
Keysight Add 4-Port Capability Upgrade Kit For Version 6, Single-Source Synthesizers

To Upgrade PNA N5227B
Option 219 to Option 419

Upgrade Kit Order
Number: N5227BU-619

Kit Number: N5227-60114

This is Installation Note is for upgrading the N5227B Microwave Network Analyzers from Option 219 to Option 419.

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Keysight Add 4-Port Capability Upgrade Kit
Upgrade Kit Number: N5227-60114
Installation Note

Description of the Upgrade

This upgrade converts your N5227B/N5247B Option 219 2-port analyzer to an N5227B/N5247B Option 419 4-port analyzer by adding:

- an additional 26.5 GHz source board
- an additional 13.5 GHz source synthesizer board
- two additional 40 GHz doublers
- two additional 70 GHz doubler
- an additional mixer brick
- two additional receiver couplers and brackets
- two additional test port couplers
- two additional bias tees
- two additional source attenuators and brackets
- two additional receiver attenuators and brackets
- an additional cable guard for front panel jumpers
- a splitter
- a 3 dB pad
- a modified front panel
- many additional new cables

Refer to **“Overview of the Installation Procedure”** on page 16.

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.

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

- A license key - refer to **“License Key Redemption”** below.
- A PDF copy or a paper copy of the PNA Service Guide - refer to **“Downloading the Online PNA Service Guide”** below.
- An ESD-safe work area - refer to **“Protecting Your Workspace from Electrostatic Discharge”** below.
- Correct tools - refer to **“Tools Required for the Installation”** on page 10.
- Enough time - refer to **“About Installing the Upgrade”** on page 10.
- Test equipment for the post-upgrade adjustments and full instrument calibration. To view the equipment list, click the Chapter 3 bookmark “Tests and Adjustments” in the PDF Service 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, you must request a license key from: <http://www.keysight.com/find/softwarelicense>. To complete the request, you will need to gather the following information:

- From the certificate
 - Order number
 - Certificate number

1. See **“Downloading the Online PNA Service Guide”** on page 9.

Getting Prepared

- From your instrument
 - Model number
 - Serial number
 - Host ID

Part of the OEC procedure to obtain the 12-digit license key online requires you to provide the HostID number of the PNA. This HostID number is NOT the one currently shown on the PNA. To determine your new HostID, Keysight personnel should use the new model number with the utility at go to <http://mktwww.srs.is.keysight.com/field/service/network/pna/upgrades.html>. Non-Keysight personnel should contact Keysight at <http://www.keysight.com/key/contactus>.

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 7**.

Verify the License Contents

Refer to the license message you received from Keysight:

If the model number, serial number, or option number do not match those on the license message you received from Keysight, you will not be able to install the license key file. If this is the case you received from Keysight, you will not be able to install the license key file. If this is the case, contact Keysight for assistance. Refer to **“Getting Assistance from Keysight” on page 6**.

Downloading the Online PNA Service Guide

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

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

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

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

Protecting Your Workspace from Electrostatic Discharge

For information, click on the Chapter 1 bookmark, "Electrostatic Discharge Protection" in the PDF Service 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-8 TORX driver - set to 6 in-lbs (0.68 N.m)	1	N/A
T-10 TORX driver - set to 9 in-lbs (1.02 N.m)	1	N/A
T-20 TORX driver - set to 21 in-lbs (2.38 N.m)	1	N/A
5/16-in (8 mm) nutsetter or open end torque wrench- set to 10 in-lbs (1.13 N.m)	1	N/A
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-in (25.4 mm) torque wrench - set to 72 in-lbs (8.15 N.m)	1	N/A

CAUTION

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

About Installing the Upgrade

Products affected	N5227B/N5247B Option 219
Installation to be performed by	Keysight service center or personnel qualified by Keysight
Estimated installation time	5 hours
Estimated adjustment time	0.5 hours
Estimated full instrument calibration time	4.5 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 6**.

Table 1 Contents of Upgrade Kit N5227-60114

Ref Desig.	Description	Qty	Part Number
-	Installation note (this document)	1	N5227-90114
-	Software Entitlement Certificate	1	9030-0000
A10	26.5 GHz source (2) board	1	5087-7780
A12	40 GHz doubler assembly port 3	2	5087-7346
A13	40 GHz doubler assembly port 4		
A17	13.5 GHz (source 2) synthesizer board	1	N5240-60074
A26	Splitter	1	5067-4086
A28	Mixer brick (2)	1	5087-7337
A30	Test port 3 receiver coupler	2	5087-7744
A31	Test port 4 receiver coupler		
A34	Test port 3 coupler	2	5087-7778
A35	Test port 4 coupler		
A39	Test port 3 source attenuator	2	84905-60004
A40	Test port 4 source attenuator		
A43	Test port 3 bias tee	2	5087-7732
A44	Test port 4 bias tee		
A47	Test port 3 receiver attenuator	2	84905-60004
A48	Test port 4 receiver attenuator		
A61	Test port 3 70 GHz doubler assembly	2	5087-7336
A62	Test port 4 70 GHz doubler assembly		
A69	3-dB attenuator, attached to R4 connector on A28 mixer brick	1	08490-60037
-	Bulkhead connector, 1.85 mm, 50-ohm for test set front plate	12	1250-4747 ^a
-	Washer for bulkhead connectors, front panel	12	1250-3310
-	Nut for bulkhead connectors, front panel	12	1250-3516

Items Included in the Upgrade Kit

Table 1 **Contents of Upgrade Kit N5227-60114**

Ref Desig.	Description	Qty	Part Number
-	Machine screw, M3.0 x 8, pan head (8 to attach port 3 and port 4 attenuator assemblies to deck; 8 to attach 2 src attn and 2 rcvr attn to brackets; 6 to attach receiver coupler assemblies to attenuator assembly brackets; 4 to attach brace N5247-20134 to attenuator pair brackets; 4 to attach brace N5247-20133 to attenuator pair brackets)	30	0515-0372
-	Machine screw, M3 x 10, pan head (2 to attach cable bracket mount to test set deck)	2	0515-0374
-	Machine screw, M3 x 16, pan head (6 to attach 2 70 GHz doublers to mounts)	6	0515-0375
-	Machine screw, M4.0 x 10, pan head (2 to attach brace N5247-20134 to 70 GHz doubler mounts; 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.)	8	0515-0380
-	Machine screw, M2.0 x 6, pan head (8 to attach 2 receiver couplers to brackets)	8	0515-0658
-	Machine screw, M3.0 x 18, pan head (1 to attach bracket to A10 26.5 GHz source)	1	0515-0666
-	Machine screw, M3.0 x 25, pan head	2	0515-0667
-	Machine screw, M3.0 x 35, pan head (3 to attach A28 mixer brick to block)	3	0515-1038
-	Machine screw, M3.0 x 6, flat head (4 to attach 2 bias tees to blocks)	4	0515-1227
-	Machine screw, M3.0 x 6, 90-DEG-flat head (to attach front panel near ports 3 and 4)	2	0515-1946
-	Machine screw, M2.5 x 16, pan head (2 to attach splitter to mixer brick)	2	0515-2007
-	Machine screw, M3.0 x 20, flat head (2 to attach bracket to A10 26.5 GHz source)	2	0515-2078
-	Front panel overlay (label), 4-port – N5227B Option 419	1	N5227-80027
-	Front panel overlay (label), 4-port – N5247B Option 419	1	N5247-80021
-	Test set front plate, 4-port	1	N5247-00009
-	Protective cap, black plastic	4	1401-0214
-	Pad (between each receiver coupler and the bracket for the attenuator pairs)	2	0403-0179
-	Gap pad (between each test coupler and the test set front plate)	4	E4403-20033
-	Vibration mount (between couplers 1 & 3, and 2 & 4)	2	0460-2725
-	Mounting nuts (for port 3 & 4 test port couplers)	2	5022-1087
-	50 ohm load, attached to A13 40 GHz doubler	1	1250-4261
-	Dress Panel, lower 4-port	1	N5240-00009
-	Cable guard, center jumper cables	1	N5242-00049

Table 1 Contents of Upgrade Kit N5227-60114

Ref Desig.	Description	Qty	Part Number
-	Cable clamp, 1 to secure W145 (N5247-20066); 1 to secure W41 (N5247-20069); 1 to secure W37 (N5247-20070); 3 to secure W45 (N5247-20058); 1 to secure W52 (N5247-20012).	5	1400-1334
-	Cable tie wrap, 1 to secure W93 and W94 cable ends together; 1 to secure W95 and W96 cable ends together; 1 to secure W55 (N5247-20067); 1 to secure W37 (N5247-20070); 1 to secure W54 (N5247-20062); 2 to secure W144 (N5247-20071).	5	1400-0249
-	Bracket, rear, bottom side - for semi rigid cables	1	N5247-00006
-	Bracket for receiver coupler, port 3	1	N5247-00012
-	Bracket for receiver coupler, port 4	1	N5247-00011
-	Bracket for receiver attenuator and source attenuator pairs	2	N5247-00005
-	Bracket for A10 26.5 GHz source (2) board	1	N5247-20136
-	Brace, bottom side of PNA	1	N5247-20133
-	Brace, bottom side of PNA	2	N5247-20134
W2	RF cable, A10 source (2) P1 to A17 13.5 GHz source (2) synthesizer J1207	1	N5245-20100
W7	RF cable, A10 source (2) P5 to A12 port 3 40 GHz doubler P1	1	N5245-20034
W8	RF cable, A10 source (2) P3 to A13 port 4 40 GHz doubler P1	1	N5247-20125
W9	RF cable, A10 source (2) P4 to A12 port 3 40 GHz doubler P4	1	N5245-20032
W10	RF cable, A12 port 3 40 GHz doubler P3 to A13 port 4 40 GHz doubler P4	1	N5245-20033
W15	RF cable, A12 port 3 40 GHz doubler P6 to W16	1	N5247-20114
W16	RF cable, A61 port 3 70 GHz doubler to W15	1	N5247-20060
W17	RF cable, A12 port 3 40 GHz doubler P2 to W18	1	N5247-20086
W18	RF cable, A61 port 3 70 GHz doubler to W17	1	N5247-20084
W19	RF cable, A13 port 4 40 GHz doubler P6 to W20	1	N5247-20114
W20	RF cable, A62 port 4 70 GHz doubler to W19	1	N5247-20015
W21	RF cable, A13 port 4 40 GHz doubler P2 to W22	1	N5247-20086
W22	RF cable, A62 port 4 70 GHz doubler to W21	1	N5247-20068
W28	RF cable, A61 port 3 70 GHz doubler to A30 port 3 receiver coupler	1	N5247-20043
W29	RF cable, A62 port 4 70 GHz doubler to A31 port 4 receiver coupler	1	N5247-20044
W34	RF cable, A33 port 1 coupler to front-panel Port 1 CPLR ARM	1	N5247-20082
W37	RF cable, A30 port 3 ref coupler to front-panel REF 3 SOURCE OUT	1	N5247-20070

Items Included in the Upgrade Kit

Table 1 Contents of Upgrade Kit N5227-60114

Ref Desig.	Description	Qty	Part Number
W38	RF cable, A34 port 3 coupler to front-panel Port 3 CPLR ARM	1	N5247-20007
W41	RF cable, A31 port 4 ref coupler to front-panel REF 4 SOURCE OUT	1	N5247-20069
W42	RF cable, A35 port 4 coupler to front-panel Port 4 CPLR ARM	1	N5247-20026
W46	RF cable, A36 port 2 coupler to front-panel port 2 CPLR ARM	1	N5247-20019
W54	RF cable, REF 3 RCVR R3 IN to A28 mixer brick (R3)	1	N5247-20062
W55	RF cable, REF 4 RCVR R4 IN to A28 mixer brick (R4)	1	N5247-20067
W58	RF cable, 2.4 mm cap for A28 mixer brick	1	N5247-20138
W60	RF cable, front panel jumper	6	N5247-20107
W62	RF cable, A25 HMA26.5 to A26 splitter	1	N5247-20111
W63	RF cable, A26 splitter to A27 mixer brick	1	N5245-20023
W64	RF cable, A26 splitter to A28 mixer brick	1	N5245-20022
W67	RF cable, A12 port 3 40 GHz doubler P5 to W68	1	N5247-20096
W68	RF cable, rear-panel port RF2 OUT (J12) to W67	1	N5247-20088
W72	RF cable, A27 mixer brick (R1) to A24 IF multiplexer (P411)	1	N5242-60021
W73	RF cable, A27 mixer brick (R2) to A24 IF multiplexer (P412)	1	N5242-60022
W75	RF cable, A28 mixer brick (D) to A24 IF multiplexer (P801)	1	N5242-60024
W76	RF cable, A28 mixer brick (R4) to A24 IF multiplexer (P414)	1	N5242-60019
W77	RF cable, A28 mixer brick (R3) to A24 IF multiplexer (P413)	1	N5242-60020
W78	RF cable, A28 mixer brick (C) to A24 IF multiplexer (P601)	1	N5242-60023
W80	RF cable, A24 IF multiplexer board P203 to A16 SPAM board J2	1	N5242-60013
W82	RF cable, A24 IF multiplexer board P603 to A16 SPAM board J5	1	N5242-60015
W87	RF cable, A14 frequency ref (J7) to A17 13.5 GHz (source 2) synth (J5)	1	N5242-60030
W93	RF cable, A61 port 3 70 GHz dblr J2 to A12 40 GHz dblr J401	1	N5247-60010
W94	RF cable, A61 port 3 70 GHz dblr J4 to A12 40 GHz dblr J500	1	N5247-60011
W95	RF cable, A62 port 4 70 GHz doubler (J2) to A13 40 GHz doubler (J401)	1	N5247-60012
W96	RF cable, A62 port 4 70 GHz dblr J4 to A13 40 GHz dblr J500	1	N5247-60013
W103	RF cable, front-panel Port 1 CPLR THRU to A42 port 1 bias tee	1	N5247-20010
W104	RF cable, A33 port 1 coupler to A42 port 1 bias tee	1	N5247-20022
W105	RF cable, A30 port 3 receiver coupler to A39 port 3 source attenuator	1	N5247-20083

Items Included in the Upgrade Kit

Table 1 **Contents of Upgrade Kit N5227-60114**

Ref Desig.	Description	Qty	Part Number
W106	RF cable, A39 port 3 source attenuator to front-panel Port 3 SOURCE OUT	1	N5247-20009
W107	RF cable, A43 port 3 bias tee to port 3 CPLR THRU	1	N5247-20081
W108	RF cable, A43 port 3 bias tee to A34 port 3 coupler	1	N5247-20028
W109	RF cable, A31 port 4 receiver coupler to A40 port 4 source attenuator	1	N5247-20083
W110	RF cable, A40 port 4 source attenuator to front-panel Port 4 SOURCE OUT	1	N5247-20025
W111	RF cable, port 4 CPLR THRU to A44 port 4 bias tee	1	N5247-20021
W112	RF cable, A44 port 4 bias tee to A35 port 4 coupler	1	N5247-20029
W116	RF cable, A45 port 2 bias tee to A36 port 2 coupler	1	N5247-20080
W119	RF cable, port 3 RCVR C IN to A47 port 3 receiver attenuator	1	N5247-20008
W120	RF cable, A47 port 3 receiver attenuator to A28 mixer brick (C)	1	N5247-20064
W121	RF cable, Port 4 RCVR D IN to A48 port 4 receiver attenuator	1	N5247-20024
W122	RF cable, A48 port 4 receiver attenuator to A28 mixer brick (D)	1	N5247-20065
W144	RF cable, A29 port 1 receiver coupler to A37 reference mixer switch	1	N5247-20071
W145	RF cable, REF 2 RCVR R2 IN to A27 mixer brick (R2)	1	N5247-20066
-	Ribbon cable, A23 test set motherboard J547 to A39 port 3 source attenuator	2	N5245-60006
-	Ribbon cable, A23 test set motherboard J548 to A40 port 4 source attenuator		
-	Ribbon cable, A23 test set motherboard J5 to A61 port 3 70 GHz doubler J1	2	N5247-60018
-	Ribbon cable, A23 test set motherboard J3 to A62 port 4 70 GHz doubler J1		
-	Ribbon cable, A23 test set motherboard J206 to A47 port 3 receiver attenuator	2	N5247-60020
-	Ribbon cable, A23 test set motherboard J207 to A48 port 4 receiver attenuator		
-	Ribbon cable, A23 test set motherboard J552 to A28 mixer brick (2) J52	1	N5247-60015
-	Wire harness, A43 port 3 bias tee to A23 test set motherboard J543	2	N5247-60021
-	Wire harness, A44 port 4 bias tee to A23 test set motherboard J544		

a. This upgrade kit may contain either a bulkhead adapter part number 5065-4673 or 1250-4747.

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 Jumper Cables and Cable Guards."
- "Step 5. Remove the Front Panel Assembly."
- "Step 6. Remove the Braces on the Bottom Side of the PNA."
- "Step 7. Remove the A23 Test Set Motherboard."
- "Step 8. Remove the Testset Stabilizer Bracket from the A24 IF Multiplexer Board."
- "Step 9. Remove Some Bottom-Side (Test Set) Cables."
- "Step 10. Remove the A60 70 GHz Doubler Assembly From the Test Set Deck."
- "Step 11. Assemble the A61 70 GHz Doubler on the Doubler Mount."
- "Step 12. Reinstall the A60/A61 70 GHz Doubler Assembly."
- "Step 13. Remove the A63 70 GHz Doubler Assembly From the Test Set Deck."
- "Step 14. Assemble the A62 70 GHz Doubler on the Doubler Mount."
- "Step 15. Reinstall the A62/A63 70 GHz Doubler Assembly."
- "Step 16. Install Bracket to A10 Source Assembly."
- "Step 17. Assemble the A10 26.5 GHz Source 2 Assembly."
- "Step 18. Assemble and Install the A13 40 GHz Doubler Assembly."
- "Step 19. Install the A13 40 GHz Doubler Cables."
- "Step 20. Assemble and Install the A12 40 GHz Doubler Assembly."
- "Step 21. Install the A12 40 GHz Doubler Cables."

- “Step 22. Install the A10 26.5 GHz Source 2 Assembly and Cables.”
- “Step 23. Install the A17 13.5 GHz (Source 2) Synthesizer Board and Cables.”
- “Step 24. Install the Cable Bracket Mount.”
- “Step 25. Remove the A27 Mixer Brick Assembly.”
- “Step 26. Assemble the A28 Mixer Brick Assembly.”
- “Step 27. Install the A27/A28 Mixer Brick Assemblies.”
- “Step 28. Assemble the Port 3 and Port 4 Attenuator Assemblies.”
- “Step 29. Install the Port 3 and Port 4 Attenuator Assemblies on the Test Set Deck.”
- “Step 30. Assemble the A30 and A31 Receiver Coupler Assemblies.”
- “Step 31. Install the A30 and A31 Receiver Coupler Assemblies.”
- “Step 32. Remove the Bias Tee Blocks From the Test Set Deck.”
- “Step 33. Install the A43 and A44 Bias Tees on the Bias Tee Blocks.”
- “Step 34. Reinstall the Bias Tee Blocks.”
- “Step 35. Assemble the A33 - A36 Test Port Coupler Assemblies.”
- “Step 36. Remove and Disassemble the 2-Port Test Set Front Plate.”
- “Step 37. Install the LED Boards and Test Port Coupler Assemblies to the 4-Port Test Set Front Plate.”
- “Step 38. Install the Bulkhead Connectors in the Test Set Front Plate.”
- “Step 39. Install the 4-Port Coupler Plate Assembly to the Deck.”
- “Step 40. Install Some Bottom-Side (Test Set) Cables.”
- “Step 41. Install Cables on IF Multiplexer Board.”
- “Step 42. Reinstall the Testset Stabilizer Bracket on the A24 IF Multiplexer Board.”
- “Step 43. Reinstall the A23 Test Set Motherboard.”
- “Step 44. Install Cables on the A23 Test Set Motherboard.”
- “Step 45. Install the Braces on the Bottom Side of the PNA.”
- “Step 46. Replace the Front Panel's Lower Dress Panel.”
- “Step 47. Reinstall Front Panel Assembly.”
- “Step 48. Install the Overlay.”
- “Step 49. Install the Jumper Cables.”
- “Step 50. Position the Cables and Wires to Prevent Pinching.”
- “Step 51. Reinstall the Inner Cover.”

“Step 52. Reinstall the Outer Cover.”

“Step 53. Remove Option 219 License.”

“Step 54. Enable Option 419.”

“Step 55. Perform Post-Upgrade Adjustments and Calibration.”

“Step 56. 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 7**.

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

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

NOTE

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

Step 2. Remove the Outer Cover

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

Step 3. Remove the Inner 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 9**.

Step 4. Remove the Front Panel Jumper Cables and Cable Guards

1. Pull the two cable guards off of the front panel jumper cables. Save them for re-installation later.
2. Remove all front panel jumper cables. Keep for re-installation later.

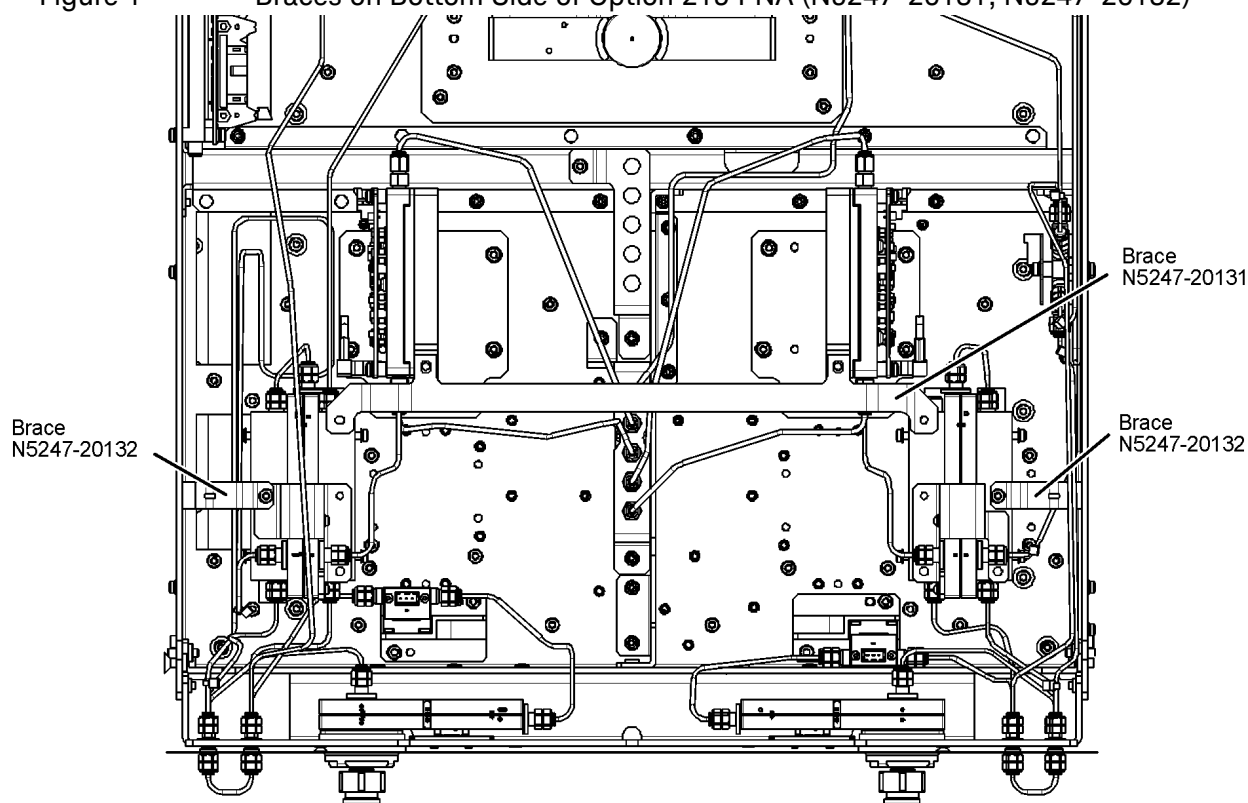
Step 5. Remove the Front Panel Assembly

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

Step 6. Remove the Braces on the Bottom Side of the PNA

1. Remove the three braces shown in **Figure 1**.
2. Discard brace N5247-20131 and the screws that secure it.
3. Keep both of the N5247-20132 braces and their screws for re-installation later.

Figure 1 Braces on Bottom Side of Option 219 PNA (N5247-20131, N5247-20132)



1. See [“Downloading the Online PNA Service Guide” on page 9](#).

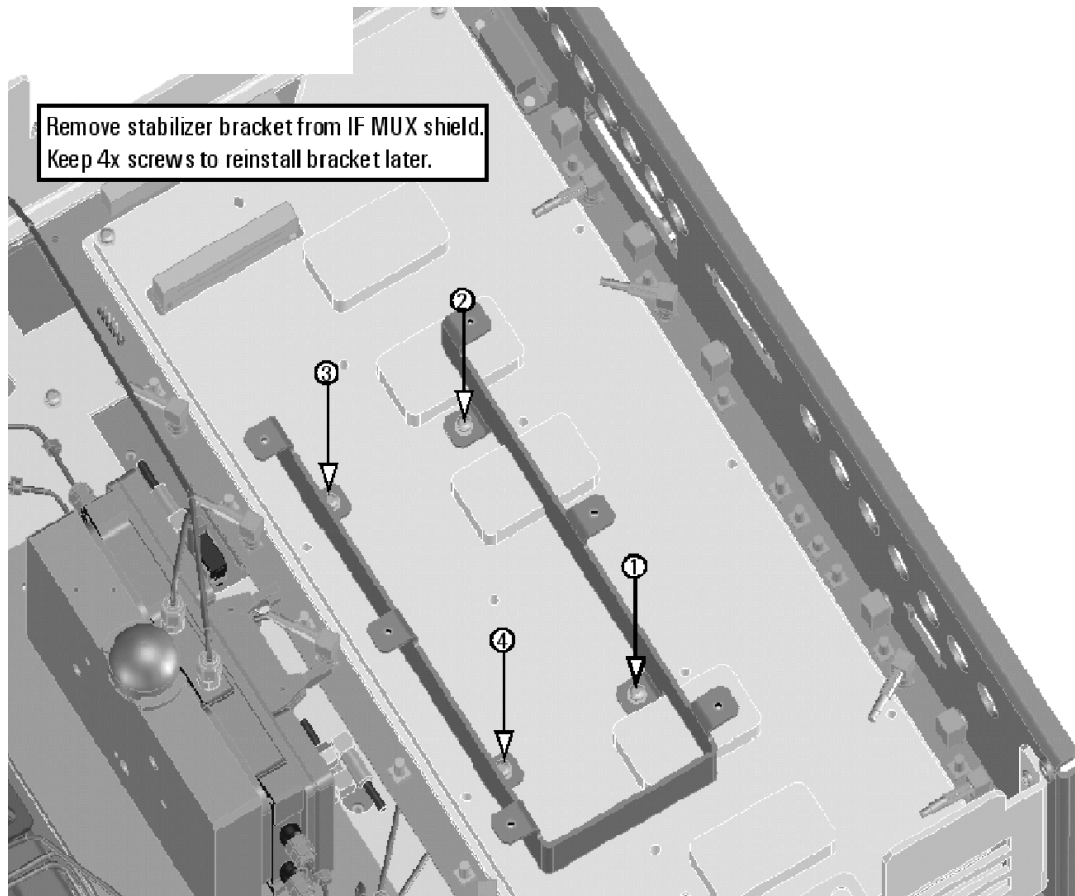
Step 7. Remove the A23 Test Set Motherboard

For instructions, click the Chapter 7 bookmark “Removing and Replacing the A23 Test Set Motherboard” in the PDF Service Guide¹.

Step 8. Remove the Testset Stabilizer Bracket from the A24 IF Multiplexer Board

Remove the stabilizer bracket as shown in **Figure 2**.

Figure 2 Testset Stabilizer Bracket on A24 IF MUX Board



Step 9. 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

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 all bottom-side cables (gray flexible and silver semi-rigid) except for those in the following table. Do not discard the cables that are removed because some will be reused later in the procedure. To see an image showing the location of cables W11, W13, W23, W25, W61, and W65, click the Chapter 6 bookmark "Top Cables, All Cables - All Options" in the PDF Service Guide¹. To see an image showing the location of cable W66, click the Chapter 6 bookmark "Bottom RF Cables, 2-Port, Option 219 (S/N Prefixes <6021)" in the PDF Service Guide¹.

Do Not Remove These Bottom-Side Cables				
Reference Designator	Type ^a	Part Number	Qty	Description
W11	SR	N5247-20114	1	A7 port 1 40 GHz doubler P6 to W12
W13	SR	N5247-20086	1	A7 port 1 40 GHz doubler P2 to W14
W23	SR	N5247-20114	1	A8 port 2 40 GHz doubler P6 to W24
W25	SR	N5247-20086	1	A8 port 2 40 GHz doubler P2 to W26
W61	SR	N5247-20110	1	A15 13.5 GHz (LO) synthesizer board J1207 to A25 HMA26.5
W65	SR	N5247-20113	1	A7 port 1 40 GHz doubler P5 to W66
W66	SR	N5247-20109	1	W65 to rear-panel EXT TSET DRIVE RF OUT (J6)

3. Remove and discard the following gray flexible cables that have a top-side connection:
 - W149 (N5247-60023) A16 SPAM board (J2) to A24 IF multiplexer (P603)
 - W150 (N5247-60024) A16 SPAM board (J5) to A24 IF multiplexer (P203)
4. Leave any remaining gray flexible cables, the wire harnesses, and the ribbon cables connected where possible. Any that are removed should be labeled for reconnection later.

1. See ["Downloading the Online PNA Service Guide" on page 9](#).

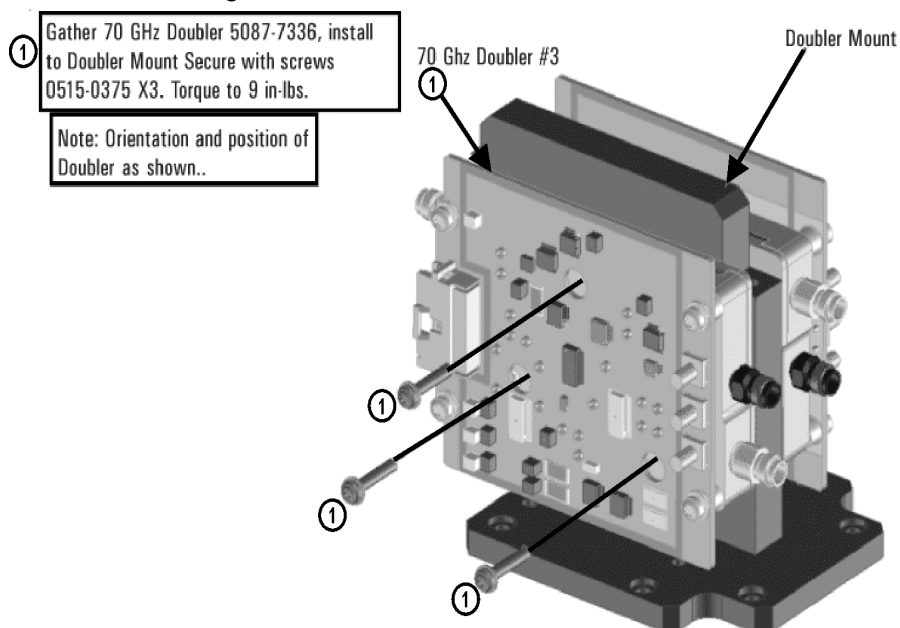
Step 10. Remove the A60 70 GHz Doubler Assembly From the Test Set Deck

Remove the 70 GHz doubler 1 assembly from the test set deck. For instructions, click the Chapter 7 bookmark, “Removing and Replacing the A60-A63 70 GHz Doublers” in the PDF Service Guide¹. Keep all parts for re-installation later.

Step 11. Assemble the A61 70 GHz Doubler on the Doubler Mount

1. Follow the instruction in **Figure 3** to install the A61 70 GHz doubler 3 on the doubler mount. New parts are listed in **Table 1 on page 11** of this document.

Figure 3 Installing A61 Doubler 3 on the Doubler Mount (0515-0375, 5087-7336)

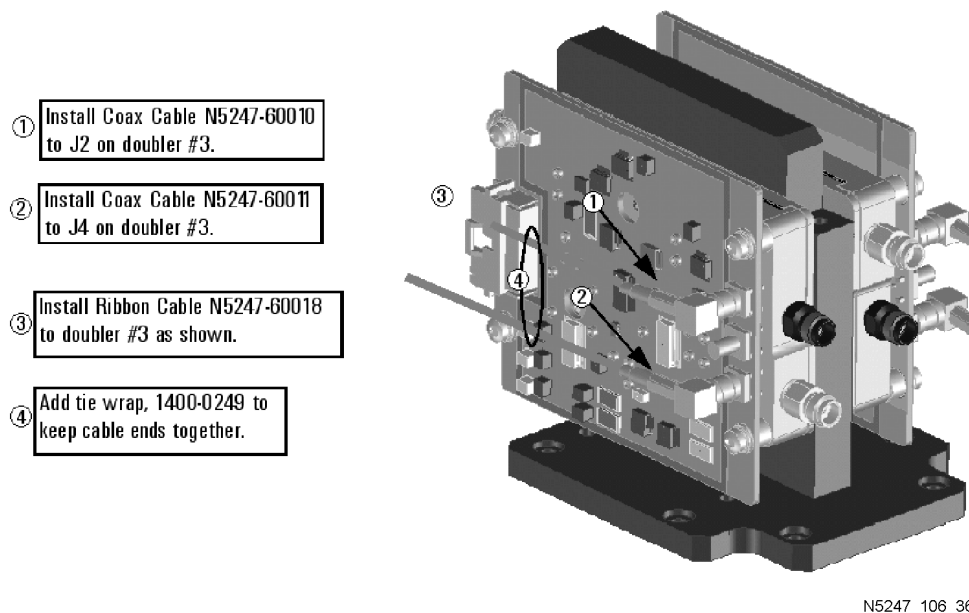


N5247 106 35

2. Connect the cables to the A61 70 GHz doubler 3 in the order shown in **Figure 4**. The other ends of the cables will be connected later.

Figure 4 A61 70 GHz Doubler Assembly (1400-0249, N5247-60010, N5247-60011, N5247-60018)

Note: Orientation of the coax cables.



Step 12. Reinstall the A60/A61 70 GHz Doubler Assembly

Reinstall the A60 70 GHz doubler 1 cables, and then reinstall the A60/A61 70 GHz doubler assembly on the test set deck, reusing the existing screws. For instructions, click the Chapter 7 bookmark, “Removing and Replacing the A60-A63 70 GHz Doublers” in the PDF Service Guide¹.

Step 13. Remove the A63 70 GHz Doubler Assembly From the Test Set Deck

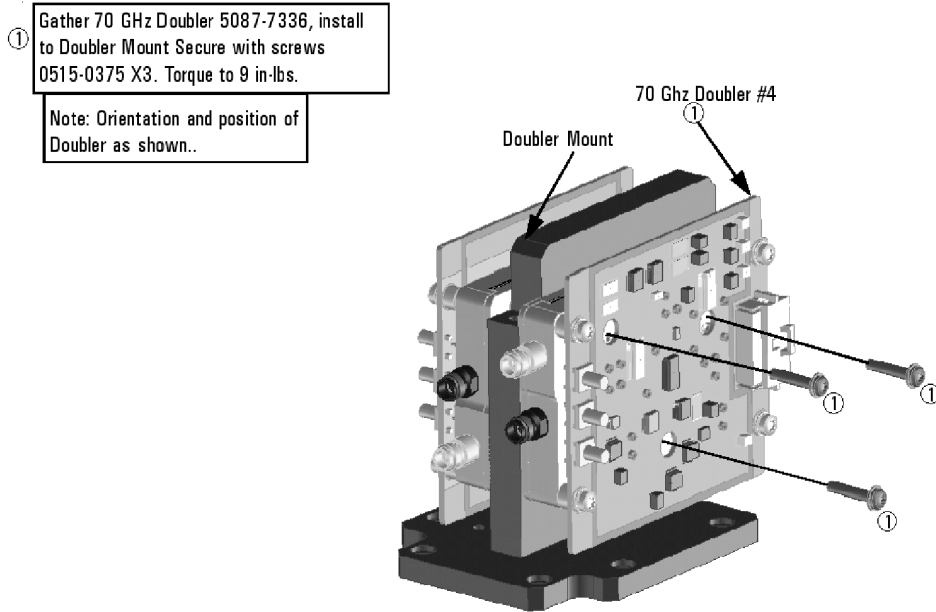
Remove the A63 70 GHz doubler 2 assembly from the test set deck. For instructions, click the Chapter 7 bookmark, “Removing and Replacing the A60-A63 70 GHz Doublers” in the PDF Service Guide¹. Keep all parts for re-installation later.

1. See [“Downloading the Online PNA Service Guide” on page 9](#).

Step 14. Assemble the A62 70 GHz Doubler on the Doubler Mount

1. Follow the instruction in **Figure 5** to install the A62 70 GHz doubler 4 on the doubler mount. New parts are listed in **Table 1 on page 11** of this document.

Figure 5 Installing A62 Doubler 4 on the Doubler Mount (0515-0375, 5087-7336)



N5247_106_37

2. Connect the cables to the A62 70 GHz doubler in the order shown in **Figure 6**. The other ends of the cables will be connected later.

Figure 6 A62 70 GHz Doubler Assembly (1400-0249, N5247-60012, N5247-60013, N5247-60018)

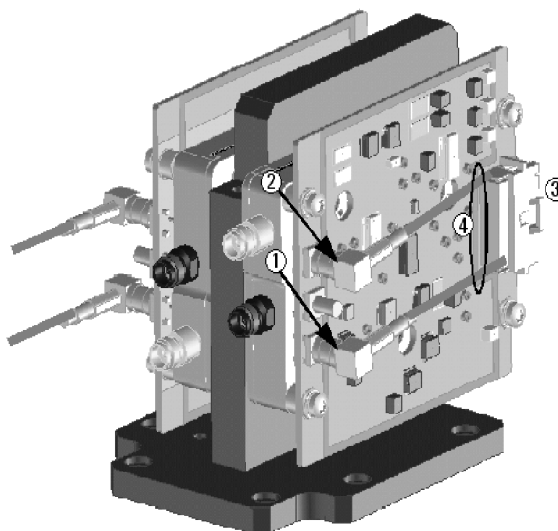
Note: Orientation of the coax cables.

① Install Coax Cable N5247-60012 to J2 on doubler #4.

② Install Coax Cable N5247-60013 to J4 on doubler #4.

③ Install Ribbon Cable N5247-60018 to doubler #4 as shown.

④ Add tie wrap, 1400-0249 to keep cable ends together.



Step 15. Reinstall the A62/A63 70 GHz Doubler Assembly

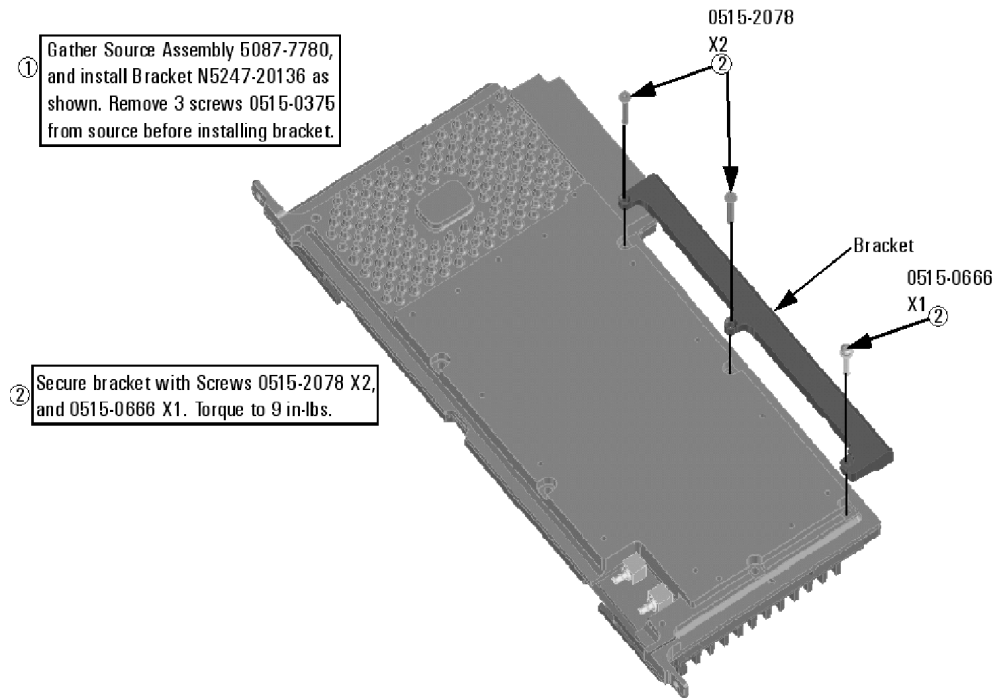
Reinstall the A63 70 GHz doubler 2 cables, and then reinstall the A62/A63 70 GHz doubler assembly on the test set deck, reusing the existing screws. For instructions, click the Chapter 7 bookmark, “Removing and Replacing the A60-A63 70 GHz Doublers” in the PDF Service Guide¹.

1. See [“Downloading the Online PNA Service Guide” on page 9](#).

Step 16. Install Bracket to A10 Source Assembly

Follow the two instructions shown in **Figure 7**.

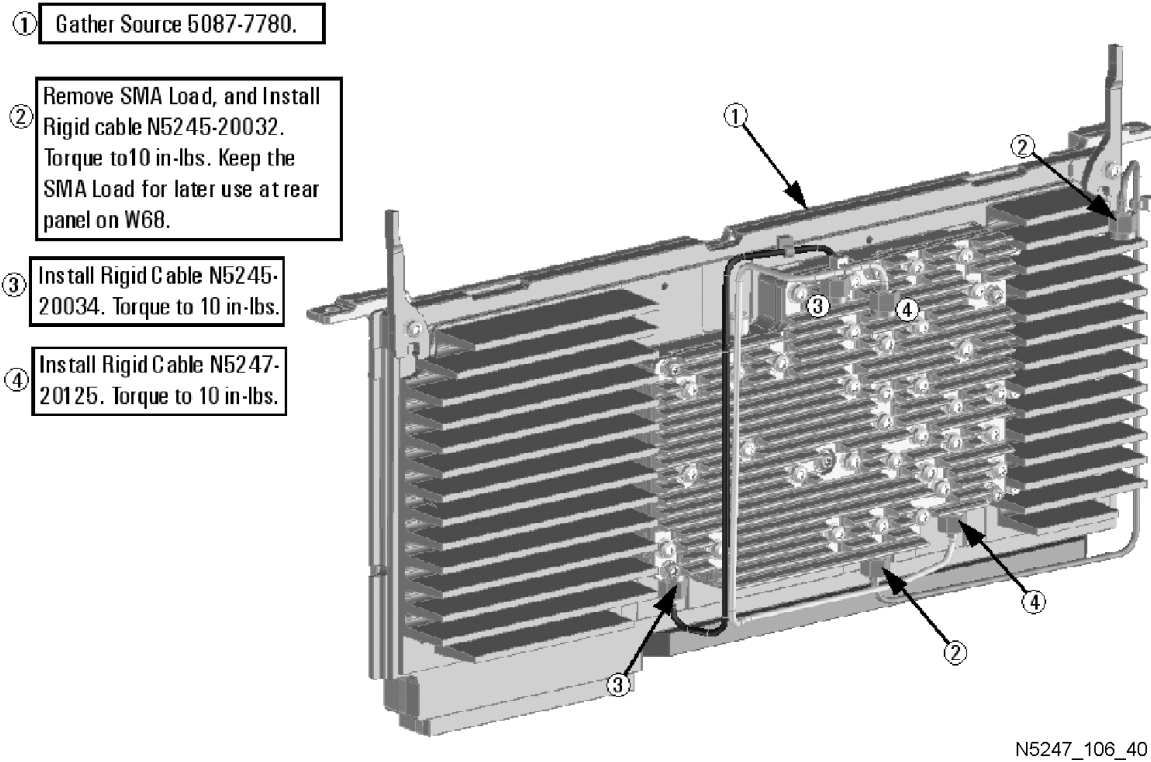
Figure 7 A10 Source 2 Assembly Bracket Installation (0515-0375, 0515-0666, 0515-2078, 5087-7780, N5247-20136)



Step 17. Assemble the A10 26.5 GHz Source 2 Assembly

Follow the four instructions shown in **Figure 8**.

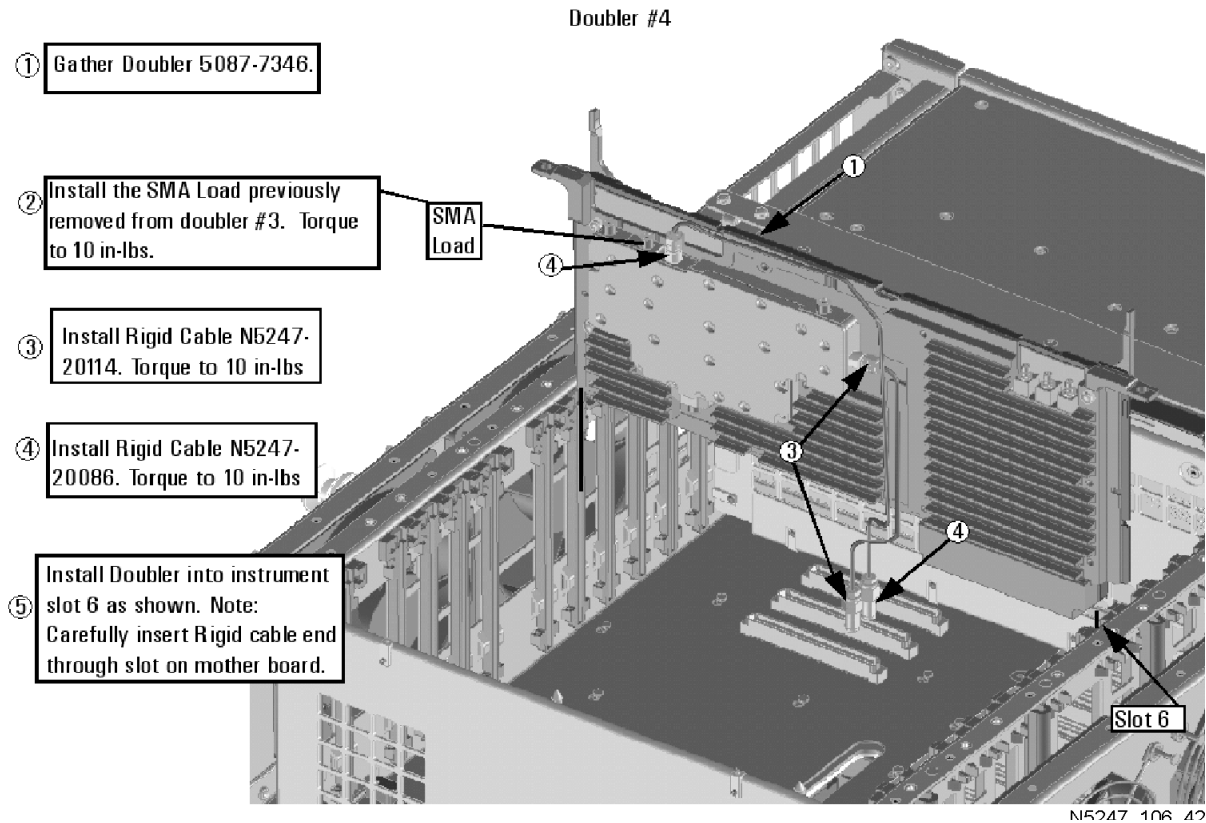
Figure 8 A10 Source 2 Assembly (5087-7780, N5245-20032, N5245-20034, N5247-20125)



Step 18. Assemble and Install the A13 40 GHz Doubler Assembly

Follow the five instructions shown in **Figure 9**.

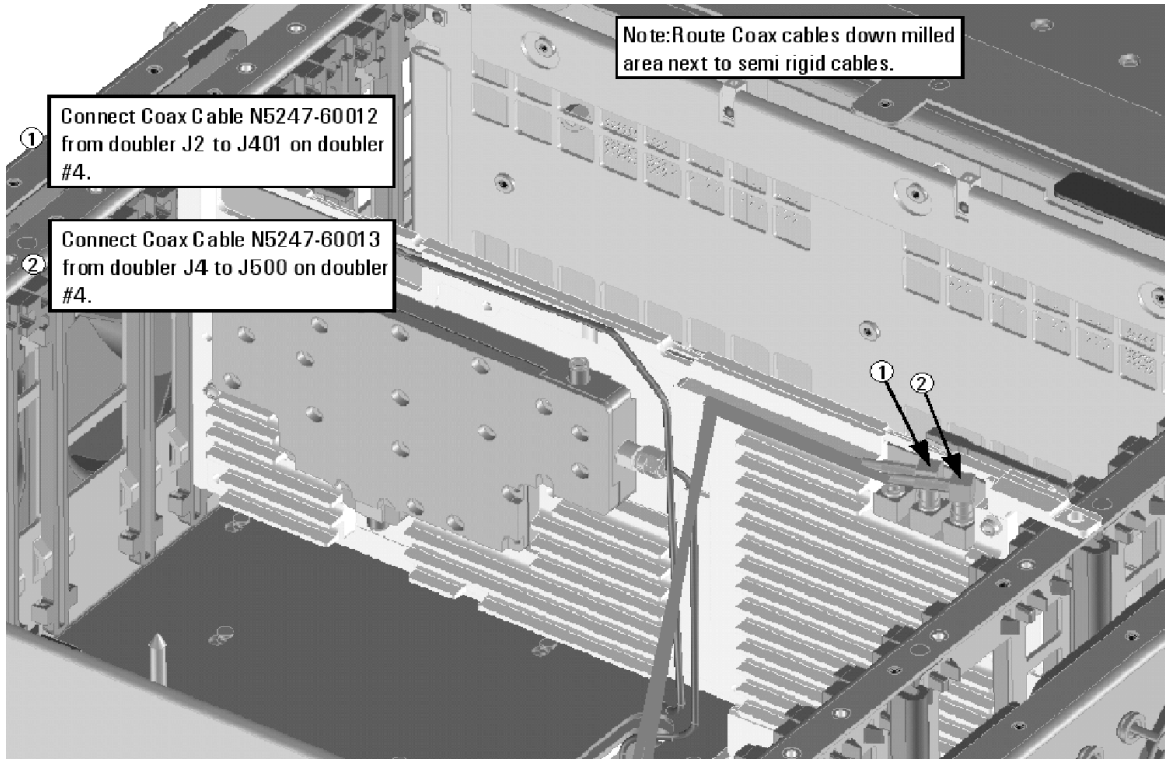
Figure 9 A13 40 GHz Doubler 4 Installation (1250-4261, 5087-7346, N5247-20086, N5247-20096, N5247-20114)



Step 19. Install the A13 40 GHz Doubler Cables

Follow the three instructions shown in **Figure 10**.

Figure 10 A13 40 GHz Doubler 4 Cable Installation (N5247-60012, N5247-60013)

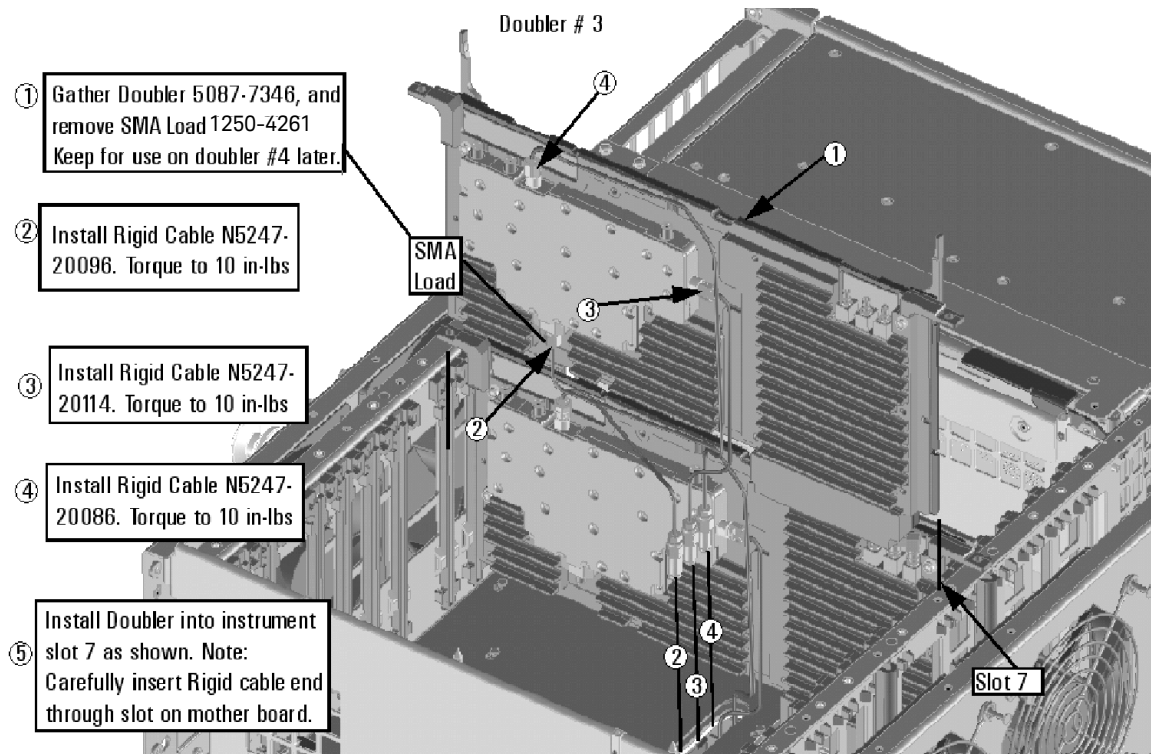


N5247_106_43

Step 20. Assemble and Install the A12 40 GHz Doubler Assembly

Follow the five instructions shown in **Figure 11**.

Figure 11 A12 40 GHz Doubler 3 Assembly Installation (1250-4261, 5087-7346, N5247-20086, N5247-20114)

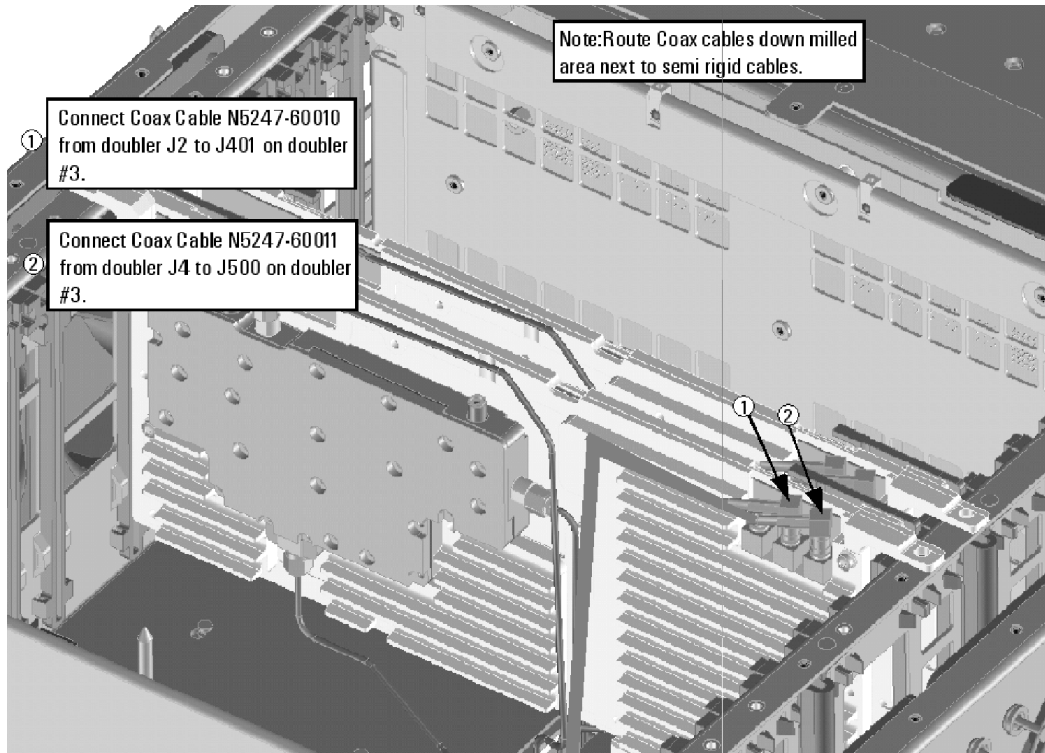


N5247_106_41

Step 21. Install the A12 40 GHz Doubler Cables

Follow the three instructions shown in **Figure 12**.

Figure 12 A12 40 GHz Doubler 3 Assembly Cable Installation (N5247-60010, N5247-60011)

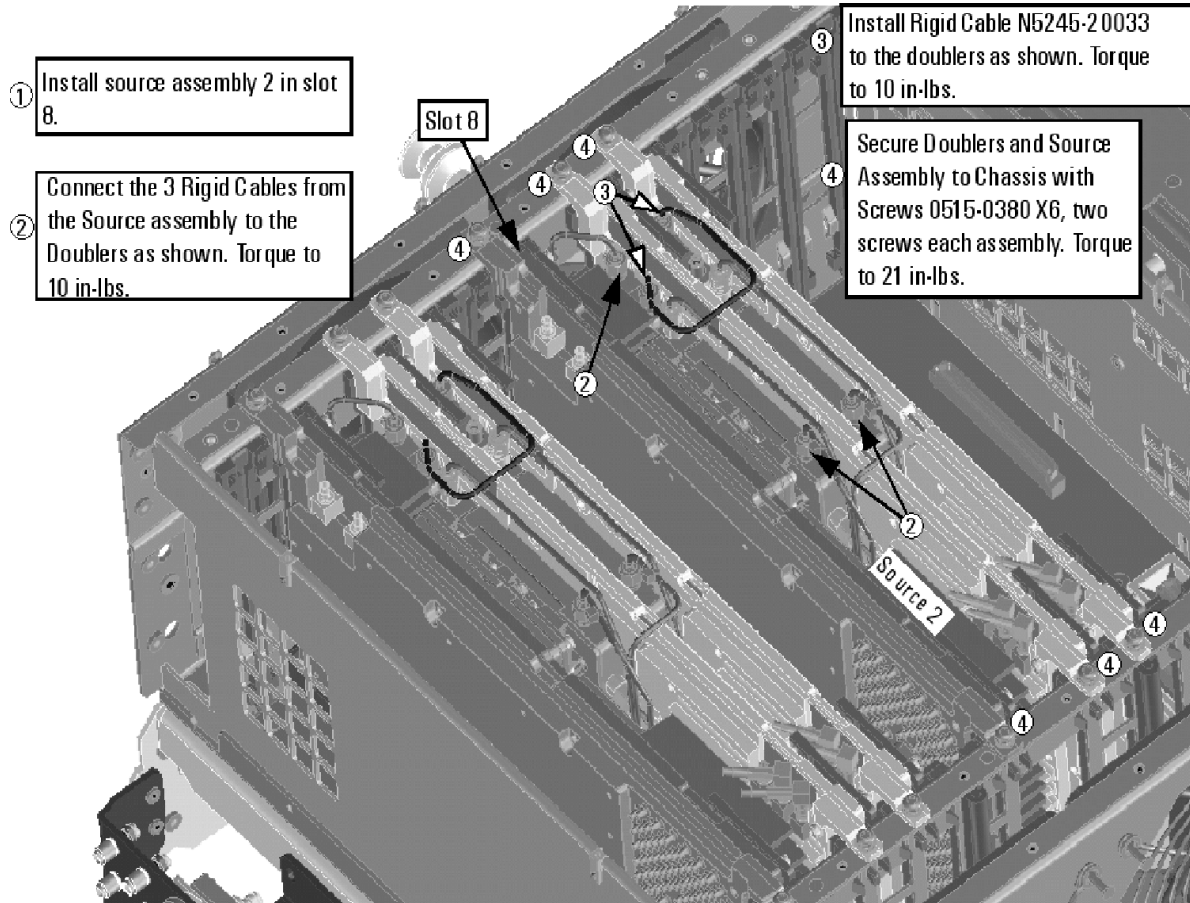


N5247_106_44

Step 22. Install the A10 26.5 GHz Source 2 Assembly and Cables

Follow the four instructions shown in **Figure 13**.

Figure 13 A10 Source 2 Assembly Installation (0515-0380, N5245-20033)



N5247_106_45

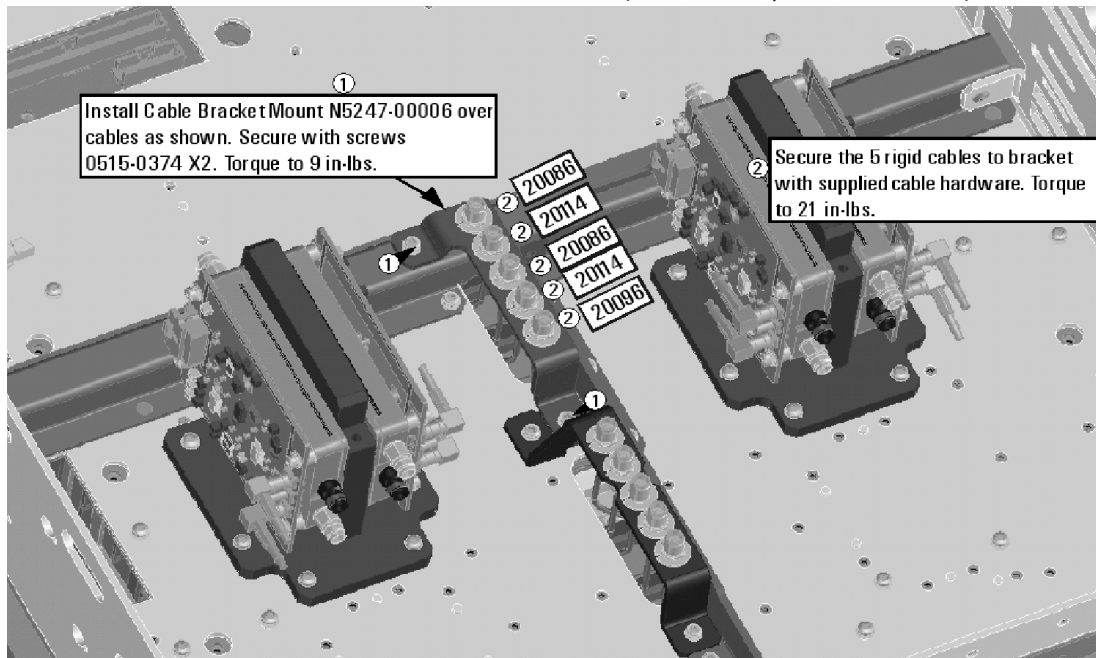
Step 23. Install the A17 13.5 GHz (Source 2) Synthesizer Board and Cables

1. Install new gray cable W87 (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.
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 W87 (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 24. Install the Cable Bracket Mount

Follow the two instructions shown in **Figure 13-1**. New parts are listed in **Table 1 on page 11** of this document.

Figure 13-1 Cable Bracket Mount Installation (0515-0374, N5247-00006)



1. See “[Downloading the Online PNA Service Guide](#)” on page 9.

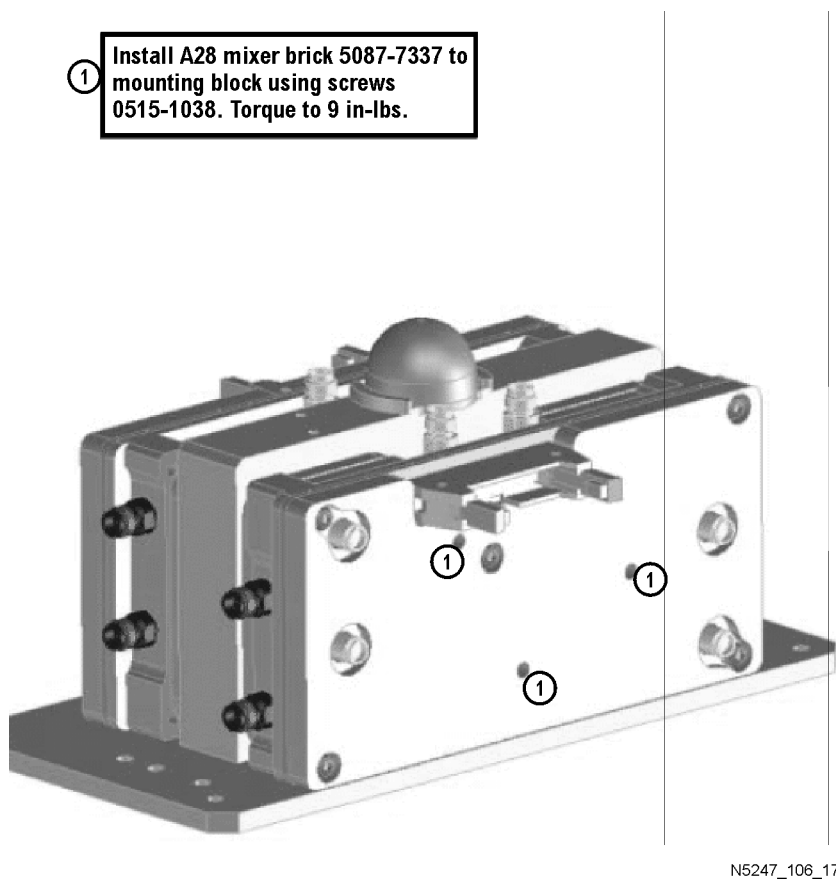
Step 25. Remove the A27 Mixer Brick Assembly

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 26. Assemble the A28 Mixer Brick Assembly

1. Follow the instruction shown in **Figure 14**. New parts are listed in **Table 1 on page 11** of this document.

Figure 14 A28 Mixer Brick Assembly (0515-1038, 5087-7337)



1. See “[Downloading the Online PNA Service Guide](#)” on page 9.

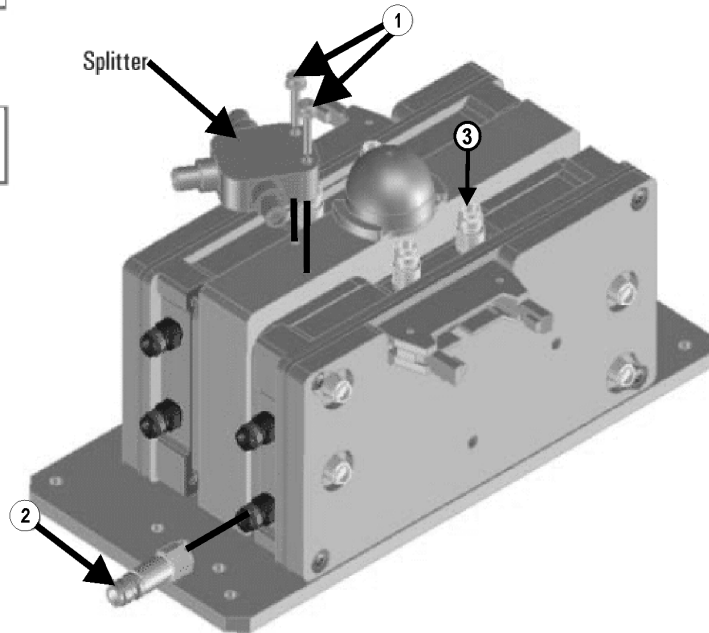
2. Follow the instructions shown in **Figure 14-1**.

Figure 14-1 A26 Splitter, A69 3 dB Pad, and Dust Cap Installation (0515-2007, 5067-4086, 08490-60037, N5247-20138)

- ① Install splitter 5067-4086 (label facing up), secure with screws 0515-2007 X2. Leave loose for now.

- ② Install 3dB pad 08490-60037 X1 only on R4 connector of A28 mixer brick. Torque to 10 in-lbs.

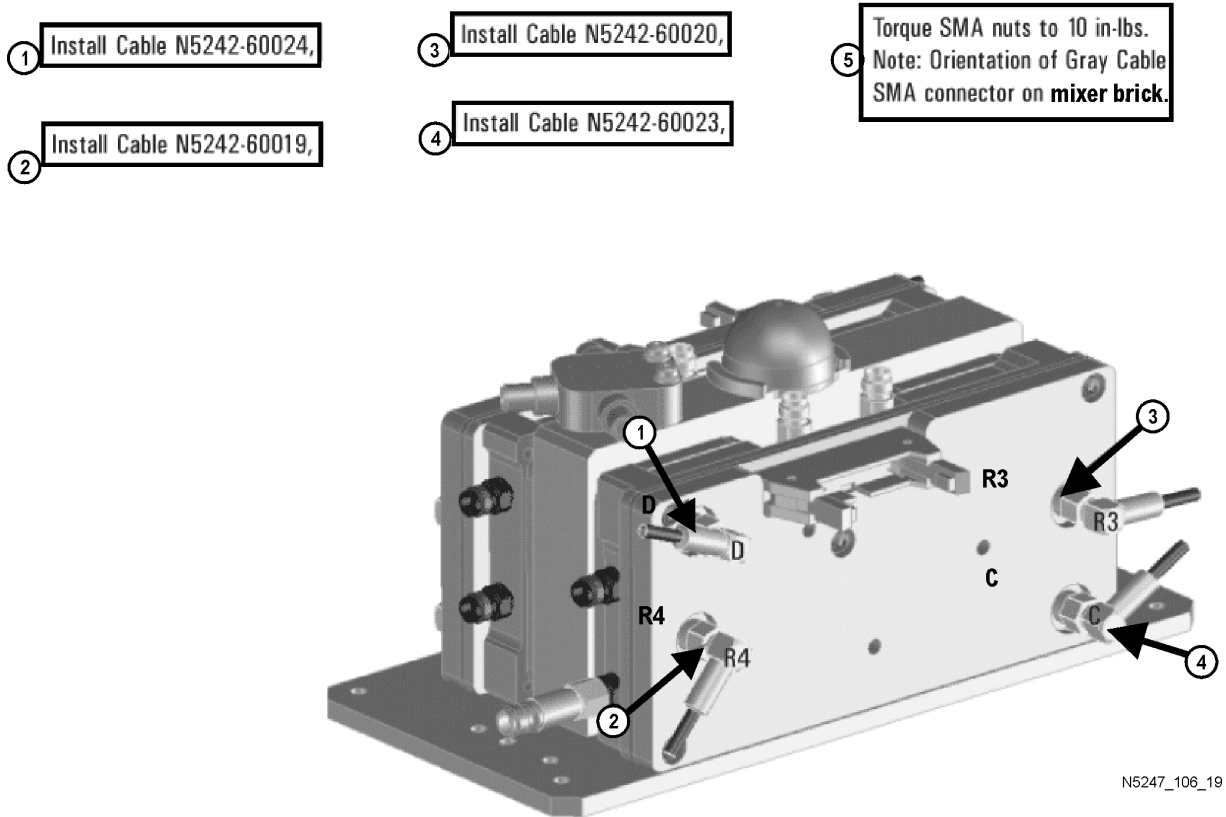
- ③ Add dust cap N5247-20138 X1 (not shown) to L-Brick.



N5247_106_18

3. Connect the gray flexible cables to the A28 mixer in the order shown in **Figure 14-2**. The other ends of the cables will be connected when the IF board is reinstalled later.

Figure 14-2 A28 Mixer Brick Cable Installation (N5242-60019, N5242-60020, N5242-60023, N5242-60024)



Step 27. Install the A27/A28 Mixer Brick Assemblies

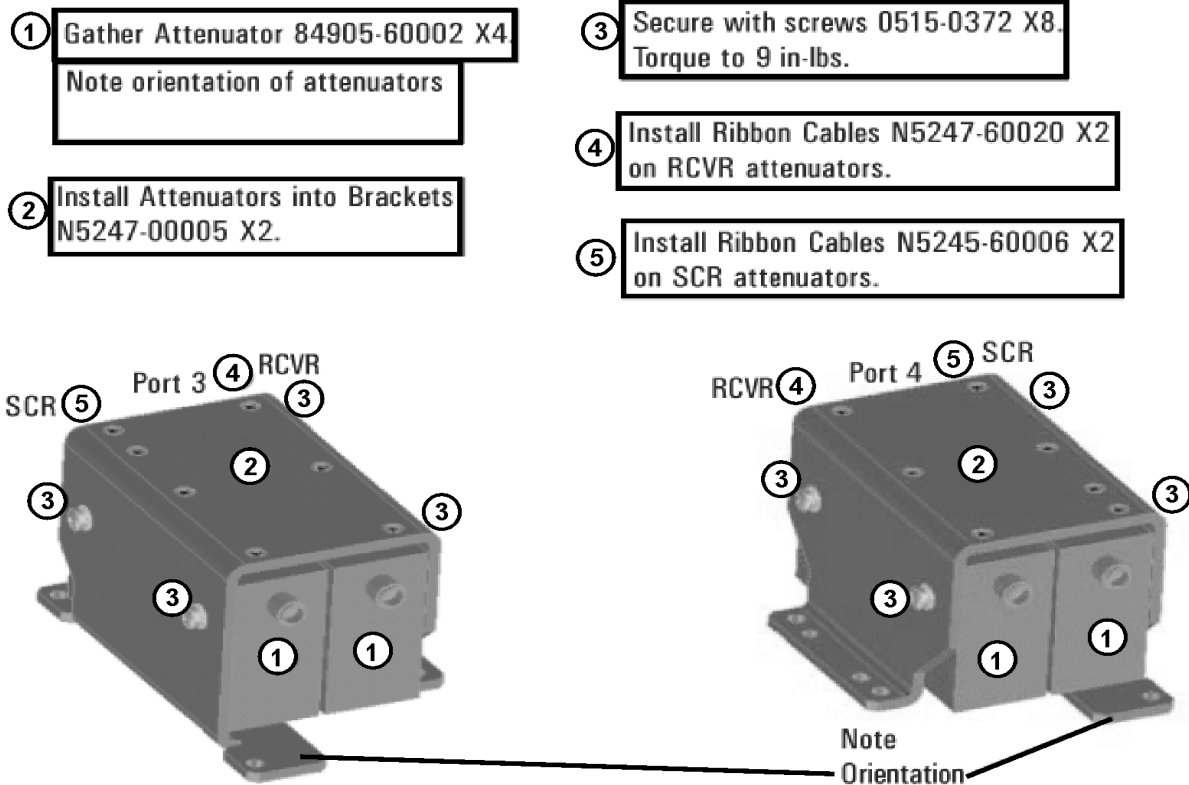
Reinstall the A27 mixer brick cables, and then install the A27/A28 mixer brick assembly, reusing the 10 existing screws. For instructions, click the Chapter 7 bookmark, “Removing and Replacing the A27 and A28 Mixer Bricks” in the PDF Service Guide¹. New parts are listed in **Table 1 on page 11** of this document.

1. See “[Downloading the Online PNA Service Guide](#)” on page 9.

Step 28. Assemble the Port 3 and Port 4 Attenuator Assemblies

Follow the instruction shown in **Figure 15**. New parts are listed in **Table 1 on page 11** of this document.

Figure 15 Port 3 and Port 4 Attenuator Assemblies (0515-0372, 08905-60002, N5247-00005, N5247-60006, N5247-60020)



N5247_106_22

Step 29. Install the Port 3 and Port 4 Attenuator Assemblies on the Test Set Deck

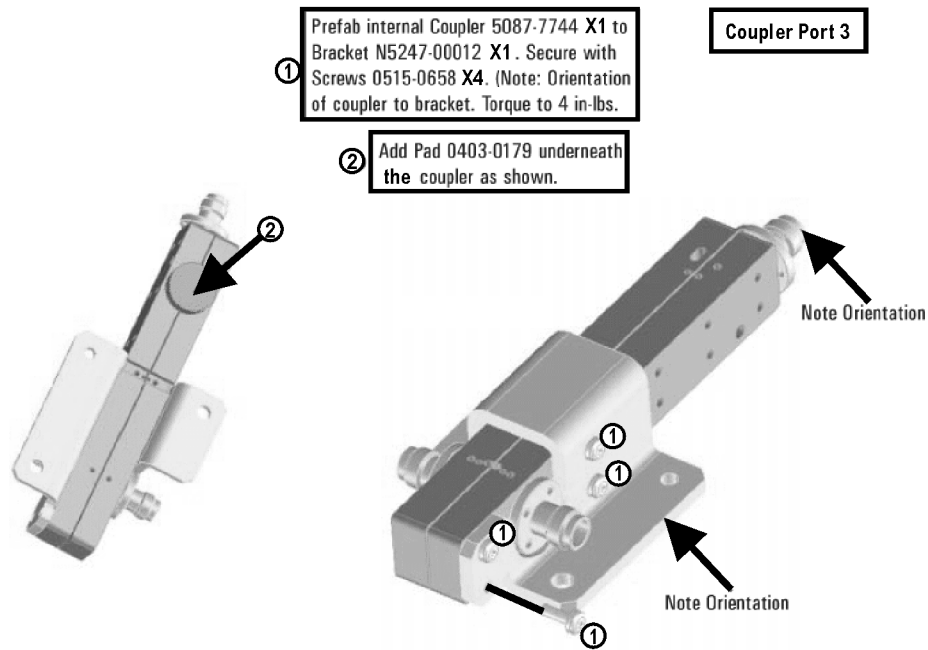
Install the Port 3 and Port 4 attenuator assemblies using four 0515-0372 screws to secure each bracket. For instructions, click the Chapter 7 bookmark, “Removing and Replacing the A38-A41 Source Attenuators and the A46-A49 Receiver Attenuators” in the PDF Service Guide¹. New parts are listed in **Table 1 on page 11** of this document.

Refer to **Figure 18 on page 40** for the location of the attenuator assemblies.

Step 30. Assemble the A30 and A31 Receiver Coupler Assemblies

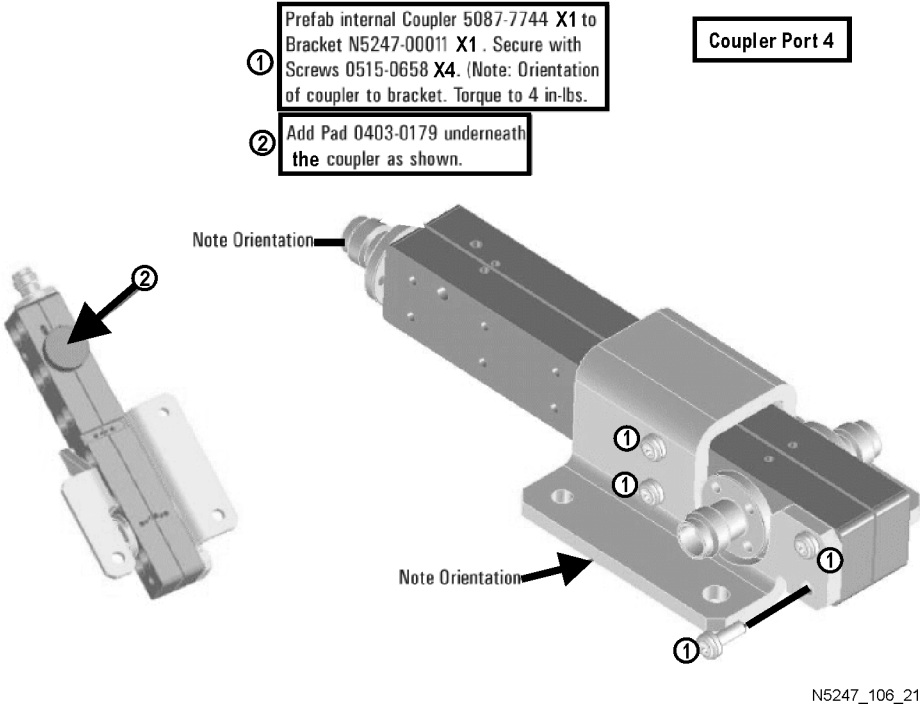
Follow the instructions shown in **Figure 16** and **Figure 17**. New parts are listed in **Table 1 on page 11** of this document.

Figure 16 A30 Receiver Coupler Assembly (0403-0179, 0515-0658, 5087-7744, N5247-00011)



N5247_106_20

Figure 17 A31 Receiver Coupler Assembly (0403-0179, 0515-0658, 5087-7744, N5247-00012)

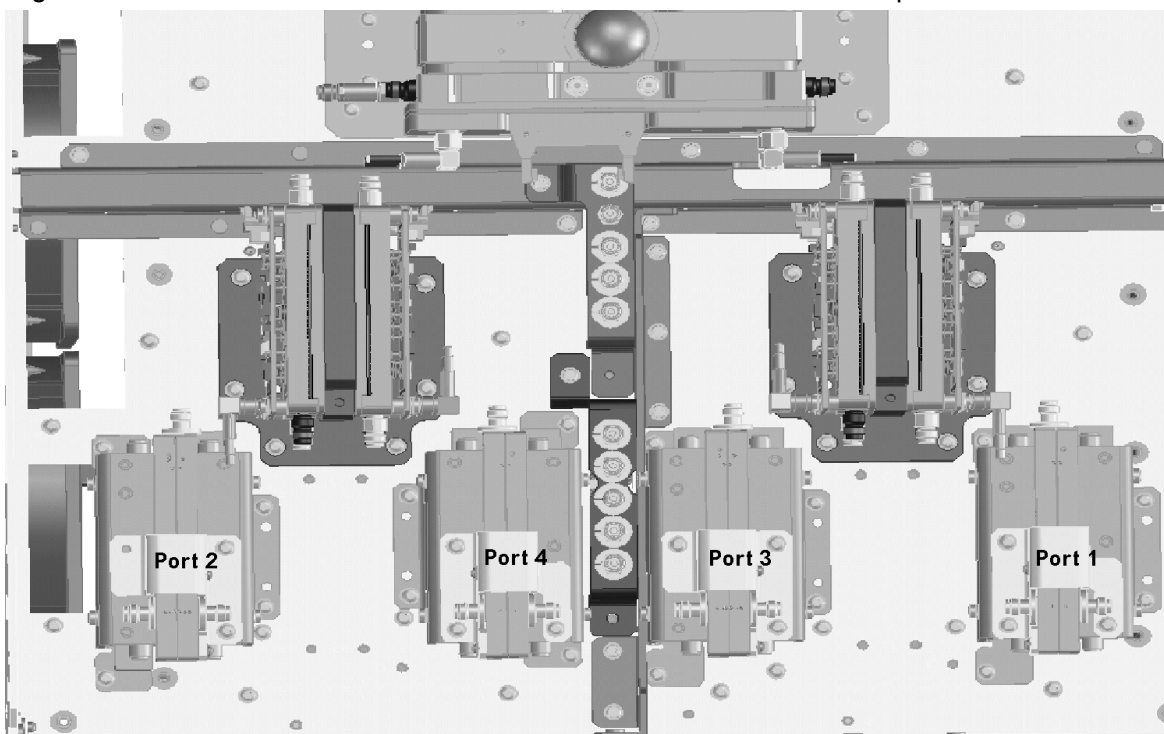


Step 31. Install the A30 and A31 Receiver Coupler Assemblies

Install the A30 and A31 receiver coupler assemblies using three 0515-0372 screws to secure each bracket. For instructions, click the Chapter 7 bookmark, “Removing and Replacing the A29-A32 receiver couplers and receiver coupler Mounting Brackets” in the PDF Service Guide¹. New parts are listed in **Table 1 on page 11** of this document.

Refer to **Figure 18** below for the location of the receiver coupler assemblies.

Figure 18 Location of Attenuator Assemblies and Receiver Coupler Assemblies



N5247_106_14

Step 32. Remove the Bias Tee Blocks From the Test Set Deck

Remove the two bias tee blocks from the test set deck. For instructions, click the Chapter 7 bookmark, “Removing and Replacing the A42-A45 Bias Tees” in the PDF Service Guide¹. Keep all parts for re-installation later.

1. See **“Downloading the Online PNA Service Guide” on page 9.**

Step 33. Install the A43 and A44 Bias Tees on the Bias Tee Blocks

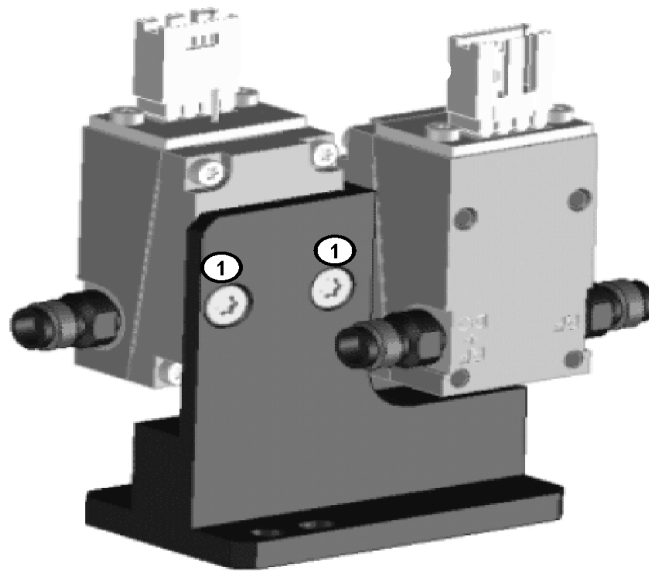
Follow the instruction in **Figure 19** to install the A43 and A44 bias tees on the bias tee blocks. New parts are listed in **Table 1 on page 11** of this document.

Figure 19

Installing A43 and A44 Bias Tees on the Bias Tee Blocks (0515-7732, 5087-7732)

①

Secure a second 5087-7732 bias tee to each block using screws 0515-1227 X2. Torque to 9 in-lbs.



N5247_106_02

Step 34. Reinstall the Bias Tee Blocks

Reinstall the two bias tee blocks on the test set deck, reusing the existing screws. For instructions, click the Chapter 7 bookmark, “Removing and Replacing the A42-A45 Bias Tees” in the PDF Service Guide¹.

NOTE

As shown in “Removing and Replacing the A42-A45 Bias Tees” in the PDF Service Guide, the slot on the bias tee block should be oriented toward the back of the PNA.

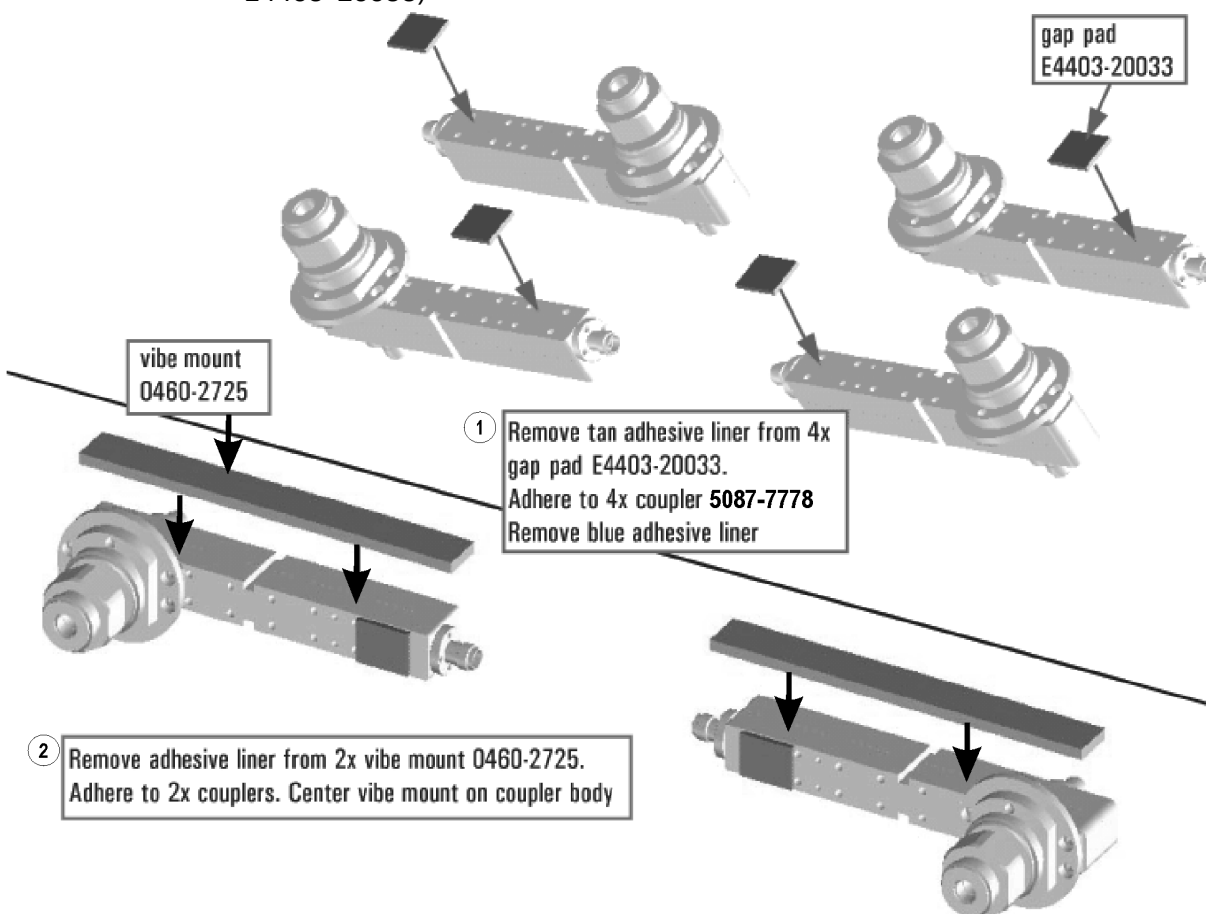
1. See [“Downloading the Online PNA Service Guide” on page 9](#).

Step 35. 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 20**. New parts are listed in **Table 1 on page 11** of this document.

Figure 20

A33 - A36 Test Port Coupler Assembly (0460-2725, 5087-7778, E4403-20033)



N5247_106_11

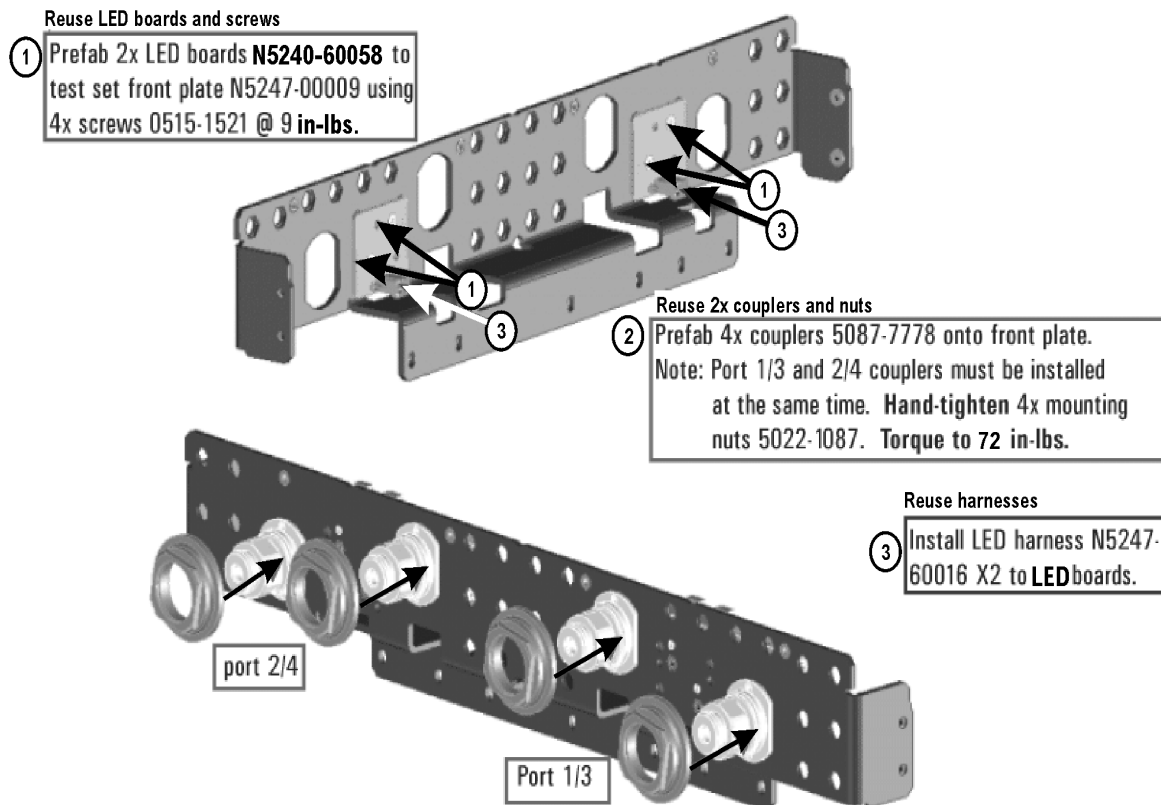
Step 36. Remove and Disassemble the 2-Port Test Set Front Plate

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 for re-installation later.
2. Remove the 2-port test set front plate from the test set deck. Keep the screws to reuse later.
3. Remove the 12 bulkhead connectors, nuts and washers from the 2-port front plate to reuse later.

Step 37. Install the LED Boards and Test Port Coupler Assemblies to the 4-Port Test Set Front Plate

1. Follow the three instructions shown in **Figure 21**.

Figure 21 LED Board Assemblies and Test Port Coupler Assemblies Installation (0515-1521, 5022-1087, 5087-7778, N5240-60058, N5247-60016)



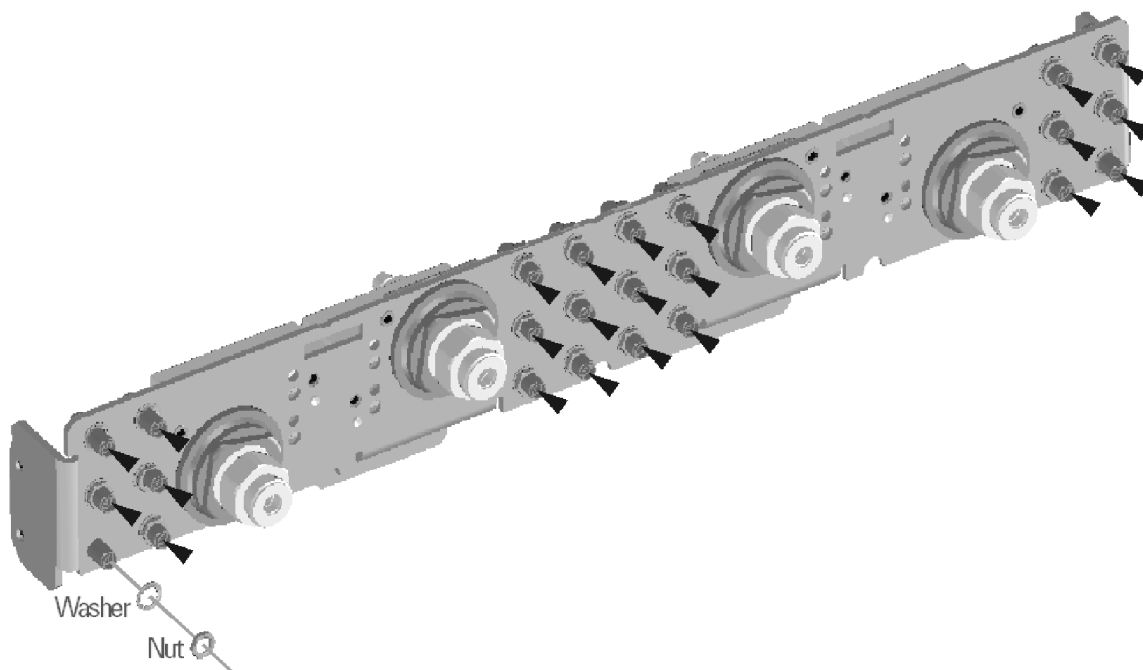
N5247_106_12

Step 38. Install the Bulkhead Connectors in the Test Set Front Plate

Refer to **Figure 22** for this procedure. New parts are listed in **Table 1 on page 11**.

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 tighten 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 22 Bulkhead Connectors Installation



N5242_004_09

Step 39. Install the 4-Port Coupler Plate Assembly to the Deck

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

Figure 23 Coupler Plate Assembly Installation (0515-0372, 0515-0664, 0515-1227)

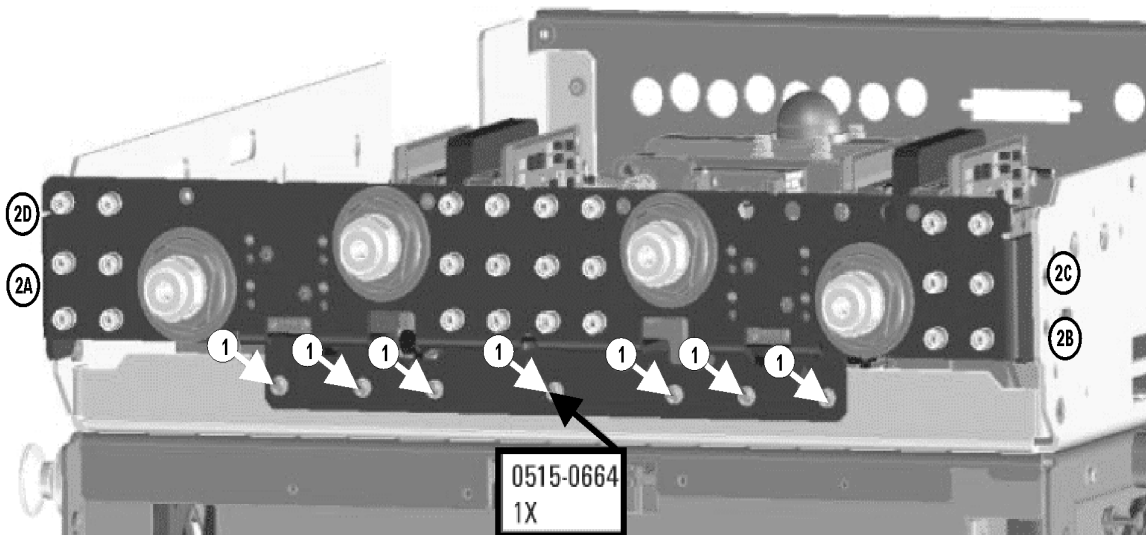
Reuse screws

- ① Install coupler plate assy to deck. Install 6x screws 0515-0372 and 1X 0515-0664. Do not torque.

- ③ Torque the 7x screws in step 1 to 9 in-lbs.

- ② Install 4x screws 0515-1227 at 9 in-lbs. Alternate sides in torque sequence as shown in alphabetic circles.

Reuse screws



N5247_106_13

Step 40. Install Some Bottom-Side (Test Set) Cables

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 semirigid 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.

Flexible Cables Required for Upgrading to an Option 419 PNA

Install the following gray flexible cables in the order listed. 70 GHz cables were connected to the 70 GHz doublers earlier in this procedure, but the other end of these cables still requires a connection. To see images showing the location of these cables, click either of the Chapter 6 bookmarks “Bottom RF Cables, 4-Port, Option 419, S/N Prefixes <6021” in the PDF Service Guide¹. New parts are listed in **Table 1 on page 11**.

- W91 (reuse) (N5247-60006) A60 port 1 70 GHz doubler (J2) to A7 40 GHz doubler (J401)
- W92 (reuse) (N5247-60007) A60 port 1 70 GHz doubler (J4) to A7 40 GHz doubler (J500)
- W97 (reuse) (N5247-60008) A63 port 2 70 GHz doubler (J2) to A8 40 GHz doubler (J401)
- W98 (reuse) (N5247-60009) A63 port 2 70 GHz doubler (J4) to A8 40 GHz doubler (J500)

Semirigid Cables Required for Upgrading to an Option 419 PNA

To see images showing the location of these cables, click the Chapter 6 bookmark “Bottom RF Cables, 4-Port, Option 419, S/N Prefixes <6021” in the PDF Service Guide¹. New parts are listed in **Table 1 on page 11**.

- W69 (reuse) (N5247-20112) A27 mixer brick to rear-panel EXT TSET DRIVE LO OUT (J5)
- W68 (N5247-20088) rear panel port RF2 OUT (J12) to W67
* Install SMA load previously removed from A10 26.5 GHz source board onto rear panel port RF2 OUT (J12).
- W123 (reuse) (N5247-20020) A49 port 2 receiver attenuator to port 2 RCVR B IN

1. See “**Downloading the Online PNA Service Guide**” on page 9.

Installation Procedure for the Upgrade

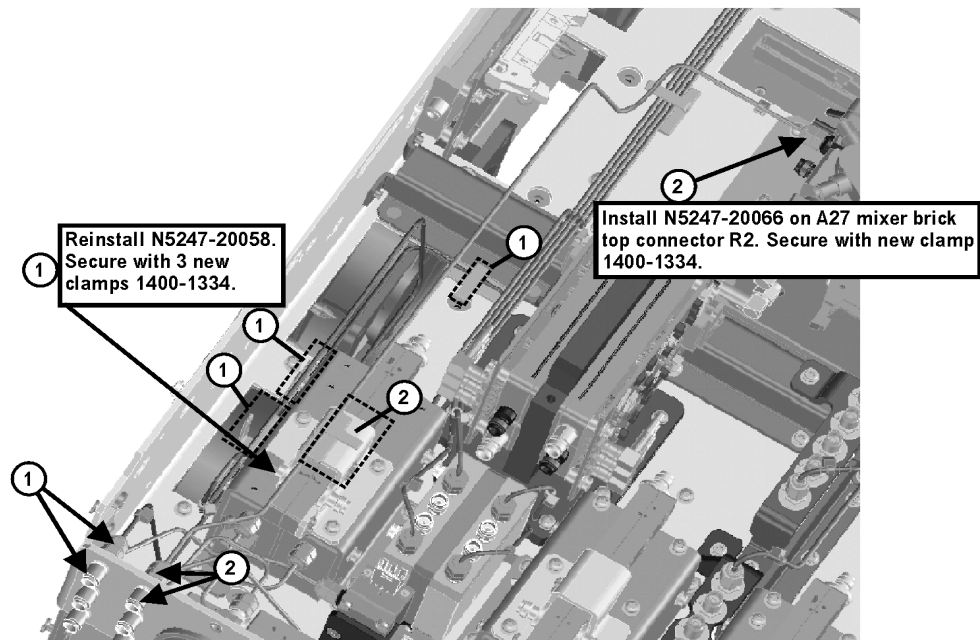
- W115 (reuse) (N5247-20027) A45 port 2 bias tee to port 2 CPLR THRU
- W46 (N5247-20019) A36 port 2 coupler to port 2 CPLR ARM
- W114 (reuse) (N5247-20034) A41 port 2 source attenuator to port 2 SOURCE OUT
- W112 (N5247-20029) A44 port 4 bias tee to A35 port 4 coupler
- W45 (reuse) (N5247-20058) A32 port 2 receiver coupler to REF 2 SOURCE OUT

* As shown in **Figure 23-1**, install clamps to secure W45.

- W124 (reuse) (N5247-20046) A49 port 2 receiver attenuator to A27 mixer brick (B)
- W145 (N5247-20066) A27 mixer brick (R2) to REF 2 RCVR R2 IN

* As shown in **Figure 23-1**, install clamp part number 1400-1334 to secure W145.

Figure 23-1 Location of W45 and W145 Cable Securing Clamps (1400-1334, N5247-20058, N5247-20066)



N5247_106_04

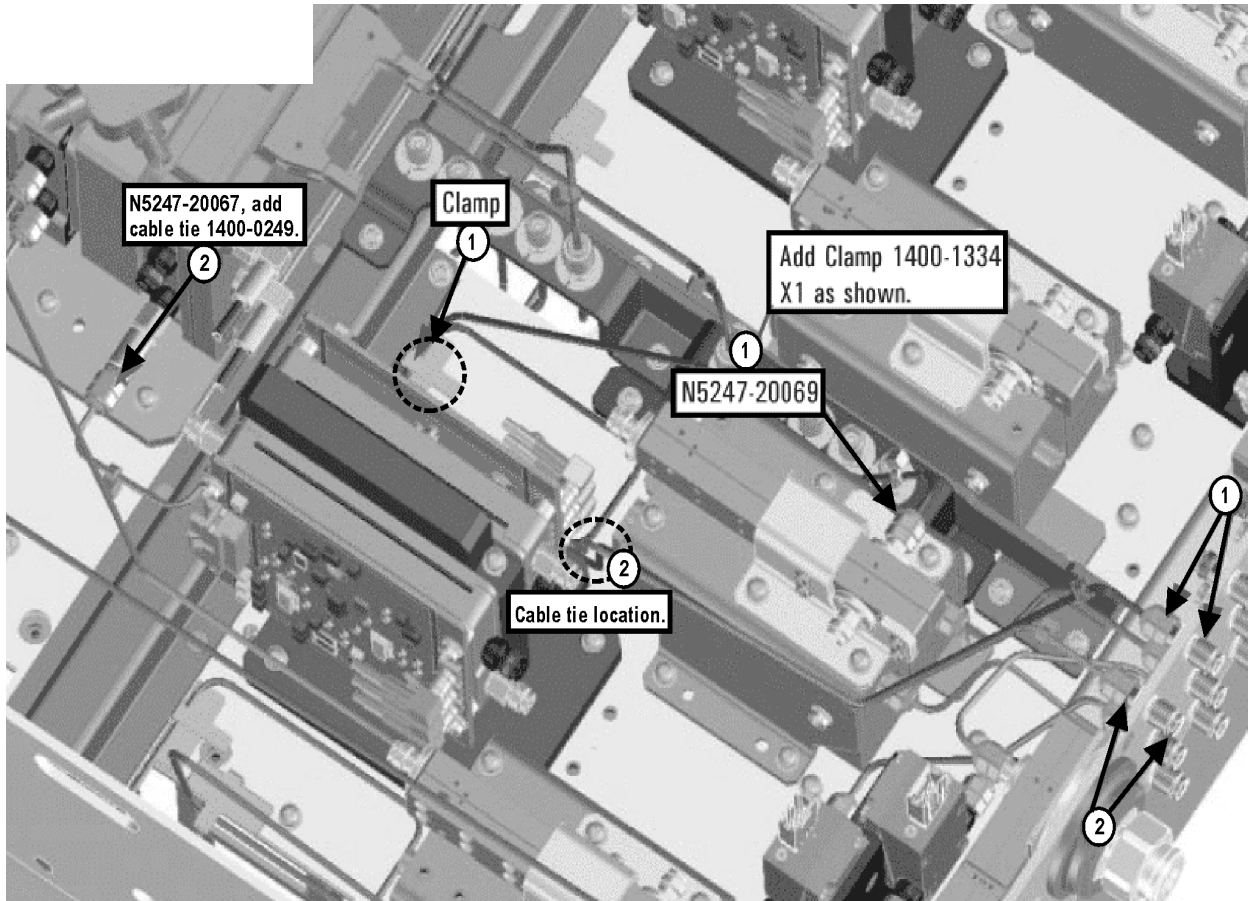
- W116 (N5247-20080) A45 port 2 bias tee to A36 port 2 coupler
- W121 (N5247-20024) A48 port 4 receiver attenuator to port 4 RCVR D IN
- W111 (N5247-20021) A44 port 4 bias tee to port 4 CPLR THRU
- W42 (N5247-20026) A35 port 4 coupler to port 4 CPLR ARM
- W110 (N5247-20025) A40 port 4 source attenuator to port 4 SOURCE OUT

Installation Procedure for the Upgrade

- W41 (N5247-20069) A31 port 4 receiver coupler to REF 4 SOURCE OUT
- W55 (N5247-20067) A28 mixer brick (R4) to REF 4 RCVR R4 IN

* As shown in **Figure 23-2**, install clamp part number 1400-1334 to secure W41, and install cable tie part number 1400-0249 to secure W55.

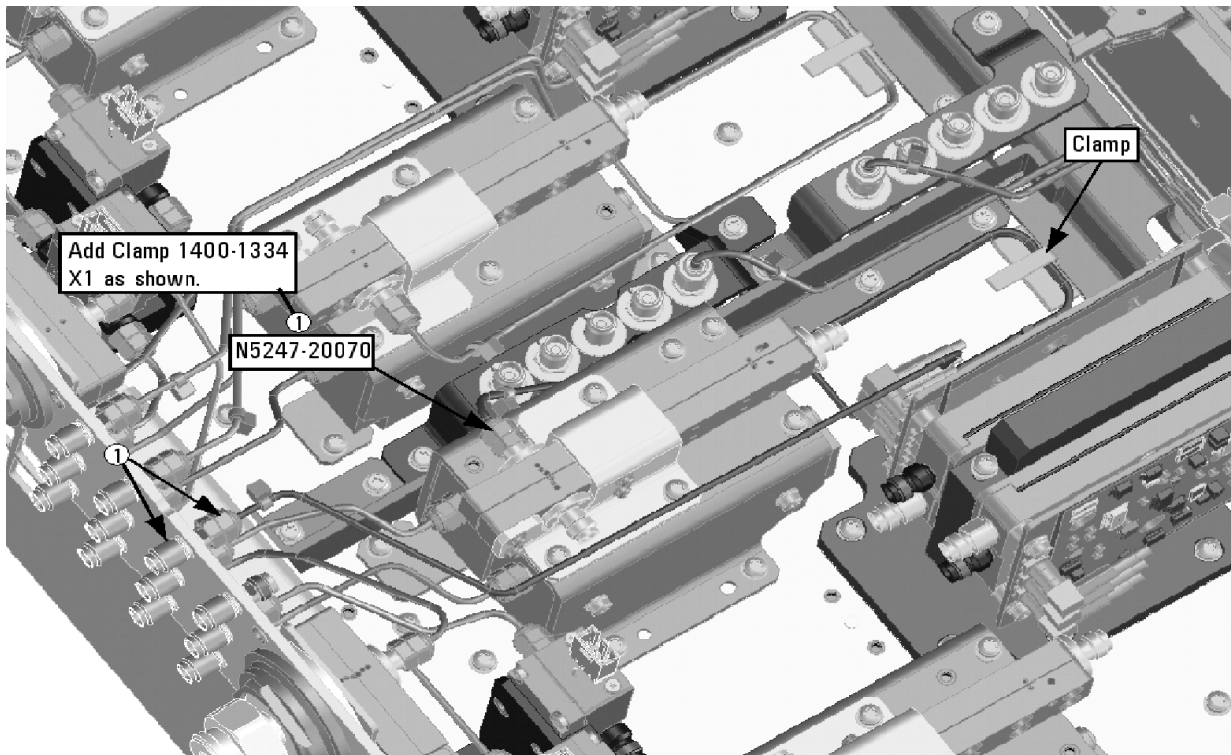
Figure 23-2 Location of Cable Clamp to Secure W41 and Cable Tie to Secure W55



- W104 (N5247-20022) A42 port 1 bias tee to A33 port 1 coupler
- W119 (N5247-20008) Port 3 RCVR C IN to A47 port 3 receiver attenuator
- W38 (N5247-20007) Port 3 CPLR ARM to A34 port 3 coupler
- W106 (N5247-20009) Port 3 SOURCE OUT to A39 port 3 source attenuator
- W103 (N5247-20010) A42 port 1 bias tee to port 1 CPLR THRU
- W37 (N5247-20070) A30 port 3 receiver coupler to front-panel REF 3 SOURCE OUT

* As shown in **Figure 23-3**, install clamp, part number 1400-1334, to secure W37.

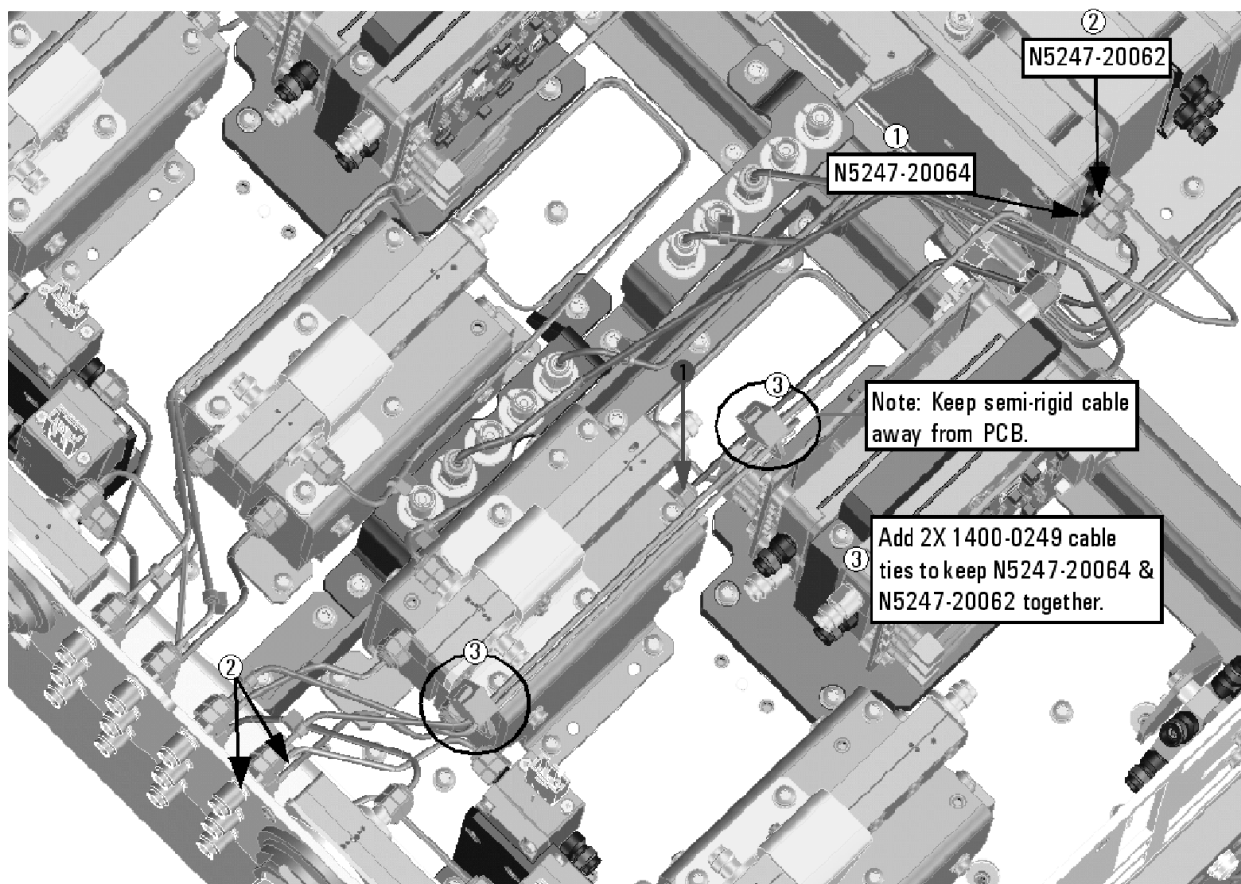
Figure 23-3 Location of Cable Clamp to Secure W37



- W18 (N5247-20084) A61 port 3 70 GHz doubler to W17
- W14 (reuse) (N5247-20072) A60 port 1 70 GHz doubler to W13
- W120 (N5247-20064) A47 port 3 receiver attenuator to A28 mixer brick (C)
- W54 (N5247-20062) REF 3 RECEIVER R3 IN to A28 mixer brick (R3)

* As shown in **Figure 23-4**, install two cable ties, part number 1400-0249, to secure W120 and W54.

Figure 23-4 Location of Cable Ties to Secure W120/W54 (1400-0249, N5247-20062, N5247-20064)

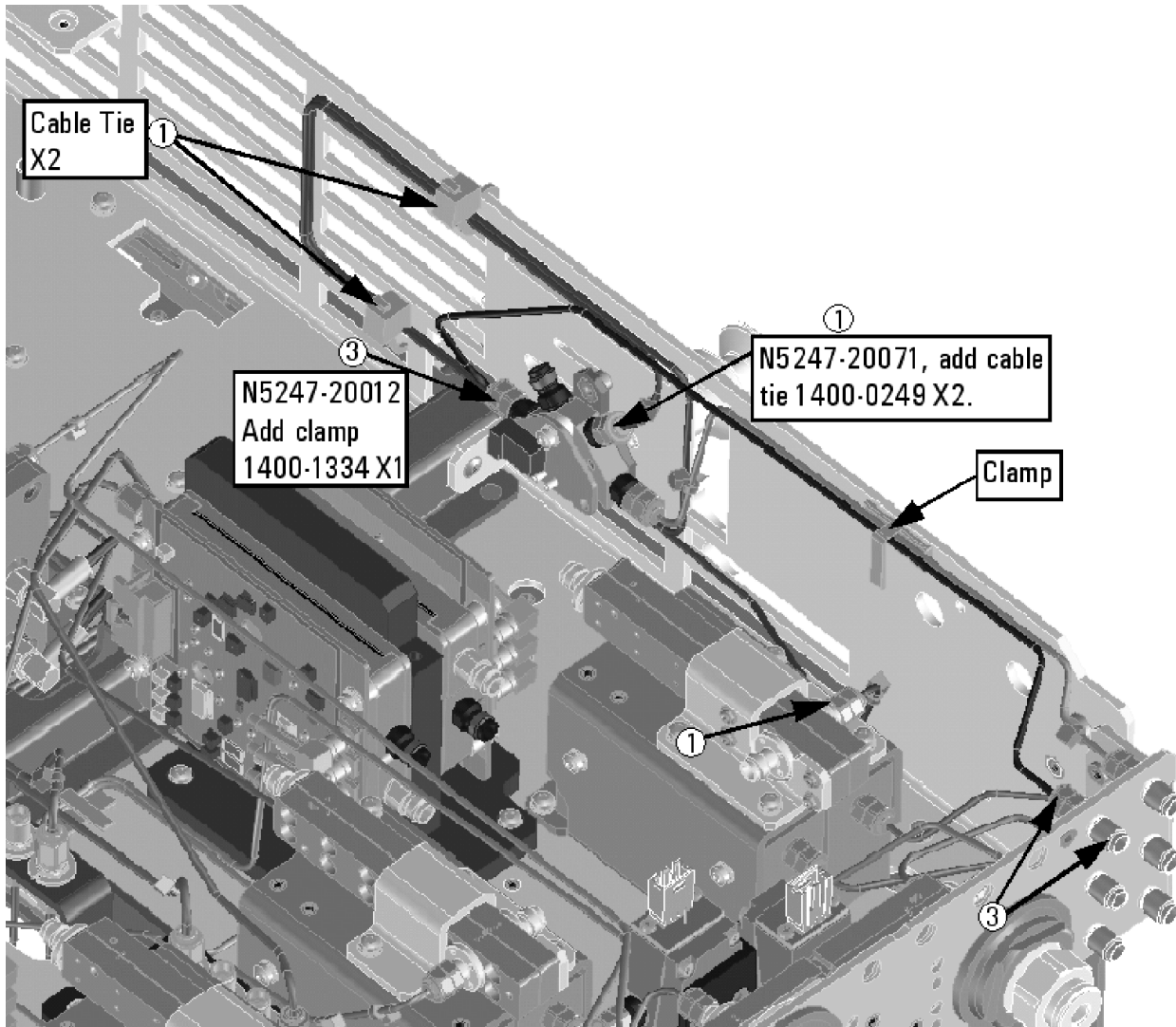


N5227_110_01

- W107 (N5247-20081) A43 port 3 bias tee to port 3 CPLR THRU
- W34 (N5247-20082) A33 port 1 coupler to port 1 CPLR ARM
- W117 (reuse) (N5247-20013) A46 port 1 receiver attenuator to port 1 RCVR A IN
- W102 (reuse) (N5247-20014) A38 port 1 source attenuator to port 1 SOURCE OUT
- W108 (N5247-20028) A43 port 3 bias tee to A34 port 3 coupler
- W144 (N5247-20071) A29 port 1 receiver coupler to A37 reference mixer switch

* As shown in **Figure 23-5**, install cable tie, part number 1400-0249, to secure W144.

Figure 23-5 Location of Cable Tie to Secure W144 (1400-1334, N5247-20012, N5247-20071)



N5247_106_03

- W51 (reuse) (N5247-20011) A37 reference mixer switch to REF 1 SOURCE OUT
- W52 (reuse) (N5247-20012) A37 reference mixer switch to REF 1 RCVR R1 IN
- * As shown in **Figure 23-5**, install cable clamp, part number 1400-1334, to secure W52.
- W53 (reuse) (N5247-20048) A37 reference mixer switch to A27 mixer brick (R1)
- W118 (reuse) (N5247-20047) A46 port 1 receiver attenuator to A27 mixer brick (A)
- W122 (N5247-20065) A48 port 4 receiver attenuator to A28 mixer brick (D)

Installation Procedure for the Upgrade

- W101 (reuse) (N5247-20083) A29 port 1 receiver coupler to A38 port 1 source attenuator
 - W113 (reuse) (N5247-20083) A32 port 2 receiver coupler to A41 port 2 source attenuator
 - W105 (N5247-20083) A30 port 3 ref coupler to A39 port 3 source attenuator
 - W109 (N5247-20083) A31 port 4 ref coupler to A40 port 4 source attenuator
 - W27 (reuse) (N5247-20044) A60 port 1 70 GHz doubler to A29 port 1 receiver coupler
 - W28 (N5247-20043) A61 port 3 70 GHz doubler to A30 port 3 receiver coupler
 - W16 (N5247-20060) A61 port 3 70 GHz doubler to W15
 - W12 (reuse) (N5247-20059) A60 port 1 70 GHz doubler to W11
 - W29 (N5247-20044) A62 port 4 70 GHz doubler to A31 port 4 receiver coupler
 - W20 (N5247-20015) A62 port 4 70 GHz doubler to W19
 - W24 (reuse) (N5247-20061) A63 port 2 70 GHz doubler to W23
 - W30 (reuse) (N5247-20043) A63 port 2 70 GHz doubler to A32 port 2 receiver coupler
 - W22 (N5247-20068) A62 port 4 70 GHz doubler to W21
 - W26 (reuse) (N5247-20051) A63 port 2 70 GHz doubler to W25

 - W63 (N5245-20023) A26 splitter to A27 mixer brick
 - W64 (N5245-20022) A26 splitter to A28 mixer brick
 - W62 (N5247-20111) A26 splitter to A25 HMA26.5
- * Tighten the screws that secure the A26 splitter to the mixer mounting block to 9 in-lbs.

Step 41. Install Cables on IF Multiplexer Board

Install the following gray flexible cables in the order listed. Mixer brick cables were connected to the mixer bricks earlier in this procedure, but the other ends of these cables still require a connection. To see images showing the location of these cables, click either of the Chapter 6 bookmarks “Bottom RF Cables, 4-Port, Option 419 (S/N Prefixes <6021)” in the PDF Service Guide¹. New parts are listed in **Table 1 on page 11**.

- W80 (N5242-60013) A24 IF multiplexer board P203 to A16 SPAM board J2

Installation Procedure for the Upgrade

- W82 (N5242-60015) A24 IF multiplexer board P603 to A16 SPAM board J5
- W71 (reuse) (N5242-60017) A27 mixer brick (A) to A24 IF multiplexer (P1)
- W72 (N5242-60021) A27 mixer brick (R1) to A24 IF multiplexer (P411)
- W73 (N5242-60022) A27 mixer brick (R2) to A24 IF multiplexer (P412)
- W74 (reuse) (N5242-60018) A27 mixer brick (B) to A24 IF multiplexer (P201)
- W75 (N5242-60024) A28 mixer brick (D) to A24 IF multiplexer (P801)
- W76 (N5242-60019) A28 mixer brick (R4) to A24 IF multiplexer (P414)
- W77 (N5242-60020) A28 mixer brick (R3) to A24 IF multiplexer (P413)
- W78 (N5242-60023) A28 mixer brick (C) to A24 IF multiplexer (P601)
- W79 (reuse) (N5242-60012) A24 IF multiplexer board P3 to A16 SPAM board J1
- W81 (reuse) (N5242-60014) A24 IF multiplexer board P403 to A16 SPAM board J4
- W83 (reuse) (N5242-60016) A24 IF multiplexer board P803 to A16 SPAM board J6

Step 42. Reinstall the Testset Stabilizer Bracket on the A24 IF Multiplexer Board

Reinstall the stabilizer bracket - see **Figure 2**.

Step 43. 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.

Step 44. Install Cables 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 cables and wire harness in the order listed. To see an image showing their locations, click the Chapter 6 bookmark “Bottom Ribbon Cables and Wire Harnesses, 4-Port, Option 419 (S/N Prefixes <6021)” in the PDF Service Guide¹. New parts are listed in **Table 1 on page 11**.

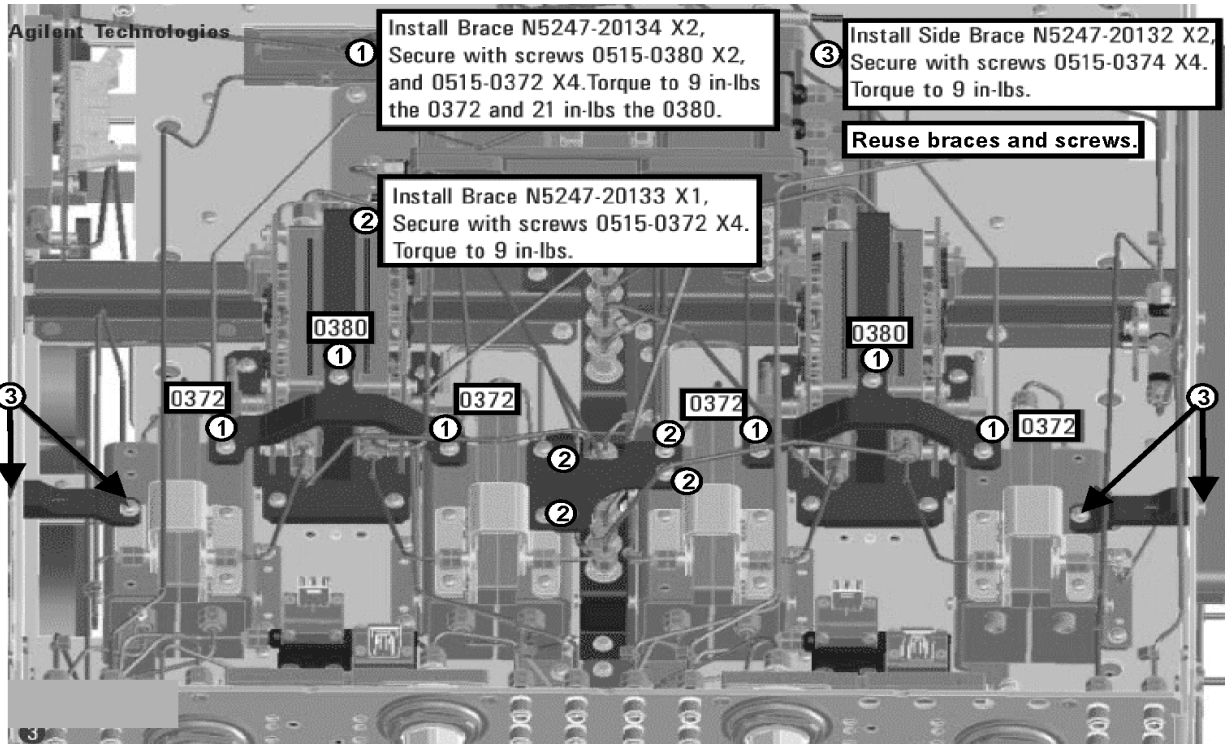
- Ribbon cable (N5247-60015) from A28 mixer brick (2) J52 to A23 test set motherboard J552
- Ribbon cable (N5247-60018), A61 port 3 70 GHz doubler J1 to A23 test set motherboard J5
- Ribbon cable (N5247-60018), A62 port 4 70 GHz doubler J1 to A23 test set motherboard J3
- Ribbon cable (N5247-60021), A43 port 3 bias tee to A23 test set motherboard J543
- Ribbon cable (N5247-60021), A44 port 4 bias tee to A23 test set motherboard J544
- Ribbon cable (N5247-60020), A47 port 3 receiver attenuator to A23 test set motherboard J206
- Ribbon cable (N5247-60020), A48 port 4 receiver attenuator to A23 test set motherboard J207
- Ribbon cable (N5245-60006), A39 port 3 source attenuator to A23 test set motherboard J547
- Ribbon cable (N5245-60006), A40 port 4 source attenuator to A23 test set motherboard J548

1. See “[Downloading the Online PNA Service Guide](#)” on page 9.

Step 45. Install the Braces on the Bottom Side of the PNA

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

Figure 24 Location of Braces on the Bottom Side of the PNA (0515-0372, 0515-0374, 0515-0380, N5247-20032, N5247-20033, N5247-20134)



N5247_106_08

Step 46. 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 25 on page 56**. New parts are listed in **Table 1 on page 11**.

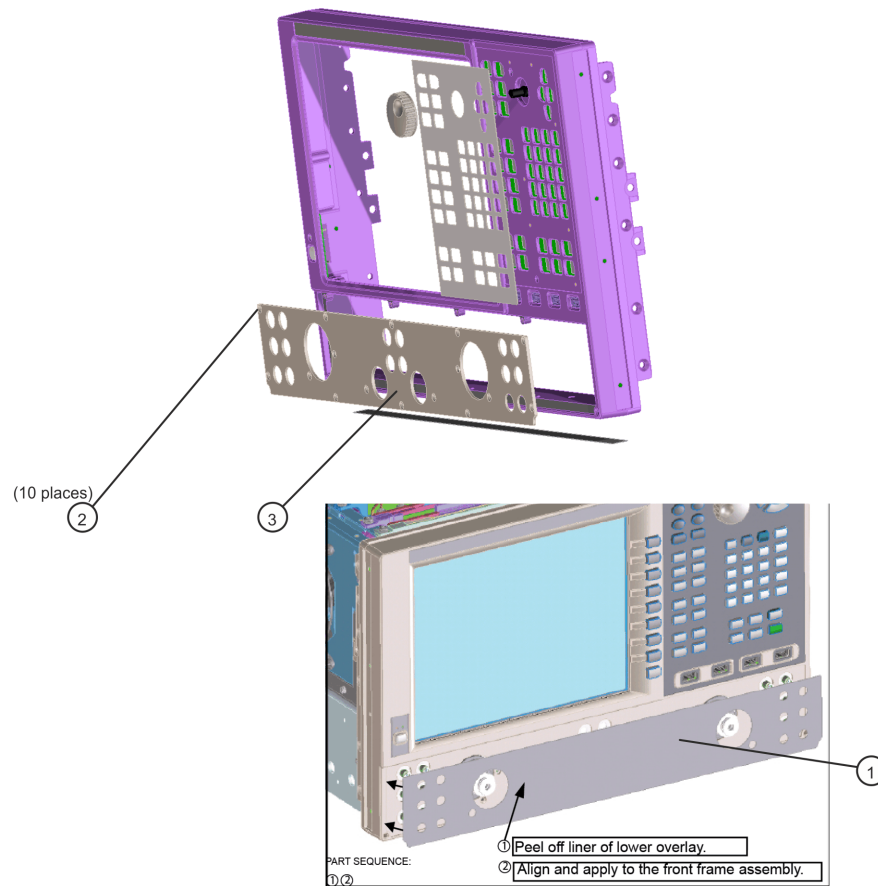
1. Remove the 2-Port lower front panel label (item ①).
2. Remove the 10 screws (save the screws for reuse) from the 2-port dress panel and remove the dress panel (item ② and ③ respectively).
3. Reassemble the front panel's lower dress panel assembly with the new 4-port dress panel (N5240-00009) by reversing 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 48. Install the Overlay"** on page 56.

Figure 25

Replacing the Front Panel's Lower Dress Panel and label



Step 47. 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 48. Install the Overlay

To see an image of the front panel overlay (N5227-80027 or N5247-80021), click the Chapter 6 bookmark “Front Panel Assembly, Front Side, All Options” in the PDF Service Guide¹. New parts are listed in **Table 1 on page 11**.

1. Remove the protective backing from the new front panel overlay (N5227-80027 or N5247-80021).
2. Loosely place the overlay in the recess on the lower front panel.

1. See **“Downloading the Online PNA Service Guide” on page 9**.

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 49. Install the Jumper Cables

- Install twelve W60 front panel jumper cables (N5247-20107) – 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.

Step 50. 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 51. Reinstall the Inner Cover

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

Step 52. 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 9.](#)

Step 53. Remove Option 219 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 219 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. In the Select Desired Option list, click **219**.
3. Right click the on the desired option and click **Delete**.
4. In the Keysight License Manager dialog box that appears, press or click **Yes** to confirm delete.
5. A message displays stating that the option removal was successful.
6. Restart the PNA Analyzer application: Press **File > Exit**.
7. In the Exit NA Application dialog box that opens, press **OK**.

Step 54. Enable Option 419

Procedure Requirements

NOTE

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

-
- The analyzer must be powered up and operating to perform this procedure.
 - The Network Analyzer program must **not** be running.
 - Refer to the license message you received from Keysight: Verify that the analyzer's model and serial numbers match those on the license message you received from Keysight.
 - A keyboard and mouse must be connected to the network analyzer.

Option Enable Procedure

1. Locate the email(s) from Keysight which contain license file attachments. These emails are a result of **“Step 1. Obtain a Keyword and Verify the Information” on page 18.**
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 licenses for more than one instrument.

-
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.

Option Verification Procedure

NOTE

If the option(s) have not been enabled or older options have not been removed, perform the prior steps again. If the options are still not correct, contact Keysight Technologies. Refer to **“Getting Assistance from Keysight” on page 6.**

Once the analyzer has restarted and the Network Analyzer program is again running:

1. Start the Network Analyzer program.
2. Once the Network Analyzer program is running:
 - Press **Help > About NA** and verify that Option 419 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 Adjustments (i.e., Diagnostic Tools, Utilities, and Adjustments) topic in the PNA Online Help:
<https://rfmw.em.keysight.com/wireless/helpfiles/N52xxB/help.htm>.

Step 55. 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 freq adjustment
- EE default adjustment: Src 2 Synth Only
- synthesizer bandwidth adj. (only run when EE default adjust is not sufficient)
- source adjustment
- IF gain adjustment
- receiver adjustment
- receiver characterization
- IF Response Adjustment (Option S93090xA/B, S93092A/B, S93093A/B, or S93094A/B Only)

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

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

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

1. See “[Downloading the Online PNA Service Guide](#)” on page 9.

EEPROM Backup

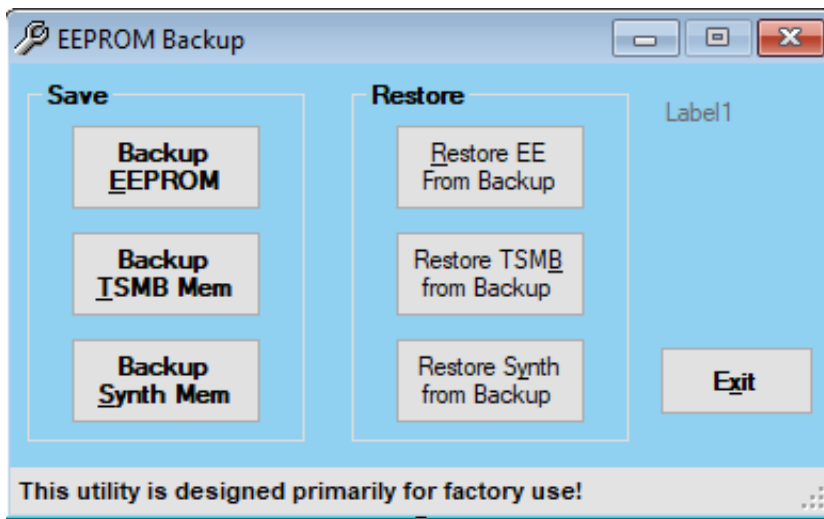
The analyzer uses arrays of correction constants to enable the analyzer to produce accurate, leveled source signals and receive clean test signals. These constants are stored in non-volatile EEPROM memory and in flash memory files.

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.

Figure 26 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 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 Guide¹.

Step 56. 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

