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

To Upgrade PNA N5221B or N5222B Option 401 to Option 405

Upgrade Kit Order Number: N5221BU-405 and N5222BU-405

Keysight Kit Number: N5222-60122

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

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Installation Note

Notices

Trademark Acknowledgments

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Safety Notices

CAUTION

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

WARNING

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

Keysight Add LFE (Low Frequency Extension) Upgrade Kit
Upgrade Kit Number: N5222-60122
Installation Note

Description of the Upgrade

This upgrade adds the following items to your N5221B Option 401 or N5222B Option 401network analyzer:

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

After installation of this upgrade, your analyzer will be an N5221B Option 405 or N5222B Option 405.

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

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

Getting Assistance from Keysight

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

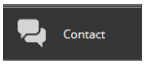
Contacting Keysight

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

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

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

If You Have Problems With the Upgrade Kit Contents

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

) 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. 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 Service Guide" on page 10.

NOTE

IMPORTANT!

–This document contains references to legacy and new A21 HMA26.5 Multiplier/Amplifier assemblies. Your model instrument may have either legacy assemblies or the new parts installed.

–To verify your instrument's A21 HMA26.5 Multiplier/Amplifier, refer to "Verify the Model/Version of HMA26.5 Installed" on page 9.

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

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

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

- A license key - refer to "License Key Redemption" below.
- A PDF copy or a paper copy of the PNA Service Guide - refer to "Downloading the Online PNA Service Guide" below.
- An ESD-safe work area - refer to "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 and full instrument calibration. To view the equipment list, click the Chapter 3 bookmark "Tests and Adjustments" in the PDF Service Guide[1].

License Key Redemption

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

If you are unfamiliar with the licensing process, refer to the https://www.keysight.com/us/en/assets/9018-04534/installation-guides/9018-04534.pdf (N5242-90024).

NOTE The enclosed Software Entitlement Certificate is a receipt, verifying that you have purchased a licensed option for the PNA 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(s) for your A model or for your B models, a license key file(s) from the Keysight Software Manager: http://www.keysight.com/find/softwaremanager.

You will need to provide an email address, Keysight will promptly email your license key file(s) as a attachment message. Refer to "License Key Redemption" on page 8.

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

- A22 splitter 5067-4086
- W52 N5245-20013
- W53 N5245-20023
- W54 N5245-20022

(If you have the legacy 5087-7765 HMA26.5, please discard the N5245-20195 semi-rigid cables. 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 Service Guide

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

1. Go to www.keysight.com.
2. In the Search box, enter the model number of the analyzer (e.g., N5232B) and click **Search**.
3. Click **Support** > **Keysight Product Support**.
4. In the **Search Support** area type your instrument's model number (e.g., N2222B).
5. Press **Enter**.
6. Scroll down to the **PRINT DOCUMENTATION** section and click to select **Service Manual**.

   The **Service Manual** for your instrument will be displayed near the top of the right column.
7. Click the hyperlink of the Service Guide title to download the PDF file.
8. When the PDF of the Service Guide is displayed, scroll through the Contents section bookmarks to locate the information needed.

Protecting Your Workspace from Electrostatic Discharge

For information, click on the Chapter 1 bookmark, "Electrostatic Discharge Protection" in the PDF Service 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 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 wrench (to stabilize the bias tee combiner when torquing cables)	1	N/A
5/16-in (8 mm) nutsetter or open end torque wrench - set to 21 in-lbs (2.38 N.m)	1	N/A
T-6 TORX driver - set to 6 in-lbs (0.68 N.m)	1	N/A
T-20 TORX driver - set to 21 in-lbs (2.38 N.m)	1	N/A
5/16-in (8 mm) nutsetter or open end torque wrench- set to 8 in-lbs (0.9 N.m)	1	N/A
3/16-in (5 mm) nutsetter or open end torque wrench - set to 6 in-lbs (0.68 N.m)	1	N/A
5/8-in (16 mm) nutsetter or open end torque wrench - set to 21 in-lbs (2.38 N.m)	1	N/A
9 mm nutsetter or open end torque wrench - set to 21 in-lbs (2.38 N.m)	1	N/A
1/4-in (6 mm) open end wrench	1	N/A

CAUTION Use a 5/16-in torque wrench set to 10 in-lbs on all cable connections except the front and rear panel cable connectors. On these, use a 9 mm nutsetter or open end torque wrench set to 21 in-lb.

About Installing the Upgrade

Products affected	N5221A/B and N5222A/B and N5241B and N5242B and N5249B Option 401
Installation to be performed by	Keysight service center or personnel qualified by Keysight
Estimated installation time	5.0 hours
Estimated adjustment time	2.5 hours
Estimated full instrument calibration time	8.0 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 10.

Table 1 Contents of Upgrade Kit N5222-60122

Ref Desig.	Description	Qty	Part Number
--	Installation note (this document)	1	N5222-90112
--	Software Entitlement Certificate (provided separately)	1	5964-5145
--	China RoHS Addendum	1	9320-6722
A71	Port 1 LFE Bias-T combiner - port 1	4	5087-7403
A72	Port 3 LFE Bias-T combiner - port 3		
A73	Port 4 LFE Bias-T combiner - port 4		
A74	Port 2 LFE Bias-T combiner - port 2		
A70	LFE PC assembly - 4-port	1	N5291-60001
--	Bracket (For ports 1 and 3 26.5 GHz bias-T)	1	N5222-00001
--	Bracket (For ports 2 and 4 26.5 GHz bias-T)	1	N5222-00002
--	Nameplate, N5221B, Option LFE	1	N5221-80009
--	Nameplate, N5222B, Option LFE	1	N5222-80015
--	Machine screw, M3 x 8, pan head (install bias T combiner brackets to test set (x4) and lower bracket to IF MUX board (x4))	8	0515-0372
--	Machine screw, M3.0 x 14, pan head (to attach A70 LFE board)	2	0515-0665
--	Machine screw, M3.0 x 18, pan head	2	0515-0666
--	Machine screw, M3 x 25, pan head	3	0515-0667
--	Machine screw, M3 x 6, flat head	8	0515-1227
--	Machine screw, M2.5 x 14, pan head	4	0515-2141
--	Cable clamp (LFE cables) – 10 mm wide steel	4	1400-1334
--	Cable clamp – 12.9 mm wide steel	4	1400-1391
--	Caps, protective	4	1401-0214

Table 1 Contents of Upgrade Kit N5222-60122

Ref Desig.	Description	Qty	Part Number
––	Cable clamp – Bias T combiners	4	5023-3299
--	Cable, coaxial SMB -f- right angle terminations, 100 mm (Connect P4 to A70 LFE board J14 and P604 to A70 LFE board J11)	2	8120-5014
--	Cable, assembly, coaxial A06/A06, 205 mm long (Connect P204 to A70 LFE board J13; P604, and P804 to A70 LFE board)	3	8120-5017
--	Bracket, lower (For IF MUX/LFE)	1	N5240-00011
--	Front panel overlay – B models Options 405 and 420	1	N5242-80036
W161	Port 1 CPLR THRU to A71 port 1 Bias combiner	1	N5222-20119
W162	A33 port 1 test coupler to A71 port 1 Bias combiner	1	N5222-20115
W163	Port 3 CPLR THRU to A72 port 3 Bias combiner	1	N5222-20121
W164	A30 Port 3 test coupler to A72 port 3 bias combiner	1	N5222-20117
W165	Port 4 CPLR THRU to A73 port 4 Bias combiner	1	N5222-20122
W166	A31 port 4 test port coupler to A73 port 4 Bias combiner	1	N5222-20118
W167	Port 2 CPLR THRU to A74 port 2 Bias combiner	1	N5222-20120
W168	A32 Port 2 test coupler to A74 port 2 bias combiner	1	N5222-20116
W191[a]	Cable, assembly, RF CA, A70 LFE board Source 1 J20 to A5 Synthesizer Source 1 J102	1	N5242-60078
W192[a]	Cable assembly, RF CA, A70 LFE board to Source 2	1	N5242-60079
W193[a]	Cable, assembly, RF CA, A70 LFE board LO J18 to A4 Synthesizer LO J102	1	N5242-60080
W174	A71 bias combiner “RF IN” to conn “Port1” on LFE board	3	N5240-60098
W175	A72 bias combiner “RF IN” to conn “Port3” on LFE board		
W176	A73 bias combiner “RF IN” to conn “Port4” on LFE board		
W177	A74 bias combiner “RF IN” to conn “Port2” on LFE board	1	N5240-60097
W180	REF 3 RCVR R3 IN to A24 mixer brick (R3)	1	N5222-20125
--	Cable, ribbon assembly – MB/IFMUX/LFE/SMB (A14 system mother board J1 to A19 test set motherboard to A70 LFE board to A20 IF Multiplier board J1)	1	N5240-60089
--	Cable, DC, 2–pin to R/A SMP (Port 1, Port 2, Port 3, and Port 4 bias combiner DC to A19 Bias J541, J542, J543, & J544.)	4	N5240-60091
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

Table 1 Contents of Upgrade Kit N5222-60122

Ref Desig.	Description	Qty	Part Number
W210[b]	A70/A75 LFE board to A15 DD Synth LO J13	1	N5240-60113

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.

NOTE Some of the following figures provided in this procedure contain bias tees. Bias tees are included in the Option 219/419 upgrade kits and can be ignored for Options 217/417 and 222/422.

Overview of the Installation Procedure

Step 1. Obtain a Keyword and Verify the Information

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

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

Once the license key file has been received and the information verified, you can proceed with the installation at "Step 2. Remove the Outer Cover" on page 17.

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.

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 1 on Page 15).

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.

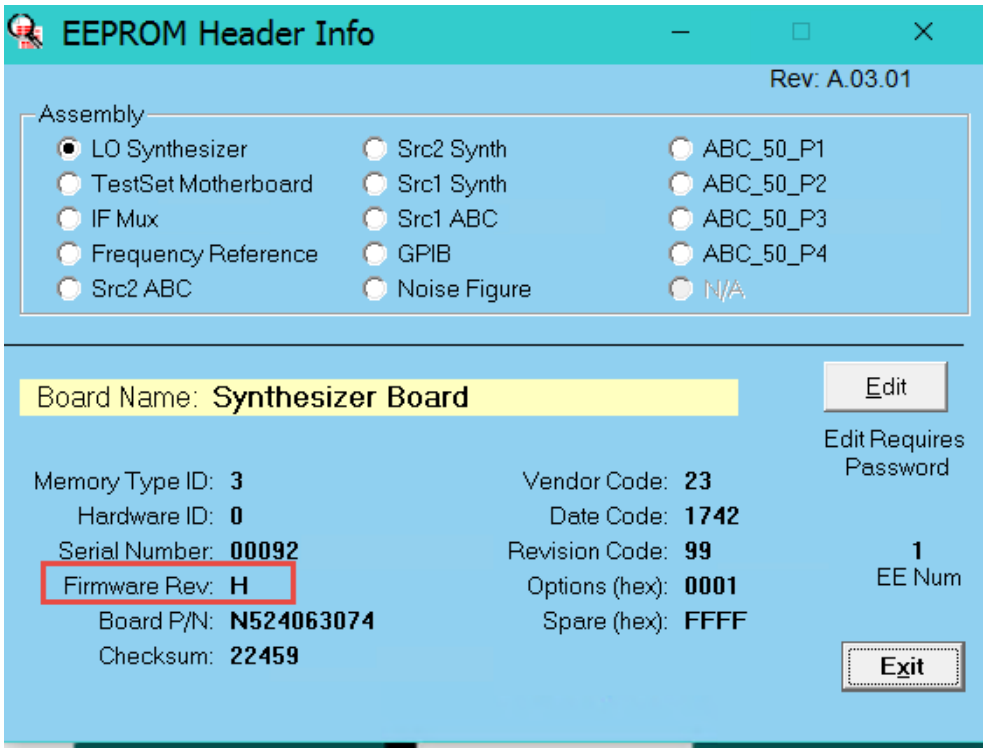
Verify that the synthesizer boards are all version H or greater.

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 18.

1. See “Downloading the Online PNA 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 7. Remove Some Bottom-Side (Test Set) Cables".

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

4. Removing the synthesizer boards for upgrading:

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

For instructions, click the Chapter 7 bookmark "Removing and Replacing the A4-A13 Boards" (i.e., refer to your PNA's serial number prefix section) in the PDF Service 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 Service Guide" on page 10.

Step 4. Remove the Front Panel Assembly

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

Step 5. Remove the A19 Test Set Motherboard

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

Step 6. Remove A20 IF Multiplexer (IF MUX) Board

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

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

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

Step 7. Remove Some Bottom-Side (Test Set) Cables

CAUTION Be careful not to damage the center pins of the semirigid cables. Some flexing of the cables may be necessary but do not over-bend them.

NOTE Leave the gray flexible cables, the wire harnesses, and the ribbon cables connected where possible. Any that are removed should be labeled for reconnection later.

NOTE When removing a cable, also remove the plastic cable clamp, if present. It is normal for some of the cable clamp’s adhesive to remain.

1. Place the analyzer bottom-side up on a flat surface
2. Remove the following cables. To see an image showing the location of these cables, click the Chapter 6 bookmark “Bottom RF Cables, Standard 4-Port Configuration, Option 401 (S/N Prefixes <6021)” or ““Bottom RF Cables, Standard 4-Port Configuration, Option 401 (S/N Prefixes ≥6021)” in the PDF Service Guide.

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

– W16 (N5222-20049) Port 3 CPLR THRU to A30 port 3 coupler
– W12 (N5222-20045) Port 1 CPLR THRU to A29 port 1 coupler
– W49 (N5222-20057) REF 3 RCVR R3 IN to A24 mixer brick (R3)

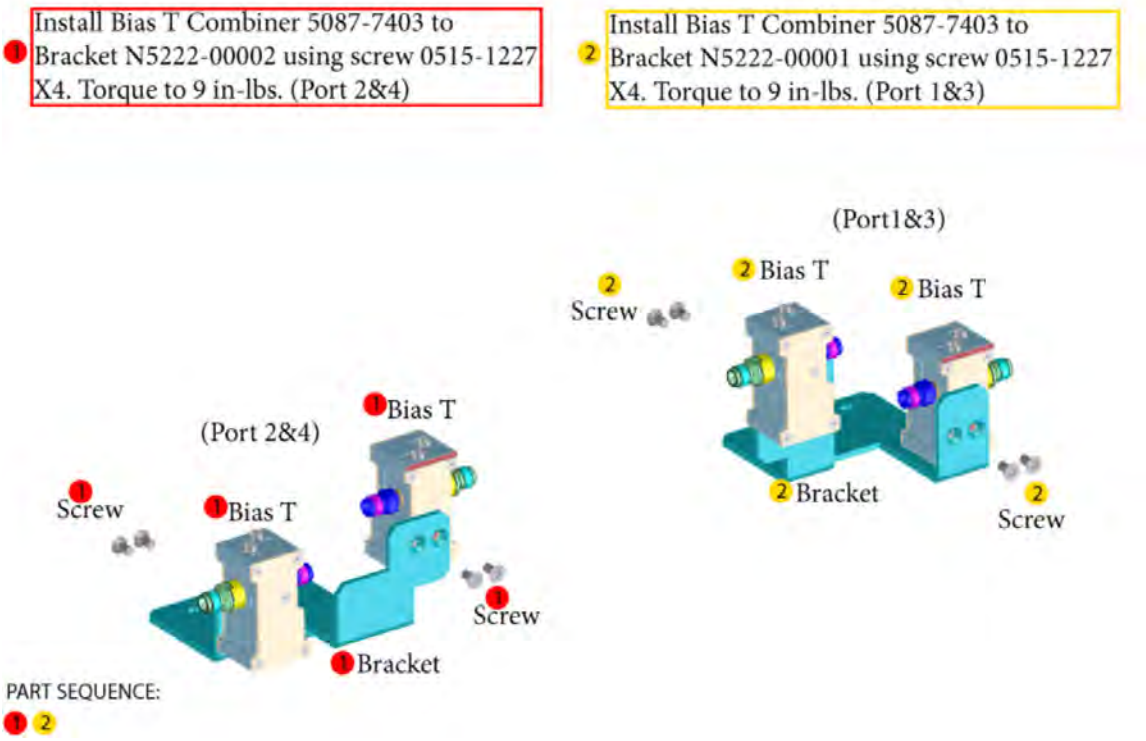
1. See “Downloading the Online PNA Service Guide” on page 10.

– W19 (N5222-20054) A27 port 4 receiver coupler to front-panel Port 4 SOURCE OUT
– W24 (N5222-20053) Port 2 CPLR THRU to A32 port 2 coupler

Step 8. Assemble the Bias Tee Combiner Assemblies

Refer to Figure 3 for this step of the procedure. New parts are listed in Table 1 on page 12. Use a T-10 TORX driver to tighten all screws.

Figure 3 Bias Tee Combiner Assembly (N5222-00001 (Ports 1 and 3), N5222-00002 (Ports 2 and 4), 5087-7403, & 0515-1227)

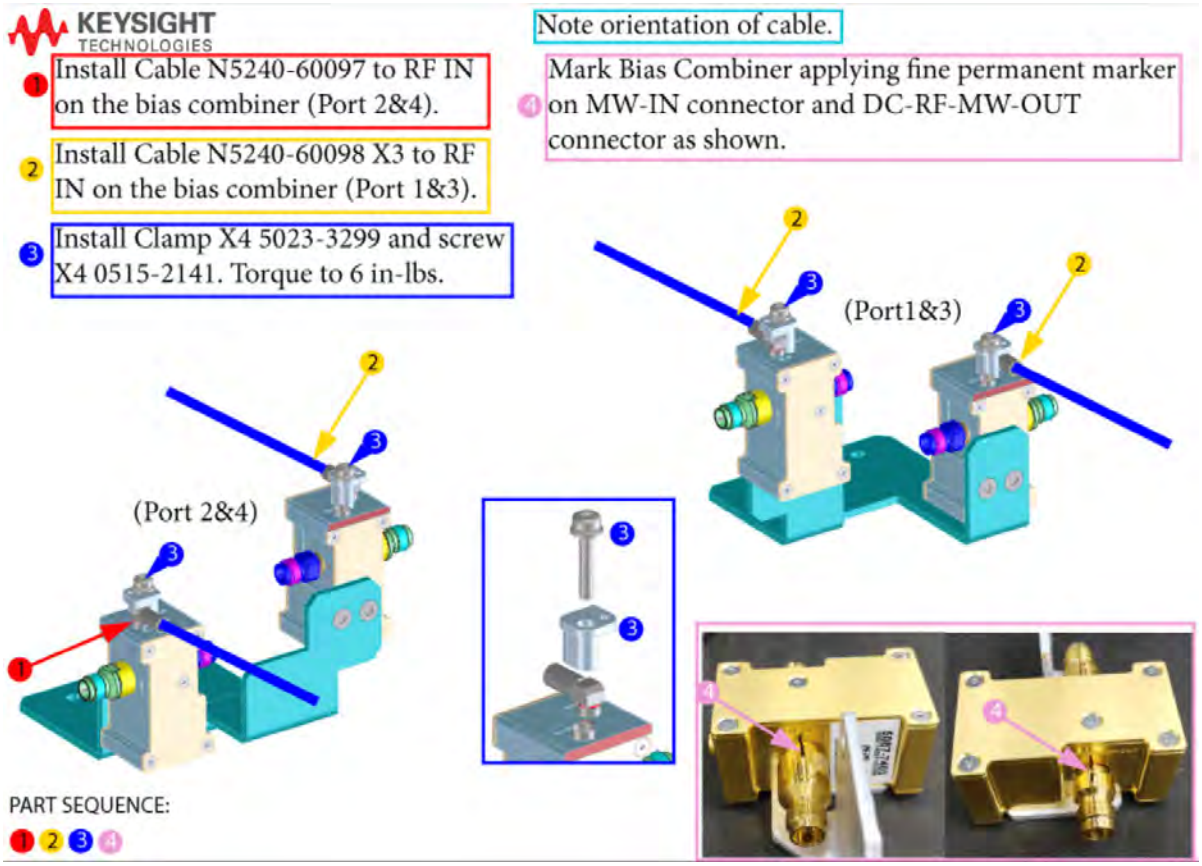


Step 9. Install the A71–A74 Bias Tee Combiner Assemblies

Refer to Figure 4 for this step of the procedure. New parts are listed in Table 1 on page 12. Use a T-10 TORX driver to tighten all screws.

1. Install the N5240-60097 cable as shown. Note the orientation of the cable (item ①).
2. Install the N5240-60098 (x3) cable as shown. Note the orientation of the cable (item ②).
3. Add 5023-3299 (x4) clamps and 0515-2141 (x4) clamp screws as shown (item ③). Torque to 6 in-lbs.

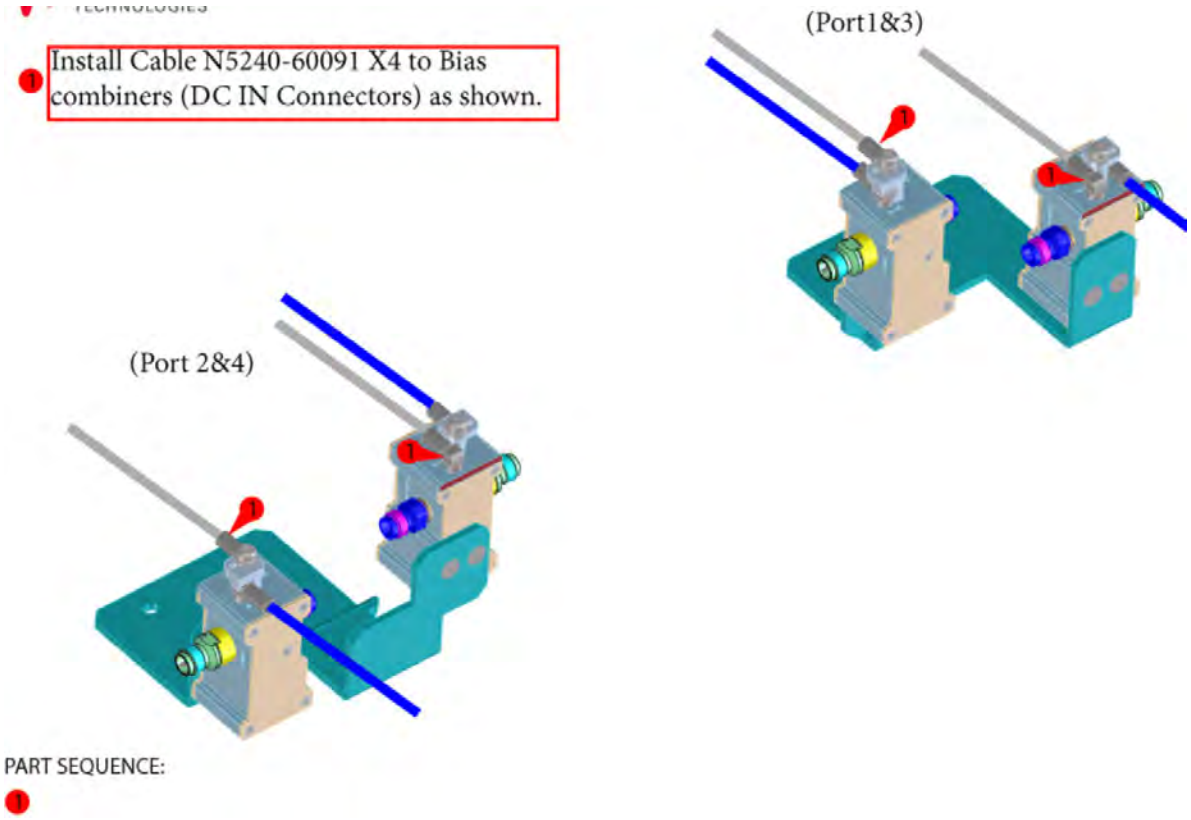
Figure 4 Install cables and clamps to bias tee combiners (N5240-60098, N5240-60097, 5023-3299, and 0515-2141)



Refer to Figure 5 for this step of the procedure. New parts are listed in Table 1 on page 12.

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

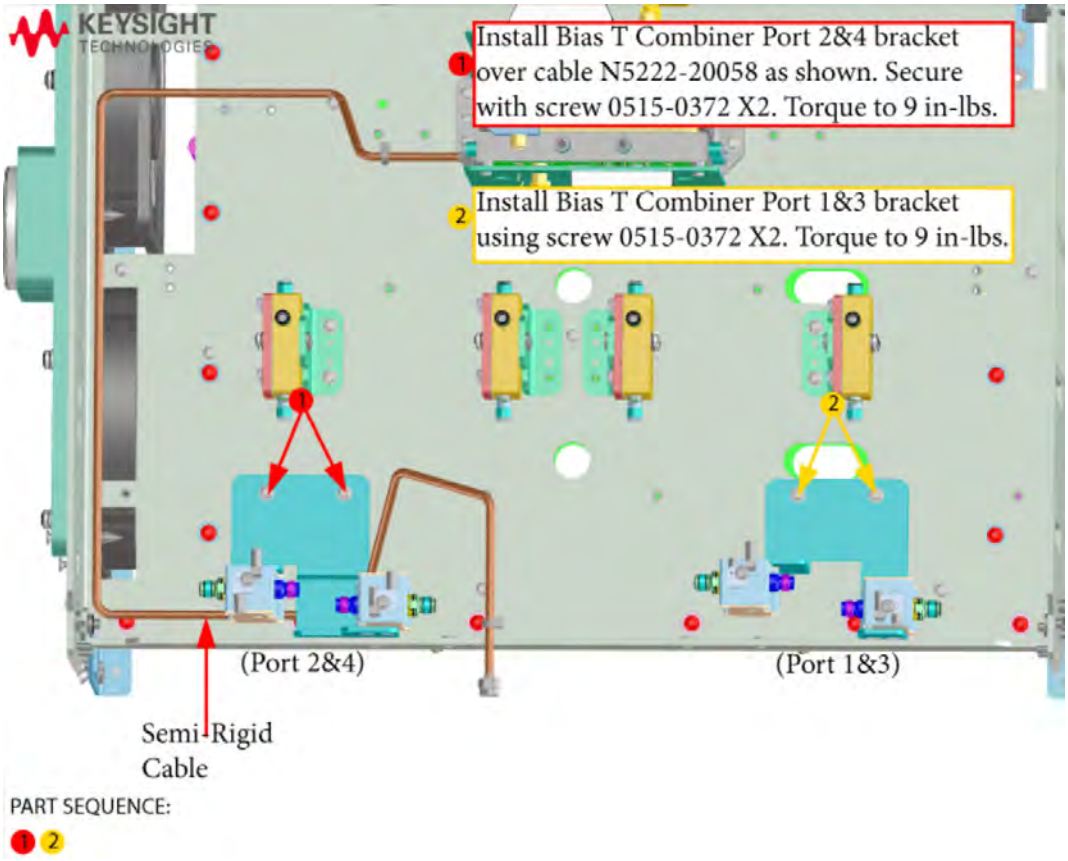
Figure 5 Install DC cables to the bias tees (N5240-60091)



Refer to Figure 6 for this step of the procedure. New parts are listed in Table 1 on page 12. Torque to 9 in-lbs.

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

Figure 6 Bias Tee Combiner Installation (using 0515-0372 screws)



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

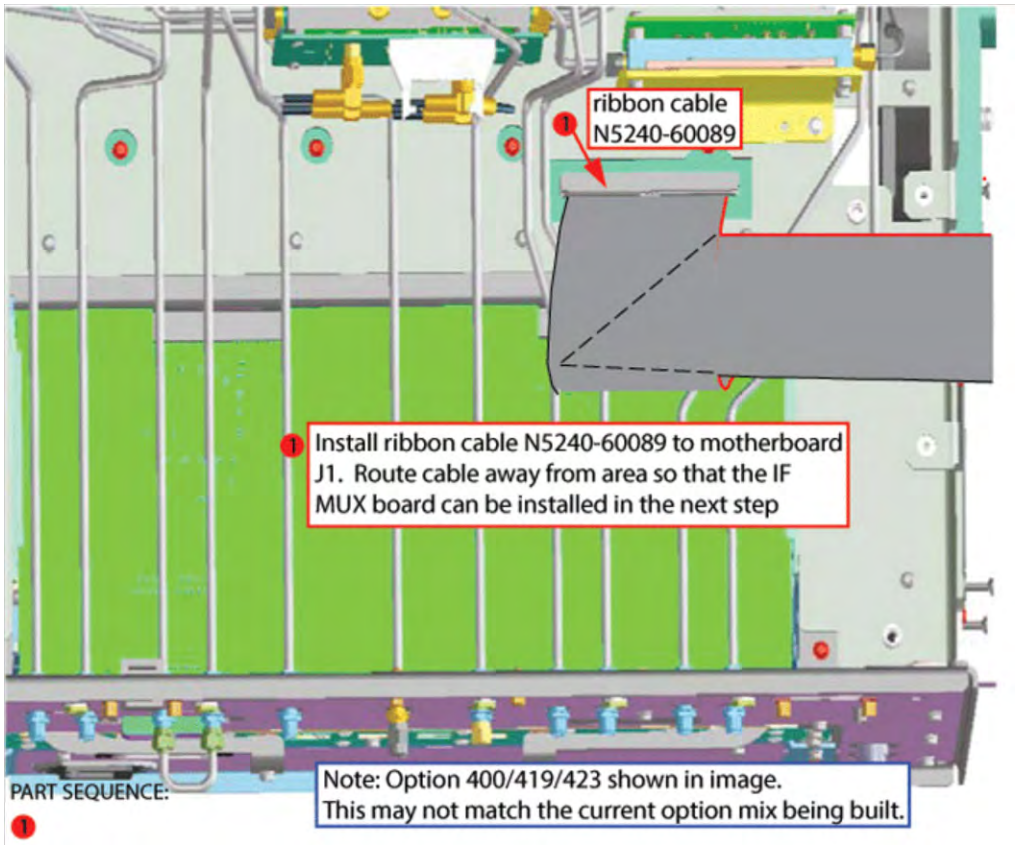
Refer to Figure 7 for this step of the procedure. New parts are listed in Table 1 on page 12.

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

NOTE

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

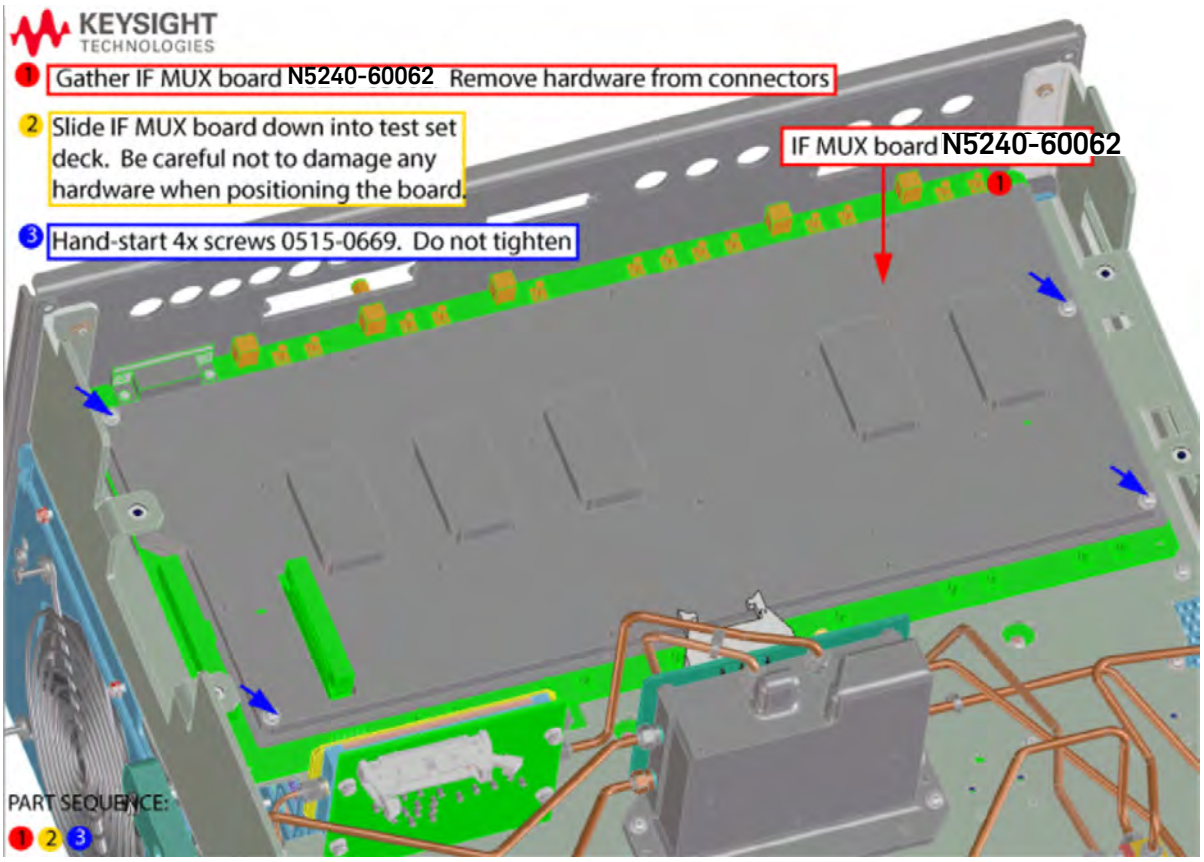
Figure 7 Install the Ribbon Cable on the A14 Motherboard (N5240-60089)



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

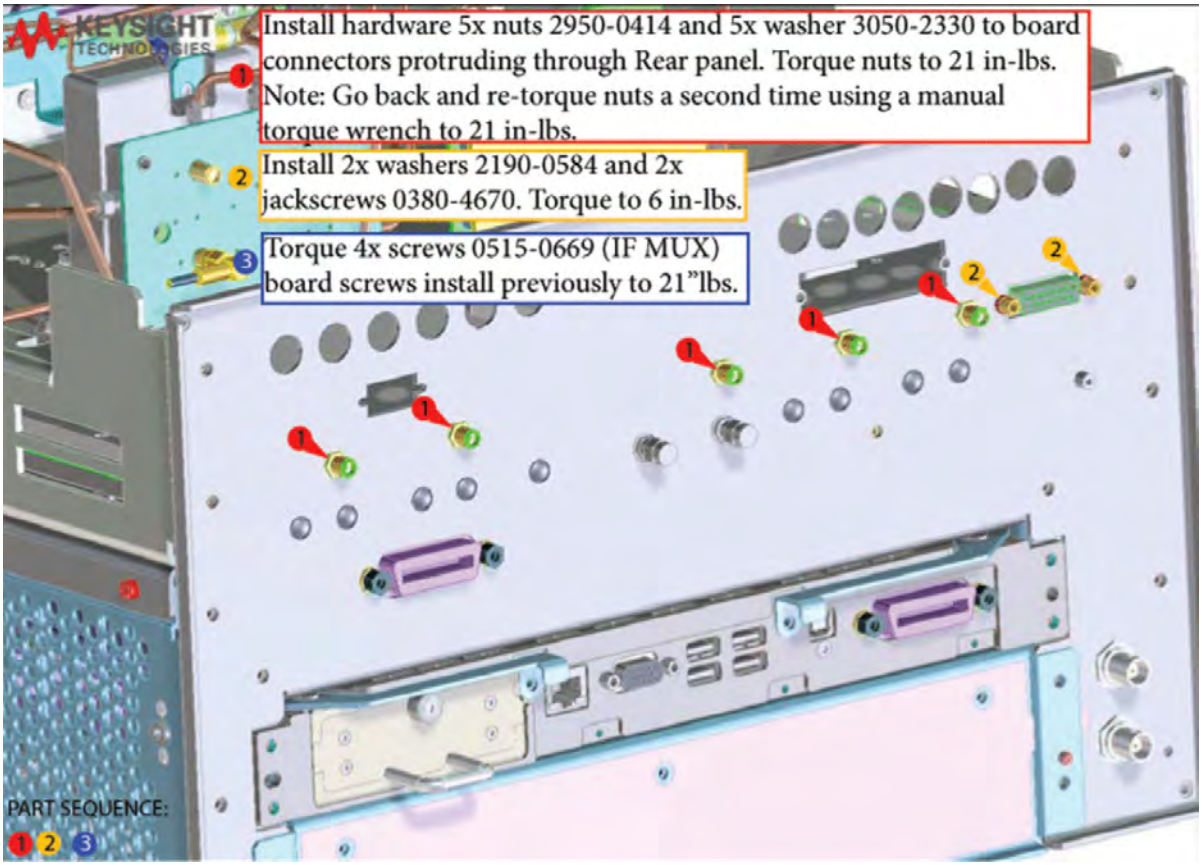
1. Reinstall the IF MUX board using 0515-0669 (x4) screws (item ① thru ③).
2. For now, hand tighten only (item ③). Refer to Figure 8.

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



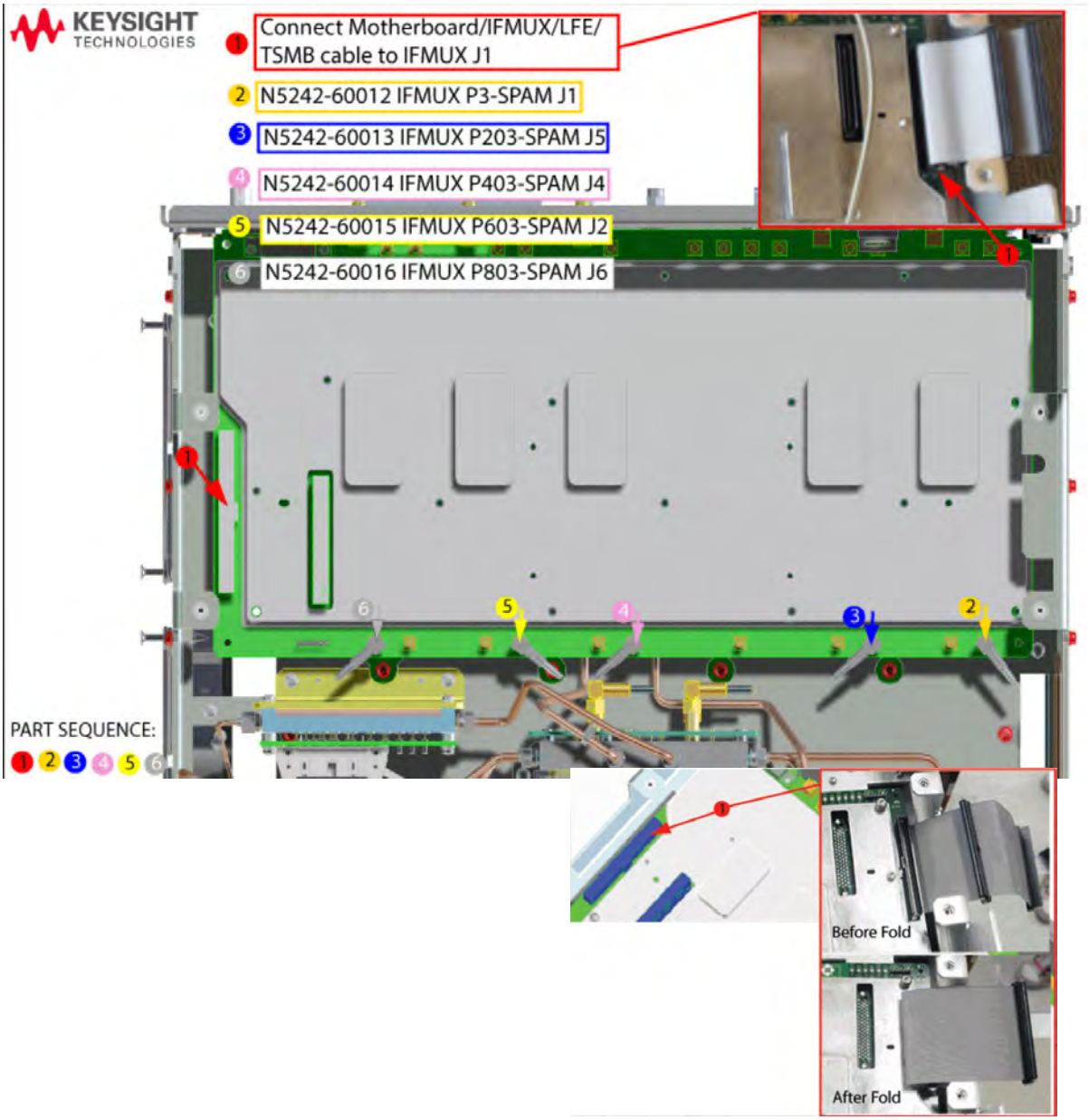
3. Reinstall the IF MUX board rear panel connectors using the washers and nuts removed in “Step 6. Remove A20 IF Multiplexer (IF MUX) Board” on page 19 (items ① and ②). Refer to Figure 9.
4. Torque the 0515-0669 IF MUX board screws that were previously hand-tightened to 21 in-lbs (item ③).

Figure 9 Reinstall the A20 IF MUX board rear panel hardware (N5240-60062 and 0515-0669)



5. Connect the N5240-60089 Motherboard/IF Multiplexer/Low Frequency Extension/Test set motherboard (i.e., MB/IF MUX/LFE/TSMB) ribbon cable to IF MUX J1 and fold as shown (item ①). Refer to Figure 10 on page 28.
6. Reconnect the IF Multiplexer /SPAM gray cables (N5242-60012, N5242-60013, N5242-60014, N5242-60015, and N5242-60016), to the A20 IF MUX board as indicated in Figure 10 on page 28 (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, N5242-60013, N5242-60014, N5242-60015, and N5242-60016)



Step 12. Reinstall the Mixer Brick (MXB) Cables and Route Cables

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

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

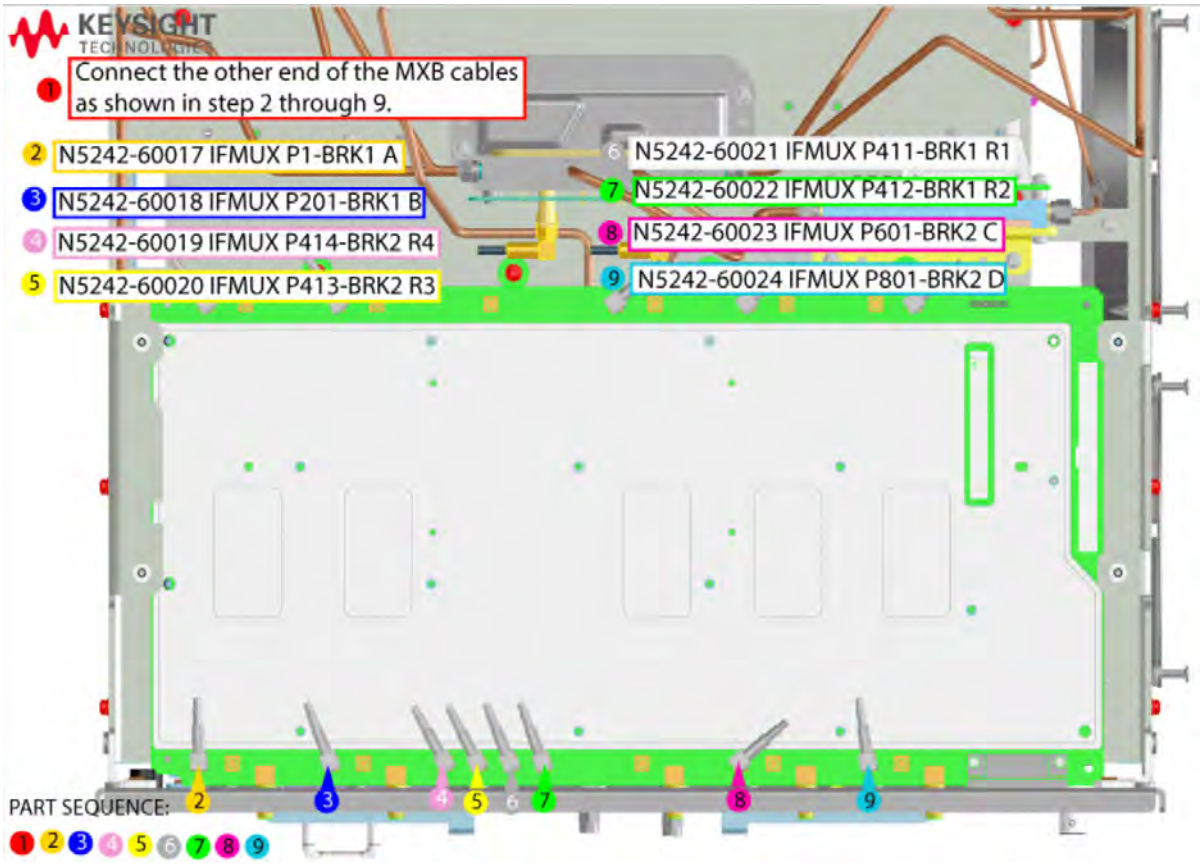
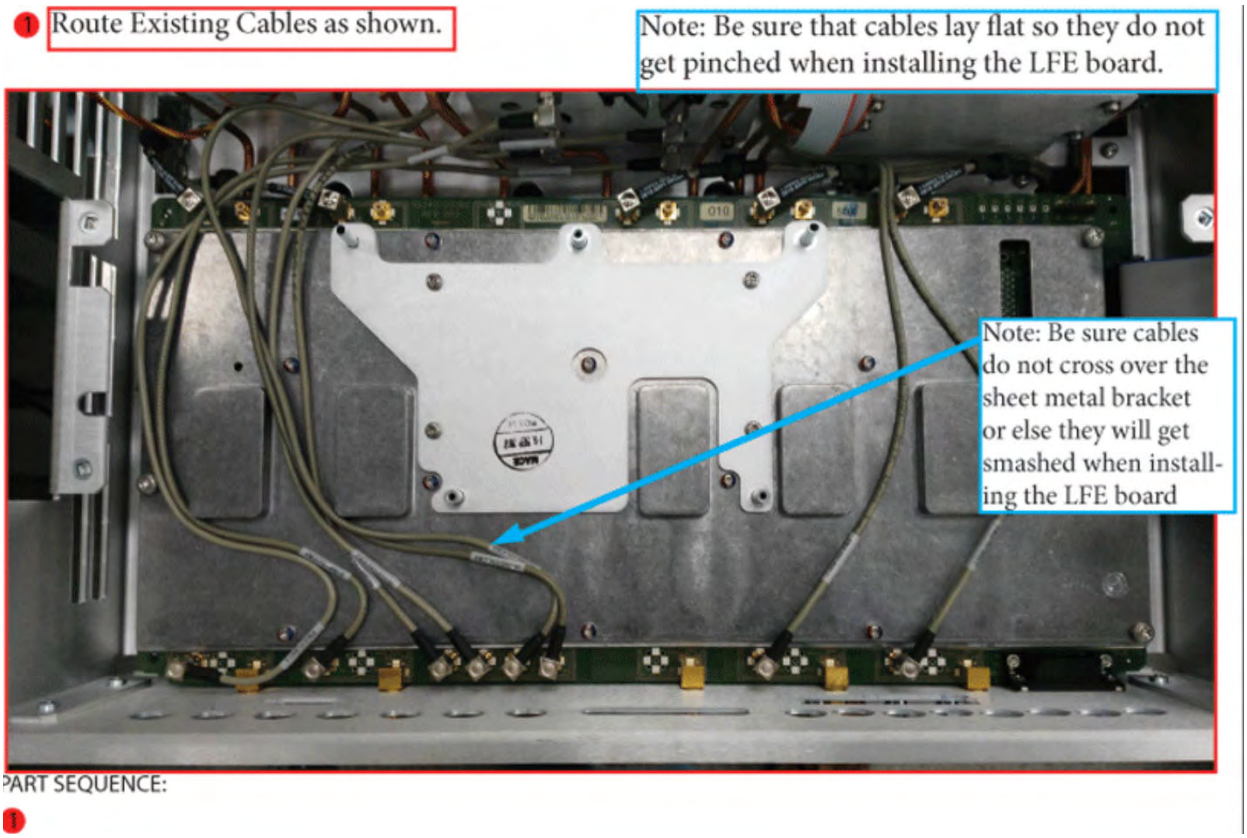


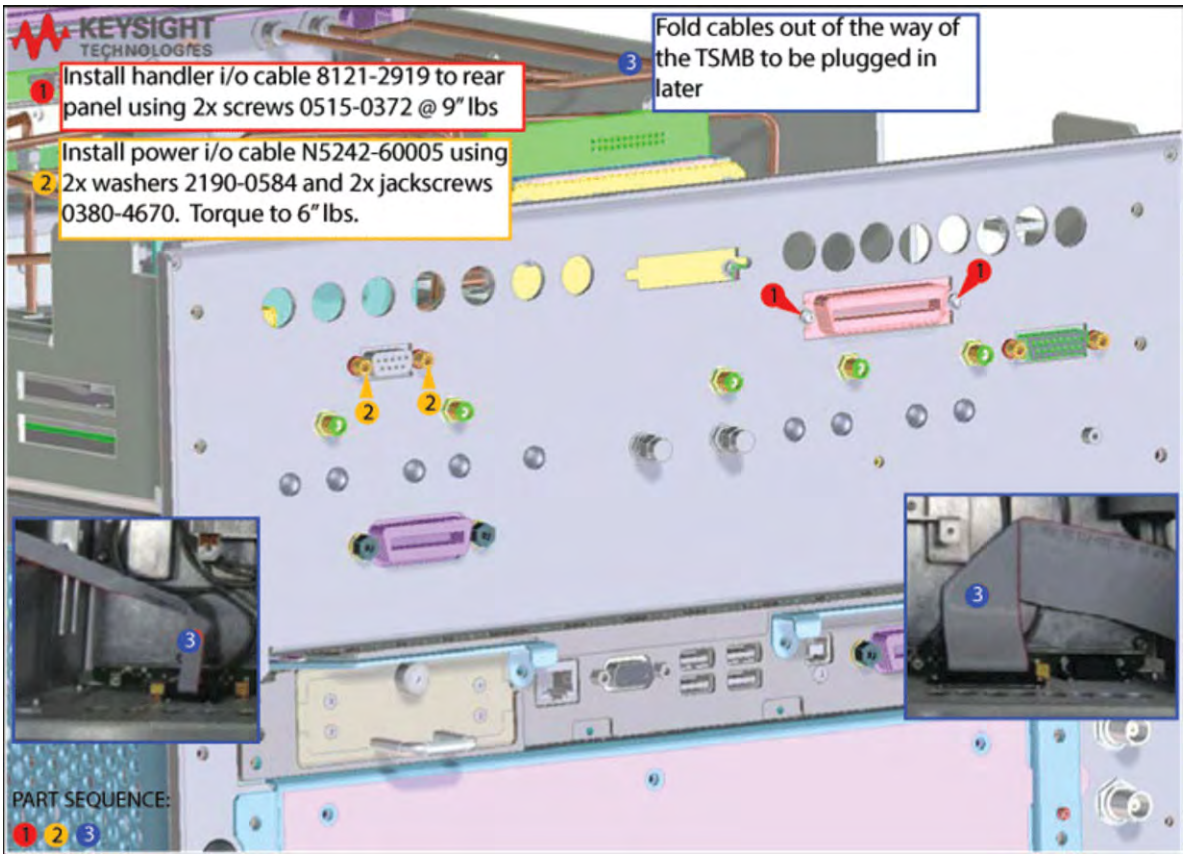
Figure 12 Route the existing IF gray cables



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

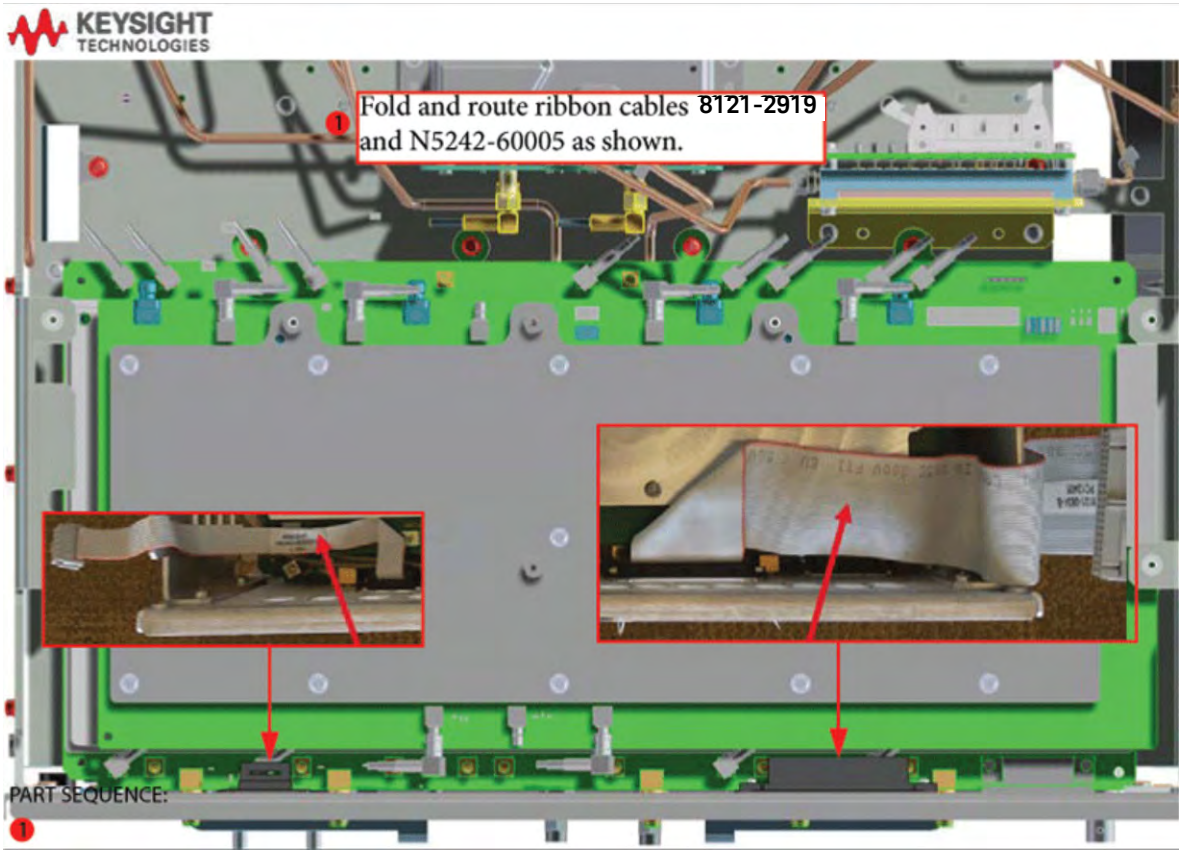
1. Reinstall the handler, power, and other I/O assemblies and fold cables out of the way of the LFE board to be plugged in (items ① and ③). Refer to Figure 13.

Figure 13 Reinstall handler I/O cable, I/O cable assembly, power I/O assembly, and I/O Cables.



2. Reinstall and route Power I/O and Handler I/O cables. Refer to Figure 14.

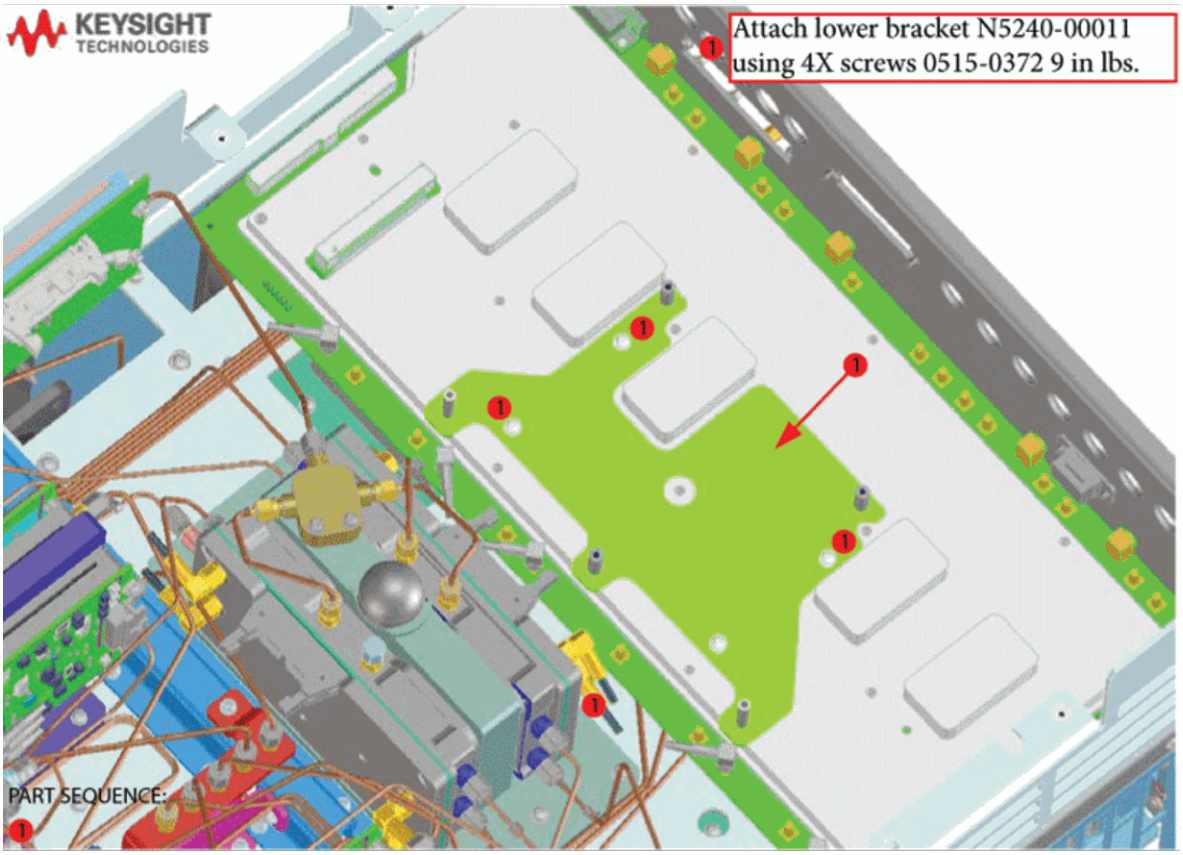
Figure 14 Reinstall and route the ribbon cables (8121-2919) and gray cable N5242-60005



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

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

Figure 15 Attach lower bracket to IF MUX board (N5240-00011 and 0515-0372)

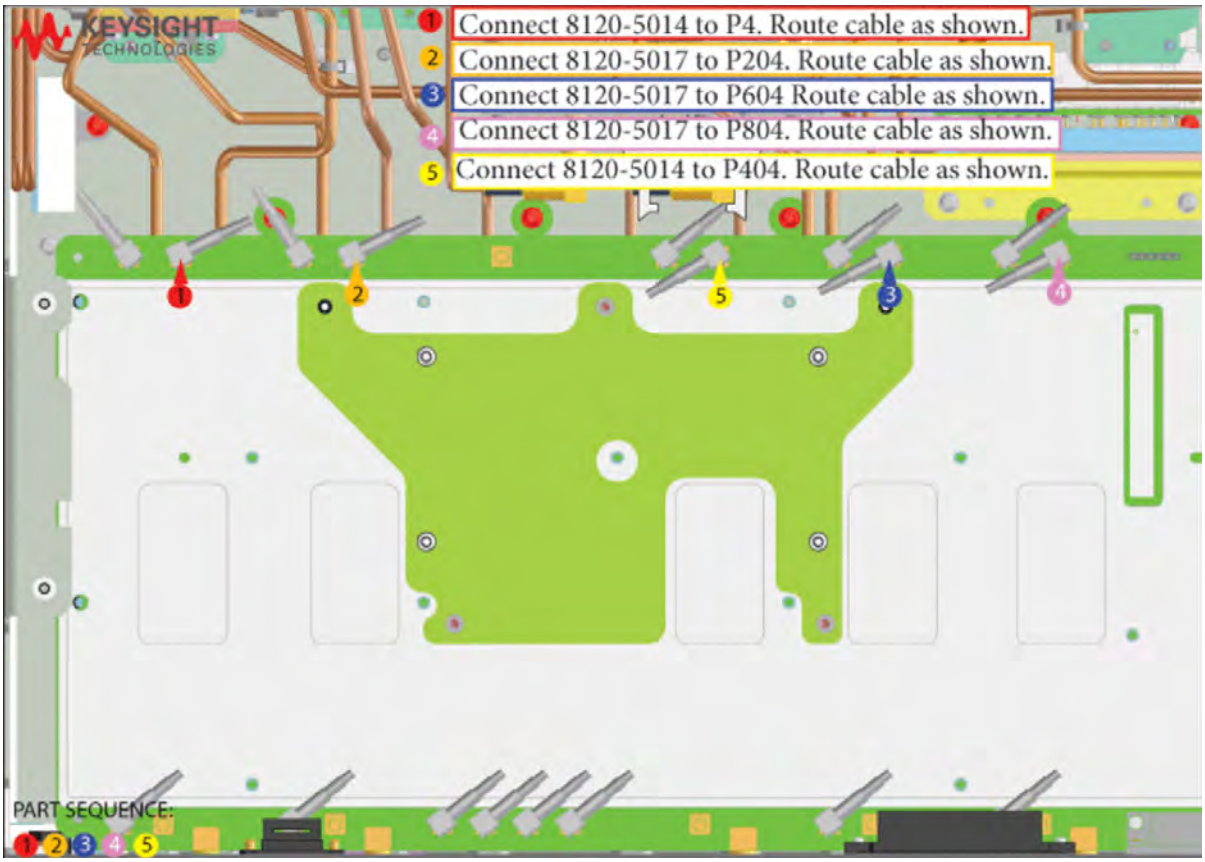


Step 15. Connect and Route New Low Frequency Extension (LFE) Cables (8120-5014 (x2) and 8120-5017 (x3)) and the Other Ends of the New Cables Connected to the IF Multiplexer (IF MUX) Board

1. Connect and route the 8120-5014 (x2) and 8120-5017 (x3) cables and connect the N5240-60089 MB/IF MUX/LFE/TSMB ribbon cable as shown on the IF MUX board (items ① through ⑤). You will connect the other ends of the IF gray cables later on the process. Refer to Figure 16.

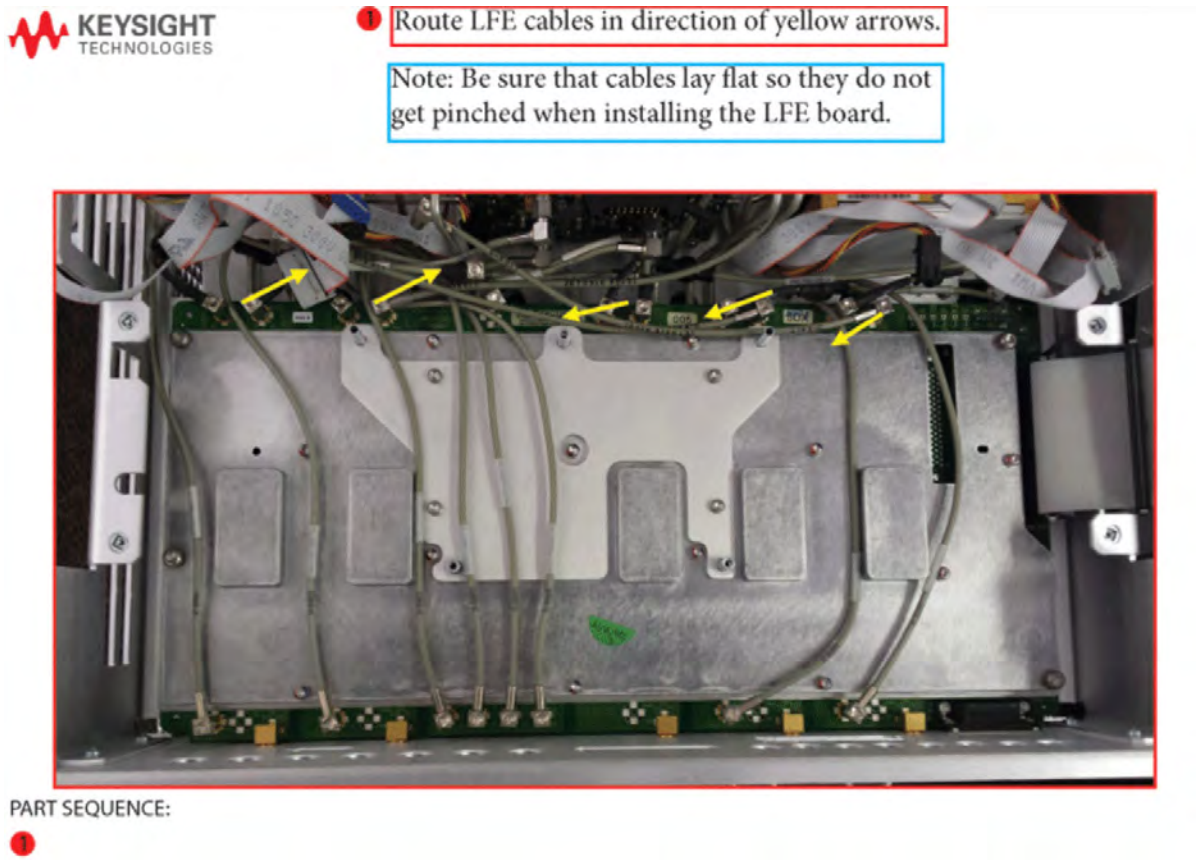
NOTE When connecting the IF gray cables, be careful to look for the correct connector labels on the IF multiplexer (IF MUX) board.

Figure 16 Connecting and routing the gray cables on the IF MUX board (8120-5014 (x2) and 8120-5017 (x3))



2. Route the reconnected mixer brick (MXB) and IF multiplexer (IF MUX) gray cables that were reconnected in “Step 12. Reinstall the Mixer Brick (MXB) Cables and Route Cables” on page 29. Refer to Figure 17.

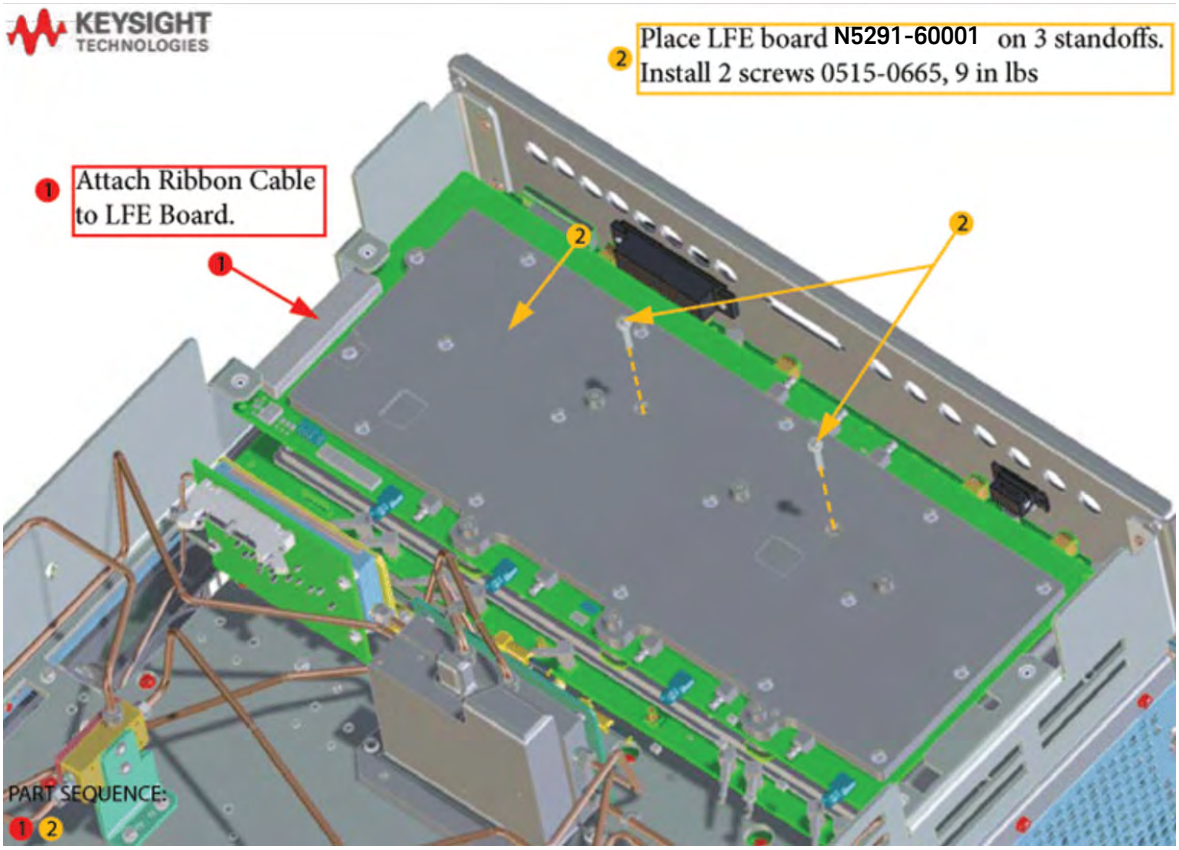
Figure 17 Routing the reconnected MXB and IF MUX Gray Cables on the IF MUX board



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

1. Install the A70 LFE board using the standoffs as a guide.
2. Connect N5240-60089 Motherboard / IF Multiplexer / LFE/ Test set motherboard (i.e., MB/IF MUX/LFE/TSMB) ribbon cable to LFE board J1 (item ①). Refer to Figure 18.
3. Install the N5291-60001 A70 LFE board using the 0515-0665 screws x2. Torque to 9 in-lbs (item ②). Refer to Figure 18.

Figure 18 Install the A70 LFE board (N5240-60089, N5291-60001 and 0515-0665)



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

CAUTION

This upgrade kit contains cables for Version 6 synthesizers and Version 7 direct digital synthesizer (DDS) assemblies. Please refer to your instrument's Service Guide, if you are unclear which assembly you have installed. Refer to "Downloading the Online PNA Service Guide" on page 10.

1. Connect the (8120-5014 (x2), 8120-5017 (x3)) IF gray cables item ① through item ⑤ as shown in Figure 19 on page 38 and Figure 20 on page 39. (i.e., one end was installed in Figure 16 on page 34.)
2. Then choose one of the following:
   - **Version 6 Synthesizers**: Connect the N5242-60078 Source 1, N5242-60079 Source 2, and N5242-60080 LO Source cables to the LFE board as shown – (items ⑥ through ⑧). The other end of the N5242-60078, N5242-60079, and N5242-60080 cables are connected to the Source1, Source 2, and LO Source boards in a later step. Refer to Figure 19 on page 38.
   - **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, Source 2, and LO Source boards in a later step. Refer to Figure 20 on page 39.

Figure 19 **Version 6 Synthesizers**: Connect A71–A74 bias-T combiners new cables to the A70 LFE board the other ends of the new LFE cables to the LFE Board (8120-5014 (x2), 8120-5017 (x3), N5242-60078, N5242-60079, and N5242-60080)

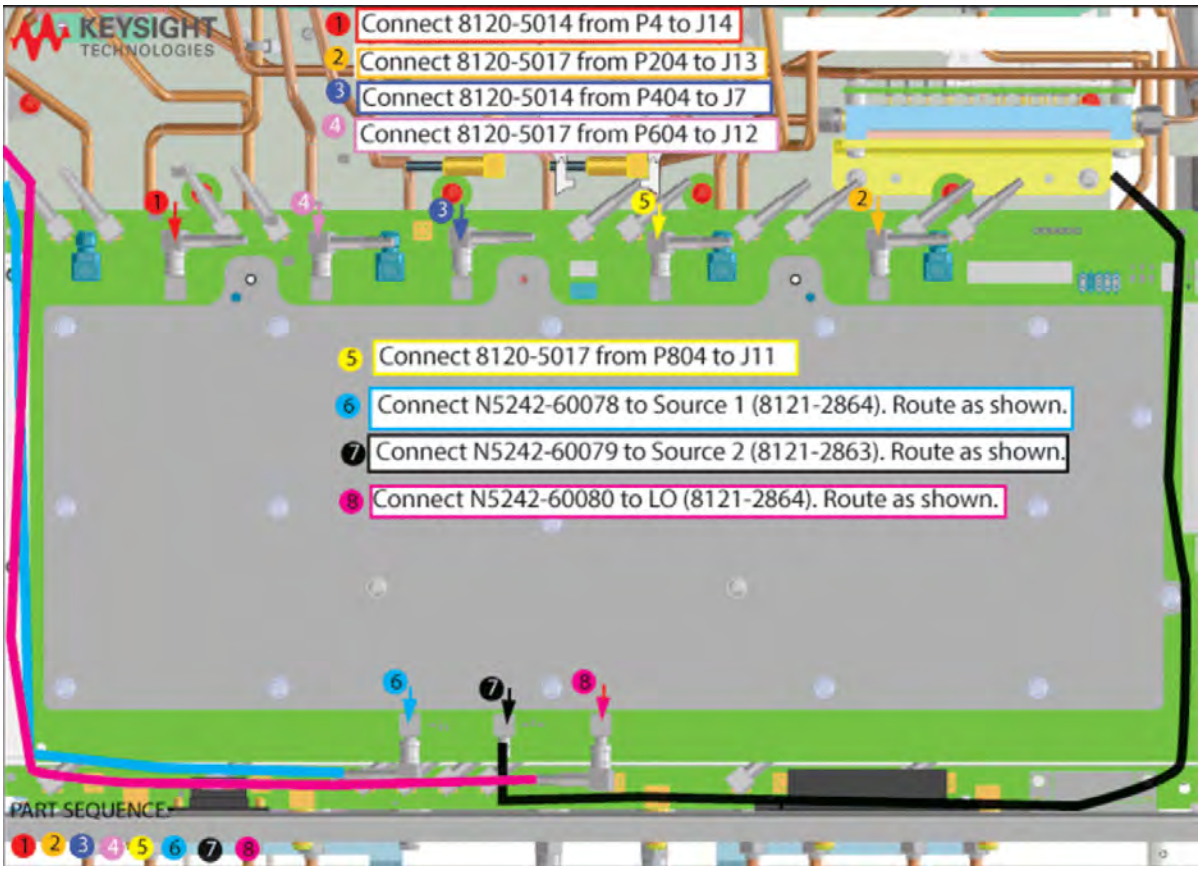
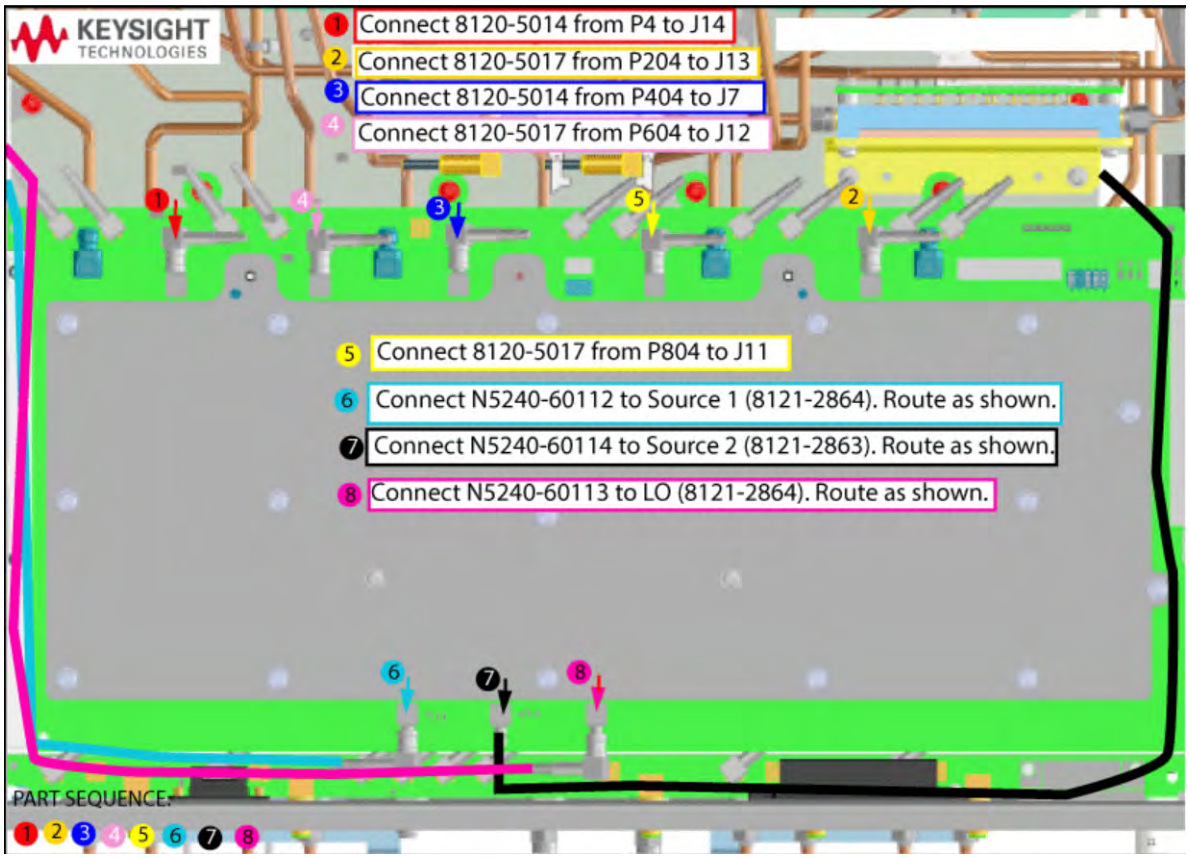


Figure 20 **Version 7 Synthesizers**: Connect the other ends of the IF gray cables and connect the Source 1, Source 2, and LO Source cables as shown (8120-5014 (x2), 8120-5017 (x3), N5240-60112, N5240-60113, and N5240-60114)



Step 18. Install the New Bias Tee Combiner's Semirigid Test Set Cables, the Blue Cables, and Install Cable Clamps Onto 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 Cables" on page 40
- "Install New N5240-60097 (x1) and N5240-60098 (x3) Blue Bias-Tee Combiner Cables and Clamps from the A71–A74 Bias Tees "RF-IN" to the A70 LFE Board "Port1", "Port2", "Port3", and "Port4" Connectors and Install Clamps Onto Ferrite Beads" on page 45

Install the New Semirigid Cables

To see an image showing the location of these cables, refer to Figure 21 on page 41, Figure 22 on page 42, and Figure 23 on page 43. See also the Chapter 6 bookmarks "Bottom RF Cables, 4-port Configuration, Option 405 (**S/N Prefixes** <6021)" or "Bottom RF Cables, 4-Port, Option 405 (**S/N Prefixes** ≥6021)" in the PDF Service Guide. New parts are listed in Table 1 on page 12.

1. Install the following cables in the order listed.

   Refer to Figure 21 on page 41.

   - ①– W167 (N5222-20120) Port 2 CPLR THRU to A74 port 2 Bias combiner
   - ②– W168 (N5222-20116) A32 Port 2 test coupler to A74 port 2 bias combiner

   Refer to Figure 22 on page 42.

   - ①– W166 (N5222-20118) A31 port 4 test port coupler to A73 port 4 Bias combiner
   - ②– W165 (N5222-20122) Port 4 CPLR THRU to A73 port 4 Bias combiner

   Refer to Figure 23 on page 43.

– ③– W180 (N5222-20125) REF 3 RCVR R3 IN to A24 mixer brick (R3)

Refer to Figure 24 on page 44.

– ①– W162 (N5222-20115) A29 port 1 test coupler to A71 port 1 Bias combiner

– ②– W163 (N5222-20121) Port 3 CPLR THRU to A72 port 3 Bias combiner

– ③– W161 (N5222-20119) Port 1 CPLR THRU to A71 port 1 Bias combiner

– ④– W164 (N5222-20117) A30 Port 3 test coupler to A72 port 3 bias combiner

Figure 21 Install A74 port 2 bias-T semirigid cables (N5222-20116 and N5222-20120)

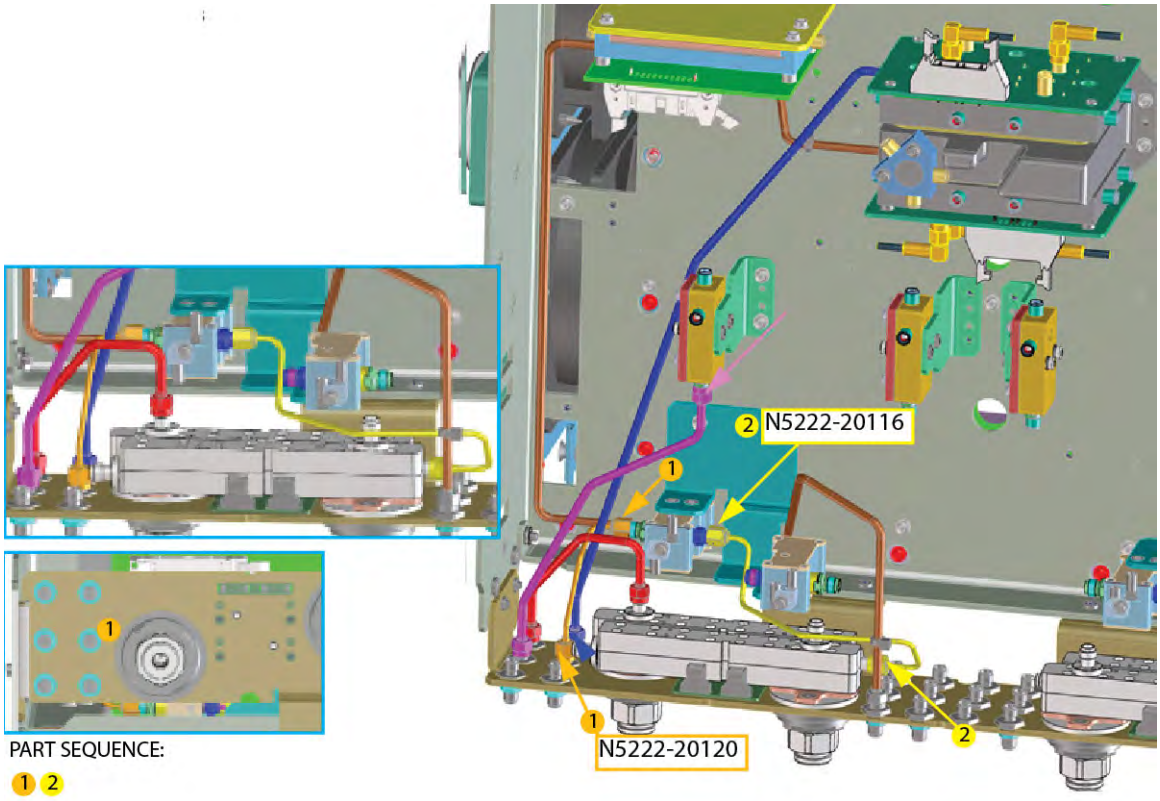


Figure 22 Install A73 port 4 bias-T semirigid cables (N5222-20118 and N5222-20122)

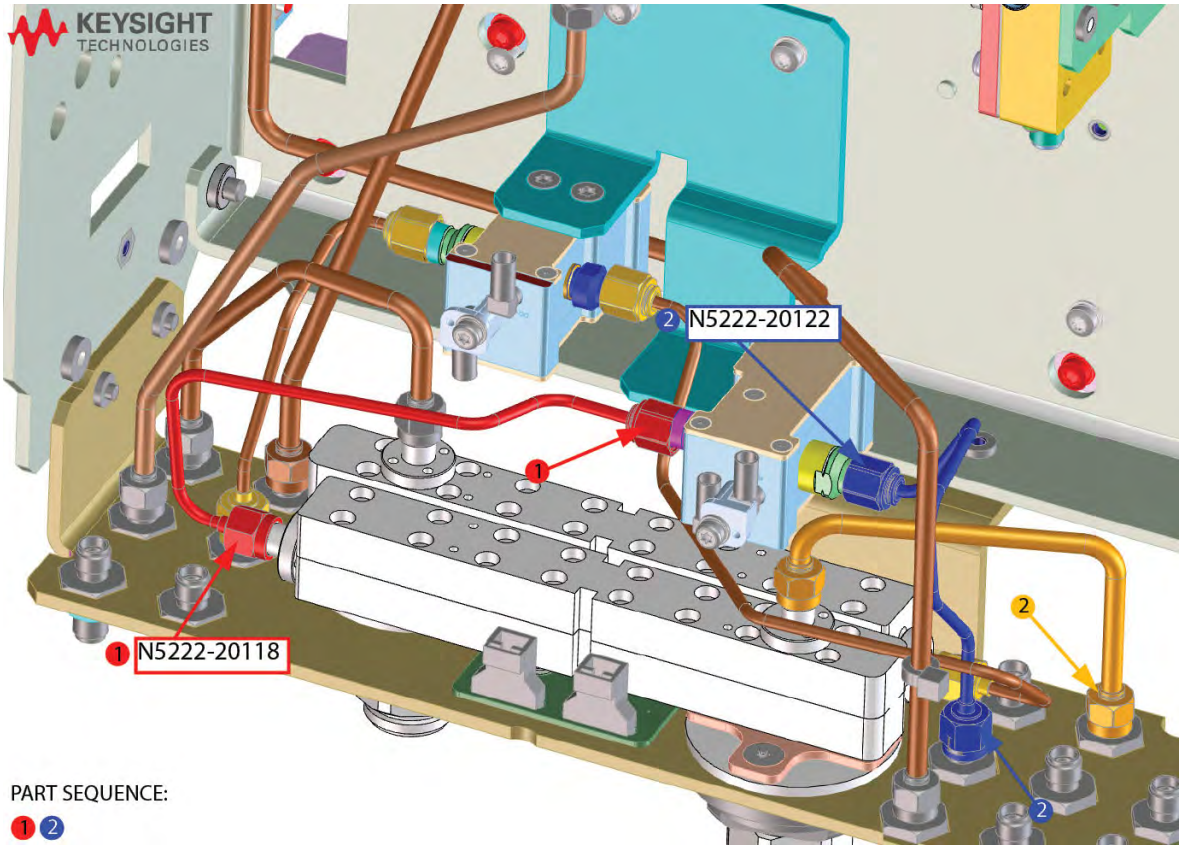


Figure 23 Install A24 MXB R3 semirigid cable to front panel RCVR R3 IN (N5222-20125)

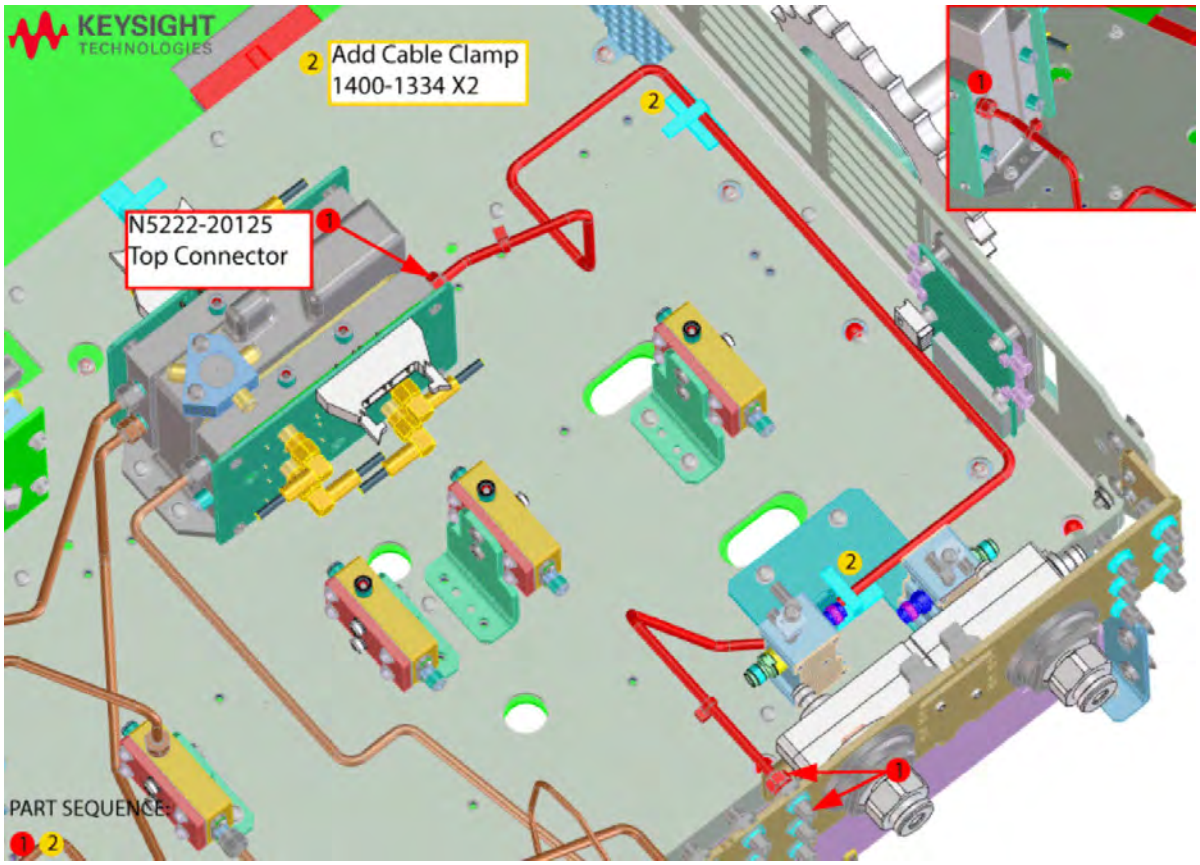
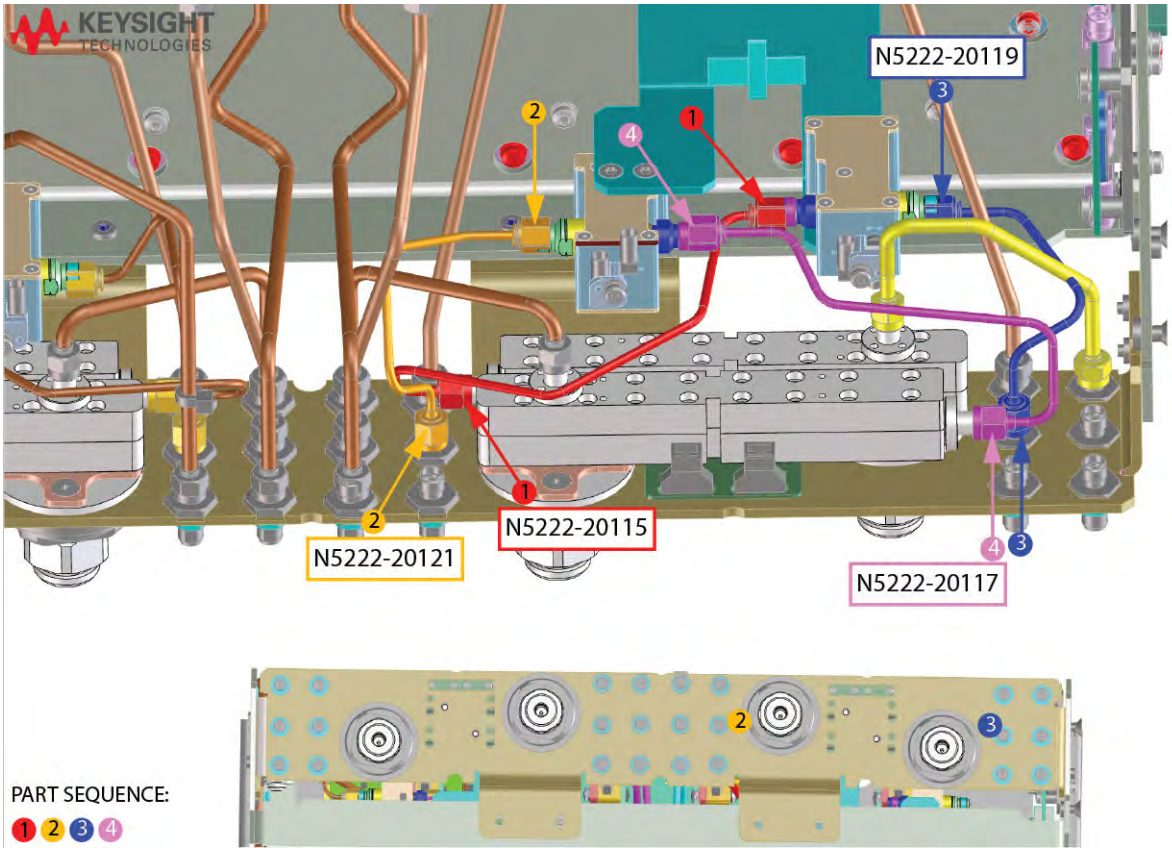


Figure 24 Install A71 port 1 and A72 port 3 bias-T semirigid cables (N5222-20115, N5222-20121, N5222-20119, and N5222-20117)



Install New N5240-60097 (x1) and N5240-60098 (x3) Blue Bias-Tee Combiner Cables and Clamps from the A71–A74 Bias Tees “RF-IN” to the A70 LFE Board “Port1”, “Port2”, “Port3”, and “Port4” Connectors and Install Clamps Onto Ferrite Beads

For this step, refer to Figure 25 on page 45 and Figure 26 on page 46.

2. Install the N5240-60097 (x1) and N5240-60098 (x3) cable as shown. Note the orientation of the cable (item ① through ③). Torque to 10 in-lbs.

Figure 25 Connect N5240-60097 from A74 and N5240-60098 from A73 Bias Tee Combiner cables to A70 LFE Board and Install Clamps on Ferrite Beads (N5240-60097 (x1), N5240-60098 (x1), and 1400-1391 (x2))

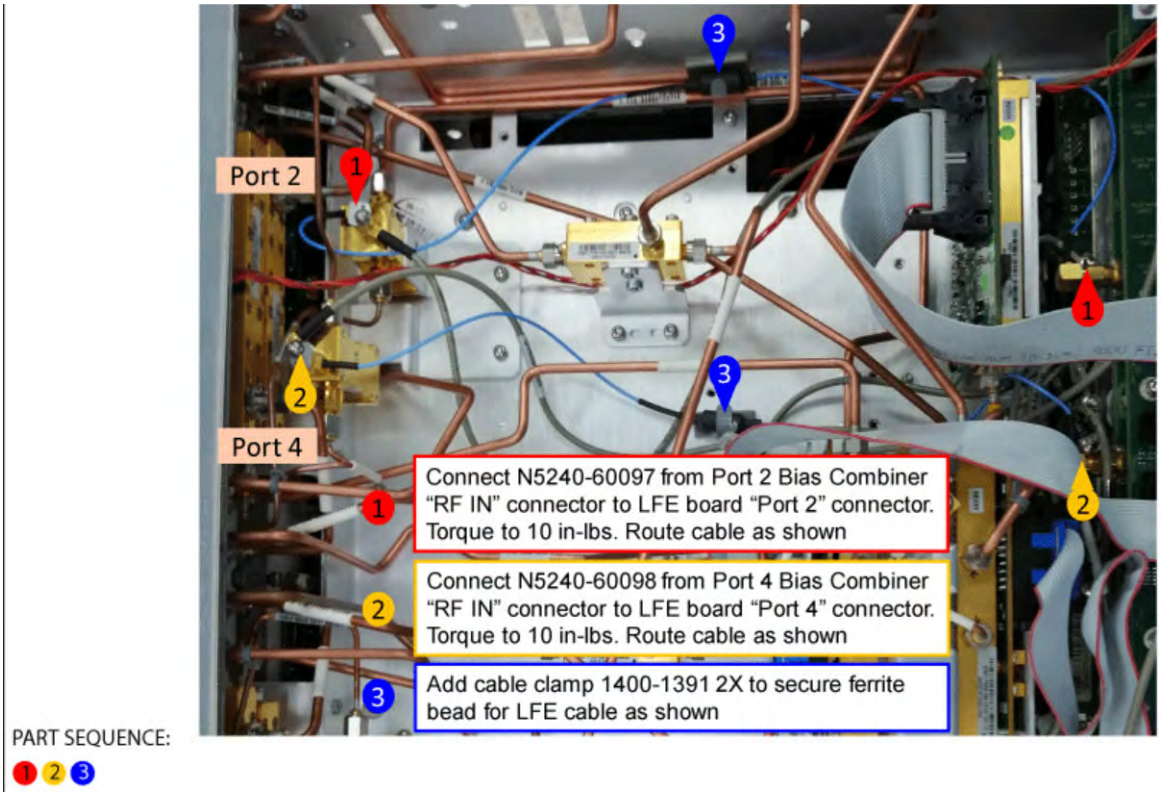
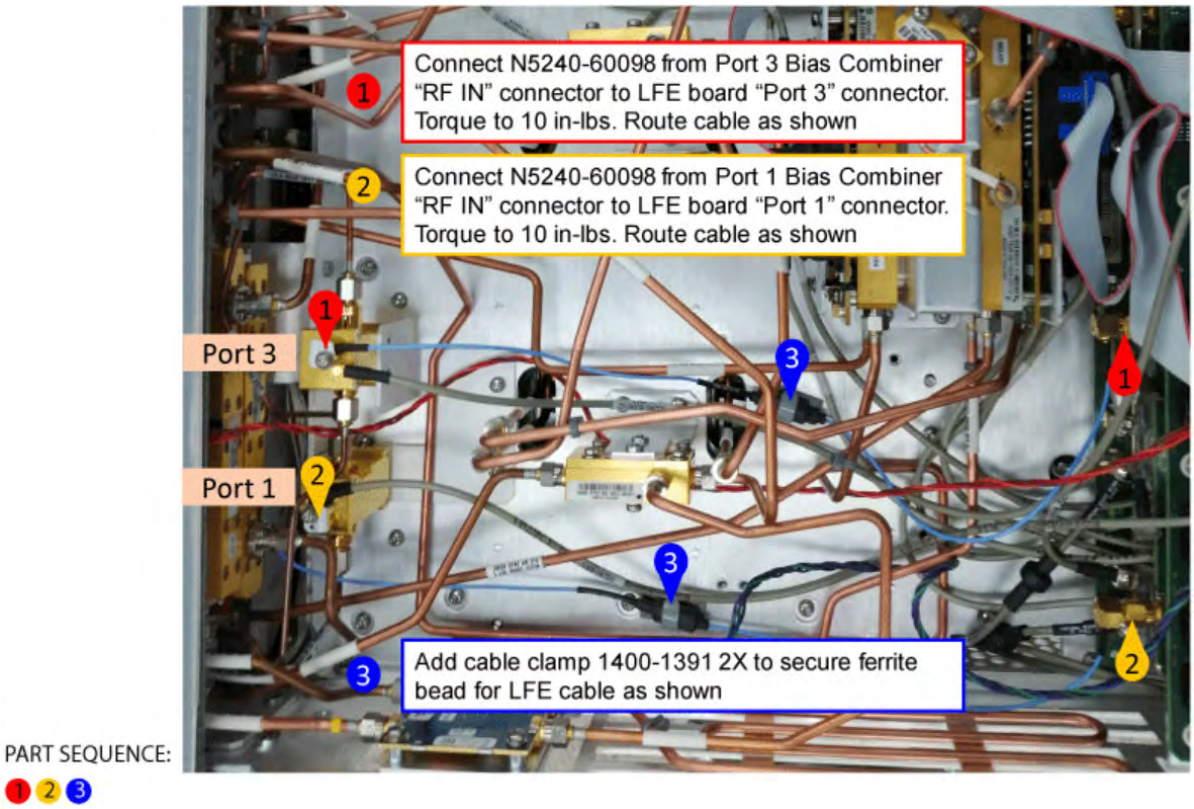


Figure 26 Connect N5240-60098 (x2) from A71 and A72 Bias Tee Combiner cables to A70 LFE Board and Install Clamps on Ferrite Beads (N5240-60098 (x2), and 1400-1391 (x2))



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 12.

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

This step contains the following:

Install the A7–74 bias-Tee combiner's gray Low Frequency Extension (LFE) DC bias Cables

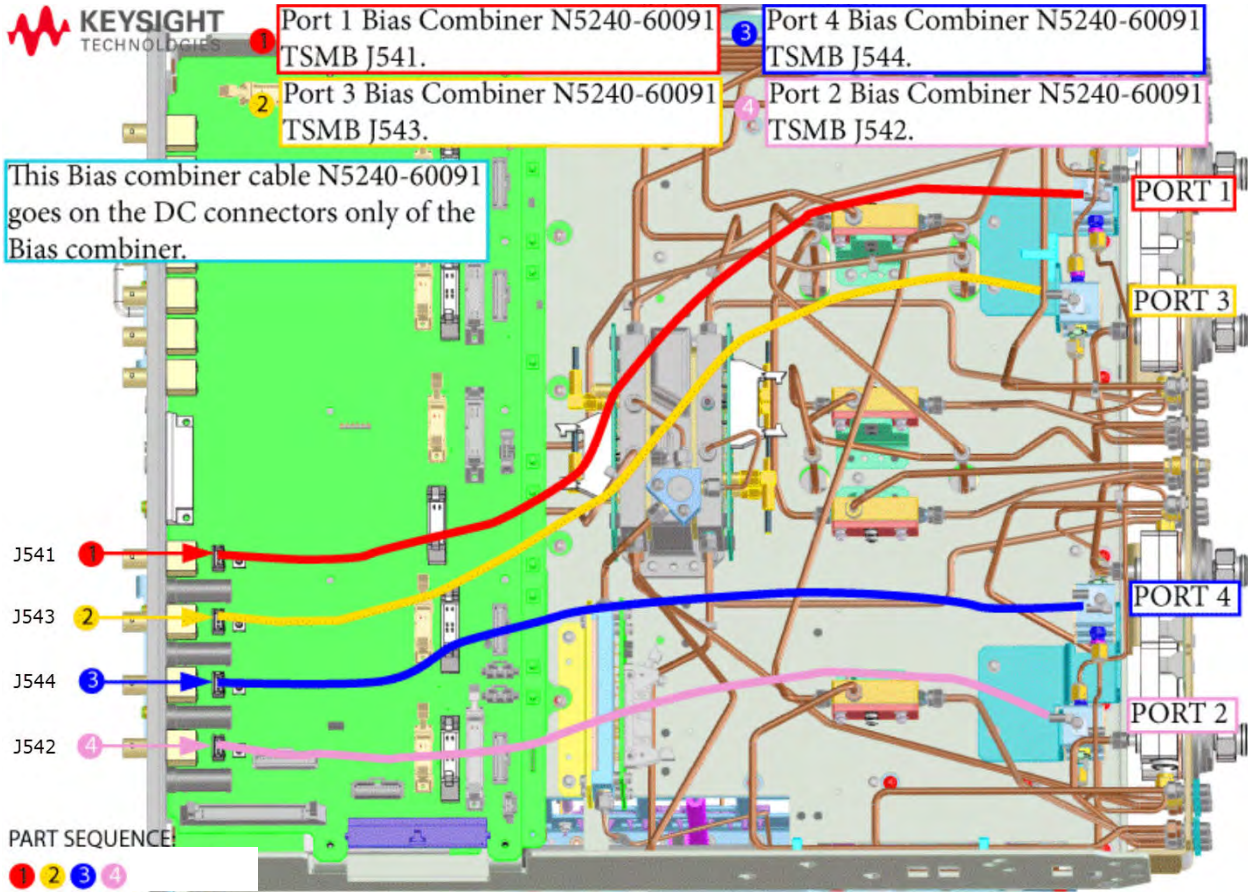
To see an image showing the location of these cables, refer to Figure 27 on page 48. See also the Chapter 6 bookmarks "Bottom Ribbon Cables and Wire Harnesses, 4-port, Option 405 (**S/N Prefixes <**6021)" or "Bottom Ribbon Cables and Wire Harnesses, 4-port, Option 405 (**S/N Prefixes ≥**6021)" in the PDF Service Guide[1]. New parts are listed in Table 1 on page 12.

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

1. Connect A71 and A74 gray DC cables to the test set motherboard (TSMB) as follows:
   - ①–(N5242-60091) A19 test set motherboard J541 to A71 port 1 bias-T combiner
   - ②–(N5242-60091) A19 test set motherboard J543 to A74 port 2 bias-T combiner
   - ③–(N5242-60091) A19 test set motherboard J544 to A72 port 3 bias-T combiner
   - ④–(N5242-60091) A19 test set motherboard J542 to A73 port 4 bias-T combiner

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

Figure 27 Install the A71–A74 bias-Tee combiner's gray DC bias cables to the (N5240-60091)



Route Cables

2. 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 27 on page 48.

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 10.

Refer to Figure 28 on page 50 and Figure 29 on page 51. 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 N5242-60078 (item ①), N5242-60079 (item ②), and N5242-60080 (item ③) flexible cables as indicated in Figure 28 on page 50.
   - **Version 7 Synthesizers:** Connect N5240-60112 (item ①), N5240-60114 (item ②), and N5240-60113 (item ③) flexible cables as indicated in Figure 29 on page 51.

Figure 28 Version 6 Synthesizers: New test set cables. Connect the other end of the N5242-60078, N5242-60079, and N5245-60080 cables

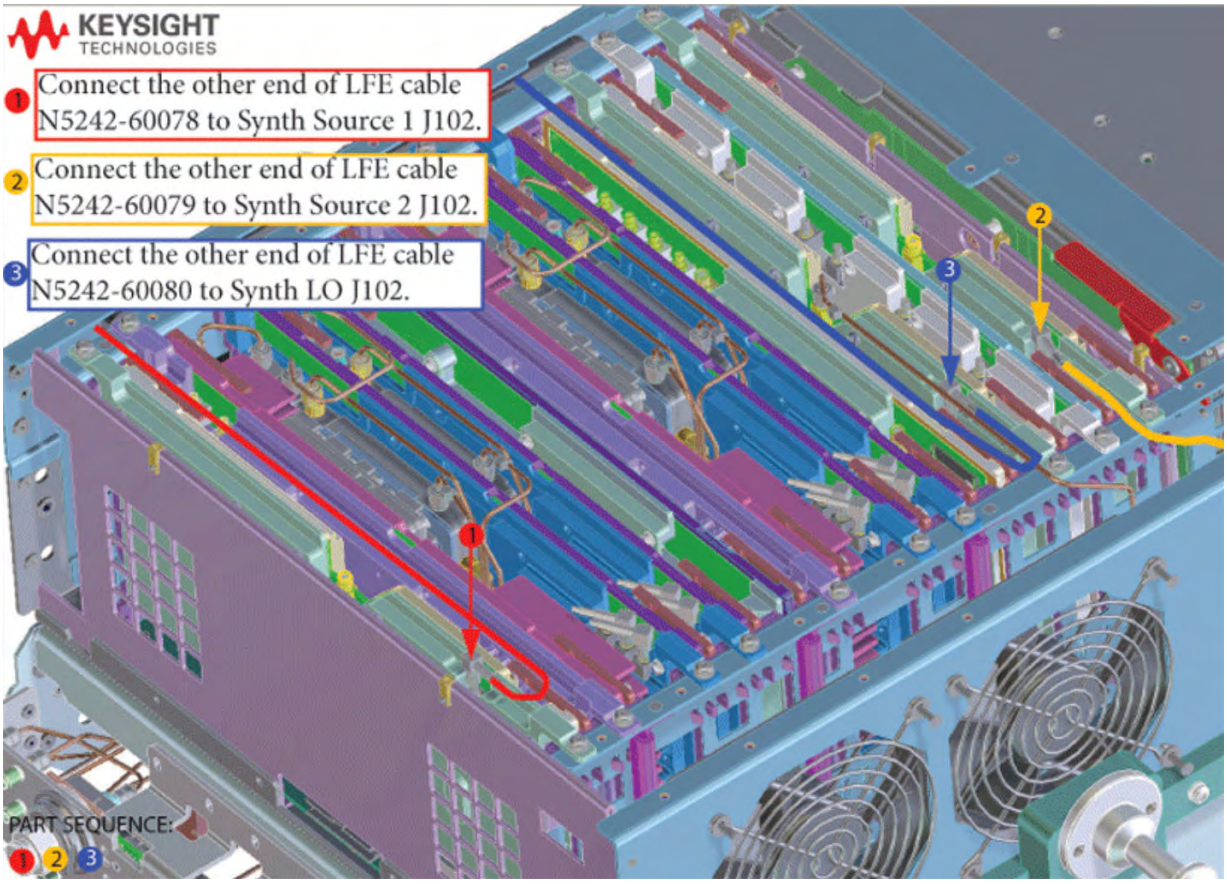
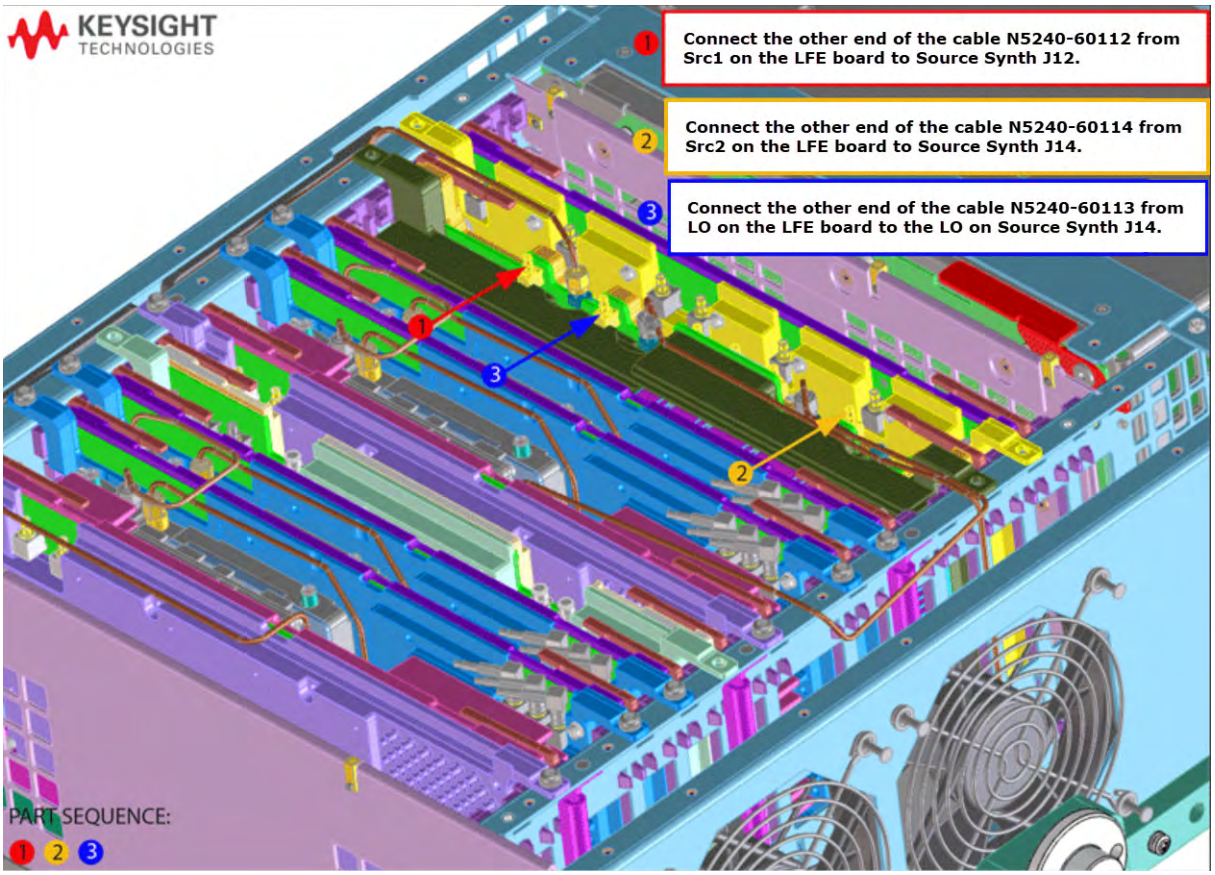


Figure 29 Version 7 Synthesizers: New test set cables. Connect the other end of the N5240-60112, N5240-60113, and N5240-60114 cables

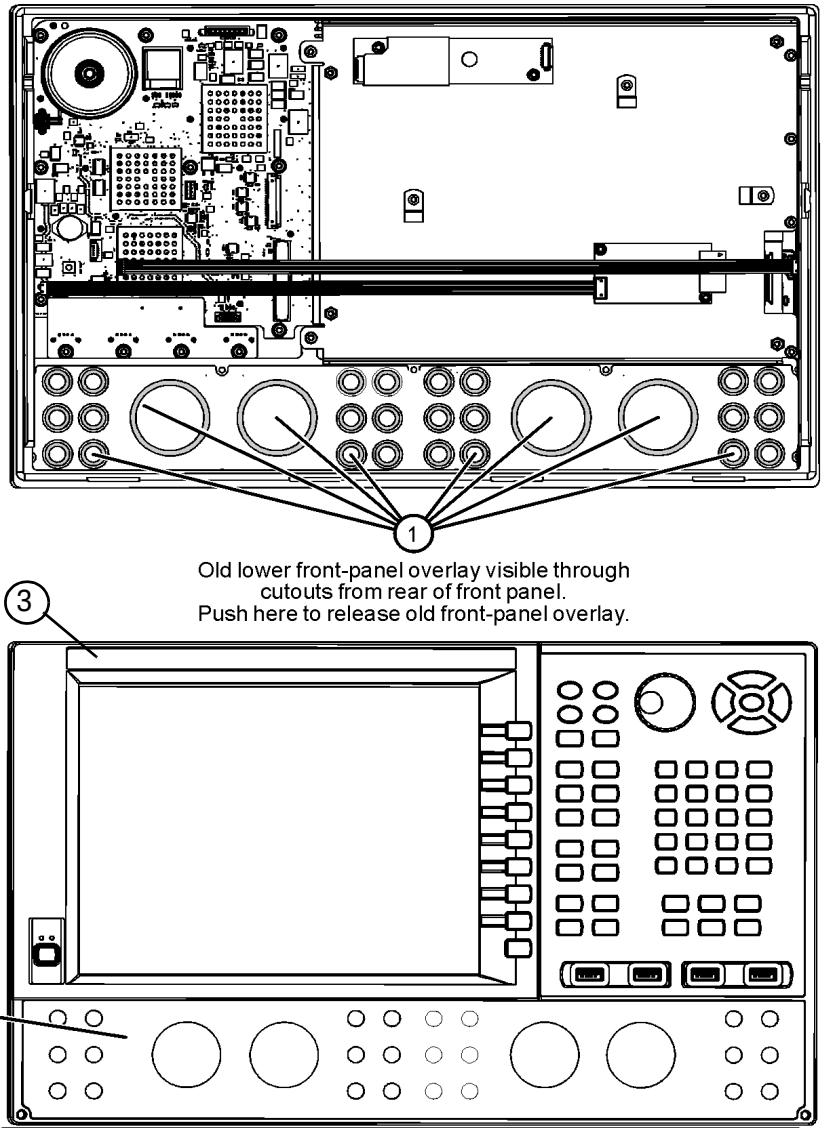


Step 22. Remove the Old Lower Front Panel Overlay and Nameplate

Refer to Figure 29-1 or this step of the procedure. 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 j) and separate it from the front dress panel.
2. From the front side of the front panel, pull off the overlay completely and discard it.
3. Remove the nameplate from the front panel (item ③).
4. Remove any adhesive remaining on the front panel.

Figure 29-1 Lower Front Panel Overlay Replacement



Step 23. Reinstall Front Panel Assembly

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

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

Refer to Figure 29-1 on page 52 for this step of the procedure. New parts are listed in Table 1 on page 12.

1. Remove the protective backing from the new front panel overlay, N5222-80036 (N5221/2B) —(item ②).
2. Starting from either side, **loosely** place the overlay in the recess on the lower front panel, ensuring that it fits tightly against the edges of the recess.
3. Once the overlay is in place, press it firmly onto the frame to secure it.
4. Remove the protective backing and Install the nameplate (N5221-80009 or N5222-80015, item ③).

.

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

Step 25. Reinstall Front Panel Jumpers

As shown in Figure 30, reinstall the 12 front panel jumper cables.

Figure 30 Front Panel Jumper Cables Installation

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 cables installed in "Step 27. Position the Cables and Wires to Prevent Pinching" on page 55 and "Step 20. Install the A71–74 bias-Tee Combiner's Gray Low Frequency Extension (LFE) DC bias Cables and Route Cables" on page 47 are connected correctly and not open or shorted.

Step 27. Position the Cables and Wires to Prevent Pinching

On the top side of the PNA, carefully position the gray flex cables so they can't be pinched between the covers and the rails.

On the bottom side of the PNA, carefully fold or push down the ribbon cables and wires so they can't be pinched between the hardware and the outer cover. Ribbon cables and wires must never be positioned on top of hardware.

Step 28. Reinstall the Inner and Outer Covers

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 10.

Step 29. 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 30. Enable Option 405

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.
- 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 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 a result of Step 3 on "License Key Redemption" on page 8.
2. Copy the license file(s) from the email(s) to the root directory of the USB flash drive. More than one license file may be copied to the USB flash drive.

NOTE A single license file may contain more than one feature.

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

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

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

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

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

1. Start the Network Analyzer program.
2. Once the Network Analyzer program is running:
   - Press **Help** > **About NA** and verify that Option 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 following Web site: http://mktwww.srs.is.keysight.com/field/service/network/pna/.

Step 32. 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 (For A models: Options 090, 093, or 094 Only. For B models: Options S93090xA/B, S93093A/B, or S93094A/B Only.)

– Noise adjustment (For N524xB applicable models: Option 029 with S93029A/B Only.)

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

To view this service guide information, click the Chapter 3 bookmark “Tests and Adjustments” in the PDF Service 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.

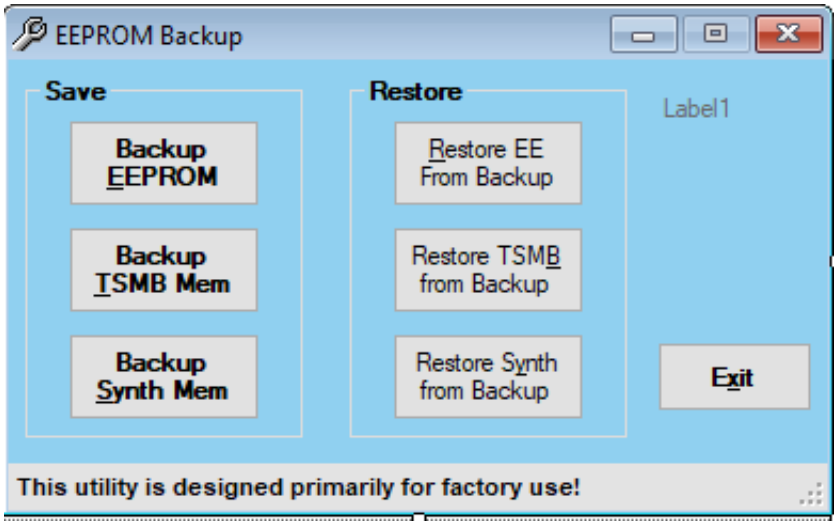
– Click Backup TSMB Mem.

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

– Click Exit when the program has finished.

1. 6ee “Downloading the Online PNA Service Guide” on page 10.

Figure 31 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 33. Prepare the PNA for the User

1. If necessary, reinstall front jumper cables.
2. If necessary, reinstall 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.

Appendix for Version 6 Synthesizer Upgrade

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 17.

If you do not have the following equipment, do not attempt to the process in the Appendix, because you may damage the board and or your instrument. Stop and return the instrument to Keysight for repair. Refer to "Getting Assistance from Keysight" on page 6.

This process requires the following:

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

This section is only required if the synthesizer boards N5240-60074/76 are not a version H or greater. If your synthesizer boards do not require this modification, skip this process and continue to the "Step 4. Remove the Front Panel Assembly" on page 19. After this section is completed, your synthesizer board will be a version H synthesizer board. Refer to Figure 2 on page 61.

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.

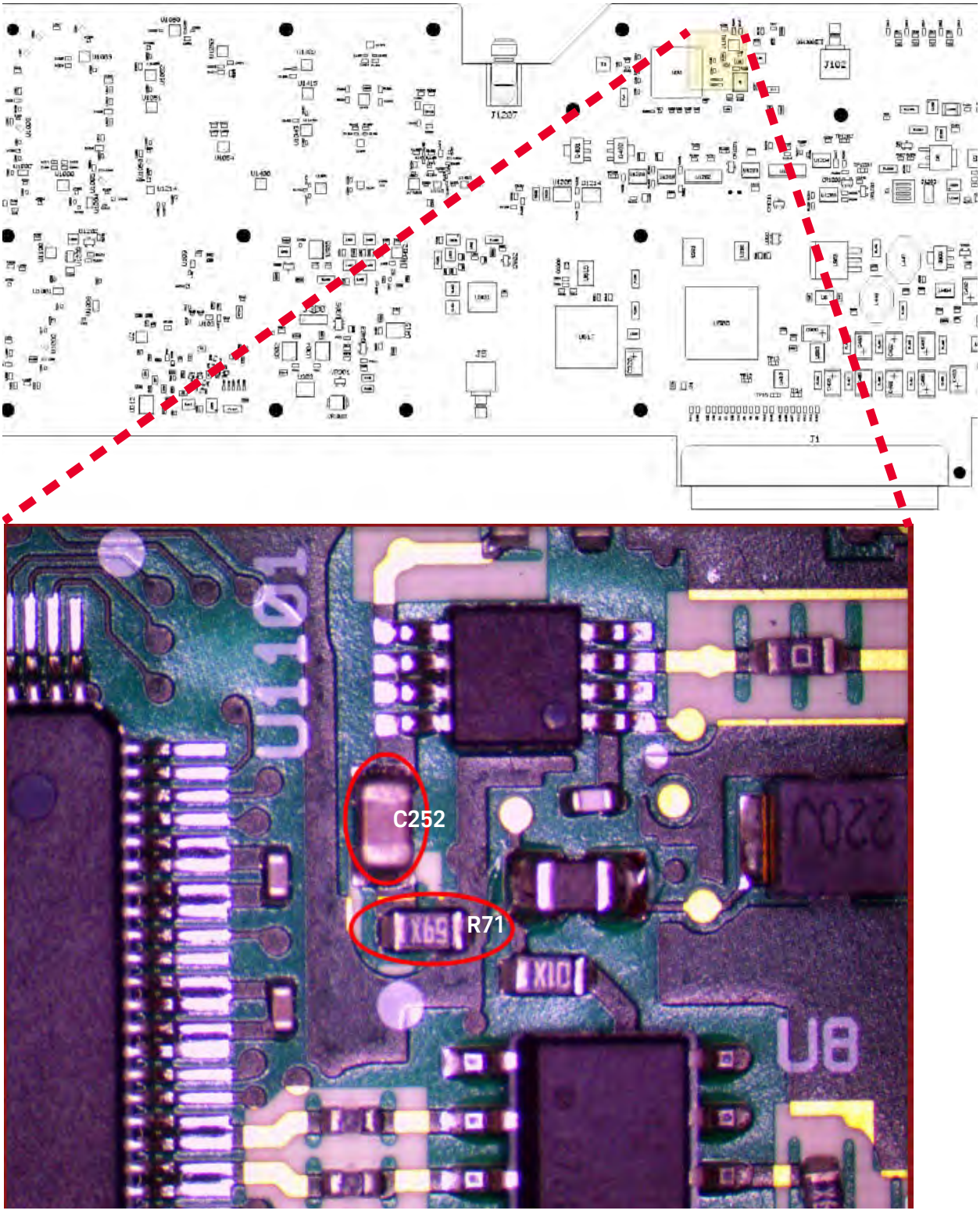
Procedure

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 59.
3. Clean pads.
4. Replace with resistor 1 kΩ (0699-3947). Refer to Figure 1 on page 59.
5. Remove capacitor C252.
6. Clean pads.

7. Replace with capacitor 22µF (0161-4279). Refer to Figure 1 on page 59.

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 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 61.
    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 62.
    e. Press **Enter**. Refer to Figure 3 on page 62.
    f. Press **Save Changes**. Refer to Figure 3 on page 62.
    g. Repeat steps d through f for the other synthesizer boards requiring upgrade.
    h. Press **Exit** to close the EEPROM Header Info window when you have completed updating all of the synthesizer boards and continue with “Step 4. Remove the Front Panel Assembly.”

Figure 2 EEPROM Header Info Window

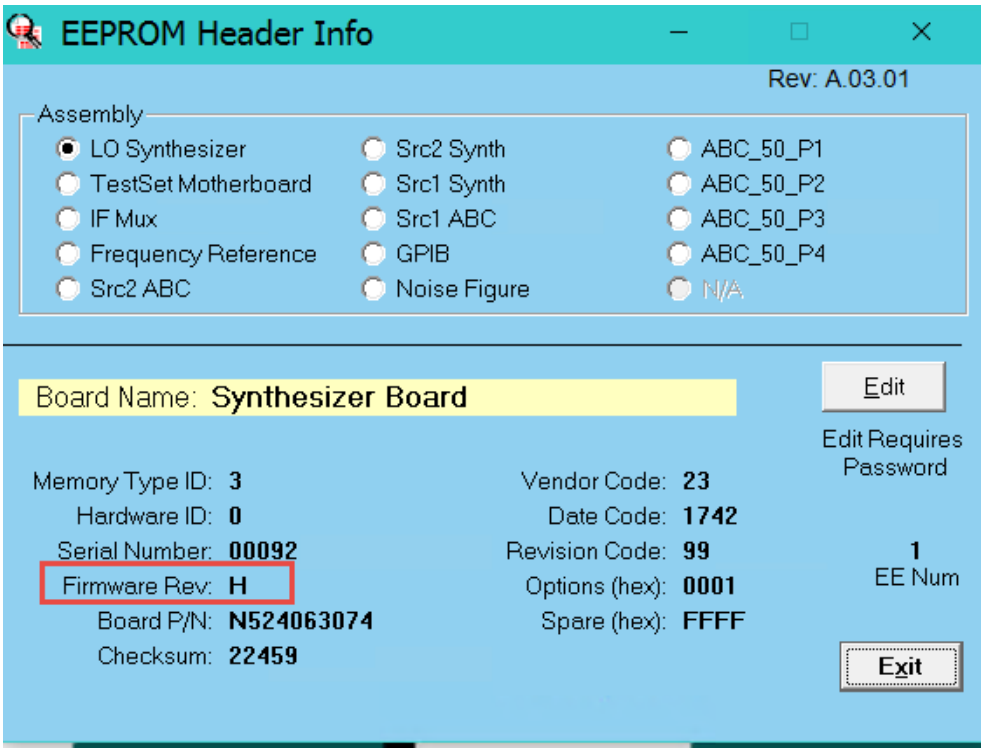
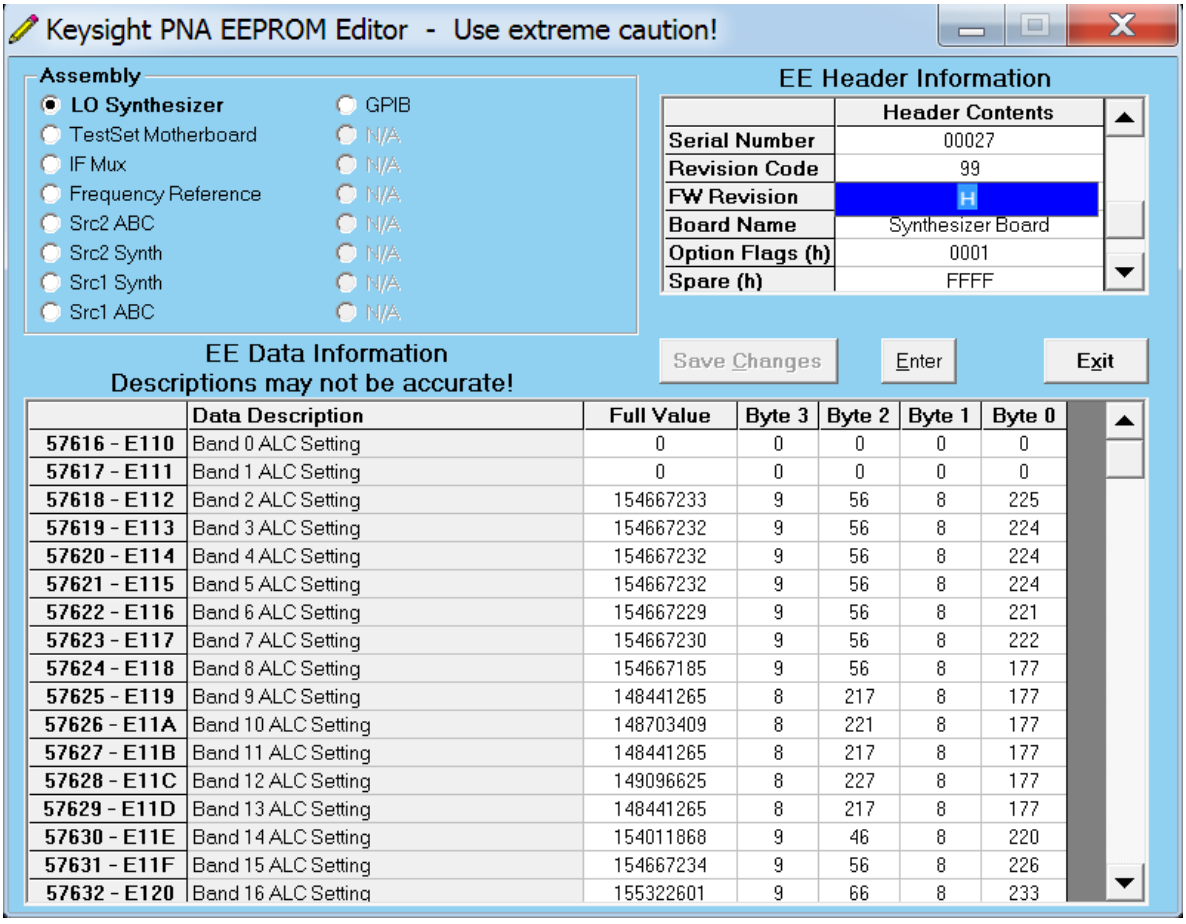


Figure 3 EEPROM Editor Window



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