Keysight - N5241/2/9A&B Add Low Frequency Extension (LFE) - Upgrade Kit (For Version 6 and Version 7 Synthesizers) - Installation Guide

To Upgrade PNA-X N5241/2/9B Series Option 423 and Option 423 with 029 to Option 425 and Option 425 with 029

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

Upgrade Kit Order Numbers: N5241BU-425, N5242BU-425, and N5249BU-425

Keysight Kit Number: N5242-60124

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

Notices

Trademark Acknowledgments

Manual Part Number

N5242-90124

Edition

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Warranty

Technology Licenses

U.S. Government Rights

Safety Notices

CAUTION

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a CAUTION notice until the indicated conditions are fully understood and met.

WARNING

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

Keysight Low Frequency Extension (LFE) Upgrade Kit
Keysight Kit Number: N5242-60124
Installation Note

Description of the Upgrade

NOTE The following may apply to your "B" model PNA–X: 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 the two connected 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. This kit replaces the Bias tee and the two 2.4 mm connected semi-rigid cables on each port. The 2.4 mm couplers and connecting cables in your analyzer must be replaced with new 3.5 mm couplers that are not included in this kit.

IMPORTANT! It is possible your couplers were replaced with the new 3.5 mm parts during a previous repair. Please verify your coupler type before ordering new 3.5 mm couplers. To order new couplers, refer to "Contacting Keysight" on page 6.

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 couplers. The items that are included in this kit, replace the other 3.5 mm components (i.e., new bias combiners and cables replace the other 3.5 mm components).

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 adds the low frequency extension (LFE) to an N5241/2/9B Option 423 4-port or Option 423 with 029 analyzer by adding:

— PC assembly, low frequency extension (LFE)

— bias combiners to all ports

— additional new cables

After installation of this upgrade, your analyzer will be an N5241/2/9B Option 425 or an Option 425 with 029.

KEYSIGHT
TECHNOLOGIES

Refer to **"Overview of the Installation Procedure" on page 15**.

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** (Contact) link.
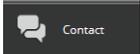
Getting Prepared

CAUTION	The PNA-X 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. Refer to your instrument's Service Guide, Chapter 7 bookmark "Removing and Replacing the A20 IF Multiplexer Board" in the PDF Service Guide[a].

—Verify your Synthesizer board is version H or greater. If not, refer to Chapter A:, "Synthesizer Board Upgrade (N5240-60074 (with Tabs)/N5240-60076 (Without Tabs) Version F/G to Version H)."

a. See "Downloading the Online PNA–X Service Guide" on page 10.

NOTE	**IMPORTANT!**

— This document contains references to legacy and new A21 HMA26.5 Multiplier/Amplifier 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 9.

— See also your instrument's PDF Service Guide [a].

a. See "Downloading the Online PNA–X 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–X Service Guide - refer to "Downloading the Online PNA–X 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 Guide[1].

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-X 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. This upgrade only applies to B models.

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

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 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

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-X models using the legacy HMA26.5 part number 5086-7765. If your PNA-X has the newer HMA26.5 part number N5240-60101 installed you may discard these parts:

— A22 splitter 5067-7139

— 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 9.)

The new N5240-60101 HMA26.5 has the splitter integrated into the assembly. Refer to Figure 1 on page 9.

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.
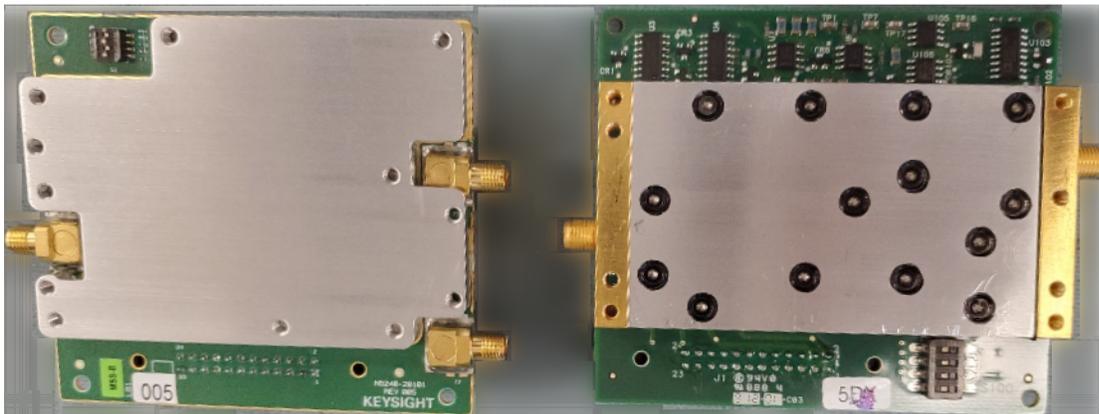
Downloading the Online PNA–X Service Guide

To view the online Service Guide for your PNA-X 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 Guide[1].

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

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

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)	1	N/A
5/16-in (8 mm) nutsetter or open end torque wrench- set to 10 in-lbs (1.13 N.m)	1	N/A
5/16-in (8 mm) nutsetter or open end torque wrench - set to 21 in-lbs (2.38 N.m)	1	N/A
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 and rear panel bulkhead connectors and the bias tees. The bias tees should be torqued to 9 in-lbs. And, on the front and rear bulkhead connectors, use a 5/16 inch nutsetter or open end torque wrench set to 21 in-lb.

About Installing the Upgrade

Products affected[a]	N5241, N5242B, and N5249B Option 423 and N5241B, N5242B, and N5249B Option 423 with 029
Installation to be performed by	Keysight service center or personnel qualified by Keysight
Estimated installation time	5 hours
Estimated adjustment time	2.5 hours
Estimated full instrument calibration time	8.0 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.

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–X Service Guide" on page 10.

Table 1-1   Contents of Upgrade Kit N5242-60124[a]

Ref Desig.	Description	Qty	Part Number
	Installation note (this document)	1	N5242-90124
	Software Entitlement Certificate (shipped separately)	1	5964-5145
	China RoHS Addendum	1	9320-6722
A71	Port 1 LFE Bias-T combiner - port 1	4	5087-7403
A72	Port 3 LFE Bias-T combiner - port 3		
A73	Port 4 LFE Bias-T combiner - port 4		
A74	Port 2 LFE Bias-T combiner - port 2		
A70	PC assy, LFE	1	N5291-60001
	Bracket for IF MUX, low frequency extension (LFE)	1	N5240-00011

Table 1-1   Contents of Upgrade Kit N5242-60124[a]

Ref Desig.	Description	Qty	Part Number
	Bracket for Bias-T combiner - ports 1 & 2	2	N5242-00050
	Bracket for Bias-T combiner - ports 3 & 4	2	N5242-00051
	Machine screw, M3 x 8, pan head (4 to attach bias T-combiner assemblies to deck and lower bracket N5240-00011 to IF MUX board)	10	0515-0372
	Machine screw, M3 x 14, pan head (2 to attach A70 LFE board to the deck)	2	0515-0665
	Machine screw, M3 x 25, pan head (3 to reattach TSMB assembly to deck)	3	0515-0667
	Machine screw, M3.0 x 6, flat head (8 to attach Bias T-combiners to bracket and 2 to attach bias T-combiners to bracket)	10	0515-1227
	Machine screw, M2.5 x 14, pan head (4 to attach clamps to bias tees)	4	0515-2141
	Cap, protective	4	1401-0214
	Clamps, cable	4	5023-3299
	clamps (snap-in), cable (LFE DC bias cables)	10	1400-1334
	clamps (pressure), cable (LFE DC bias cables)	4	1400-1391
	Nameplate, N5241B Option 425	1	N5241-80003
	Nameplate, N5242B Option 425	1	N5242-80035
	Nameplate, N5249B Option 425	1	N5249-80004
	Front panel overlay (lower) – Option 405, 420, and 425	1	N5242-80036
	Front panel overlay (lower) – Option 405, 420, and 425 with 029	1	N5242-80037
	Cable, ribbon assy, motherboard (MB/IF MUX/LFE/TSMB)	1	N5240-60089
	Cable, DC, 2 pin to R/A SMP	4	N5240-60091
W161	Cable, assy-RF, Port 1CPLR THRU to A71 port 1 bias T combiner - (Option 425 without 029 Only)	1	N5222-20119
W162	Cable, assy-RF, A29 port 1 test coupler to A71 port 1 bias T combiner	1	N5222-20115
W163	Cable, assy-RF, Port 3 CPLR THRU to A72 port 3 bias T combiner	1	N5222-20121
W164	Cable, assy-RF, A30 port 3 test coupler to A72 port 3 bias T combiner	1	N5222-20117
W165	Cable, assy-RF, Port 4 CPLR THRU to A73 port 4 bias T combiner	1	N5222-20122
W166	Cable, assy-RF, A31 port 4 test coupler to A73 port 4 bias T combiner	1	N5222-20118
W167	Cable, assy-RF, Port 2 CPLR THRU to A74 port 2 bias T combiner	1	N5222-20120
W168	Cable, assy-RF, A32 port 2 test coupler to A74 bias T combiner	1	N5222-20116

Table 1-1   Contents of Upgrade Kit N5242-60124[a]

Ref Desig.	Description	Qty	Part Number
W169	Cable, assy-RF, A52 port 1 bypass switch to A71 bias T combiner – (Option 425 with 029 Only)	1	N5242-20325
W191[b]	Cable, assy RF CA, LFE SRC1 J21 - Synth SRC1 J102	1	N5242-60078
W192[b]	Cable, assy RF CA, LFE SRC2 J21 - Synth SRC2 J102	1	N5242-60079
W193[b]	Cable, assy RF CA, LFE LO J18 - Synth LO J102	1	N5242-60080
W194	Cable (short), coax, LFE RF, (Port 1 A71 bias combiner "RF-IN" to "Port1" A70 LFE board)	3	N5240-60098
W195	Cable (short), coax, LFE RF, (Port 3 A72 bias combiner "RF-IN" to "Port3" A70 LFE board)		
W196	Cable (short), coax, LFE RF, (Port 4 A73 bias combiner "RF-IN" to "Port4" A70 LFE board)		
W197	Cable (long), assembly, coaxial LFE (Port 2 A74 bias combiner "RF-IN" to "Port2" A70 LFE board)	1	N5240-60097
W202[c]	A21 HMA26.5 (Top) to A24 mixer brick (in all 4-port models with new HMA26.5)	1	N5222-20126
W208[d]	A70/A75 LFE board to A15 DD Synth Source 1 J12	1	N5240-60112
W209[d]	A70 LFE board to A15 DD Synth Source 2 J14	1	N5240-60114
W210[d]	A70/A75 LFE board to A15 DD Synth LO J13	1	N5240-60113
W211	RF cable, A70/A75 LFE J14 to A24 IF Multiplexer P4	1	8120-5014
W212	RF cable, A70/A75 LFE J13 to A24 IF Multiplexer P204	1	8120-5017
W213	RF cable, A70/A75 LFE J7 to A24 IF Multiplexer P404	1	8120-5014
W214	RF cable, A70 LFE J12 to A24 IF Multiplexer P604	1	8120-5017
W215	RF cable, A70 LFE J11 to A40 IF Multiplexer P804 (4-port only)	1	8120-5017

a. In addition to the upgrade kit, the shipment includes an Software Entitlement Certificate. Refer to "License Key Redemption" on page 8 for important information about this certificate.
b. Version 6 synthesizers use these cables. If you have a Version 7 direct digital synthesizer (DDS) assembly installed, these cables may be be discarded.
c. Semirigid cable N5222-20126 is only installed in instruments with the new HMA26.5. If you are unclear which HMA26.5 assembly your PNA has installed, refer to "Verify the Model/Version of HMA26.5 Installed" on page 9.
d. 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.

NOTE   **IMPORTANT!** Save all screws, nuts, and washers for reuse that have been removed.

Overview of the Installation Procedure

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

"Step 2. Remove the Outer and Inner Cover."

"Step 3. Inspect and (If Necessary) Remove the A4, A11, and A13 Synthesizer Boards, if They Are Not Version H."

"Step 4. Remove the Front Panel Assembly."

"Step 5. Remove the Existing Test Set Cables."

"Step 6. Install New Couplers—if Necessary."

"Step 7. Remove the A19 Test Set Motherboard."

"Step 8. Remove the A20 IF Multiplexer (IF MUX) Board."

"Step 9. Remove the A38–A41 Bias Tee Assemblies."

"Step 10. Assemble and Install the A71–A74 Bias Tee Combiner Assemblies."

"Step 11. Connect the A18 Motherboard/IF Multiplexer (IF MUX)/Low Frequency Extension (LFE)/Test Set Motherboard (TSMB) Ribbon Cable (N5240-60089)."

"Step 12. 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 13. Reinstall the handler, Power and Other I/O Assemblies."

"Step 14. Reinstall the Mixer Brick (MXB) Cables."

"Step 15. Attach Lower Bracket (N5240-00011) to IF MUX Board Shield."

"Step 16. Connect and Route New LFE Cables (8120-5014 (x2) and 8120-5017 (x3)) to the on the IF Multiplexer (IF MUX) Board."

"Step 17. Install A70 Low Frequency Extension (LFE) Board."

"Step 18. Connect A71–A74 Bias Tee Combiner New Gray Cables to A70 Low Frequency Extension (LFE) Board and the Other Ends of the New Cables Connected to the IF Multiplier (IF MUX) Board."

"Step 19. Install the New Bias Tee Combiner's Semirigid Test Set Cables and the Blue Cables, and Install Cable Clamps on Ferrite Beads."

"Step 20. Reinstall the A19 Test Set Motherboard."

"Step 21. Install the A71 and 74 bias-Tee combiner's Gray Low Frequency Extension (LFE) DC bias Cables and Route Cables."

"Step 22. Install the Other End of the Bias-Tee Combiner Cables to the Source Synthesizer and LO Synthesizer Board Gray Cables."

"Step 23. Remove the Old Lower Front Panel Overlay."

"Step 24. Reinstall the Front Panel Assembly."

"Step 26. Install the New Lower Front Panel Overlay and Nameplate."

"Step 25. DC Continuity Test the LFE Board and Test Ports."

"Step 27. Position the Cables and Wires to Prevent Pinching."

"Step 28. Reinstall the Inner Cover."

"Step 29. Reinstall the Outer Cover."

"Step 30. Remove Option 423."

"Step 31. Enable Option 425."

"Step 32. Verify the PNA–X Analyzer Program is Running with the Correct Options."

"Step 33. Perform Post-Upgrade Adjustments and Calibration."

"Step 34. Prepare the PNA-X 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 file(s) have been received and the information verified, you can proceed with the installation at "Step 2. Remove the Outer and Inner Cover" on page 17.

NOTE	If the model number, serial number, or option number do not match those on your license key file(s), 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 and Inner Cover

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

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

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 18). 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 5. Refer to "Contacting Keysight" on page 6.

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

1. If your synthesizer boards are all H or greater, on the PNA-X: 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 18.

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

Figure 2   EERPOM Header Info Window
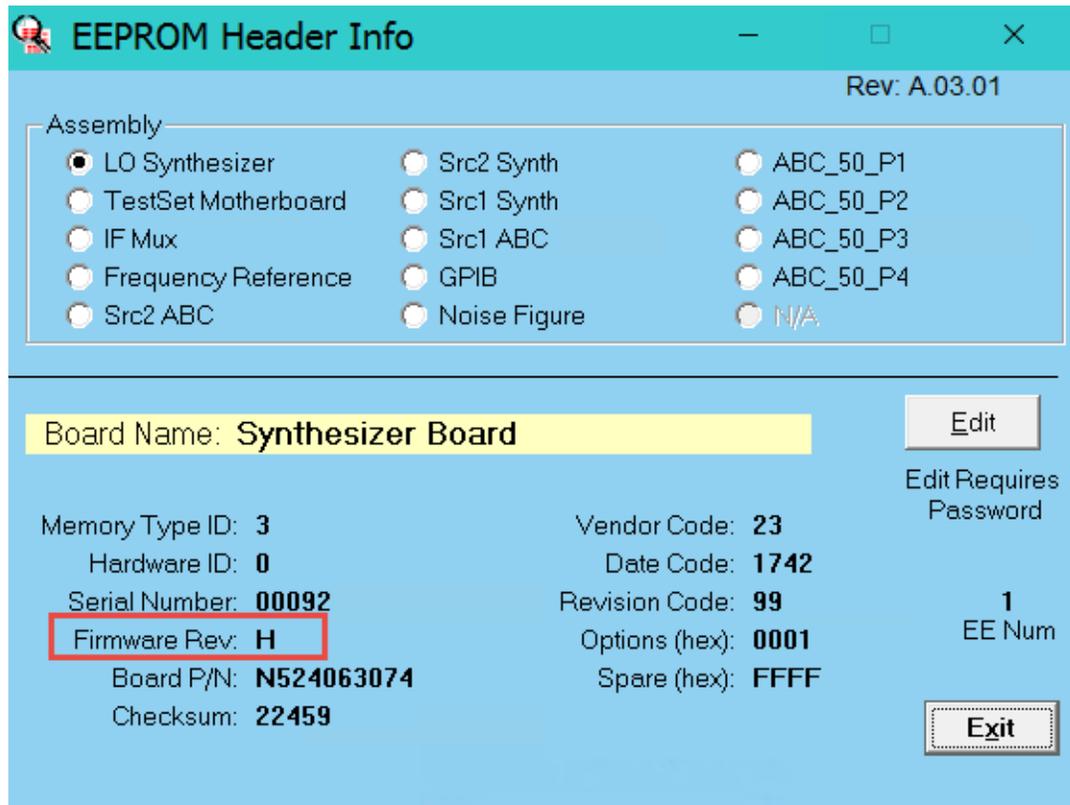
3. If all of the boards are version H or greater, proceed to "Step 4. Remove the Front Panel Assembly".

4. If your synthesizer boards are **not** H or greater, remove 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-X's serial number prefix section) in the PDF Service Guide[1].

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)."

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

Step 4. Remove the Front Panel Assembly

For instructions, click the Chapter 7 bookmark "Removing and Replacing the Front Panel Assembly" in the PDF Service Guide[1].

Step 5. Remove the Existing 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. Remove and save the cable guards for the front panel jumpers.

To see an image showing the location of some of the cables, click the Chapter 6 bookmark "Top Cables, All Cables - All Options (**S/N Prefixes** <6021)" or "Top Cables, All Cables - All Options (**S/N Prefixes** ≥6021)" in the PDF Service Guide[1].

And, to see an image showing the location of the other cables, click the Chapter 6 bookmark and then chooser from the following:

— "Bottom RF Cables, 4-Port, Option 423 (S/N Prefixes **<6021**)" and then "Bottom RF Cables, 4-Port, Option 423 with 029 (serial numbers **<6021**)"[1]

— "Bottom RF Cables, 4-Port, Option 423 (S/N Prefixes **≥6021**)" and then "Bottom RF Cables, 4-Port, Option 423 with 029 (S/N Prefixes **≥6021**)"[1].

Refer to Figure 3 on page 20 for this step of the procedure.

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

2. **For all analyzers:** Remove and discard the following cables in the order listed:

   — W78 – from front-panel A39 port 3 bias tee toA30 port 3 coupler

   — W77 – from front-panel Port 3 CPLR THRU to A39 port 3 bias tee

   — W74 – A38 port 1 bias tee to A33 port 1 test port coupler

   — W81 – from front-panel Port 4 CPLR THRU to A40 port 4 bias tee

   — W82 – A40 port 4 bias tee to A35 port 4 test port coupler

   — W86 – A74 port 2 bias tee to A36 port 2 test port coupler

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

       – W85 – from front-panel Port 2 CPLR THRU to A35 port 2 bias tee

For analyzers with Option 029 only: Remove and discard the following cables in the order listed:

       – W125 (N5242-20296) – A52 port 1 noise bypass switch to A38 port 1 bias tee

Figure 3   Option 423 Existing Test Set Cables Removal[1]
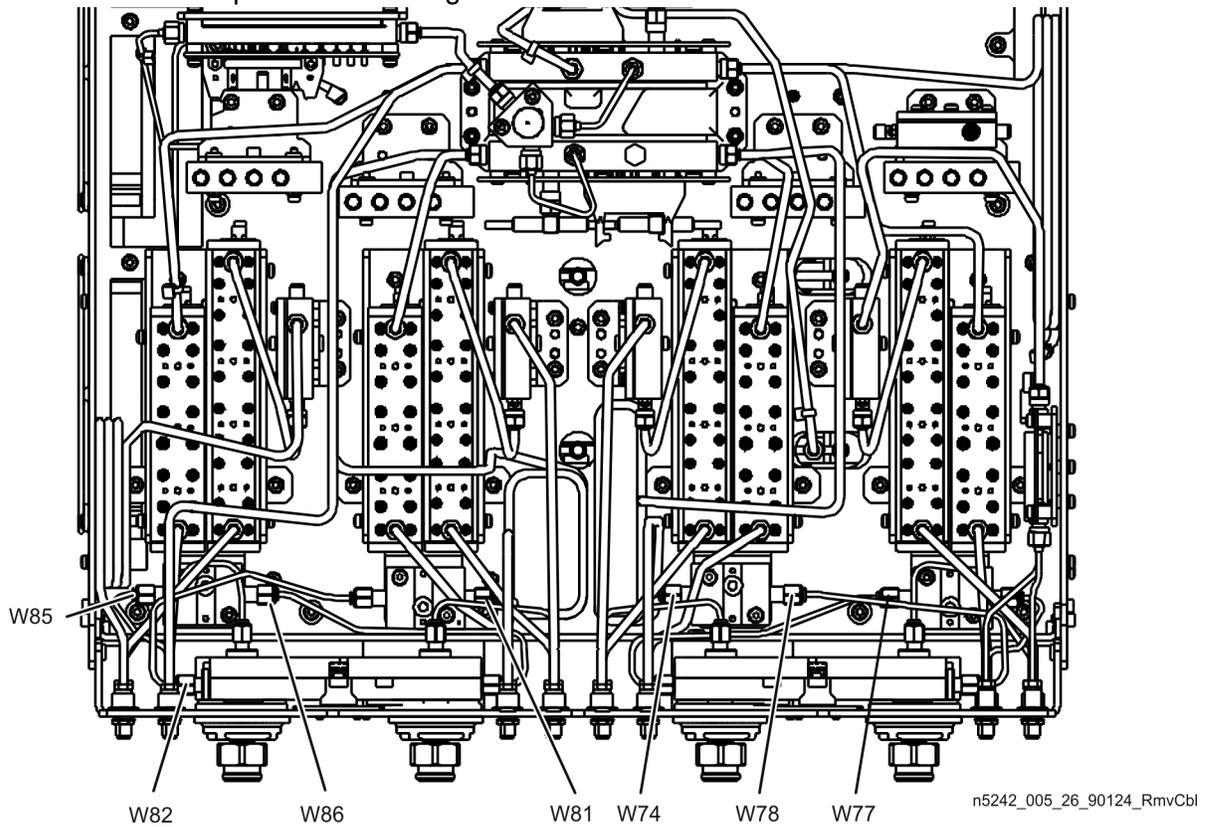
n5242_005_26_90124_RmvCbl

W85

W82   W86   W81   W74   W78   W77

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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 9.

Step 6. Install New Couplers—if Necessary

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 the two connected 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. This kit replaces the Bias tee and the two 2.4 mm connected semi-rigid cables on each port. The 2.4 mm couplers and connecting cables in your analyzer must be replaced with new 3.5 mm couplers that are not included in this kit.

IMPORTANT! It is possible your couplers were replaced with the new 3.5 mm parts during a previous repair. Please verify your coupler type before ordering new 3.5 mm couplers. To order new couplers, refer to "Contacting Keysight" on page 6.

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 couplers. The items that are included in this kit, replace the other 3.5 mm components (i.e., new bias combiners and cables replace the other 3.5 mm components).

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

For instructions, click the Chapter 7 bookmark "Removing and Replacing the A29–A32 Test Port Couplers" in the PDF Service Guide[1].

Step 7. 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 Guide[1].

Step 8. Remove the A20 IF Multiplexer (IF MUX) Board

NOTE	**IMPORTANT!** If you have not done so, 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. Refer to your instrument's Service Guide, Chapter 7 bookmark "Removing and Replacing the A20 IF Multiplexer Board" in the PDF Service Guide and to "Contacting Keysight" on page 6[1].

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 Guide[1].

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

Step 9. Remove the A38–A41 Bias Tee Assemblies

For instructions, click the Chapter 7 bookmark "Removing and Replacing the A38-A41 Bias Tees" in the PDF Service Guide[1].

The bias tee assemblies and bias cables will not be reused.

Step 10. Assemble and Install the A71–A74 Bias Tee Combiner Assemblies

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

1. Assemble the 5087-7403 (x2) Bias T combiners to N5242-00050 brackets (Ports 1 and 2) (x2) using 0515-1227 screws (x4) – (item ①). Torque to 9 in-lbs. Refer to Figure 4.

2. Assemble the 5087-7403 (x2) Bias T combiners to brackets (Ports 3 and 4) (x2) using 0515-1227 screws (x4) – (item ②). Torque to 9 in-lbs. Refer to Figure 4.

---

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

Figure 4   Assemble Bias T Combiners to brackets (5087–7403, N5242–00050, N5242–00051, and 0515–1227)
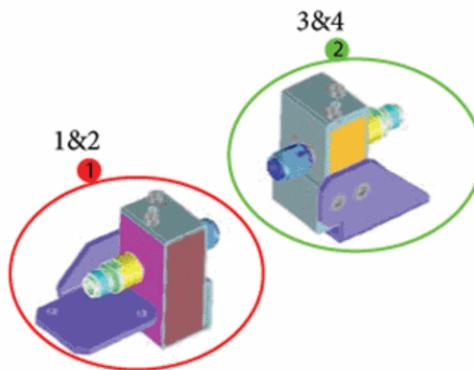
Refer to Figure 5 for this step of the procedure. New parts are listed in Table 1-1 on page 12.

3. Install the N5240-60098 (x3) cables as shown. Note the orientation of the cable (item ①).

4. Install the N5240-60097 (x1) cable as shown. Note the orientation of the cable (item ②).

**5.** Add 5023-3299 (x4) clamps and 0515-2141 (x4) clamp screws as shown (item ③). Torque to 6 in-lbs.

Figure 5   Install cables and clamps to bias tee combiners (N5240-60098, N5240-60097, 5023-3299, and 0515-2141)
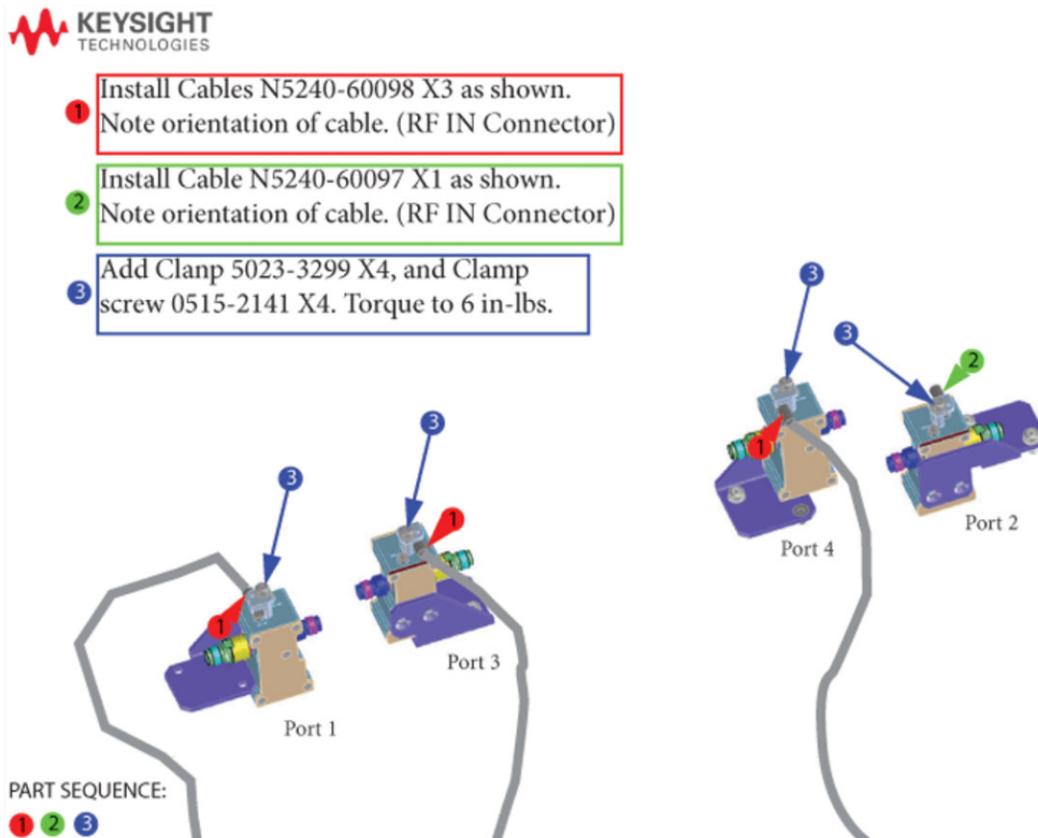
Refer to Figure 6 for this step of the procedure. New parts are listed in Table 1-1 on page 12.

6. Install the N5240-60091 (x4) DC cables as shown (item ①).

Figure 6   Install DC cables to the bias tees (N5240-60091)
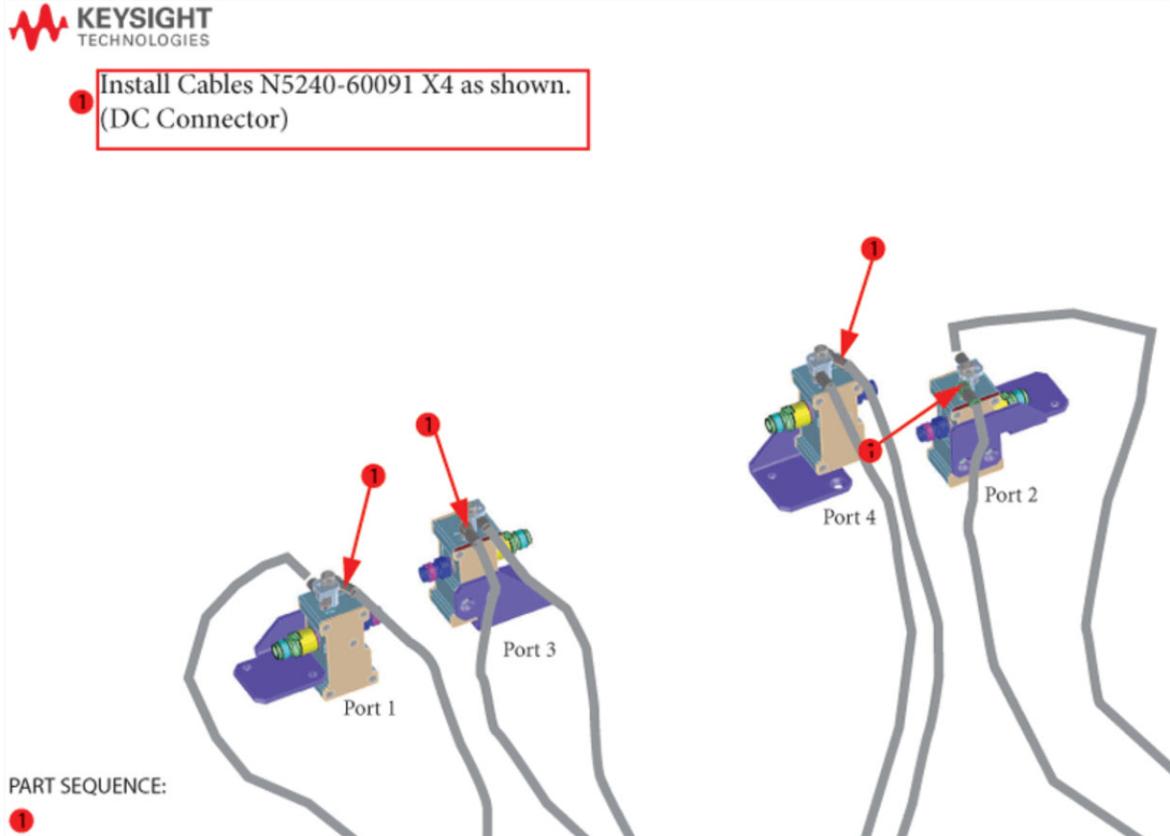
7. Install the A71-A74 Bias T combiners onto bracket using 0515-0372 (x6) screws (item ①). Refer to Figure 7.

8. Install the 0515-1227 (x2) screws onto bracket (item ②). Refer to Figure 7.

Figure 7   Install A71-A74 Bias T Combiners to brackets (0515-0372 and 0515-1227)
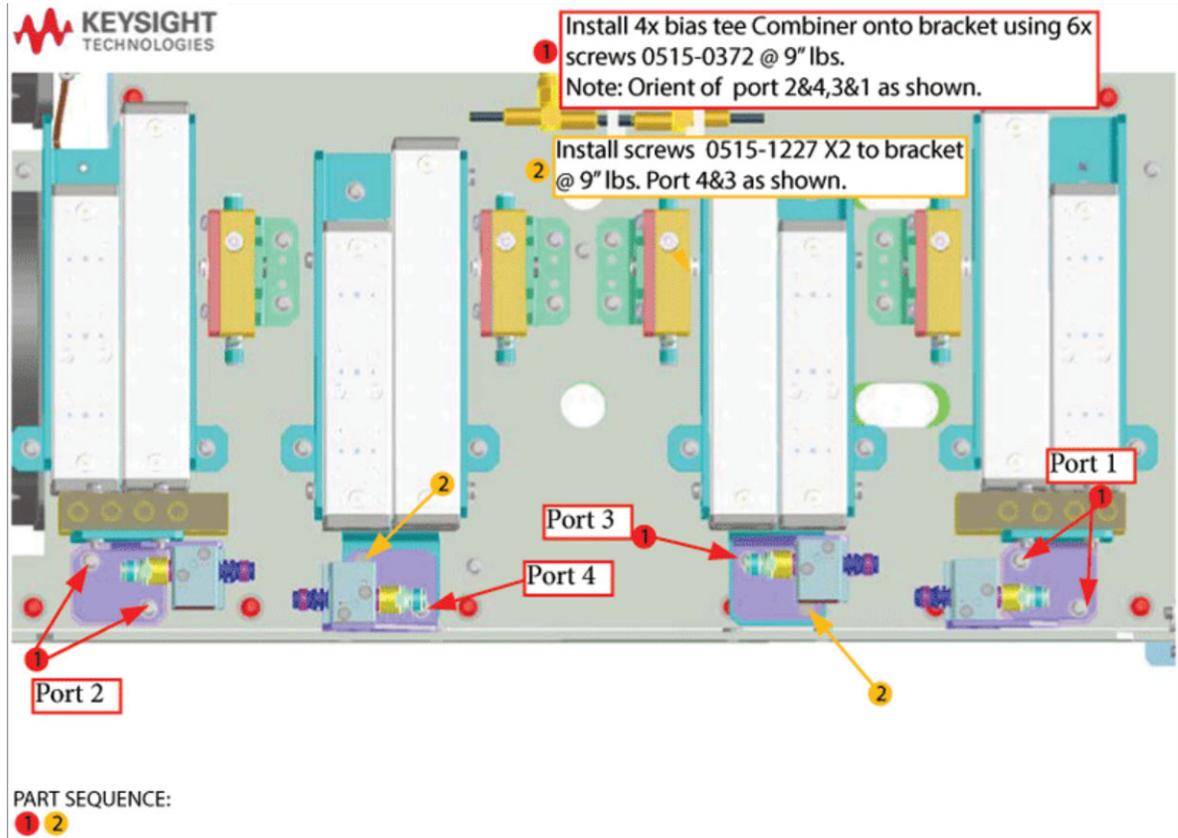
Step 11. Connect the A18 Motherboard/IF Multiplexer (IF MUX)/Low Frequency Extension (LFE)/Test Set Motherboard (TSMB) Ribbon Cable (N5240-60089)

1. Remove the N5242-60004 Motherboard/IF MUX/Test set motherboard (MB)/IF MUX/TSMB) ribbon cable from the A18 system motherboard connector J1 and discard this cable. Refer to Figure 8 (N5240-60089 is shown, but N5242-60004 is similar).

2. Install the N5240-60089 to A18 system motherboard J1. Refer to Figure 8.

| NOTE | **IMPORTANT!** Be careful to route the cable as shown in Figure 8 to avoid interference with the IF MUX board installation. |

Figure 8   Install the N5240-60089 MB/IF MUX/TSMB Ribbon Cable to A18 Motherboard J1
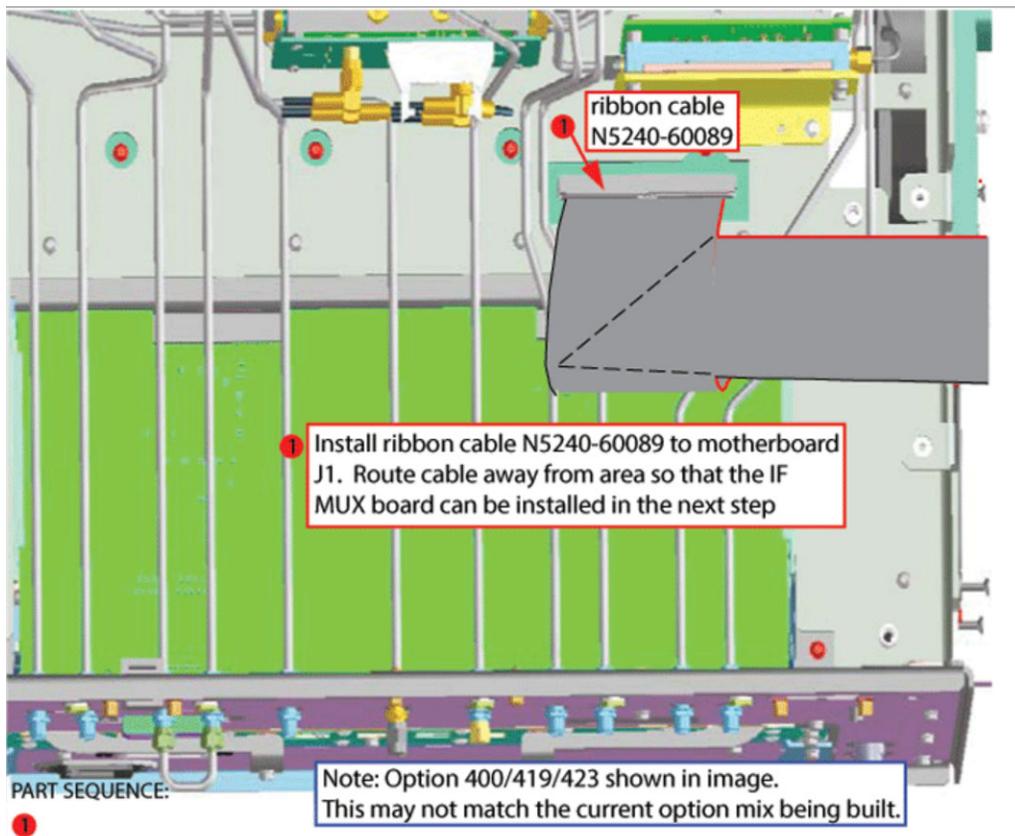
ribbon cable
N5240-60089

Install ribbon cable N5240-60089 to motherboard J1. Route cable away from area so that the IF MUX board can be installed in the next step

PART SEQUENCE:

Note: Option 400/419/423 shown in image. This may not match the current option mix being built.

Step 12. 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 using 0515-0669 (x4) screws (item ①).

2. For now, hand tighten only (item ②). Refer to Figure 9.

Figure 9   Reinstall the A20 IF MUX Board (N5240-60062 and 0515-0669)
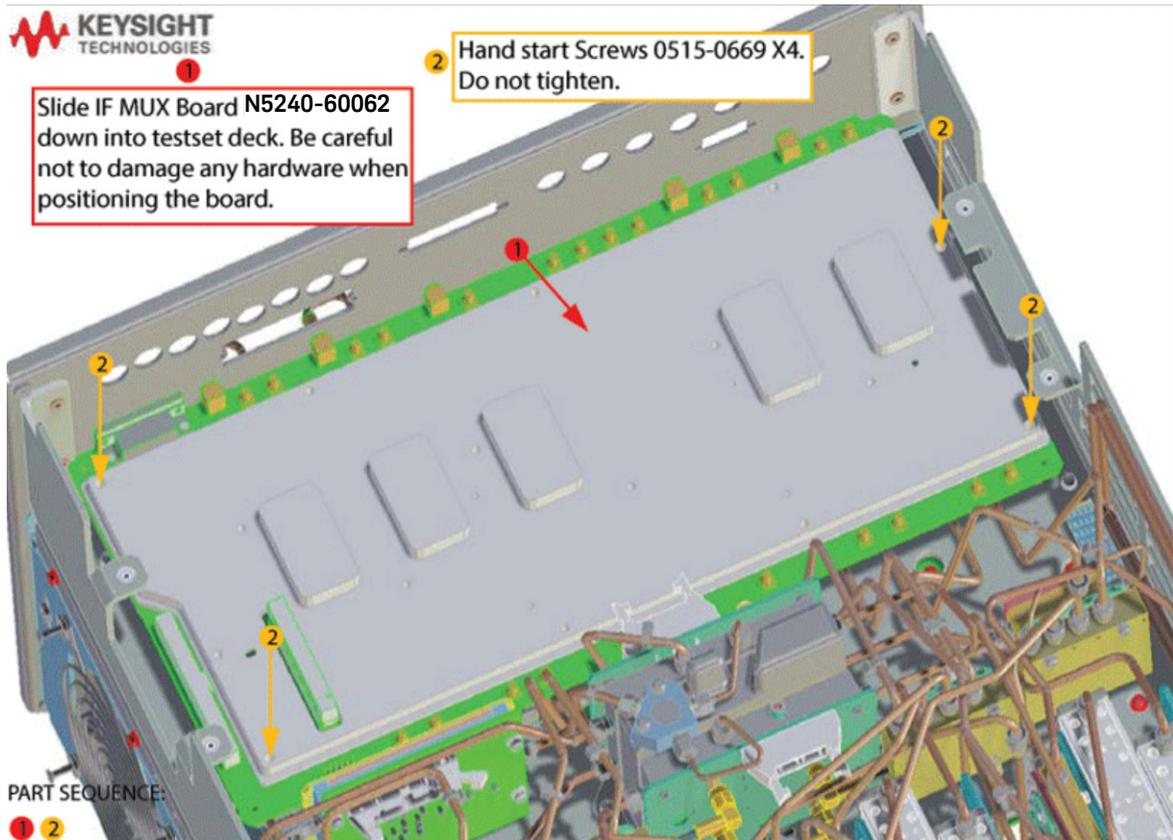
3. Reinstall the IF MUX board rear panel connectors using the washers and nuts removed in "Step 8. Remove the A20 IF Multiplexer (IF MUX) Board" on page 22 (items ① and ②). Torque to 6 in-lbs. Refer to Figure 10.

4. Torque the 0515-0669 IF MUX board screws that were previously hand-tightened to 21 in-lbs (item ②). Refer to Figure 9 on page 28.

Figure 10   Reinstall the A20 IF MUX Board (N5240-60062 and 0515-0669)
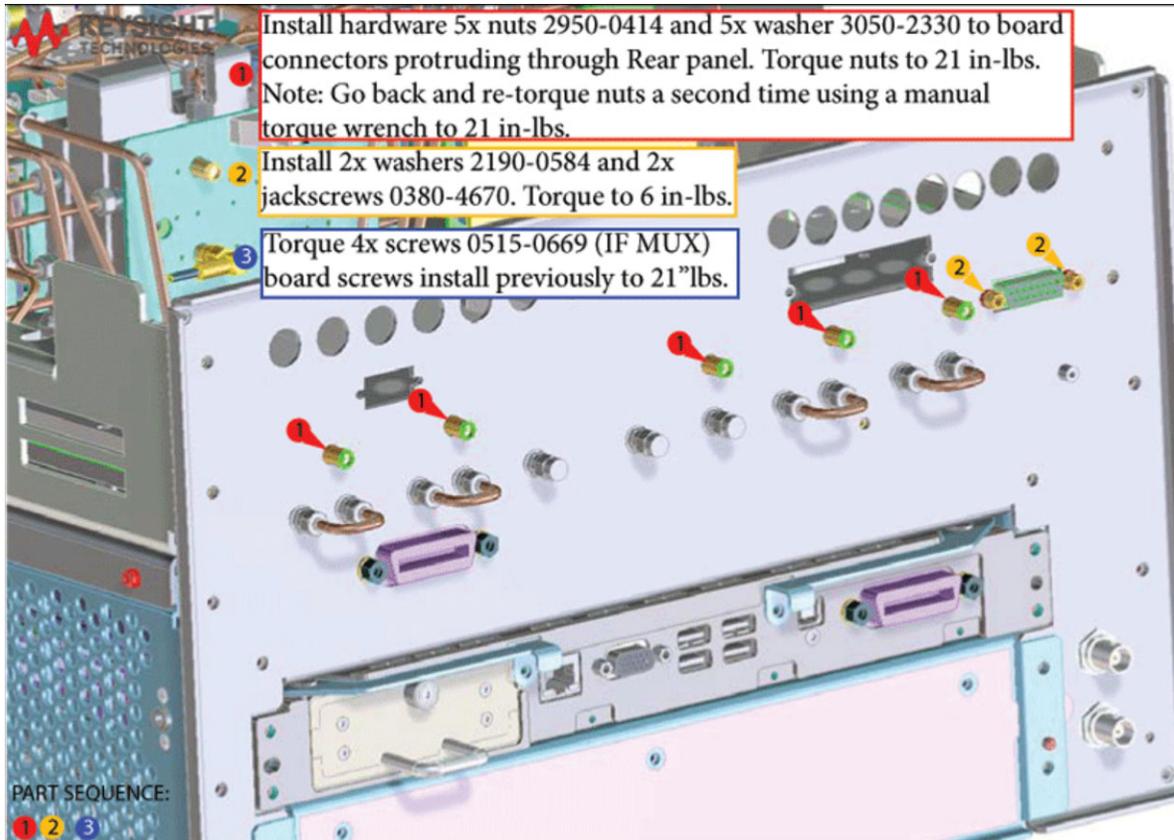
5. Connect N5240-60089 Motherboard / IF Multiplexer / Low Frequency Extension (LFE)/ Test set motherboard (MB/IF MUX/LFT/LFE/TSMB) ribbon cable to IF MUX J1 and fold as shown (item ①). Refer to Figure 11.

6. Reconnect the IF MUX/SPAM gray cables to the A20 IF MUX board as indicated in Figure 11 (items ② through ⑥).

Figure 11   Connect the MB/IF MUX/ Low Frequency Extension (LFE)/TSMB ribbon cable to A20 IF MUX J1(N5240-60089)[1]
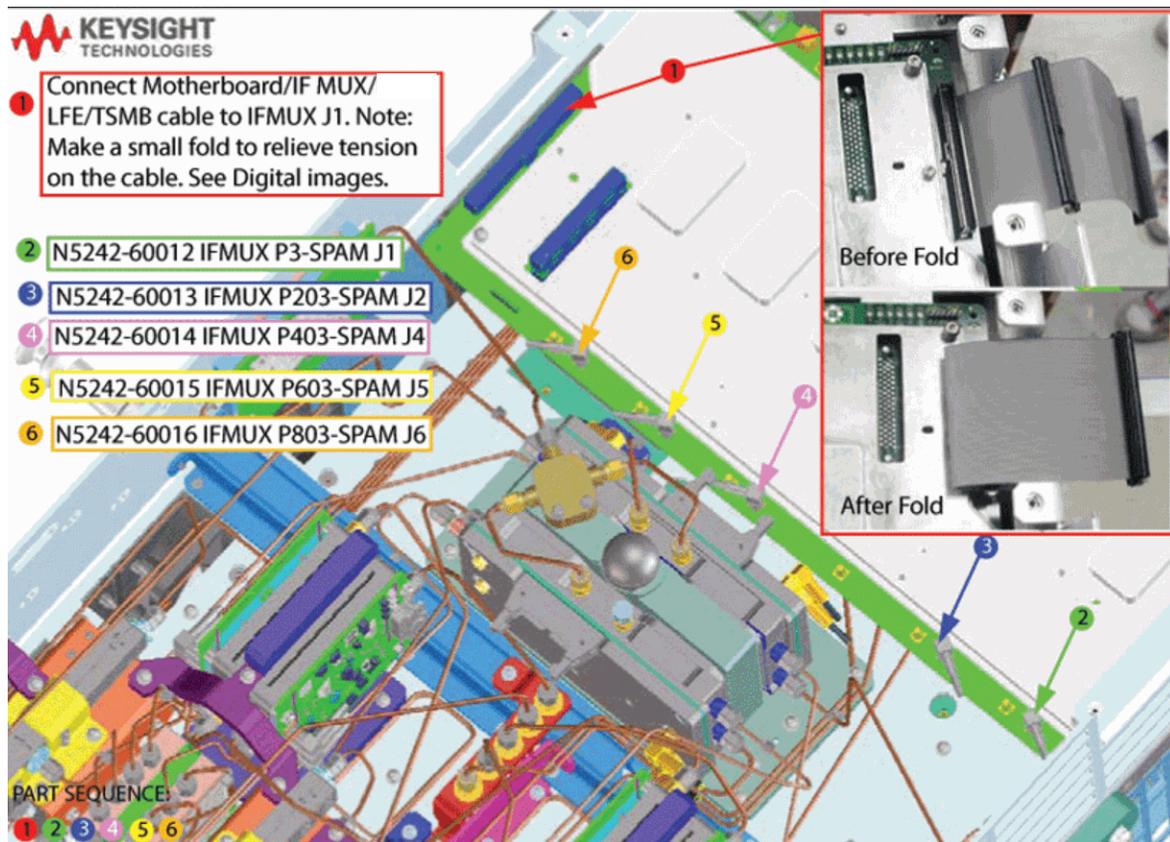
1. The A22 splitter (5087-7139) and N5222-20007, N5222-20008, and N5222-20009 cables are only used with a legacy HMA26.5 p/n: 5087-7765. If your PNA has a new N5240-60101 assembly installed, then set aside these parts as spares for use in other PNAs with the older HMA26.5 or discard. If you are unclear which HMA26.5 assembly your PNA has installed, refer to Figure 1 on page 9.

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 through ③). Refer to Figure 12.

Figure 12   Reinstall handler I/O cable, I/O cable assembly, power I/O assembly, and I/O Cables[1].
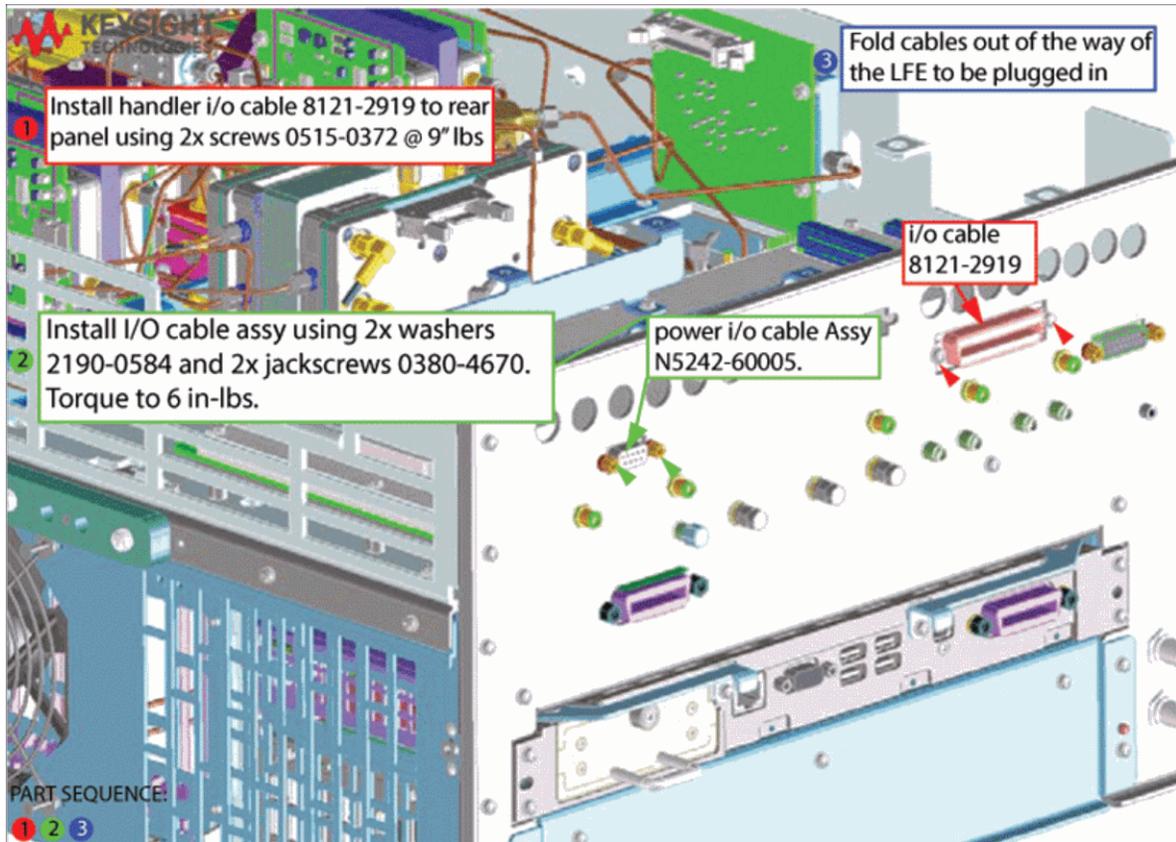

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1. The A22 splitter (5087-7139) and N5222-20007, N5222-20008, and N5222-20009 cables are only used with a legacy HMA26.5 p/n: 5087-7765. If your PNA has a new N5240-60101 assembly installed, then set aside these parts as spares for use in other PNAs 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 9.

2. Route Power I/O and Handler I/O cables. Refer to Figure 28.

Figure 13   Route Power I/O and Handler I/O cables
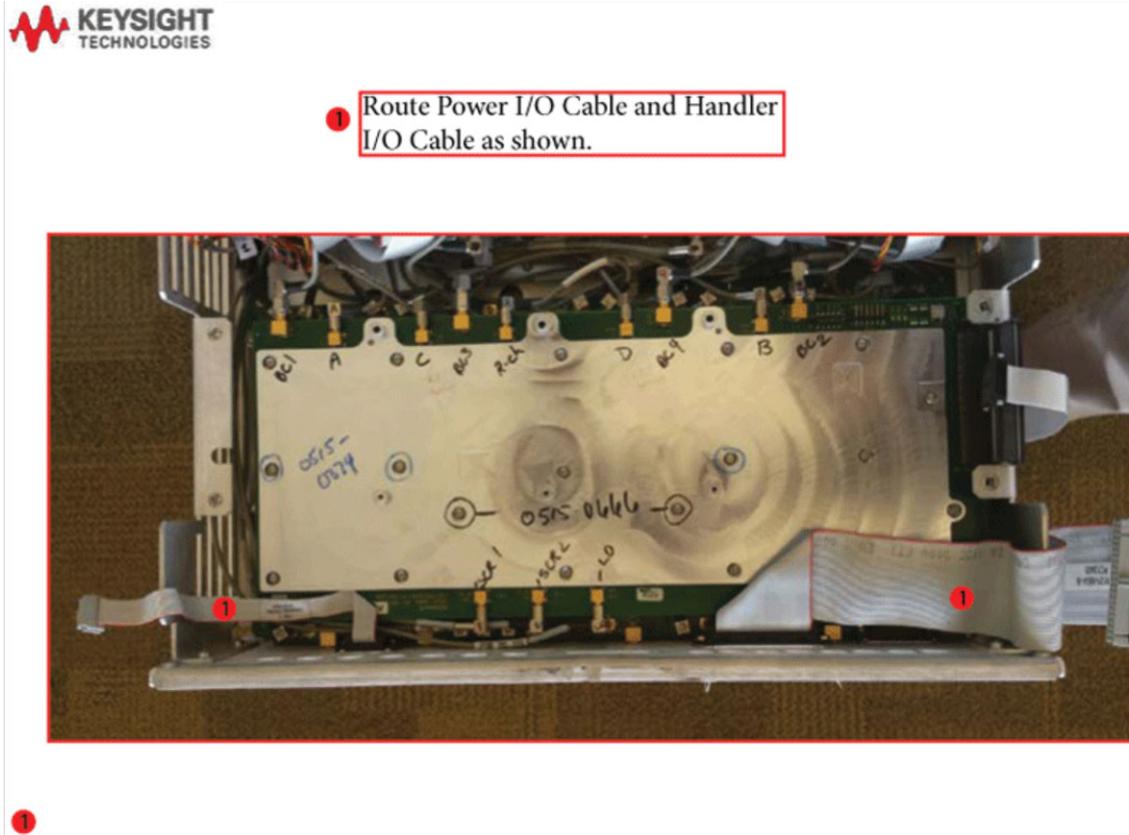
Step 14. Reinstall the Mixer Brick (MXB) Cables

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 ⑨). Refer to Figure 14.

Figure 14   **Reconnect the other end of the IF gray cables to the IF MUX board[1]**
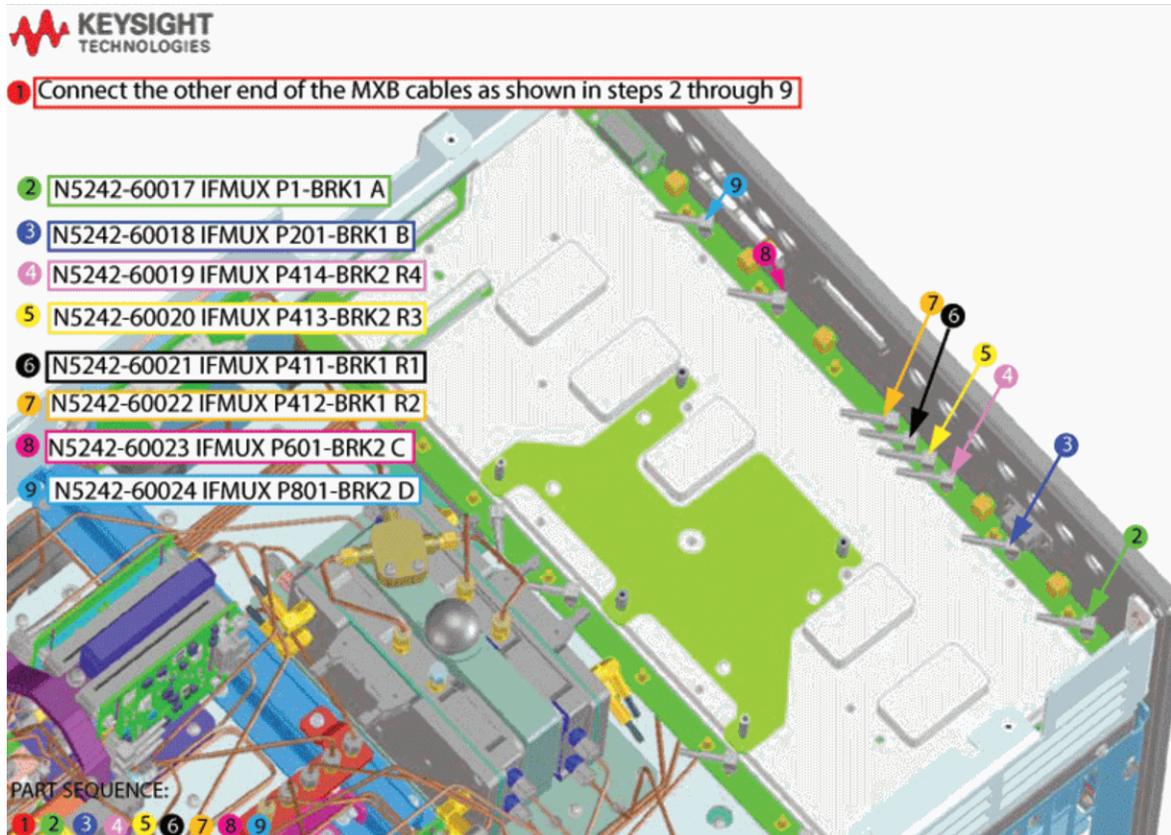

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1. The A22 splitter (5087-7139) and N5222-20007, N5222-20008, and N5222-20009 cables are only used with a legacy HMA26.5 p/n: 5087-7765. If your PNA has a new N5240-60101 assembly installed, then set aside these parts as spares for use in other PNAs 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 9.

Step 15. Attach Lower Bracket (N5240-00011) to IF MUX Board Shield

Attach N5240-00011 lower bracket to IF MUX board using 0515-0372 screws (x4). Torque to 9 in-lbs. Refer to Figure 15.

Figure 15　　　　　　　Attach lower bracket to IF MUX board (N5240-00011 and 0515-0372)[1]
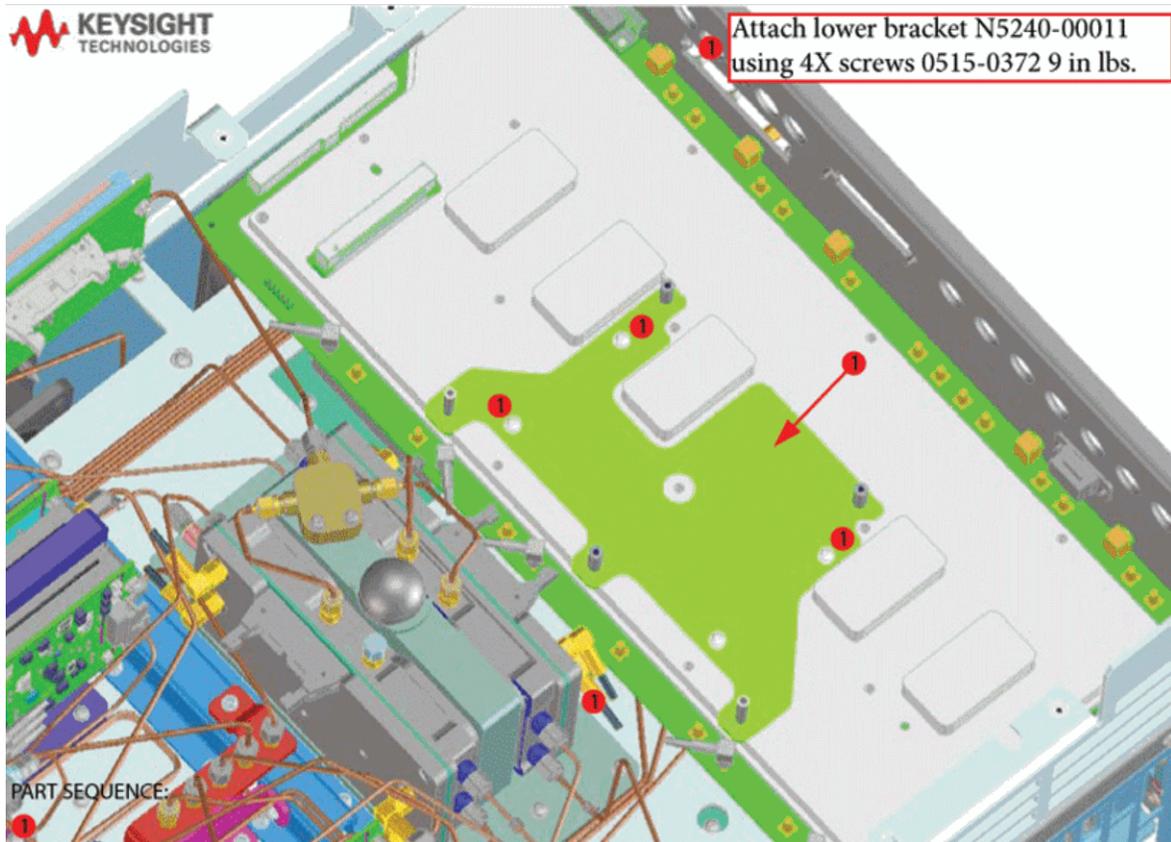
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1. The A22 splitter (5087-7139) and N5222-20007, N5222-20008, and N5222-20009 cables are only used with a legacy HMA26.5 p/n: 5087-7765. If your PNA has a new N5240-60101 assembly installed, then set aside these parts as spares for use in other PNAs 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 9.

Step 16. Connect and Route New LFE Cables (8120-5014 (x2) and 8120-5017 (x3)) to the on the IF Multiplexer (IF MUX) Board

1. Connect and route the 8120-5014 (x2) and 8120-5017 (x3) cables as shown on the IF multiplexer (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 16.

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

Figure 16   Connecting the Gray Cables on the IF MUX board (8120-5014 (x2) and 8120-5017 (x3))

2. Route the reconnected IF mixer brick (MXB) and IF multiplexer (IF MUX) gray cables that were reconnected in "Step 14. Reinstall the Mixer Brick (MXB) Cables" on page 33. Refer to Figure 17.

Figure 17   Routing the reconnected IF MXB and IF MUX Gray Cables on the IF MUX board
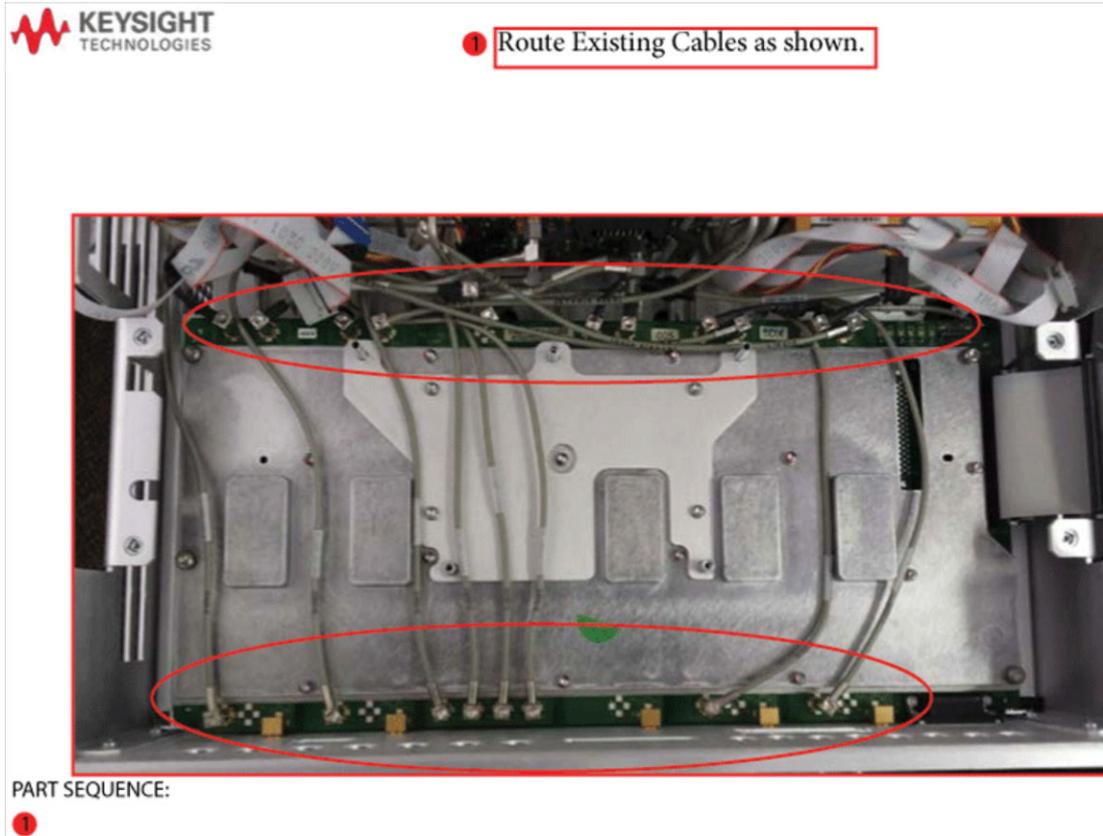
Figure 18   Routing the new low frequency extension (LFE) Gray Cables on the IF MUX
                     board (8120-5014 (x2) and 8120-5017 (x3))
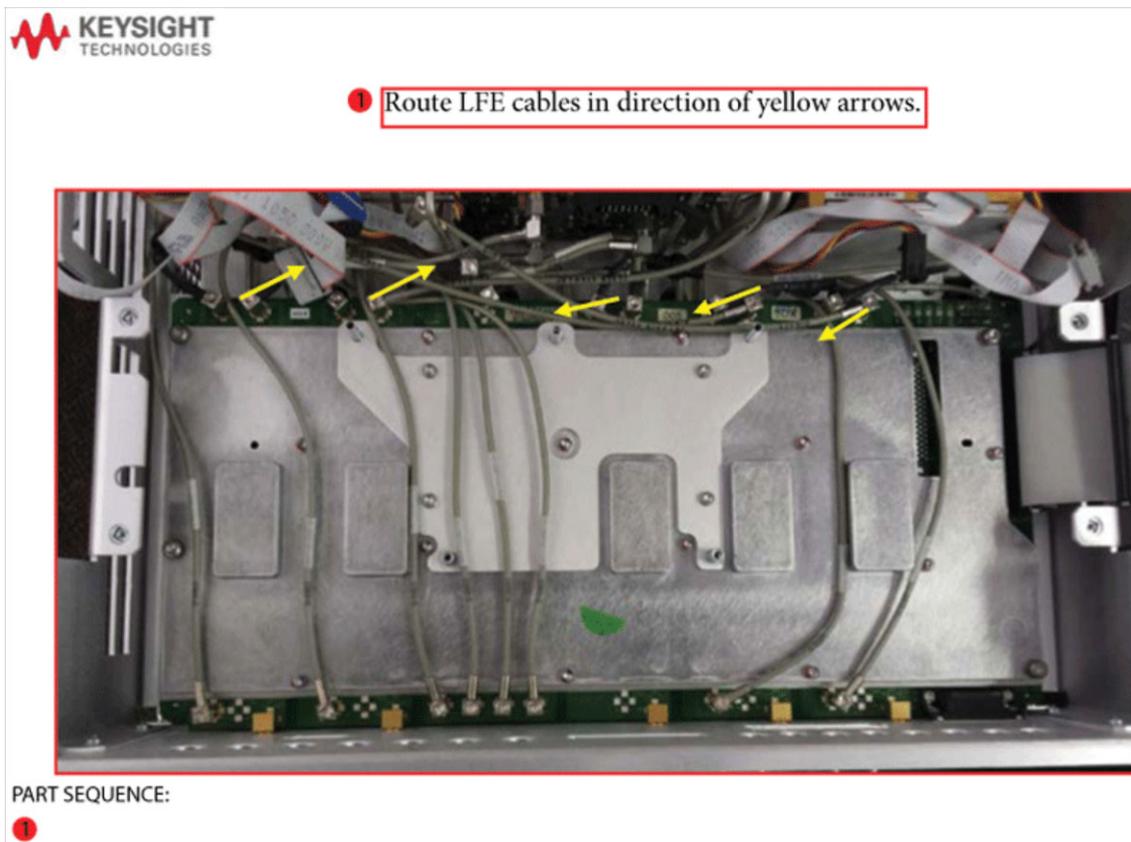
Step 17. Install A70 Low Frequency Extension (LFE) Board

1. Install the LFE A70 board using the standoffs as a guide.

2. Connect Motherboard / IF Multiplexer / LFT/ LFE/ Test set motherboard (MB/IF MUX/LFT/LFE/TSMB) ribbon cable to LFE board J1 (item ①). Refer to Figure 19.

3. Install the A70 LFE board using the 0515-0665 screws x2. Torque to 9 in-lbs (item ②). Refer to Figure 19.

Figure 19   Install the A70 LFE board (N5240-60089, N5291-60001 and 0515-0665)
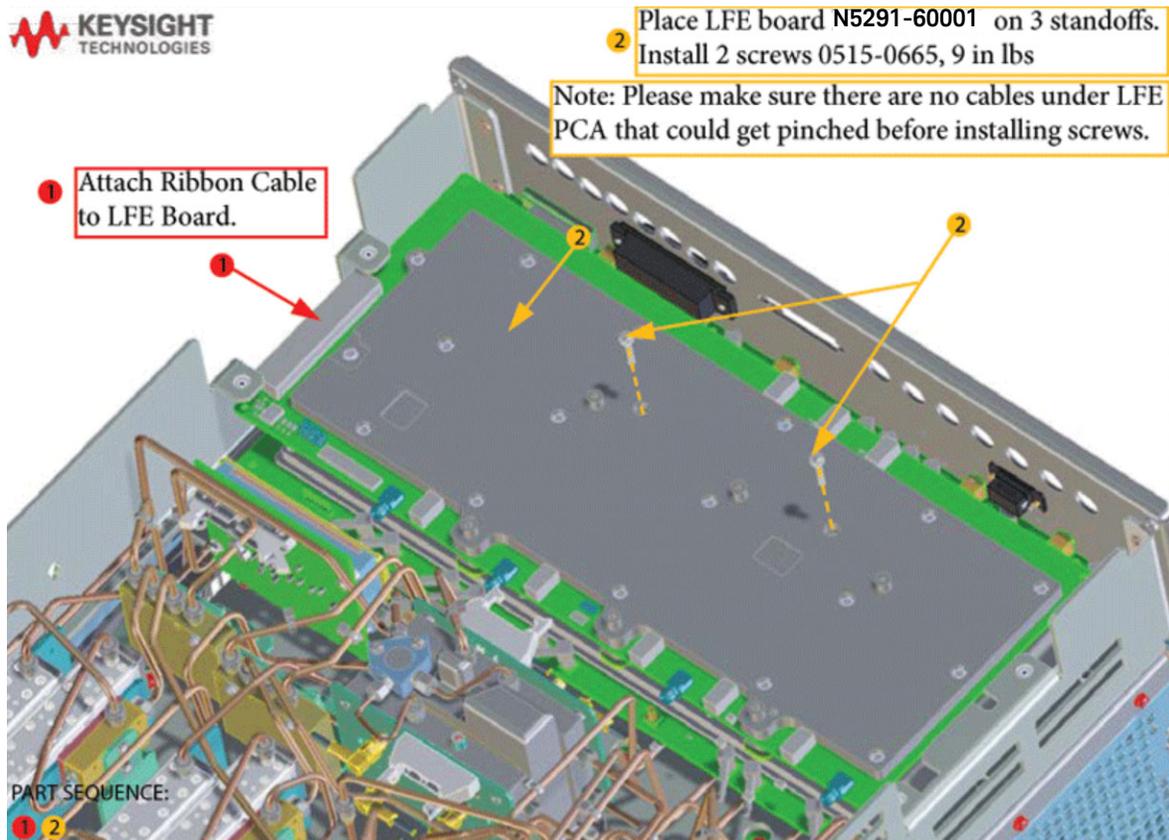
Step 18. Connect A71–A74 Bias Tee Combiner New Gray Cables to A70 Low Frequency Extension (LFE) Board and the Other Ends of the New Cables Connected to the IF Multiplier (IF MUX) Board

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–X Service Guide" on page 10.

1. Connect the IF gray cables item ① through item ⑤ as shown in Figure 20 on page 40 and Figure 21 on page 41. (8120-5014 (x2), 8120-5017 (x3)). (i.e., one end was installed in Figure 16 on page 35.)

2. Then choose one of the following:

   – **Version 6 Synthesizers**: Connect the N5242-60078 Source 1, N5242-60079 Source 2, and N5242-60080 LO Source cables to the LFE board as shown – (items ⑥ through ⑧). The other end of the N5242-60078, N5242-60079, and N5242-60080 are connected to Source1, Source 2, and LO Source boards in a later step. Refer to Figure 20 on page 40.

   – **Version 7 Synthesizers**: Connect the direct digital synthesizer (DDS) assembly cables Source 1, Source 2, and LO Source cables to the LFE board as shown (N5240-60112, N5240-60113, and N5240-60114) – (items ⑥ through ⑧). The other end of the N5240-60112, N5240-60113, and N5240-60114 are connected to Source1, Source 2, and LO Source boards in a later step. Refer to Figure 21 on page 41.

Figure 20   **Version 6 Synthesizers**: Connect the other ends of the IF gray cables and connect the Source 1, Source 2, and LO Source cables as shown (8120-5014 (x2), 8120-5017 (x3), N5242-60078, N5242-60079, and N5242-60080)

1. Connect 8120-5014 from P4 to J14
2. Connect 8120-5017 from P604 to J12
3. Connect 8120-5014 from P404 to J7
4. Connect 8120-5017 from P804 to J11
5. Connect 8120-5017 from P204 to J13

6. Connect N5242-60078 to Source 1 (8121-2864). Route as shown.
7. Connect N5242-60079 to Source 2 (8121-2863). Route as shown.
8. Connect N5242-60080 to LO (8121-2864). Route as shown.

PART SEQUENCE:
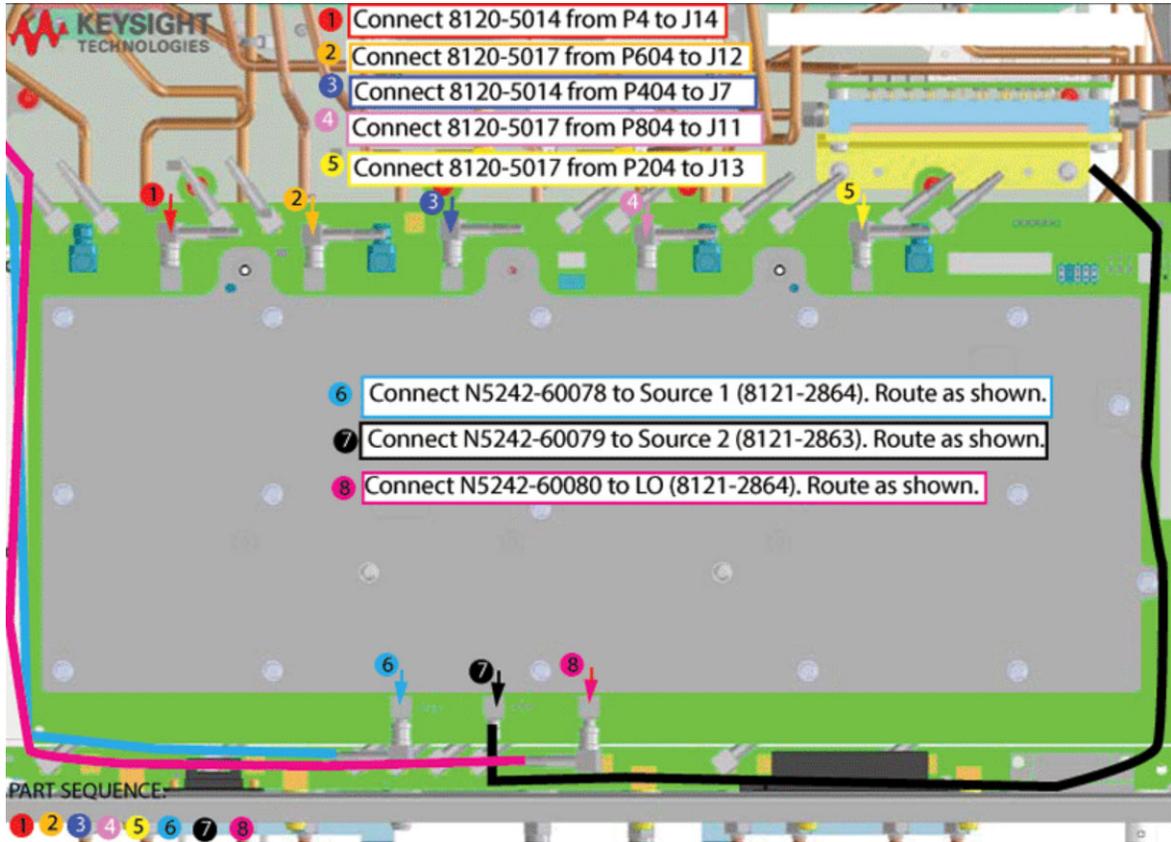
Figure 21   **Version 7 Synthesizers**: Connect the other ends of the IF gray cables and connect the Source 1, Source 2, and LO Source cables as shown (8120-5014 (x2), 8120-5017 (x3), N5240-60112, N5240-60113, and N5240-60114)
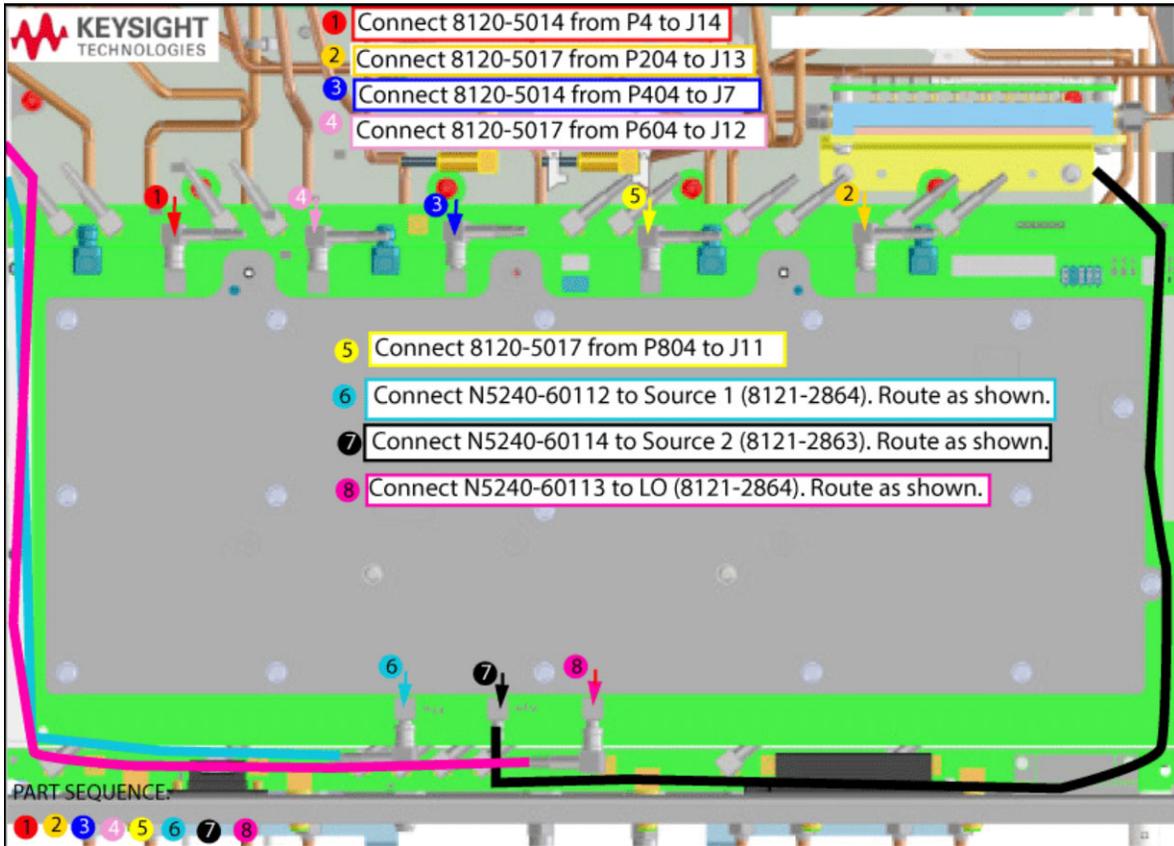
Step 19. Install the New Bias Tee Combiner's Semirigid Test Set Cables and the Blue Cables, and Install Cable Clamps on Ferrite Beads

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 Semirigid Test Set Cables" on page 43

— Refer to Figure 22 on page 44 through Figure 31 on page 53 for all models for the first 5 parts of this step.

— For Option 425 with 029 (Only), refer to Figure 26 on page 48.

— For Option 425 without 029, refer to Figure 27 on page 49. New parts are listed in Table 1-1 on page 12.

— "Install New Blue Bias-Tee Combiner Cables N5240-60097 (x1) and N5240-60098 (x3) Gray Cables From the A71–A74 Bias Tees "RF-IN" to the A70 LFE Board "Port1"–"Port4" Connectors, Cable Clamps Onto Ferrite Beads" on page 50

Install the New Semirigid Test Set Cables

Refer to Figure 22 on page 44 through Figure 32 on page 54 for this step of the procedure. Although only Option 423 is shown in the illustrations, Option 425 is similar in appearance. To see an image showing the location of these cables, click the appropriate Chapter 6 bookmark (e.g., "Bottom Cables, 4-Port Configuration, Options 425/029 (**S/N Prefixes** <6021)" or "Bottom Cables, 4-Port Configuration, Options 425/029 (**S/N Prefixes** ≥6021)") in the PDF Service Guide[1]. New parts are listed in Table 1-1 on page 12.

1. Install the following cables in the order listed. Unless otherwise indicated, use a 5/16-in torque wrench set to 10 in-lbs to tighten all cable connectors.

For all analyzers:

— W164 (N5222-20117) A30 test port coupler to A72 Bias Tee, Port 3

For analyzers with Option 425 and with 029 – Only (R77efer to Figure 26 on page 48*):*

— W169 (N5242-20325) A71 Bias Tee, Port 1 to A52 noise switch, port 1

*For analyzers with 425, but without 029 – Only (Refer to* Figure 27 on page 49*):*

— W161 (N5242-20119) A71 Bias Tee, Port 1 to front panel CPLR THRU

For all analyzers Option 425:

— W163 (N5222-20121) A73 Bias Tee, Port 3 to front panel CPLR THRU

— W162 (N5222-20115) A71 Bias Tee, Port 1 to A329 test port coupler

— W166 (N5222-20118) A73 Bias Tee, Port 4 to A31 test port coupler

— W165 (N5222-20122) A73 Bias Tee, Port 4 to front panel CPLR THRU

— W168 (N5222-20116) A74 Bias Tee, Port 2 to A32 test port coupler

— W167 (N5222-20120) A74 Bias Tee, Port 2 to front panel CPLR THRU

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

Figure 22   New Test Set Cable Installation (Option 423 is shown. Option 425 and Option 425 with 029 is similar.)[1]
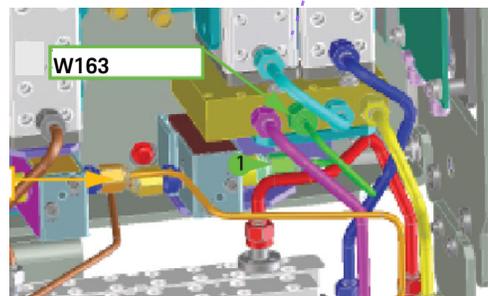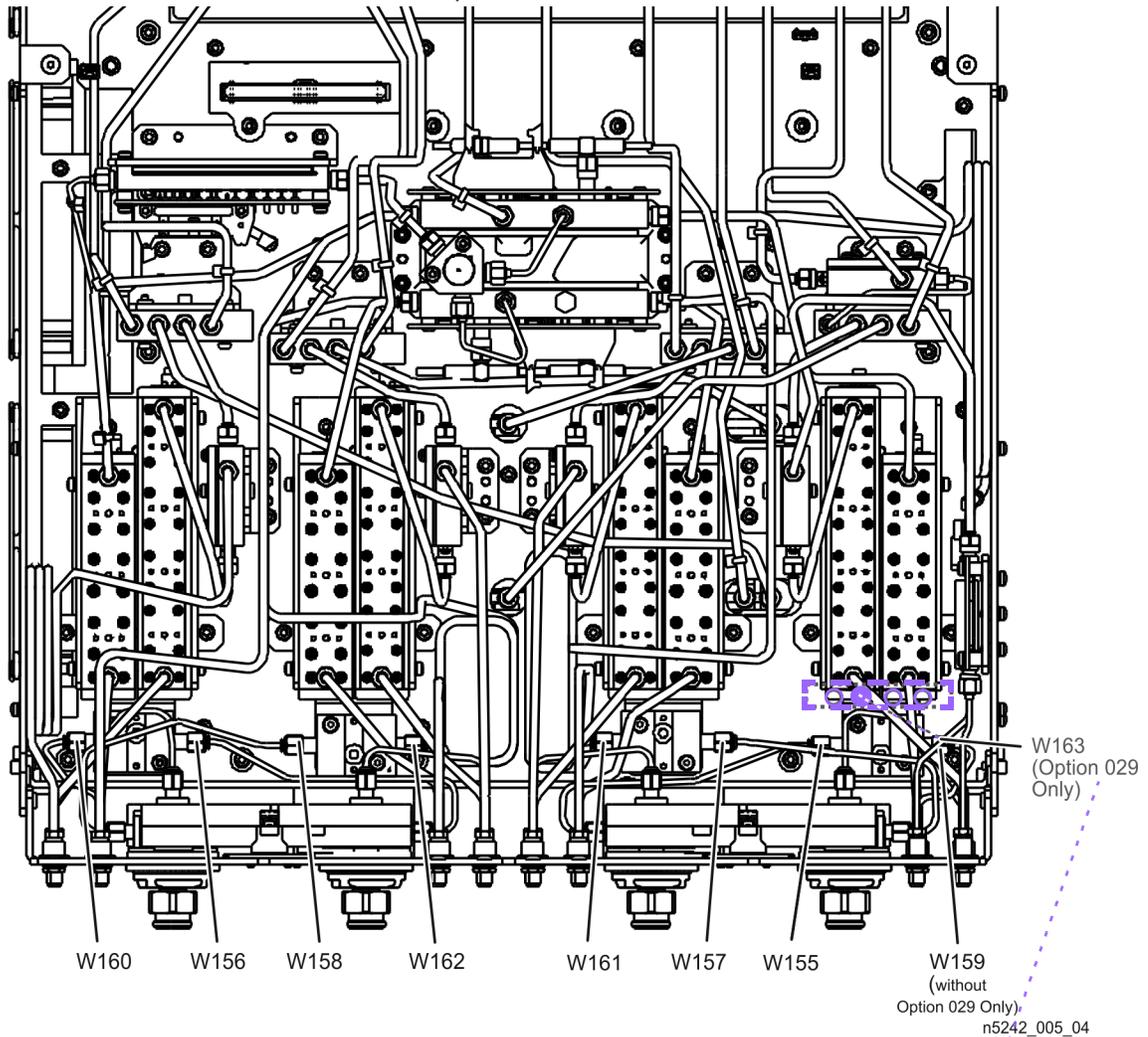
W163
(Option 029
Only)

W160   W156   W158   W162   W161   W157   W155   W159
(without
Option 029 Only)
n5242_005_04

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 9.

Figure 23　　　　**N5242B Option 425 and Option 425 with 029**: New Test Set Cables Installation, Part 3 (N5222-20120). (Option 425 with 029 is shown, but Option 425 without 029 is similar.)
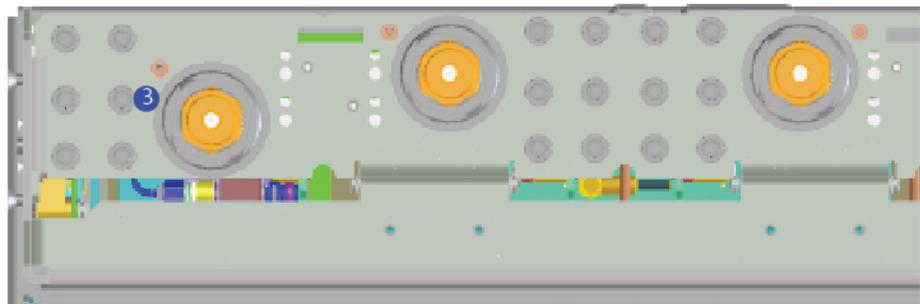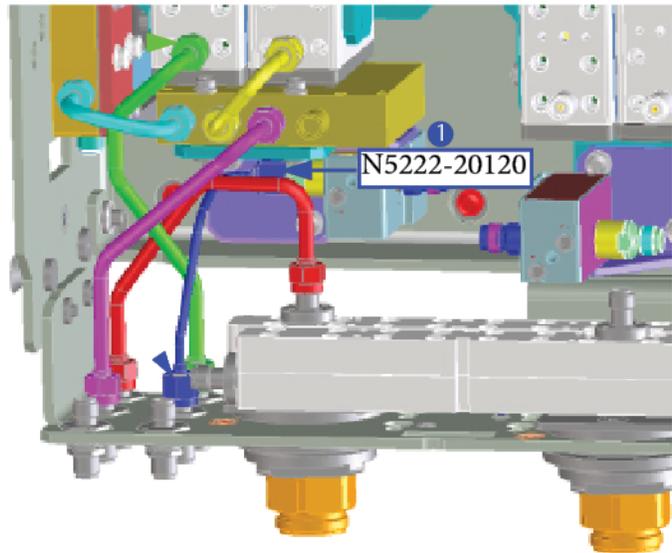
PART SEQUENCE:

①

Figure 24   **N5242B Option 425 and Option 425 with 029**: New Test Set Cables Installation, Part 4 (N5222-20116, N5222-20118, and N5222-20122). (Option 425 with 029 is shown, but Option 425 without 029 is similar.)
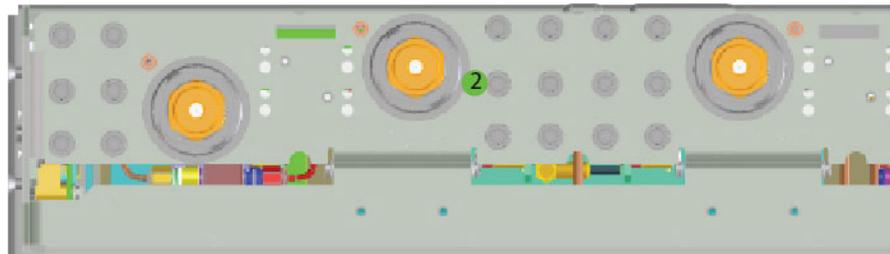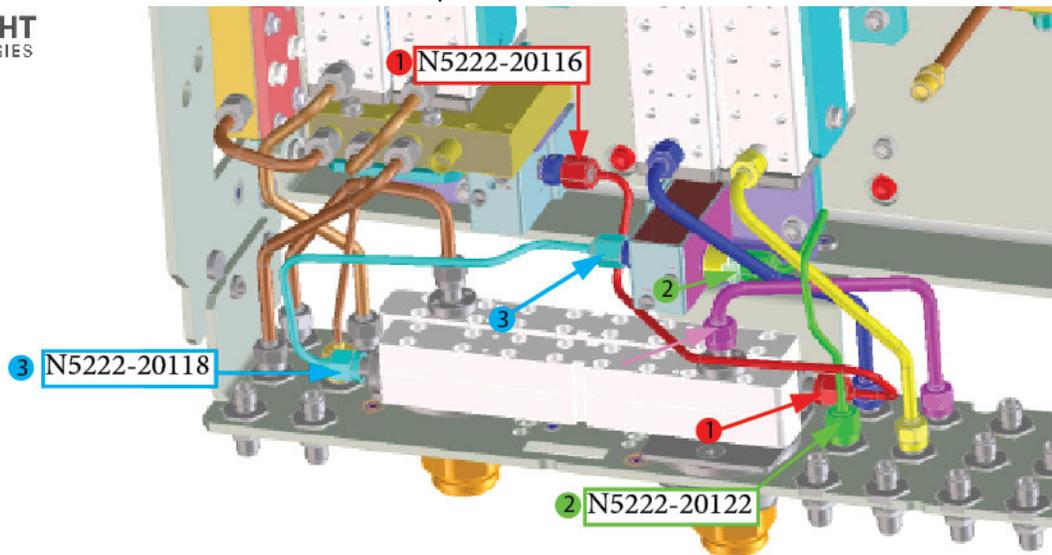
Figure 25   **N5242B Option 425 and Option 425 with 029**: New Test Set Cables Installation, Part 5 (N5222-20115 and N5222-20121). (Option 425 with 029 is shown, but Option 425 without 029 is similar.)
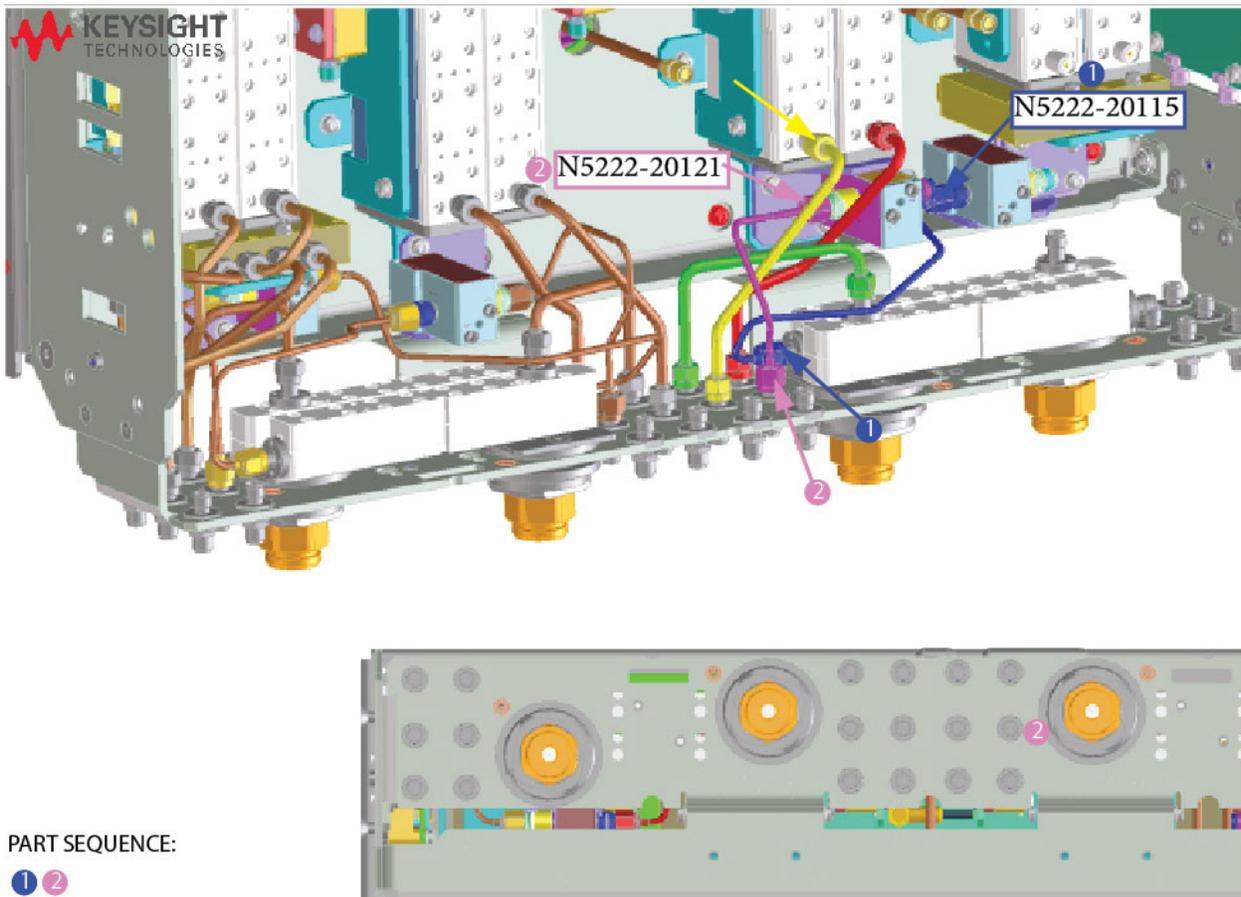
Figure 26   **N5242B Option 425 with 029 (Only)**: New Test Set Cables Installation, Part 6 (N5222-20117 and N5242-20325)
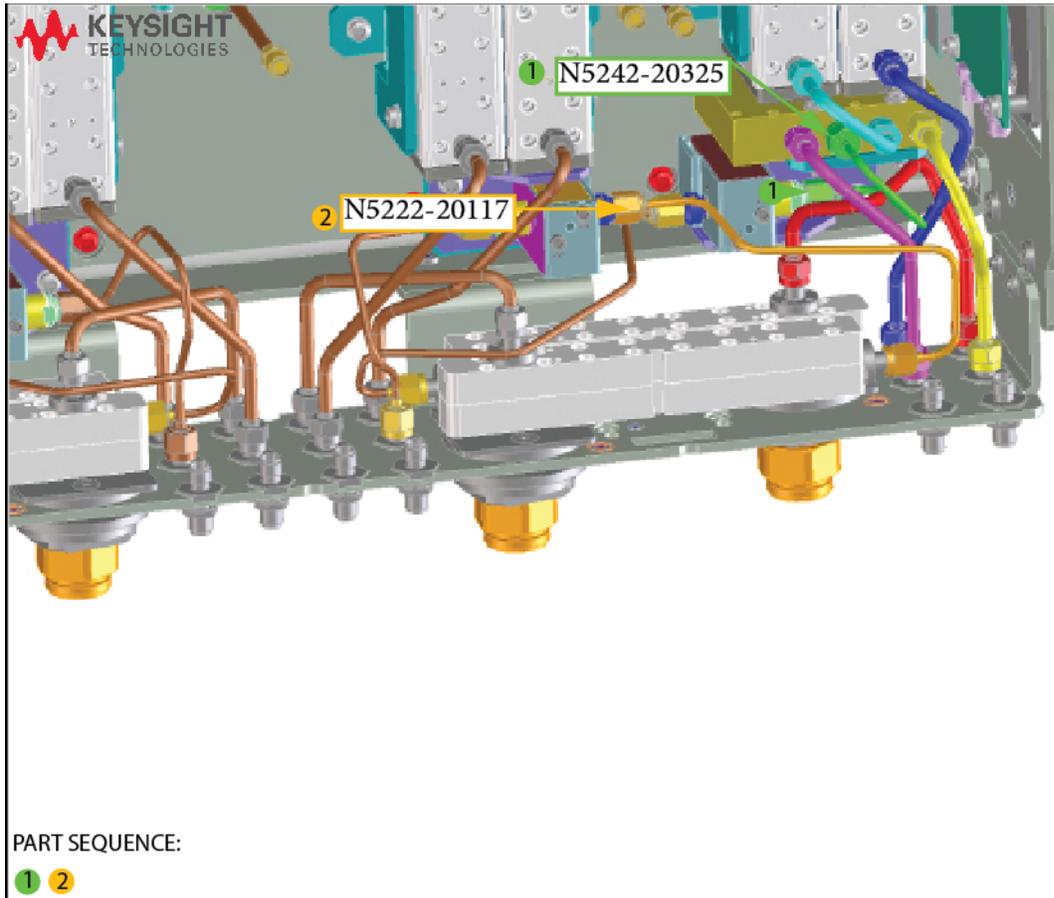
Figure 27 **N5242B Option 425 (Only)**: New Test Set Cables Installation, Part 7 (N5222-20117 and N5222-20119)
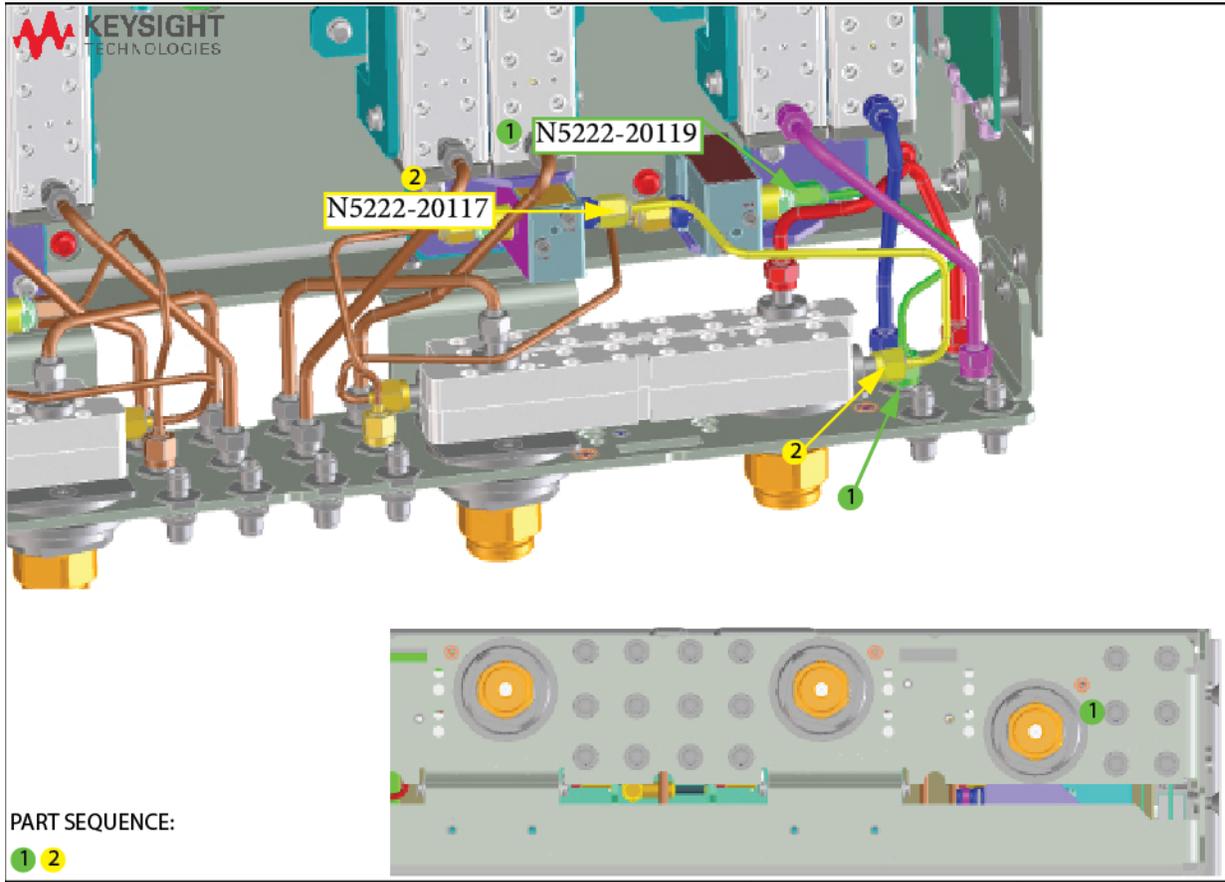
Install New Blue Bias-Tee Combiner Cables N5240-60097 (x1) and N5240-60098 (x3) Gray Cables From the A71–A74 Bias Tees "RF-IN" to the A70 LFE Board "Port1"–"Port4" Connectors, Cable Clamps Onto Ferrite Beads

— Separate cables as much as possible

— OK to cross

— Not OK run parallel or next to each other

— Do **not** tie wrap a semirigid cable

2. Install the N5240-60097 (x1) cables as shown. Note the orientation of the cable (items ① and ②). Refer to Figure 28.

3. Install the N5240-60098 (x3) cable as shown. Note the orientation of the cable (item ① through ③). Refer to Figure 29 on page 51, Figure 30 on page 52, and Figure 31 on page 53.

4. Route cables as shown.

Figure 28   Connect N5240-60097 from Port 2 A72 Bias Combiner to A70 LFE Board (N5240-60097 (x1) and 1400-1391 (x1))

Connect N5240-60097 from Port 2 Bias Combiner "RF IN" connector to LFE board "Port 2" connector. Torque to 10 in-lbs. Route cable as shown

Add cable clamp 1400-1391 1X to secure ferrite bead for LFE cable as shown
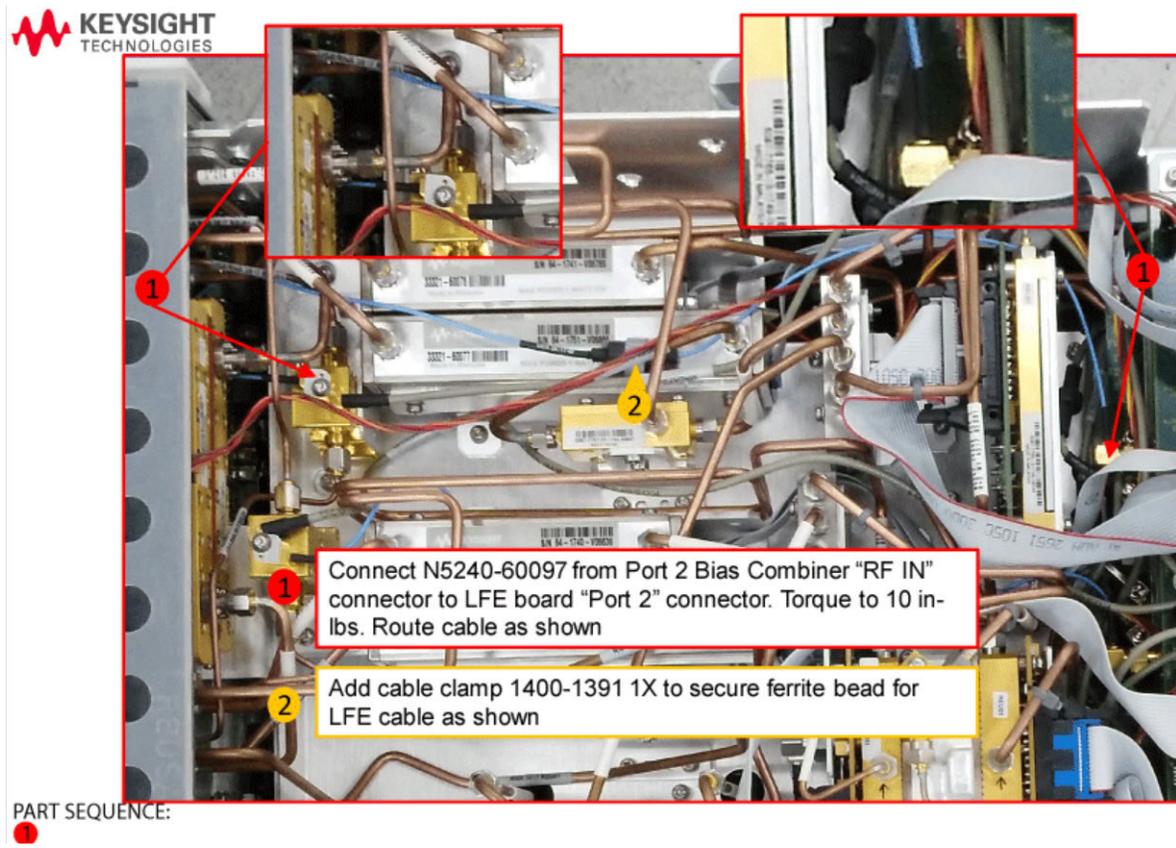
Figure 29   Connect N5240-60098 from Port 4 A73 Bias Combiner to A70 LFE Board
                   (N5240-60098 (x1), 1400-1334 (x1), and 1400-1391 (x1))
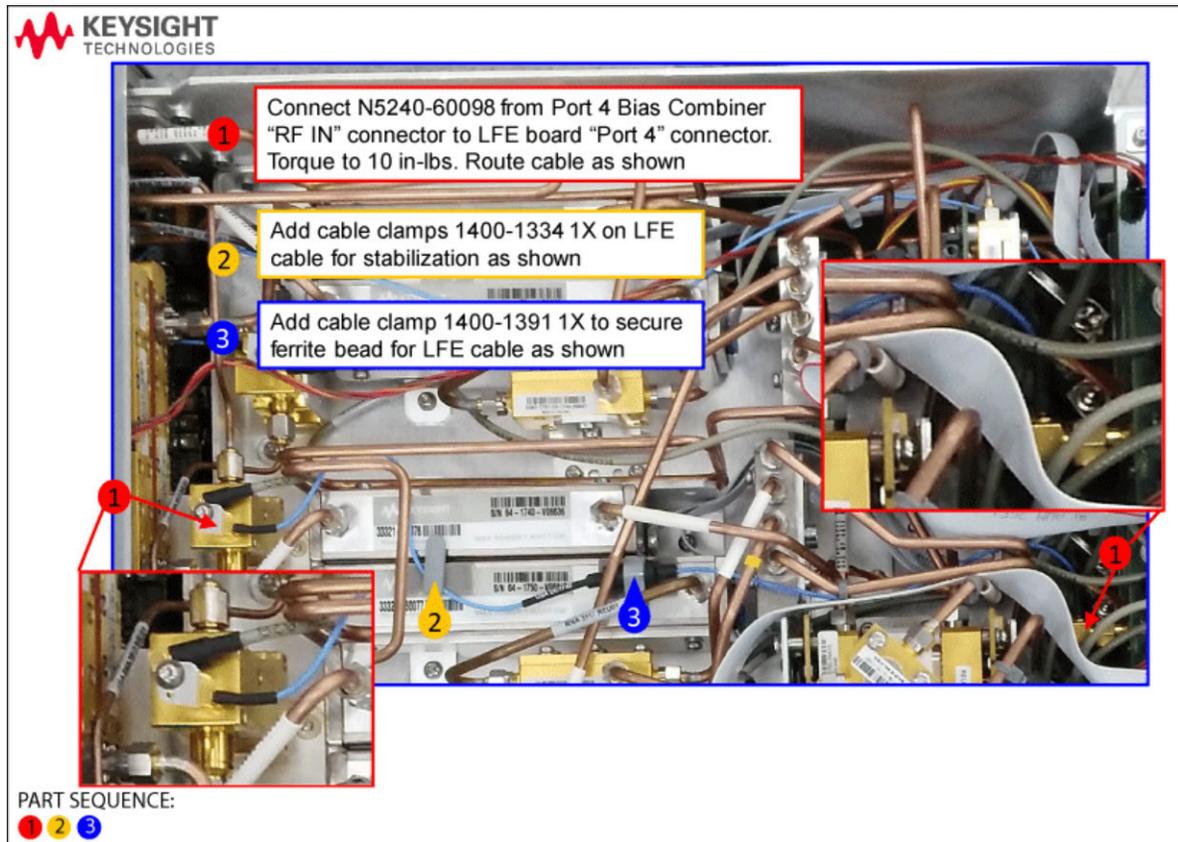
Figure 30   Connect N5240-60098 from Port 3 A72 Bias Combiner to A70 LFE Board
   (N5240-60098 (x1), 1400-1334 (x1), and 1400-1391 (x1))
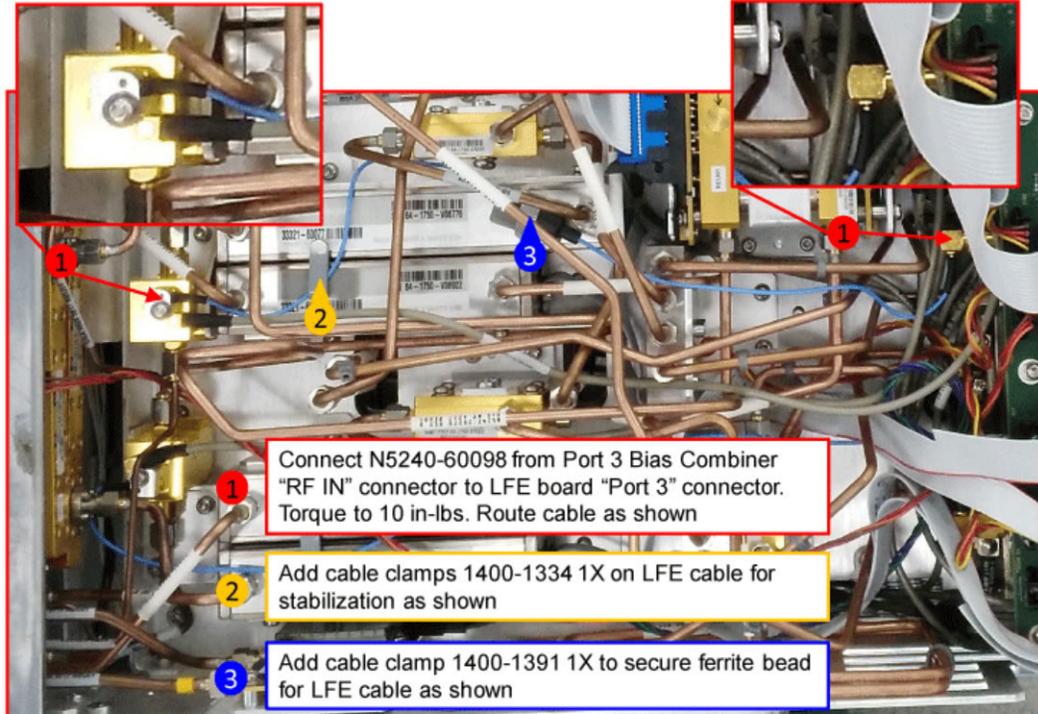
Figure 31   Connect N5240-60098 from Port 1 A71 Bias Combiner to A70 LFE Board (N5240-60098 (x1), 1400-1334 (x1), and 1400-1391 (x1))
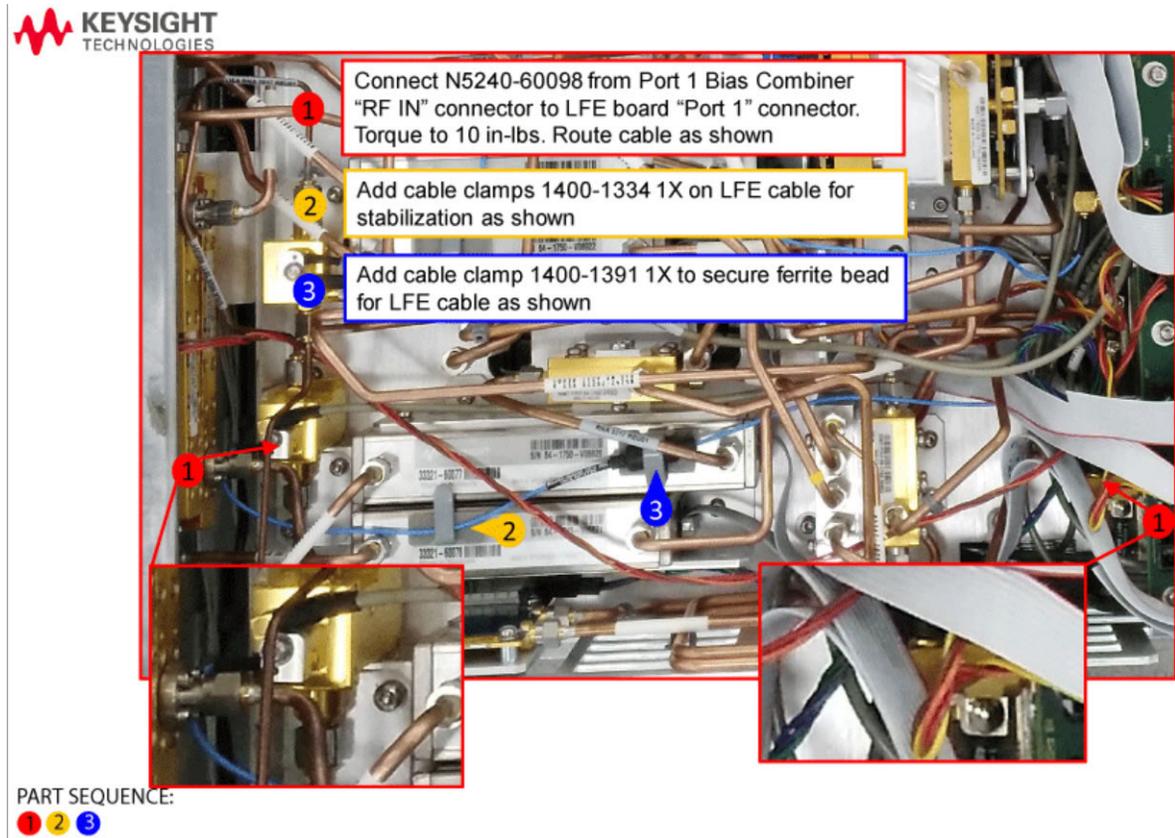
Step 20. Reinstall the A19 Test Set Motherboard

For instructions, click the Chapter 7 bookmark "Removing and Replacing the A19 Test Set Motherboard" in the PDF Service Guide[1].

Step 21. 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–A74 Bias-Tee Gray DC Bias Tee Combiner Low Frequency Extension (LFE) Cables to the Rear Panel" on page 54

— "Route the Bias Cables" on page 55

---

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

Install the A71–A74 Bias-Tee Gray DC Bias Tee Combiner Low Frequency Extension (LFE) Cables to the Rear Panel

Refer to Figure 32 for this step of the procedure. New parts are listed in Table 1-1 on page 12.

NOTE	**IMPORTANT!** The N5240-60091 (x4) bias combiner cables only connect to the DC bias of the Bias Tee Combiner.

5. Install the N5240-60091 (x4) DC cables to the rear panel as shown (items ① through ④).

Figure 32   Install DC cables to bias tees to the rear panel (N5240-60091)
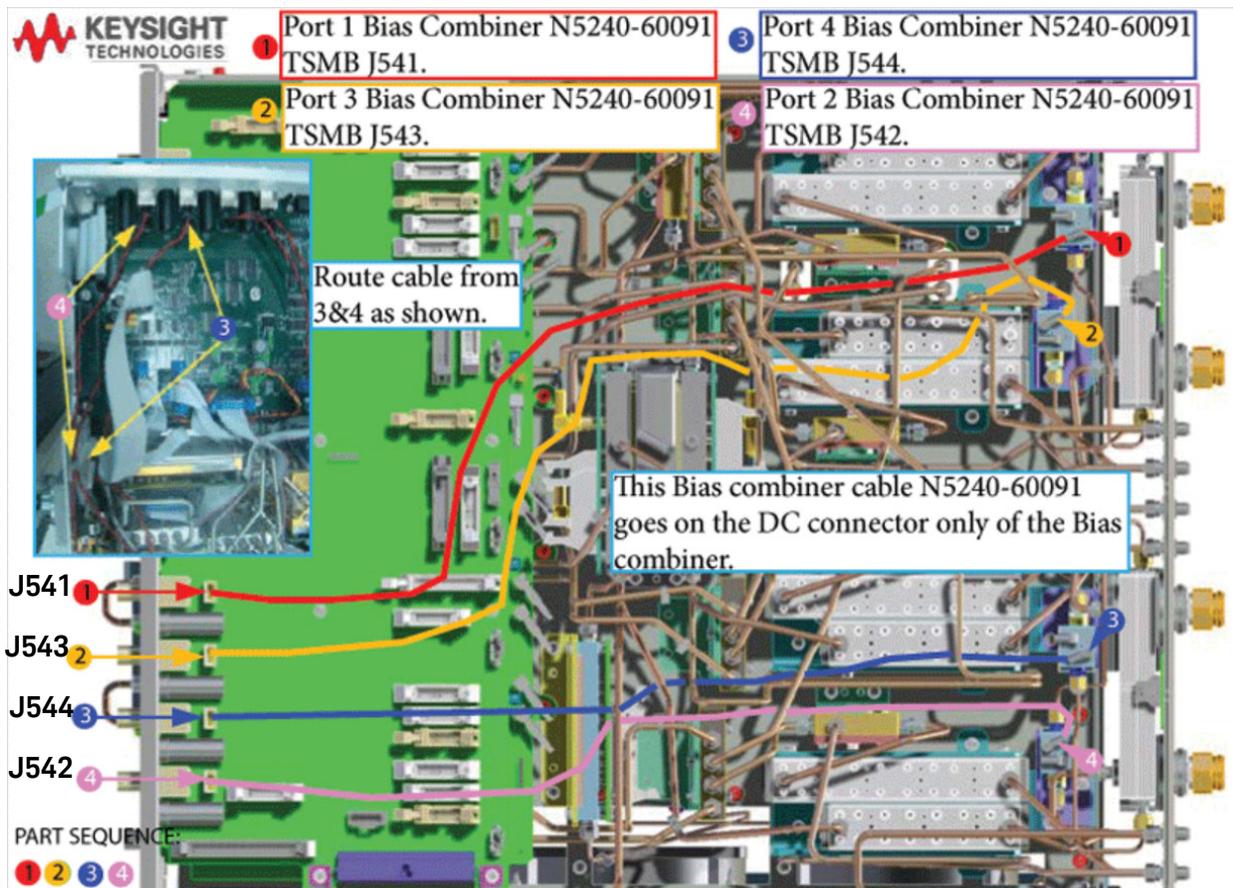
Route the Bias Cables

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 32 on page 54.

Step 22. Install the Other End of the Bias-Tee Combiner Cables to the Source Synthesizer and LO Synthesizer Board Gray Cables

Refer to Figure 33 on page 56 and to Figure 34 on page 57. New parts are listed in Table 1-1 on page 12.

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 flexible cable N5242-60078 (item ①), N5242-60079 (item ②), and N5242-60080 (item ③) as indicated in Figure 33 on page 56.

   – **Version 7 Synthesizers:** Connect flexible cable N5240-60112 (item ①), N5240-60114 (item ②), and N5240-60113 (item ③) as indicated in Figure 34 on page 57.

Figure 33   **Version 6 Synthesizers:** New Test Set Cables Installation, Part 8 (N5242-60078, N5242-60079, and N5242-60080)
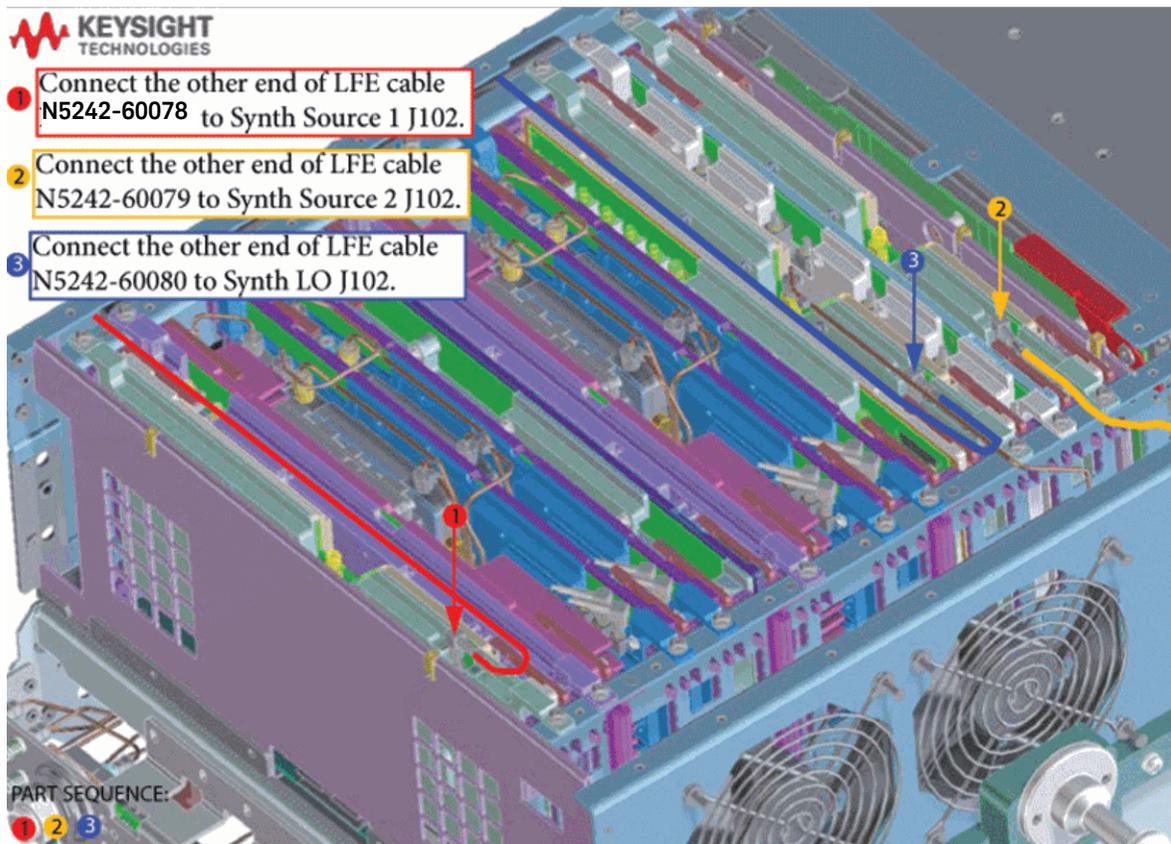
Figure 34   **Version 7 Synthesizers:** New Test Set Cables Installation. Connect the other end of gray cables—Part 2 (N5240-60112, N5240-60113, and N5240-60114)
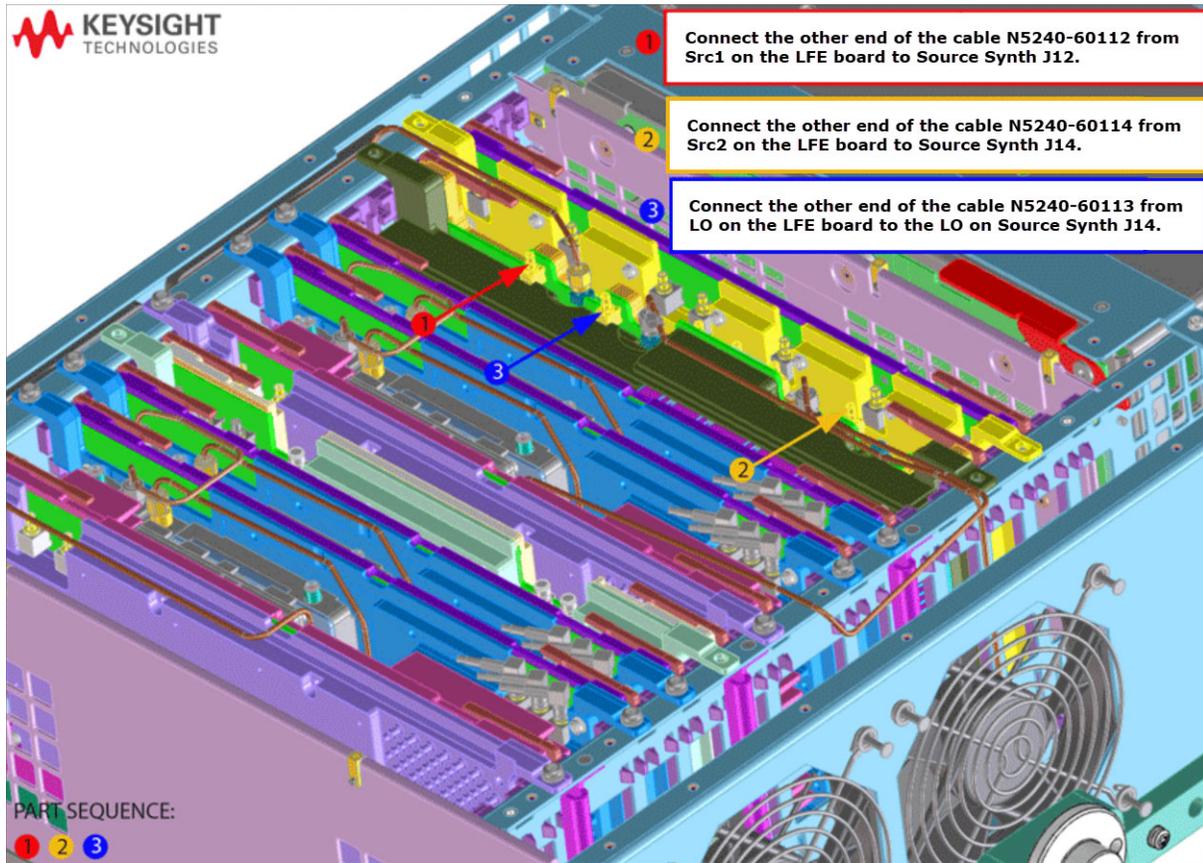
Step 23. Remove the Old Lower Front Panel Overlay

Refer to Figure 35 on page 59 for this step of the procedure. Although a 4-port PNA-X is shown in the graphic, the concept is the same for the 2-port PNA-X. New parts are listed in Table 1-1 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 the nameplate from the front panel (item ③).

4. 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 26. Install the New Lower Front Panel Overlay and Nameplate" on page 61. |

Figure 35   Lower Front Panel Overlay Replacement

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

New lower front-panel
overlay.
Align loosely to opening
before pressing firmly.
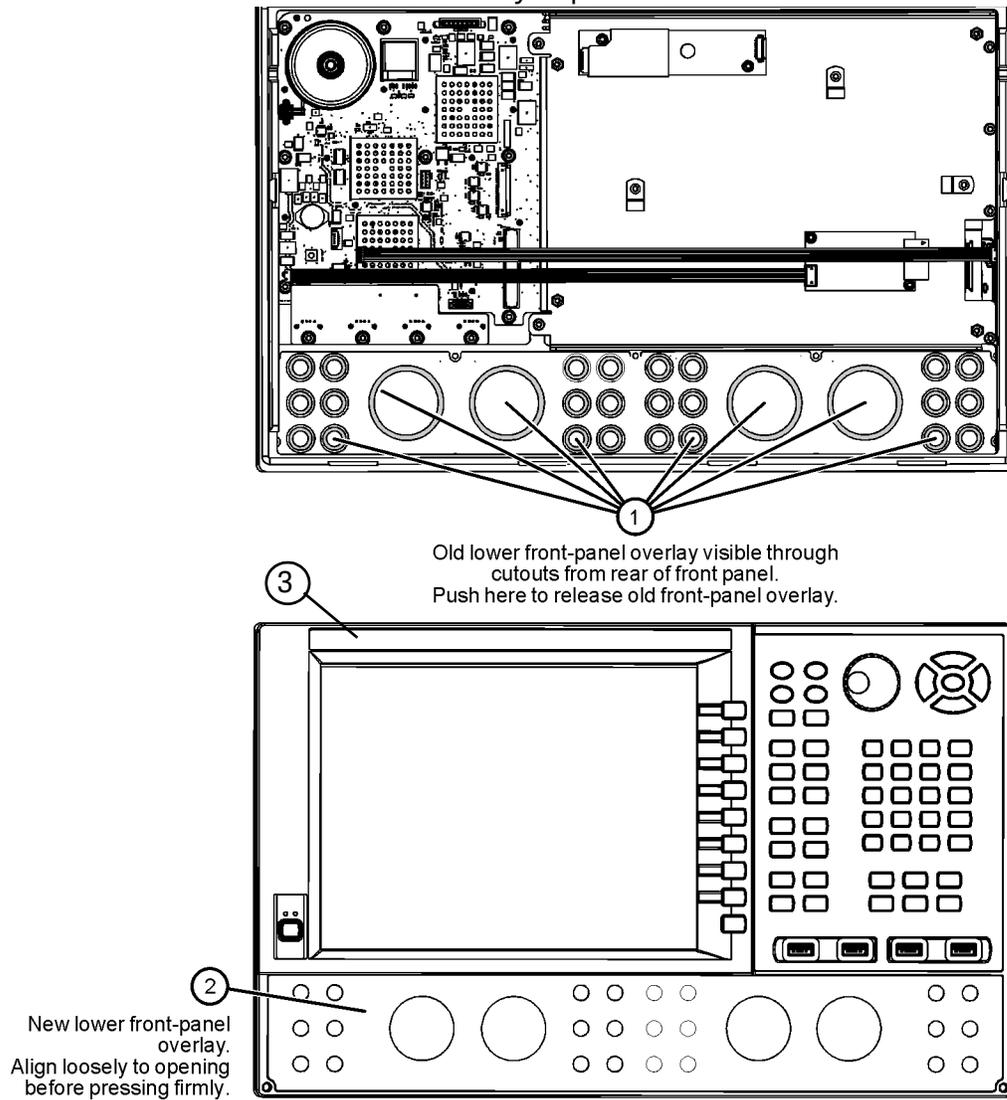
N5225_105_04

Step 24. Reinstall the Front Panel Assembly

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

Refer to Figure 36 for this step of the procedure. New parts are listed in Table 1-1 on page 12.

1. Make sure all of the hex nuts on the front-panel cable connectors have been tightened using a 5/16-in torque wrench set to 21-in lbs.

2. Reconnect the ribbon cable (item ③) to the A1 front panel interface board.

3. Slide the front panel over the front-panel connectors.

4. With a T-10 TORX driver, reinstall the 12 screws (item ②) in the sides of the frame.

— 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.

Figure 36   Front Panel Assembly Re-installation
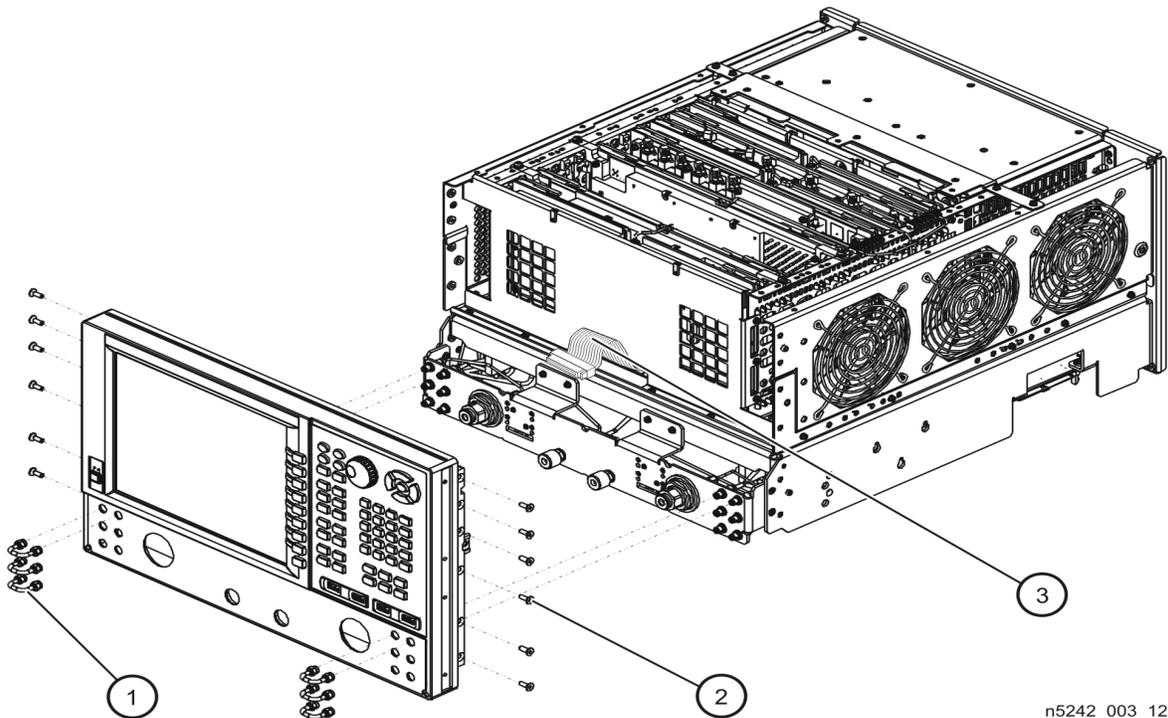
n5242_003_12

Step 25. 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 <10Ω.

4. Repeat these steps for each of the other test ports.

NOTE   If the DVM value is 0Ω or >10Ω, 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 24. Reinstall the Front Panel Assembly" on page 60 and "Step 21. Install the A71 and 74 bias–Tee combiner's Gray Low Frequency Extension (LFE) DC bias Cables and Route Cables" on page 53 are connected correctly and not open or shorted.

Step 26. Install the New Lower Front Panel Overlay and Nameplate

Refer to Figure 35 on page 59 for this step of the procedure. Although a 4-port PNA-X is shown in the graphic, the concept is the same for the 2-port PNA-X. New parts are listed in Table 1-1 on page 12.

1. Remove the protective backing from the new front panel overlay, N5242-80036 (Option 425) or N5242-80037 (Option 425 with 029) — (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 (N5242-80035). New parts are listed in Table 1-1 on page 12.

5. 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 27. Position the Cables and Wires to Prevent Pinching

On the top side of the PNA-X, 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-X, 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 Cover

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

Step 29. Reinstall the Outer Cover

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

Step 30. Remove Option 423

Procedure Requirements

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

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

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

Option 423 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.

---

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

Step 31. Enable Option 425

Procedure Requirements

<table>
<tr><td>NOTE</td><td>For this step, you will need a USB flash drive.
A single license file may contain more than one feature.</td></tr>
</table>

— 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 16.

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.

<table>
<tr><td>NOTE</td><td>For this step, you will need a USB flash drive.
A single license file may contain more than one feature.</td></tr>
</table>

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. Verifying and editing the license file:

   For these steps, refer to the example in Figure 37 on page 64.

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

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

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

Figure 37 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.
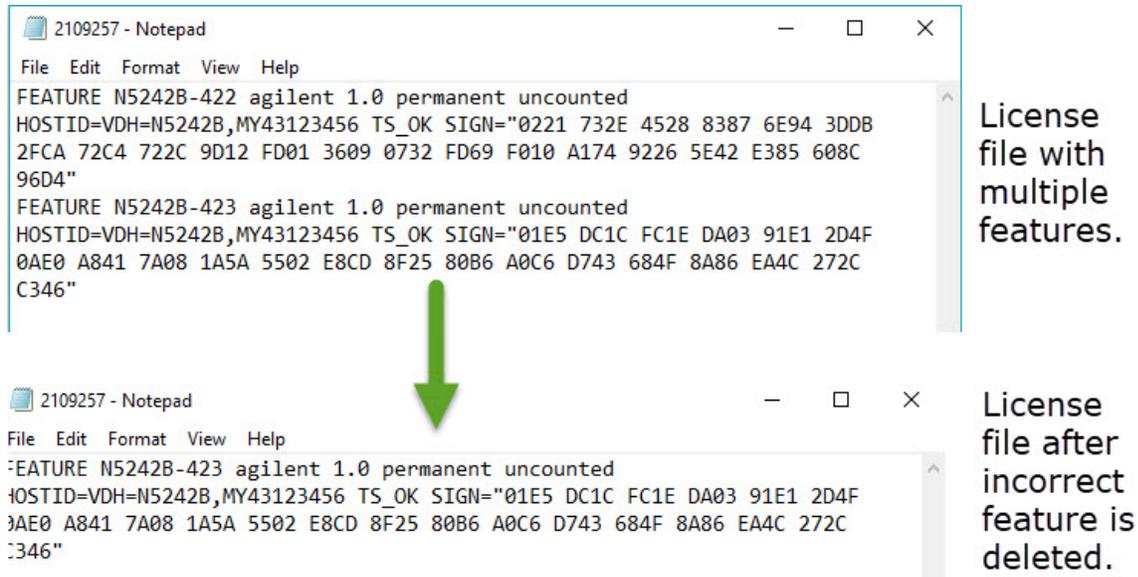
d. Re-save the text license file to the root directory of your USB flash drive.

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.

5. Disconnect the USB flash drive from the PNA.

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

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

Step 32. Verify the PNA–X Analyzer Program is Running with the Correct Options

Verify that the Options Correct and are Enabled

1. Start the Network Analyzer program.

2. Once the Network Analyzer is running:

   - Press **Help** > **About NA** and verify that Option **425** is listed in the PNA–X application.

> **NOTE**
>
> If the option(s) have not been enabled, contact Keysight Technologies. Refer to "Getting Assistance from Keysight" on page 6.

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 33. 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–X 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–X 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.)

— noise adjustment (Applicable N524xB models: Option 029 with S93029A/B Only.)

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

To view this service guide information, click the Chapter 3 bookmark "Tests and Adjustments" in the PDF Service Guide[1].

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

EEPROM Backup

The analyzer uses arrays of correction constants to enable the analyzer to produce accurate, leveled source signals and receive clean test signals. These constants are stored in non-volatile EEPROM memory and in flash memory files.

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

To store the backup data, perform these steps:

— Navigate to the EEPROM Backup Utility, located at:

— Windows 7 -- `C:\Program Files (x86)\Keysight\Network Analyzer\Service\eebackup.exe`

— Windows 10 -- `C:\Program Files\Keysight\Network Analyzer\Service\eebackup.exe`

— Run the program.

— Click Backup EEPROM.

— Click Backup TSMB Mme.

— Click Backup Synth Mem. (Applies to Version 7 Synthesizers Only)

— Click Exit when the program has finished.

---

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

Figure 38   EEPROM Backup Menu
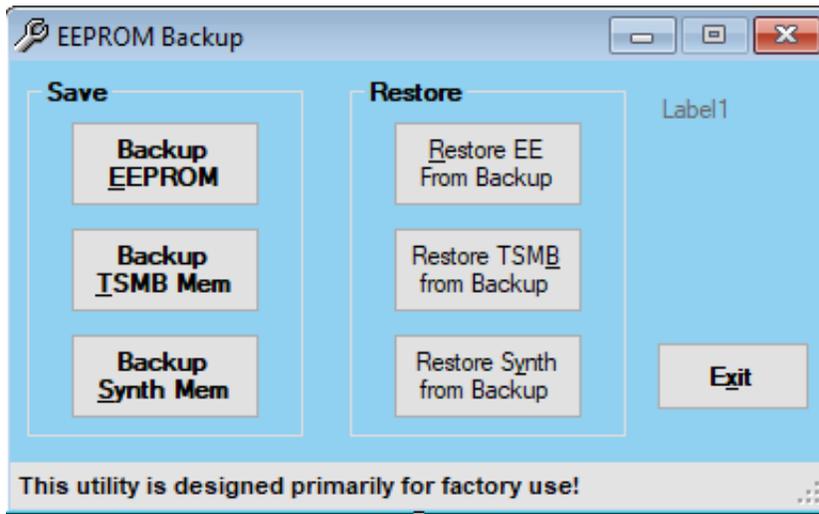
Operator's Check

Perform the Operator's Check to check the basic functionality of the analyzer. For instructions, click the Chapter 3 bookmark "Tests and Adjustments" in the PDF Service Guide[1].

If you experience difficulty with the basic functioning of the analyzer, contact Keysight. Refer to "Contacting Keysight" on page 6.

Calibration

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

Step 34. Prepare the PNA-X 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.

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" on page 17.

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 6.

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 19. After this section is completed, your synthesizer board will be a version H synthesizer board. Refer to Figure 2 on page 5.

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

Part number	Description
0699-3947	1 kΩ Resistor
0161-4279	22 μF 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 kΩ (0699-3947). Refer to Figure 1 on page 3.

5. Remove capacitor C252.

6. Clean pads.

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

Figure 1   Remove old resistor and capacitor and replace with resistor 1 kΩ (0699-3947) and 22μF (0161-4279).
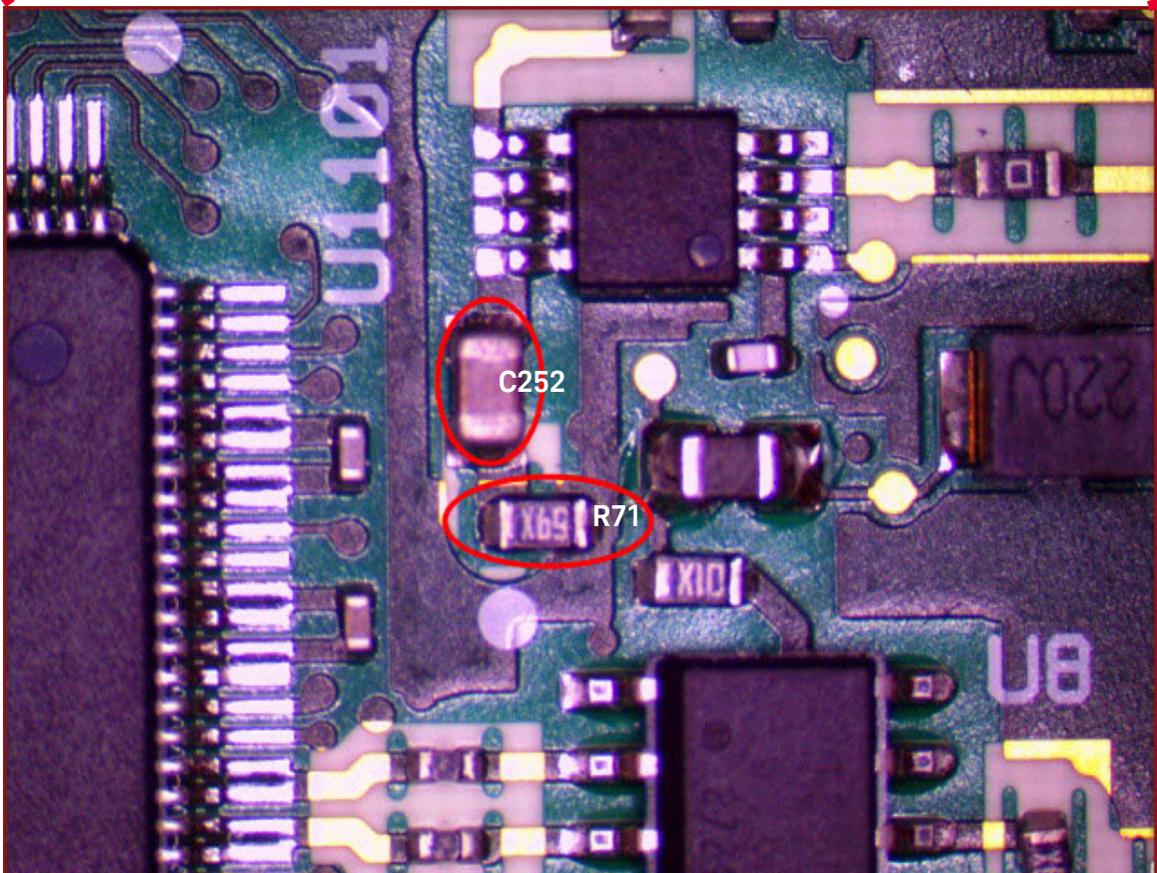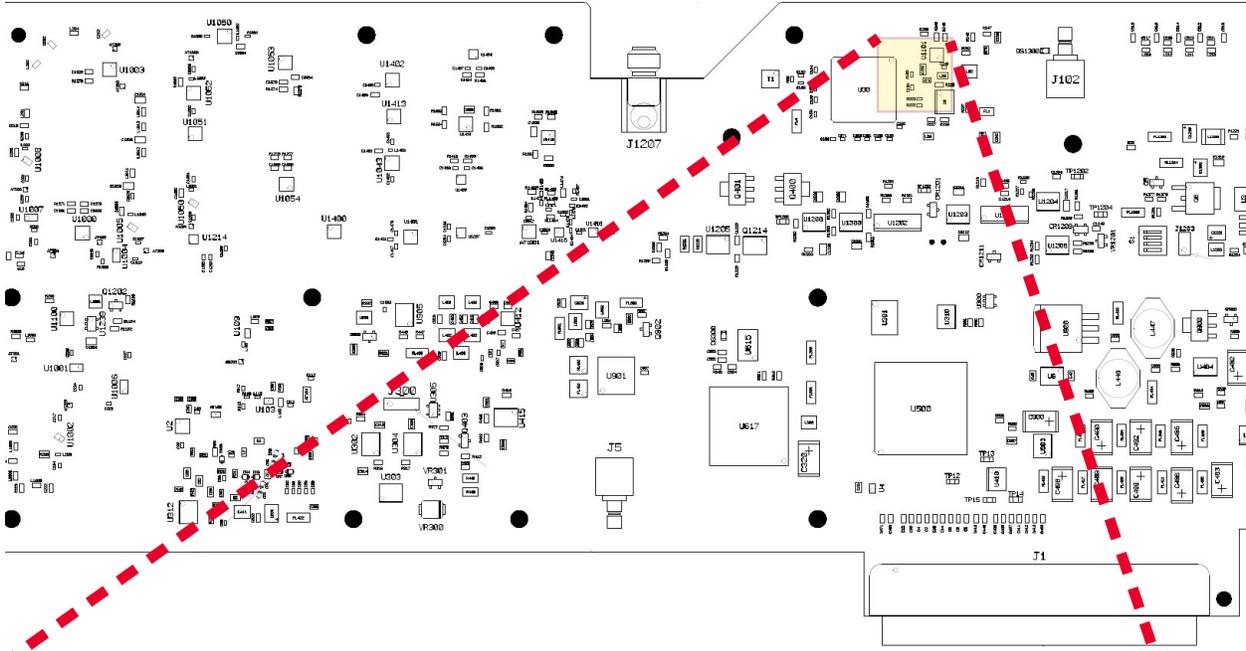
8. Re-assemble shield, screws, and torque:

- — 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–X and if necessary, start the PNA–X 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
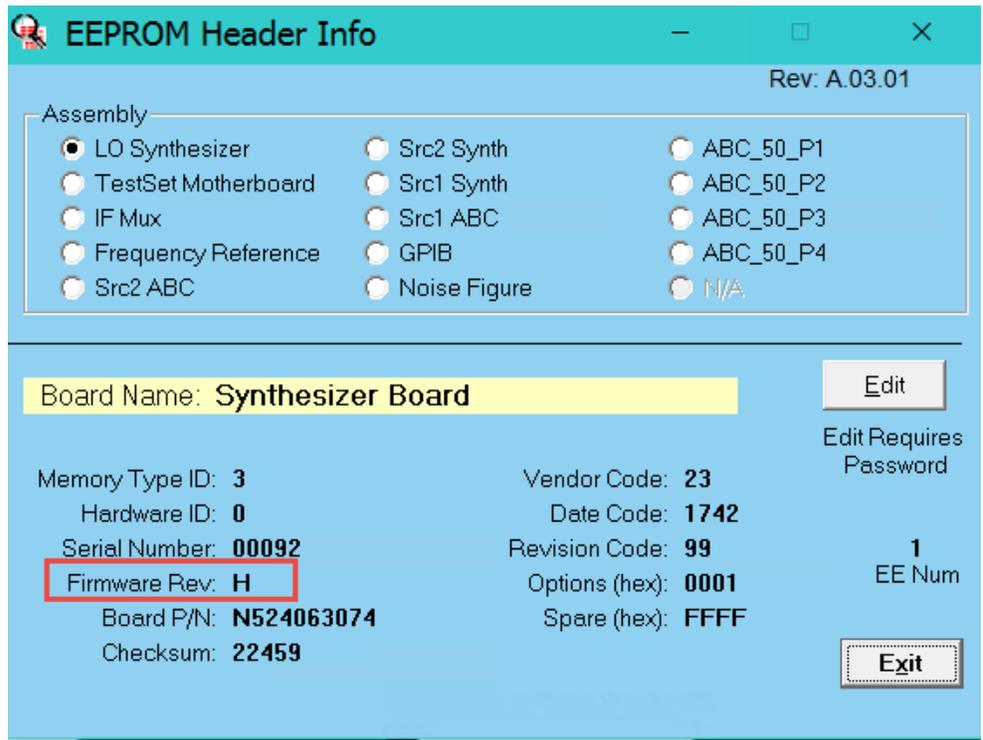
Figure 3   EEPROM Editor Window

	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

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