

Installation Note

Keysight Add 4-Port Capability For Low Frequency Extension (LFE) Upgrade Kit For Version 6 Single-Source Synthesizers

To Upgrade PNA N5224B or N5225B Option 205 to Option 405

Upgrade Kit Order Numbers: N5224BU- 605 and
N5225BU- 605

Keysight Kit Number: N5225-60124

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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 4-Port Capability Upgrade Kit
Upgrade Kit Number: N5225-60124
Installation Note

Description of the Upgrade

This upgrade converts your N5224B or N5225B Option 205 2-port analyzer to a N5224B or N5225B Option 405 4-port analyzer by adding:

- an additional source
- an additional source synthesizer
- two additional doublers
- an additional mixer brick
- two additional receiver couplers
- two additional test port couplers
- a splitter
- a modified front panel
- an additional cable guard
- two additional LFE bias tee combiners
- PC assembly, low frequency extension (LFE) – 4-port
- new cables

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 4.

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>

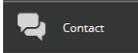
If you do not have access to the Internet, please contact your Keysight field engineer.

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 P3, P203, P403, P603, P803 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 8](#).

NOTE

IMPORTANT!

- This document contains references to legacy and new A25 HMA26.5 Multiplier/Amplifier and A27/A28 mixer brick assemblies. Your model instrument may have either legacy assemblies or the new parts installed.
- To verify your instrument’s A25 HMA26.5 Multiplier/Amplifier, refer to [“Verify the Model/Version of HMA26.5 Installed” on page 7](#).
- The A27/A28 mixer bricks might be a legacy part number 5087-7323 (with (x2) discrete 3dB attenuators, 08490-60039) or new part number 5087-7417 (with integrated 3 dB attenuators).
- See also your instrument’s PDF Service Guide ^a.

a. See [“Downloading the Online PNA Service Guide” on page 8](#).

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 9](#).

Description of the Upgrade Getting Prepared

- Enough time - refer to **“About Installing the Upgrade” on page 9.**
- Test equipment for the post-upgrade adjustments and full instrument calibration. To view the equipment list, click the Chapter 3 bookmark “Tests and Adjustments” in the PDF Service Guide¹.

License Key Redemption

NOTE

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

If you are unfamiliar with the licensing process, refer to <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 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(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. Refer to **“License Key Redemption” on page 6.**

1. See **“Downloading the Online PNA Service Guide” on page 8.**

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 4.**

Verify the Model/Version of HMA26.5 Installed

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:

- A26 splitter 5067-4086
- W52 N5245-20013
- W53 N5245-20023
- W54 N5245-20022

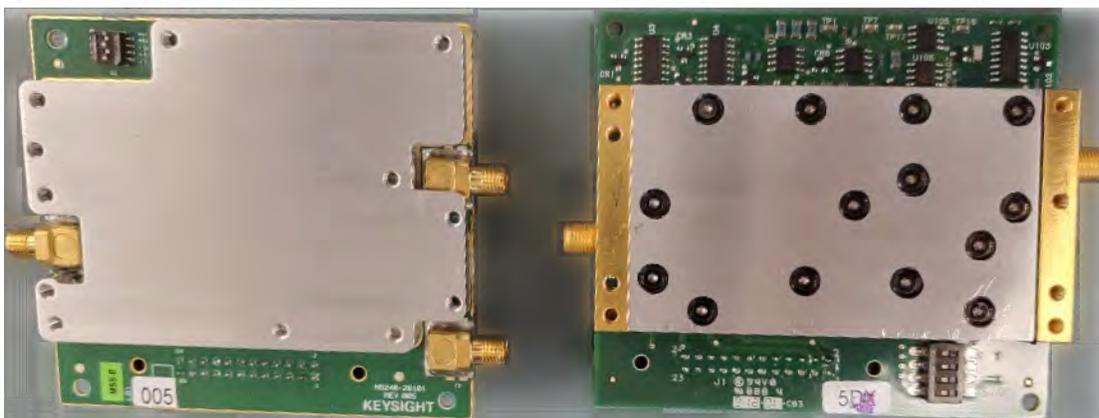
(If you have the legacy 5086-7765 HMA26.5, please discard the N5245-20195 semi-rigid cables. Refer to **Figure 1 on page 7.**)

The new N5240-60101 HMA26.5 has the splitter integrated into the assembly. Refer to **Figure 1 on page 7.**

Figure 1 Comparison of Legacy HMA26.5 (5087-7765) and New HMA26.5 (N5240-60101)

New HMA26.5 -- N5240-60101
Requires (x1) Cable.

Legacy HMA26.5 -- 5087-7765
Requires A26 Splitter and (x3) Cables.



Downloading the Online PNA Service Guide

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

1. Go to www.keysight.com.
2. In the Search box, enter the model number of the analyzer (e.g., N5225B) and click **Search**.
3. Click **Support** > **Keysight Product Support**.
4. In the **Search Support** area type your instrument's model number (e.g., N2225B).
5. Press **Enter**.
6. Scroll down to the **PRINT DOCUMENTATION** section and click to select **Service Manual**.

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

7. Click the hyperlink of the Service Guide title to download the PDF file.
8. When the PDF of the Service Guide is displayed, scroll through the Contents section bookmarks to locate the information needed.

Protecting Your Workspace from Electrostatic Discharge

For information, click on the Chapter 1 bookmark, "Electrostatic Discharge Protection" in the PDF Service Guide¹.

ESD Equipment Required for the Installation

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

Tools Required for the Installation

Description	Qty	Part Number
T-6 TORX driver - set to 4 in-lbs (0.45 N.m)	1	N/A
T-10 TORX driver - set to 9 in-lbs (1.02 N.m)	1	N/A
T-20 TORX driver - set to 21 in-lbs (2.38 N.m)	1	N/A
5/16-in (8 mm) nutsetter or open end torque wrench - set to 10 in-lbs (1.13 N.m)	1	N/A
5/16-in (8 mm) nutsetter or open end wrench (to stabilize the bias tee combiner when torquing cables)	1	N/A
5/16-in (8 mm) nutsetter or open end torque wrench - set to 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
1-in (25.4 mm) torque wrench - set to 72 in-lbs (8.15 N.m)	1	N/A
9 mm nutsetter or open end torque wrench - set to 21 in-lbs (2.38 N.m)	1	N/A
1/4-in (6 mm) open end wrench	1	N/A

CAUTION

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

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

About Installing the Upgrade

Products affected	N5224B and N5225B Option 205
Installation to be performed by	Keysight service center or personnel qualified by Keysight
Estimated installation time	5 hours
Estimated adjustment time	3 hours
Estimated full instrument calibration time	7.5 hours

Items Included in the Upgrade Kit

Check the contents of your kit against the following list. If any part is missing or damaged, contact Keysight Technologies. Refer to **“Getting Assistance from Keysight” on page 4.**

Table 2 Contents of Upgrade Kit N5225-60124

Ref Desig.	Description	Qty	Part Number
-	Installation note (this document)	1	N5225-90134
-	Software Entitlement Certificate (provided separately)	1	5964-5145
-	China RoHS Addendum	1	9320-6722
A10	26.5 GHz source (2) board	1	5087-7342
A12	40 GHz doubler assembly port 3	2	5087-7349
A13	40 GHz doubler assembly port 4		
A17	13.5 GHz (source 2) synthesizer board	1	N5240-60074
A26 ^a	Splitter	1	5067-4086
A28	Mixer brick (2)	1	5087-7417
A30	Test port 3 receiver coupler	2	5087-7760
A31	Test port 4 receiver coupler		
A34	Test port 3 coupler	2	5087-7793
A35	Test port 4 coupler		
A69	3 dB pad, attached to R4 connector on A28 mixer brick	1	08490-60039
A70	LFE PC assembly - 4-port	1	N5291-60001
A72	Test port 3 bias T combiner	2	5087-7403
A73	Test port 4 bias T combiner		
-	Machine screw, M3.0 x 6, flat head (to attach front frame to coupler plate)	2	0515-1946
-	Machine screw, M2.0 x 6, flat head (8 to attach two receiver couplers to brackets)	8	0515-1602
-	Machine screw, M3.0 x 8, pan head (3 to attach shield to A28 mixer brick; 8 to attach two src attn and two rcvr attn to brackets)	4	0515-0372
-	Machine screw, M2.5 x 20, pan head (x4 to attach A34 and A35 receiver coupler assemblies to test set deck)	4	0515-0374
-	Machine screw, M4.0 x 10, pan head (2 each to attach the following boards to the analyzer chassis: A17 13.5 GHz synthesizer board, A10 26.5 GHz source board, A12 40 GHz doubler assembly port 3, and A13 40 GHz doubler assembly port 4.)	7	0515-0380

Description of the Upgrade
Items Included in the Upgrade Kit

Table 2 Contents of Upgrade Kit N5225-60124

Ref Desig.	Description	Qty	Part Number
-	Machine screw, M2.5 x 20, pan head (to attach A26 and A27 receiver coupler assemblies to test set deck)	4	0515-0430
-	Machine screw, M3.0 x 12, pan head (1 to attach cable bracket to test set deck)	1	0515-0664
-	Machine screw, M3.0 x 25, pan head (3 to attach A28 mixer brick to block)	3	0515-0667
-	Machine screw, M3 x 16, pan head (to attach A72 & A73 Bias T combiners to brackets)	4	0515-1227
-	Cable clamp pressure sensitive with adhesive mounting	2	1400-1391
-	Machine screw, M2.5 x 16, pan head (2 to attach splitter to mixer brick)	2	0515-2007
-	Machine screw, M2.5 x 14, pan head	2	0515-2141
-	Machine screw, M3.0 x 20, flat head (2 to attach bracket to A10 26.5 GHz source)	2	0515-2078
-	Machine screw, M3.0 x 18, pan head (1 to attach bracket to A10 26.5 GHz source)	3	0515-0666
-	Front panel overlay (label), 4-port (405, 420)	1	N5240-80008
-	Dress panel, lower 4-port	1	N5240-00009
-	Gap pad (between mixer brick A28 and shield)	4	N5245-20125
-	Gap pad (between each test coupler and the test set front plate)	4	E4403-20033
-	Shield, mixer brick	1	N5245-00023
-	Bracket (For port 3 and port 4 50 GHz bias-T)	2	N5245-00036
-	50 ohm load, attached to A13 40 GHz doubler	2	1250-4261
-	Vibration mount (between couplers 1 & 3, and 2 & 4)	2	0460-2725
-	Mounting nuts (for port 3 & 4 test port couplers)	2	5022-1087
-	Clamp – SMP – instrument	2	5023-3299
-	Cable guard, center jumper cables	1	N5242-00049
-	Cable clamp.	2	1400-1334
-	Dust caps for test ports	4	1401-0214
-	Gap pad (between each test coupler and the test set front plate)	4	E4403-20033
-	Test set front plate (subpanel), 4-port	1	N5224-00005
-	Front panel overlay (label), 4-port (Option LFE 405, 420)	1	N5225-80008
-	Dress panel, lower 4-port	1	N5240-80009
-	2.4 mm dust cap for A28 mixer brick	1	N5247-20138
-	Bracket for receiver coupler	2	N5245-00017

Description of the Upgrade
Items Included in the Upgrade Kit

Table 2 Contents of Upgrade Kit N5225-60124

Ref Desig.	Description	Qty	Part Number
-	Bracket for cables	1	N5245-00022
-	Bracket for A10 26.5 GHz source (2) board	1	N5247-20136
W2	RF cable, A10 source (2) P1 to A17 13.5 GHz source (2) synthesizer J1207 (4-port)	1	N5245-20100
W7	RF cable, A10 source (2) P5 to A12 port 3 doubler	1	N5245-20034
W8	RF cable, A10 source (2) P3 to A13 port 4 doubler	1	N5245-20035
W9	RF cable, A10 source (2) P4 to A12 port 3 doubler	1	N5245-20032
W10	RF cable, A12 port 3 doubler to A13 port 4 doubler	1	N5245-20033
W13	RF cable, A12 port 3 doubler to W111	1	N5245-20036
W14	RF cable, A30 port 3 receiver coupler to W13	1	N5245-20043
W15	RF cable, A13 port 4 doubler to W115	1	N5245-20036
W16	RF cable, A31 port 4 receiver coupler to W15	1	N5245-20044
W21	RF cable, A29 port 1 receiver coupler to A37 reference mixer switch	1	N5245-20110
W22	RF cable, A33 port 1 coupler to front-panel Port 1 REF 1 CPLR ARM	1	N5245-20014
W23	RF cable, A30 port 3 rcvr coupler to front-panel Port 3 SOURCE OUT	1	N5245-20051
W25	RF cable, A30 port 3 receiver coupler to front-panel REF 3 SOURCE	1	N5245-20016
W26	RF cable, A34 port 3 coupler to front-panel Port 3 CPLR ARM	1	N5245-20015
W27	RF cable, A31 port 4 rcvr coupler to front-panel Port 4 SOURCE OUT	1	N5245-20052
W30	RF cable, A35 port 4 coupler to front-panel Port 4 CPLR ARM	1	N5245-20018
W33	RF cable, A32 port 2 receiver coupler to front-panel REF 2 SOURCE OUT - (4-port only)	1	N5245-20108
W34	RF cable, A36 port 2 coupler to front-panel Port 2 CPLR ARM	1	N5245-20019
W36	RF cable, Front panel jumper	6	N5245-20155
W38	RF cable, Port 3 RCVR C IN to A28 mixer brick (C)	1	N5245-20037
W44	RF cable, REF 3 RCVR R3 IN to A28 mixer brick (R3)	1	N5245-20020
W45	RF cable, REF 4 RCVR R4 IN to A28 mixer brick (R4)	1	N5245-20191
W52 ^a	RF cable, A25 HMA26.5 to A26 splitter	1	N5245-20013
W53 ^a	RF cable, A26 splitter to A27 mixer brick	1	N5245-20023
W54 ^a	RF cable, A26 splitter to A28 mixer brick	1	N5245-20022

Description of the Upgrade
Items Included in the Upgrade Kit

Table 2 Contents of Upgrade Kit N5225-60124

Ref Desig.	Description	Qty	Part Number
W62	RF cable, A27 mixer brick (R1) to A24 IF multiplexer (P411)	1	N5242-60021
W63	RF cable, A27 mixer brick (R2) to A24 IF multiplexer (P412)	1	N5242-60022
W65	RF cable, A28 mixer brick (D) to A24 IF multiplexer (P801)	1	N5242-60024
W66	RF cable, A28 mixer brick (R4) to A24 IF multiplexer (P414)	1	N5242-60019
W67	RF cable, A28 mixer brick (R3) to A24 IF multiplexer (P413)	1	N5242-60020
W68	RF cable, A28 mixer brick (C) to A24 IF multiplexer (P601)	1	N5242-60023
W70	RF cable, A24 IF multiplexer board P203 to A16 SPAM board J2	1	N5242-60013
W72	RF cable, A24 IF multiplexer board P603 to A16 SPAM board J5	1	N5242-60015
W77	RF cable, A14 frequency reference board J7 to A17 13.5 GHz (source 2) synthesizer board J5 (Located on bottom of board.)	1	N5242-60030
W182	Cable, assy-RF, FP, A33 port 1 test coupler to A71 port 1 Bias combiner	1	N5245-20182
W183	Cable, assy-RF, port 3 CPLR THRU to A72 port 3 Bias combiner	1	N5245-20180
W184	Cable, assy-RF, FP, A34 Port 3 test coupler to A72 port 3 bias combiner	1	N5245-20184
W185	Cable, assy-RF, port 4 CPLR THRU to A73 port 4 Bias combiner	1	N5245-20181
W186	Cable, assy-RF, FP, A35 port 4 test port coupler to A73 port 4 Bias combiner	1	N5245-20185
W188	Cable, assy-RF, FP, A36 Port 2 test coupler to A74 port 2 bias combiner	1	N5245-20183
W198	Cable, assy-RF, FP, A31 port 4 receiver coupler to port 4 REF 4 SOURCE OUT	1	N5245-20192
W191	Cable, RF, A4 Source 1 Synth J102 to A70/A75 LFE J20	1	N5245-60027
W192	Cable assembly, RF CA, A70 LFE board Source 2 J21 to LO Synth Source 2 J102	1	N5242-60079
W195	Cable (long), assy, coaxial A70 LFE J4 to A72 port 3 bias combiner (Port 3 bias combiner "RF-IN" to "Port3" A70 LFE board)	2	N5240-60097
W196	Cable (long), assy, coaxial A70 LFE J5 to A73 port 4 bias combiner (Port 4 bias combiner "RF-IN" to "Port4" A70 LFE board)		
W203 ^b	RF cable, A25 HMA26.5 (top) to A28 mixer block (top)	1	N5245-20195
W214	RF cable, A70 LFE J12 to A24 IF Multiplexer P604	1	8120-5017
W215	RF cable, A70 LFE J11 to A40 IF Multiplexer P804 (4-port only)	1	8120-5017
-	Ribbon cable, A23 test set motherboard J552 to A28 mixer brick (2) J52	1	N5247-60015
-	Cable, DC – 2 pin to R/A SMP (Port 3 bias combiner DC to A23 Bias J543 and Port 4 bias combiner DC to A23 Bias J544.)	2	N5240-60091

Description of the Upgrade Installation Procedure for the Upgrade

- a. The A26 splitter (5067-4086) and N5245-20013, N5245-20022, N5245-20023, N545-20101, and N5245-20150 cables are only used with a legacy HMA26.5 p/n: 5087-7765. If you are unclear which HMA26.5 assembly your PNA has installed, refer to Chapter 7 Repairs and **Figure 1 on page 7** and for details on A26 splitter and cabling, refer to your option-model in Chapter 6 "2-Port Configurations, Serial Number Prefix <6021" and "4-Port Configuration, Serial Number Prefix <6021".
- b. The N5245-20195 cable is used only with instruments that have a newer HMA26.5 installed. If your PNA has a legacy 5087-7765 HMA26.5 assembly installed, then this cable can be discarded. If you are unclear which HMA26.5 assembly your PNA has installed, refer to **Figure 1 on page 7**.

NOTE

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

Installation Procedure for the Upgrade

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

WARNING

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

Overview of the Installation Procedure

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

"Step 2. Remove the Outer Cover."

"Step 3. Remove the Inner Cover."

"Step 4. Remove the Front Panel Assembly."

"Step 5. Remove the A23 Test Set Motherboard."

"Step 6. Disconnect A71 and A74 Bias-Tee Combiner's LFE Cables From the A70 Low Frequency Extension (LFE) Board and the Ends of the LFE Cables Connected to the IF Multiplier (IF MUX) Board."

"Step 7. Remove the A75 Low Frequency Extension (LFE) Board."

"Step 8. Remove Some Low Frequency Extension (LFE) Cables (8120-5014 (x1), 8120-5021 (x1), and N5240-60097 (x2)) From the IF Multiplier (IF MUX) Board."

"Step 9. Remove Some of the Mixer Brick (MXB) Cables."

"Step 10. Remove Some Gray Cables From the A24 IF Multiplier Board."

"Step 11. Remove the A75/A70 LFE Board Bracket."

- “Step 12. Remove Some Bottom-Side Semi-Rigid (Test Set) Cables.”
- “Step 13. Remove the A27 Mixer Brick Assembly.”
- “Step 14. Assemble the A28 Mixer Brick Assembly.”
- “Step 15. Install the A27/A28 Mixer Brick Assemblies.”
- “Step 16. Assemble the A34 and A35 Receiver Coupler Assemblies.”
- “Step 17. Install the A34 and A35 Receiver Coupler Assemblies.”
- “Step 18. Assemble the A72 (Port 3) and A73 (Port 4) Bias Tee Combiner Assemblies.”
- “Step 19. Install the New A72 and A73 Bias Tee Combiner Assemblies.”
- “Step 20. Assemble the A33 - A36 Test Port Coupler Assemblies.”
- “Step 21. Install the LED Boards and Test Port Coupler Assemblies to the 4-Port Test Set Front Plate.”
- “Step 22. Install the Bulkhead Connectors in the Test Set Front Plate.”
- “Step 23. Install the 4-Port Coupler Plate Assembly to the Deck.”
- “Step 24. Assemble and Install the A13 40 GHz Doubler Assembly.”
- “Step 25. Install Bracket to A10 Source Assembly.”
- “Step 26. Assemble the A10 26.5 GHz Source 2 Assembly.”
- “Step 27. Install the A10 26.5 GHz Source 2 Assembly and Cables.”
- “Step 28. Install the A17 13.5 GHz (Source 2) Synthesizer Board and Cables.”
- “Step 29. Install the Cable Bracket Mount.”
- “Step 30. Connect New Cables to A24 IF Multiplexer (IF MUX) Board.”
- “Step 31. Reinstall A70 Low Frequency Extension (LFE) Board Bracket.”
- “Step 32. Install the New Mixer Brick (MXB) Cables and Route Cables.”
- “Step 33. Reconnect/Connect Old and New Cables and then Route Low Frequency Extension (LFE) Cables (8120-5014 (x2) and 8120-5017 (x3)) and the Other Ends of the Cables Connected to the IF Multiplexer (IF MUX) Board.”
- “Step 34. Install the New A70 Low Frequency Extension (LFE) Board.”
- “Step 35. Connect/Reconnect A71–A74 Bias-Tee Combiner’s Cables to A70 Low Frequency Extension (LFE) Board and the Other Ends of the Cables Connected to the IF Multiplier (IF MUX) Board.”
- “Step 36. Install the Test Set Cables and Install Cable Clamps on Ferrite Beads.”
- “Step 37. Secure the Front Panel Bulkhead Connectors.”
- “Step 38. Reinstall the A23 Test Set Motherboard.”

“Step 39. Install Cable on the A23 Test Set Motherboard.”

“Step 40. Install/Reinstall the A71–74 Bias-Tee Combiner’s Gray Low Frequency Extension (LFE) DC bias Cables and Route Cables.”

“Step 41. Install the Other End of the Bias-Tee Combiner Cables to the Source Synthesizer and LO Synthesizer Board Gray Cables.”

“Step 42. Replace the Front Panel’s Lower Dress Panel.”

“Step 43. Reinstall Front Panel Assembly.”

“Step 44. Install the New Lower Front Panel Overlay.”

“Step 45. Install the Front Panel Jumper Cables.”

“Step 46. DC Continuity Test the LFE Board and Test Ports.”

“Step 47. Position the Cables and Wires to Prevent Pinching.”

“Step 48. Reinstall the Inner Cover.”

“Step 49. Reinstall the Outer Cover.”

“Step 50. Remove Option 205 License.”

“Step 51. Enable Options 405.”

“Step 52. Verify the PNA Analyzer Program is Running with the Correct Options.”

“Step 53. Perform Post-Upgrade Adjustments and Calibration.”

“Step 54. Prepare the PNA for the User.”

Step 1. Obtain a Keyword and Verify the Information

Follow the instructions on the Software Entitlement Certificate supplied to obtain a license key for installation of this upgrade. Refer to **“License Key Redemption” on page 6**.

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 4**.

Step 2. Remove the Outer Cover

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

Step 3. Remove the Inner Cover

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

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 Guide¹.

Step 5. Remove the A23 Test Set Motherboard

For instructions, click the Chapter 7 bookmark “Removing and Replacing the A23 test set motherboard” in the PDF Service Guide¹.

1. See [“Downloading the Online PNA Service Guide” on page 8.](#)

Step 6. Disconnect A71 and A74 Bias-Tee Combiner's LFE Cables From the A70 Low Frequency Extension (LFE) Board and the Ends of the LFE Cables Connected to the IF Multiplier (IF MUX) Board

1. Disconnect the (8120-5014 (x2), 8120-5017 (x1), and 8120-5021 (x1)) IF gray cables item ① through item ④ as shown in **Figure 2**. (i.e., one end is removed in **"Step 8. Remove Some Low Frequency Extension (LFE) Cables (8120-5014 (x1), 8120-5021 (x1), and N5240-60097 (x2)) From the IF Multiplexer (IF MUX) Board"** on page 20.)

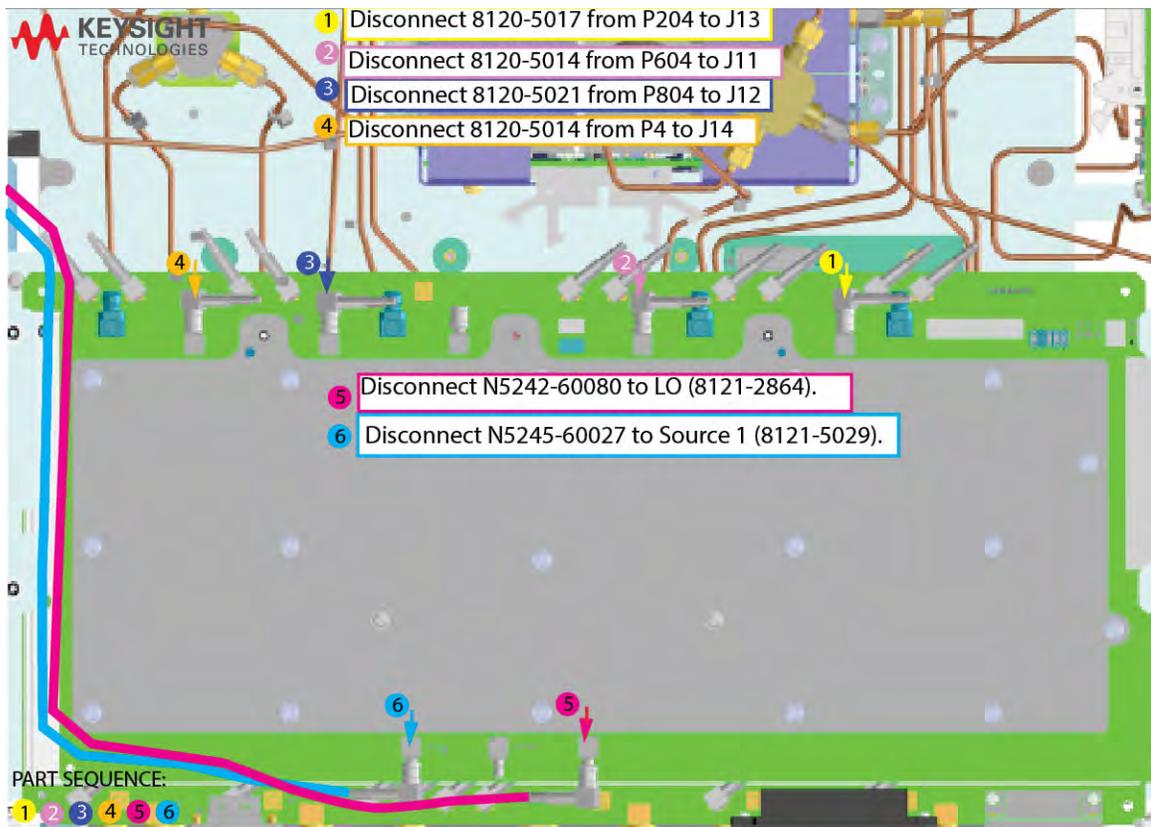
Save: 8120-5014 (x2) and 8017 (x1) for reuse.

Discard: 8120-5021.

2. Disconnect the N5245-60027 Source 1 and N5242-60080 LO Source cables from the LFE board as shown – (items ⑤ and ⑥). The other end of the N5242-60080, N5245-60027 does **not** need to be disconnected from the Source1 and LO Source boards. Refer to **Figure 2** and **Figure 44 on page 67**.

Figure 2

Disconnect A71 and A74 bias-T combiners new cables to the A70 LFE board the other ends of the LFE cables to the LFE Board (8120-5014 (x2), 8120-5017 (x1), 8120-5021 (x1), N5245-60027, and N5242-60080)



Step 7. Remove the A75 Low Frequency Extension (LFE) Board

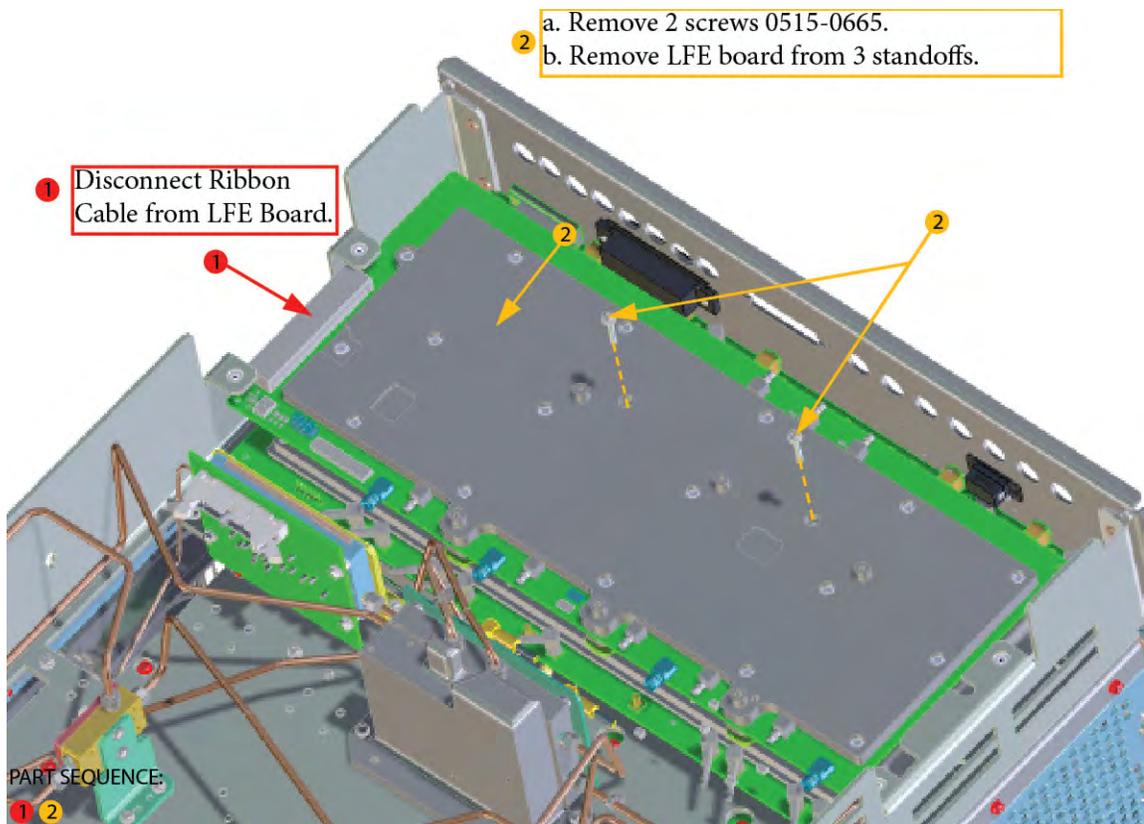
NOTE

IMPORTANT!

Save all mounting hardware for reuse. And, for later steps, mark all cables for reconnection.

1. Disconnect the N5240-60089 Motherboard / IF Multiplexer / LFE/ Test set motherboard (i.e., MB/IF MUX/LFE/TSMB) ribbon cable to LFE board J1 (item ①). Save for reuse. Refer to [Figure 3](#).
2. Refer to [Figure 3](#) for the following:
 - a. Remove the A75 LFE board's 0515-0665 screws (x2). It will not be reused (item ②a).
 - b. Remove the A75 LFE board from the standoffs (item ②b).

Figure 3 Remove the A75 LFE board (N5240-60089, N5291-60005 and 0515-0665)



Step 8. Remove Some Low Frequency Extension (LFE) Cables (8120-5014 (x1), 8120-5021 (x1), and N5240-60097 (x2)) From the IF Multiplexer (IF MUX) Board

NOTE

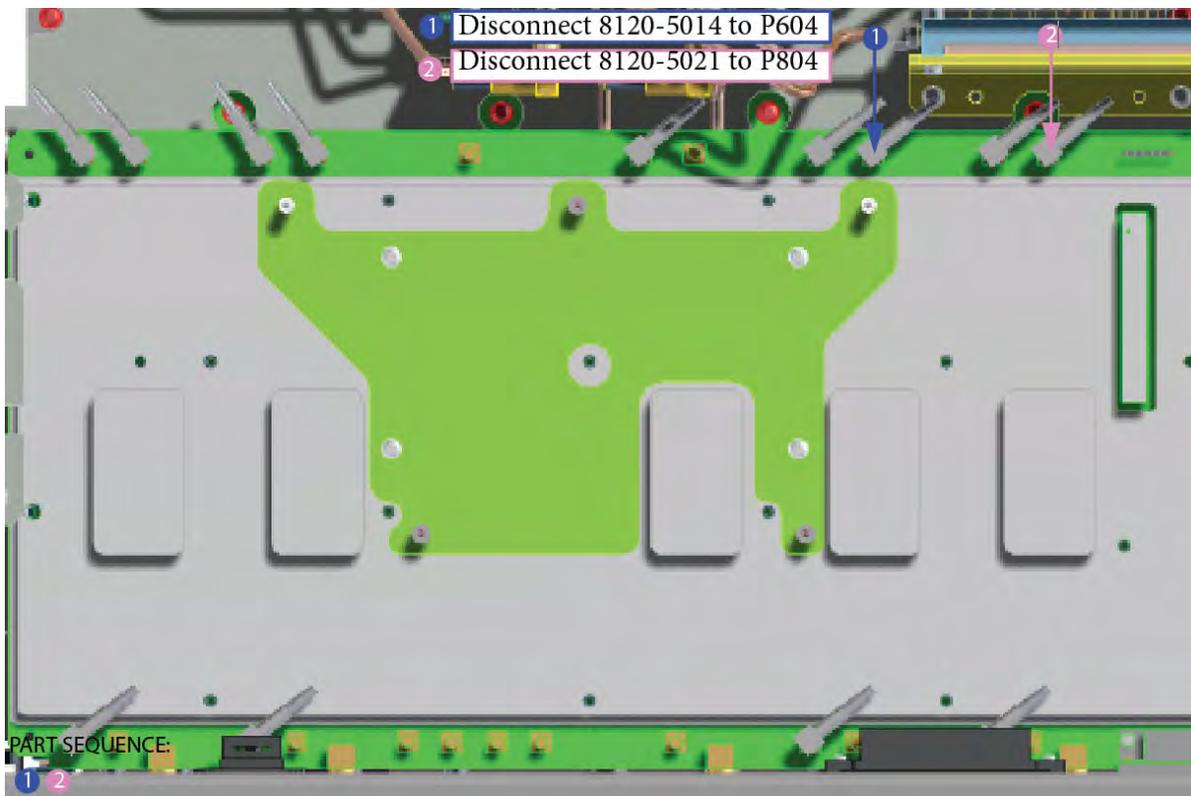
IMPORTANT! Before disconnecting the IF gray cables, be careful to label where the cables connect on the IF multiplexer (IF MUX) board. Not all cables are reused and some will move to new positions. See also, [Figure on page 48](#).

Disconnect the other end of the 8120-5014 (x1) and 8120-5021 (x1) cables on the IF MUX board (items ① and ②). You disconnected the other ends of the IF gray cables previously in the process in “[Step 6. Disconnect A71 and A74 Bias-Tee Combiner’s LFE Cables From the A70 Low Frequency Extension \(LFE\) Board and the Ends of the LFE Cables Connected to the IF Multiplier \(IF MUX\) Board](#)” on page 18). Refer to [Figure 4](#).

- Save 8120-5014 cable for reuse.
- Discard 8120-5021 cable.

Figure 4

Disconnecting the gray cables on the IF MUX board (8120-5014 (x1) and 8120-5021 (x1))



Step 9. Remove Some of the Mixer Brick (MXB) Cables

Remove one end of some the mixer brick (MXB) gray cables (item ① through ③). Refer to **Figure 5**. These cables are **not** reused and can be discarded.

Figure 5 Remove the one end of the IF gray cables to the IF MUX board (N5242-60025 and N5242-60026)

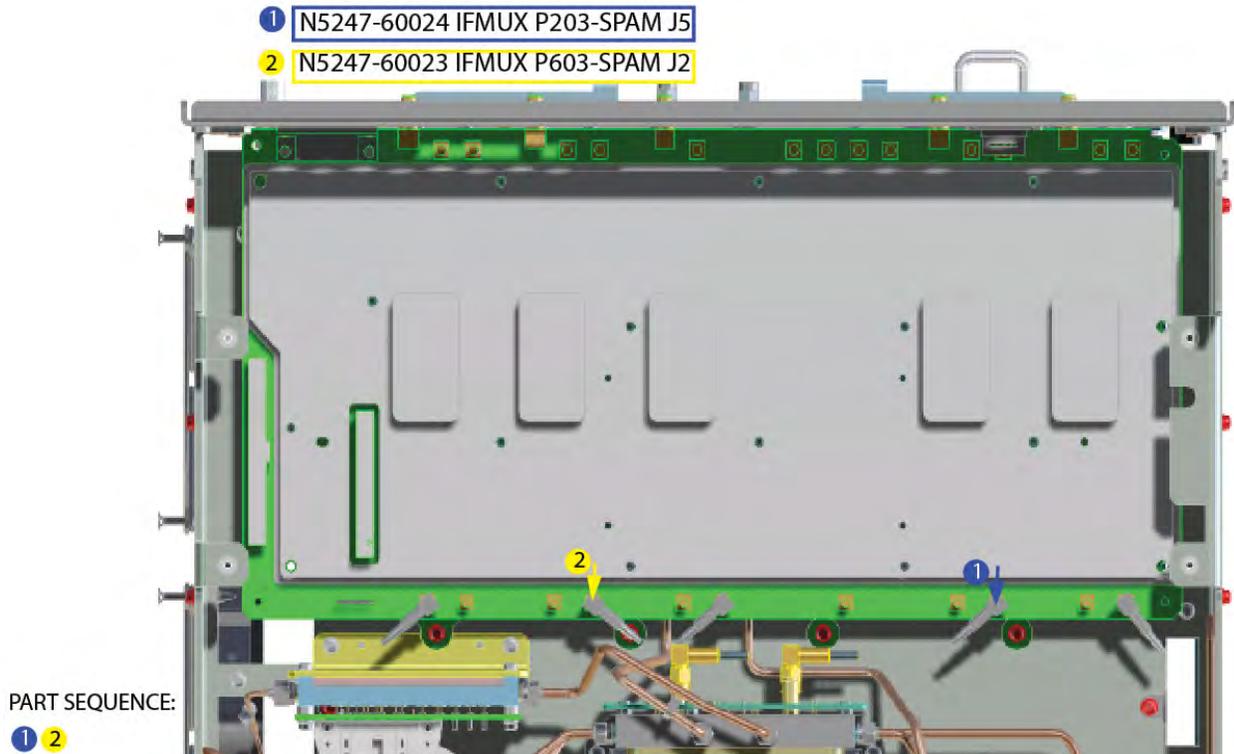


Step 10. Remove Some Gray Cables From the A24 IF Multiplexer Board

Remove the IF Multiplexer /SPAM gray cables (N5247-60023 and N5247-60024), to the A24 IF MUX board as indicated in **Figure 6 on page 22** (items ① and ②). These cables are **not** reused and can be discarded.

Figure 6

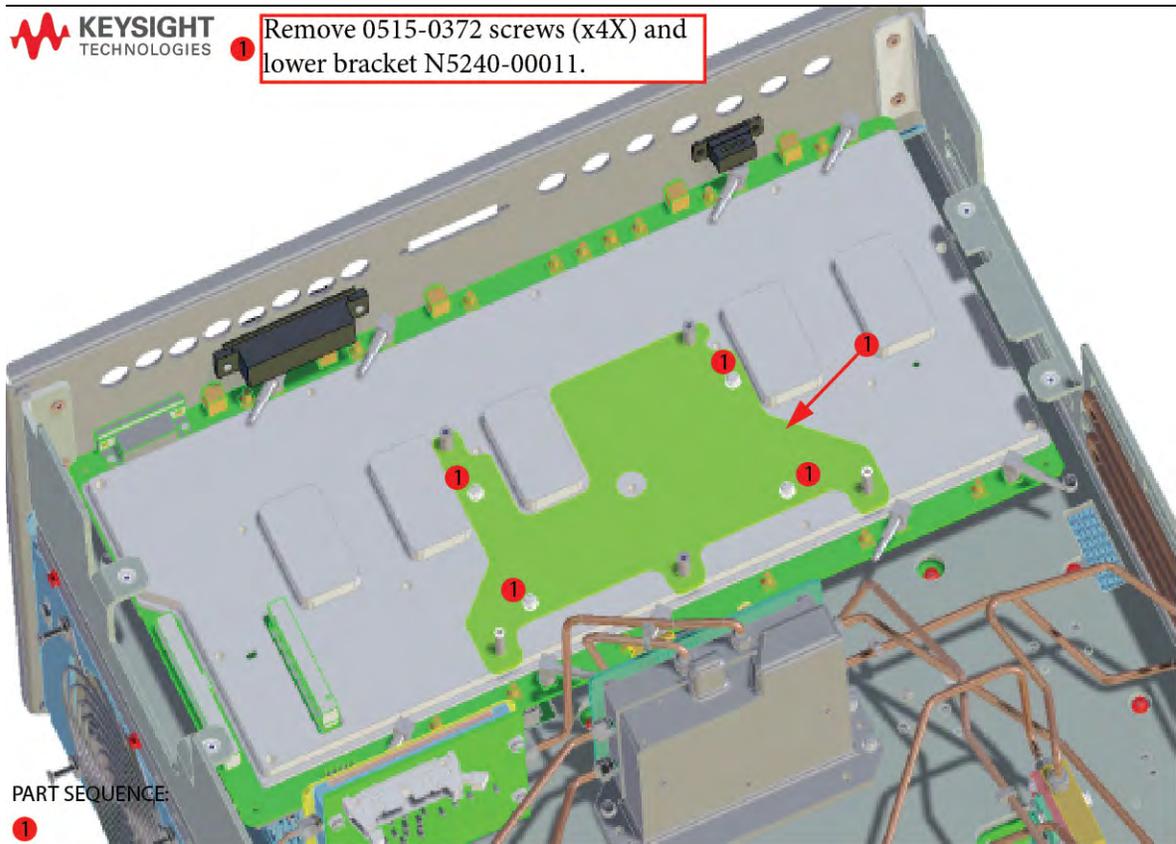
Remove the IF MUX Gray Cables (N5247-60023 and N5247-60024)



Step 11. Remove the A75/A70 LFE Board Bracket

Remove the LFE bracket as indicated (item ①). Refer to **Figure 7**.

Figure 7 Remove the Screws (x4) and LFE Bracket



Step 12. Remove Some Bottom-Side Semi-Rigid (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

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 2-Port Configuration, Option 205, S/N Prefixes <6021" or in the PDF Service Guide¹.

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

NOTE

These flexible cables have been removed in previous steps:

- W72 (N5247-60023) A24 IF multiplexer board P603 to A12 SPAM board J2 (2-port)
 - W70 (N5247-60024) A24 IF multiplexer board P203 to A12 SPAM board J5 (2-port)
 - W62 (N5242-60025) A23 mixer brick (R1) to A24 IF multiplexer (P601)
 - W63 (N5242-60026) A23 mixer brick (R2) to A24 IF multiplexer (P801)
-
- W21 (N5245-20120) A29 port 1 receiver coupler to A37 reference mixer switch
 - W186 (N5245-20176) A33 port 1 coupler to front-panel A71 bias T combiner
 - W185 (N5245-20193) A33 port 1 coupler to front-panel COUP THRU
 - W184 (N5245-20177) A36 port 2 coupler to front-panel A74 bias T combiner
 - W32 (N5245-20097) Front panel port 2 CPLR THRU to A36 port 2 coupler
 - W28 (N5245-20096) Front panel port 4 CPLR THRU to A35 port 4 coupler
 - W34 (N5245-20024) A36 port 2 coupler to front-panel REF 2 CPLR ARM
 - W33 (N5245-20121) A32 port 2 receiver coupler to front-panel REF 2 SOURCE OUT - (2-port only)
 - W80 (N5245-20048) A25 HMA26.5 to A27 mixer brick

These cables must be saved - they will be reinstalled.

1. See ["Downloading the Online PNA Service Guide" on page 8](#).

Description of the Upgrade
Installation Procedure for the Upgrade

- W12 (N5245-20109) A29 port 1 receiver coupler to W11
- W18 (N5245-20111) A32 port 2 receiver coupler to W17
- W40 (N5245-20042) Front panel port 2 RCVR B IN to A27 mixer brick (B)
- W36 (N5245-20155) Front panel jumpers (quantity = 6)

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

Step 13. Remove the A27 Mixer Brick Assembly

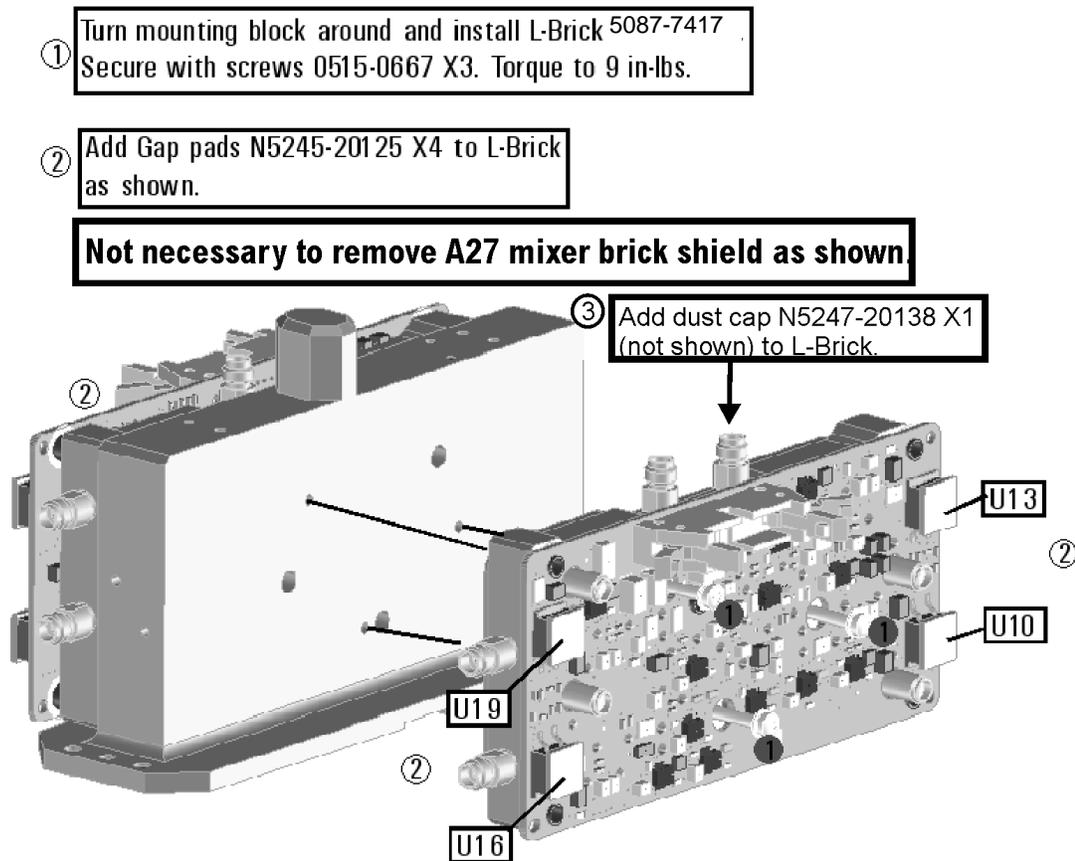
Remove the A27 mixer brick assembly from the PNA. For instructions, click the Chapter 7 bookmark, “Removing and Replacing the A27 and A28 Mixer Bricks” in the PDF Service Guide¹.

Step 14. Assemble the A28 Mixer Brick Assembly

1. Follow the instruction shown in **Figure 8**. New parts are listed in **Table 2** on **page 10** of this document.

Figure 8

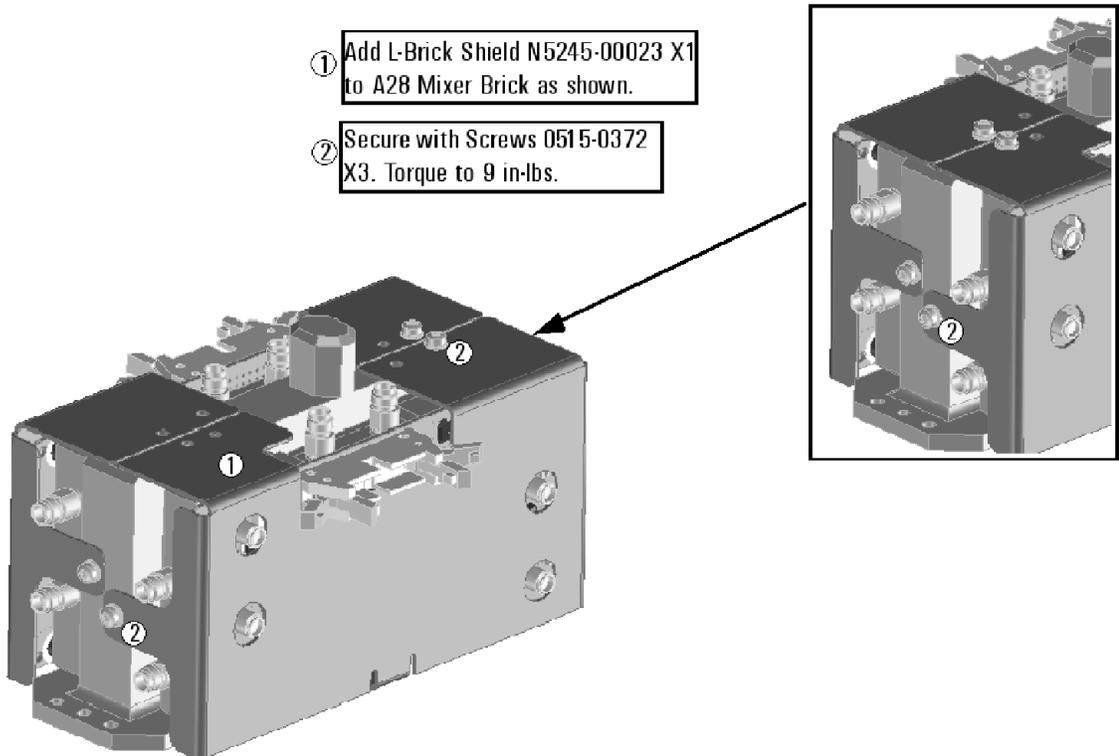
A27/A28 Mixer Brick Assembly (5087-7417, 0515-0667(x3), N5245-20125 (x4), N5247-20138 (x1))



N5225_124_04

2. Follow the two instructions shown in **Figure 9**.

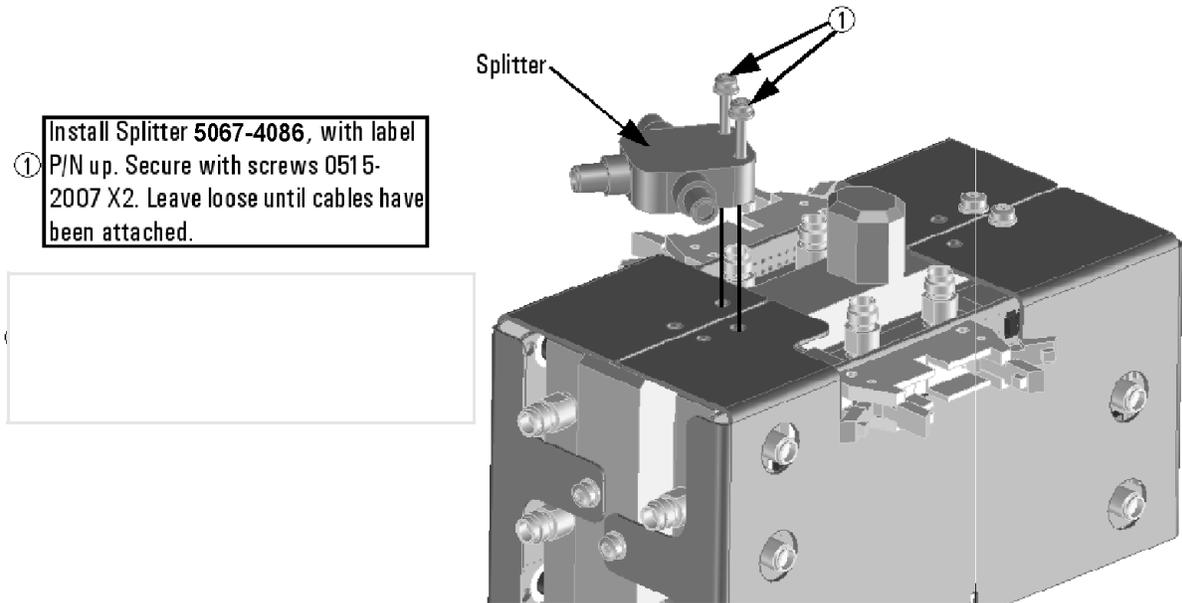
Figure 9 A28 Mixer Brick Shield Installation (N5245-00023 (x1), 0515-0372 (x3))



N5225_124_05

3. Follow the two instructions shown in **Figure 10**.

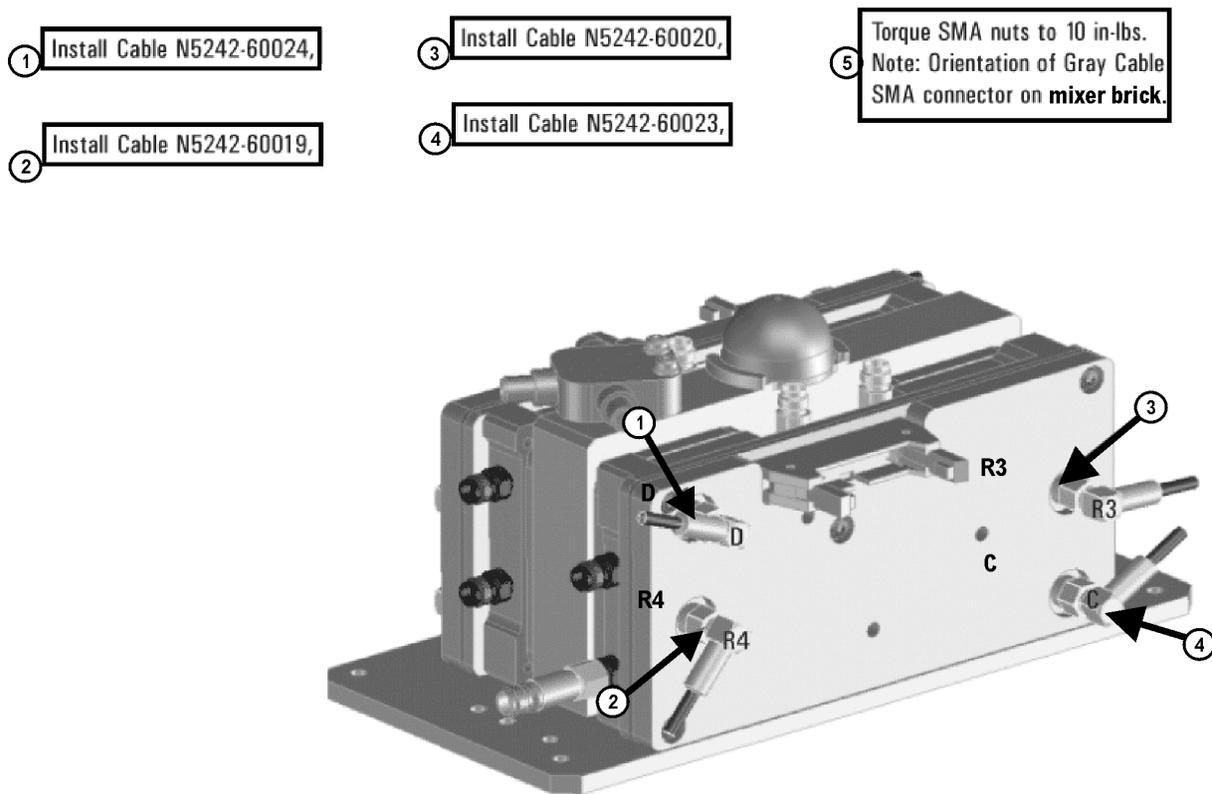
Figure 10 A26 Splitter¹ Installation (5067-4086, 0515-2007 (x2), 08490-60039 (x1))



1. The A26 splitter (5067-4086) and N5245-20013, N5245-20022, N5245-20023, N545-20101, and N5245-20150 cables are only used with a legacy HMA26.5 p/n: 5087-7765. If you are unclear which HMA26.5 assembly your PNA has installed, refer to Chapter 7 Repairs and **Figure 1 on page 7** and for details on A26 splitter and cabling, refer to your option-model in Chapter 6 "2-Port Configurations, Serial Number Prefix <6021" and "4-Port Configuration, Serial Number Prefix <6021".

4. Connect the gray flexible cables to the A28 mixer in the order shown in **Figure 11**. The other ends of the cables will be connected when the IF board is reinstalled later.

Figure 11 A27/A28 Mixer Brick Assembly (N5242-60019, N5242-60020, N5242-60023, and N5242-60024)^{1, 2}



N5225_124_07

1. The A26 splitter (5067-4086) and N5245-20013, N5245-20022, N5245-20023, N545-20101, and N5245-20150 cables are only used with a legacy HMA26.5 p/n: 5087-7765. If you are unclear which HMA26.5 assembly your PNA has installed, refer to Chapter 7 Repairs and **Figure 1 on page 7** and for details on A26 splitter and cabling, refer to your option-model in Chapter 6 "2-Port Configurations, Serial Number Prefix <6021" and "4-Port Configuration, Serial Number Prefix <6021".
2. Attenuator 08490-60039 is shown in the figure, but is not included in this upgrade and not required with the A28 mixer brick (5087-7417).

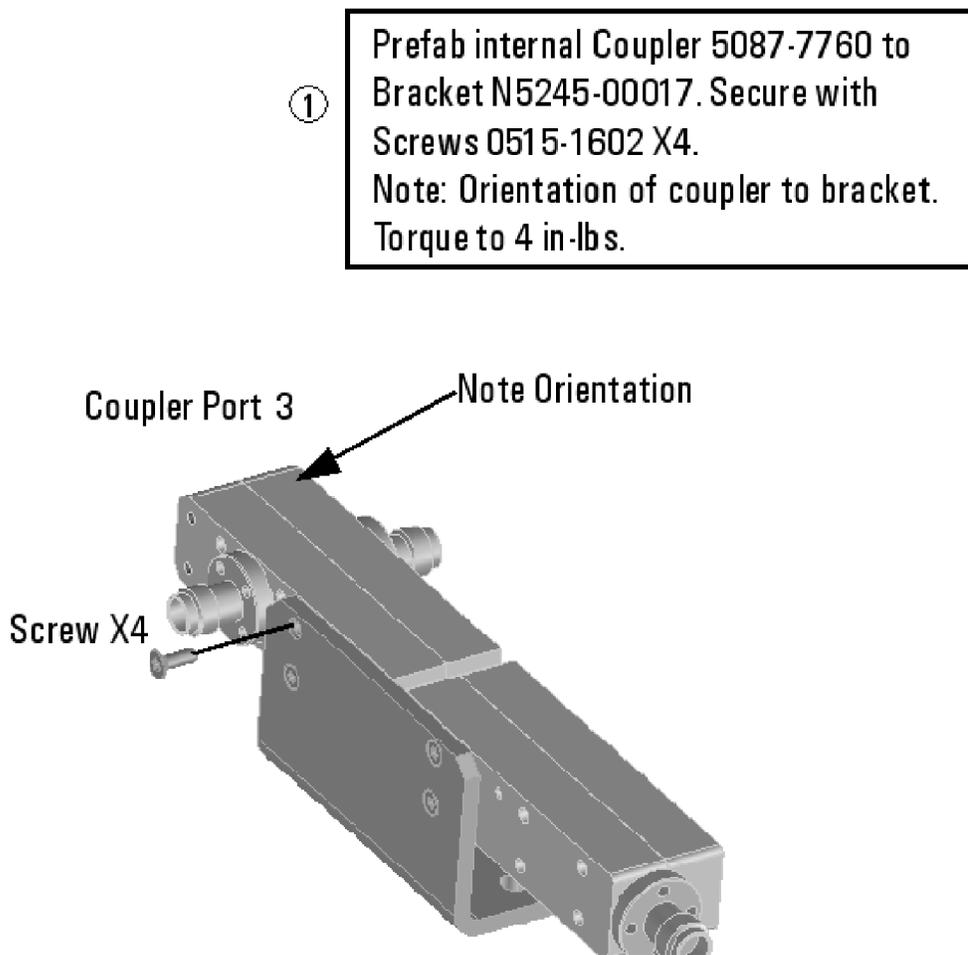
Step 15. Install the A27/A28 Mixer Brick Assemblies

Reinstall the A27 mixer brick cables, and then install the A27/A28 mixer brick assembly, reusing the four existing screws. For instructions, click the Chapter 7 bookmark, “Removing and Replacing the A27 and A28 Mixer Bricks” in the PDF Service Guide¹. New parts are listed in **Table 2 on page 10** of this document.

Step 16. Assemble the A34 and A35 Receiver Coupler Assemblies

Follow the instructions shown in **Figure 12** and **Figure 14**. New parts are listed in **Table 2 on page 10** of this document.

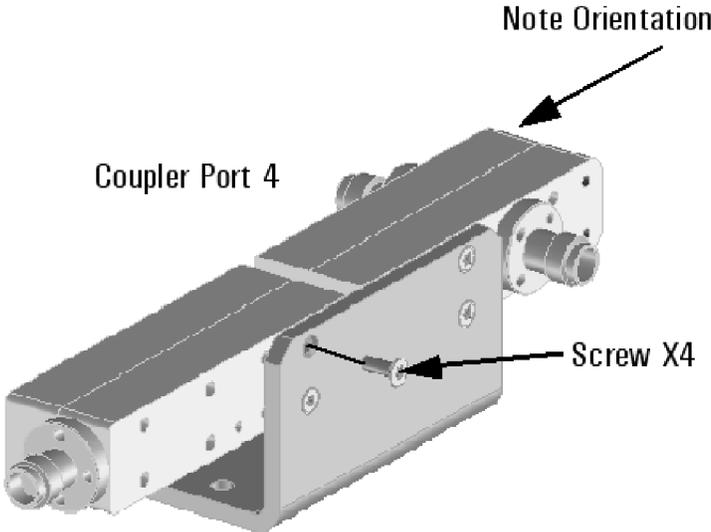
Figure 12 A34 Receiver Coupler Port 3 Assembly (5087-7760, N5245-00017, 0515-1602 (x4))



1. See “[Downloading the Online PNA Service Guide](#)” on page 8.

Figure 13 A35 Receiver Coupler Port 4 Assembly (5087-7760, N5245-00017, 0515-1602 (x4))

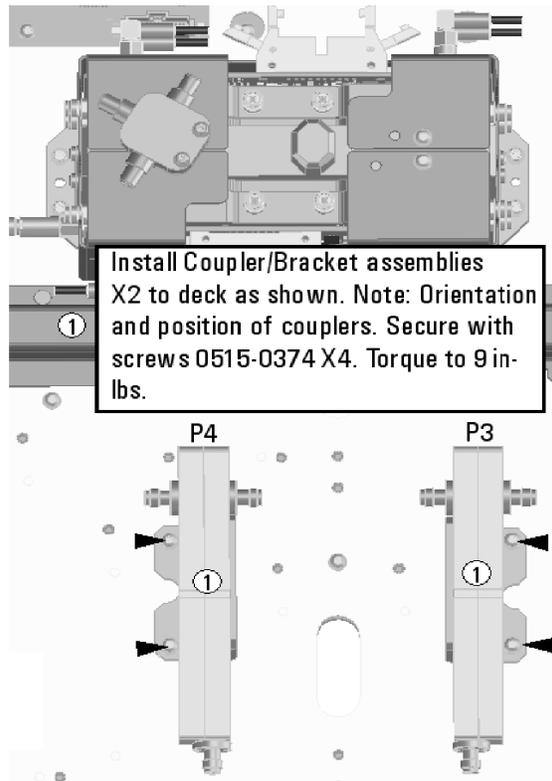
① Prefab internal Coupler 5087-7760 to Bracket N5245-00017. Secure with Screws 0515-1602 X4.
Note orientation of coupler to bracket. Torque to 4 in-lbs.



Step 17. Install the A34 and A35 Receiver Coupler Assemblies

Follow the instructions shown in **Figure 14**. New parts are listed in **Table 2** on **page 10** of this document.

Figure 14 A34 and A35 Receiver Coupler Assemblies Installation (0515-0374 (x4))^{1, 2}



N5247_106_10

1. The A26 splitter (5067-4086) and N5245-20013, N5245-20022, N5245-20023, N545-20101, and N5245-20150 cables are only used with a legacy HMA26.5 p/n: 5087-7765. If you are unclear which HMA26.5 assembly your PNA has installed, refer to Chapter 7 Repairs and **Figure 1** on **page 7** and for details on A26 splitter and cabling, refer to your option-model in Chapter 6 "2-Port Configurations, Serial Number Prefix <6021" and "4-Port Configuration, Serial Number Prefix <6021".
2. Attenuator 08490-60039 is shown in the figure, but is not included in this upgrade and not required with the A28 mixer brick (5087-7417).

Step 18. Assemble the A72 (Port 3) and A73 (Port 4) Bias Tee Combiner Assemblies

Refer to **Figure 15** and **Figure 16 on page 34** for this step of the procedure. New parts are listed in **Table 2 on page 10**. Use a T-10 TORX driver to tighten all screws.

Figure 15 Bias Tee Combiner “RF IN” Cable Assembly (N5240-60097 (x2), 5087-7403 (x2), & 5023-3299 (x2), 0515-2141 (x2))

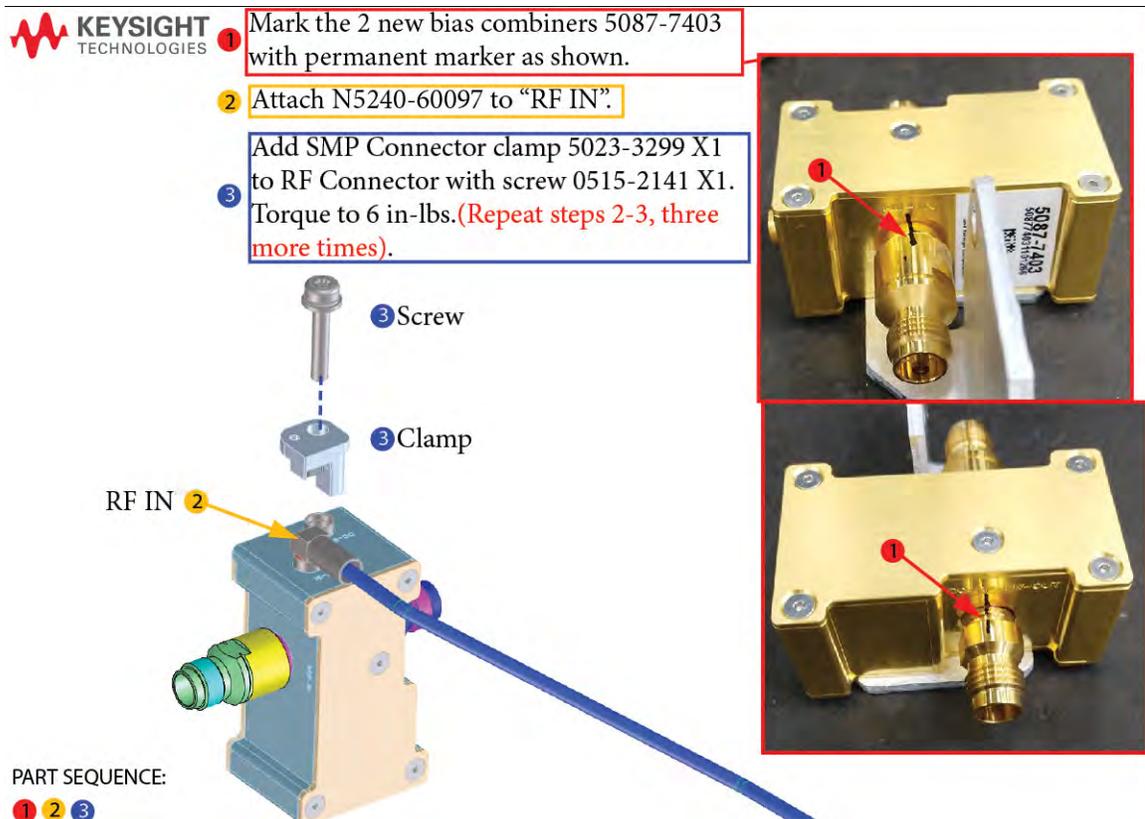
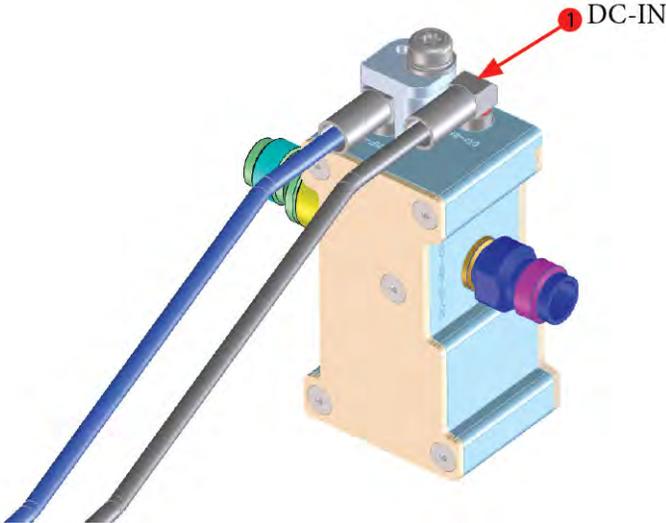


Figure 16

Bias Tee Combiner “DC IN” Cable Assembly (N5240-60091 (x2))



1 Install Cable N5240-60091 to “DC-IN” on Bias Combiner.



PART SEQUENCE:

1

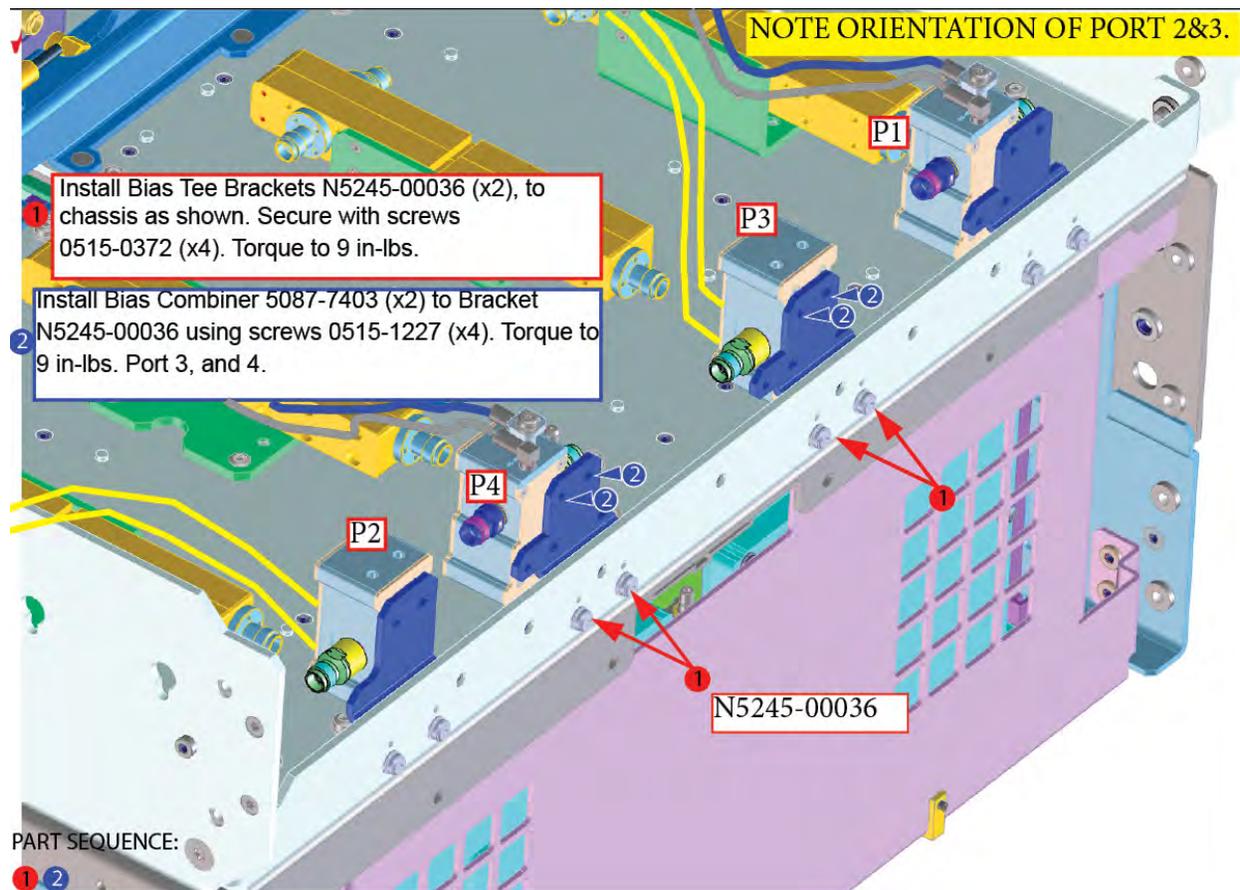
Step 19. Install the New A72 and A73 Bias Tee Combiner Assemblies

Refer to **Figure 17** for this step of the procedure. New parts are listed in **Table 2 on page 10**. Use a T-10 TORX driver to tighten all screws.

1. Install the bias Tee combiner brackets to chassis as shown using screws 0515-0372 (x4). Note the orientation of the assemblies (item ①).
2. Install the bias Tee combiners to the brackets using screws 0515-1227 (x4) as shown (item ②). Torque to 6 in-lbs.

Figure 17

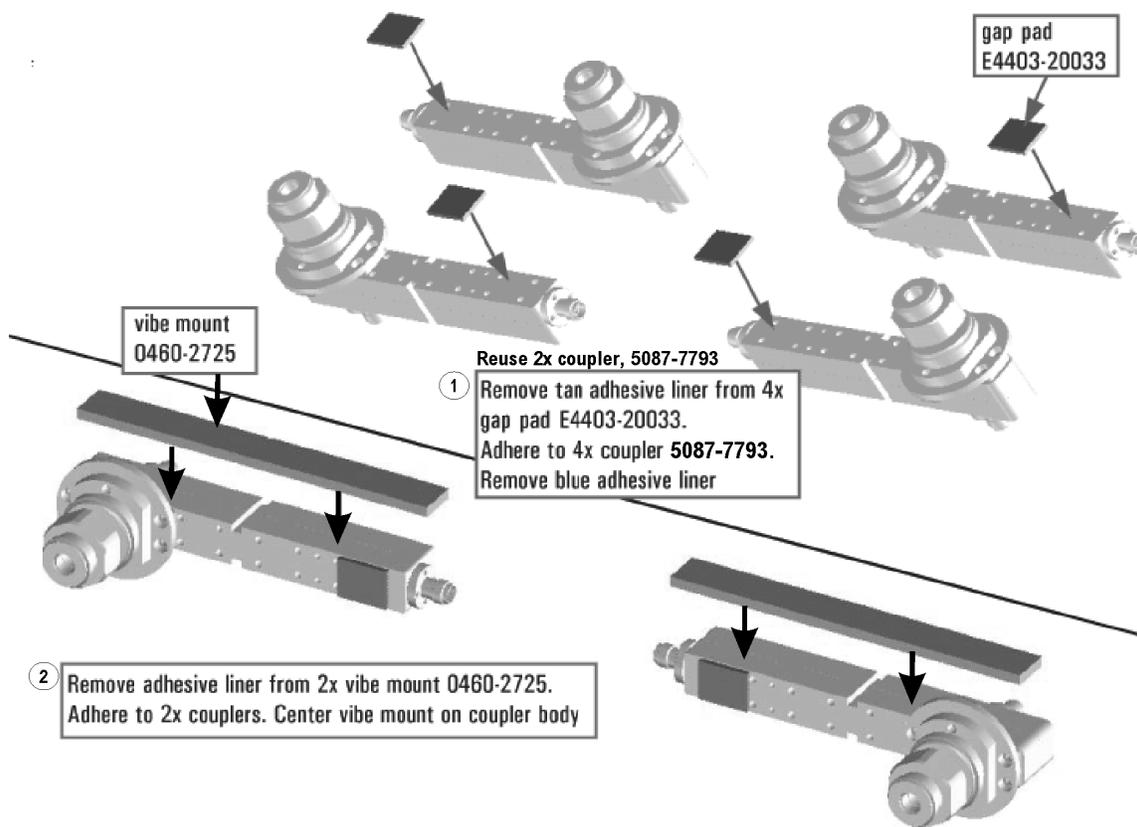
Install bias tee combiners on brackets (N5245-00036 (x2), 5023-7403 (x2), 0515-1227 (x4), and 0515-0372 (x4))



Step 20. Assemble the A33 - A36 Test Port Coupler Assemblies

1. Remove the A33 test port 1 coupler and A36 test port 2 coupler from the PNA. For instructions, click the Chapter 7 bookmark, "Removing and Replacing the A33 - A36 Test Port Couplers" in the PDF Service Guide¹.
2. Using pliers, remove the adhesive bumper on the A33 test port 1 coupler and on the A36 test port 2 coupler.
3. Follow the two instructions shown in **Figure 18**. New parts are listed in **Table 2 on page 10** of this document.

Figure 18 A33 - A36 Test Port Coupler Assembly (0460-2725, E4403-20033 (x4), 5087-7793 (x4), 0460-2725 (x2))



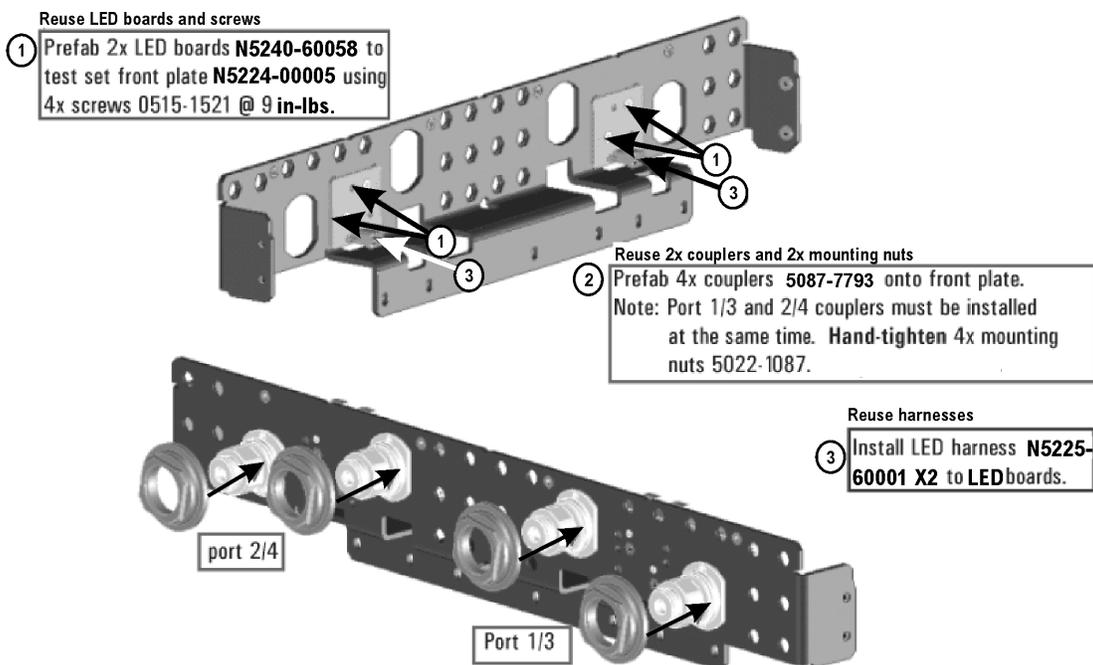
N5225_124_18

1. See "Downloading the Online PNA Service Guide" on page 8.

Step 21. Install the LED Boards and Test Port Coupler Assemblies to the 4-Port Test Set Front Plate

1. Remove two screws from each LED board and remove the boards from the 2-port test set front plate of the PNA. Keep the screws and LED boards for reuse later.
2. Remove the bulkhead connectors, nuts and washers from the 2-port front plate to reuse later.
3. Remove the 2-port test set front plate from the test set deck. Keep the screws for reuse later, but dispose of the test set front plate.
4. Follow the two instructions shown in **Figure 19**.

Figure 19 LED Board Assemblies and Test Port Coupler Assemblies Installation (N5240-60058, N5224-00005, 0515-1521 (x4), 5087-7793, 5022-1087 (x4), N5225-60001 (x2))



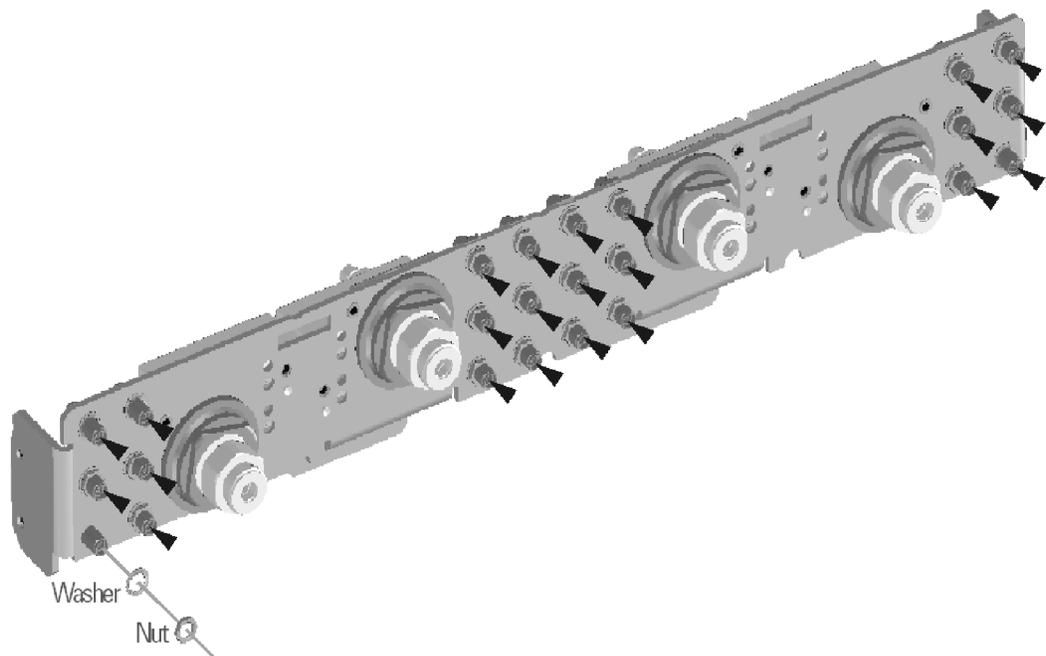
N5225_124_19

Step 22. Install the Bulkhead Connectors in the Test Set Front Plate

Refer to **Figure 20** for this procedure. New parts are listed in **Table 2 on page 10**.

1. Locate the bulkhead connectors you removed earlier from the 2-port test set front plate of the PNA. Use these and the new bulkhead connectors included in the kit for the remainder of this step.
2. From the back side of the test set front plate, insert a bulkhead connector into a hole in the plate.
3. Install 1x washer and 1x nut. Hand tight en nut and ensure bulkhead connector hexagon nut, on the back side of test set front plate, is aligned to the test set subpanel hexagon indent.
4. Repeat previous two steps for the remaining bulkhead connectors.
5. Torque nuts, on the front side of test set front plate, to 21 in-lbs.

Figure 20 Bulkhead Connectors Installation (1250-3805 (x10))



N5242_004_09

Step 23. Install the 4-Port Coupler Plate Assembly to the Deck

Follow the four instructions shown in **Figure 21**.

Figure 21

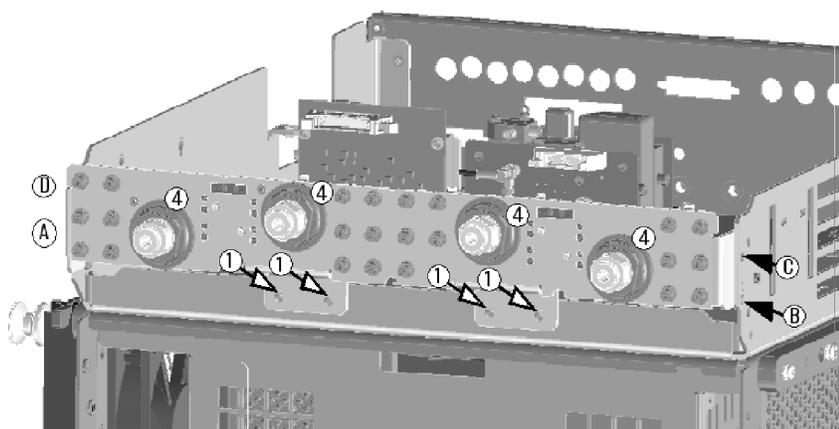
Coupler Plate Assembly Installation

① Install coupler plate assy to deck. Reuse 4x screws. **Hand tighten - do not torque.**

② Reinstall $\times 7$ screws. Torque to 9 in-lbs. Alternate sides in torque sequence, as per the circled letters.

③ Torque the $\times 7$ screws in step 1 to 9 in-lbs

④ Torque the 4x coupler nuts to 72 in-lbs.

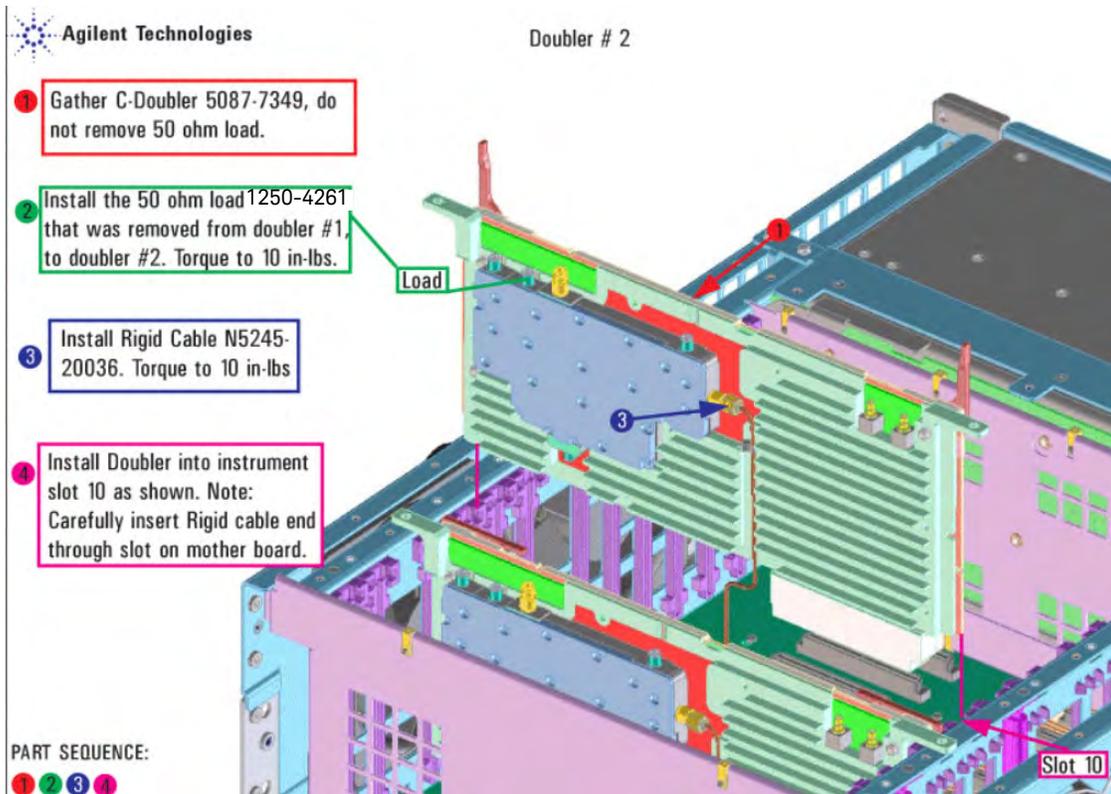


N5222_112_05

Step 24. Assemble and Install the A13 40 GHz Doubler Assembly

Follow the instructions shown in [Figure 22](#).

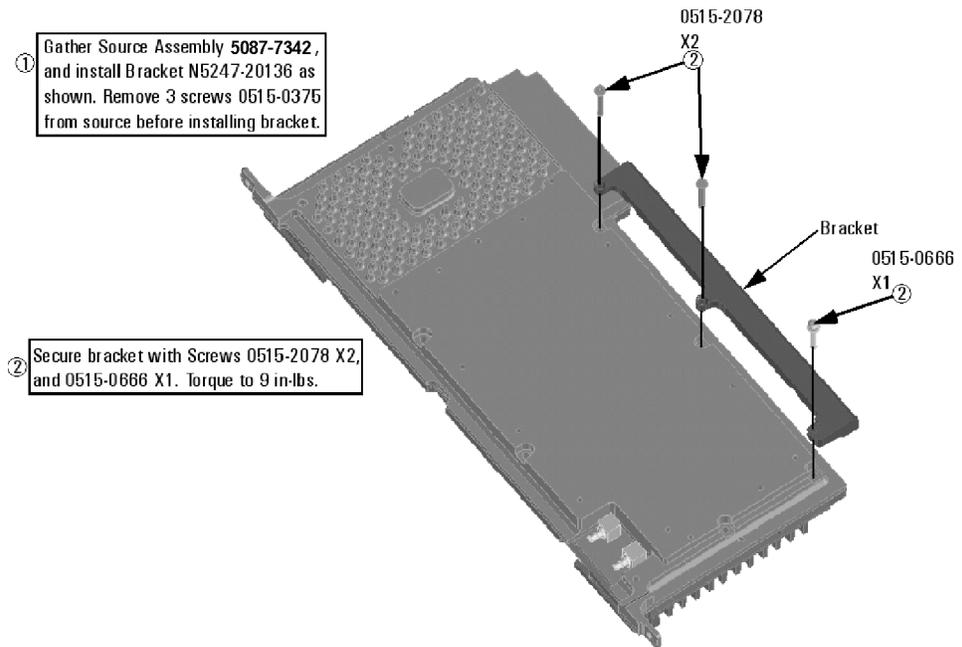
Figure 22 A13 40 GHz Doubler Installation (5087-7349, 1250-4261, N5245-20036)



Step 25. Install Bracket to A10 Source Assembly

Follow the two instructions shown in **Figure 23**.

Figure 23 A10 Source 2 Assembly Bracket Installation (5087-7342, N5247-20136, 0515-0375, 0515-2078, 0515-0666)



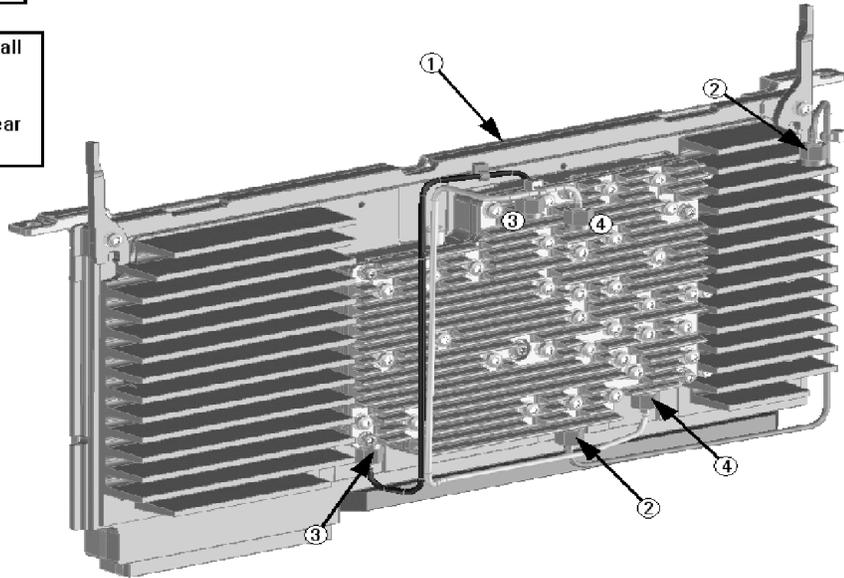
N5225_124_21

Step 26. Assemble the A10 26.5 GHz Source 2 Assembly

Follow the two instructions shown in **Figure 24**.

Figure 24 A10 Source 2 Assembly (5087-7342, N5245-20032, N5245-20033, N5245-20035)

- ① Gather Source 5087-7342.
- ② Remove SMA Load, and Install Rigid cable N5245-20032. Torque to 10 in-lbs. Keep the SMA Load for later use at rear panel
- ③ Install Rigid Cable N5245-20034. Torque to 10 in-lbs.
- ④ Install Rigid Cable N5245-20035. Torque to 10 in-lbs.

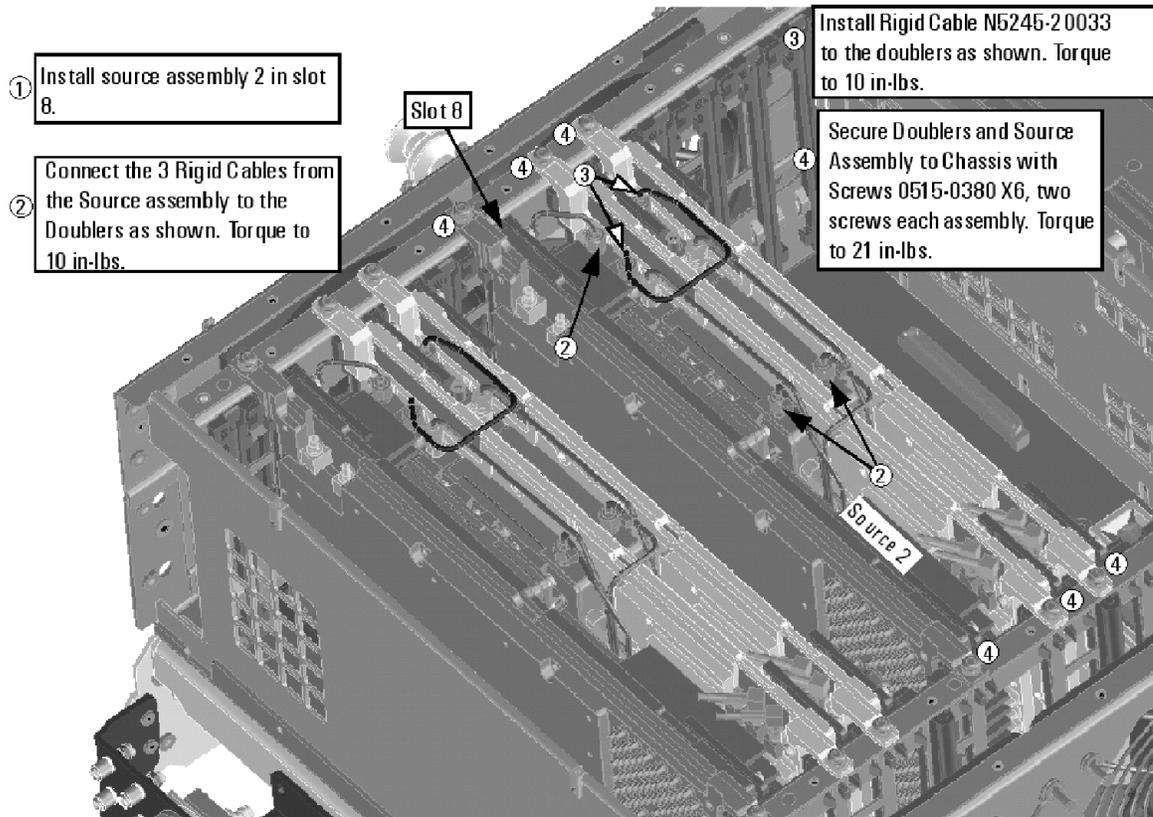


N5225_124_22

Step 27. Install the A10 26.5 GHz Source 2 Assembly and Cables

Follow the four instructions shown in **Figure 25**.

Figure 25 A10 Source 2 Assembly Installation (N5245-20033, 0515-0380 (x6))



N5225_124_26

Step 28. Install the A17 13.5 GHz (Source 2) Synthesizer Board and Cables

1. Install new gray cable W77 (N5242-60030) to connector J5 of the new A17 (source 2) synthesizer board (N5240-60074). The loose end of the cable will be connected on the A14 frequency reference board (J7) after the A17 board has been installed in the analyzer.
2. Install the A17 board into slot 2 in the motherboard. Secure the board into the chassis using two screws (0515-0380). To see an image showing the location of the A17 board in the motherboard, click the Chapter 6 bookmark "Top Assemblies, All Options" in the PDF Service Guide¹.

1. See ["Downloading the Online PNA Service Guide" on page 8](#).

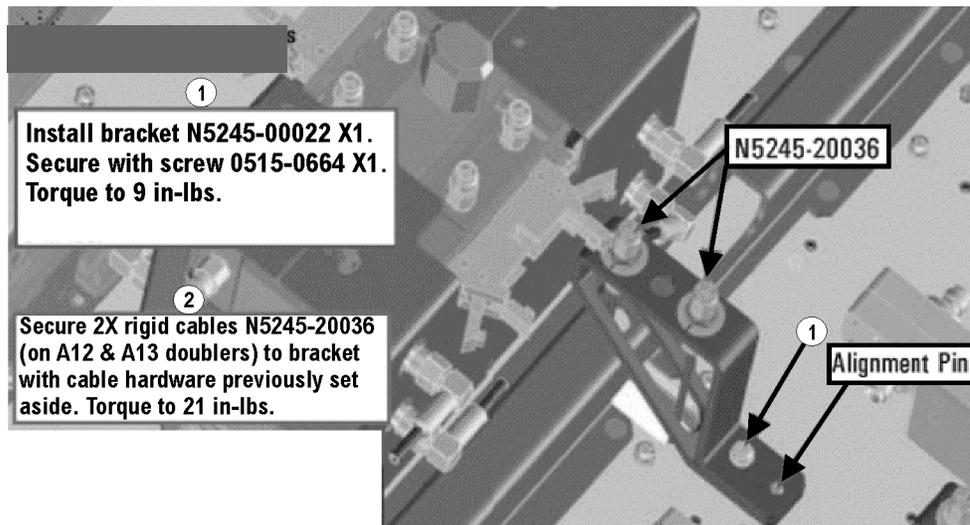
3. Connect cable W2 (N5245-20100) between the A10 source 2 board and the A17 (source 2) synthesizer board, positioning the cable in the wire looms. Tighten the cable connectors to 10 in-lbs using a 5/16-in torque wrench.
4. Connect the loose end of new gray flex cable W77 (N5242-60030) on the A14 frequency reference board (J7). (The other end of this cable was previously connected to J5 of the source 2 synthesizer board.)

Step 29. Install the Cable Bracket Mount

1. Follow the two instructions shown in **Figure 26**. New parts are listed in **Table 2 on page 10** of this document.

Figure 26
(x2))

Cable Bracket Mount Installation (N5245-00022, 0515-0664, N5245-20036

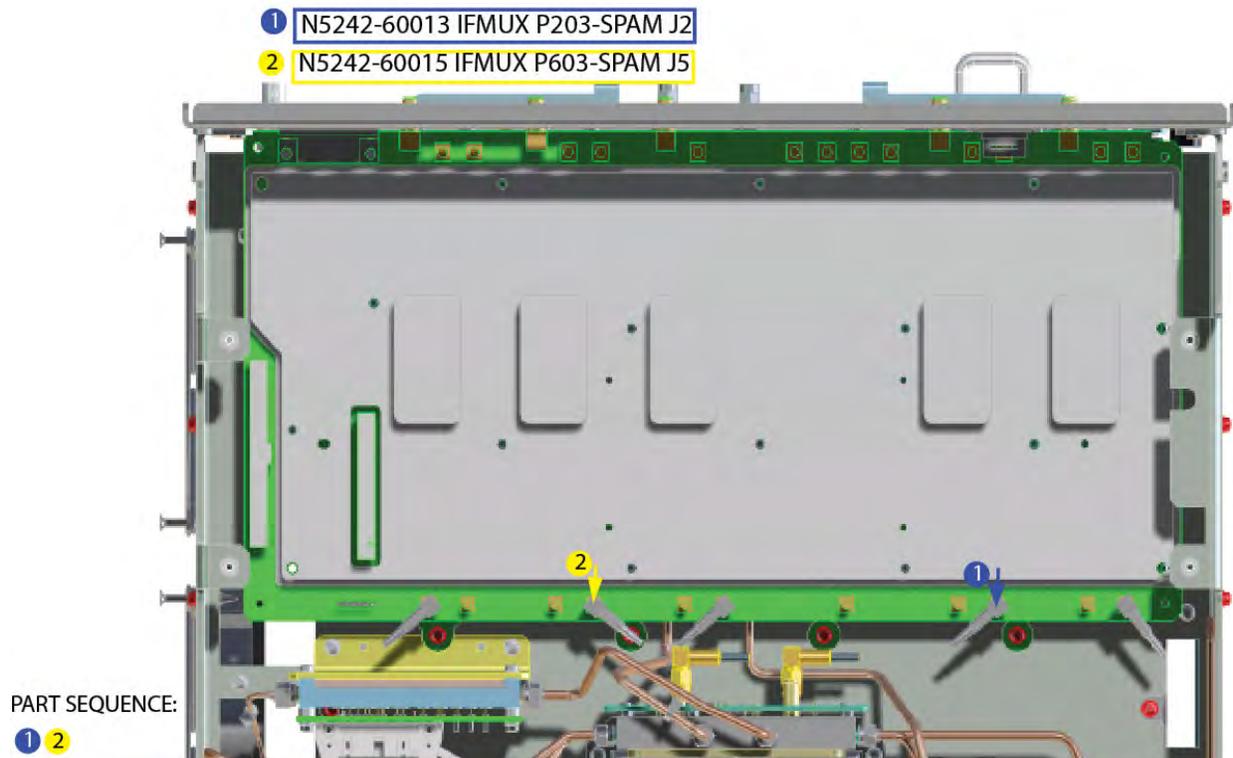


N5225_124_25

Step 30. Connect New Cables to A24 IF Multiplexer (IF MUX) Board

Connect the IF Multiplexer /SPAM gray cables (N5242-60013 and N5242-60015), to the A24 IF MUX board as indicated in **Figure 27** (items ① and ②).

Figure 27 Connect the IF MUX /SPAM gray Low Frequency Extension (LFE) gray cables to A24 IF MUX (N5242-60013 and N5242-60015)



Step 31. Reinstall A70 Low Frequency Extension (LFE) Board Bracket

Reinstall the A70 LFE board bracket by reversing the steps in **“Step 11. Remove the A75/A70 LFE Board Bracket”** on page 23. Torque the 0515-0372 screws to 9 in-lbs.

Step 32. Install the New Mixer Brick (MXB) Cables and Route Cables

Reconnect the other end of the new mixer brick (MXB) cables (item ①) and all of the IF multiplexer (IF MUX) gray cables (items ② through ⑦). Refer to [Figure 28](#) and to [Figure 29 on page 47](#).

Figure 28

Connect the other end of the new IF gray cables to the IF MUX board (N5242-60019, N5242-60020, N5242-60021, N5242-60022, N5242-60023, and N5242-60024)

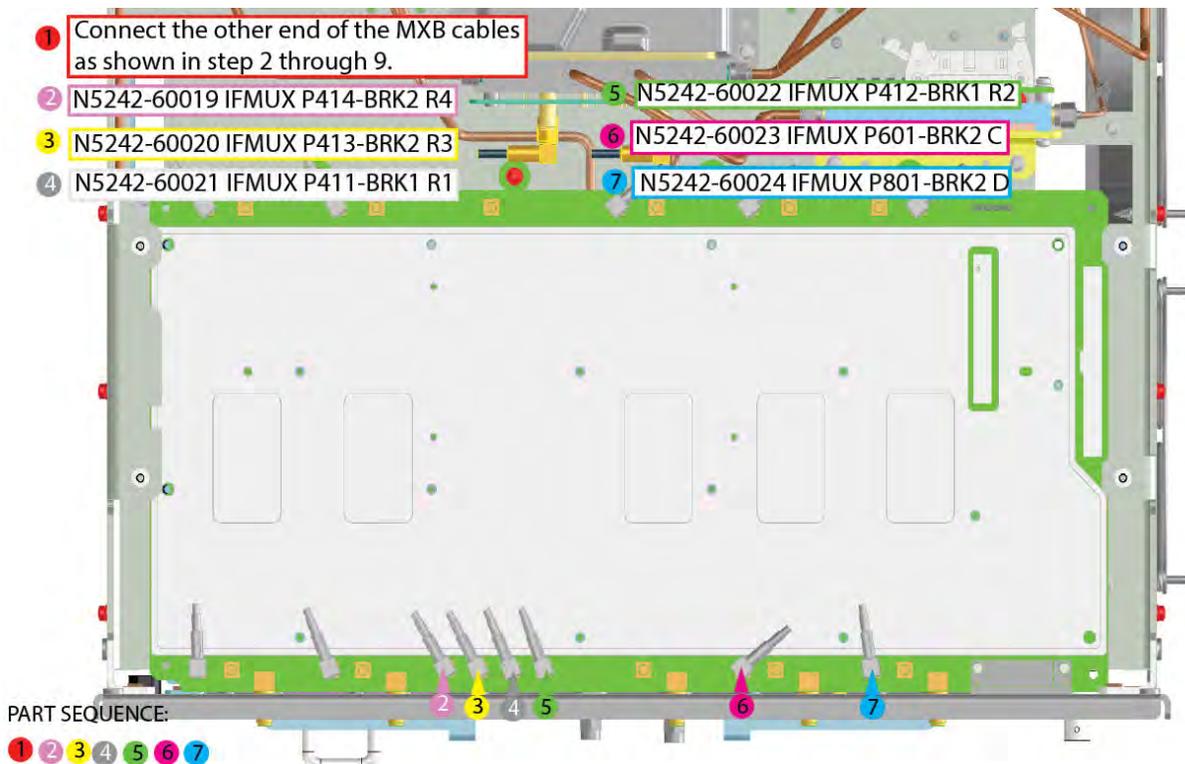
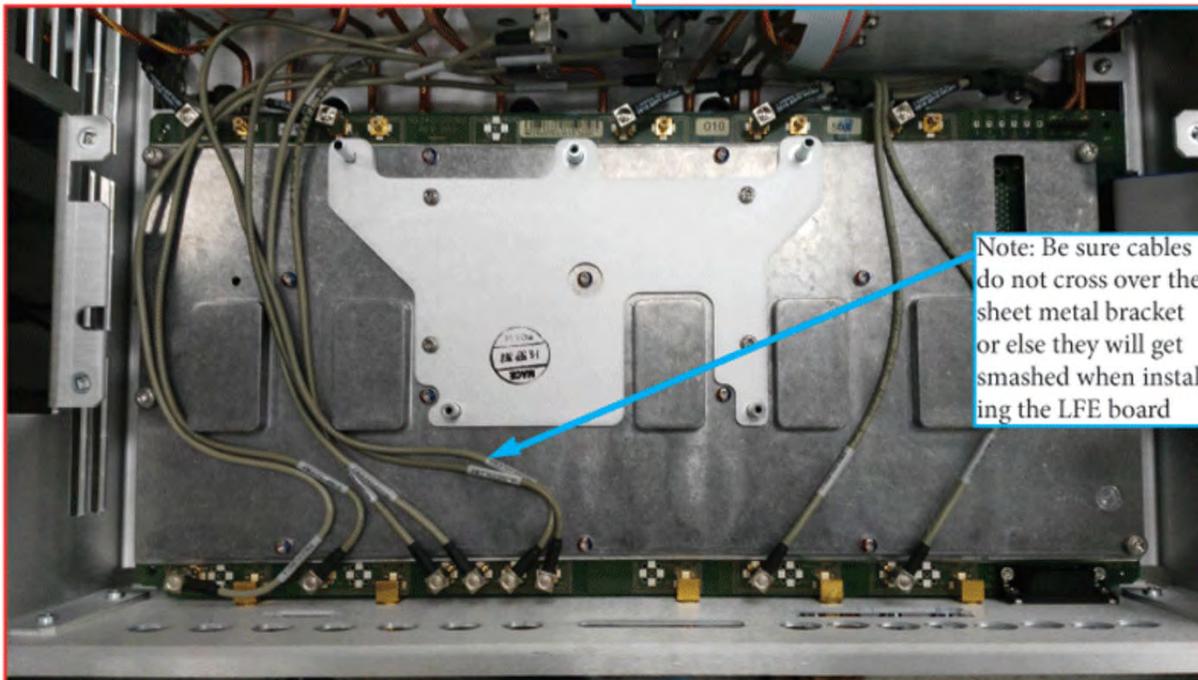


Figure 29 Route the existing IF gray cables

1 Route Existing Cables as shown.

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



Note: Be sure cables do not cross over the sheet metal bracket or else they will get smashed when installing the LFE board

PART SEQUENCE:

1

Step 33. Reconnect/Connect Old and New Cables and then Route Low Frequency Extension (LFE) Cables (8120-5014 (x2) and 8120-5017 (x3)) and the Other Ends of the Cables Connected to the IF Multiplexer (IF MUX) Board

NOTE

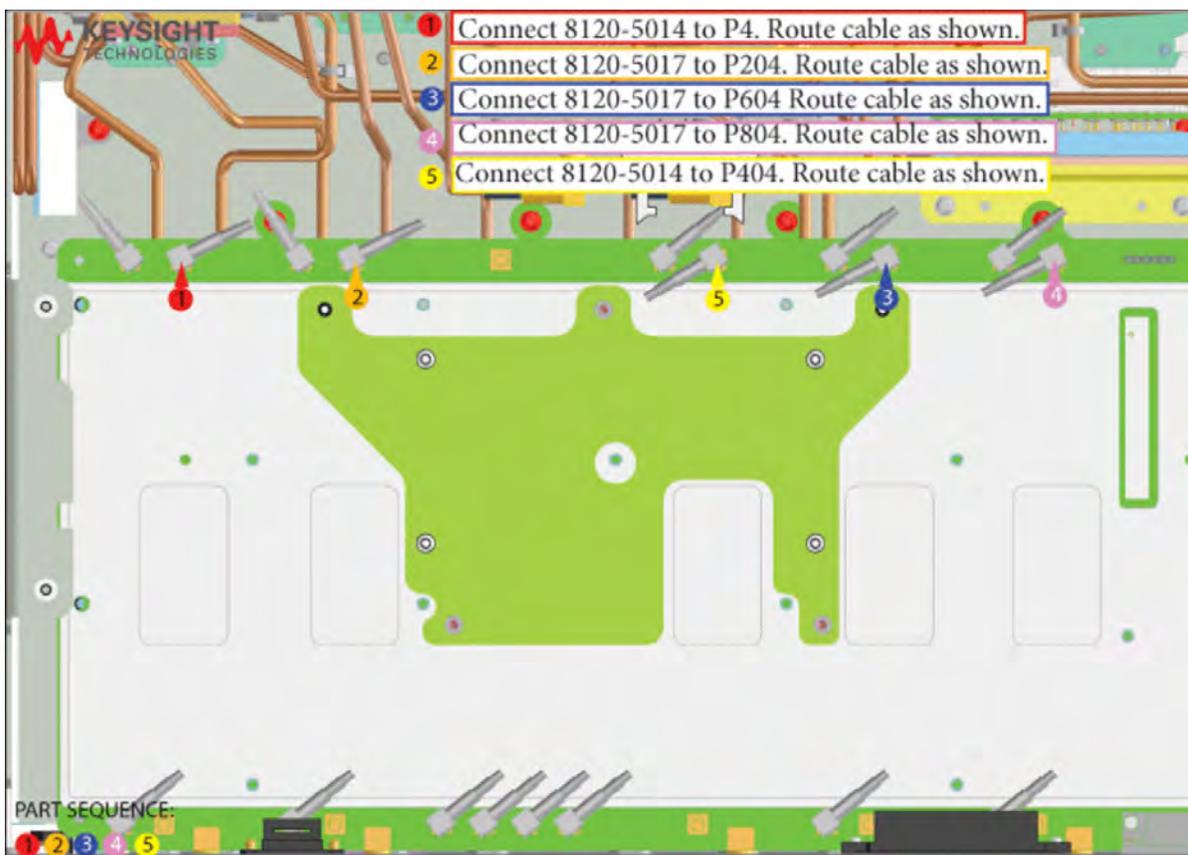
The 8120-5014 (x1) cable connection that was connected at P604 is now connected on P404. The new 8120-5017 cable is used for the P604 connection on the IF multiplexer (IF MUX) board. Refer to [Figure 30](#).

1. Reconnect and route 8120-5014 (x2), 8120-5017 (x3). Connect and route the cables on the IF MUX board as shown (items ① through ⑤). You will connect the other ends of the IF gray cables later on the process. Refer to [Figure 30](#).

NOTE

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

Figure 30 Connecting/Reconnecting and routing the gray cables on the IF MUX board (8120-5014 (x2) and 8120-5017 (x3))



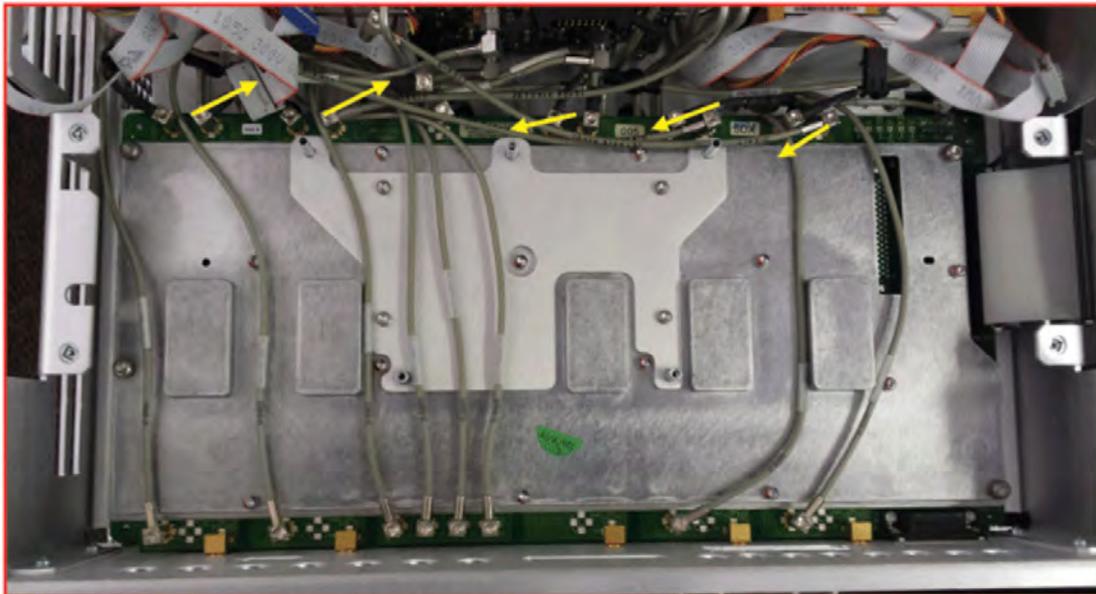
2. Route the reconnected mixer brick (MXB) and IF multiplexer (IF MUX) gray cables that were reconnected in “Step 32. Install the New Mixer Brick (MXB) Cables and Route Cables” on page 46. Refer to Figure 31.

Figure 31 Routing the reconnected MXB and IF MUX Gray Cables on the IF MUX board



1 Route LFE cables in direction of yellow arrows.

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



PART SEQUENCE:

1

Step 34. Install the New A70 Low Frequency Extension (LFE) Board

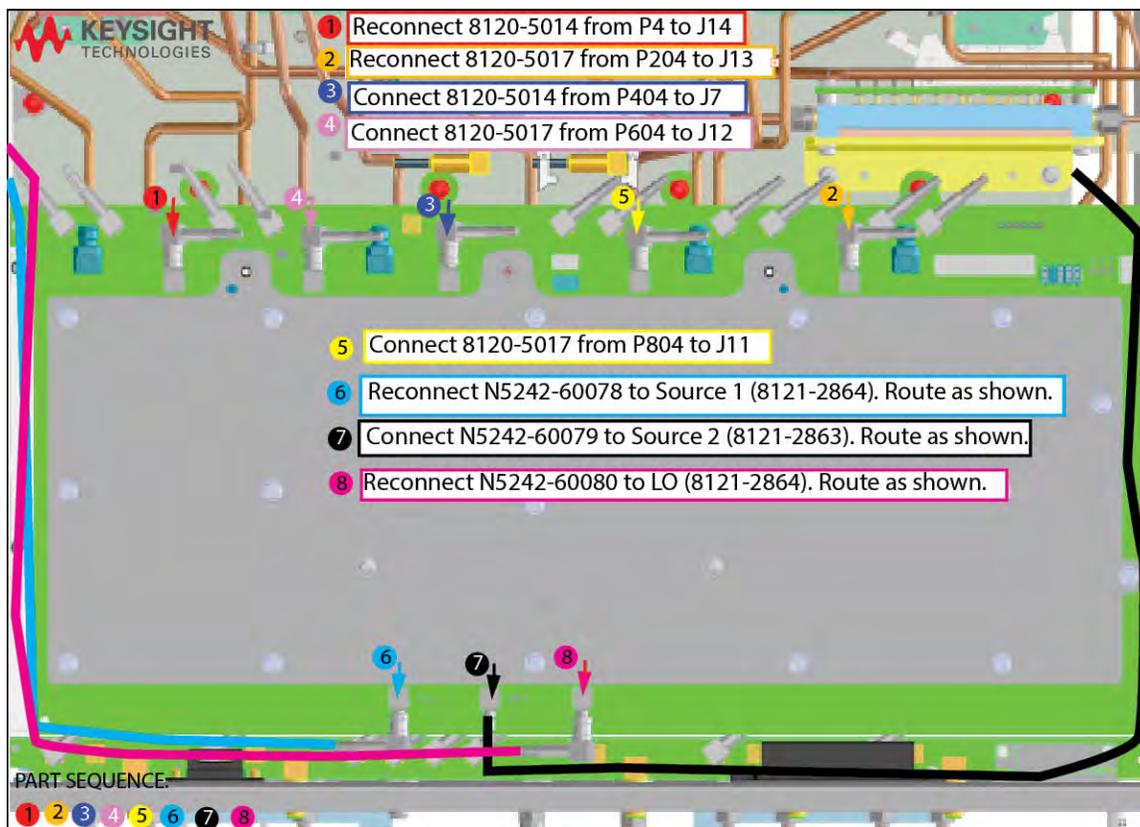
1. Reinstall the A70 LFE board (N5291-60001) by reversing the steps in “Step 7. Remove the A75 Low Frequency Extension (LFE) Board” on page 19. Torque the 0515-0665 screws to 9 in-lbs.

Step 35. Connect/Reconnect A71–A74 Bias-Tee Combiner’s Cables to A70 Low Frequency Extension (LFE) Board and the Other Ends of the Cables Connected to the IF Multiplier (IF MUX) Board

1. Reconnect/connect the (8120-5014 (x2), 8120-5017 (x3)) IF gray cables item ① through item ⑤ as shown in Figure 32. (i.e., one end was installed in Figure 30 on page 48.)
2. Reconnect the N5242-60078 Source 1 and N5242-60080 LO Source cables and connect N5242-60079 Source 2 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 (i.e., N5242-60078 and N5242-60080 should still be connected to Source1 and LO Source (respectively), but verify the connections). Refer to Figure 32 and see also, Figure 30 on page 48.

Figure 32

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



Step 36. Install the Test Set Cables and Install Cable Clamps on Ferrite Beads

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.

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

Follow instructions carefully when making cable connections, especially wire harness connections. Incorrect connections can destroy components, resulting in additional customer costs.

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.

NOTE

Cables that are to be reinstalled are designated with “reuse.”

This step contains the following:

- “Install the Flexible Cables Required for Upgrading to an Option 405 PNA” on page 52
- “Install the Semirigid Cables Required for Upgrading to an Option 405 PNA” on page 52
- “Connect New Port 4 N5240-60097 (x1) and Verify Port 2 N5242-60097 Blue Bias-Tee Combiner Cables and Clamps from the A73 and A74 Bias Tees “RF-IN” to the A70 LFE Board “Port2” and “Port4” Connectors and Install Clamps onto the Ferrite Beads” on page 61
- “Connect New N5240-60097 (x2) Blue Bias-Tee Combiner Cables and Clamps from the A71 and A72 Bias Tees “RF-IN” to the A70 LFE Board “Port1” and “Port3” Connectors and Install Clamps onto the Ferrite Beads” on page 62

Install the Flexible Cables Required for Upgrading to an Option 405 PNA

NOTE

Flexible cables N5242-60013, N5242-60015, N5242-60019, N5242-60020, N5242-60021, N5242-60022, N5242-60023, N5242-60024, N5242-60030 were previously installed in “[Step 28. Install the A17 13.5 GHz \(Source 2\) Synthesizer Board and Cables](#)” on page 43, “[Step 30. Connect New Cables to A24 IF Multiplexer \(IF MUX\) Board](#)” on page 45 and “[Step 32. Install the New Mixer Brick \(MXB\) Cables and Route Cables](#)” on page 46.

The gray flexible cables were installed in previous steps. To see additional images showing the location of these cables, click either of the Chapter 6 bookmarks “Bottom RF Cables, 4-Port, Option 405, S/N Prefixes <6021” in the PDF Service Guide¹. New parts are listed in [Table 2 on page 10](#).

Install the Semirigid Cables Required for Upgrading to an Option 405 PNA

To see images showing the location of these cables, click the Chapter 6 bookmark “Bottom RF Cables, 4-Port, Option 405” in the PDF Service Guide¹. New parts are listed in [Table 2 on page 10](#).

NOTE

Use a 5/16” wrench to hold cable connectors when tightening a mating semi-rigid cable.

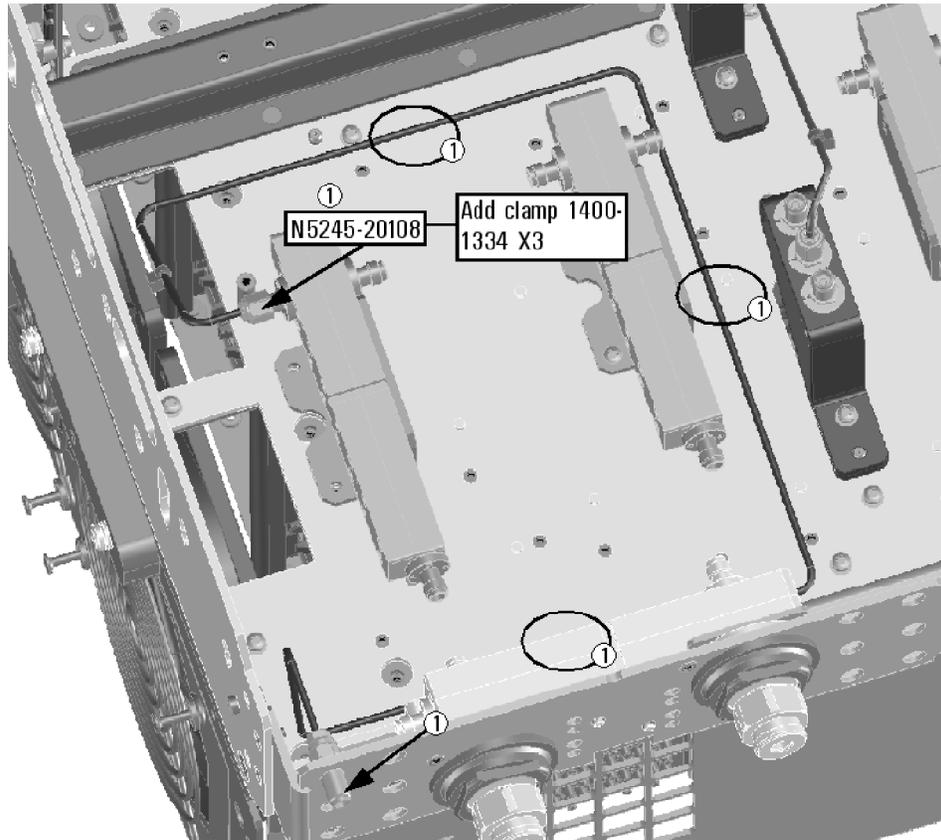
- W33 (N5245-20108) A32 port 2 receiver coupler to front-panel REF 2 SOURCE OUT – (4-port only)

* As shown in [Figure 33](#), install clamp (part number 1400-1334) to secure W33 (N5245-20108).

1. See “[Downloading the Online PNA Service Guide](#)” on page 8.

Figure 33

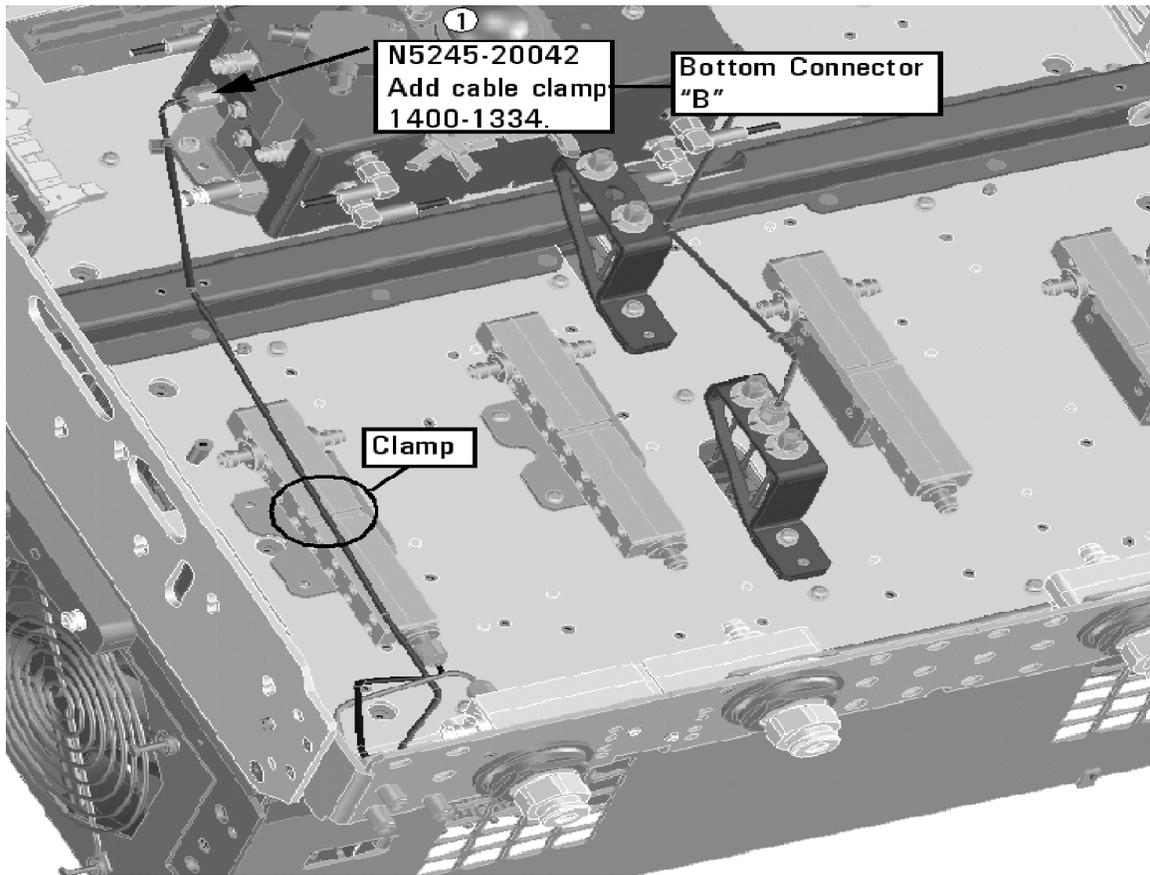
Location of Cable Clamps for W33 (N5245-20108)



– W40 (reuse) (N5245-20042) Port 2 RCVR B IN to A27 mixer brick (B)

* As shown in **Figure 34**, install clamp (part number 1400-1334) to secure W40 (N5245-20042).

Figure 34 Location of Cable Clamp for W40 (N5245-20042)¹



N5225_121_01

- W34 (N5245-20019) A36 port 2 coupler to front-panel Port 2 CPLR ARM

For W179, W181, and W185, refer to [Figure 37 on page 58](#).

- ①– W185 (N5245-20181) Port 4 CPLR THRU to A73 port 4 Bias combiner
- ②– W188 (N5245-20183) A36 Port 2 test coupler to A74 port 2 bias combiner
- ③– W186 (N5245-20185) A35 port 4 test port coupler to A73 port 4 Bias combiner

1. The A26 splitter (5067-4086) and N5245-20013, N5245-20022, N5245-20023, N545-20101, and N5245-20150 cables are only used with a legacy HMA26.5 p/n: 5087-7765. If you are unclear which HMA26.5 assembly your PNA has installed, refer to Chapter 7 Repairs and [Figure 1 on page 7](#) and for details on A26 splitter and cabling, refer to your option-model in Chapter 6 "2-Port Configurations, Serial Number Prefix <6021" and "4-Port Configuration, Serial Number Prefix <6021".

Description of the Upgrade
Installation Procedure for the Upgrade

- W45 (N5245-20191) REF 4 RCVR R4 IN to A28 mixer brick (R4)
- W30 (N5245-20018) A35 port 4 coupler to front-panel port 4 CPLR ARM
- W27 (N5245-20052) A31 port 4 rcvr coupler to front-panel Port 4 SOURCE OUT

For W187, refer to **Figure 38 on page 59**.

- ①– W198 (N5245-20192) A31 port 4 receiver coupler to port 4 REF 4 SOURCE OUT
- W18 (reuse) (N5245-20111) A32 port 2 receiver coupler to W17
- W38 (N5245-20037) Port 3 RCVR C IN to A28 mixer brick (C)
- W44 (N5245-20020) REF 3 RCVR R3 IN to A28 mixer brick (R3)
- W12 (reuse) (N5245-20109) A29 port 1 receiver coupler to W11

For W181, W182, and W183, refer to **Figure 39 on page 59**.

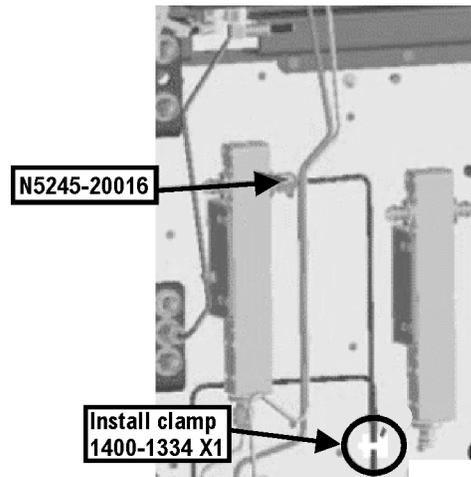
- W182 (N5245-20182) A33 port 1 test coupler to A71 port 1 Bias combiner
- W183 (N5245-20180) Port 3 CPLR THRU to A72 port 3 Bias combiner
- W181 (N5245-20178) Port 1 CPLR THRU to A71 port 1 Bias combiner

For W184, refer to **Figure 40 on page 60**.

- W184 (N5245-20184) A34 Port 3 test coupler to A72 port 3 bias combiner
- W23 (N5245-20051) A30 port 3 rcvr coupler to front-panel Port 3 SOURCE OUT
- W25 (N5245-20016) A30 port 3 rcvr coupler to front-panel REF 3 SOURCE OUT

* As shown in **Figure 35**, install clamp (part number 1400-1331) to secure W25 (N5245-20016).

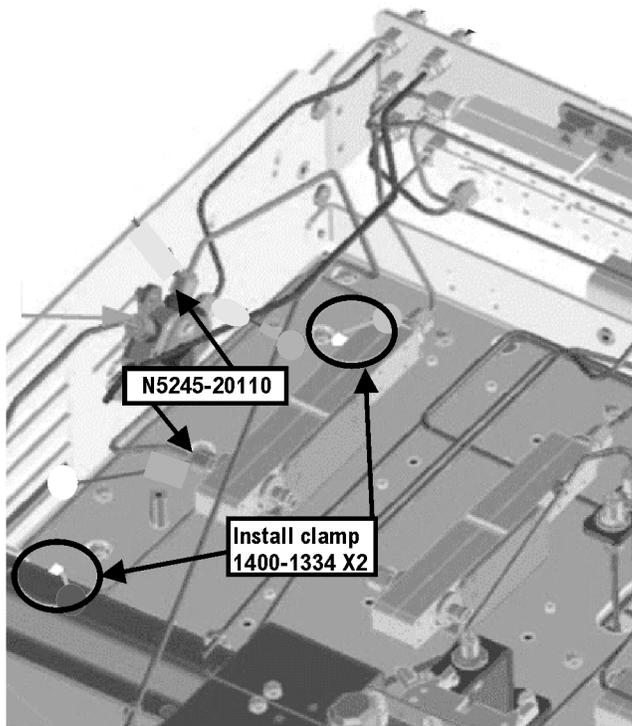
Figure 35 Location of Cable Clamp for W25 (N5245-20016)



N5245_013_01

- W22 (N5245-20014) A33 port 1 coupler to front-panel Port 1 CPLR ARM
 - W21 (N5245-20110) A29 port 1 receiver coupler to A37 reference mixer switch
- * If the screws that attach the reference mixer switch to the test set deck were loosened, torque these screws now to 9 in-lbs.
- * As shown in **Figure 36**, install two clamps (part number 1400-1334) to secure W21 (N5245-20110).

Figure 36 Location of Cable Clamps for W21 (N5245-20110)



- W14 (N5245-20043) A30 port 3 receiver coupler to W13
- W16 (N5245-20044) A31 port 4 receiver coupler to W15

Install New Cable(s) – A21 HMA26.5 to A23/A24 Mixer Brick

If your instrument has a new HMA26.5 (N5240-60101) installed:

(If you have a legacy HMA26.5 (5087-7765) installed, you can discard this cable.)

- W203 (N5245-20195) RF cable, A24 mixer brick (top connector) to A21 HMA25.6 A24 mixer brick (top connector)

NOTE

You will need to remove the cap that is installed on the HMA26.5 top connector, before connecting the other end of the W203 cable. You can discard the cap.

See also, [“Verify the Model/Version of HMA26.5 Installed” on page 7.](#)

If your instrument has a legacy HMA26.5 (5087-7765) installed:

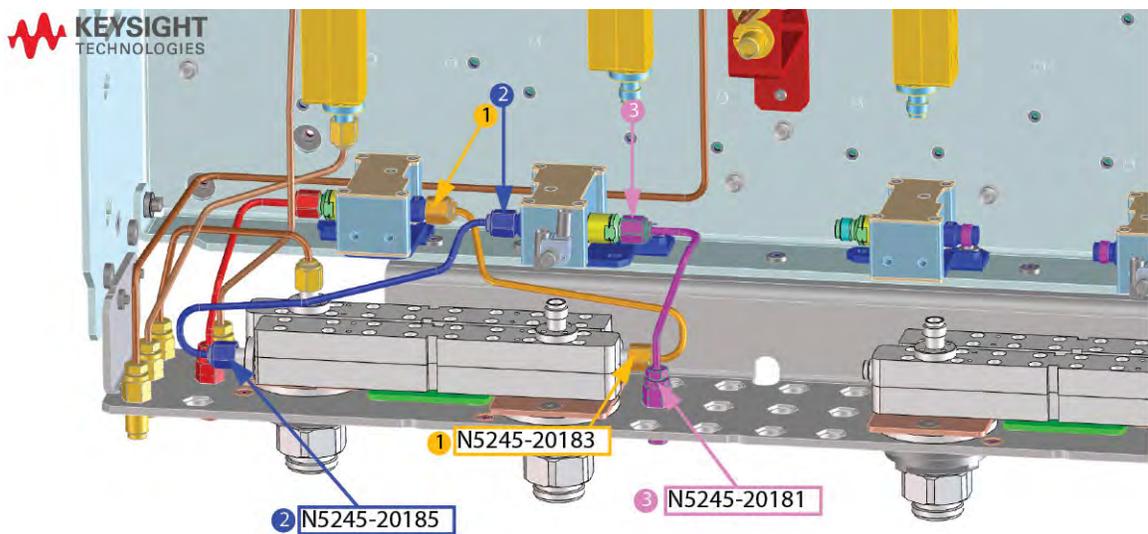
(If you have a new HMA26.5 (N5240-60101) installed, you can discard these cables.)

- W52 (N5452-20013) A21 HMA26.5 to A22 splitter
NOTE: Tighten both screws on the splitter to 9 in-lbs.
- W53 (N5245-20023) A22 splitter to A24 mixer brick
- W54 (N5245-20022) A22 splitter to A23 mixer brick

(If you have the legacy 5086-7765 HMA26.5, please discard N5245-20195¹ semi-rigid cable. Refer to [Figure 1 on page 7](#).)

See also, [“Verify the Model/Version of HMA26.5 Installed” on page 7](#).

Figure 37 Install Semirigid Cables to A73 and A74 Bias T Combiners (N5245-20181, N5245-20183, and N5245-20185)



PART SEQUENCE:



1. The N5245-20195 cable is used only with instruments that have a newer HMA26.5 installed. If your PNA has a legacy 5087-7765 HMA26.5 assembly installed, then this cable can be discarded. If you are unclear which HMA26.5 assembly your PNA has installed, refer to [Figure 1 on page 7](#).

Figure 38 Install Receiver Coupler to Front Panel Semirigid Cables (N5245-20192)

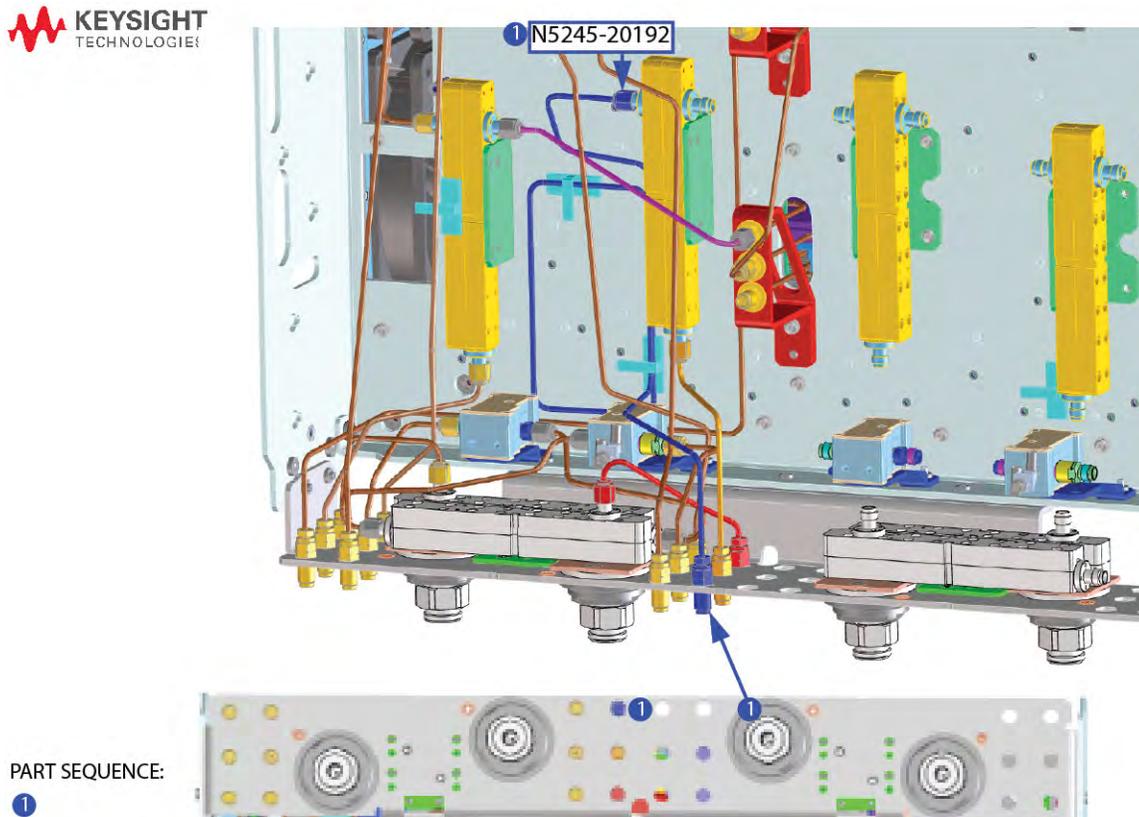


Figure 39 Install Semirigid Cables to A71 and A72 Bias T Combiners (N5245-20180 and N5245-20182)

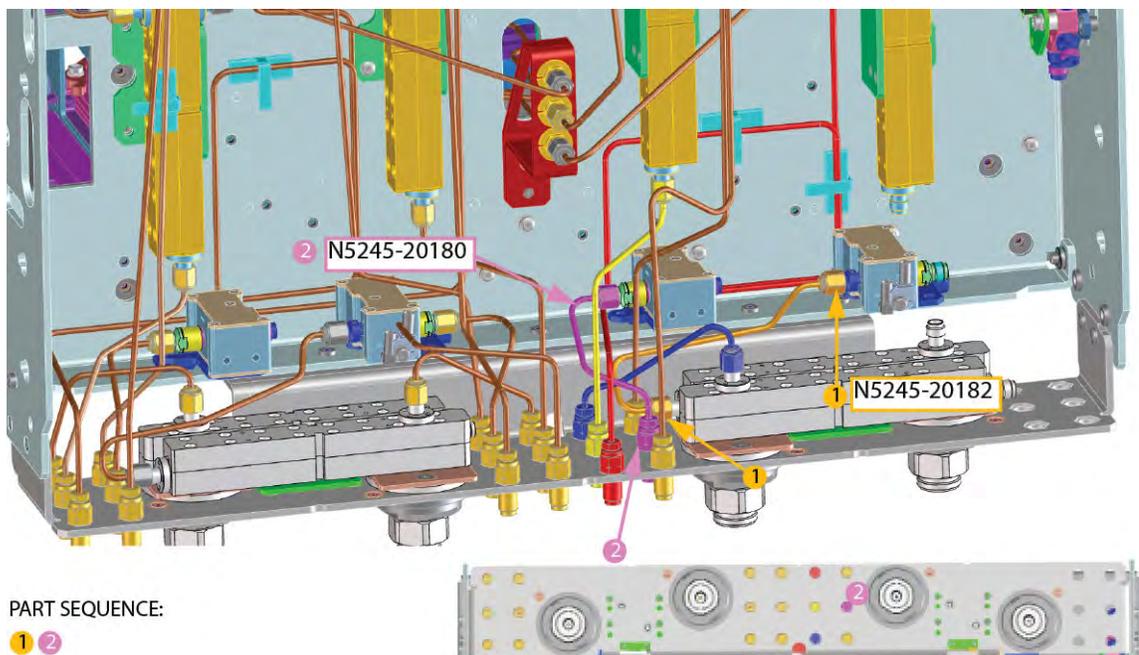
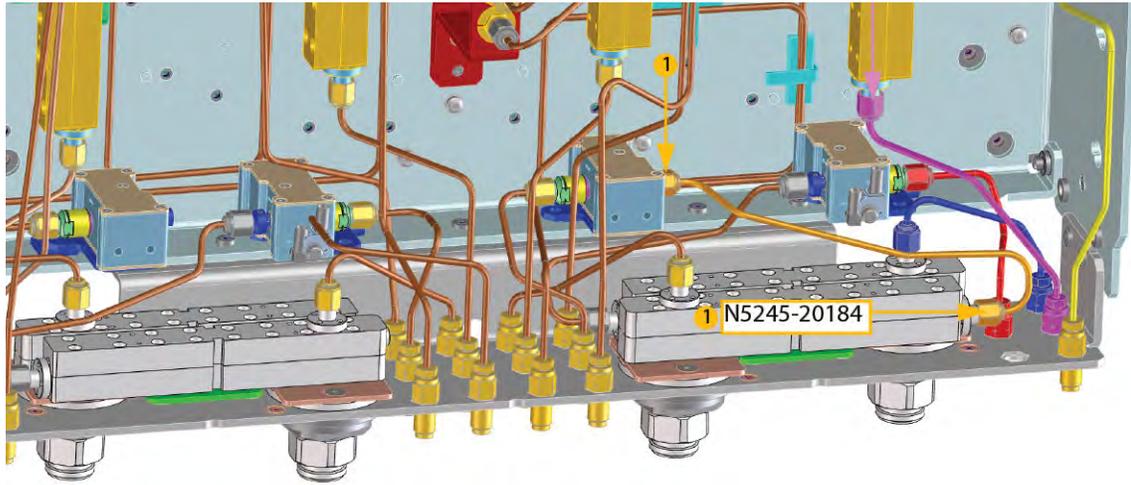


Figure 40 Install Semirigid Cable to A72 Bias T Combiner (N5245-20184)



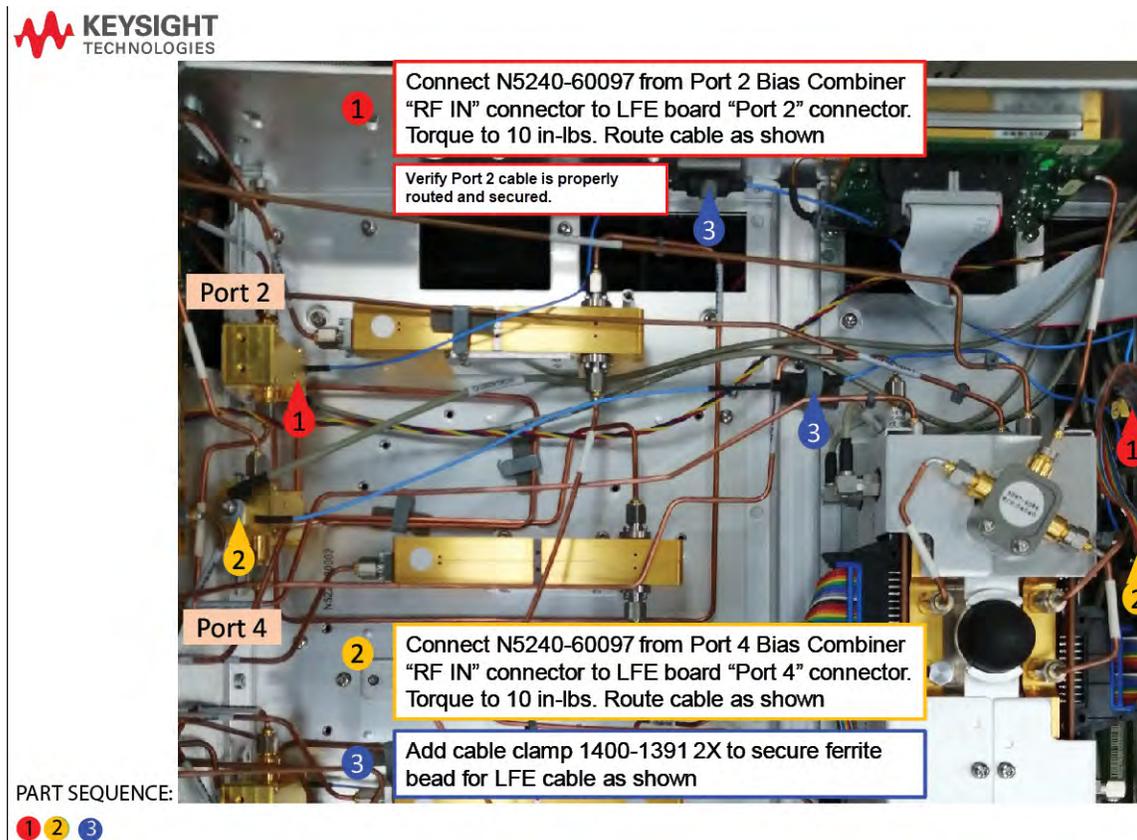
PART SEQUENCE:

1

Connect New Port 4 N5240-60097 (x1) and Verify Port 2 N5242-60097 Blue Bias-Tee Combiner Cables and Clamps from the A73 and A74 Bias Tees “RF-IN” to the A70 LFE Board “Port2” and “Port4” Connectors and Install Clamps onto the Ferrite Beads

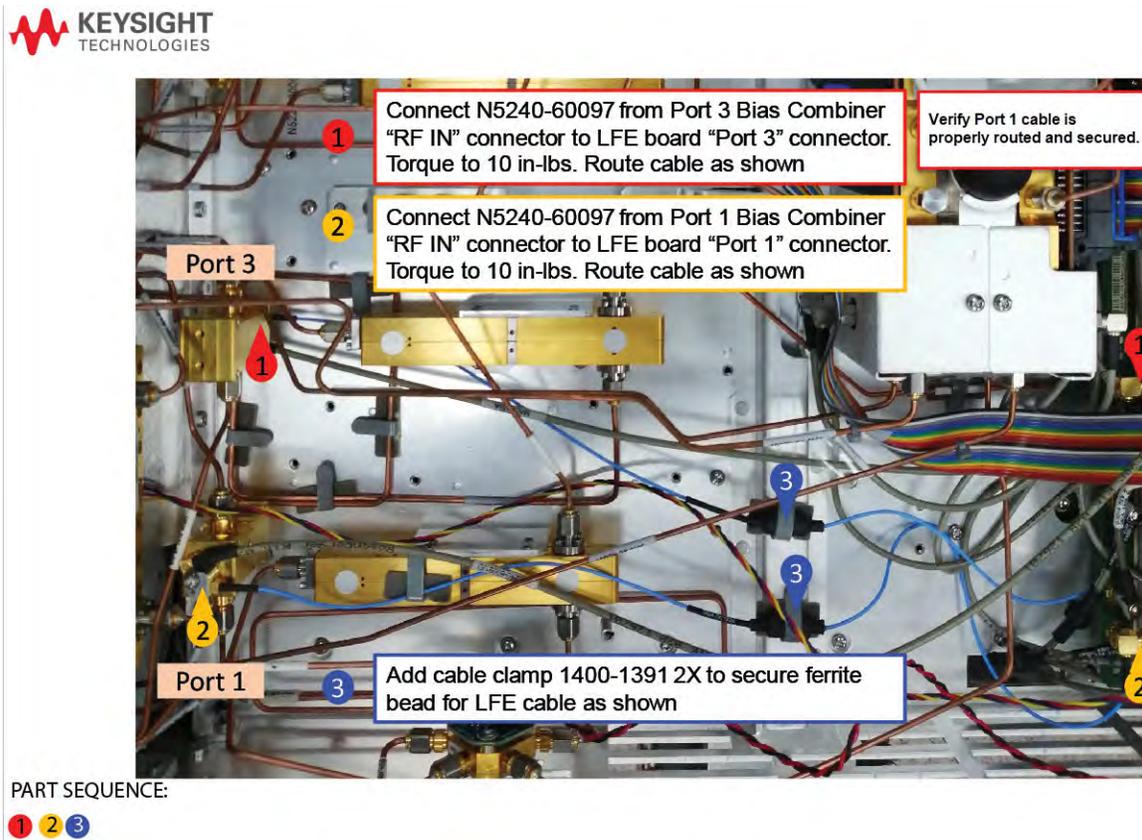
Figure 41

Install Port 4 Cable Clamps and Route RF Cables and Verify Port 2 RF Cable Clamps and Routing (N5240-60097, 1400-1391 (x1))



Connect New N5240-60097 (x2) Blue Bias-Tee Combiner Cables and Clamps from the A71 and A72 Bias Tees “RF-IN” to the A70 LFE Board “Port1” and “Port3” Connectors and Install Clamps onto the Ferrite Beads

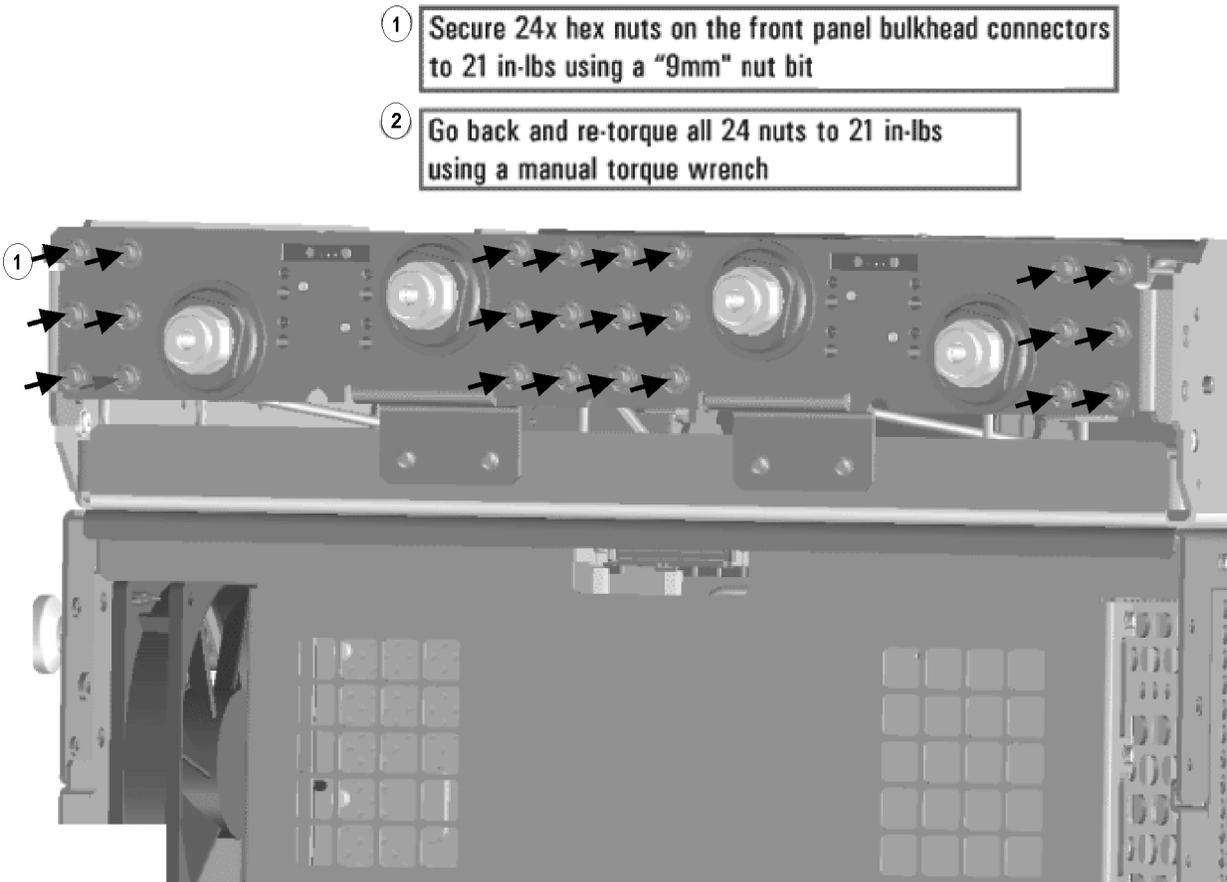
Figure 41-1 Install Port 3 Cable Clamps and Route RF Cables and Verify Port 1 RF Cable Clamps and Routing (N5240-60097, 1400-1391 (x1))



Step 37. Secure the Front Panel Bulkhead Connectors

Follow the instruction shown in **Figure 42** in this document.

Figure 42 Bulkhead Connections, Front Panel



Step 38. Reinstall the A23 Test Set Motherboard

For instructions on reinstalling the board, click the Chapter 7 bookmark "Removing and Replacing the A23 test set motherboard" in the PDF Service Guide¹.

1. See ["Downloading the Online PNA Service Guide" on page 8.](#)

Step 39. Install Cable on the A23 Test Set Motherboard

CAUTION

Follow instructions carefully when making cable connections, especially wire harness connections. Incorrect connections can destroy components, resulting in additional customer costs.

If not already done in a previous step, install the following new ribbon cable. To see an image showing the location, click the Chapter 6 bookmark “Bottom Ribbon Cables and Wire Harnesses, 4-Port, Option 405” in the PDF Service Guide¹. New parts are listed in **Table 2 on page 10**.

- Ribbon cable (N5247-60015) from A28 mixer brick (2) J52 to A23 test set motherboard J552

1. See **“Downloading the Online PNA Service Guide” on page 8**.

Step 40. Install/Reinstall the A71–74 Bias-Tee Combiner’s Gray Low Frequency Extension (LFE) DC bias Cables and Route Cables

This step contains the following:

- “[Step 16. Assemble the A34 and A35 Receiver Coupler Assemblies](#)” on [page 30](#)
- “[Route Cables](#)” on [page 66](#)

Install/Reinstall the A71–A74 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 43 on page 66](#). See also the Chapter 6 bookmarks “Bottom Ribbon Cables and Wire Harnesses, 2-port, Option 405” in the PDF Service Guide¹. New parts are listed in [Table 2 on page 10](#).

NOTE

IMPORTANT! The N5240–60091 (x4) bias combiner cables only connect to the DC bias of the Bias Tee Combiners.

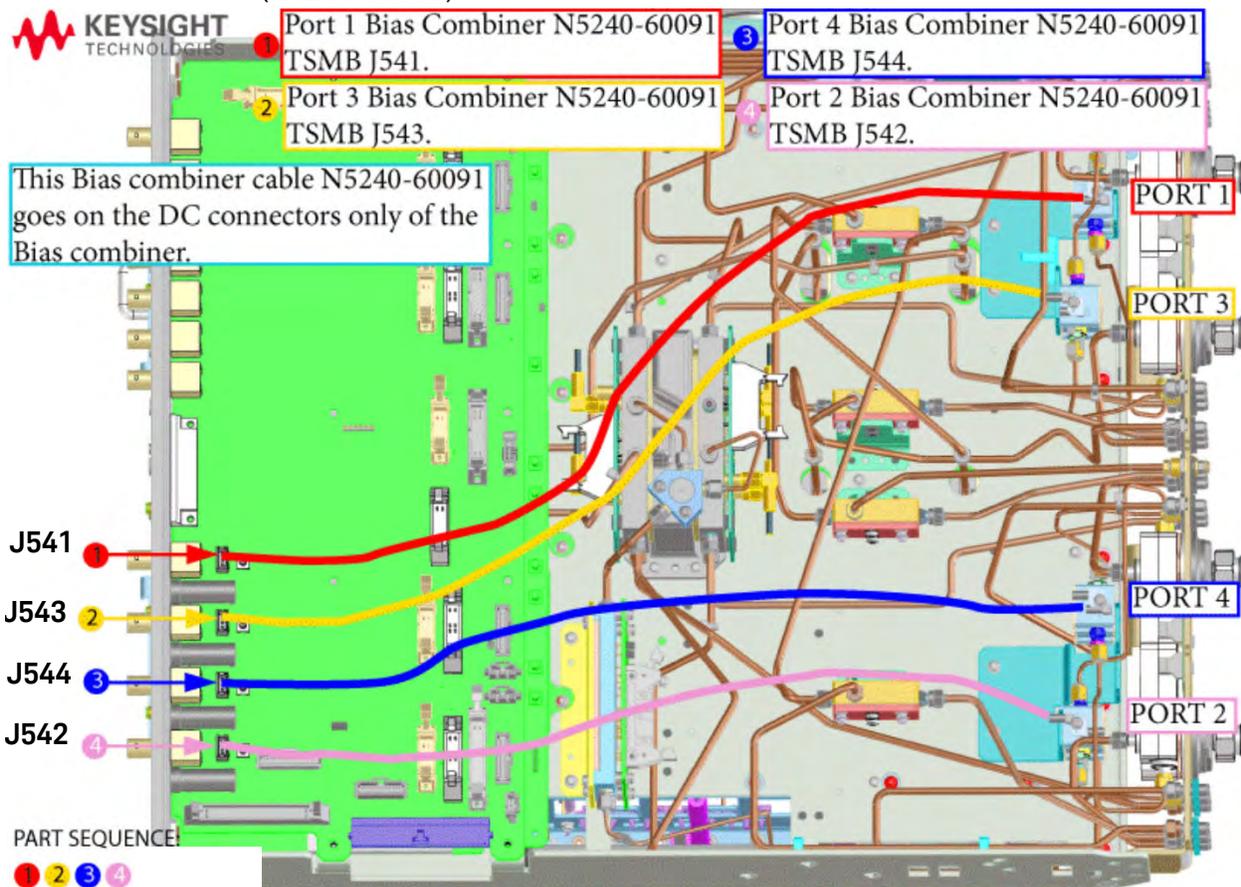
1. Connect/Reconnect A71–A74 gray DC cables to the test set motherboard (TSMB) as follows:

- ①–(Reuse)(N5240–60091) A19 test set motherboard J541 to A71 port 1 bias-T combiner
- ②–(N5240–60091) A19 test set motherboard J543 to A72 port 3 bias-T combiner
- ③–(N5240–60091) A19 test set motherboard J544 to A73 port 4 bias-T combiner
- ④–(Reuse)(N5240–60091) A19 test set motherboard J542 to A74 port 2 bias-T combiner

1. See “[Downloading the Online PNA Service Guide](#)” on [page 8](#).

Figure 43

Install/Reinstall 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.

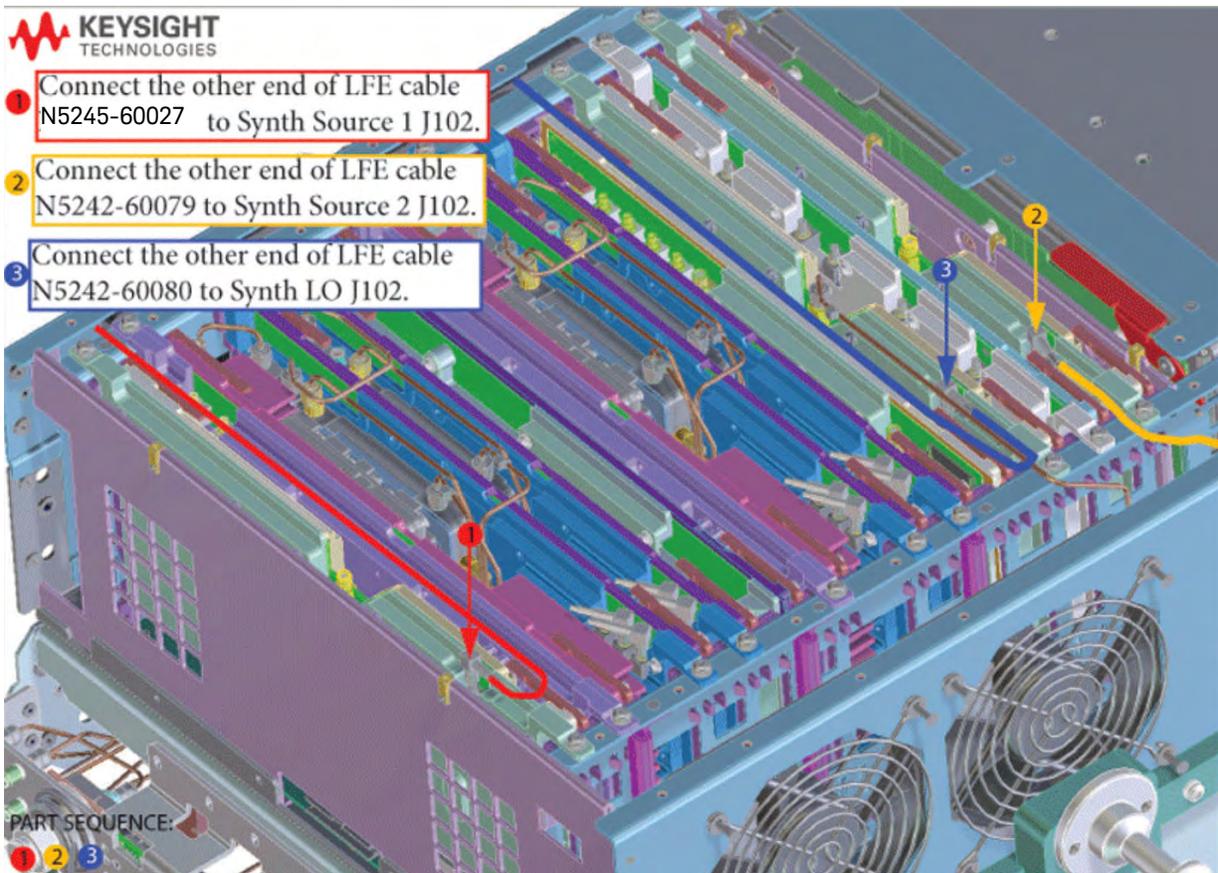
Refer to [Figure 43 on page 66](#).

Step 41. Install the Other End of the Bias-Tee Combiner Cables to the Source Synthesizer and LO Synthesizer Board Gray Cables

Refer to [Figure 44](#). New parts are listed in [Table 2 on page 10](#).

1. The analyzer should be positioned on its left side (fans facing upwards) as shown.
2. **Verify** the previously installed N5245-60027 (item ①) and N5242-60080 (item ③) cables are still securely connected.
3. Connect the new N5242-60079 (item ②) flexible cable as indicated in [Figure 44](#).

Figure 44 New test set cables. Connect/Verify the other end of the N5245-60027, N5242-60079, and N5245-60080 cables



Step 42. Replace the Front Panel's Lower Dress Panel

Before the front panel's lower dress panel can be replaced, the 2-port lower dress panel and the lower front panel label must be removed from the front panel assembly. Refer to [Figure 45 on page 68](#). New parts are listed in [Table 2 on page 10](#).

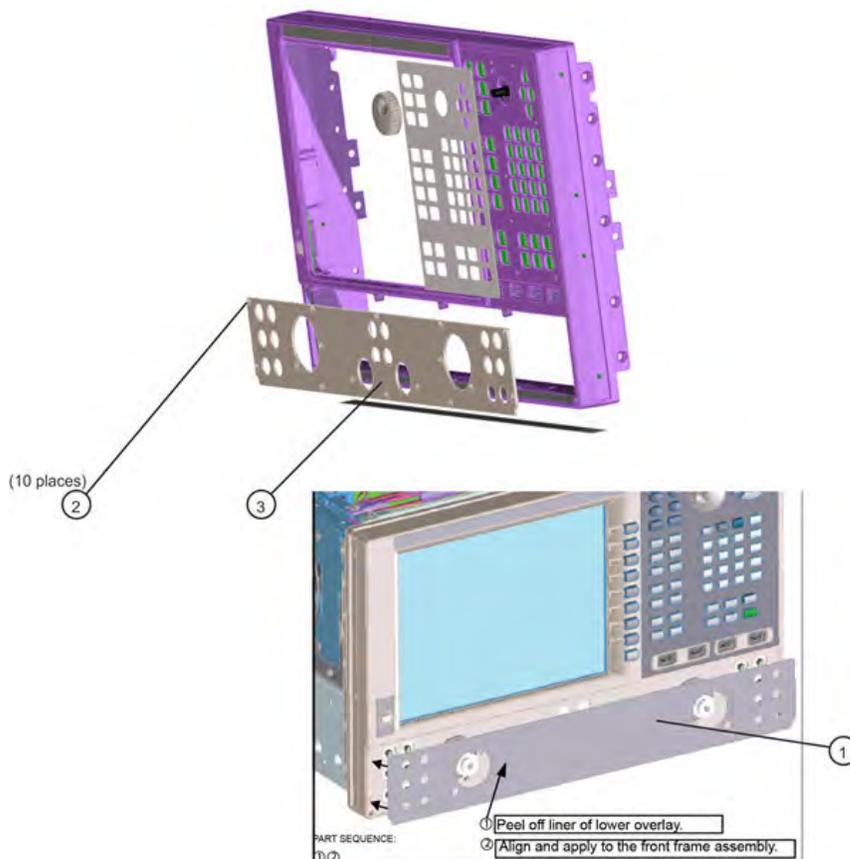
1. Remove the 2-Port lower front panel label (item ①).
2. Remove the 10 screws (save the screws for reuse) from the 2-port dress panel and remove the dress panel (item ② and ③ respectively).
3. Reassemble the front panel's lower dress panel assembly with the new 4-port dress panel (N5240-00009) by reversing the order of step 2 in the instructions previously followed.

NOTE

IMPORTANT! To avoid possible damage to the lower front panel overlay (label), do not attempt to attach the lower front panel label until ["Step 29. Install the Cable Bracket Mount" on page 44](#).

Figure 45

Replacing the Front Panel's Lower Dress Panel and label



Step 43. Reinstall Front Panel Assembly

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

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

Step 44. Install the New Lower Front Panel Overlay

To see an image of the front panel overlay (N5227-80020) click the Chapter 6 bookmark “Front Panel Assembly, Front Side, All Options” in the PDF Service Guide¹. New parts are listed in **Table 2 on page 10**.

1. **Remove the protective backing from the new front panel overlay (N5227-80020).**
2. **Loosely place the overlay in the recess on the lower 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.**

Step 45. Install the Front Panel Jumper Cables

Install twelve W36 front panel jumper cables (N5245-20155) - use 6 new jumpers and reuse 6 old jumpers. To see an image of the front panel jumper cables, click the Chapter 7 bookmark “Removing and Replacing the Front Panel Assembly” in the PDF Service Guide¹.

1. See **“Downloading the Online PNA Service Guide” on page 8**.

Step 46. DC Continuity Test the LFE Board and Test Ports

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

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

NOTE

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

- Verify the gray cables installed in [“Step 47. Position the Cables and Wires to Prevent Pinching”](#) on page 70 and [“Step 19. Install the New A72 and A73 Bias Tee Combiner Assemblies”](#) on page 35 are connected correctly and not open or shorted.

Step 47. Position the Cables and Wires to Prevent Pinching

On the top side of the PNA, carefully position the grey 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 48. Reinstall the Inner Cover

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

Step 49. Reinstall the Outer Cover

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

1. See [“Downloading the Online PNA Service Guide”](#) on page 8.

Step 50. Remove Option 205 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 205 License Removal Procedure

1. To start the Keysight License Manager, press **Start > Keysight License Manager > Keysight License Manager**. A Keysight License Manager 6 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 51. Enable Options 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.
- 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 a result of “**Step 1. Obtain a Keyword and Verify the Information**” on page 16.

2. Copy the license file(s) from the email(s) to the **root directory** of the USB flash drive.
More than one license file may be copied to the USB flash drive.

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 52. Verify the PNA Analyzer Program is Running with the Correct Options

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 4.

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.
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 53. Perform Post-Upgrade Adjustments and Calibration

Adjustments

NOTE

IMPORTANT!

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

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

- 10 MHz frequency reference adjustment
- EE default adjustment: Src 2 Synth Only
- synthesizer bandwidth adjustment (only run if the EE default adjustment is insufficient)
- source adjustment
- IF gain adjustment
- receiver characterization
- receiver adjustment
- IF response adjustment (Option S93090xA/B, S93093A/B, or S93094A/B Only)

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

To view this service guide information, click the Chapter 3 bookmark “Tests and Adjustments” in the PDF Service Guide¹.

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

EEPROM Backup

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

1. See [“Downloading the Online PNA Service Guide” on page 8](#).

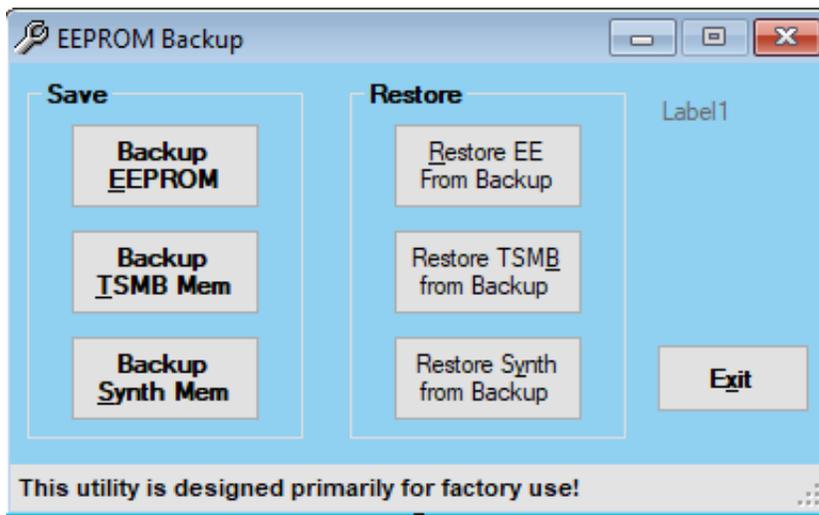
Description of the Upgrade
Installation Procedure for the Upgrade

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

To store the backup data, perform these steps:

- Navigate to the EEPROM Backup Utility, located at:
 - Windows 7 -- C:\Program Files (x86)\Keysight\Network Analyzer\Service\eebackup.exe
 - Windows 10 -- C:\Program Files\Keysight\Network Analyzer\Service\eebackup.exe
- Run the program.
- Click Backup EEPROM.
- Click Backup TSMB Mem.
- Click Backup Synth Mem. (Applies to Version 7 Synthesizers Only)
- Click Exit when the program has finished.

Figure 46 EEPROM Backup Menu



Operator's Check

Perform the Operator's Check to check the basic functionality of the analyzer. For instructions, click the Chapter 3 bookmark "Tests and Adjustments" in the PDF Service Guide¹.

If you experience difficulty with the basic functioning of the analyzer, contact Keysight. Refer to **"Contacting Keysight" on page 4.**

Calibration

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

Step 54. Prepare the PNA for the User

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

Description of the Upgrade
Installation Procedure for the 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 3. 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 4.**

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 17.** After this section is completed, your synthesizer board will be a version H synthesizer board. Refer to **Figure 2 on page 81.**

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

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

a. The factory will provide these items upon request.

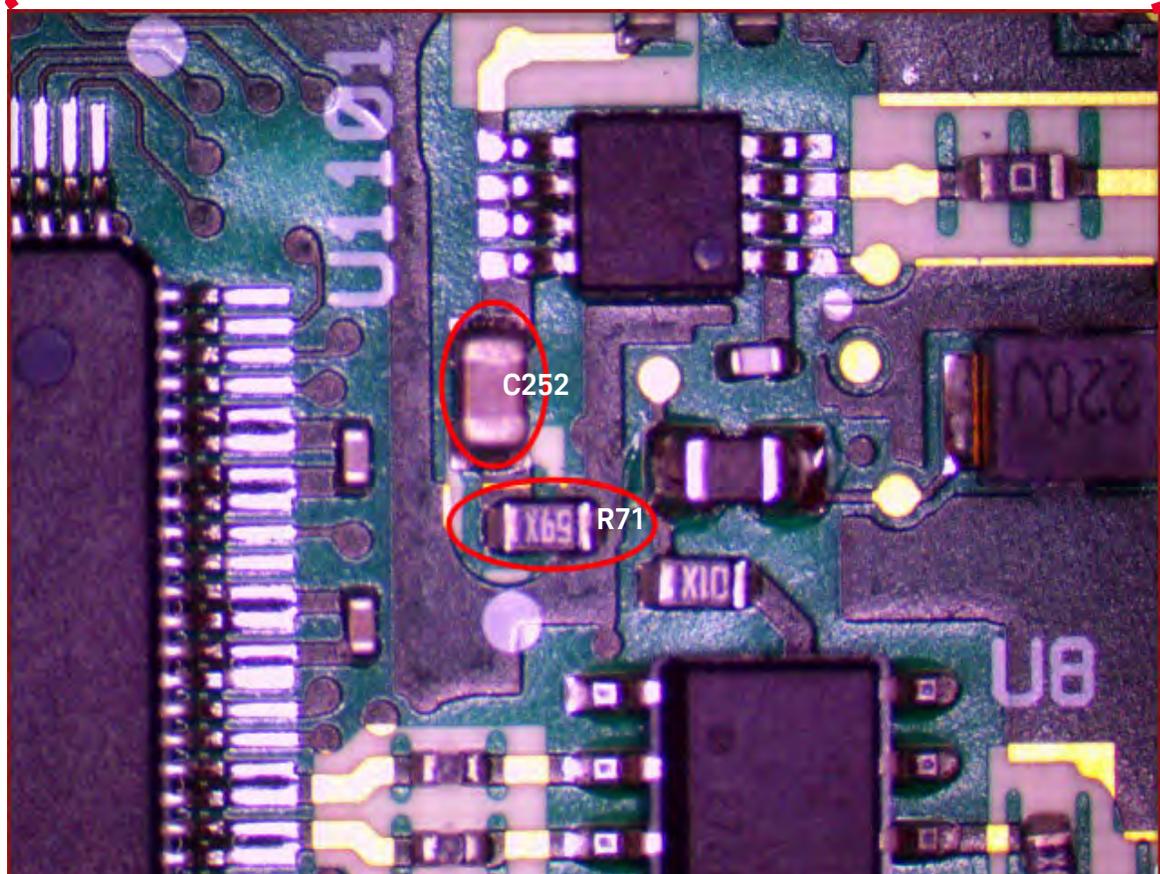
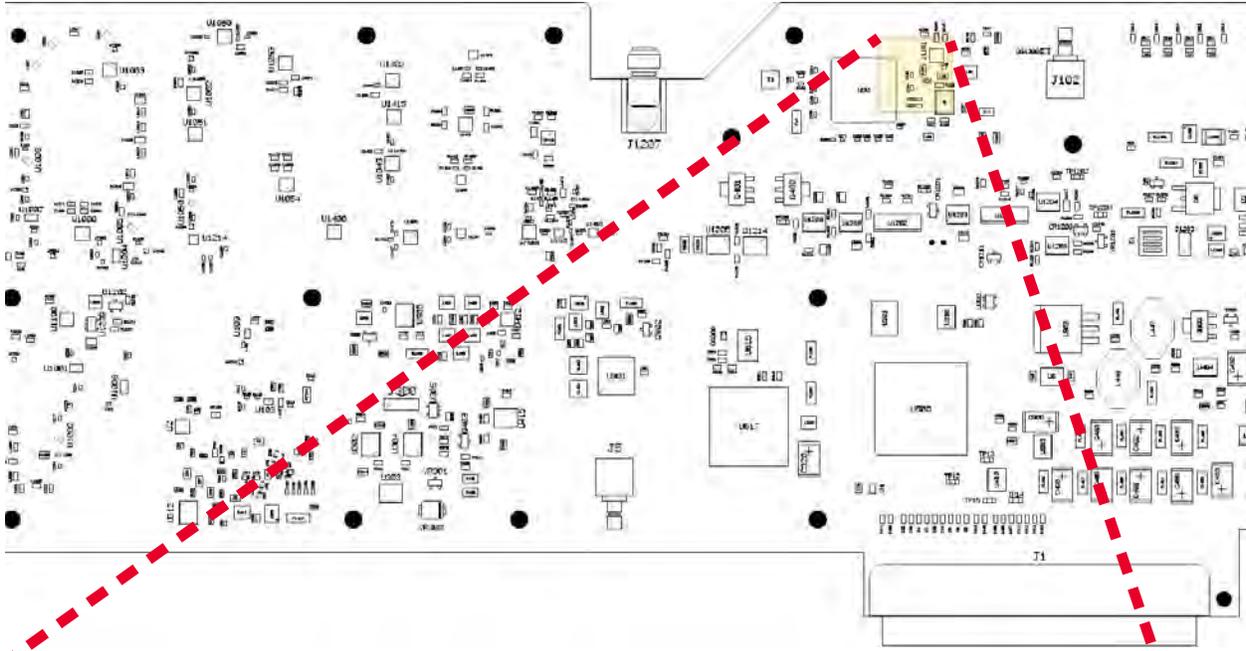
Procedure

1. If you have already removed your synthesizer board, proceed to step 2.
Else, to remove your synthesizer board, refer to the Service Guide for your instrument that can be downloaded from www.keysight.com.
2. Remove resistor R71. Refer to **Figure 1 on page 79**.
3. Clean pads.
4. Replace with resistor 1 k Ω (0699-3947). Refer to **Figure 1 on page 79**.
5. Remove capacitor C252.
6. Clean pads.

7. Replace with capacitor 22 μ F (0161-4279). Refer to [Figure 1 on page 79](#).

Figure 1

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



8. Re-assemble shield, screws, and torque:
 - M3 screws (0515-0372) to 9 in-lbs
 - M4 screws (0515-0669) to 21 in-lbs
9. Repeat steps 1 through 8 for all of the non-version H synthesizer boards.
10. Reinstall all upgraded version H synthesizer boards.
11. Power up the PNA and if necessary, start the PNA application.
12. Changing the EEPROM header data for your updated synthesizer board:
 - a. Press **Utility > System > Service > Utilities > View EEPROM Headers**.
 - b. In the **EEPROM Header Info** window that opens press **Edit**. Refer to **Figure 2 on page 81**.
 - 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 82**.
 - e. Press **Enter**. Refer to **Figure 3 on page 82**.
 - f. Press **Save Changes**. Refer to **Figure 3 on page 82**.
 - 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

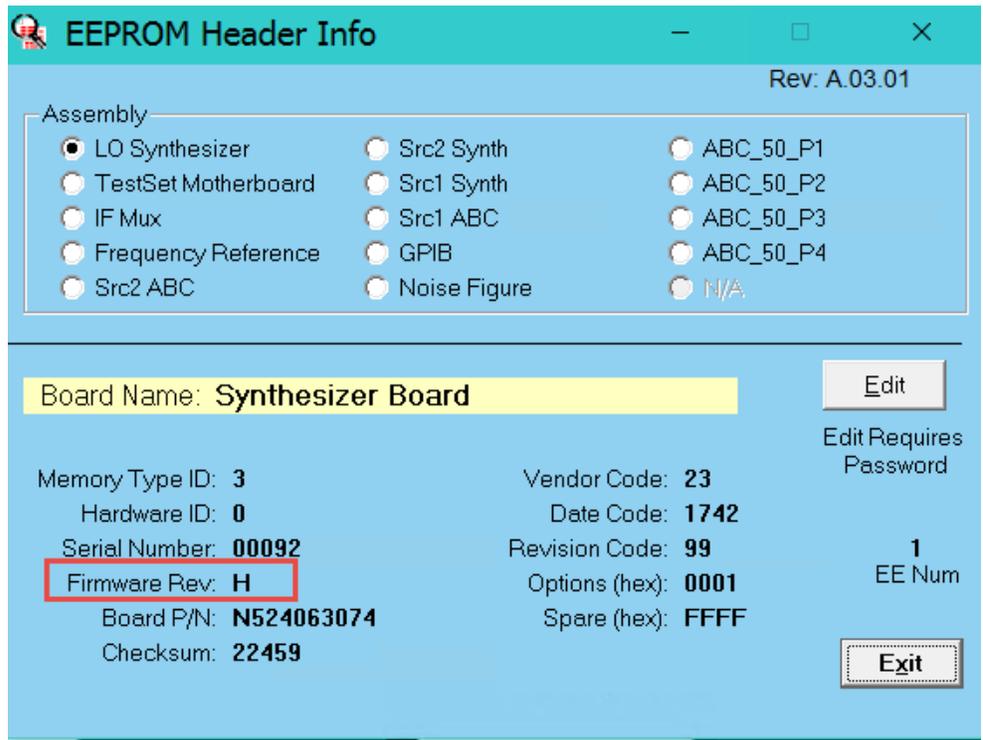


Figure 3 EEPROM Editor Window

Assembly

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

EE Header Information

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

EE Data Information
Descriptions may not be accurate!

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

Buttons: Save Changes, Enter, Exit



This information is subject to change without notice.

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