Keysight Low Frequency Extension Upgrade Kit For Version 6 & Version 7 Synthesizers

To Upgrade PNA N5227B Option 401 to Option 405

Upgrade Kit Order Number: N5227BU-405

Kit Number: N5227-60117

This is Installation Note is for upgrading the N5227B Microwave Network Analyzers from Option 401 to Option 405.

Notices

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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.

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.

Keysight Low Frequency Extension (LFE) Upgrade Kit
Upgrade Kit Number: N5227-60122
Installation Note

Description of the Upgrade

This upgrade converts your standard 4-port configurable test set analyzer (N5227B Option 401) to an low frequency extension (LFE) analyzer with bias tees by adding:

— LFE bias tee combiners

— PC assembly, low frequency extension (LFE)

— new cables

After installation of this upgrade, your analyzer will be an N5227B Option 405.

Refer to "Overview of the Installation Procedure" on page 14.

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

KEYSIGHT
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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 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.
	– Version 6 Synthesizers: 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)."
	– See also your instrument's PDF Service Guide [a].

a. See "Downloading the Online PNA Service Guide" on page 9.

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

— A license key - refer to "License Key Redemption" below.

— A PDF copy or a paper copy of the PNA Service Guide - refer to "Downloading the Online PNA Service Guide" below.

— An ESD-safe work area - refer to "Protecting Your Workspace from Electrostatic Discharge" below.

— Correct tools - refer to "Tools Required for the Installation" on page 10.

— Enough time - refer to "About Installing the Upgrade" on page 10.

— Test equipment for the post-upgrade adjustments and full instrument calibration. To view the equipment list, click the Chapter 3 bookmark "Tests and Adjustments" in the PDF Service Guide[1].

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1. See "Downloading the Online PNA Service Guide" on page 9.

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 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 files(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

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

— 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). This upgrade only applies to B models.

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.

Downloading the Online PNA Service Guide

To view the online Service Guide for your PNA model number, use the following steps:

1. Go to www.keysight.com.

2. In the Search box, enter the model number of the analyzer (e.g., N5225B) and click **Search**.

3. Click **Support** > **Keysight Product Support**.

4. In the **Search Support** area type your instrument's model number (e.g., N2225B).

5. Press **Enter**.

6. Scroll down to the **PRINT DOCUMENTATION** section and click to select **Service Manual**.

   The **Service Manual** for your instrument will be displayed near the top of the right column.

7. Click the hyperlink of the Service Guide title to download the PDF file.

8. When the PDF of the Service Guide is displayed, scroll through the Contents section bookmarks to locate the information needed.

Protecting Your Workspace from Electrostatic Discharge

For information, click on the Chapter 1 bookmark, "Electrostatic Discharge Protection" in the PDF Service Guide[1].

ESD Equipment Required for the Installation

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

Tools Required for the Installation

Description	Qty	Part Number
T-6 TORX driver – set to 6 in-lbs (0.68 N.m)	1	N/A
T-10 TORX driver - set to 9 in-lbs (1.02 N.m)	1	N/A
T-20 TORX driver - set to 21 in-lbs (2.38 N.m)	1	N/A
5/16-in (8 mm) nutsetter or open end torque wrench - set to 10 in-lbs (1.13 N.m)	1	N/A
5/16-in (8 mm) nutsetter or open end 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 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	N5227B Option 405
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 hours

Items Included in the Upgrade Kit

Check the contents of your kit against the following list. If any part is missing or damaged, contact Keysight Technologies. Refer to "Getting Assistance from Keysight" on page 6.

> **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 9.

Table 1   Contents of Upgrade Kit N5227-60117

Ref Desig.	Description	Qty	Part Number
--	Installation note (this document)	1	N5227-90117
--	Software Entitlement Certificate	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
--	Bracket for Bias-T combiner ports	2	N5247-20149
--	Machine screw, M3 x 8, pan head (4 to attach bias T-combiner assemblies to deck and 4 to attach lower bracket N5240-00011 to IF MUX board)	8	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)	8	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, cable (LFE DC bias cables)	6	1400-1334
--	Nameplate, N5227B Option LFE	1	N5227-80029
--	Front panel overlay, 4-port (Option 405 and 420)	1	N5227-80031
--	Cable, ribbon assy, motherboard (MB/IF MUX/LFE/TSMB)	1	N5240-60089

Table 1   Contents of Upgrade Kit N5227-60117

Ref Desig.	Description	Qty	Part Number
--	Cable, DC, 2 pin to R/A SMP	4	N5240-60091
W181	Cable, assy–RF, CPLR THRU – Bias T combiner, Port 1	1	N5247-20167
W182	Cable, assy-RF, Bias T combiner- FP, Port 1	1	N5247-20162
W183	Cable, assy-RF, CPLR THRU - Bias T combiner, Port 3	1	N5247-20170
W184	Cable, assy-RF, Bias T combiner- FP, Port 3	1	N5247-20164
W185	Cable, assy-RF, Bias T combiner- FP, Port 4	1	N5247-20165
W186	Cable, assy-RF, CPLR THRU - Bias T combiner, Port 4	1	N5247-20171
W187	Cable assy–RF, Bias T combiner– FP, Port 2 (without Option 029 only)	1	N5247-20163
W188	Cable, assy-RF, CPLR THRU - Bias T combiner, Port 2	1	N5247-20169
W191[a]	Cable, assy RF CA, LFE SRC1 J20 - Synth SRC1 J102	1	N5245-60027
W192[a]	Cable, assy RF CA, LFE SRC2 J21 - Synth SRC2 J102	1	N5242-60079
W193[a]	Cable, assy RF CA, LFE LO J18 - Synth LO J102	1	N5242-60080
W194	Cable, assembly, coaxial LFE (Port 1 bias combiner "RF-IN" to "Port1" A70 LFE board)	4	N5240-60097
W195	Cable, assembly, coaxial LFE (Port 3 bias combiner "RF-IN" to "Port3" A70 LFE board)		
W196	Cable, assembly, coaxial LFE (Port 4 bias combiner "RF-IN" to "Port4" A70 LFE board)		
W197	Cable, assembly, coaxial LFE (Port 2 bias combiner "RF-IN" to "Port2" A70 LFE board)		
W208[b]	A70/A75 LFE board to A15 DD Synth Source 1 J12	1	N5240-60112
W209[b]	A70 LFE board to A15 DD Synth Source 2 J14	1	N5240-60114
W210[b]	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. Version 6 synthesizers use these cables. If you have a Version 7 direct digital synthesizer (DDS) assembly installed, these cables may be 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 Outer Cover."

"Step 3. Remove the Inner Cover."

"Step 4. Inspect and (If Necessary) Remove the A4, A15, and A17 Synthesizer Boards, if They Are Not Version H."

"Step 5. Remove the Front Panel Assembly."

"Step 6. Remove Some Bottom-Side (Test Set) Cables."

"Step 7. Remove the A23 Test Set Motherboard."

"Step 8. Remove the A24 IF Multiplexer (IF MUX) Board."

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

"Step 10. Connect the A18 Motherboard/IF Multiplexer (IF MUX)/Low Frequency Extension (LFE)/Test Set Motherboard (TSMB) Ribbon Cable (N5240-60089)."

"Step 11. Reinstall the A24 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 Handler, Power and Other I/O Assemblies."

"Step 13. Reinstall the Mixer Brick (MXB) Cables."

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

"Step 15. Connect and Route New LFE Cables (8120-5014 (x2), 8120-5017 (x1), and 8120-5021 (x1)) and the Other Ends of the New Cables Connected to the IF Multiplexer (IF MUX) Board."

"Step 16. Install the A70 Low Frequency Extension (LFE) Board."

"Step 17. Connect A71 and A74 Bias-Tee Combiner's New Cables to the A70 Low Frequency Extension (LFE) Board and the Other Ends of the New Cables Connected to the IF Multiplier (IF MUX)."

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

"Step 19. Reinstall the A19 Test Set Motherboard."

"Step 20. Install the A71–74 Bias-Tee Combiner's Gray Low Frequency Extension (LFE) DC Bias Cables, 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."

"Step 23. Reinstall Front Panel Assembly."

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

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

"Step 26. Position the Cables and Wires to Prevent Pinching."

"Step 27. Reinstall Front Panel Jumpers."

"Step 28. Reinstall the Inner Cover."

"Step 29. Reinstall the Outer Cover."

"Step 30. Remove Option 401 License."

"Step 31. Enable Option 405."

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

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

"Step 34. Prepare the PNA for the User."

Step 1. Obtain a Keyword and Verify the Information

Follow the instructions on the Software Entitlement Certificate supplied to obtain a license key for installation of this upgrade. Refer to "License Key Redemption" on page 8.

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

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

Once the license key file has been received and the information verified, you can proceed with the installation at "Step 2. Remove the Outer Cover" on page 16.

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, you will not be able to install the option. If this is the case, contact Keysight for assistance before beginning the installation of this upgrade. Refer to "Contacting Keysight" on page 6.

Step 2. Remove the Outer Cover

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

Step 3. Remove the Inner Cover

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

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1. See "Downloading the Online PNA Service Guide" on page 9.

Step 4. Inspect and (If Necessary) Remove the A4, A15, and A17 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 1).

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 version H or greater, then 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 1.

Figure 1   EERPOM Header Info Window

3. If your boards are **not** version H or greater, proceed to "Step 5. 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-A17 Boards" (i.e., refer to your PNA'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),".

Step 5. 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 6. 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.

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].

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1. See "Downloading the Online PNA Service Guide" on page 9.

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

— "Bottom RF Cables, 4-Port, Option 401 (**S/N Prefixes** <6021)"[1].

— "Bottom RF Cables, 4-Port, Option 401 (**S/N Prefixes** ≥6021)"[1].

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

2. Remove the following semi-rigid cable, but keep it for re-installation later. To see an image showing the location of the cable, click the Chapter 6 bookmark "**Bottom RF Cables, Standard 2-Port Configuration, Option 401 (S/N Prefixes** <6021)**" or** "Bottom RF Cables, 4-Port, Option 401 (**S/N Prefixes** ≥6021)" **in the PDF Service Guide**[1].

   These cables may be discarded - they will not be reinstalled.

   — W36   (N5247-20006) Port 3 CPLR THRU to A34 port 3 coupler

   — W32   (N5247-20016) Port 1 CPLR THRU to A33 port 1 coupler

   — W40   (N5247-20017) Port 4 CPLR THRU to A35 port 4 coupler

   — W44   (N5247-20018) Port 2 CPLR THRU to A36 port 2 coupler

3. 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.

Step 7. Remove the A23 Test Set Motherboard

For instructions, click the Chapter 7 bookmark "Removing and Replacing the A23 Test Set Motherboard" in the PDF Service Guide[1].

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1. See "Downloading the Online PNA Service Guide" on page 9.

Step 8. Remove the A24 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 A24 IF Multiplexer Board" in the PDF Service Guide[1].

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

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

Refer to Figure 2 for this step of the procedure. New parts are listed in Table 1 on page 11.

1. Assemble the Bias T combiners 5087-7403 (x4) to brackets N5247-20149 (x2) using 0515-1227 screws (x8) (items ① and ②). Torque to 9 in-lbs. Refer to Figure 2.

Figure 2   Assemble Bias T Combiners to brackets (5087-7403, N5247-20149, and 0515-1227)
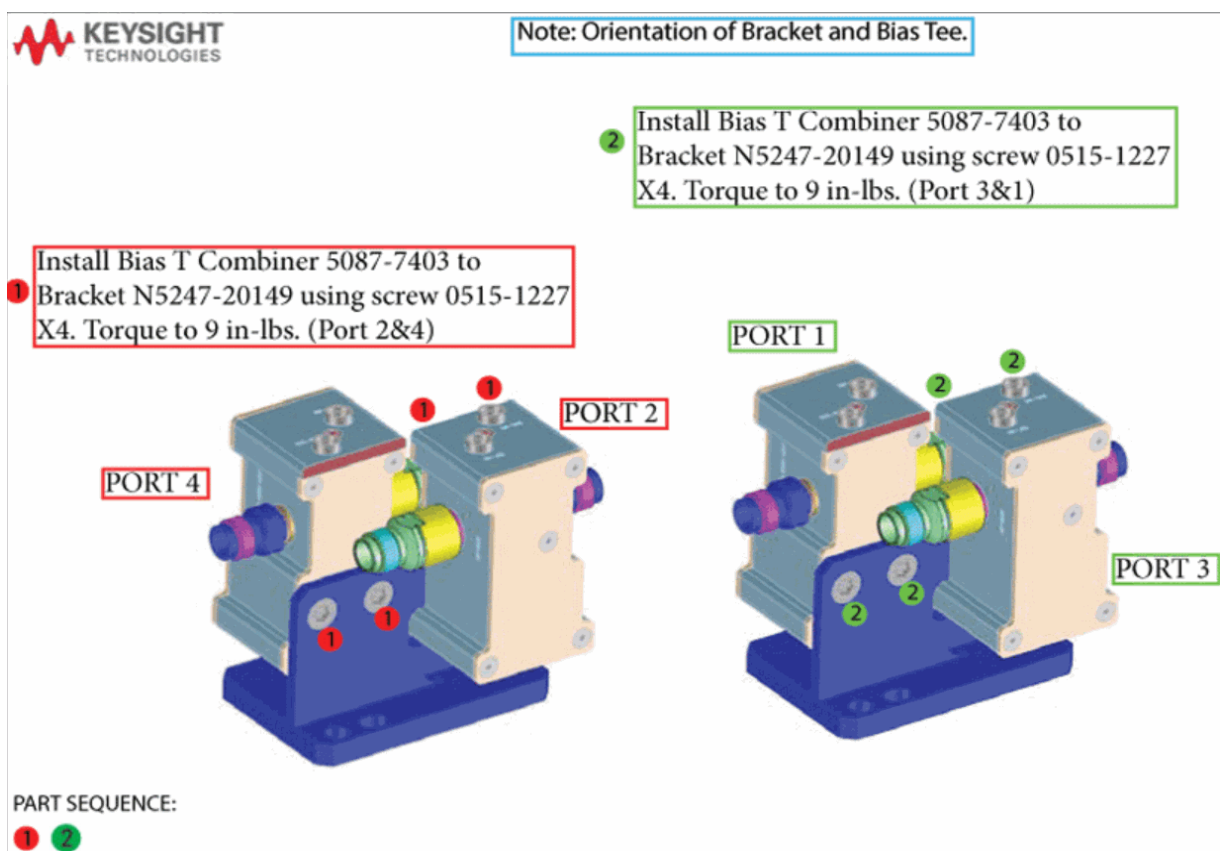
Refer to Figure 3 for this step of the procedure. New parts are listed in Table 1 on page 11.

2. Install the N5240-60097 (x4) cables onto the bias tee combiners using 5023-3299 clamps (x4) and clamp screws 0515-2141 screws (x4) (items ① and ②). Torque to 6 in-lbs. Refer to Figure 2.

Figure 3   Install cables and clamps to the bias tee combiners (N5240-60097, 5023-3299, and 0515-2141)
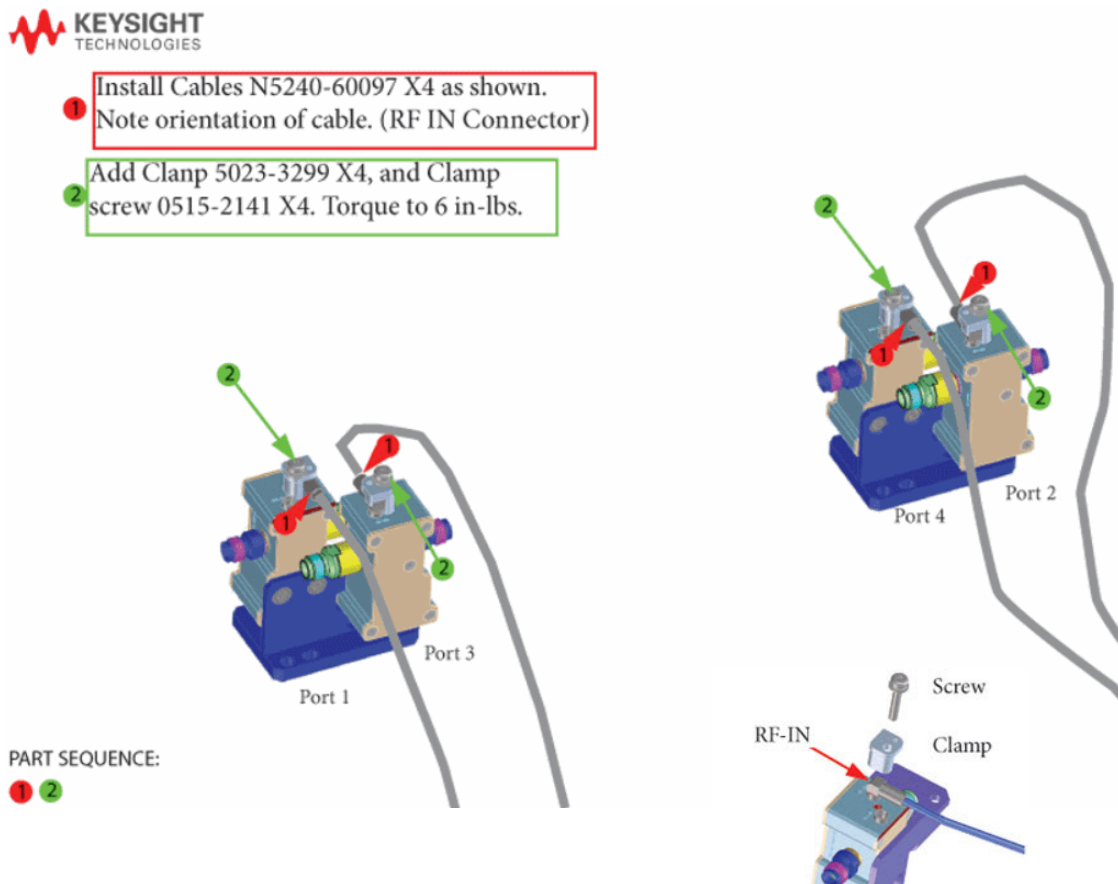
Refer to Figure 4 for this step of the procedure. New parts are listed in Table 1 on page 11.

3. Install the cables N5240-60091 (x4) onto the bias tee combiners (item ①).

Figure 4   Install DC cables to the bias tee combiners (N5240-60091 (x4))
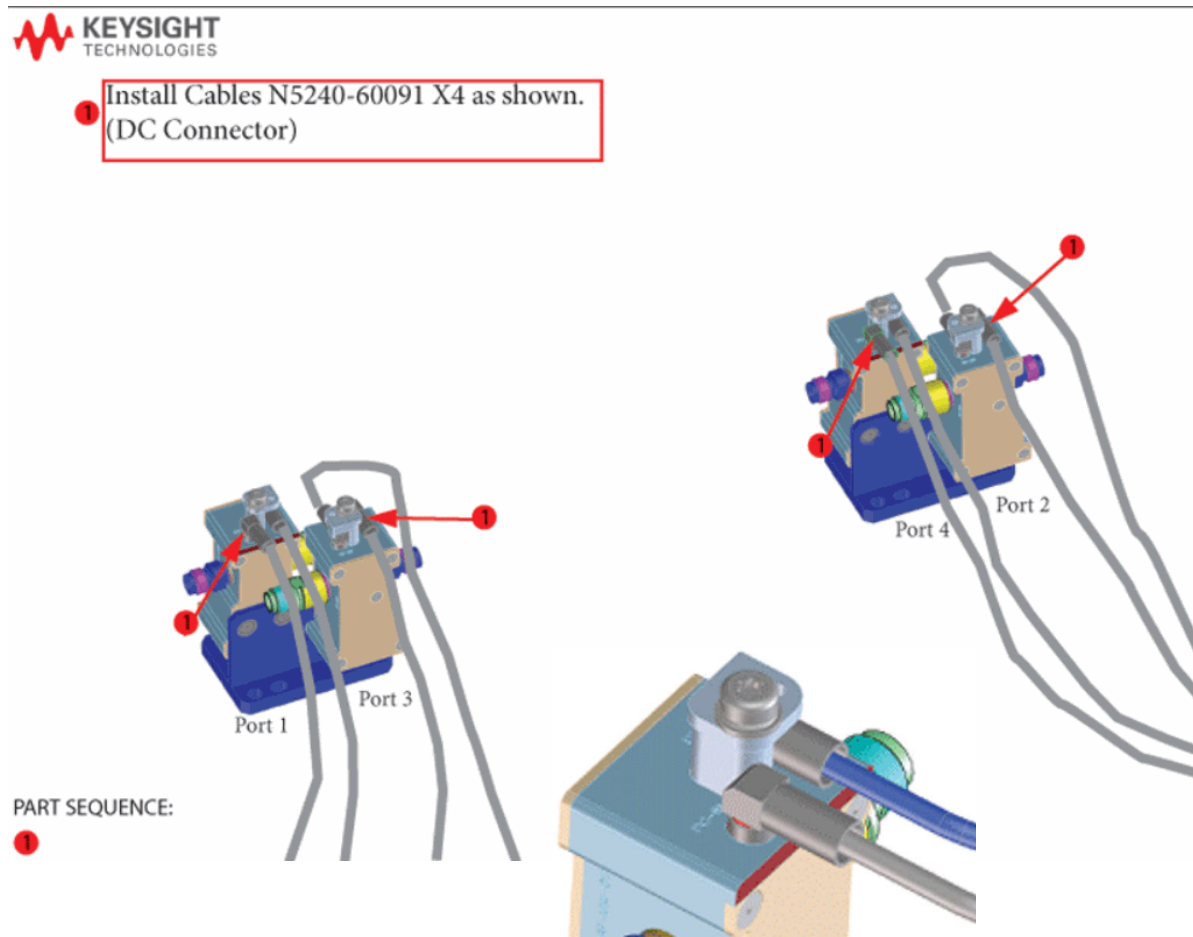
4. Install the Bias T combiners A71–A74 to using 0515-0372 (x4) screws. Torque screws to 9 in-lbs. Refer to Figure 5.

Figure 5   Install the A71–A74 Bias T Combiners to brackets (5087-7403, N5247-20149, and 0515-0372)
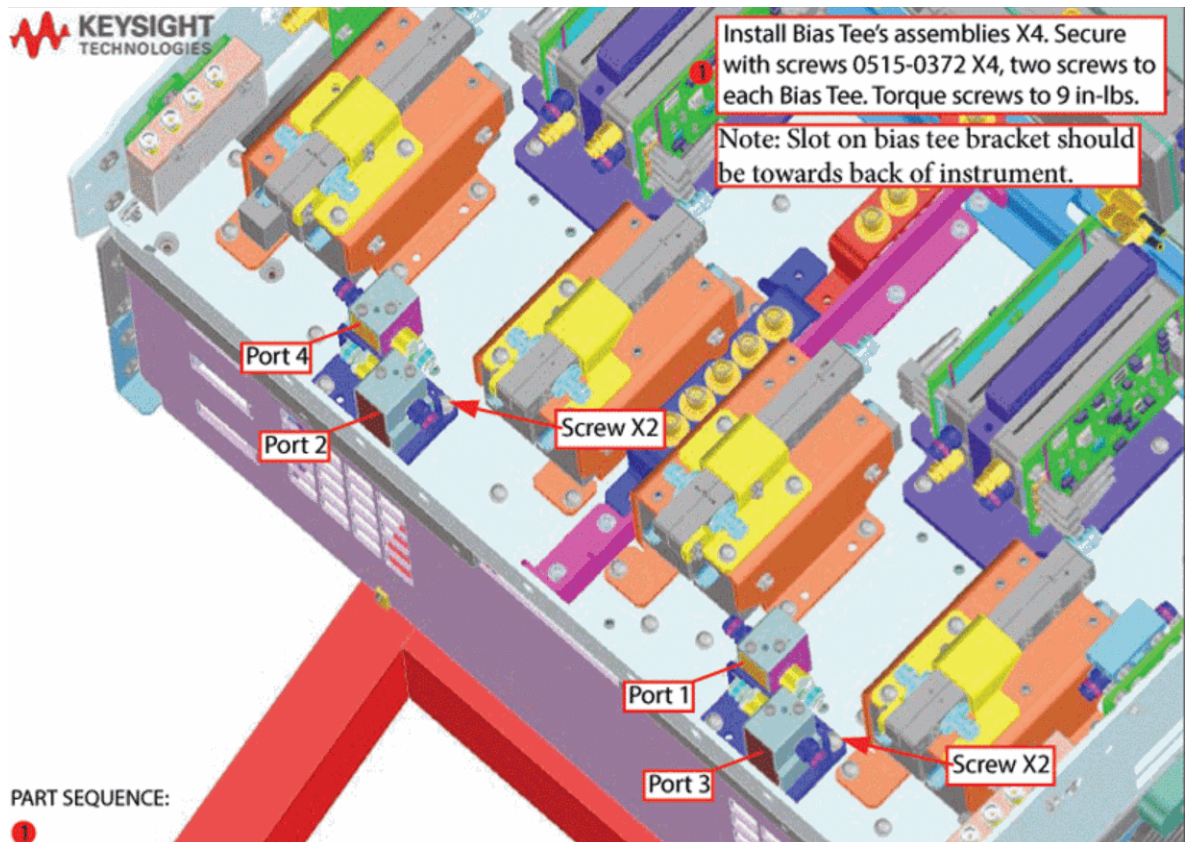
Step 10. Connect the A18 Motherboard/IF Multiplexer (IF MUX)/Low Frequency Extension (LFE)/Test Set Motherboard (TSMB) Ribbon Cable (N5240-60089)

Refer to Figure 6 for this step of the procedure. New parts are listed in Table 1 on page 11.

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 6 (N5240-60089 is shown, but N5242-60004 is similar).

2. Install the N5240-60089 ribbon cable to the A18 system motherboard J1(items ① and ②). Refer to Figure 6.

NOTE	**IMPORTANT!** Be careful to route the cable as shown in Figure 6 to avoid interference with the IF MUX board installation.

Figure 6   Install the ribbon cable on the A18 system mother board (N5240-60089)
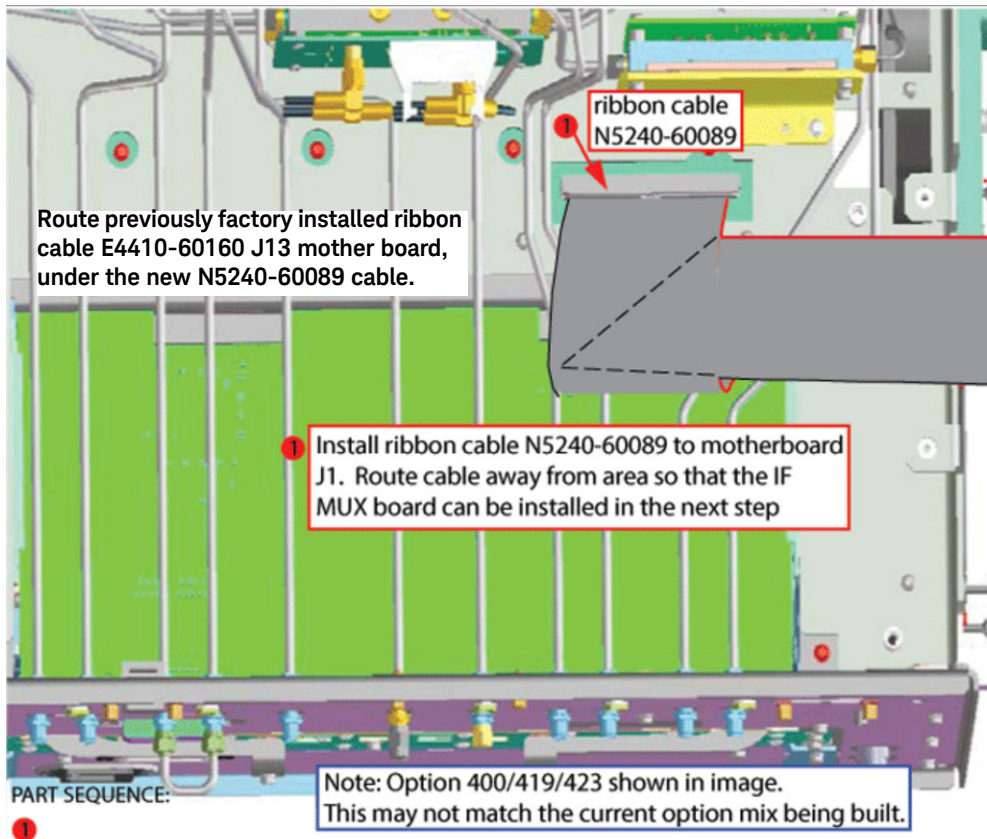
Step 11. Reinstall the A24 IF Multiplexer (IF MUX) Board and Connect
the Motherboard / IF Multiplexer / Low Frequency Extension (LFE)/
Test set motherboard (MB/IF MUX/LFE/TSMB) ribbon cable
(N5240-60089) and the IF MUX Rear Panel Hardware

1. Reinstall the IF MUX board using 0515-0669 (x4) screws (item ①).

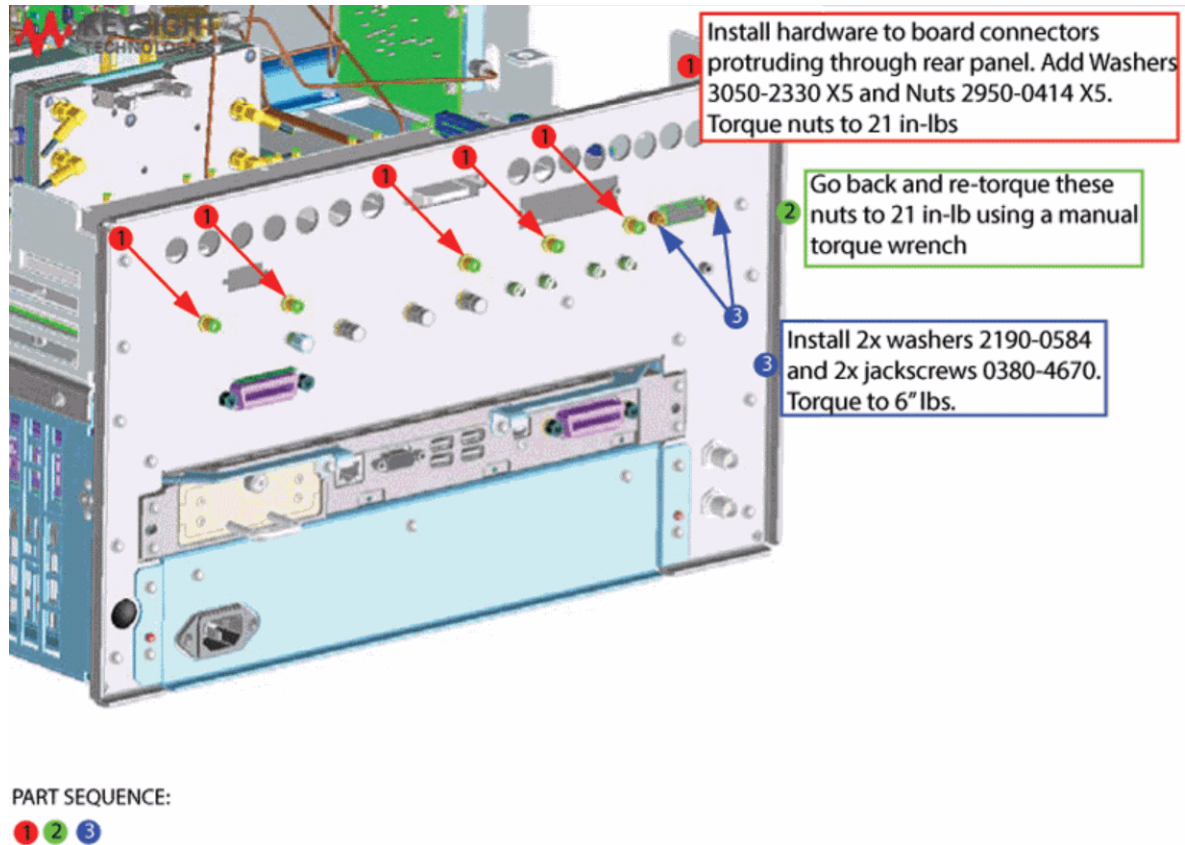2. For now, hand tighten only (item ②). Refer to Figure 7.

Figure 7   Reinstall the A24 IF MUX Board (N5240-60062 and 0515-0669)
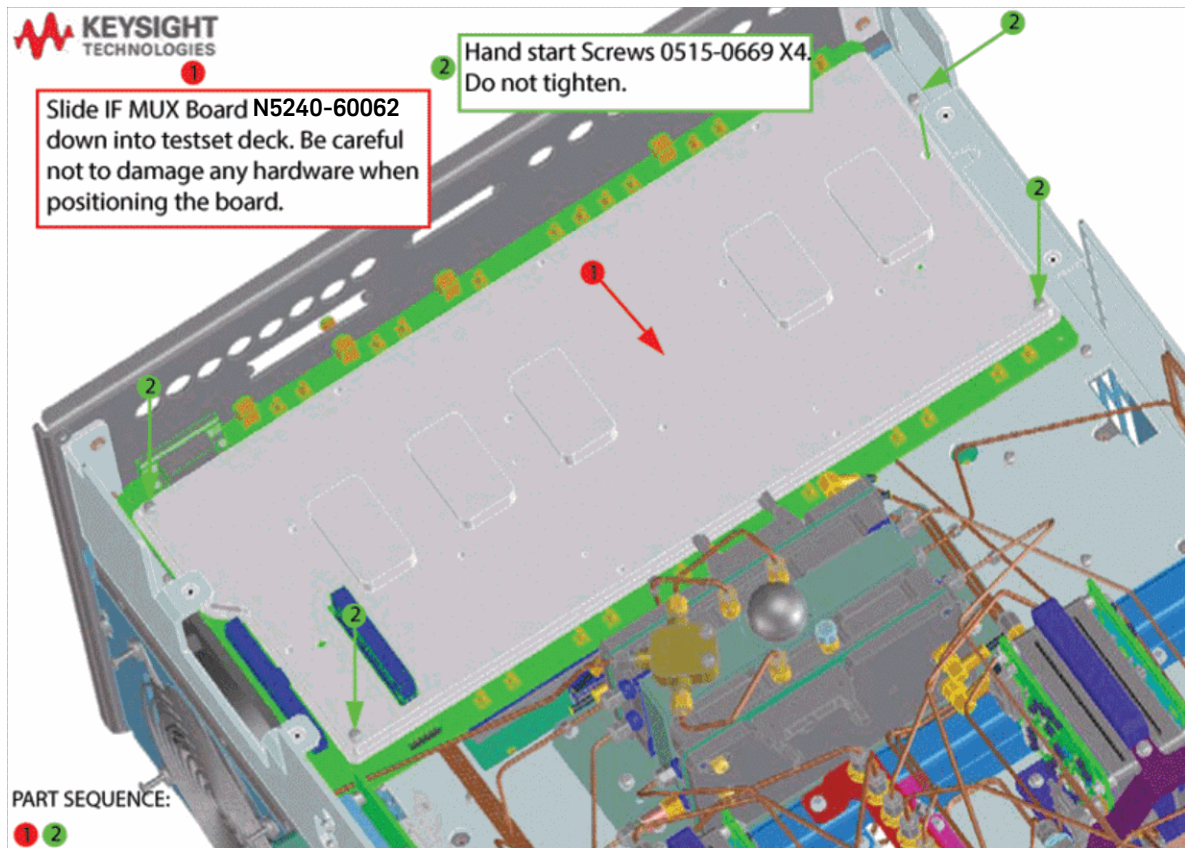
3. Reinstall the IF MUX board rear panel connectors using the washers and nuts removed in "Step 8. Remove the A24 IF Multiplexer (IF MUX) Board" on page 20 (items ① and ②). Refer to Figure 8.

4. Torque the 0515-0669 IF MUX board screws that were previously hand-tightened to 21 in-lbs (item ③). Refer to Figure 7 on page 26.

Figure 8   Reinstall the A24 IF MUX board rear panel hardware (N5240-60062 and 0515-0669)

Install hardware to board connectors protruding through rear panel. Add Washers 3050-2330 X5 and Nuts 2950-0414 X5. Torque nuts to 21 in-lbs

Go back and re-torque these nuts to 21 in-lb using a manual torque wrench

Install 2x washers 2190-0584 and 2x jackscrews 0380-4670. Torque to 6" lbs.

PART SEQUENCE:
① ② ③

5. Connect N5240-60089 Motherboard / IF Multiplexer / Low Frequency Extension (LFE)/ Test set motherboard (MB/IF MUX/LFE/TSMB) ribbon cable to IF MUX J1 and fold—to relieve tension—as shown (item ①). Refer to Figure 9 on page 28.

6. Reconnect the IF Multiplexer /SPAM gray cables to the A24 IF MUX board as indicated in Figure 9 on page 28 (items ② through ⑥).

Figure 9   Connect the MB/IF MUX/ low frequency extension (LFE)/TSMB ribbon cable to A24 IF MUX J1 and reconnect the IF MUX gray cables (N5242-60012, -60013, -60014, -60015, and -60016). Fold to relieve tension as shown (N5240-60089).
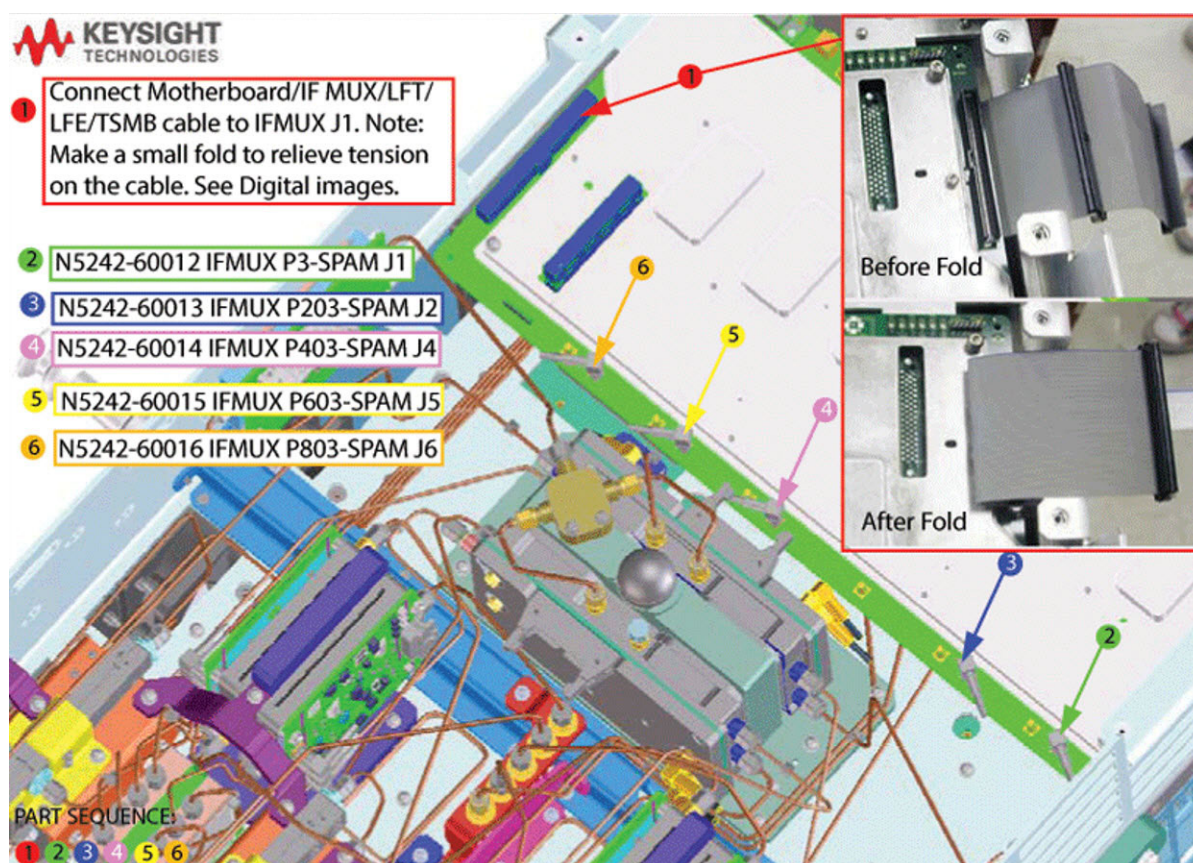
Step 12. Reinstall the Handler, Power and Other I/O Assemblies

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 10.

Figure 10   Reinstall handler I/O cable, I/O cable assembly, power I/O assembly, and I/O Cables.
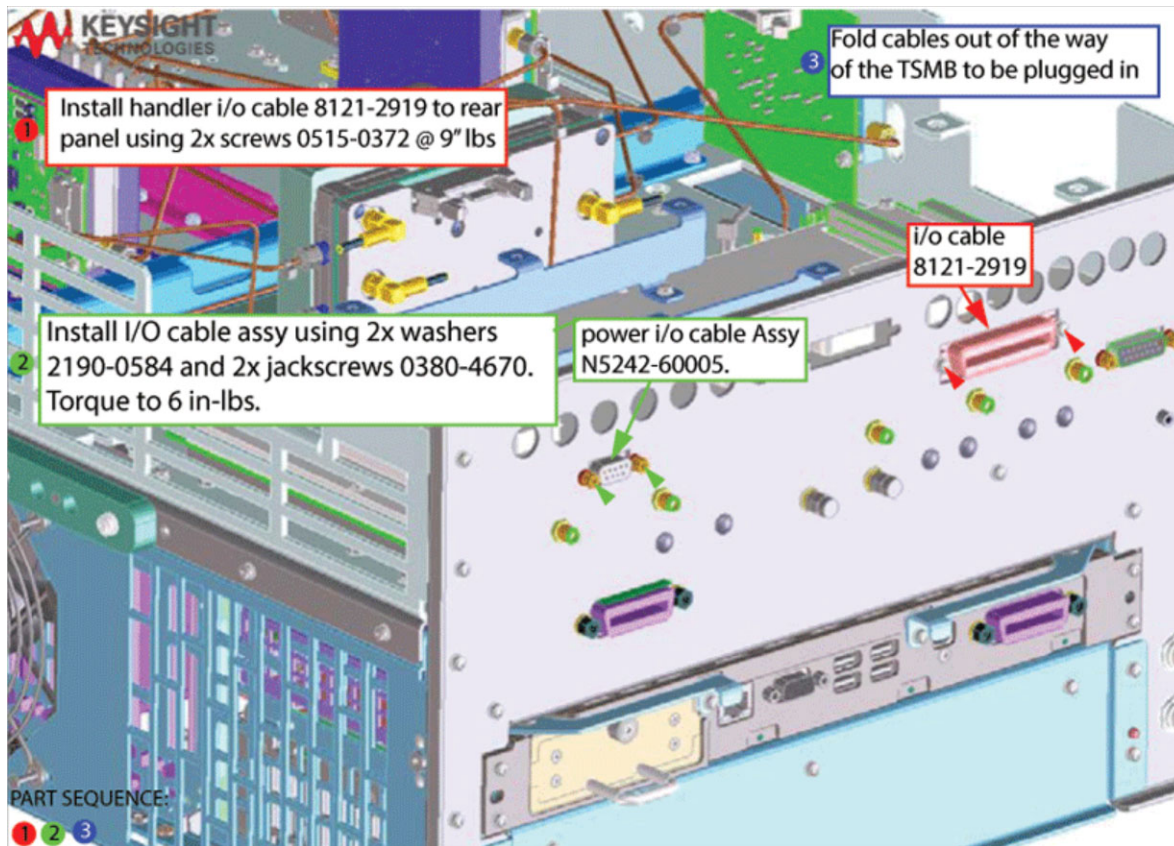
Step 13. Reinstall the Mixer Brick (MXB) Cables

Reinstall the other end of the mixer brick (MXB) cables (item ①) and all of the IF multiplexer (IF MUX) gray cables (IF MUX board as shown (items ② through ⑨). Refer to Figure 11.

Figure 11   Reconnect the other end of the IF gray cables to the IF MUX board (N5242-60017, –60018, –60019, –60020, –60021, –60022, –60023, and –60024)
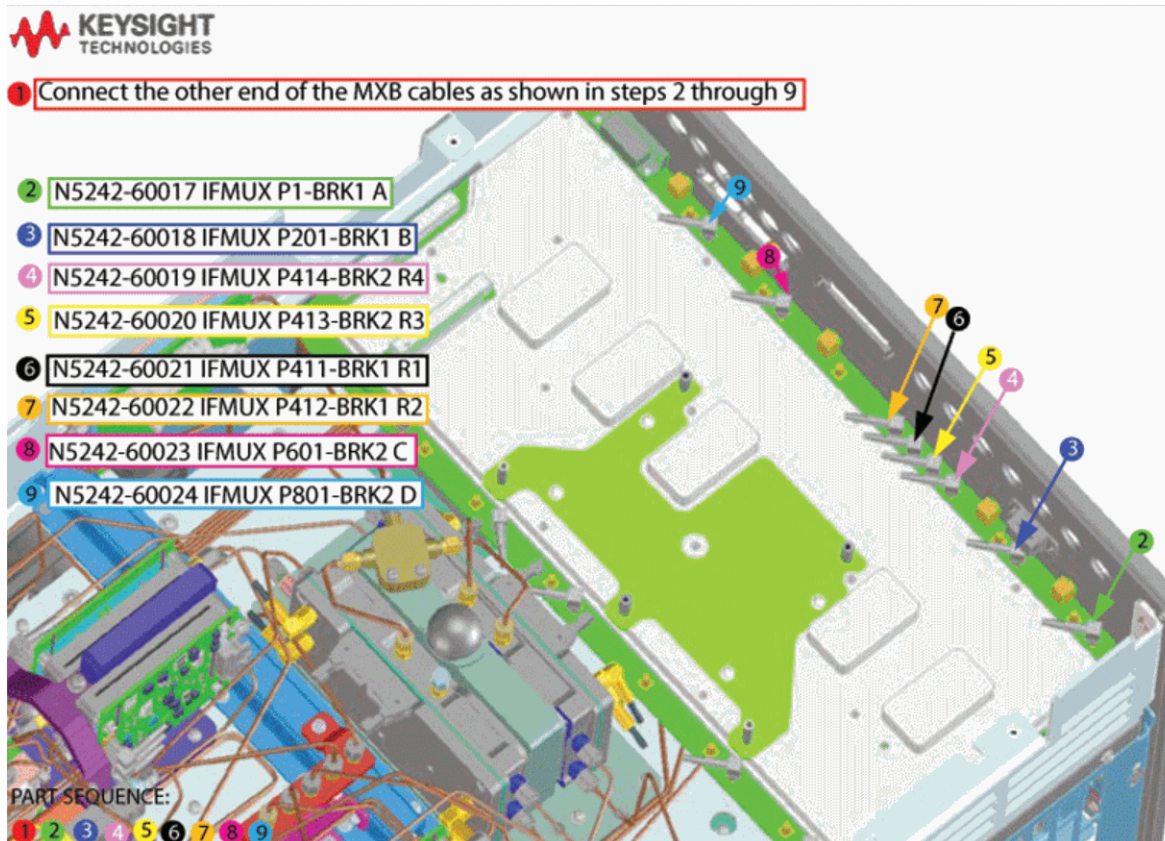
Step 14. Attach Lower Bracket (N5240-00011) to IF Multiplexer (IF MUX) Board Shield

Attach N5240-00011 lower bracket to IF MUX board using 0515-0372 screws (x4). Torque to 9 in-lbs. Refer to **Figure 12** for this step of the procedure. New parts are listed in **Table 1 on page 11**. Use a T-10 TORX driver to tighten all screws.

Figure 12   Attach lower bracket (N5240-00011) to IF MUX shield using screws (x4) (0515-0372)
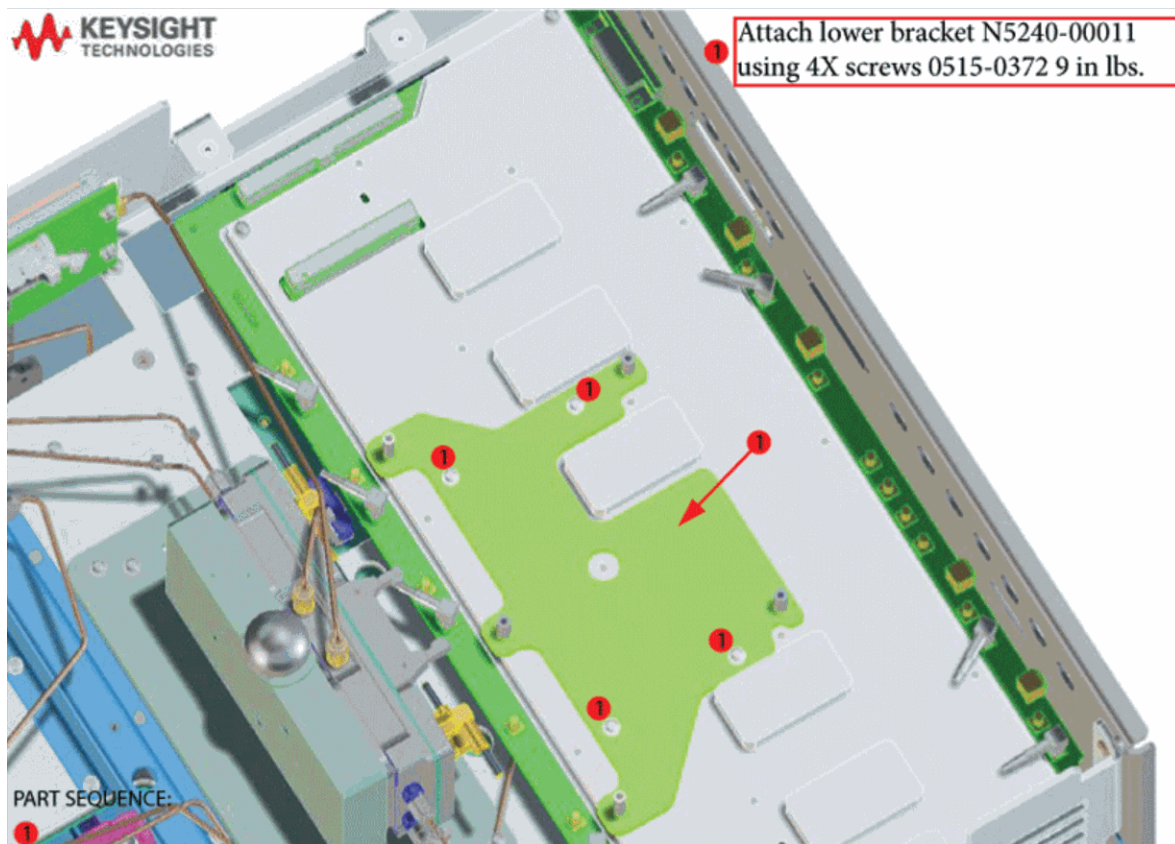
Step 15. Connect and Route New LFE Cables (8120-5014 (x2), 8120-5017 (x1), and 8120-5021 (x1)) and the Other Ends of the New Cables Connected to the IF Multiplexer (IF MUX) Board

1. Route existing cables as shown to avoid pinching (item ①). Refer to Figure 13.

Figure 13   To avoid pinching cables, route the existing cables as shown
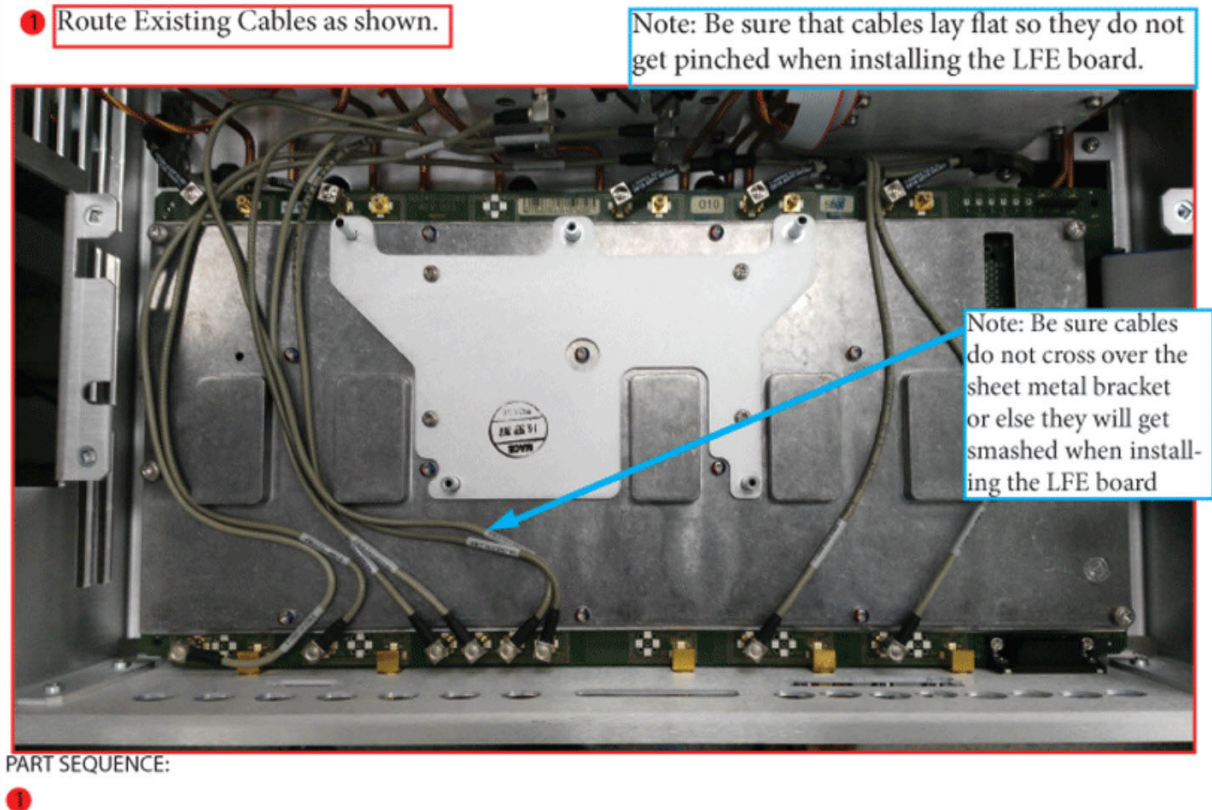
2. Connect and route the 8120-5014 (x2) and 8120-5017 (x3) cables and connect the N5240-60089 MB/IF MUX/ Low Frequency Extension (LFE)/TSMB ribbon cable as shown on the IF MUX board (items ① through ⑤). You will connect the other ends of the IF gray cables later on the process. Refer to Figure 14.

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

Figure 14　　　Connecting and routing the gray cables and MB/IF MUX/ Low Frequency Extension (LFE)/TSMB ribbon cable (N5240-60089) on the IF MUX board (8120-5014 (x2), and 8120-5017 (x3))
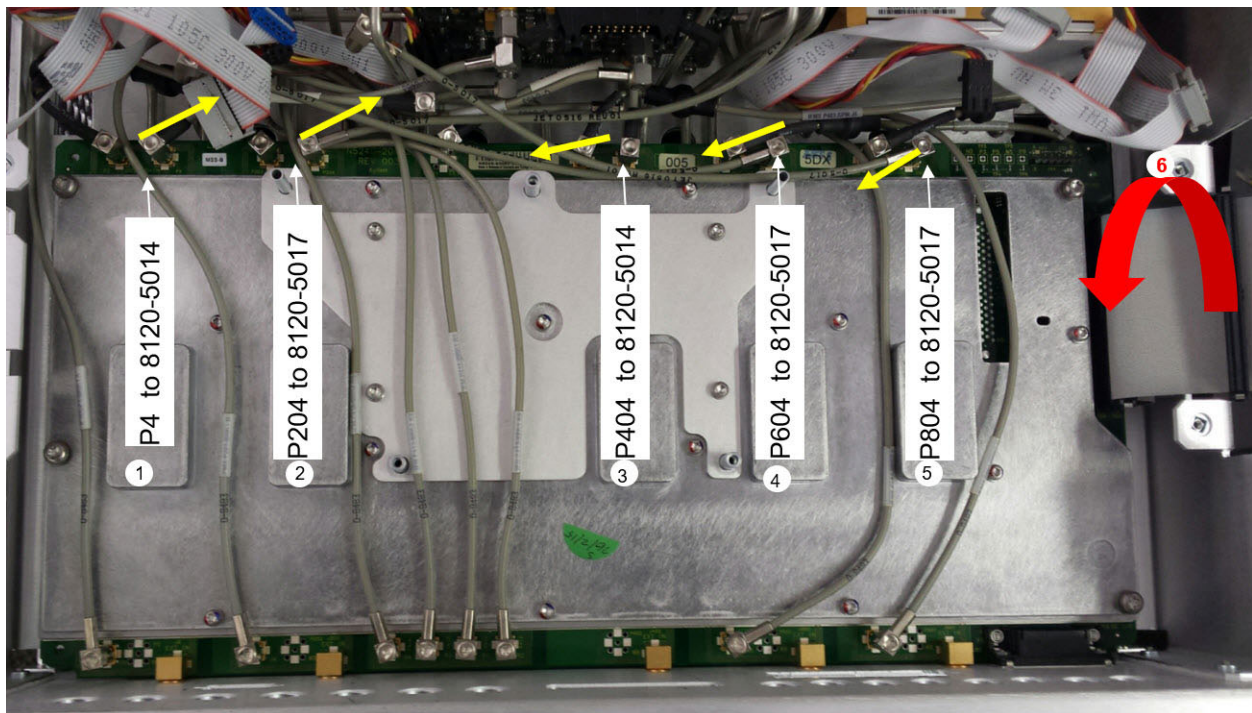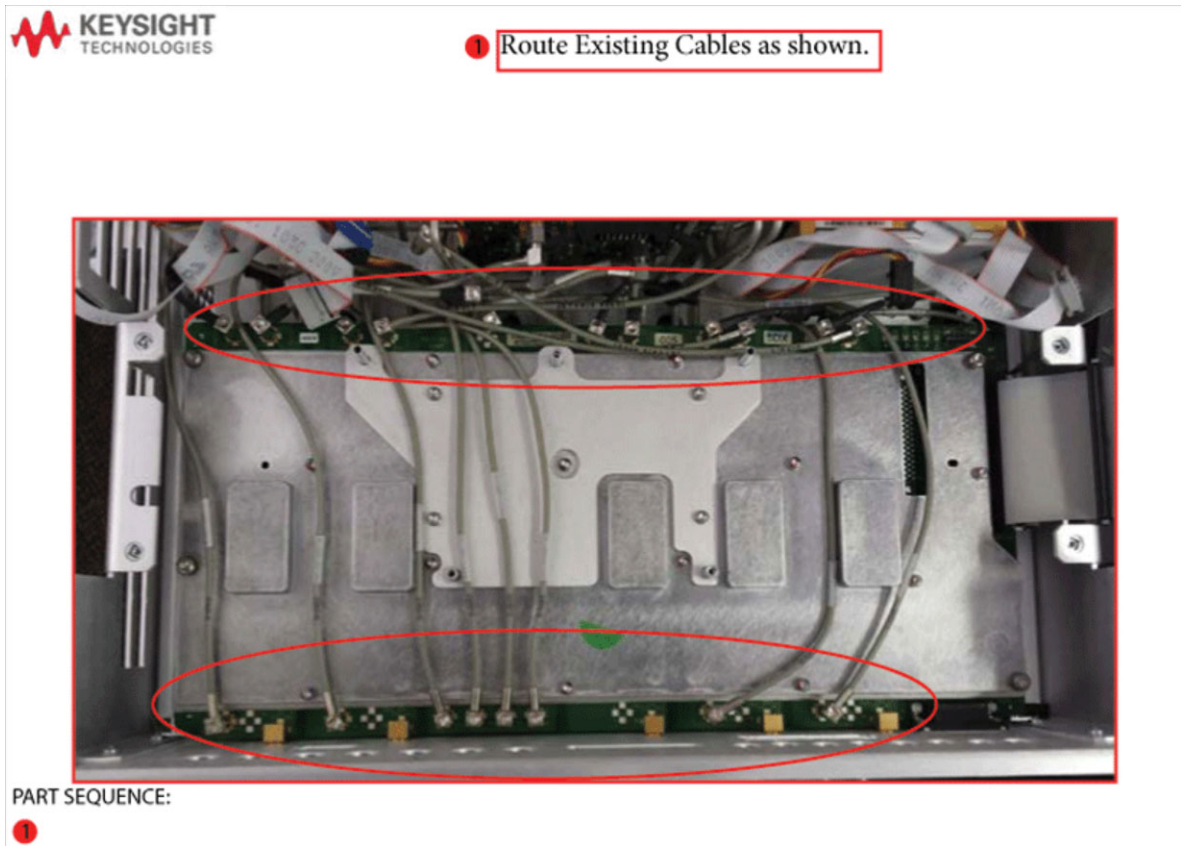
Figure 15   Routing the gray cables and MB/IF MUX/ Low Frequency Extension (LFE)/TSMB ribbon cable (N5240-60089) on the IF MUX board (8120-5014 (x2), and 8120-5017 (x3)).
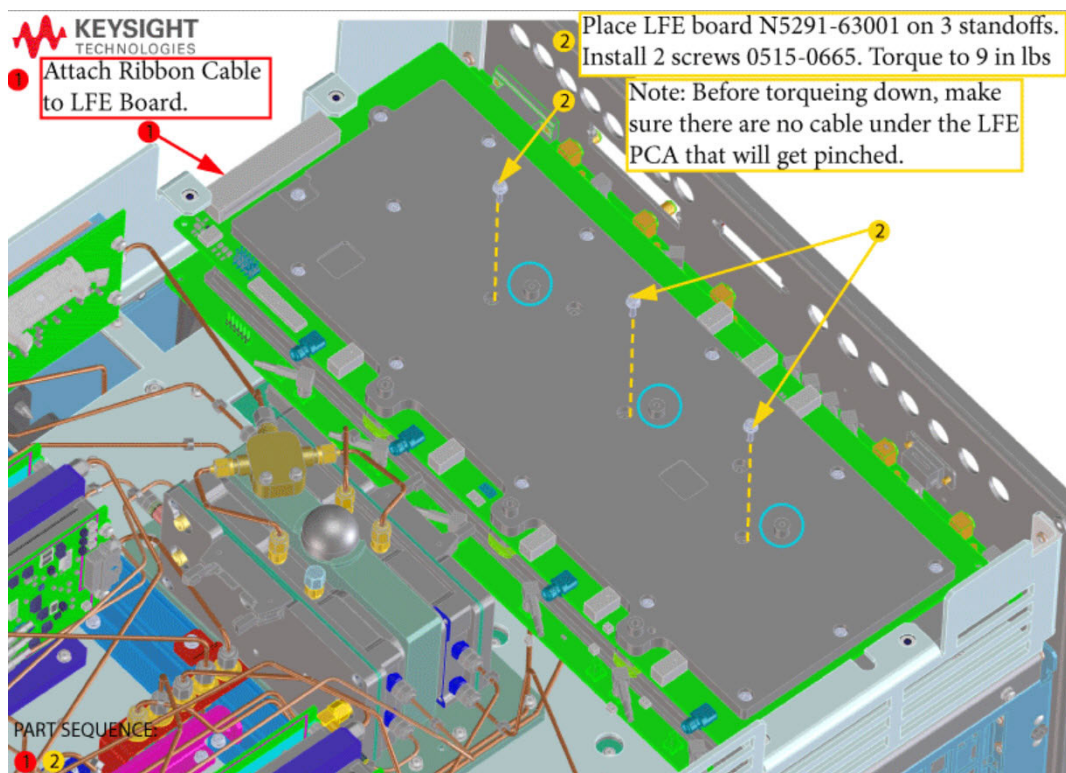
Step 16. Install the A70 Low Frequency Extension (LFE) Board

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

2. Connect N5240-60089 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 16.

3. Install the A70 LFE board using the 0515-0665 screws x2. Torque to 9 in-lbs (item ②). Refer to Figure 16.

Figure 16   Install the A70 LFE Board (N5291-60001, N5240-60089, and 0515-0666)

Step 17. Connect A71 and A74 Bias-Tee Combiner's New Cables to the A70 Low Frequency Extension (LFE) Board and the Other Ends of the New Cables Connected to the IF Multiplier (IF MUX)

> **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 9.

1. Connect the (8120-5014 (x2), 8120-5017 (x3)) items ① through ⑤ as shown in Figure 17 on page 37 and Figure 18 on page 38. (i.e., one end was installed in Figure 14 on page 33.)

2. Then choose one of the following:

    — **Version 6 Synthesizers**: Connect the N5245-60027 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 N5245-60027 N5242-60079, and N5242-60080 cables are connected to the Source1 and LO Source boards in a later step. Refer to Figure 17.

    — **Version 7 Synthesizers**: Connect the N5240-60112 Source 1, N5240-60114 Source 2, and N5240-60113 LO Source cables to the LFE board as shown – (items ⑥ through ⑧). The other end of the N5240-60112, N5240-60113, and N5240-60114 cables are connected to the Source1 and LO Source boards in a later step. Refer to Figure 18.

Figure 17   **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), N5245-60027, N5242-60079, and N5242-60080)
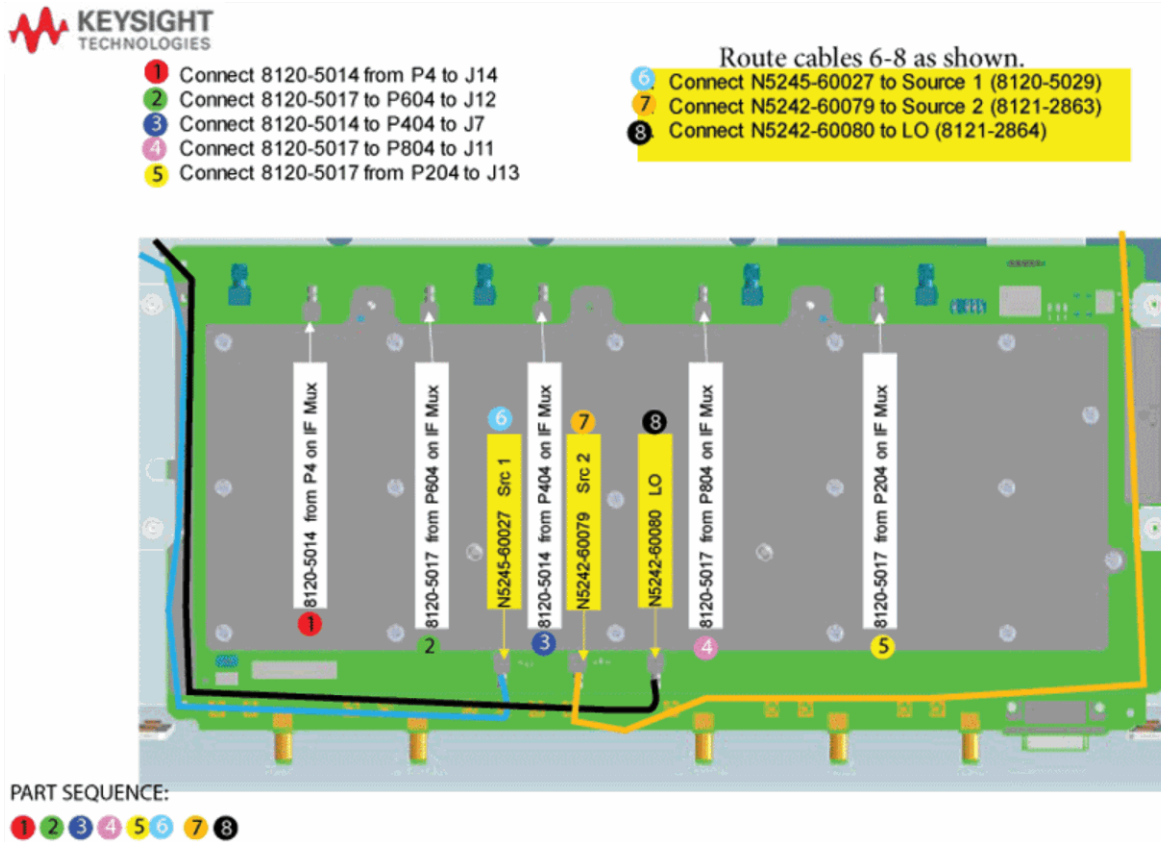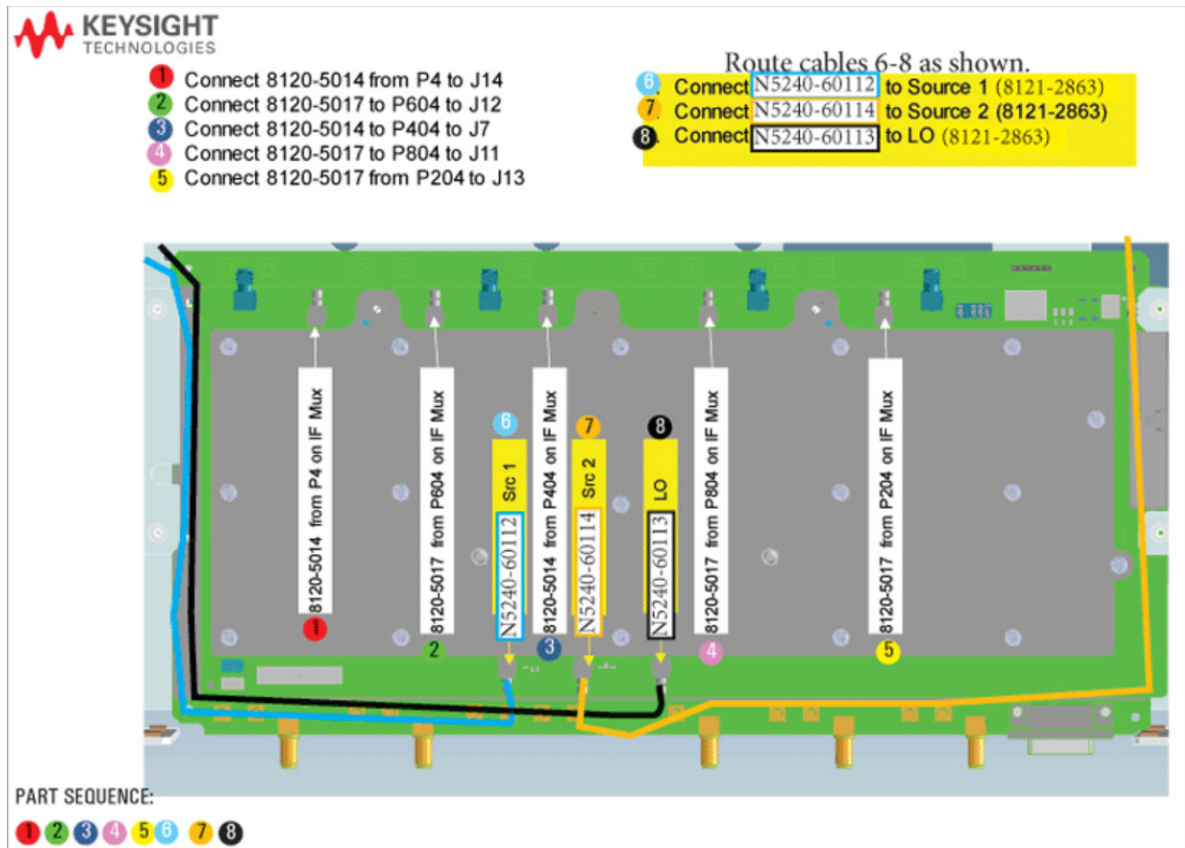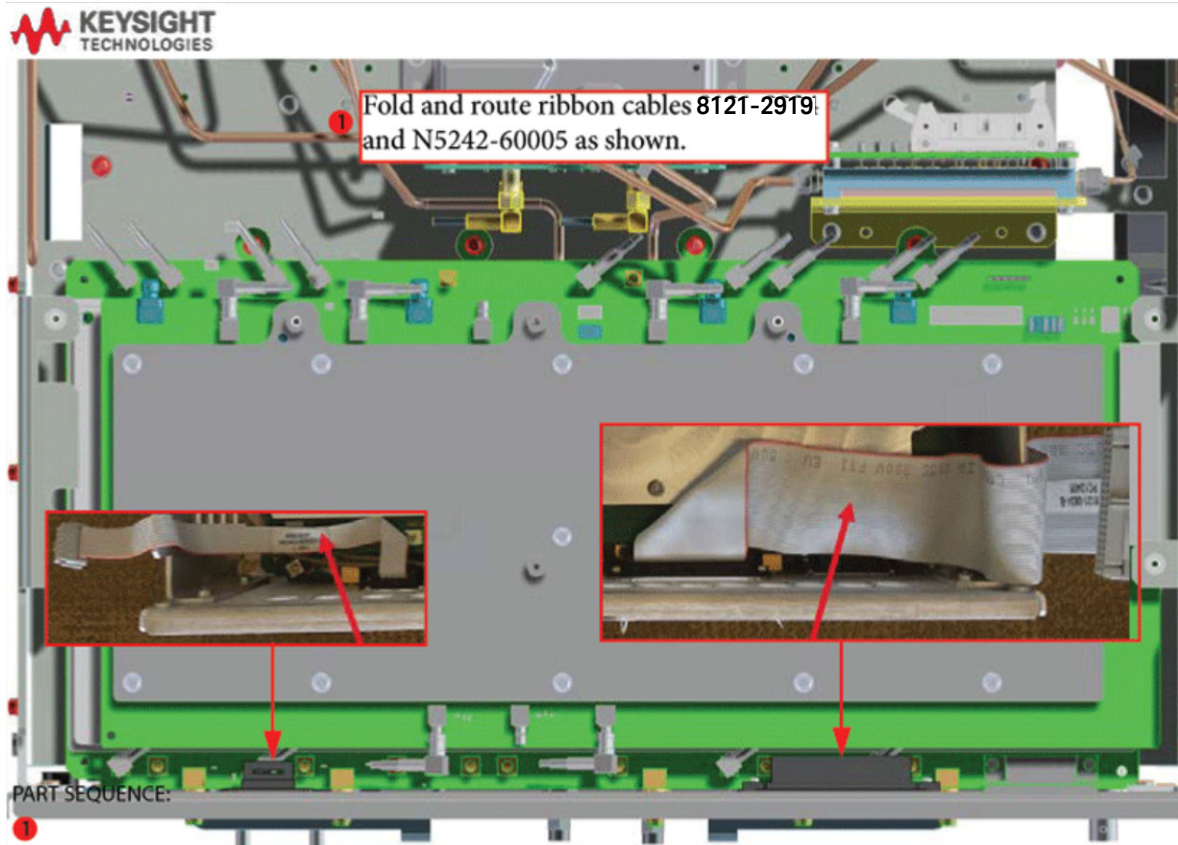
Figure 18   **Version 7 Synthesizers**: Connect the other ends of the IF gray cables and connect the Source 1, Source 2, and LO Source cables as shown (8120-5014 (x2), 8120-5017 (x3), N5240-60112, N5240-60113, and N5240-60114)

3. Fold and route Power I/O and Handler I/O cables. Refer to Figure 19.

Figure 19   Reinstall and route the ribbon cables (8121-2919 and N5242-60005)

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

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.

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

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.

This step contains the following sections:

— "Install the New Test Semi-rigid Cables"

— "Install Bias-Tee Combiner Cables and Clamps From the A71–A74 Bias Tees "RF-IN" to the A70 LFE Board "Port1"–"Port2" Connectors" on page 43

— "Install clamps onto the ferrite beaded cables" on page 45

Install the New Test Semi-rigid Cables

To see images showing the location of these cables, click the Chapter 6 bookmark "Bottom RF Cables, 4-Port, Option 405 (**S/N Prefixes** <6021)" or "Bottom RF Cables, 4-Port, Option 405 (**S/N Prefixes** ≥6021)" in the PDF Service Guide[1]. New parts are listed in Table 1 on page 11.

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

NOTE

The reference designators in this step correspond to the figures Figure 20 on page 41 and Figure 21 on page 42. But, some of the previous steps are provided for your reference.

Refer to Figure 20 on page 41.

— ①—W182 (N5247-20162) A33 test port coupler to A71 Bias Tee combiner, Port 1

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1. See "Downloading the Online PNA Service Guide" on page 9.

- ②—W183 (N5247-20170) A72 Bias Tee combiner, Port 3 to front panel CPLR THRU

- ③—W184 (N5247-20164) A34 test port coupler to A72 Bias Tee combiner, Port 3

- ④—W181 (N5247-20167) A71 Bias Tee combiner, Port 1 to CPLR THRU

Refer to .

- ①—W187 (N5247-20163) A74 port 2 bias-t combiner, Port 2 to front panel CPLR THRU

- ②—W186 (N5247-20171) A35 test port coupler to A73 port 4 bias-T combiner, Port 4

- ③—W188 (N5247-20169) A36 test port coupler to A74 Bias Tee combiner, Port 2

- ④—W185 (N5247-20165) A73 Bias Tee combiner, Port 4 to front panel CPLR THRU

Figure 20   Install A71 port 1 and A72 port 2 bias-T semirigid cables (N5247-20162, N5247-20164, N5247-20167, and N5247-20170)
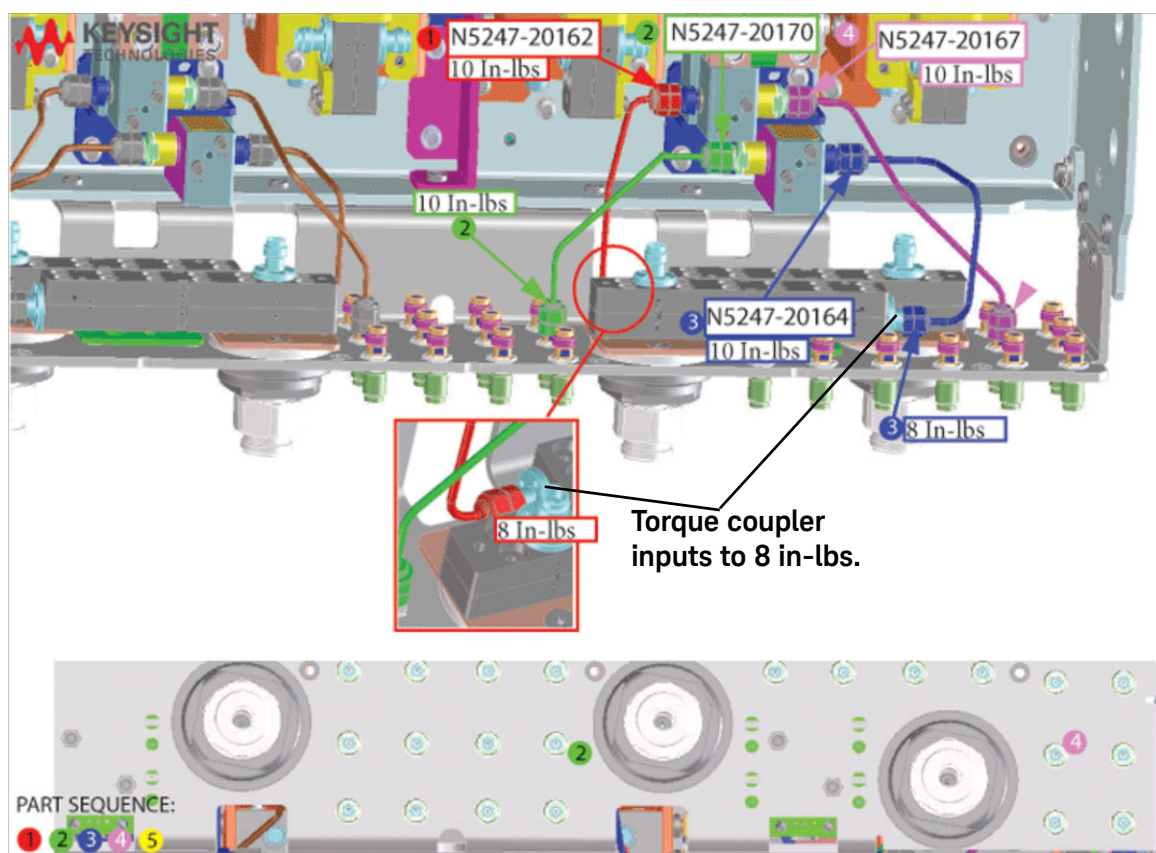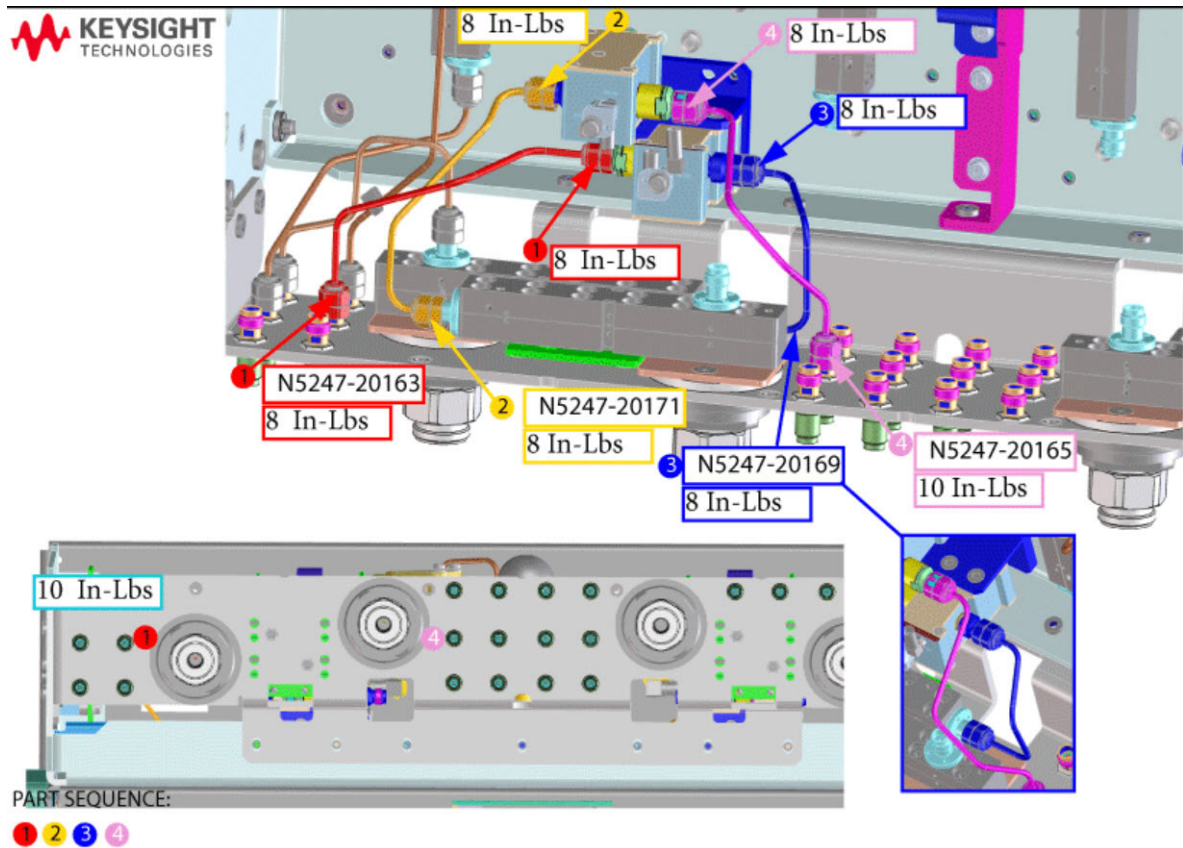
Figure 21   Install A74 port 2 and A73 port 4 bias-T semirigid cables (N5247-20163, N5247-20165, N5247-20169, and N5247-20171)

Install Bias-Tee Combiner Cables and Clamps From the A71–A74 Bias Tees "RF-IN" to the A70 LFE Board "Port1"–"Port2" Connectors

2. Install the N5240-60097 (x4) blue cables and route cables (items ① through ④) as shown in Figure 22.

— 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

Figure 22   Install the N5240-60097 Blue Cables from A71–A74 "RF-IN" to the LFE board's "Port1" Through "Port4" connectors
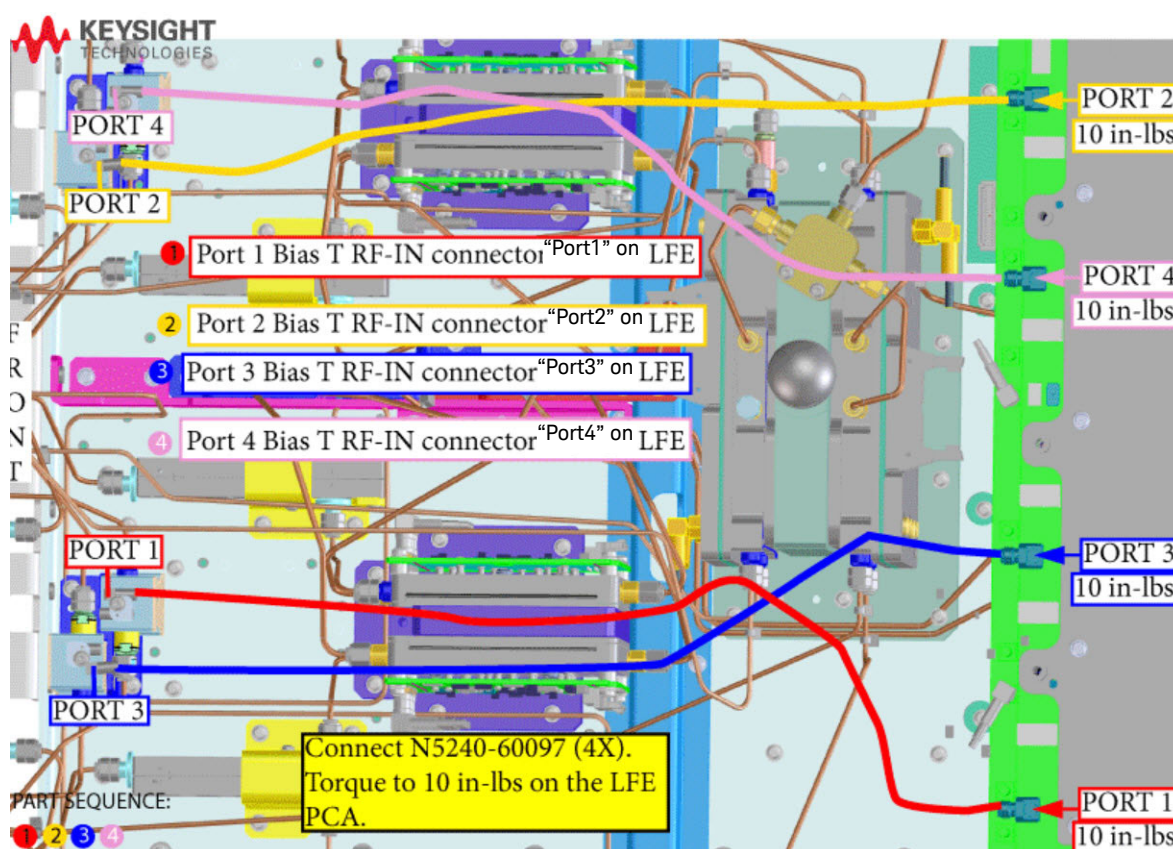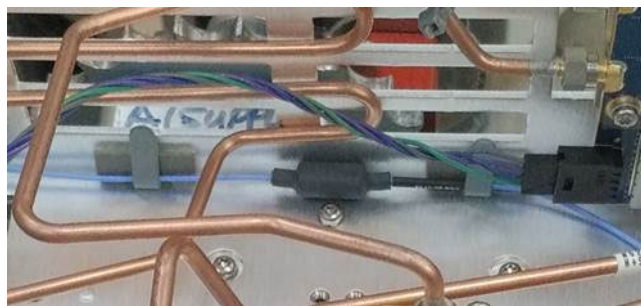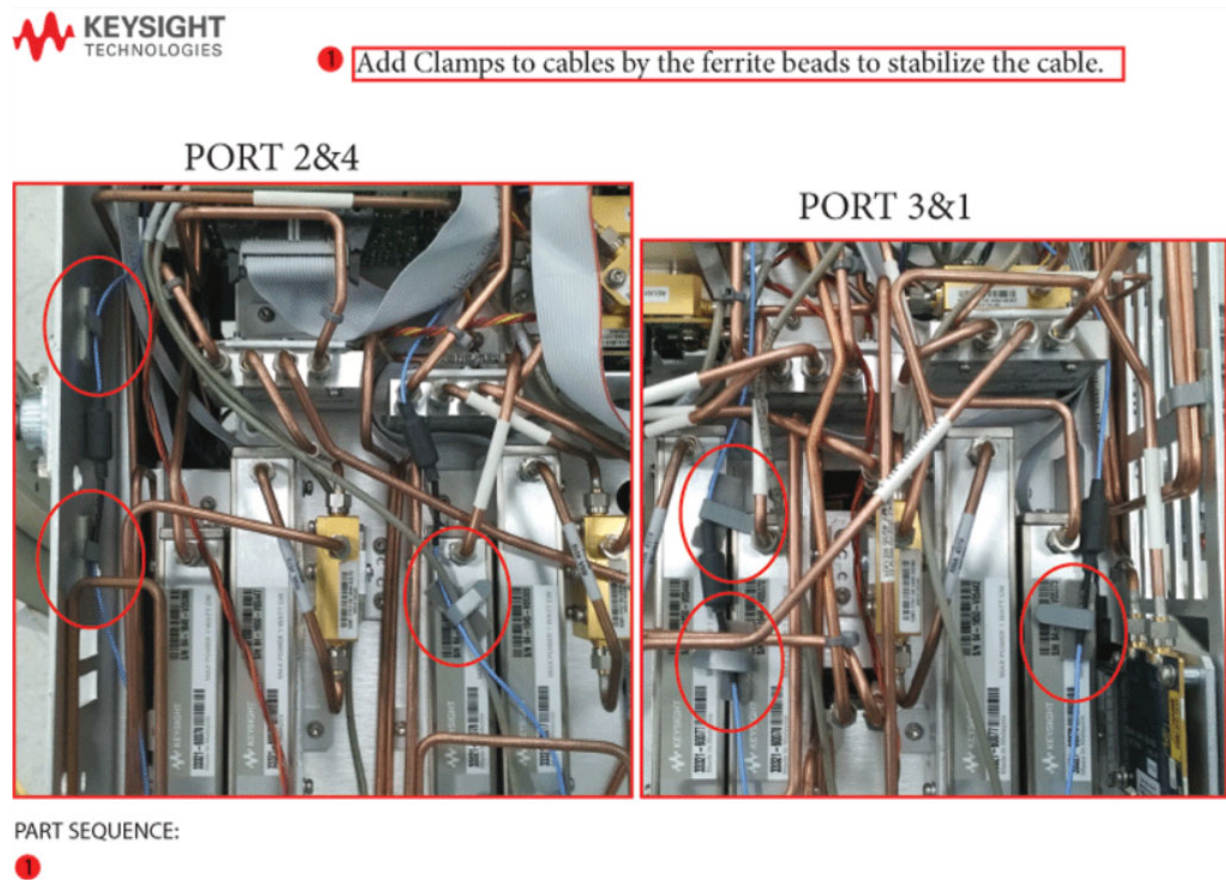
Figure 23   Install the Clamps (1400-1334) Onto the Ferrite Beads

Install clamps onto the ferrite beaded cables

3. Install clamps onto bias cables as shown.

Refer to Figure 23 on page 44.

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 11.

Step 20. Install the A71–74 Bias-Tee Combiner's Gray Low Frequency Extension (LFE) DC Bias Cables, Route Cables

This step contains the following sections:

— "Install the A71, A72, A73, and A74 bias-Tee combiner's blue Low Frequency Extension (LFE) DC bias Cables"

— "Route Cables As Shown" on page 47

Install the A71, A72, A73, and A74 bias-Tee combiner's blue Low Frequency Extension (LFE) DC bias Cables

To see an image showing the location of these cables, refer to Figure 24 on page 46. See also the Chapter 6 bookmarks "Bottom Ribbon Cables and Wire Harnesses, 4-port, Option 405 (**S/N Prefixes** <6021)" or "Bottom Ribbon Cables and Wire Harnesses, 4-port, Option 405 (**S/N Prefixes** ≥6021)" in the PDF Service Guide[1]. New parts are listed in Table 1 on page 11.

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

4. Connect A71–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 J543 to A37 port 2 bias-T combiner

   — ③—(N5242-60091) A19 test set motherboard J544 to A37 port 2 bias-T combiner

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1. See "Downloading the Online PNA Service Guide" on page 9.

- ④ –(N5242-60091) A19 test set motherboard J542 to A37 port 2 bias-T combiner

Figure 24   Install N5240-60091 DC combiner cables (x4) to A71 through A74 Bias-Tees
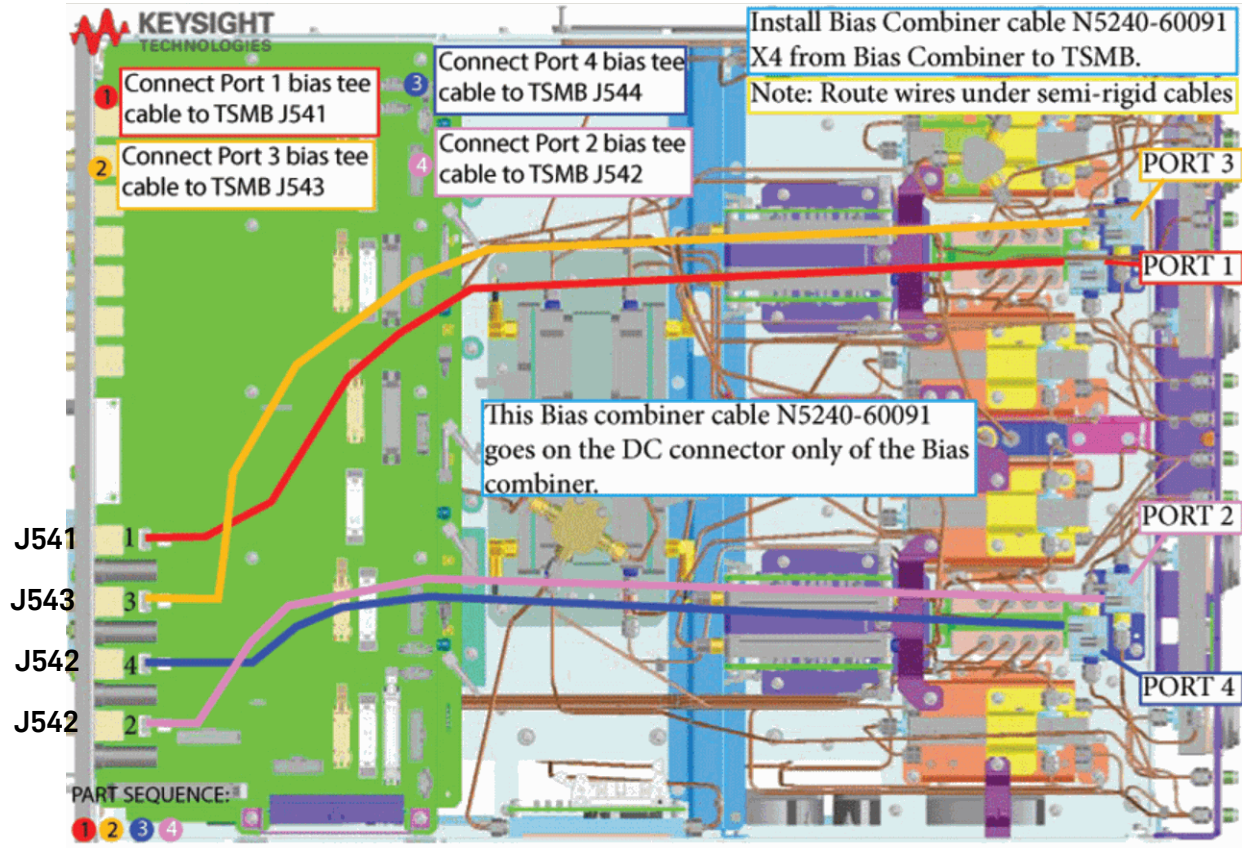
Route Cables As Shown

5. 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 24 on page 46.

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 9.

Refer to Figure 25 on page 49 and Figure 26 on page 50. New parts are listed in Table 1 on page 11.

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 N5245-60027 (item ①), N5242-60079 (item ②) and N5242-60080 (item ③) as indicated in Figure 25 on page 49.

   – **Version 7 Synthesizers:** Connect flexible cable N5240-60112 (item ①), N5240-60114 (item ②) and N5240-60113 (item ③) as indicated in Figure 26 on page 50.

Figure 25   **Version 6 Synthesizers:** Connect the other end of the N5242-60079, N5242-60080, and N5245-60027 cables
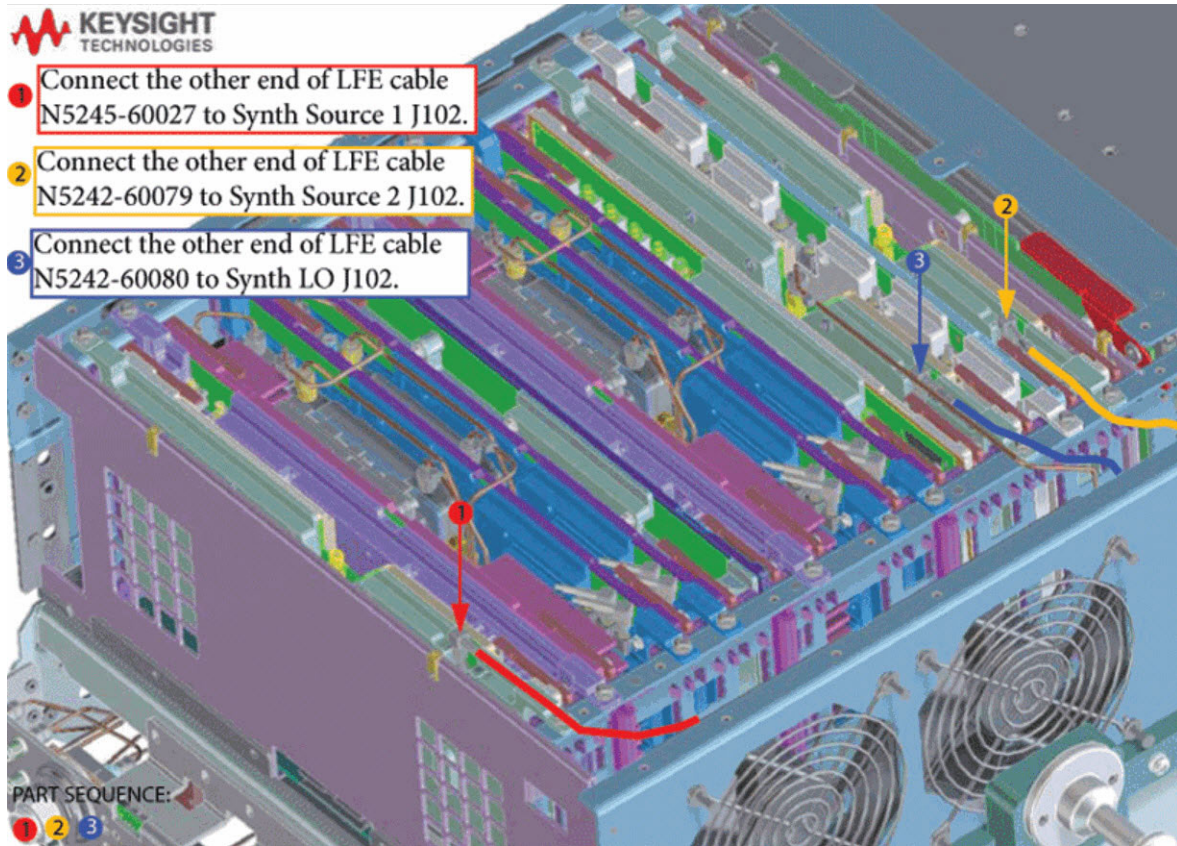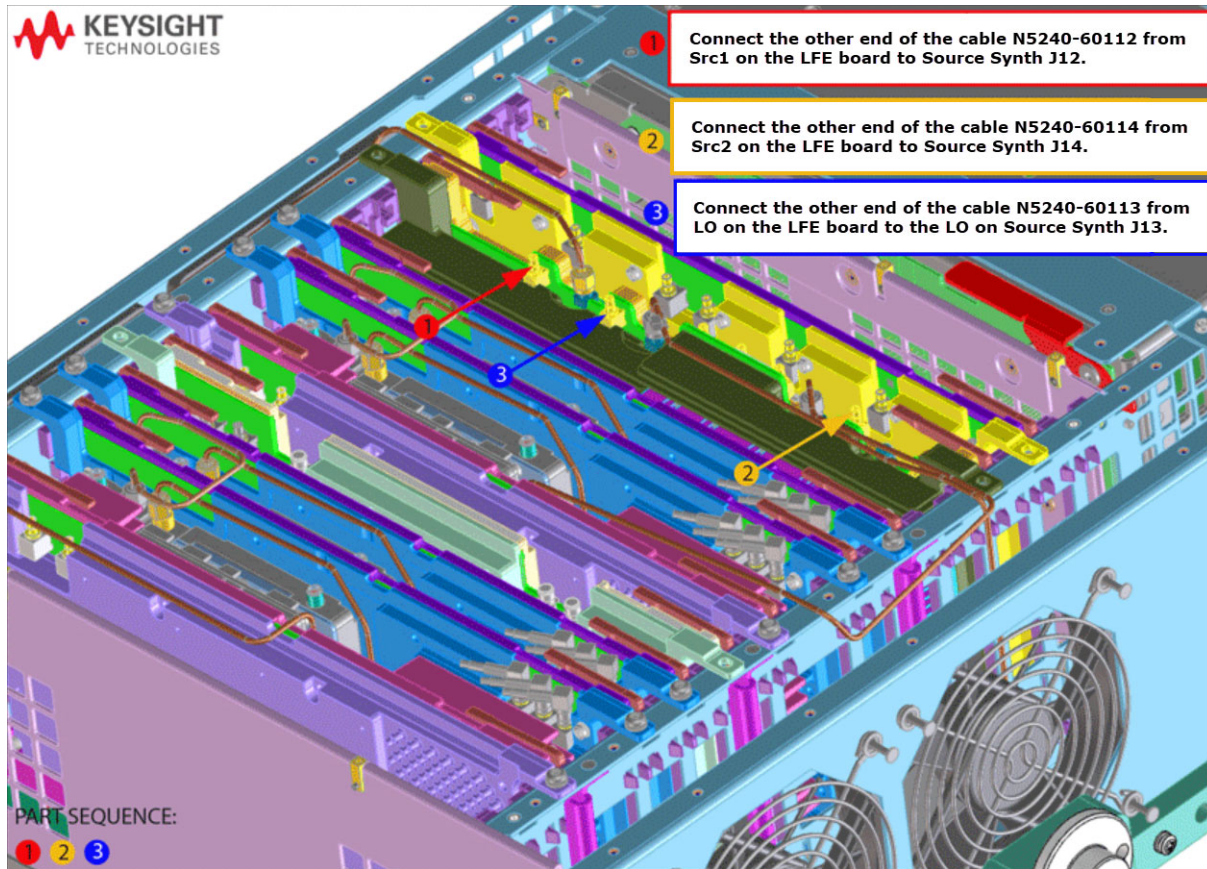
Figure 26   **Version 7 Synthesizers:** Connect the other end of the N5240-60112, N5240-60113, and N5240-60114 cables
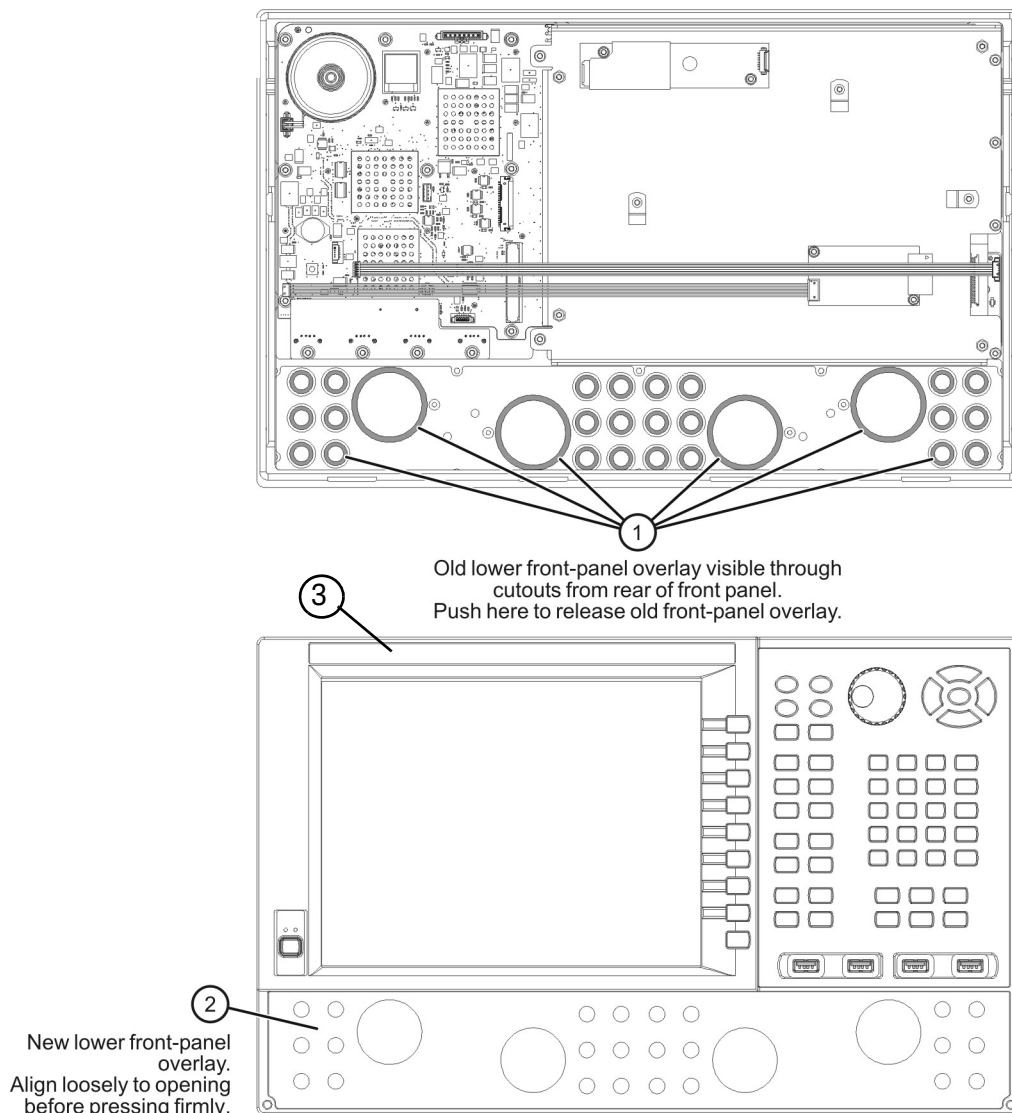
Step 22. Remove the Old Lower Front Panel Overlay

Refer to Figure 27 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 11.

1. From the back side of the front panel, use a blunt object in the cutouts in the lower front dress panel to push on the old overlay (item ①) and separate it from the front dress panel.

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

3. Remove the nameplate from the front panel (item ③).

4. Remove any adhesive remaining on the front panel.

Figure 27   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.

n5242_010_10

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 Guide[1].

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

Refer to Figure 27 on page 51 for this step of the procedure. New parts are listed in Table 1 on page 11.

1. Remove the protective backing from the new lower front panel overlay, N5227-80031 — (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 (N5227-80029, item ③).

---

1. See "Downloading the Online PNA Service Guide" on page 9.

Installation Procedure for the Upgrade

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 18. Install the Bias Tee Combiner's Semirigid Test Set Cables, the Blue Cables, and Install Cable Clamps Onto the Ferrite Beads" on page 40 and "Step 20. Install the A71–74 Bias-Tee Combiner's Gray Low Frequency Extension (LFE) DC Bias Cables, Route Cables" on page 45 are connected correctly and not open or shorted.

Step 26. 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 27. Reinstall Front Panel Jumpers

Reinstall the front panel jumper cables.

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].

1. See "Downloading the Online PNA Service Guide" on page 9.

Step 30. Remove Option 401 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 401 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 31. Enable Option 405

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

Procedure Requirements

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

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

- Refer to the license message you received from Keysight: Verify that the analyzer's model and serial numbers match those on the license message you received from Keysight.

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

Option Enable Procedure

1. Locate the email(s) from Keysight which contain license file attachments. These emails are the result of .

2. Copy the license file(s) from the email(s) to the root directory 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 32. 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 405 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 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

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

NOTE

IMPORTANT!

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

— 10 MHz frequency reference adjustment

— EE default adjustment: Synth LO only (Version 6 synthesizers), 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

— IF Response adjustment (Options S93090xA/B, S93092A/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 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.

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1. See "Downloading the Online PNA Service Guide" on page 9.

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.

Figure 28   EEPROM Backup Menu
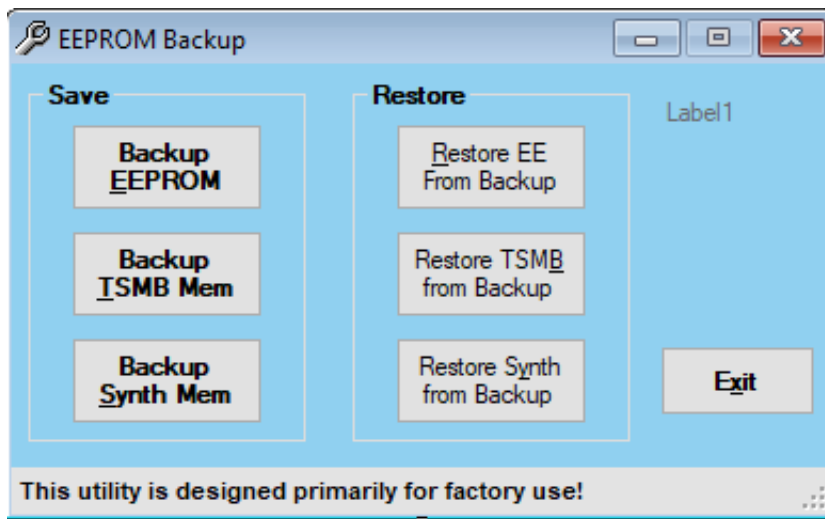
Operator's Check

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 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 4. Inspect and (If Necessary) Remove the A4, A15, and A17 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 5. Remove the Front Panel Assembly" on page 18. 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 and if necessary, start the PNA application.

12. Changing the EEPROGM 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 5. 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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