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 N5241B, N5242B or N5249B Option 201 to Option 205

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

Upgrade Kit Order Number:
N5241BU- 205, N5242BU- 205, and N5249BU- 205

Keysight Kit Number: N5242-60125

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

Notices

Trademark Acknowledgments

Manual Part Number

N5242-90125

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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

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

Keysight Add LFE Capability Upgrade Kit
Upgrade Kit Number: N5242-60125

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 some semi-rigid cables) were replaced with components that have 3.5 mm connectors.
If your analyzer's serial number prefix is MY/SG/US5310 and below:
Your analyzer was originally shipped with 2.4 mm components. The 2.4 mm couplers and connecting cables in your analyzer must be replaced with the new 3.5 mm items included in this kit.
If your analyzer's serial number prefix is MY/SG/US5321 and above:
Your analyzer was shipped with 3.5 mm components, so it is not necessary to replace the couplers and connecting cables. These items are included in this kit, but will not be used for your upgrade. Set them aside for possible use in the future.
Be very careful to use the appropriate hardware in your analyzer. Using the wrong hardware can ruin analyzer components, resulting in additional customer costs

This upgrade converts your standard 2-port configurable test set analyzer (N5241/2/9B Option 201) 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 N5241B Option 205 or N5242B Option 205 2-port analyzer.

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

CAUTION

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

Getting Assistance from Keysight

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

Contacting Keysight

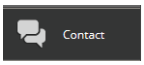
Assistance with test and measurements needs and information on finding a local Keysight office are available on the Web at:
http://www.keysight.com/find/assist

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

NOTE

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

If You Have Problems With the Upgrade Kit Contents

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

) link.

Getting Prepared

CAUTION

The PNA–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 Appendix A:, "Synthesizer Board Upgrade (N5240-60074 (with Tabs)/N5240-60076 (Without Tabs) Version F/G to Version H),".

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

NOTE

IMPORTANT! Before you begin this upgrade:

- 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 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 "Protecting Your Workspace from Electrostatic Discharge" below.
- Correct tools - refer to "Tools Required for the Installation" on page 11.
- Enough time - refer to "About Installing the Upgrade" on page 11.
- Test equipment for the post-upgrade adjustments. To view the equipment list, click the Chapter 3 bookmark "Tests and Adjustments" in the PDF Service Guide[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 file for the instrument that will receive the option.

To enable the option product(s), you must request license key(s) file 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, to which Keysight will promptly email your license key file. This upgrade only applies to B models.

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, 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 N5245-20009
- W43 N5245-20007
- W44 N5245-20008

(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)**

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 Required for the Installation

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

1. See "Downloading the Online PNA–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 (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 torque wrench - set to 21 in-lbs (2.38 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
1-in (25.4 mm) torque wrench - set to 72 in-lbs (8.15 N.m)	1	N/A
1/4-in (6 mm) open end wrench	1	N/A
9 mm nutsetter or open end torque wrench - set to 21 in-lbs) (2.38 N.m)	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 tee combiners. The bias tee combiners should be torqued to 9 in-lbs. And, on the front and rear bulkhead connectors, 5/16 inch nutsetter or open end torque wrench torque these connections to 21 in-lb.

About Installing the Upgrade

Products affected[a]	N5241B and N5242B Option 201
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

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 Contents of Upgrade Kit N5242-60125

Ref Desig.	Description	Qty	Part Number
--	Installation note (this document)	1	N5242-90125
--	Software Entitlement Certificate	1	5964-5145
--	China RoHS Addendum	1	9320-6722
A71	Port 1 LFE Bias-T combiner - port 1	2	5087-7403
A74	Port 2 LFE Bias-T combiner - port 2		
A75	LFE PC assembly – 2-port	1	N5291-60005
--	Bracket (For port 2 26.5 GHz bias-T) – Port 1 of 4	1	N5222-00001
--	Bracket (For port 2 26.5 GHz bias-T) – Port 2 of 4	1	N5222-00002
--	Bracket, lower (For IF MUX/LFE)	1	N5240-00011
--	Lower Front panel overlay – Option 205 and 220	1	N5222-80016
--	Machine screw, M3.0 x 8, pan head (2 to install mixer brick 2 to mounting block)	7	0515-0372
--	Machine screw, M3 x 14 mm, pan head (to install A75 LFE board on standoffs)	2	0515-0665
--	Machine screw, M3.0 x 18, pan head (2 to install mixer brick 2 to mounting block)	2	0515-0666
--	Machine screw, M3 x 25 mm, pan head (to install TSMB to deck)	3	0515-0667
--	Machine screw, M3 x 6 mm, 90-DEG-Flat head (to install port 1 and port 2 bias tee combiners to brackets (x2 each))	4	0515-1227
--	Machine screw, M2.5 x 14 mm, pan head (to install cable clamps and cables N5240-60097 and N5240-60098 to port 1 and port 2 bias tee RF connectors)	2	0515-2141
--	Clamp, cable – snap-in, adhesive mount (LFE DC bias cables)	9	1400-1334
--	Clamp, cable – pressure adhesive mount - (LFE bias combiner cables)	9	1400-1391
--	Clamp, SMP instrument (A71 and A74 Bias Tee RF connector x2)	2	5023-3299
--	Cable A06/A06, 310G (Connect P804 to J12)	1	8120-5021

Table 1 Contents of Upgrade Kit N5242-60125

Ref Desig.	Description	Qty	Part Number
--	Nameplate N5241B Option LFE	1	N5241-80003
--	Nameplate N5242B Option LFE	1	N5242-80035
--	Nameplate N5249B Option LFE	1	N5249-80004
W181	Cable, assy-RF, Port 1CPLR THRU to A71 port 1 bias T combiner	1	N5222-20119
W187	Cable, assy-RF, Port 2 CPLR THRU to A74 port 2 bias T combiner	1	N5222-20120
W191[a]	A75 LFE board to Synth Source 1 J102	1	N5242-60078
W193[a]	A75 LFE board to Synth LO 1 J102	1	N5242-60080
W194	Cable (short), coax, LFE RF, (Port 1 bias combiner “RF-IN” to “Port1” A75 LFE board)	1	N5240-60098
W197	Cable (long), assembly, coaxial LFE RF, (Port 2 bias combiner “RF-IN” to “Port2” A75 LFE board)	1	N5240-60097
W208[b]	A70/A75 LFE board to A15 DD Synth Source 1 J12	1	N5240-60112
W210[b]	A70/A75 LFE board to A15 DD Synth LO J13	1	N5240-60113
W182	Cable, assy-RF, A29 port 1 test coupler to A71 port 1 bias combiner	1	N5222-20123
W188	Cable, assy-RF, A32 port 2 test coupler to A74 port 2 bias combiner	1	N5222-20124
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
––	Cable Assy - MB/IFMUX/LFE/TSMB	1	N5240-60089
--	Cable, DC, 2–pin to R/A SMP (Port 1 bias combiner DC to A19 Bias “Port1” and Port 2 bias combiner DC to A19 Bias “Port2”.)	2	N5240-60091

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

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 Cover."

"Step 3. Remove the Inner Cover."

"Step 4. Inspect and (If Necessary) Remove the A4, A11, and A13 Synthesizer Boards, if They Are Not Version H."

"Step 5. Remove the Front Panel Assembly."

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

"Step 7. Install New Couplers—if Necessary."

"Step 8. Remove the A19 Test Set Motherboard."

"Step 9. Remove the A20 IF Multiplexer (IF MUX) Board."

"Step 10. Remove the A38–A41 Bias Tee Assemblies."

"Step 11. Assemble and Install the A71 and A74 Bias Tee Combiner Assemblies."

"Step 12. Connect the A18 Motherboard/IF Multiplexer (IF MUX)/Low Frequency Extension (LFE)/Test Set Motherboard (TSMB) Ribbon Cable (N5240-60089)."

"Step 13. 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 Connect the IF MUX Rear Panel Hardware."

"Step 14. Reinstall the handler, Power and Other I/O Assemblies."

"Step 15. Reinstall the Mixer Brick (MXB) Cables."

"Step 16. Attach Lower Bracket (N5240-00011) to IF MUX Board Shield."

Step 1. Obtain a Keyword and Verify the Information

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

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

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

NOTE

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

Step 2. Remove the Outer Cover

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

Step 3. Remove the Inner Cover

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

Step 4. 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 17).

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.

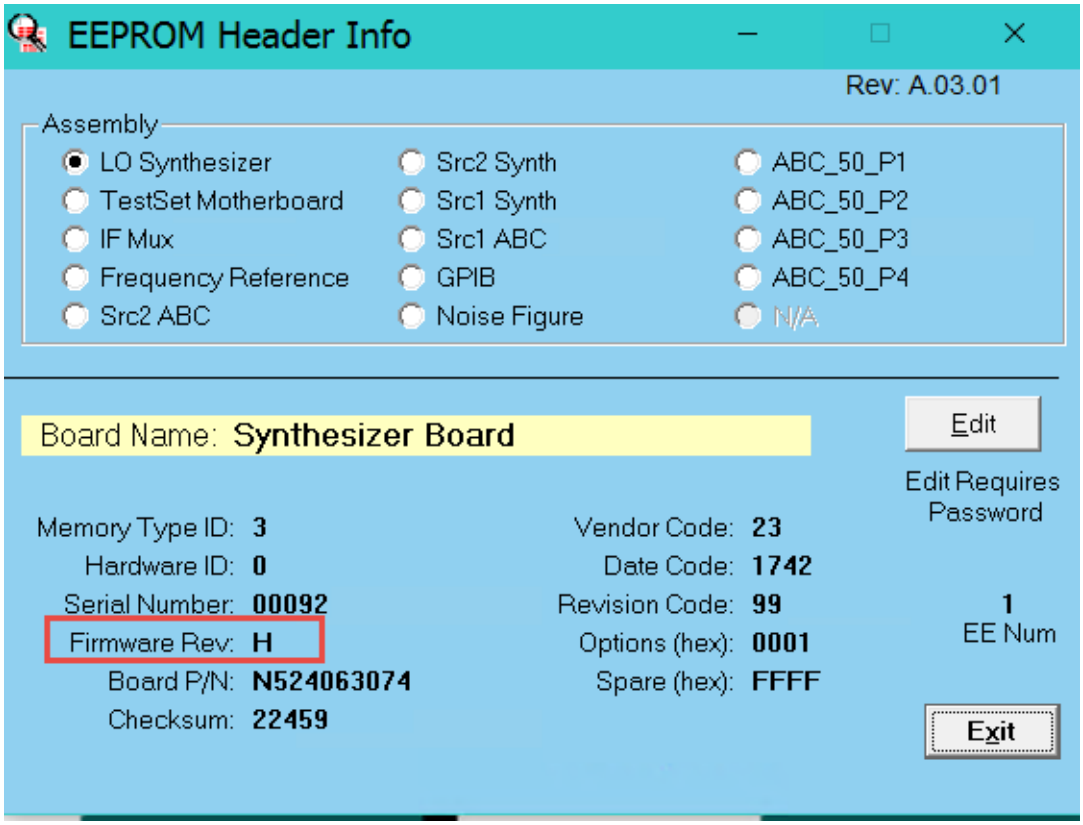
Verify that the synthesizer boards are all version H or greater.

1. If your synthesizer boards are all H or greater, on the PNA: 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 17.

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 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-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),"

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

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 (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.

Remove and save the cable guards for the front panel jumpers.

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. And, to see an image showing the location of the other cables, click the Chapter 6 bookmark “Bottom RF Cables, 4-Port, Option 201 (S/N Prefixes <6021)” or “Bottom RF Cables, 4-Port, Option 201 (S/N Prefixes ≥6021)”[1].

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:
   - W114 – from front-panel Port 1 CPLR THRU to A29 port 1 coupler
   - W116 – from front-panel Port 2 CPLR THRU to A32 port 2 coupler

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

Step 7. 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 8. 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].

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

Step 9. Remove the A20 IF Multiplexer (IF MUX) Board

NOTE

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

For instructions, click the Chapter 7 bookmark “Removing and Replacing the A20 IF Multiplexer Board” in the PDF Service Guide[1].

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

Step 10. 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.

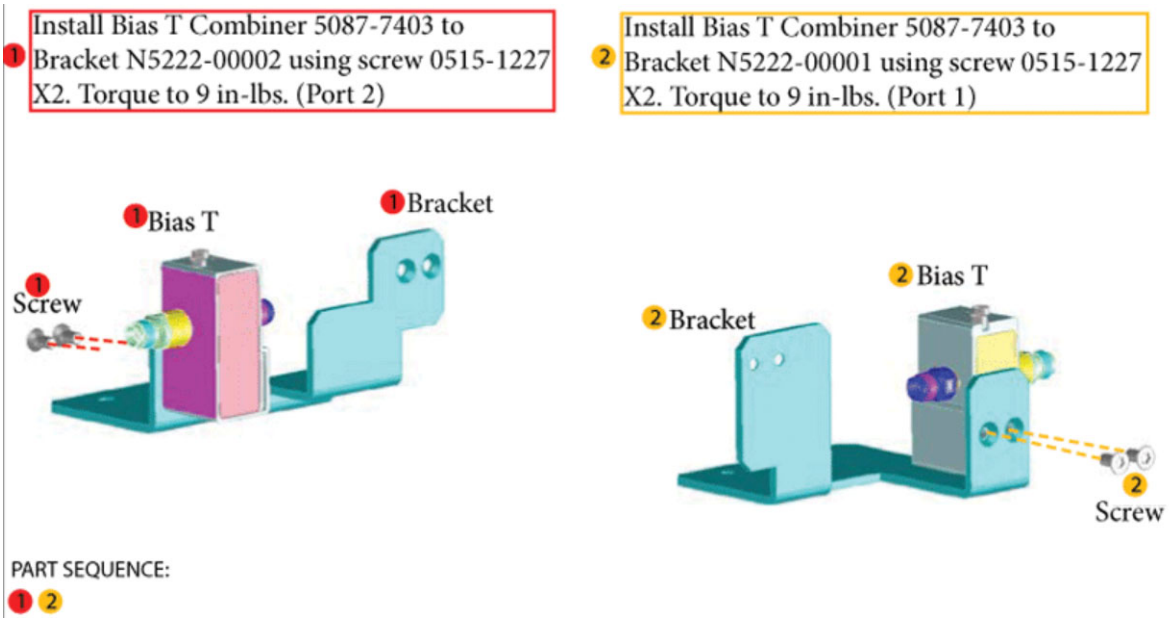
1. See “Downloading the Online PNA–X Service Guide” on page 10.

Step 11. Assemble and Install the A71 and A74 Bias Tee Combiner Assemblies

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

1. Assemble the 5087-7403 (x2) Bias T combiners to N5242-00001 and N5242-00002 brackets (Ports 1 and 2) (x2) using 0515-1227 screws (x4) – (item ① and ②). Torque to 9 in-lbs. Refer to Figure 3.

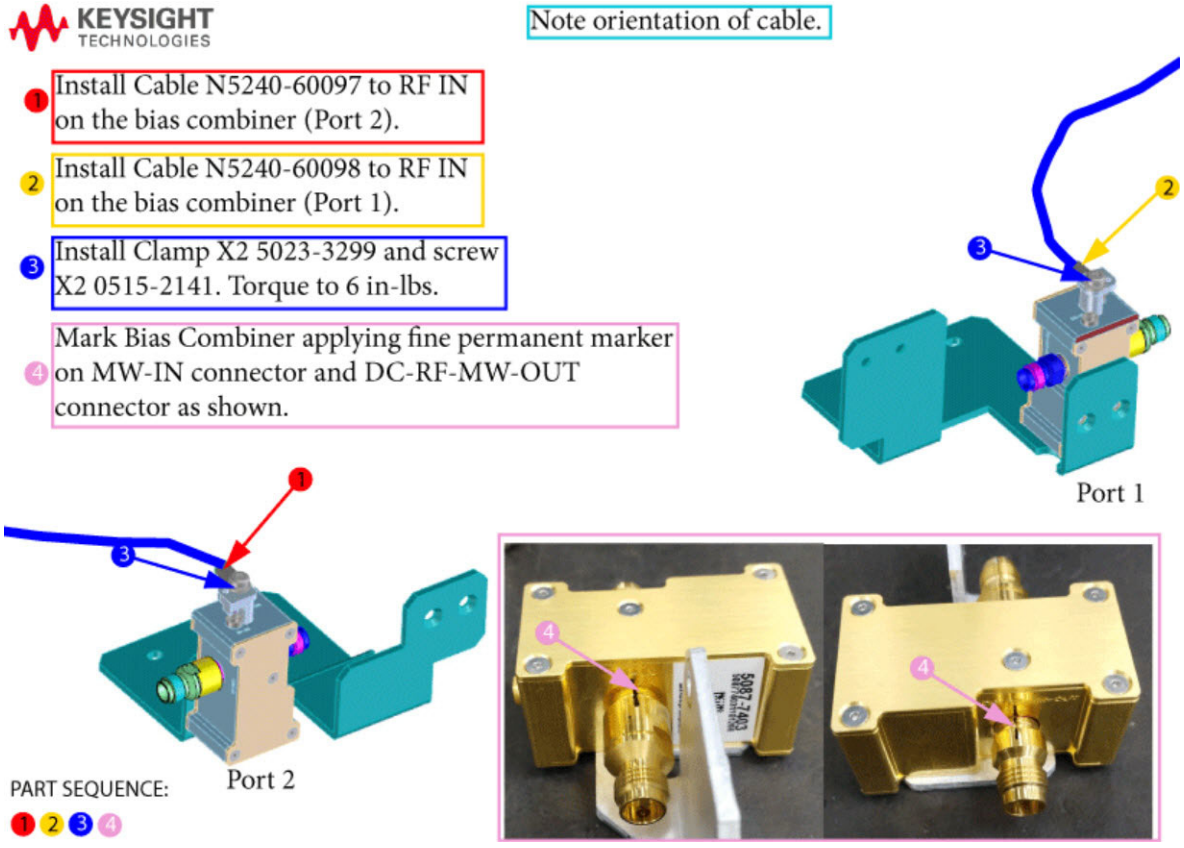
Figure 3 Assemble Bias T Combiners to brackets (5087-7403, N5222-00001, N5222-00002, and 0515-1227)



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

2. Install the N5240-60097 (x1) cables as shown. Note the orientation of the cable (item ①).
3. Install the N5240-60098 (x1) cable as shown. Note the orientation of the cable (item ②).
4. Add 5023-3299 (x2) clamps and 0515-2141 (x2) clamp screws as shown (item ③). Torque to 6 in-lbs.
5. Mark bias combiner with fine permanent marker on MW-IN connector and DC-RF-MW-OUT (item ④).

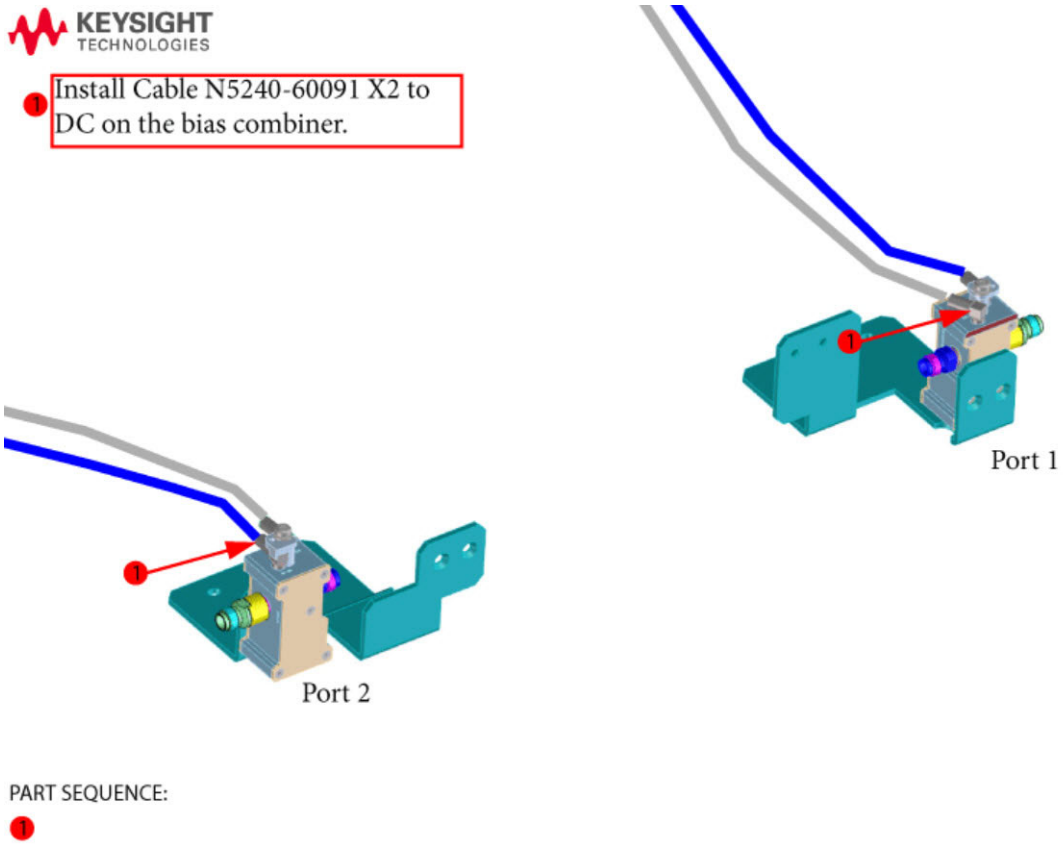
Figure 4 Install cables and clamps to bias tee combiners (N5240-60098, N5240-60097, 5023-3299, and 0515-2141)



Refer to Figure 5 for this step of the procedure. New parts are listed in Table on page 12.

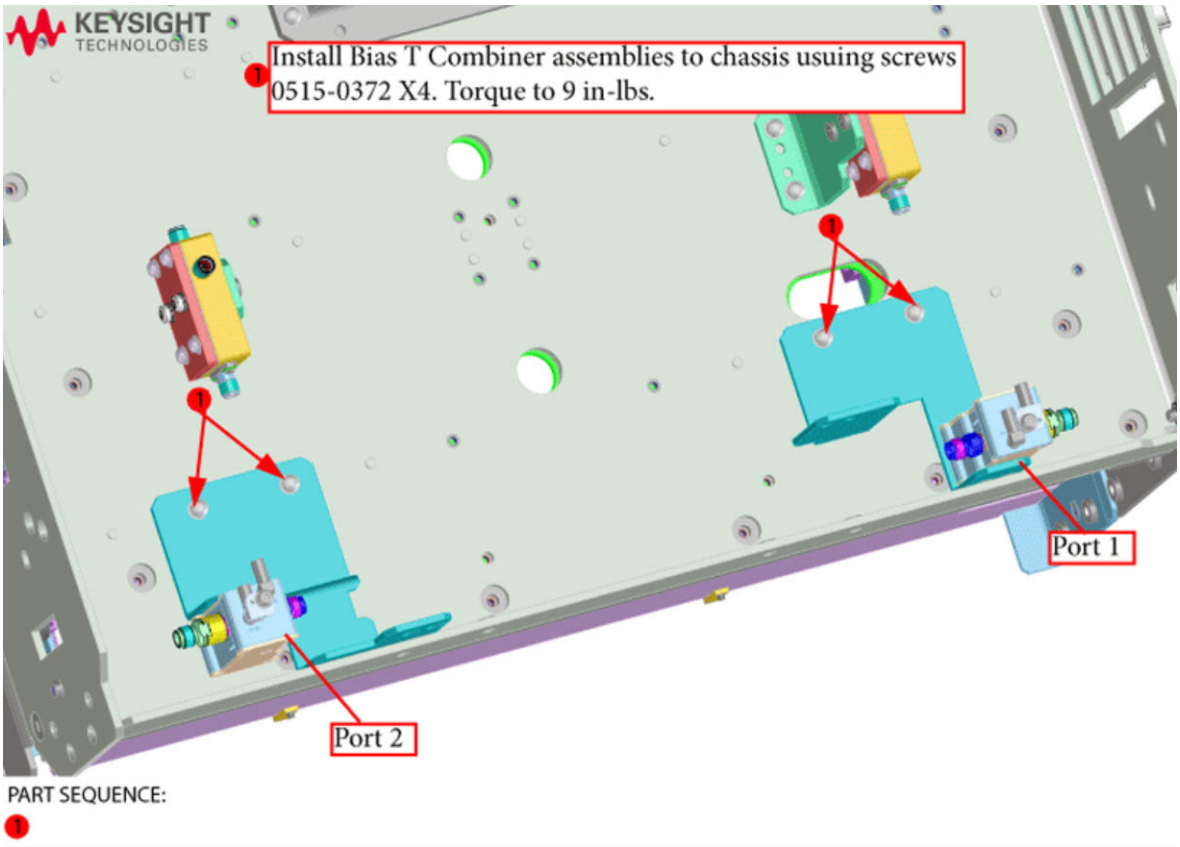
6. Install the N5240-60091 (x2) DC cables as shown (item ①).

Figure 5 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 6.
8. Install the 0515-1227 (x2) screws onto bias tee combiner assemblies (item ①). Refer to Figure 6.

Figure 6 Install A71-A74 Bias T Combiners to brackets (0515-0372 and 0515-1227)



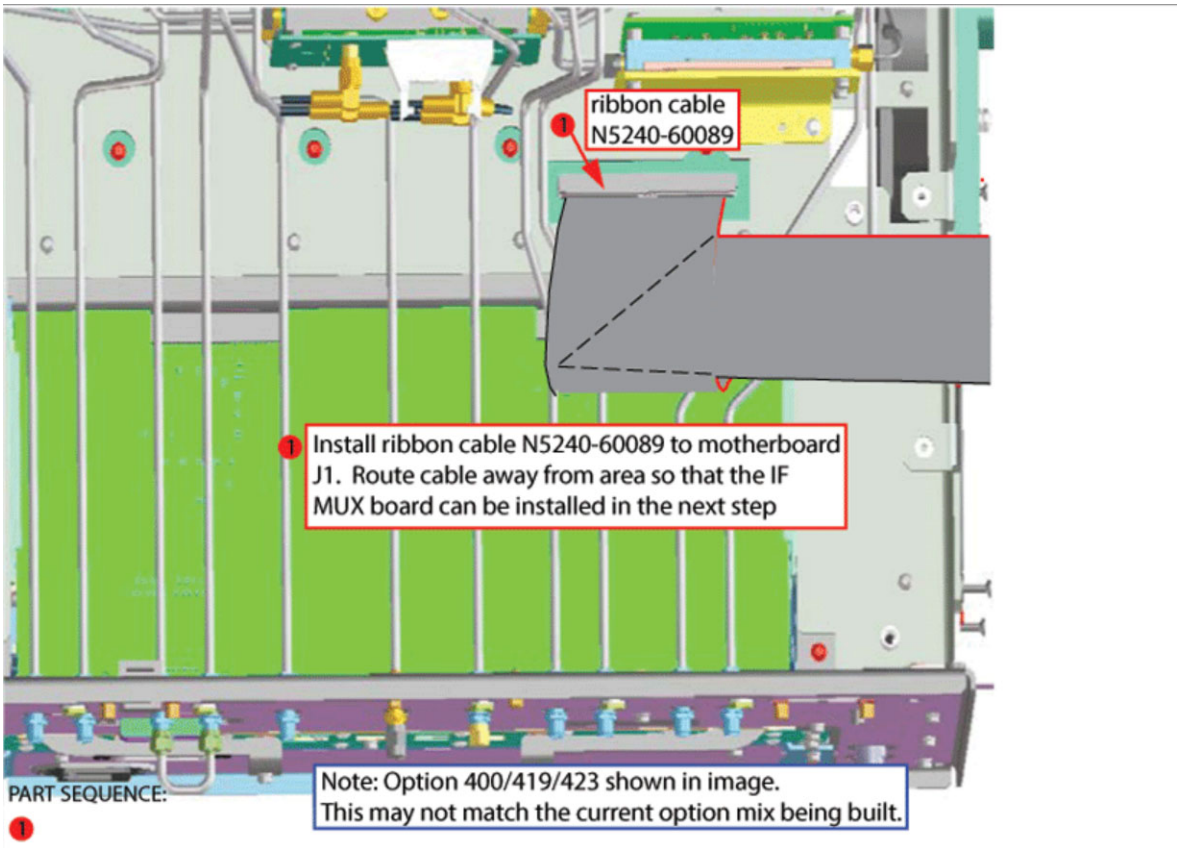
Step 12. Connect the A18 Motherboard/IF Multiplexer (IF MUX)/Low Frequency Extension (LFE)/Test Set Motherboard (TSMB) Ribbon Cable (N5240-60089)

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 7 (N5240-60089 is shown, but N5242-60004 is similar).
2. Install the N5240-60089 to A18 system motherboard J1. Refer to Figure 7.

NOTE

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

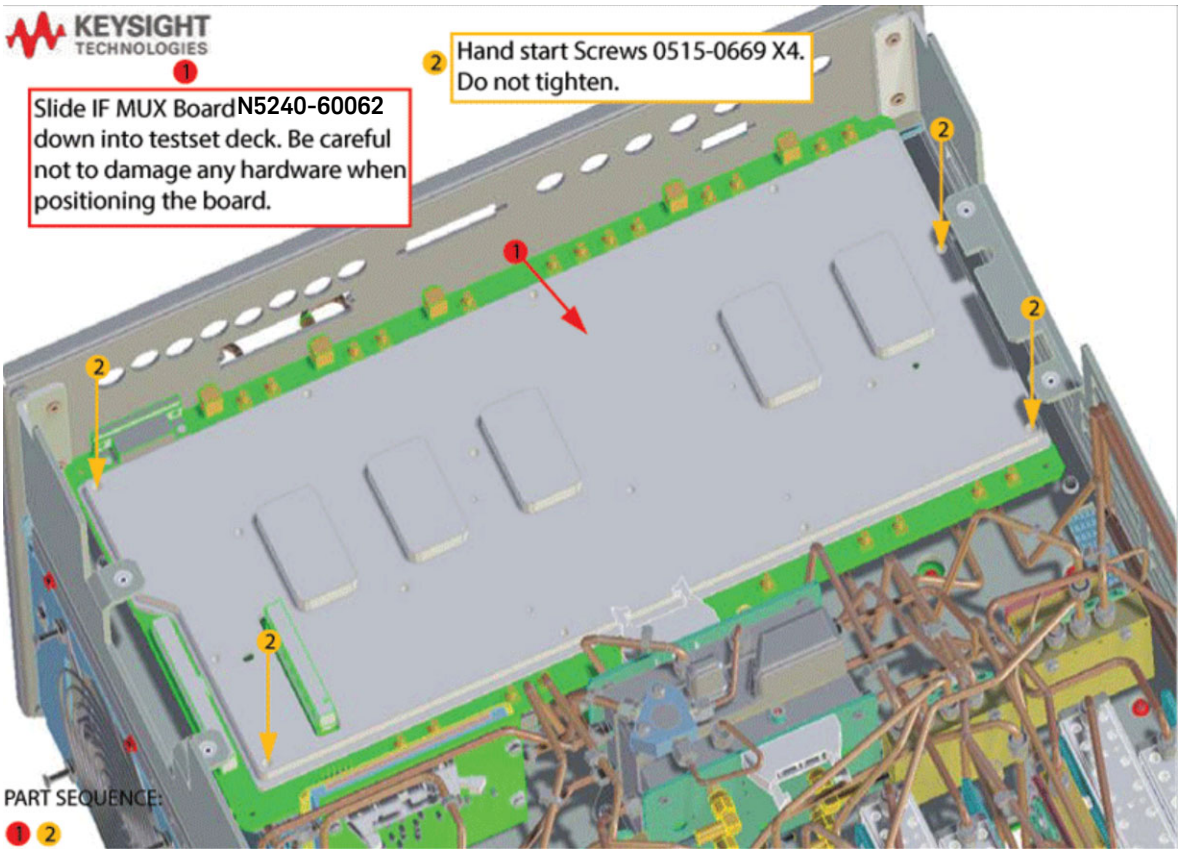
Figure 7 Install the N5240-60089 MB/IF MUX/TSMB Ribbon Cable to A18 Motherboard J1



Step 13. 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 Connect the IF MUX Rear Panel Hardware

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

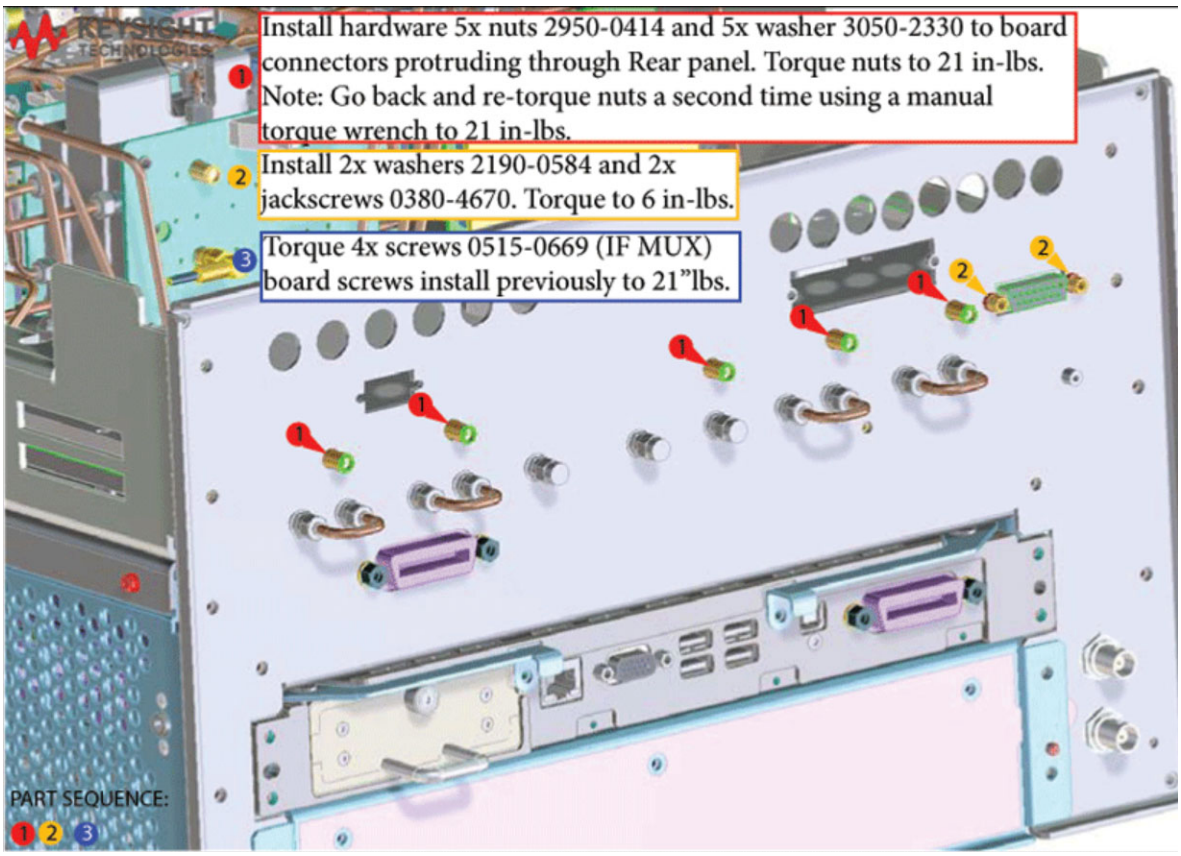
Figure 8 Reinstall the A20 IF MUX Board (N5240-60062 and 0515-0669)[1]



1. N5242B with Option 425 shown. N5241/2/9B with Option 205 is similar for the IF MUX installation.

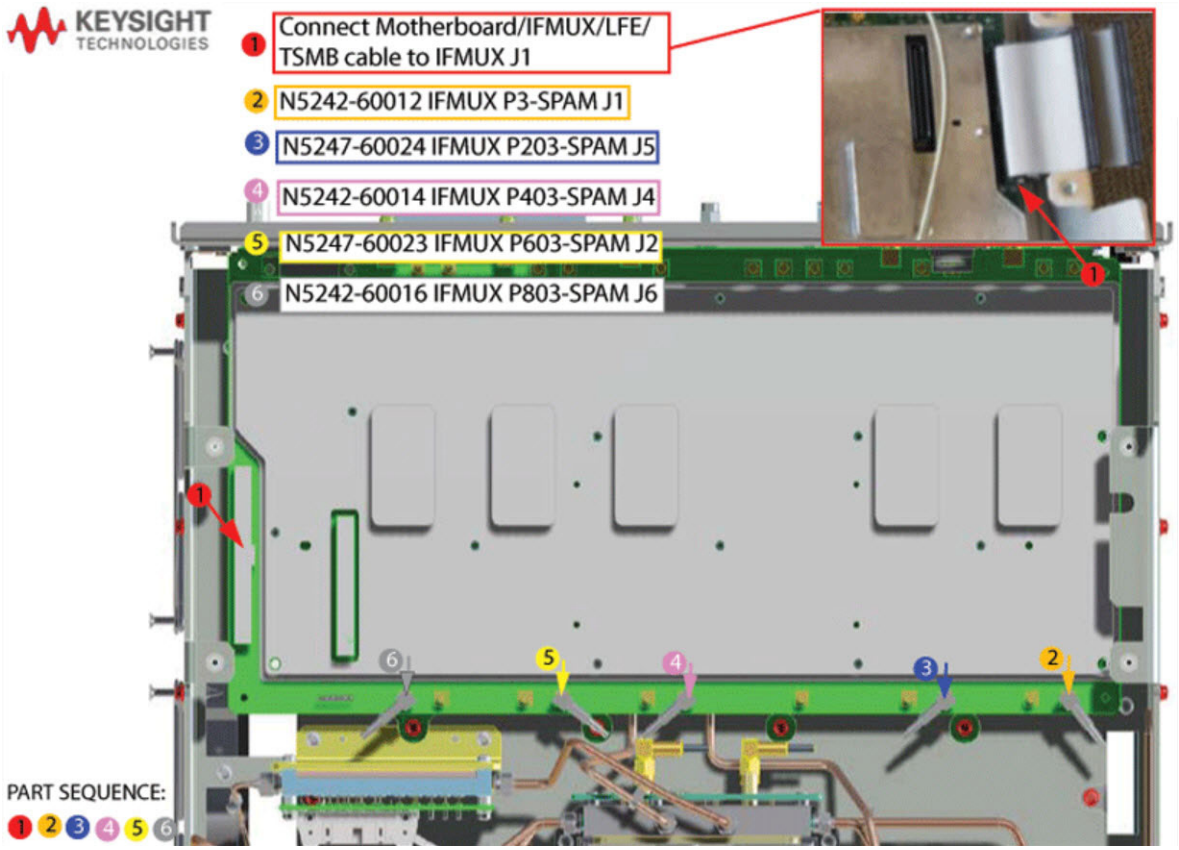
3. Reinstall the IF MUX board rear panel connectors using the washers and nuts removed in “Step 9. Remove the A20 IF Multiplexer (IF MUX) Board” on page 20 (items ① and ②). Torque to 6 in-lbs. Refer to Figure 9.
4. Torque the 0515-0669 IF MUX board screws that were previously hand-tightened to 21 in-lbs (item ③).

Figure 9 Reinstall the A20 IF MUX Board (N5240-60062 and 0515-0669)



5. Connect the N5240-60089 Motherboard/IF Multiplexer/Low Frequency Extension/Test set motherboard (i.e., MB/IF MUX/LFE/TSMB) ribbon cable to IF MUX J1 and fold as shown (item ①). Refer to Figure 10 on page 28.
6. Reconnect the IF MUX/SPAM gray cables to the A20 IF MUX board as indicated in Figure 10 (items ② through ⑥).

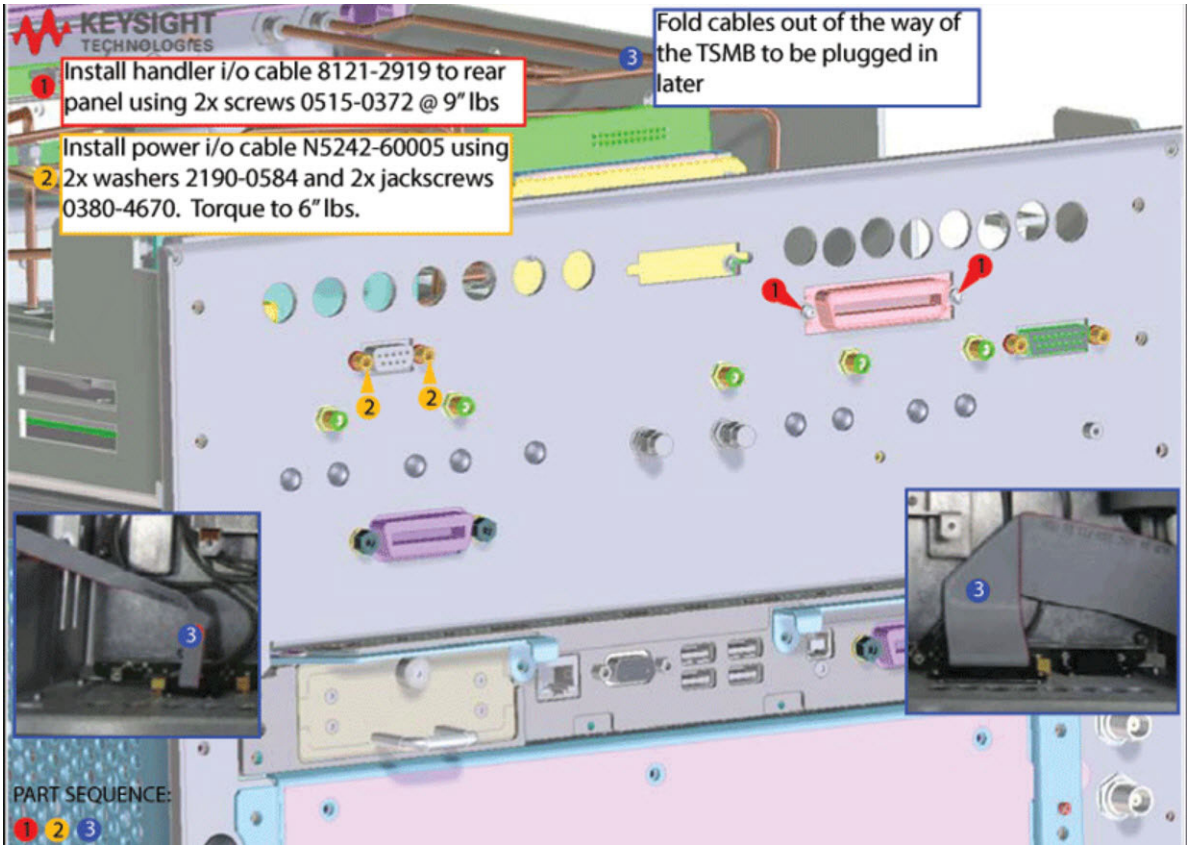
Figure 10 Connect the MB/IF MUX/ Low Frequency Extension (LFE)/TSMB ribbon cable to A20 IF MUX J1(N5240-60089, N5242-60012, N5247-60024, N5242-60014, N5247-60023, and N5242-60016)



Step 14. 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 and ③). Refer to Figure 11.

Figure 11 **Reinstall handler I/O cable, I/O cable assembly, power I/O assembly, and I/O Cables.**



Step 15. Reinstall the Mixer Brick (MXB) Cables

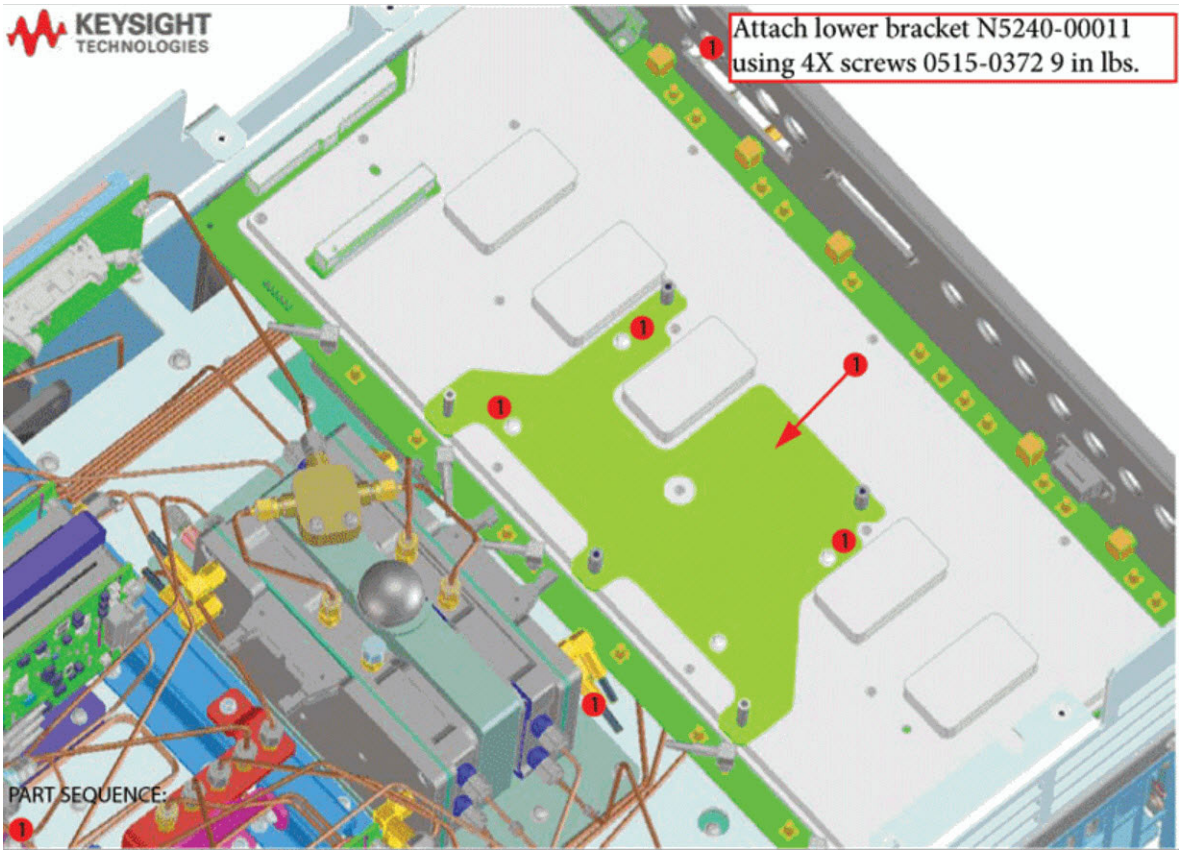
Reconnect the other end of the mixer brick (MXB) cable (item ①) and all of the IF multiplexer (IF MUX) gray cables (IF MUX board as shown (items ② through ⑤). Refer to Figure 12.

Figure 12 Reconnect the other end of the IF gray cables to the IF MUX board

Step 16. 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 13.

Figure 13 Attach lower bracket to IF MUX board (N5240-00011 and 0515-0372)[1,2]



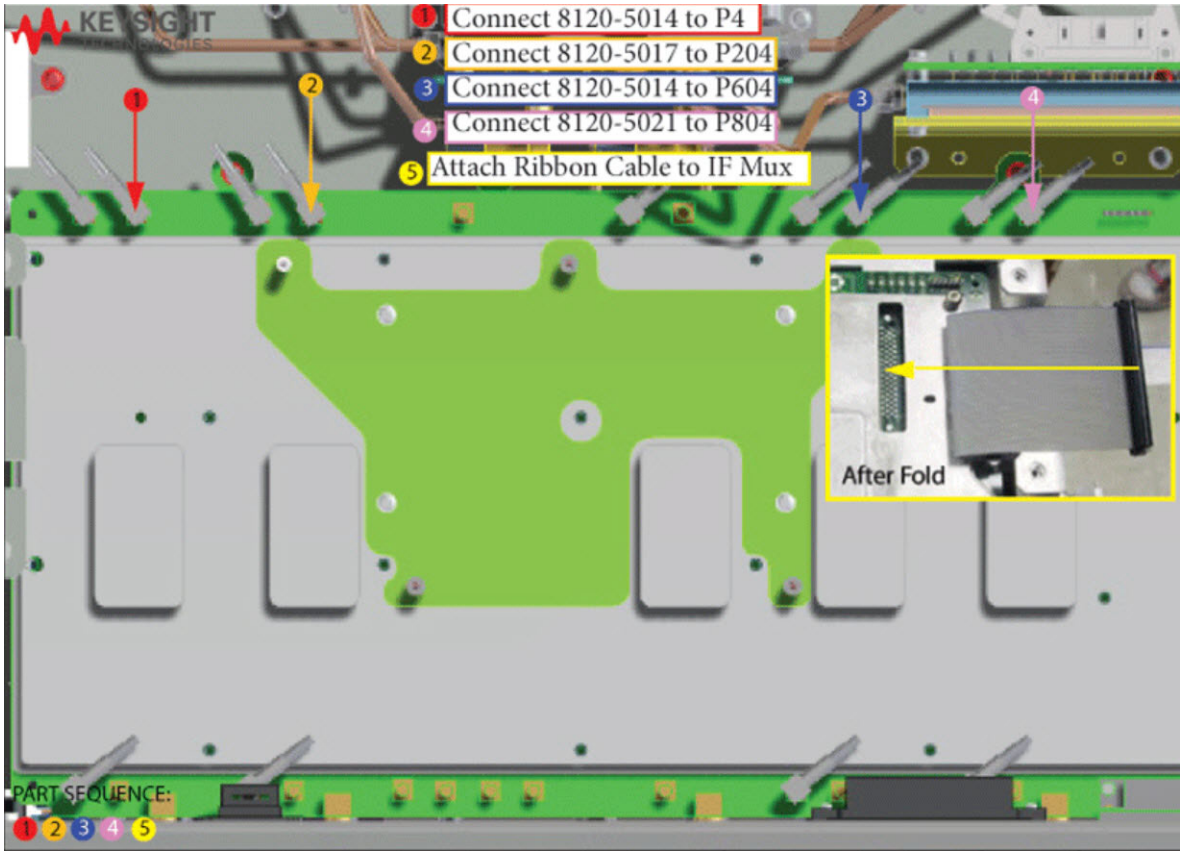
1. N5242B with Option 425 shown. N5241/2/9B with Option 205 is similar.
2. The A22 splitter (5087-7139) and N5222-20007, N5222-20008, and N5222-20009 cables are only used with a legacy HMA26.5 p/n: 5087-7765. If your PNA has a new N5240-60101 assembly installed, then set aside these parts as spares for 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 17. Connect and Route New LFE Cables (8120-5014 (x2), 8120-5017 (x1), and 8120-5021 (x1)) to the on the IF Multiplexer (IF MUX) Board

1. Connect and route the 8120-5014 (x2), 8120-5017 (x1), 8120-5021 (x1), and N5240-60089 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 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 the Gray Cables on the IF MUX board (8120-5014 (x2) and 8120-5017 (x1), and 8120-5021 (x1))



2. Route the reconnected IF mixer brick (MXB) and IF multiplexer (IF MUX) gray cables that were reconnected in “Step 15. Reinstall the Mixer Brick (MXB) Cables” on page 30. Refer to Figure 15.

Figure 15 Routing the reconnected IF MXB and IF MUX Gray Cables on the IF MUX board

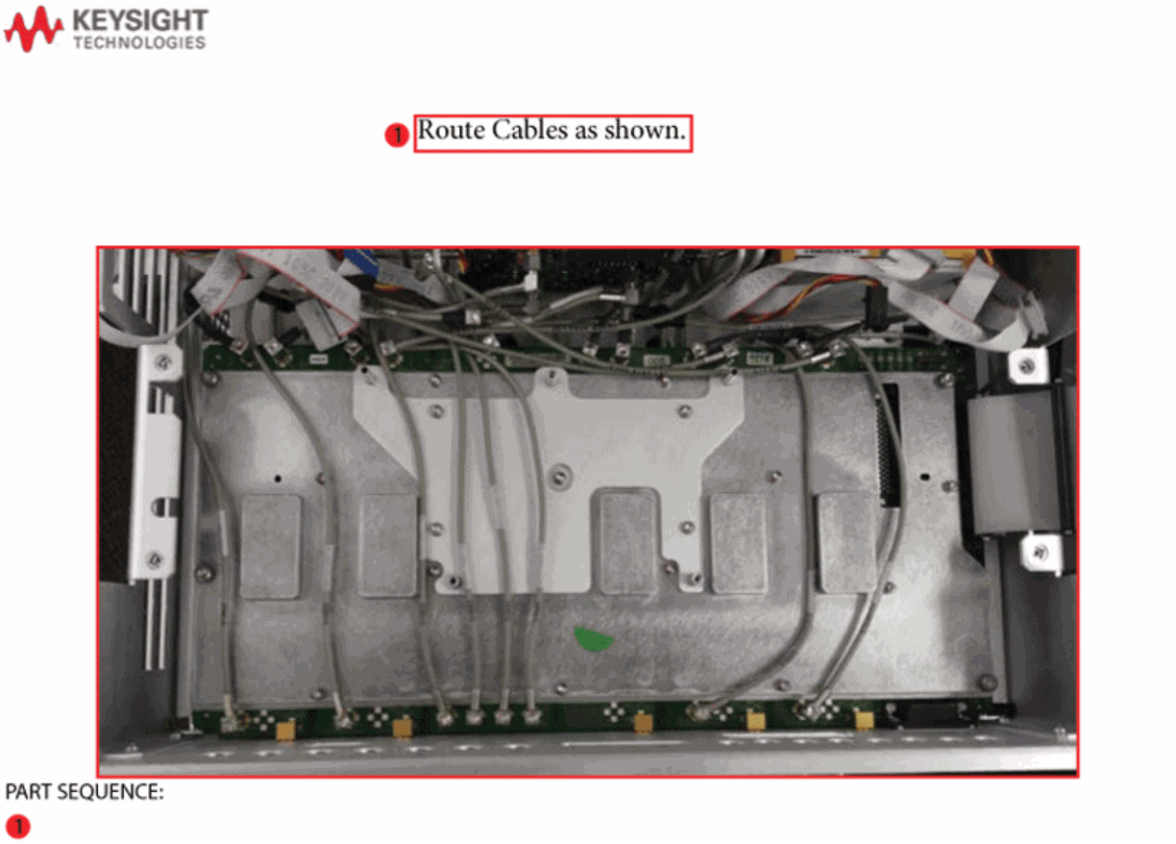
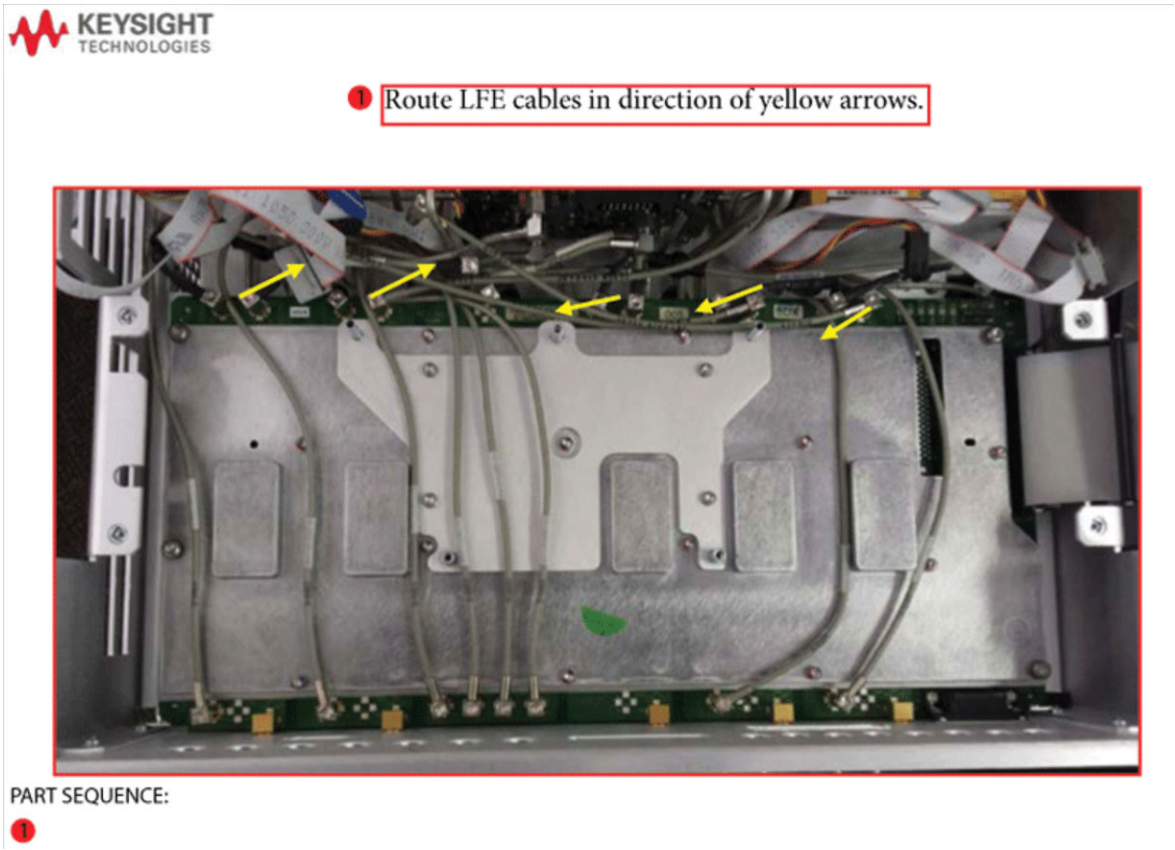


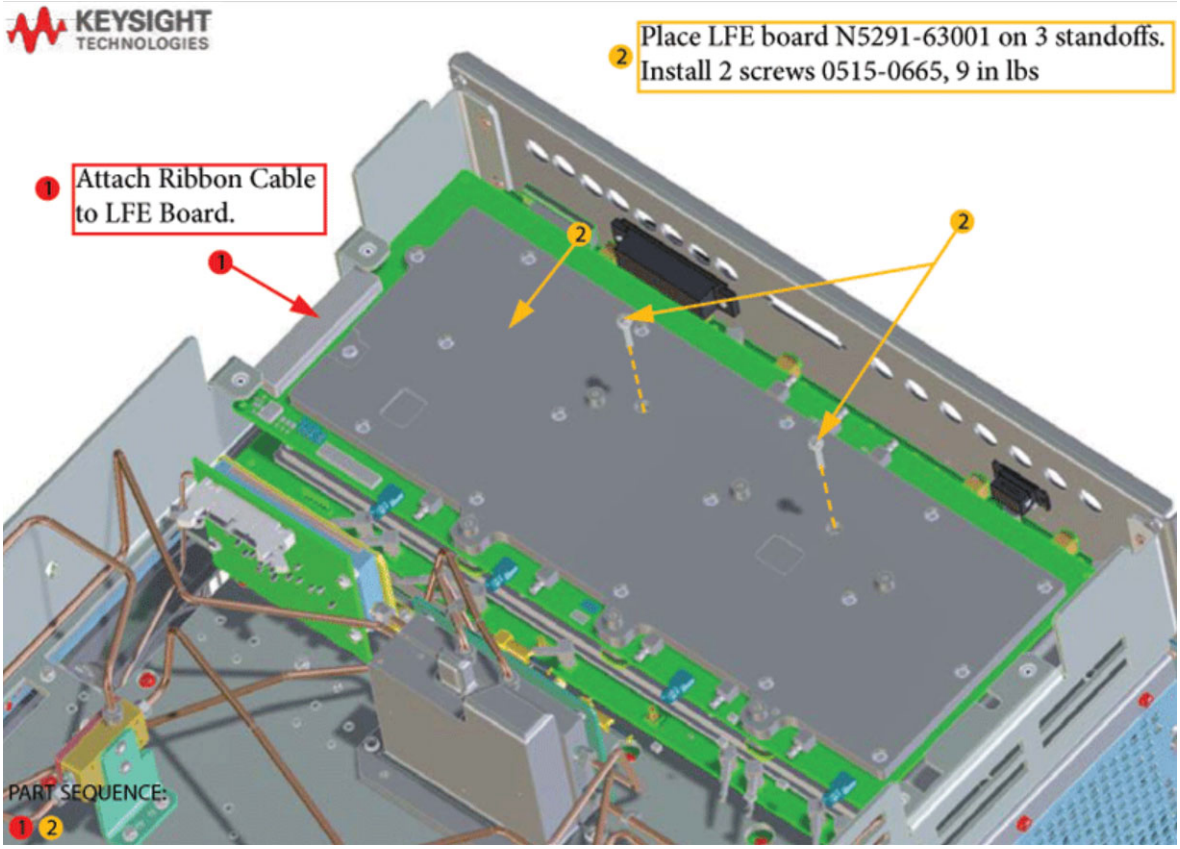
Figure 16 Routing the new low frequency extension (LFE) Gray Cables on the IF MUX board (8120-5014 (x2), 8120-5017 (x3), and 8120-5021 (x1))



Step 18. Install A75 Low Frequency Extension (LFE) Board

1. Install the LFE A75 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 17.
3. Install the A75 LFE board using the 0515-0665 screws x2. Torque to 9 in-lbs (item ②). Refer to Figure 17.

Figure 17 Install the A75 LFE board (N5240-60089, N5291-60005 and 0515-0665)[1]



1. N5242B with Option 425 shown. N5241/2/9B with Option 205 is similar.

Step 19. Connect A71 and A74 Bias Tee Combiner New Cables to A75 Low Frequency Extension (LFE) Board and the Other Ends of the New Cables Connected to the IF Multiplier (IF MUX) Board

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 items ① and ④ as shown in Figure 18 on page 37 and Figure 19 on page 38. (8120-5014 (x2), 8120-5017 (x1), and 8120-5021 (x1)).
2. Then choose one of the following:
   - **Version 6 Synthesizers**: Connect the N5242-60078 Source 1, and N5242-60080 LO Source cables to the LFE board as shown – (items ⑤ through ⑥). The other end of the N5242-60078 and N5242-60080 are connected to Source1 and LO Source boards in a later step. Refer to Figure 18 on page 37.
   - **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 ⑤ through ⑥). 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 19 on page 38.

Figure 18 **Version 6 Synthesizers**: Connect the other ends of the IF gray cables and connect the Source 1, and LO Source cables as shown (8120-5014 (x2), 8120-5017 (x1), 8120-5121 (x1) N5242-60078, and N5242-60080)

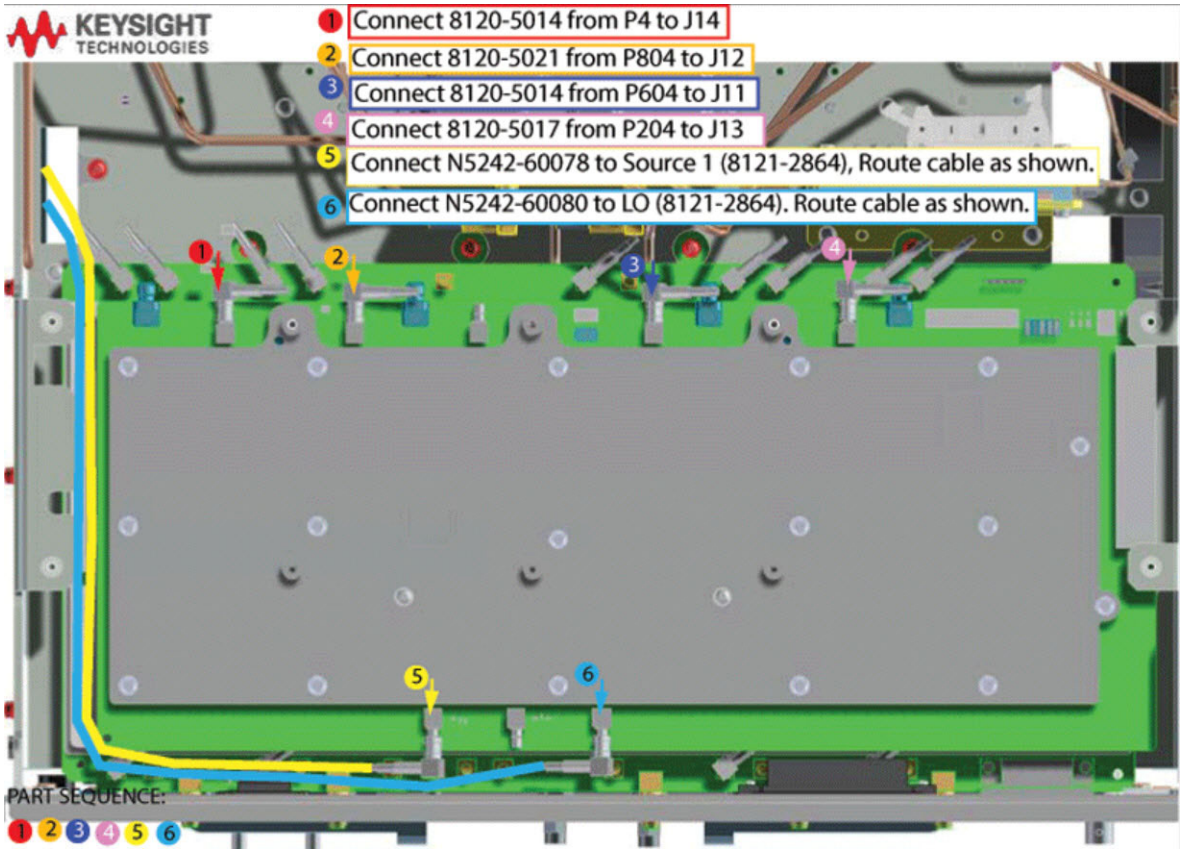
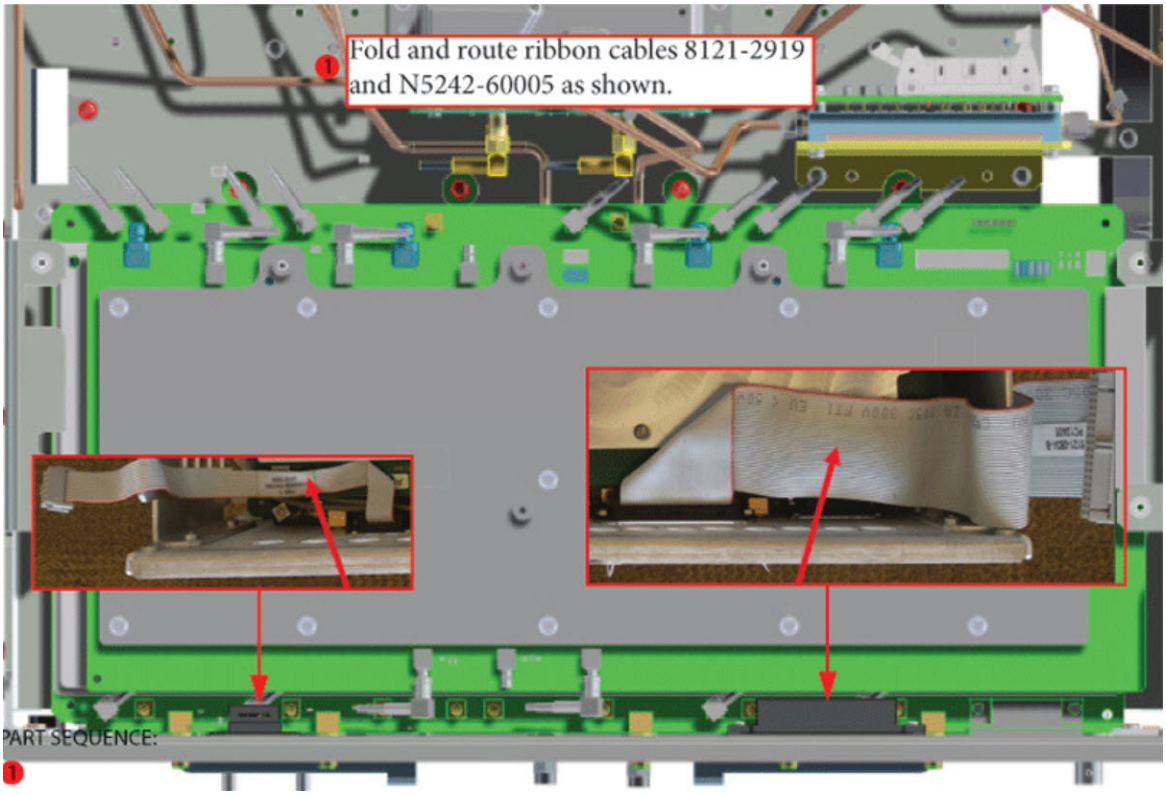


Figure 19 **Version 7 Synthesizers**: Connect the other ends of the IF gray cables and connect the Source 1, and LO Source cables as shown (8120-5014 (x2), 8120-5017 (x1), 8120-5121 (x1) N5240-60112, and N5240-60113)

3. Route Power I/O and Handler I/O cables. Refer to Figure 20.

Figure 20 Route Power I/O and Handler I/O cables



Step 20. Install the New Bias Tee Combiner's Semirigid Test Set Cables and the Blue Cables, and Install Cable Clamps on the 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 41
  - Refer to Figure 21 on page 41 and Figure 22 on page 42.
- "Install New Blue Bias-Tee Combiner Cables N5240-60097 (x1) and N5240-60098 (x1) Gray Cables From the A71 and A74 Bias Tees "RF-IN" to the A75 LFE Board "Port1" and "Port2" Connectors, and Cable Clamps Onto Ferrite Beads" on page 43

Install the New Semirigid Test Set Cables

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 installation of the following cables, refer to Figure 21 on page 41.

– ①–W187 (N5222-20120) A74 Bias T combiner, port 2 CPLR THRU

– ②–W188 (N5222-20124) A74 Bias T combiner to A32 port 2 test port coupler port 2

For installation of the following cables, refer to Figure 21 on page 41.

– ①–W181 (N5222-20119) A71 Bias T combiner, port 1 to CPLR THRU

– ②–W182 (N5222-20123) A71 Bias T combiner to A29 port 1 test port coupler

Figure 21 Install A74 port 2 bias-T combiner semirigid cables (N5222-20120 and N5222-20124)

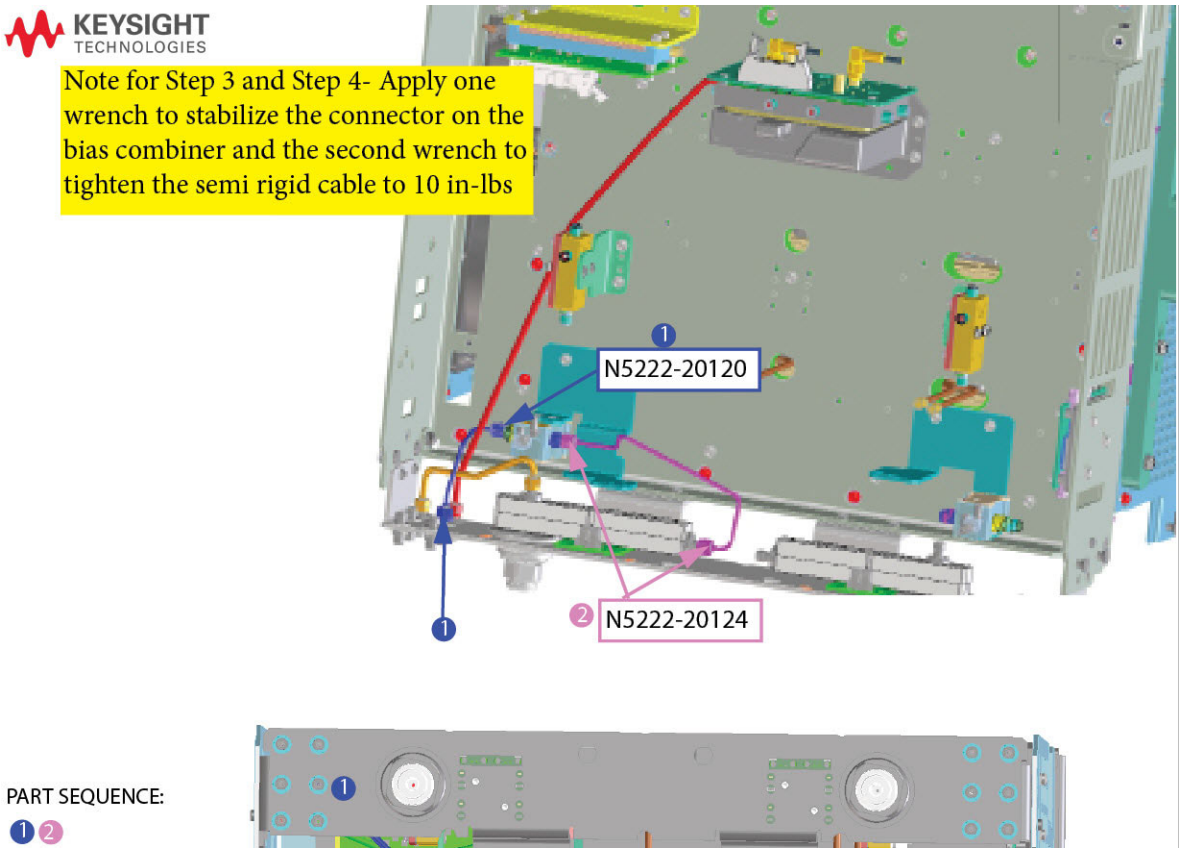
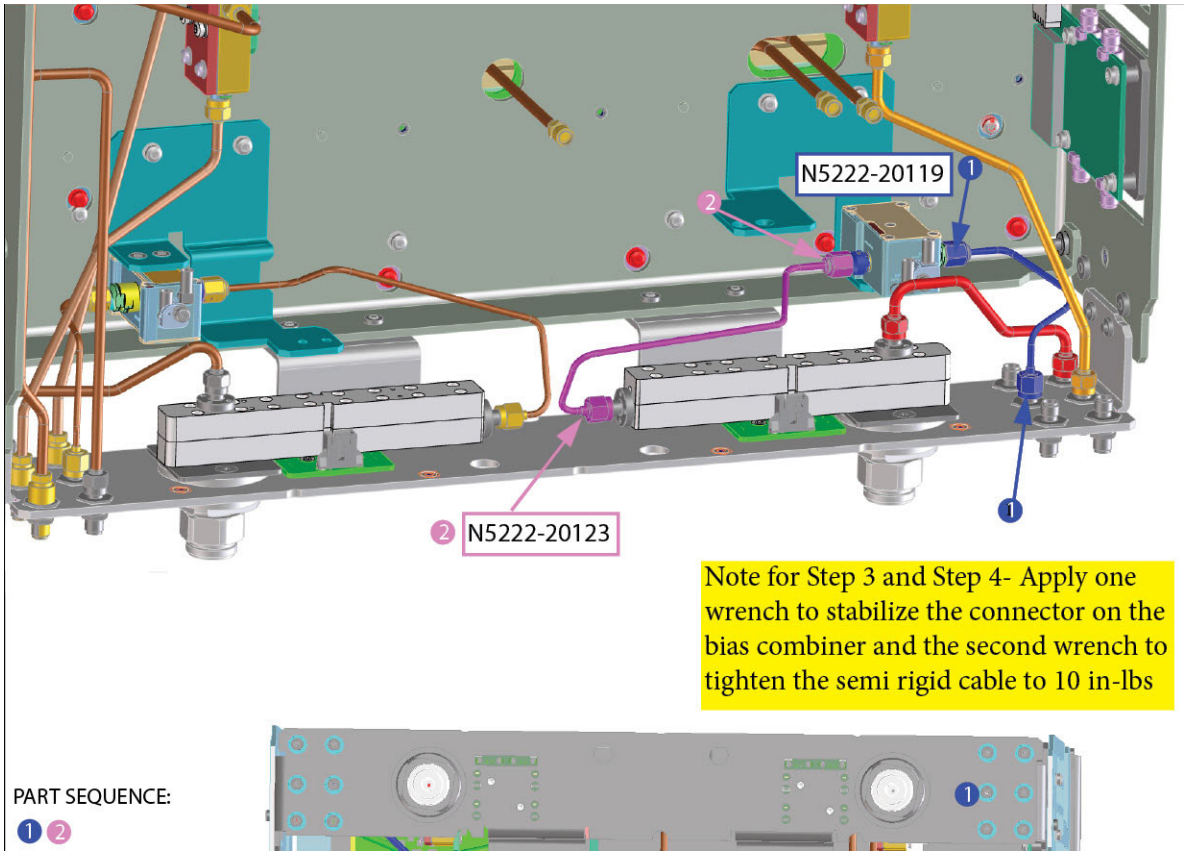


Figure 22 Install A71 port 1 bias-T combiner semirigid cables (N5222-20119 and N5222-20123)



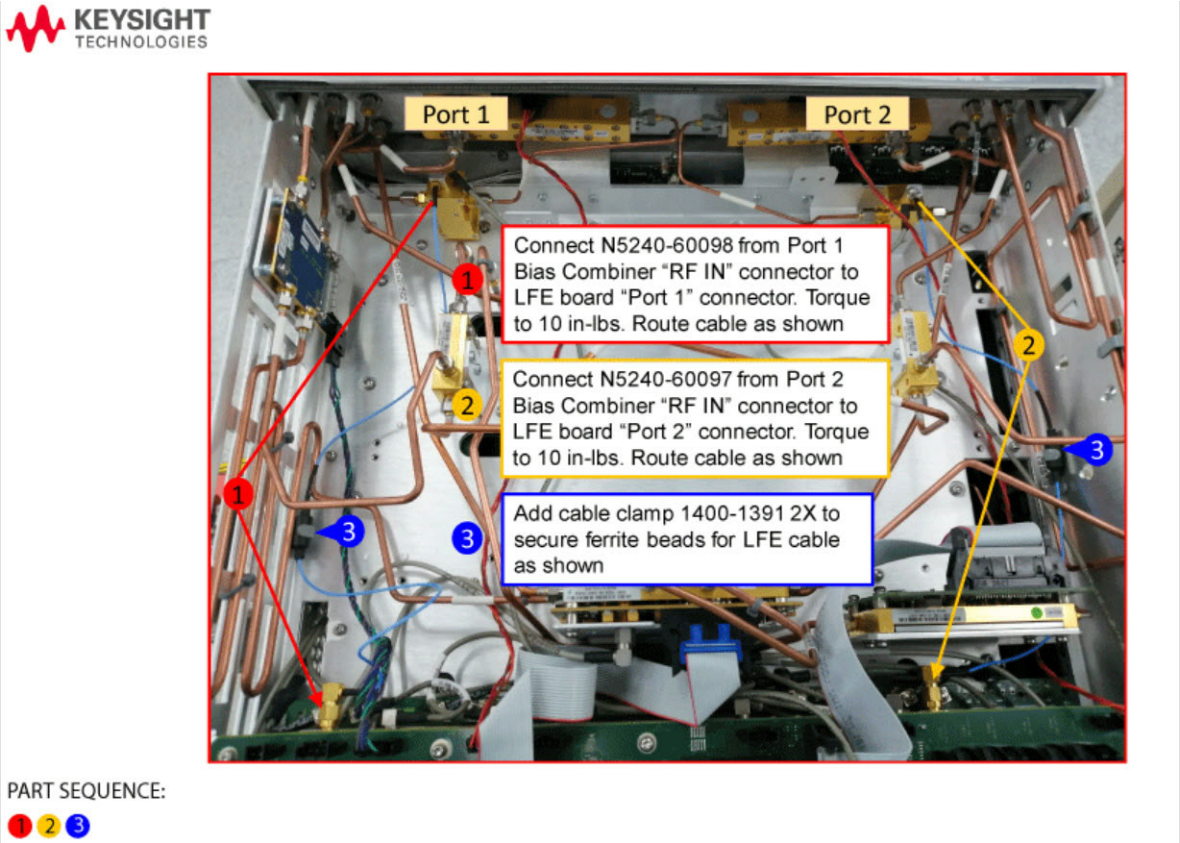
Install New Blue Bias-Tee Combiner Cables N5240-60097 (x1) and N5240-60098 (x1) Gray Cables From the A71 and A74 Bias Tees “RF-IN” to the A75 LFE Board “Port1” and “Port2” Connectors, and Cable Clamps Onto Ferrite Beads

For the following steps, refer to Figure 23 on page 44.

- 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 N5240-60098 (x1) cables as shown. Note the orientation of the cable (item ①).
3. Install the N5240-60097 (x1) cable as shown. Note the orientation of the cable (item ②).
4. Add cable clamp 1400-1391 (x2) to cables (item ③).
5. Route cables as shown.

Figure 23 Connect N5240-60097 and N5240-60098 from A71 and A74 Bias Tee Combiners to A75 LFE Board (N5240-60097 (x1), N5240-60098 (x1), 1400-1391 (x2))



Step 21. Reinstall the A19 Test Set Motherboard

1. For instructions, click the Chapter 7 bookmark "Removing and Replacing the A19 Test Set Motherboard" in the PDF Service Guide[1].
2. Reconnect ribbon cable N5242-60006 from J213 to A24 mixer brick (2). To see an image showing the location of the cable, click the Chapter 6 bookmark "Bottom Ribbon Cables and Wire Harnesses, Standard 2-Port Configuration, Option 201 (S/N Prefixes <6021)" or "Bottom Ribbon Cables and Wire Harnesses, Standard 2-Port Configuration, Option 201 (S/N Prefixes ≥6021)" in the PDF Service Guide[1].

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

Step 22. Install the A71 and 74 bias-Tee combiner's Gray Low Frequency Extension (LFE) DC bias Cables and Route Cables

This step contains the following:

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

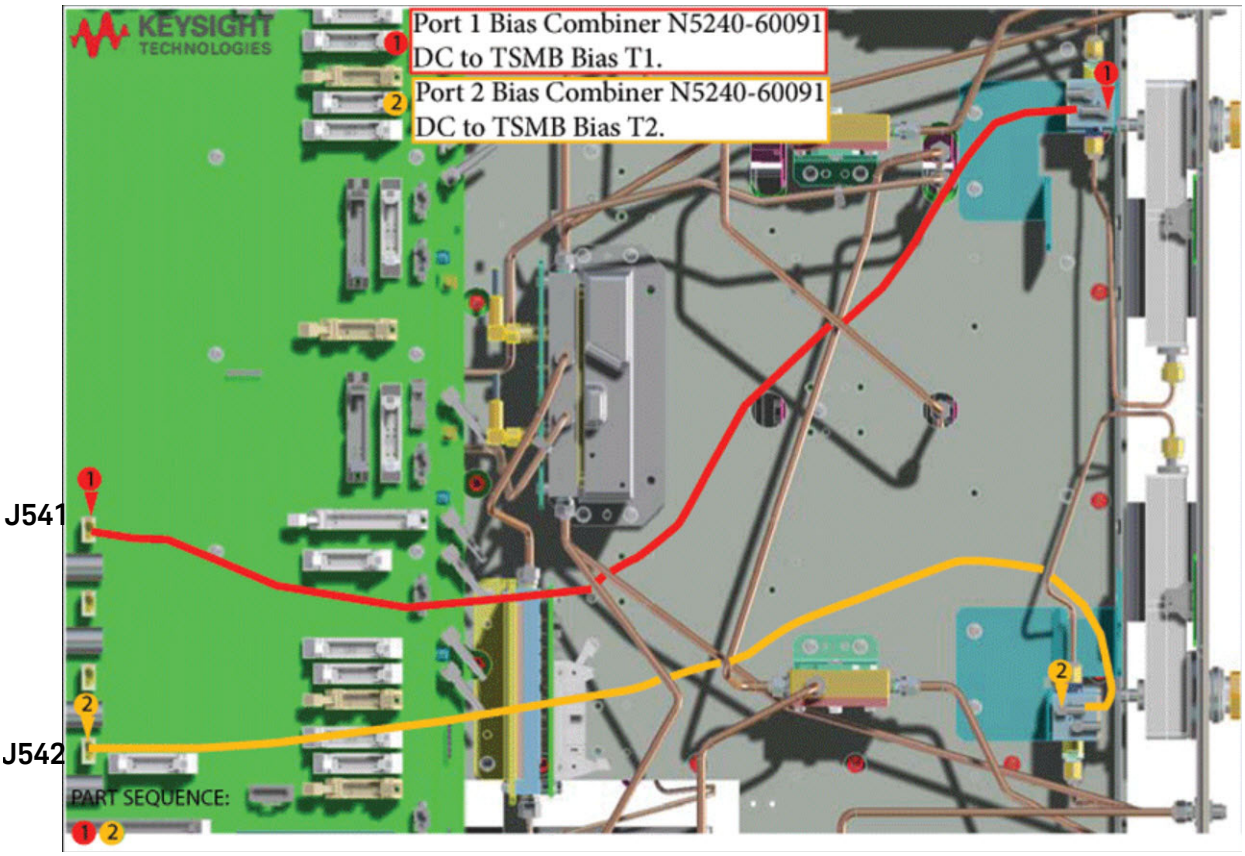
Refer to Figure 24 for this step of the procedure. New parts are listed in Table 1 on page 12.

NOTE

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

3. Install the N5240-60091 (x2) DC cables to the rear panel as shown (items ① and ②).

Figure 24 Install DC cables to bias tees to the rear panel (N5240-60091)



Route the Bias Cables

4. 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 45.

Step 23. Install the Other End of the Bias-Tee Combiner Cables to the Source Synthesizer and LO Synthesizer Board Gray Cables

Refer to Figure 25 on page 47 and Figure 26 on page 48. New parts are listed in Table 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 N5245-60078 (item ①) and N5242-60080 (item ②) flexible cables as indicated in Figure 25 on page 47.
   - **Version 7 Synthesizers:** Connect flexible cable N5240-60112 (item ①), N5240-60113 (item ②), as indicated in Figure 26 on page 48.

Figure 25 **Version 6 Synthesizers:** New test set cables. Connect the other end of the N5242-60080 and N5242-60078 cables

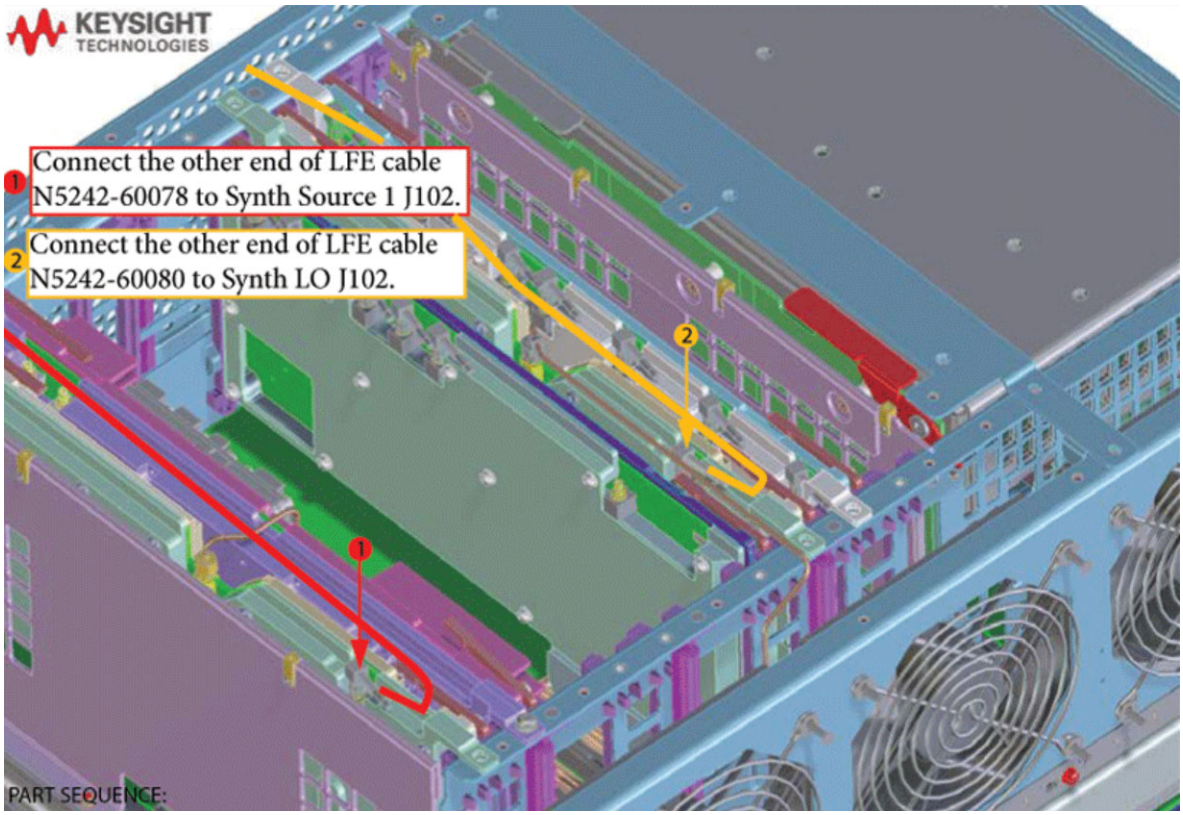
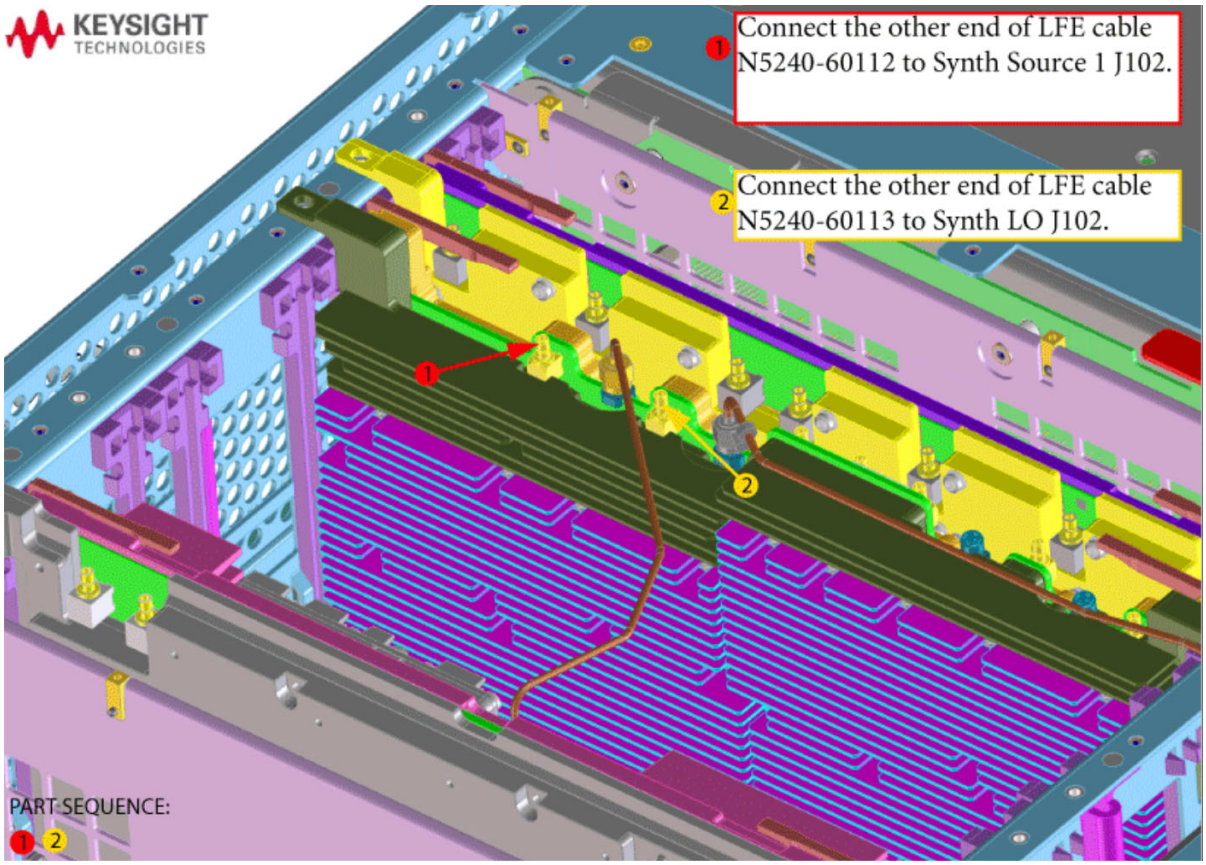


Figure 26 **Version 7 Synthesizers:** New test cables. Connect the other end of the N5240-60112 and N5240-60113 cables

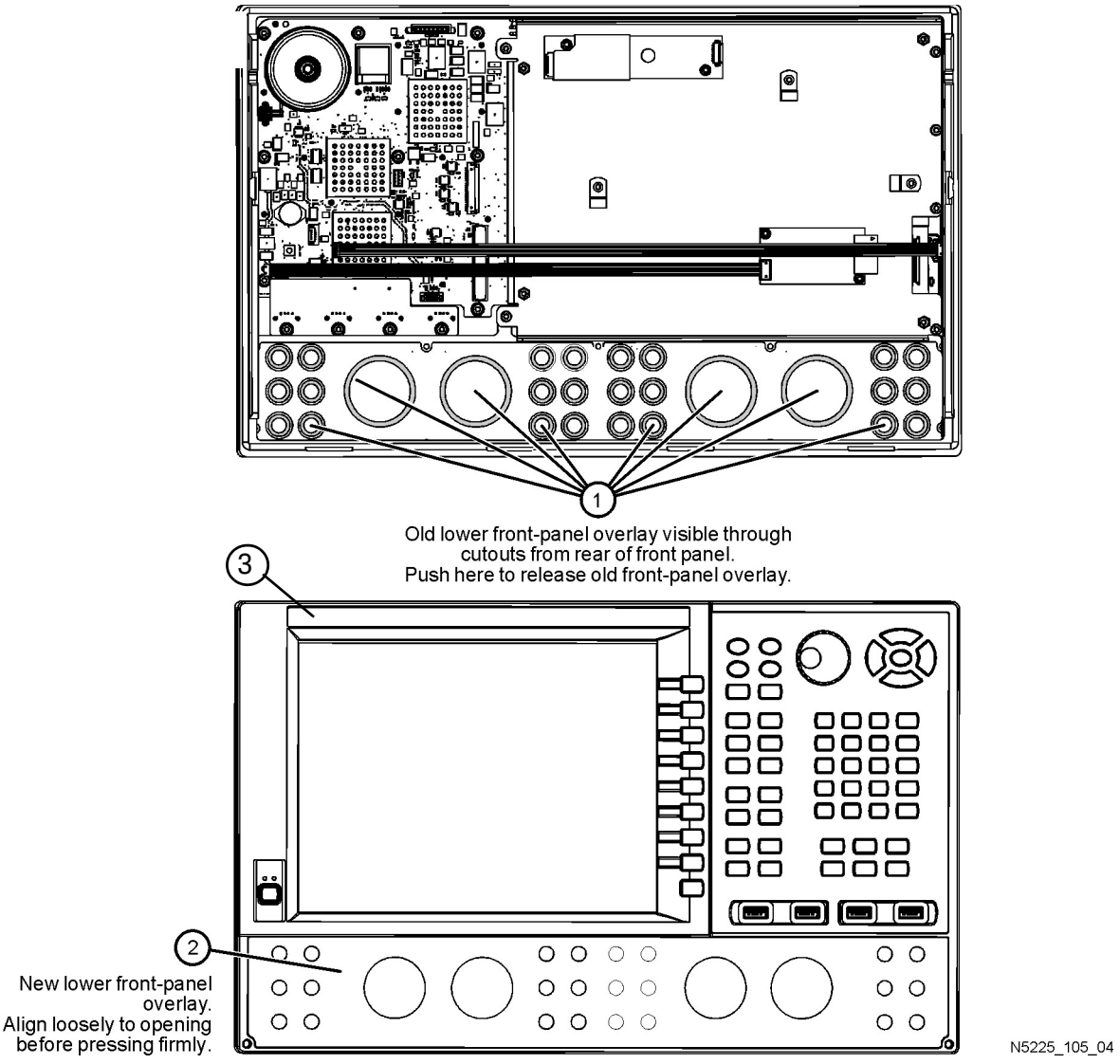


Step 24. Remove the Old Lower Front Panel Overlay and Nameplate

Refer to Figure 27 for this step of the procedure. Although this figure shows a 4-port PNA-X, the concept is the same for a 2-port PNA-X. New parts are listed in Table 1 on page 12.

1. From the back side of the front panel, use a blunt object in the cutouts in the lower front dress panel to push on the old overlay (item ①) and separate it from the front dress panel.
2. From the front side of the front panel, pull off the overlay completely and discard it.
3. Remove the nameplate from the front panel (item ③).
4. Remove any adhesive remaining on the front panel.

Figure 27 Lower Front Panel Overlay Replacement



Step 25. Reinstall the Front Panel Assembly

For instructions on reinstalling the front panel assembly, click the Chapter 7 bookmark “Removing and Replacing the Front Panel Assembly” in the PDF Service Guide[1].

– Be sure to reinstall the two screws (0515-1946) in the front panel, next to test ports 3 and 4. Torque these screws to 9 in-lbs.

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

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

1. Using a DVM, connect one test probe to the center conductor of the RF port 1 on the front panel.
2. Connect the other test probe to the port 1 bias input (**BIAS 1 IN**) on the rear panel.
3. Verify the DVM measures <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 gray cables installed in “Step 20. Install the New Bias Tee Combiner’s Semirigid Test Set Cables and the Blue Cables, and Install Cable Clamps on the Ferrite Beads” on page 40 and “Step 22. Install the A71 and 74 bias-Tee combiner’s Gray Low Frequency Extension (LFE) DC bias Cables and Route Cables” on page 45 are connected correctly and not open or shorted.

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

Step 27. Install the Front Panel Overlay and Nameplate

To see an image of the front panel overlay, keypad overlay, and power button overlay, click the Chapter 6 bookmark “Front Panel Assembly, Front Side, All Options” in the PDF Service Guide[1]. New parts are listed in Table 1 on page 12.

1. **Remove the protective backing from the new front panel overlay N5222-80016 – (item ②).**
2. **Loosely place the overlay in the recess on the front panel.**
3. **Placing two fingers at the middle, press the overlay firmly onto the frame while sliding your fingers in opposite directions towards the ends of the overlay. Repeat on all areas of the overlay.**
4. **Remove the protective backing and Install the nameplate (item ③). New parts are listed in Table 1 on page 12.**

Step 26. Install the Front Panel Jumper Cables

For instructions on installing the W30 front panel jumpers, click the Chapter 7 bookmark “Removing and Replacing the Front Panel Assembly” in the PDF Service Guide[1].

Step 28. 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 29. Reinstall the Inner Cover

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

Step 30. Reinstall the Outer Cover

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

Step 31. Remove Option 201 License

Procedure Requirements

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

Option 201 License Removal Procedure

1. To start the Keysight License Manager 6, 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 32. Enable Option 205

Procedure Requirements

NOTE

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

A single license file may contain more than one feature.

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

Option Enable Procedure

1. Locate the email(s) from Keysight which contain license file attachments. These emails are the result of "Step 1. Obtain a Keyword and Verify the Information" on page 15.
2. Copy the license file(s) from the email(s) to the **root directory** of the USB flash drive.
   More than one license file may be copied to the USB flash drive.

NOTE

A single license file may contain more than one feature.

3. Insert the USB flash drive into the PNA's USB drive slot. Within 5 seconds, the PNA–X should display a small "New license installed" message.

   Else, load the license key file(s), manually mover your license file(s) to `C:\Program Files\Agilent\licensing`. It may take Keysight 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 33. Verify the PNA–X Analyzer Program is Running with the Correct Options

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

NOTE

If the option is still not enabled or if the older option has 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 34. 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.)

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.

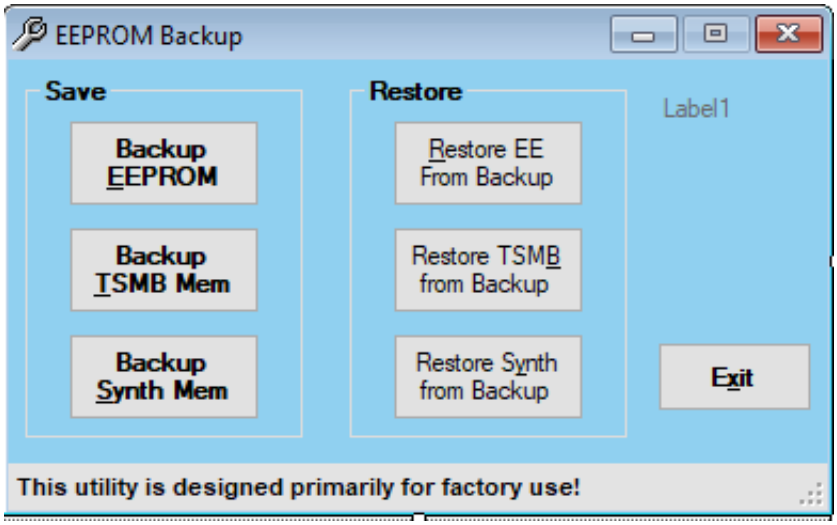
The adjustments listed here generate new correction constants. The analyzer must have a backup of this new data in case any of the data becomes corrupted.

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 Mem.
- Click Exit when the program has finished.

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

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 35. 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 4. Inspect and (If Necessary) Remove the A4, A11, and A13 Synthesizer Boards, if They Are Not Version H" on page 16.

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.

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.

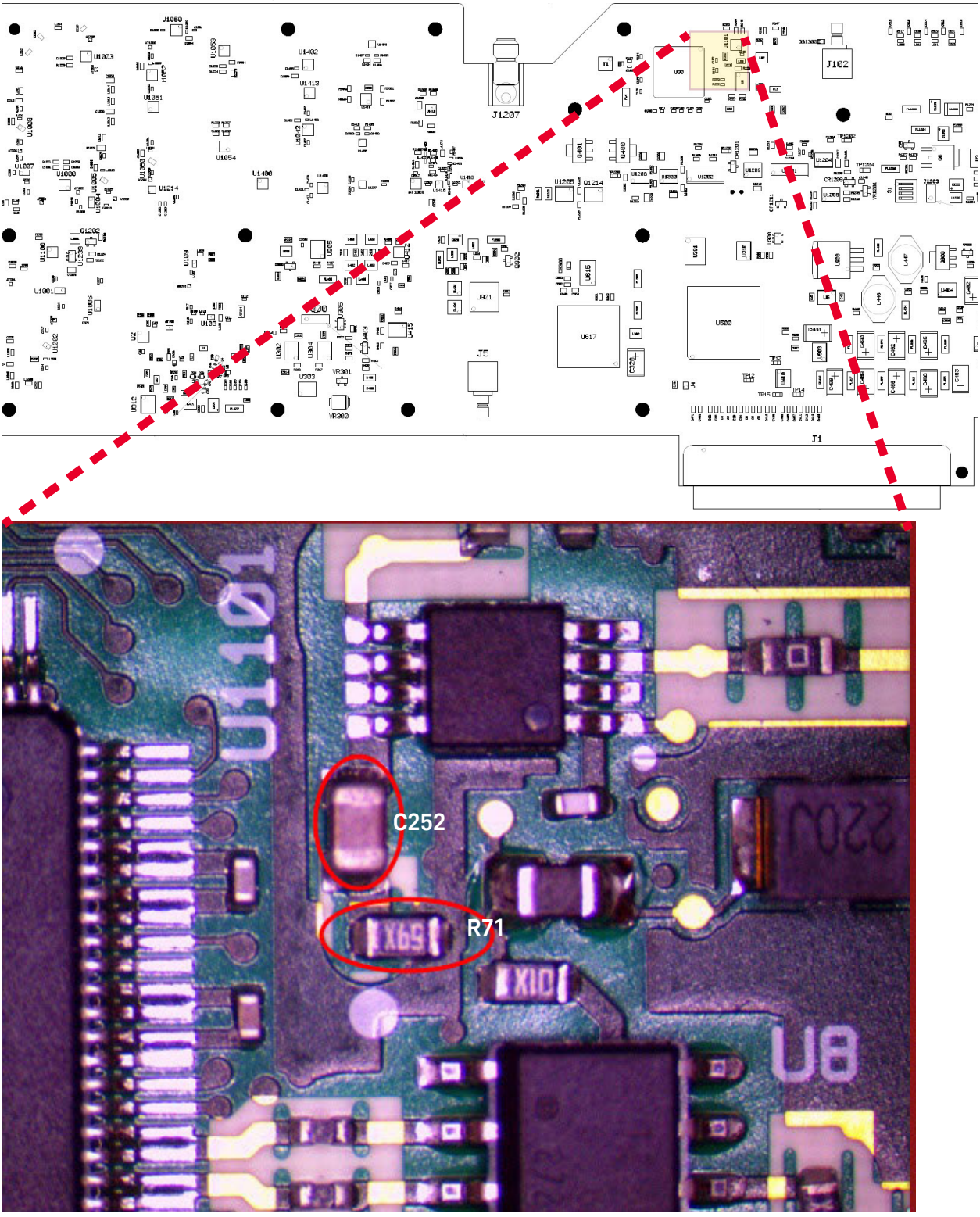
Procedure

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 5. Remove the Front Panel Assembly.”

Figure 2 EEPROM Header Info Window

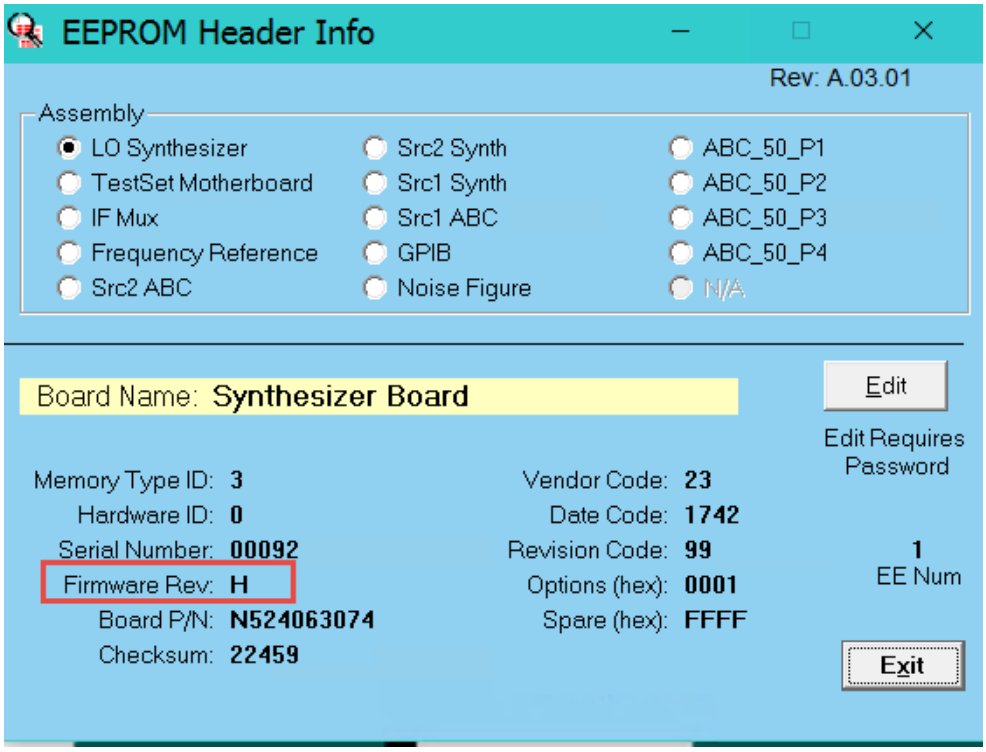
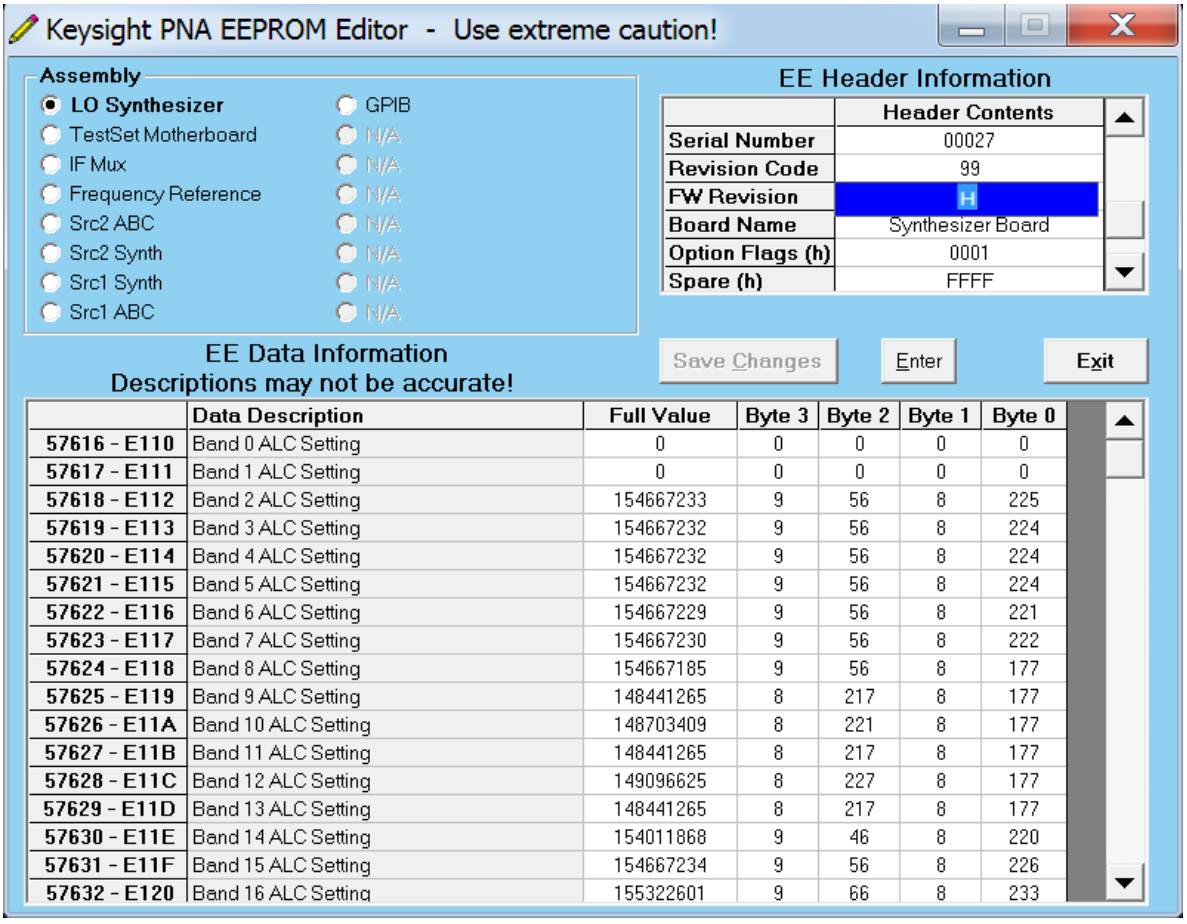


Figure 3 EEPROM Editor Window



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