Keysight 2-Port/4-Port N522xA to N522xB Model PNA Upgrade Kit - Installation Guide

This manual provides documentation for the following models: N522xA
To Upgrade 2-Port/4-Port "A" models to
2-Port/4-Port "B" models:

N5221AU-690 /N5221AU-691 (For N5221B),
N5222AU-690 /N5222AU-691 (For N5222B),
N5224AU-690 /N5224AU-691 (For N5224B),
N5225AU-690 /N5225AU-691 (For N5225B), and
N5227AU-690 /N5227AU-691 (For N5227B)

Upgrade Kit Numbers: N5222-60115 /N5222-60134,
N5225-60115 /N5225-60126, and
N5227-60111 /N5227-60126

This is the Installation Note for the PNA-X N522xA Series Microwave Network Analyzers.

Notices

Trademark Acknowledgments

Manual Part Number

N5222-90115

Edition

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Warranty

Technology Licenses

U.S. Government Rights

Safety Notices

CAUTION

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

WARNING

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

Keysight Licensed Functionality Upgrade Kit
License-Enabled Options, N522xB Microwave Network Analyzers
Installation Note

Description of this Upgrade

This upgrade converts your N52xxA microwave network analyzer to an equivalent N52xxB running the Windows 10 operating system. This is done by removing the existing front panel assembly, outer covers, and installing a new front panel assembly, SSDA, and outer covers.

As part of this upgrade, there are other assemblies that need to be verified, because the boards must be of a certain type to be compatible with the B model upgrade. Refer to "Initial Instrument Inspection" on page 19.

After installation of this upgrade, your analyzer will be a "B" model rather than an "A" model.

Option 690 is for N52xxA models which already contain the version 7 CPU. Option 691 is for N52xxA models which need the CPU upgraded to the latest version.

Refer to "Overview of the Installation Procedure" on page 22.

CAUTION	**STOP!** This repair must be done at a service center! Refer to "Getting Assistance from Keysight" on page 6.

NOTE	**IMPORTANT!** As part of the upgrade, the service center needs a copy of the customer's Keysight License files that were sent to them from Keysight. Refer to "License Key File Redemption" on page 7.

NOTE	Included in the contents of this kit is a Software Entitlement Certificate with instructions on how to redeem it. Do NOT attempt to redeem this certificate until you have read "License Key File Redemption" on page 7.

NOTE	For additional information on using the Keysight Software Manager and redeeming a Software Entitlement Certificate, refer to https://www.keysight.com/us/en/assets/9018-04534/installation-guides/9018-04534.pdf (N5242-90024).

KEYSIGHT
TECHNOLOGIES

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.
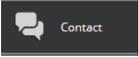
Getting Prepared

License Key File Redemption

| NOTE | **IMPORTANT!** As part of the upgrade, the service center needs to request a the customer's Keysight License files from Keysight. Refer to "License Key File Redemption" on page 7. |

| NOTE | **IMPORTANT!** Also, you will need to contact the Keysight factory support node to request multiple license key files. Refer to "Obtain Multiple License Key Files" on page 9. |

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

| NOTE | The enclosed Software Entitlement Certificate is a receipt, verifying that you have purchased a licensed option for the analyzer 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 upgrade model(s), you must request an Option 690/691 license key file from the Keysight Software Manager:
http://www.keysight.com/find/softwaremanager:

To complete the request, you will need to gather the following information:

— From the certificate

 — Order number

 — Certificate number

— From your instrument

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

 — Model number

 — Serial number

Using the information just gathered, you must request license key file from the Keysight Software Manager:
http://www.keysight.com/find/softwaremanager.

The following Keysight Software Manager (KSM) procedure has steps that are specific to the A model to B model upgrade (Option 690/691).

1. Enter your login and password or setup a login as required.

2. In the Keysight License Manager welcome window, click **You can add a new certificate**.

3. In the "Keysight Software Manager: Add Certificate" window that opens, in the "Enter your certificate information" section, refer to your Software License Certificate that you received with your upgrade kit and enter the following:

    – Order Number

    – Certificate Number

4. Click **Continue** (to return to the Keysight Software Manager welcome screen).

5. If there are multiple "A" model PNAs that are being upgraded to a "B" model, repeat steps 3 and 4.

    Else, continue to next step.

6. In the Keysight Software Manager welcome screen, click "You can request new licenses".

7. In the "Keysight Software Manager: Request Licenses" window that opens, in the "Select the host to assign licenses to" section, click the **Click to add or select a host** dropdown.

8. Click **Add a new License Notifier Host ID host...**

9. In the **License Notifier Host ID:** box that is displayed, enter your instrument's model and serial number, separated by only a comma—no spaces). Example:

    – **New License Host Notifier Host ID host:** `N5242A,MY12345678`

    – The Model number suffix should **always** be "**A**" (i.e., NOT "AS", and NOT "B")

10. In the **Select the licenses to assign** section, scroll down until you see a Option 690 or Option 691 upgrade with your instrument's "A" and "B" model values— similar to this `example`—and then click the box to select:

    – `N5247AU-690 Upgrade N5247A to N5247B`

NOTE

IMPORTANT: To avoid the loss of an option license, ensure that you only have a single Option 690/691 upgrade checked.

11. Click **Assign Licenses**

12. In the "Assigned licenses:" section that opens, listing all of the License Notifier Host IDs and associated instrument information, verify the following:

    – **License Notifier Host ID:** contains the correct "B" model and serial number

- — the associated **N52xxAU-690 Upgrade** or **N52xxAU-691 Upgrade** lists the correct "A" model to "B" model

If any of the information listed in the "Assigned licenses:" section is incorrect, click **Remove** next to the incorrect License Notifier Host ID: or N52xxAU-690 or N52xxAU-691 to remove them from the Assigned Licenses list.

13. If there are multiple "A" model PNAs that are being upgraded to a "B" model, repeat steps 7 through 12.

    Else, continue to next step.

14. Once you have verified the License Notifier Host ID & N52xxAU-690 /N52xxAU-691 Option models are correct for all of the PNAs being upgraded, click **Continue >** (an email is sent to you with an Option 690 or Option 691 license file for each specific License Notifier Host ID'd PNA).

15. Keysight will promptly email your license key file(s) to your profile's email address.

Obtain Multiple License Key Files

All of the licenses in your instrument need to be converted to a new format for your "B" model instrument. Contact Keysight Technologies factory support early in your upgrade process to receive your licenses in a timely manner. See "Getting Assistance from Keysight" on page 6.

You will need to provide Keysight with the following information:

— model number

— serial number

— email address of the technician performing this upgrade (i.e., to send the license key files)

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 "Description of this Upgrade" on page 5.

Downloading the Online PNA Service Guide

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

1. Go to www.keysight.com.

2. In the Search box, enter the model number of the analyzer (e.g., N5232B) and click **Search**.

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

4. In the **Search Support** area type your instrument's model number (e.g., N2222B).

5. Press **Enter**.

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

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

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

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

Protecting Your Workspace from Electrostatic Discharge

For information, click on the Chapter 1 bookmark, "Electrostatic Discharge Protection" in the PDF of your instrument's Service Guide on www.keysight.com.[1]

ESD Equipment Required for the Installation

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

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

Tools Required for the Installation

Description	Qty
T-10 TORX driver - set to 9 in-lbs (1.02 N.m)	1
T-20 TORX driver - set to 21 in-lbs (2.38 N.m)	1
5/16-in (8 mm) nutsetter or open end torque wrench - set to 10 in-lbs (1.13 N.m)	1
5/16-in (8 mm) nutsetter or open end torque wrench - set to 21 in-lbs (2.38 N.m)	1
9 mm nutsetter or open end torque wrench - set to 21 in-lbs) (2.38 N.m)	1
1/4-in (6 mm) open end wrench	1

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.

About Installing the Upgrade

Products affected	All N522xA microwave network analyzers
Installation to be performed by	Keysight service center, personnel qualified by Keysight, or customer
Estimated installation time	4 hours
Estimated adjustment time	1.5 hours
Estimated full instrument calibration time	4.5 to 8.0 hours

Items Included in the Upgrade Kit

Check the contents of your kit against the following list. If any part is missing or damaged, contact Keysight Technologies. Refer to "Description of this Upgrade" on page 5.

CAUTION
There are two CPU version part numbers listed in the upgrade kit tables below.

– W1312-60211 is the legacy version 7 CPU that some units have already installed. It is NOT being replaced and it is NOT included in Option 690 upgrade kit.

– W1312-60563 is current Version 9 CPU for Windows 10 upgrades in the N523xAU-691 upgrade kits. This CPU is included in the Option 691 upgrade kit.

Please verify your CPU version and your upgrade kit part number before you begin this procedure.

NOTE
This section applies to multiple models and upgrade kits. Please refer to the model and upgrade kit for your instrument's upgrade.

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.

Table 1   Contents of Upgrade Kit N5222-60115/N5222-60134 for N5221AU-690/N5221AU-691 (N5221B) and N5222AU-690/N5222AU-691 (N5222B)

Qty	Description	Part Number
1	Installation Note (this document)	N5222-90115
1	Software Entitlement Certificate	5964-5145
2	Front handle	5023-3074
4	Rear foot	5041-7903
4	Bottom foot	5041-7906
2	Trim strip, side, phantom gray	5041-7908
1	Caution label	5190-1799
1	Win 10 IoT Ent 2019 LTSC MultiLang ESD OEI EPKEA Value	9010-0350
1	China RoHS Addendum	9320-6722
1	Front panel – (assembly)	N5240-60071
4	Machine screw, M4.0 x 25 pan head (To attach rear feet to chassis.)	0515-1619

Description of this Upgrade
Items Included in the Upgrade Kit

Table 1   Contents of Upgrade Kit N5222-60115/N5222-60134 for
                    N5221AU-690/N5221AU-691 (N5221B) and N5222AU-690/N5222AU-691
                    (N5222B)

Qty	Description	Part Number
14	Machine screw, M3.0 x 10 mm flat head (To attach lower dress panel overlay frame to chassis).	0515-1946
12	Machine screw, M4.0 x 10 flat head (To attach front frame to chassis.)	0515-2044
1	Cable Assembly–Flat Ribbon 230 mm LG - Handler I/O cable (LFE)	8121-2919
1	Solid-state drive assembly (SSDA) – Option 690 only	N5242-60135[1]
	Solid-state drive assembly (SSDA) – Option 691 only	N5242-60137[2]
1	Lower front panel overlay, 2-port (N5221/2B Option 200)	N5222-80009
	Lower front panel overlay, 2-port (N5221/2B Option 201/219)	N5222-80010
	Lower front panel overlay, 2-port (N5221/2B Option 217)	N5222-80011
	Lower front panel overlay, 4-port (N5221/2B Option 400)	N5222-80012
	Lower front panel overlay, 4-port (N5221/2B Option 401/419/423)	N5222-80013
	Lower front panel overlay, 4-port (N5221/2B Option 417)	N5222-80014
	Lower front panel overlay, 2-port (N5221/2B Option 210)	N5227-80017
	Lower front panel overlay, 4-port (N5221/2B Option 410)	N5227-80018
1	Nameplate, N5221B	N5221-80008
	Nameplate, N5222B	N5222-80008
1	Lower Dress Panel, 2-Port (ALL PNA models). Goes on, before lower front panel overlay. Attach with 0515-1946 subpanel screws.	N5240-00010
	Lower Dress Panel, 4-Port (ALL PNA models). Goes on, before lower front panel overlay. Attach with 0515-1946 subpanel screws.	N5240-00009
1	Rear panel, power supply	N5240-00012
1	Cable, assembly 60C 30 AWG 60F 60F	N5240-60090
1	Label, KCC	N5220-80001
2	Guard, jumper cables, side—2-Port & 4-Port	N5242-00048
1	Outer cover	N5242-00047
1	Guard, jumper cables, center—4-Port	N5242-00049
1	Front impact cover	N9040-40007
1	Rear impact cover	N9040-40008
2	Strap handle assembly	N5242-60076

Table 1   Contents of Upgrade Kit N5222-60115/N5222-60134 for N5221AU-690/N5221AU-691 (N5221B) and N5222AU-690/N5222AU-691 (N5222B)

Qty	Description	Part Number
4	Key lock (for bottom foot)	5021-2840
1	Version 9 CPU kit (Option 691 only)	W1312-60563
Not Included - (For Reference Only) - External Hardware and Miscellaneous Parts, All Options		
4	Machine screw M5.0 x 18, flat head (To attach strap handle.)	0515-0710
4	Hole plug (When analyzer is rack mounted.)	N9020-40007
1	Synthesizer board (With tabs for s/n 5200 and above)	N5240-60074
	Synthesizer board (Without tabs for s/n's below 5200)	N5240-60076
1	Synthesizer board kit (Without tabs for s/n's below 5200)	N5242-60168
1	DSP (SPAM) version 5 board	N5240-60077
1	DSP (SPAM) cable (2-port only)	N5247-60023
	DSP (SPAM) cable (2-port only)	N5247-60024
	DSP (SPAM) cable (All)	N5242-60014
n/a	Version 7 CPU – is already installed on some instruments. It can be upgraded to Windows 10 OS using SSDA N5242-60135, but this legacy CPU is not part of the Option 690 upgrade kit. This p/n is included for reference only.	W1312-60211[1]

1. Version 7 SSDA for use only with the version 7 CPU. The version 7 CPU is not part of the Option 690 upgrade kit, but is required to use N5242-60135 Windows 10 OS SSDA. If an instrument has an older CPU than version 7 W1312-60211, the customer must order Option 691 to upgrade to a B model.
2. Version 9 SSDA for use only with the Version 9 CPU. The Version 9 CPU is included in the Option 691 upgrade kit.

Table 2   Contents of Upgrade Kit N5225-60115/N5225-60126 for N5224AU-690/691
(N5244B) and N5225AU-690/691 (N5225B)

Qty	Description	Part Number
1	Installation Note (this document)	N5222-90115
1	Software Entitlement Certificate	5964-5145
2	Front handle	5023-3074
4	Rear foot	5041-7903
4	Bottom foot	5041-7906
2	Trim strip, side, phantom gray	5041-7908
1	Caution label	5190-1799
1	Win 10 IoT Ent 2019 LTSC MultiLang ESD OEI EPKEA Value	9010-0350
1	China RoHS Addendum	9320-6722
1	Front frame – (assembly)	N5240-60071
4	Machine screw, M4.0 x 25 pan head (To attach rear feet to chassis.)	0515-1619
14	Machine screw, M3.0 x 10 mm flat head (To attach lower dress panel overlay frame to chassis).	0515-1946
12	Machine screw, M4.0 x 12 flat head (To attach front frame to chassis.)	0515-2044
1	Cable Assembly–Flat Ribbon 230 mm LG - Handler I/O cable (LFE)	8121-2919
1	Solid-state drive assembly (SSDA) – Option 690 only	N5242-60135[1]
	Solid-state drive assembly (SSDA) – Option 691 only	N5242-60137[2]
1	Lower front panel overlay, 2-port (N5224/5B Options 217)	N5225-80005
	Lower front panel overlay, 4-port (N5224/5B Option 417)	N5225-80006
	Lower front panel overlay, 4-port (N5224/5B Option 400)	N5227-80019
	Lower front panel overlay, 4-port (N5224/5B Option 401/419)	N5227-80020
	Lower front panel overlay, 2-port (N5224/5B Option 200)	N5227-80021
	Lower front panel overlay, 2-port (N5224/5B Option 201/219)	N5227-80022
	Lower front panel overlay, 2-port (N5224/5B Option 210)	N5227-80017
	Lower front panel overlay, 4-port (N5224/5B Option 410)	N5227-80018
1	Nameplate, N5224B	N5224-80002
	Nameplate, N5225B	N5225-80004
1	Lower Dress Panel, 2-Port (ALL PNA models). Goes on, before lower front panel overlay. Attach with 0515-1946 subpanel screws.	N5240-00010

Table 2   Contents of Upgrade Kit N5225-60115/N5225-60126 for N5224AU-690/691 (N5244B) and N5225AU-690/691 (N5225B)

Qty	Description	Part Number
	Lower Dress Panel, 4-Port (ALL PNA models). Goes on, before lower front panel overlay. Attach with 0515-1946 subpanel screws.	N5240-00009
1	Rear panel, power supply	N5240-00012
1	Cable, assembly 60C 30 AWG 60F 60F	N5240-60090
1	Label, KCC	N5220-80001
1	Outer cover	N5245-00035
2	Guard, jumper cables, side—2-Port & 4-Port	N5242-00048
1	Guard, jumper cables, center—4-Port	N5242-00049
1	Front impact cover	N9040-40007
1	Rear impact cover	N9040-40008
2	Strap handle assembly	N5247-60030
4	Key lock (for bottom foot)	5021-2840
1	Version 9 CPU kit (Option 691 only)	W1312-60563
Not Included - (For Reference Only) - External Hardware and Miscellaneous Parts, All Options		
	Machine screw M5.0 x 18, flat head (To attach strap handle.)	0515-0710
	Hole plug (When analyzer is rack mounted.)	N9020-40007
	Synthesizer board (With tabs for s/n 5200 and above)	N5240-60074
	Synthesizer board (Without tabs for s/n's below 5200)	N5240-60076
	Synthesizer board kit (Without tabs for s/n's below 5200) – Qty is 3 boards	N5242-60168
	DSP (SPAM) version 5 board	N5240-60077
1	DSP (SPAM) cable (2-port only)	N5247-60023
	DSP (SPAM) cable (2-port only)	N5247-60024
	DSP (SPAM) cable (All)	N5242-60014
n/a	Version 7 CPU – is already installed on some instruments. It can be upgraded to Windows 10 OS using SSDA N5242-60135, but the legacy CPU is not part of the Option 690 upgrade kit. This p/n is included for reference only.	W1312-60211[1]

1. Version 7 SSDA for use only with the version 7 CPU. The version 7 CPU is not part of the Option 690 upgrade kit, but is required to use N5242-60135 Windows 10 OS SSDA. If an instrument has an older CPU than version 7 W1312-60211, the customer must order Option 691 to upgrade to a B model.
2. Version 9 SSDA for use only with the Version 9 CPU. The Version 9 CPU is included in the Option 691 upgrade kit.

Table 3   Contents of Upgrade Kit N5227-60111/N5227-60126 (For N5227AU-690/691 (N5227B))

Qty	Description	Part Number
1	Installation Note (this document)	N5222-90115
1	Software Entitlement Certificate	5964-5145
1	Caution label	5190-1799
1	Win 10 IoT Ent 2019 LTSC MultiLang ESD OEI EPKEA Value	9010-0350
1	China RoHS Addendum	9320-6722
1	Front frame – (assembly)	N5240-60071
4	Machine screw, M4.0 x 25 pan head (To attach rear feet to chassis.)	0515-1619
14	Machine screw, M3.0 x 10 mm flat head (To attach lower dress panel overlay frame to chassis).	0515-1946
12	Machine screw, M4.0 x 12 flat head (To attach front frame to chassis.)	0515-2044
1	Solid-state drive assembly (SSDA) – Option 690 only	N5242-60135[1]
	Solid-state drive assembly (SSDA) – Option 691 only	N5242-60137[2]
2	Front handle	5023-3074
4	Rear foot	5041-7903
4	Bottom foot	5041-7906
2	Trim strip, filler (For analyzers without handles.)	5041-7908
1	Cable Assembly–Flat Ribbon 230 mm LG - Handler I/O cable (LFE)	8121-2919
1	Lower front panel overlay, 2-port (N5227B Options 200)	N5227-80023
	Lower front panel overlay, 4-port (N5227B Option 400)	N5227-80024
	Lower front panel overlay, 4-port (N5227B Option 401/419)	N5227-80027
	Lower front panel overlay, 2-port (N5227B Option 201/219)	N5227-80028
	Lower front panel overlay, 2-port (N5227B Option 210)	N5227-80025
	Lower front panel overlay, 4-port (N5227B Option 410)	N5227-80026
1	Nameplate, N5227B	N5227-80016
1	Lower Dress Panel, 2-Port (ALL PNA models). Goes on, before lower front panel overlay. Attach with 0515-1946 subpanel screws.	N5240-00010
	Lower Dress Panel, 4-Port (ALL PNA models). Goes on, before lower front panel overlay. Attach with 0515-1946 subpanel screws.	N5240-00009
1	Rear panel, power supply	N5240-00012
1	Cable, assembly 60C 30 AWG 60F 60F	N5240-60090

Table 3   Contents of Upgrade Kit N5227-60111/N5227-60126 (For N5227AU-690/691 (N5227B))

Qty	Description	Part Number
1	Label, KCC	N5220-80001
1	Outer cover	N5245-00035
2	Guard, jumper cables, side—2-Port & 4-Port	N5242-00048
1	Guard, jumper cables, center—4-Port	N5242-00049
1	Front impact cover	N9040-40007
1	Rear impact cover	N9040-40008
2	Strap handle assembly	N5247-60030
4	Key lock (for bottom foot)	5021-2840
1	Version 9 CPU kit (Option 691 only)	W1312-60563
Not Included - (For Reference Only) - External Hardware and Miscellaneous Parts, All Options		
4	Machine screw M5.0 x 18, flat head (To attach strap handle.)	0515-0710
4	Hole plug (When analyzer is rack mounted.)	N9020-40007
1	Synthesizer board (With tabs for s/n 5200 and above)	N5240-60074
	Synthesizer board (Without tabs for s/n's below 5200)	N5240-60076
1	Synthesizer board kit (Without tabs for s/n's below 5200) – Qty is 3 boards	N5242-60168
1	DSP (SPAM) version 5 board	N5240-60077
1	DSP (SPAM) cable (2-port only)	N5247-60023
	DSP (SPAM) cable (2-port only)	N5247-60024
	DSP (SPAM) cable (All)	N5242-60014
n/a	Version 7 CPU – is already installed on some instruments. It can be upgraded to Windows 10 OS using SSDA N5242-60135, but the legacy CPU is not part of the Option 690 upgrade kit. This p/n is included for reference only.	W1312-60211[1]

1. Version 7 SSDA for use only with the version 7 CPU. The version 7 CPU is not part of the Option 690 upgrade kit, but is required to use N5242-60135 Windows 10 OS SSDA. If an instrument has an older CPU than version 7 W1312-60211, the customer must order Option 691 to upgrade to a B model.
2. Version 9 SSDA for use only with the Version 9 CPU. The Version 9 CPU is included in the Option 691 upgrade kit.

Initial Instrument Inspection

CAUTION

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

This section and all steps, must be completed, before proceeding to the following sections or customer data may be lost or instrument repair delayed!

CAUTION

STOP!

Any return to factory (RTF) that will have CPU, Midplane, Motherboard, Front Panel, or Front Panel Ribbon replaced will need to have it's event log cleared after the hardware replacements are complete.

Older System motherboards with serial numbers <N5247630022319450002 need to be reworked to remove L1, per Appendix C: "Motherboard Clearing the Event Log and Modification to Replace L1," on page 1. If you have an older system board, call Keysight Support to verify, if your instrument has previously been upgraded. Refer to "Getting Assistance from Keysight" on page 6.

Before beginning this System Motherboard rework, refer to step 4, in "Verifying the Board Assemblies" on page 21.

CAUTION

STOP!

If you ordered Option 690, your instrument requires a Version 7 CPU W1312-60211 to be able to use the Windows 10 Operating System SSDA N5242-60135. A version 7 CPU is not included with Option 690. If an instrument has an older CPU, then the customer must order Option 691 that includes a Version 9 CPU, refer to Table 1 on page 12, Table 2 on page 15, Table 3 on page 17 and to "Contacting Keysight" on page 6.

The purpose of this section is to verify where the instrument should begin the model conversion process. This section verifies that the instrument has all of the required board assemblies for a B model upgrade.

If your instrument does not have all of the required board assemblies, contact the customer, to provide a quote on parts and labor. Upon customer approval, order up all of the new upgrade kits and boards, before the "B" model upgrade can be completed.

Refer to Table 4 on page 20 and then to "Verifying the Board Assemblies" on page 21.

Table 4   Overview of Assembly Requirements for B Model Upgrade

Assembly[1] (see critical footnote)	Part Number	Serial Number for PNAs that start using these boards (PNAs with these serial prefixes do not need to be upgraded)	Can be ordered using the part number, or:
SPAM 5	N5240-60078 For 2-port PNAs, also order x1 N5247-60023 and x1 N5247-60024	MY/US5200 and above	N8989A-SP5
IF Multiplexer, version B	N5240-60062	MY/US5540 and above	N889A-MX2
Synthesizers, versions E, F, or G	N5240-60076 (single board) or N5242-60168 (3 board kit)	MY/US5120 and above	N8989A-SR6

> **NOTE** 2-port PNAs without option 224 need two synthesizer boards. 4-port PNAs or 2-port option 224 PNAs need three synthesizer boards.

Test Set Motherboard – **N5221/2A only**[2]	N5245-60163	MY/US4940 and above	____
System Motherboard[3, 4, 5] (See Critical Footnote)	N5247-60002	N52476300223194500002 and above	____

1. Critical Footnote:
   Any return to factory (RTF) that will have CPU, Midplane, Motherboard, Front Panel, or Front Panel Ribbon replaced will need to have it's event log cleared after the hardware replacements are complete.
2. All of the N5247A PNA N5224/5/7A PNAs already have a current N5245-60157 test set motherboard installed.
3. Critical Footnote:
   Older System motherboards with serial numbers <N52476300223194500002 need to be reworked to remove L1, per Appendix C, "Motherboard Clearing the Event Log and Modification to Replace L1" on page C-1. If you have an older system board, call Keysight Support to verify, if your instrument has previously been upgraded. Refer to "Getting Assistance from Keysight" on page page 6.
4. This is a system motherboard serial number break.
5. The system motherboards that require the L1 rework are only installed in the PNA/PNA-X instruments (i.e., N5224/25/27/44/45/47A).

Verifying the Board Assemblies

The following board assemblies need to be verified and installed during the upgrade:

1. Press **Help** > **About NA...**

2. In the About Network Analyzer window that opens, make a note of the following:

   – System CPU Version

     – The system CPU must be a version 7 or greater. Option 690 is for PNAs that already have the version 7 CPU installed, you must have a W1312-60211 version 7 CPU installed, to use the N5242-60135 Win 10 OS SSDA. If a PNA has an older CPU version that needs to be replaced, the customer will need to order the Option 691 kit, which includes a Version 9 or greater CPU. Please contact Keysight if you need to order Option 691.

   – DSP Version

     – The DSP (SPAM) board must be version 5 or greater. The SPAM V boards are not included in this kit. Please contact Keysight if you need to replace the SPAM boards and order N5240-60077 SPAM V and N5242-60014 (W61) IF cable. If you have a 2-Port instrument, you will also need to order one each of cable numbers: N5247-60023 and N5247-60024.

3. Press **Utility** > **System** > **Service** > **Diagnostics** > **EEPROM Headers**

   – Verify the LO Synth, Src1 Synth, and Src2 Synth boards part number is either "N524063074" or "N524263150". The synthesizer boards are **not** included in this kit. Please contact Keysight if you need to replace the synthesizer boards and order N5240-60076.

4. If your system motherboard is <N524763300223194500002 and your board has not been already reworked by the factory, then you must perform the L1 modification, per Appendix C: "Motherboard Clearing the Event Log and Modification to Replace L1," on page 1. If you suspect that you have

an older system board, call Keysight Support to verify, if your instrument has previously been upgraded. Refer to "Getting Assistance from Keysight" on page 6.

CAUTION

IMPORTANT!

If you need to rework you system motherboard, do not reassemble your instrument until reviewing/completing step 5 below and the following step in the "Overview of the Installation Procedure" on page 22:

If applicable:

– "Instruments with Windows XP Operating System (Windows XP OS) only" on page 23).

Refer to the Service Guide for your model instrument and to "Removing and Replacing the A14 System Motherboard" in "Chapter 7 Repair and Replacement Procedures."

5. Remove the instrument outer covers and if necessary the power supply, to verify the Midplane Board's part number reads: "W1312-63376". Refer to the Service Guide on www.keysight.com for removing the power supply.

   If the midplane board's part number does not read "W1312-63376", the Midplane Board needs to be modified. Refer to "Step 11. Inspect or Modify Midplane Board (W1312-63095 to a W1312-63376)" on page 35.

6. If your instrument has the minimum criteria mentioned above, or you have received the required parts you need, proceed to "Step 1. Copy All Unique Files to an External Disk Drive" on page 25.

Overview of the Installation Procedure

CAUTION

Windows XP OS only: Before installing the new SSDA (N5242-60135 (for Version 7 CPU) or N5242-60137 (for Version 9 CPU)) with Windows 10 OS (i.e., Option 690 or Option 691 upgrade kit), the service center's SSDA with firmware ≥A.10.40.00 must be loaded and initialized in the instrument. This initializes the instrument to a known stable state.

CAUTION

This section assumes you have completed the "Initial Instrument Inspection" section and verified, that all of the board assemblies meet the requirements for this A to B model upgrade. If not, refer to the "Initial Instrument Inspection" on page 19.

All instruments:

"Step 1. Copy All Unique Files to an External Disk Drive" on page 25

Instruments with Windows 7 Operating System (Windows 7 OS) only:

"Step 2. Update Windows 7 OS Instruments with A.10.40 or above" on page 27

"Step 3. Verify Windows 7 OS with New A.10.40.00 Firmware or Greater" on page 27

All instruments:

"Step 4. Remove the outer covers" on page 28

"Step 5. Remove the Power Supply Cover" on page 29

All instruments with System Motherboards <N52476300223194500002 that require L1 Modification:

"Step 6. System Motherboard L1 Modification (Serial Numbers ‹N52476300223194500002 that require L1 Modification)" on page 30

Instruments with Windows XP Operating System (Windows XP OS) only

"Step 7. Install the Version 7 CPU W1312-60211 and SSDA N5242-60133 *Service Center* Assembly with A.10.40 Firmware or Greater" on page 31

All instruments:

"Step 8. Install the *New* Power Supply Cover" on page 32

"Step 9. Power Up Your Instrument and Allow Windows 7 to Stabilize" on page 33

"Step 10. Remove the Front Panel Assembly" on page 33

"Step 11. Inspect or Modify Midplane Board (W1312-63095 to a W1312-63376)" on page 35

"Step 12. Install the Dress Panel on the New Front Panel Assembly" on page 37

"Step 13. Install the New Overlays on the New Front Panel Assembly" on page 38

"Step 14. Install the New Front Panel Assembly and the Lower Overlay" on page 39

"Step 15. Install New version SPAM V, Synth, IF Multiplexer, and Test Set Mother boards (If Necessary)" on page 43

"Step 16. Install the New Handler I/O Cable" on page 44

"Step 17. Install the *NEW* N5242-60135 Solid-State Disk Drive Assembly (SSDA) from the -690 Upgrade Kit; OR Install the *NEW* Version 9 CPU W1312-60563 and *NEW* N5242-60137 Solid-State Disk Drive Assembly (SSDA) from the -691 Upgrade Kit" on page 46

Step 1. Copy All Unique Files to an External Disk Drive

CAUTION   This section assumes you have completed the "Initial Instrument Inspection" section and verified, that all of the board assemblies meet the requirements for this A to B model upgrade. If not, refer to the "Initial Instrument Inspection" on page 19.

If you still need to modify your system motherboard and some of the other subsequent steps in the "Initial Instrument Inspection" on page 19, first, complete the copying of all uniques files to an external drive as indicated in this step and then return to complete the "Initial Instrument Inspection" on page 19.

NOTE   You may skip this step, if you plan to retain the installed SSD for future access. (i.e., To connect your old SSD as a secondary drive, a USB to data or USB to SATA converter cable is required and these are available commercially).

The hard disk drive (HDD/SSD) in your analyzer will be replaced as part of this upgrade. Therefore, it is necessary that all unique and personal files stored on the HDD/SSD be saved to an external disk drive for re-installation later on the new SSD.

This procedure is written assuming a USB flash memory drive is used, although any external disk drive will suffice.

1. Connect the power cord to the analyzer and turn ON the power.

2. Insert a USB flash memory drive into a USB port.

3. Open Windows Explorer.

4. Copy all of your files that you want to transfer to the USB drive:

    — If an instrument has a SSD with Windows XP: if the user has loaded unique calibration kit information, navigate to `C:\Program Files\Keysight\Network Analyzer` and copy USER_CALKITFILE to a USB flash memory drive. Also copy any personal user files that you wish to preserve.

    — If an instrument's has a SSDA with Windows 7 OS: for more information on the N8984A SSD, refer to the *Windows 7 Operating System Upgrade Kit Installation Note*, available online at https://www.keysight.com/us/en/assets/9018-04311/installation-guides/9018-04311.pdf (N8984-90001).

    Obsolete. Reference only.

- – If you are installing an SSDA for Windows 10: for more information on the N8985A SSD, refer to the *Windows 10 Operating System Upgrade Kit Installation Note*, available online at https://www.keysight.com/us/en/assets/9018-04733/installation-guides/9018-04733.pdf (N8985-90001).

5. Remove the USB drive from the USB port.

6. Exit Windows Explorer.

Step 2. Update Windows 7 OS Instruments with A.10.40 or above

NOTE	Skip this step, if your PNA is already running firmware A.10.40 or above.

1. If the PNA is running, click **File** > **Exit**

2. Go to https://www.keysight.com/my/en/lib/software-detail/instrument-firmware-software/n52xxb-pna-series-network-analyzer-firmware.html and download the latest PNA firmware.

3. Click on the firmware to be downloaded.

4. Save the program to disk (hard drive of your PC or to your PNA).

5. If necessary, transfer the file from your PC to your PNA using LAN, CD, or USB Pen drive.

6. Double-click the file on the PNA. Follow the prompts to complete the firmware installation.

7. If the PNA application does not start up automatically, double-click the network analyzer icon on the desktop.

NOTE	If you have problems with updating the PNA's firmware, refer to "Getting Assistance from Keysight" on page 6.

Step 3. Verify Windows 7 OS with New A.10.40.00 Firmware or Greater

NOTE	Skip this step, if your PNA is already running firmware A.10.40 or above.

1. After the new firmware is installed, verify the firmware operates without errors.

2. After the instrument powers up, on the toolbar click or press **Help** > **About NA** to verify the firmware has been updated to A.10.40.00 or greater.

3. Power down your instrument.

| NOTE	If you have problems with updating the PNA's firmware, refer to "Getting Assistance from Keysight" on page 6.

Step 4. Remove the outer covers

Remove the Outer Cover

1. Turn OFF the analyzer and disconnect the power cord.

2. With a T-20 TORX driver, remove the strap handles (item ①) by loosening the screw (item ②) on each end of each handle.

3. With a T-20 TORX driver, remove the four rear panel feet (item ③) by removing the center screws (item ④).

4. Slide the four bottom feet (item ⑤) off the cover.

5. Slide the cover off of the frame.

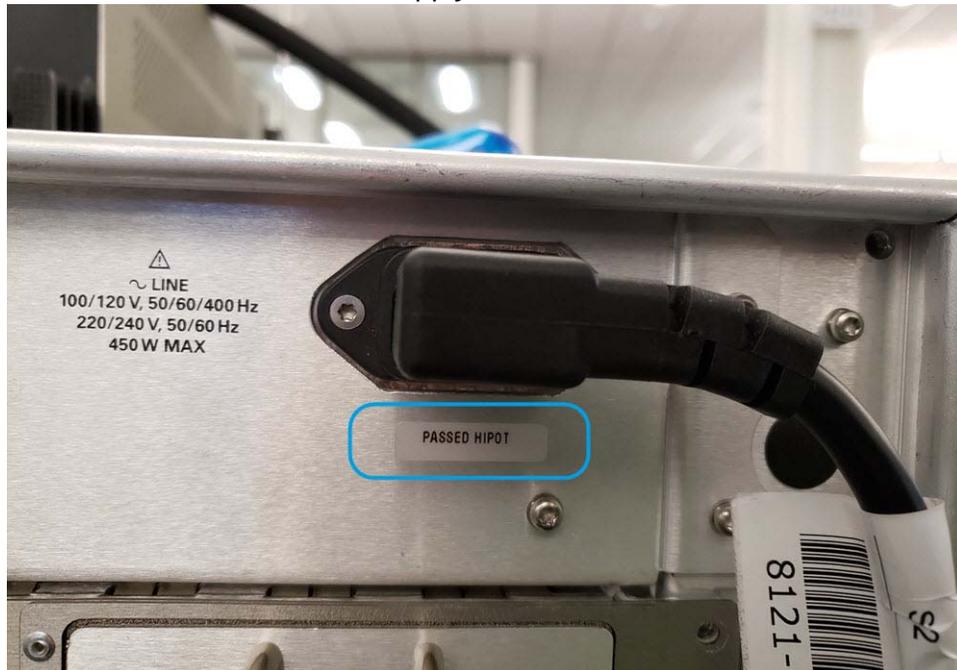Figure 1   Outer Cover Removal (Instruments Vary—Example Only)
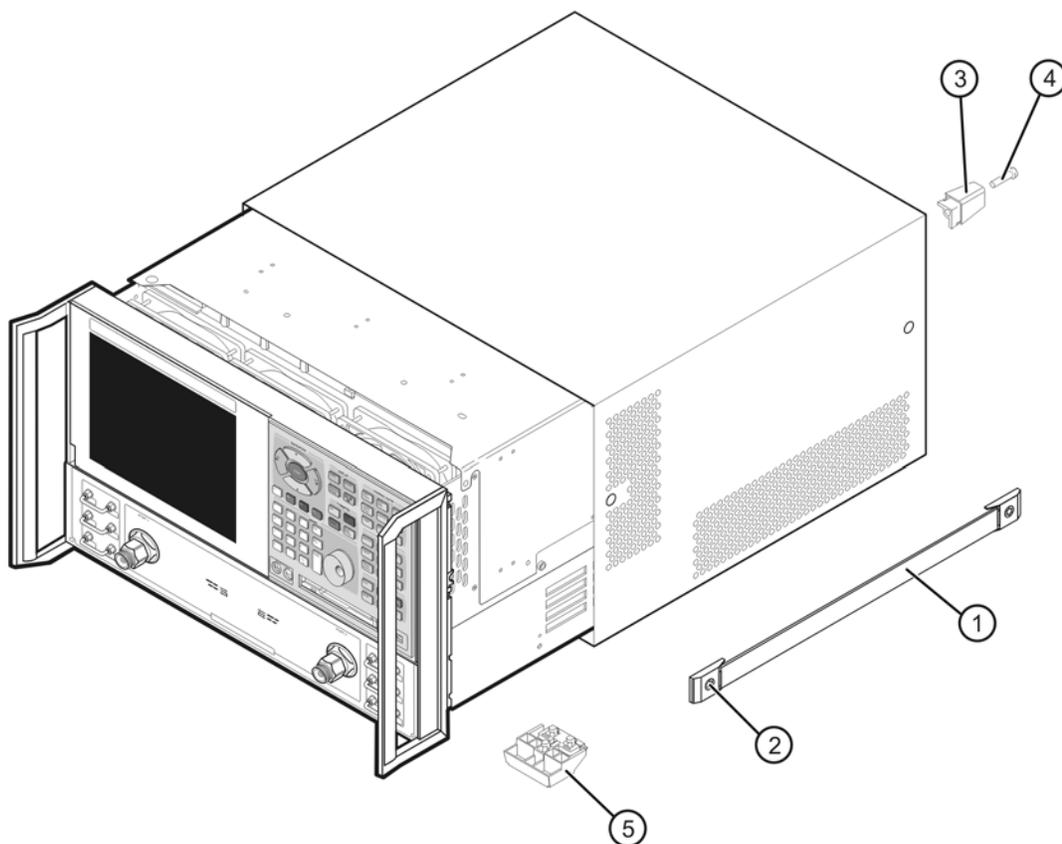
n5230_90027_003

Step 5. Remove the Power Supply Cover

1. On the rear panel, remove the screws (x7) and the power supply cover. Save the 0515-0372 (x7) screws for reuse.

2. If you do **not** have a new Hi-Pot label, then you need to peel off the old Hi-Pot sticker and save for reuse.

Figure 2   Hi-Pot Sticker on the Power Supply Cover

Description of this Upgrade
Step 6. System Motherboard L1 Modification (Serial Numbers
<N52476300223194500002 that require L1 Modification)

Step 6. System Motherboard L1 Modification (Serial Numbers <N52476300223194500002 that require L1 Modification)

CAUTION

IMPORTANT!

If your instrument already had a modified/updated system motherboard prior beginning this installation upgrade, skip to "Step 7. Install the Version 7 CPU W1312-60211 and SSDA N5242-60133 *Service Center* Assembly with A.10.40 Firmware or Greater" on page 31.

Else, if you are doing the modification as a part of this A to B-model upgrade, complete this procedure step.

1. Disassemble the instrument by referring to the Service Guide for your model instrument and to "Chapter 7 Repair and Replacement Procedures."

2. Perform the rework described in Appendix C:, "Motherboard Clearing the Event Log and Modification to Replace L1."

3. Assemble the instrument only as required to continue with this installation upgrade (e.g., complete the "Removing and Replacing the A14 System Motherboard" reverse assembly steps described in your instrument Service Guides' "Chapter 7 Repair and Replacement Procedures" up to, but **not** including the Midplane board, if your Midplane board requires rework, before reinstallation). Refer to "Downloading the Online PNA Service Guide" on page 10.

Description of this Upgrade
Step 7. Install the Version 7 CPU W1312-60211 and SSDA N5242-60133 *Service
Center* Assembly with A.10.40 Firmware or Greater

Step 7. Install the Version 7 CPU W1312-60211 and SSDA N5242-60133 *Service Center* Assembly with A.10.40 Firmware or Greater

CAUTION

IMPORTANT!

If your instrument already has a version 7 CPU W1312-60211and the Windows 7 OS has been updated to A.10.40 then skip this step to "Step 8. Install the *New* Power Supply Cover" on page 32.
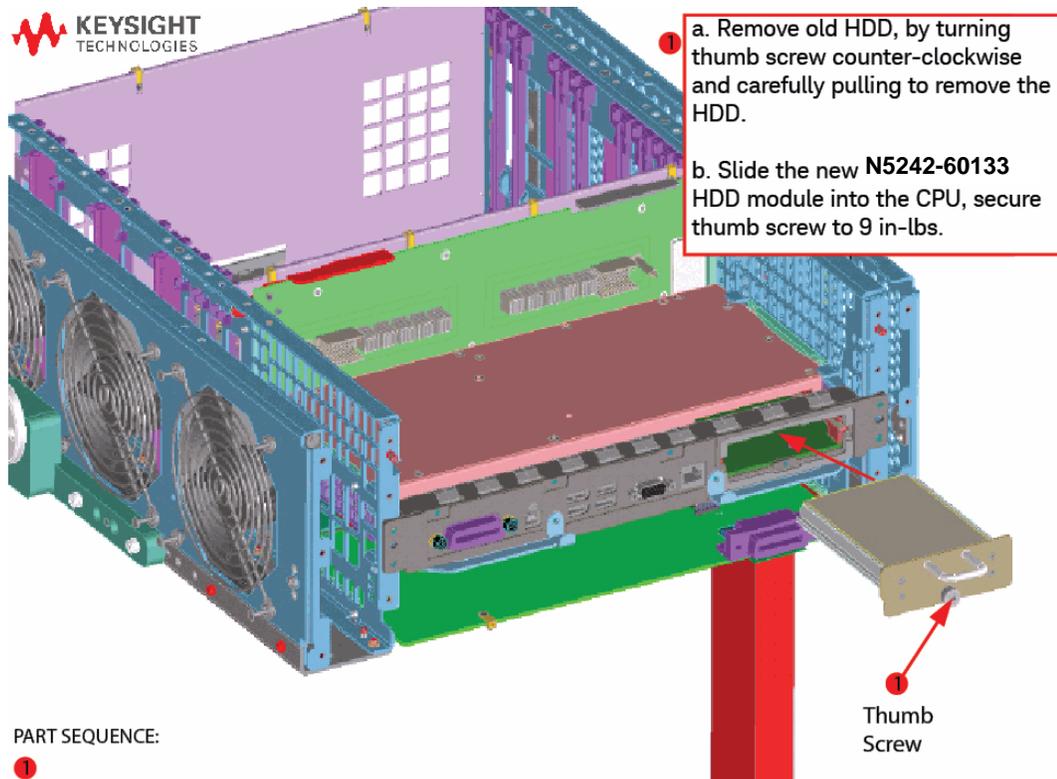
CAUTION

STOP! This section assumes you have upgraded your system board <N52476300223194500002 that require L1 Modification, else refer to "Step 6. System Motherboard L1 Modification (Serial Numbers ‹N52476300223194500002 that require L1 Modification)" on page 30.

If a instrument currently has Windows XP OS: Install the *service center's* version 7 CPU (W1312-60211) and Windows 7 OS SSDA (N5242-60133) into the analyzer by referring to Figure 3 on page 31 and to your instrument's Service Guise's Chapter 7 "Repair and Replacement Procedures" on www.keysight.com.

Figure 3   Service Center's Solid-State Disk Drive Assembly (SSDA) with A.10.40 or above (N5242-60135/N5242-60137 Win 10 OS SSDA installation is similar)

a. Remove old HDD, by turning thumb screw counter-clockwise and carefully pulling to remove the HDD.

b. Slide the new **N5242-60133** HDD module into the CPU, secure thumb screw to 9 in-lbs.

PART SEQUENCE:
①

Thumb Screw

Step 8. Install the *New* Power Supply Cover

Refer to Figure 4 and Figure 5 for this step.

1. Install the new power supply cover by reusing the 0515-0372 (x7) screws.

2. Install the KCC label (N5220-80001) as shown.

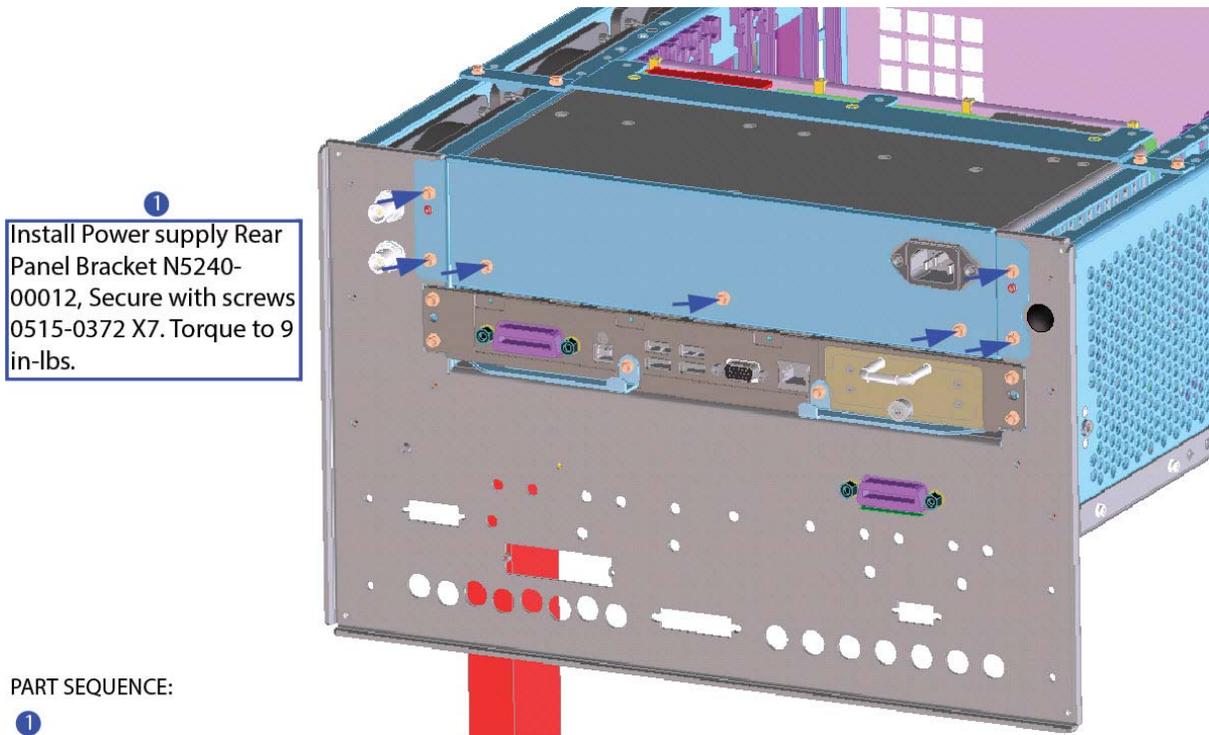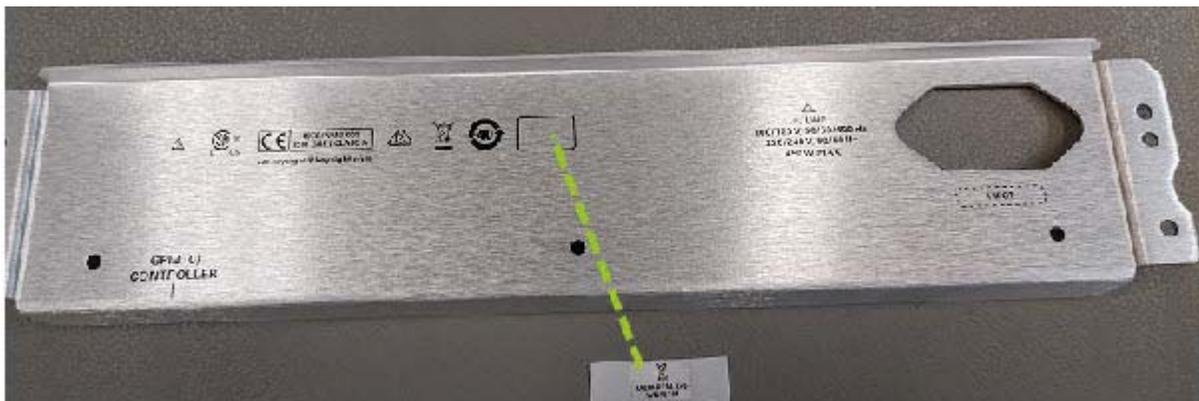Figure 4   Install the Power Supply Cover (N5240-00012) with reused screws (x7)

Install Power supply Rear Panel Bracket N5240-00012, Secure with screws 0515-0372 X7. Torque to 9 in-lbs.

PART SEQUENCE:

Figure 5   Install the KCC label (N5220-80001)

Step 9. Power Up Your Instrument and Allow Windows 7 to Stabilize

NOTE

If the PNA's serial number is 4742 or below, the display and touchscreen may not initially work. This is normal. This issue will be fixed when the new front panel is installed.

If the front panel display blanking occurs, to verify your PNA boots up and stabilizes, connect a PC monitor to the rear video output connector and verify the PNA's behavior.

1. Power up your instrument, allow to a couple of minutes for Windows 7 OS to stabilize and verify that there are no errors.

2. Power down your instrument.

Step 10. Remove the Front Panel Assembly

CAUTION

IMPORTANT! If you have already removed the instrument's front panel assembly, because of a System Motherboard L1 modification, skip to "Step 11. Inspect or Modify Midplane Board (W1312-63095 to a W1312-63376)" on page 35.

1. With a 5/16-inch wrench, remove all semi-rigid jumpers (item ①) from the front panel. Retain these screws for later use.

2. With a T-10 TORX driver, remove the eight 0515-0244 screws (item ②) from the sides of the frame.
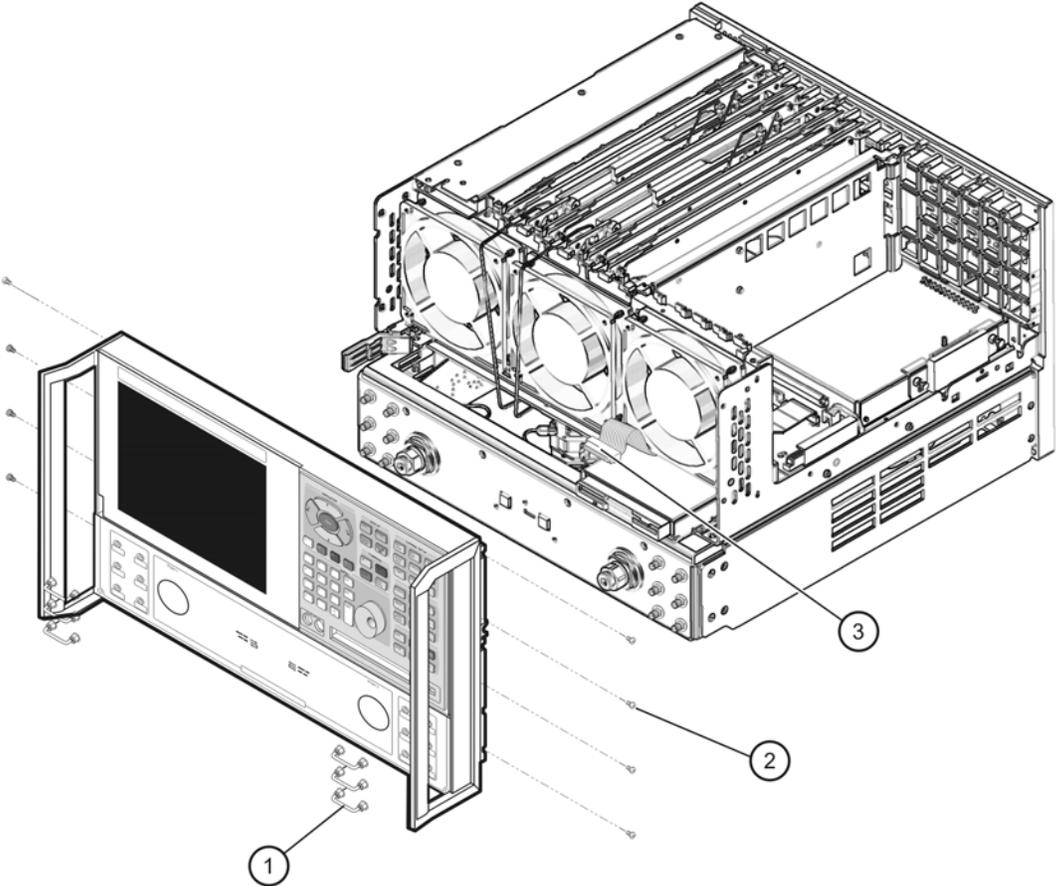
CAUTION

Before removing the front panel from the analyzer, lift and support the front of the analyzer chassis.

3. Slide the front panel over the test ports and other front panel connectors.

4. Disconnect the front panel interface ribbon cable (item ③). The front panel is now free from the analyzer.

Figure 6   Front Panel Assembly Removal ((Instruments Vary—Example Only— Shown)

n5230_90027_005

Step 11. Inspect or Modify Midplane Board (W1312-63095 to a W1312-63376)

CAUTION   If your instrument already has the correct W1312-63376 midplane board, skip to "Step 12. Install the Dress Panel on the New Front Panel Assembly" on page 37.

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 midplane board and or the instrument! See also Appendix A: "Midplane Board Upgrade (W1312-63095 to a W1312-63376)," on page 1.

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

This process requires the following:

– Training by Keysight support personnel to perform this upgrade

– RoHS compliant soldering materials and components

– Variable power surface-mount equipment

– 10s magnifier or greater

– Else, you may damage your midplane board and or your instrument

This section is only required if the Midplane board is not a W1312-63376 part number. If your midplane board does not require this modification, skip this process and continue to the next step. After this section is completed, your midplane board will be a W1312-63376 midplane board. Refer to Figure 7 on page 36.

Verify that the sticker has the "W1312-63376" part number. Refer to Figure 7.

If not, and you have read and understand the Caution on page 35, then refer to Appendix A: "Midplane Board Upgrade (W1312-63095 to a W1312-63376)," on page 1.

If you need to remove your midplane board to verify the part number, refer to the Service Guide for your instrument that can be downloaded from www.keysight.com.

Figure 7   Verifying the midplane board number part number is: W1312-63376—Top Side View
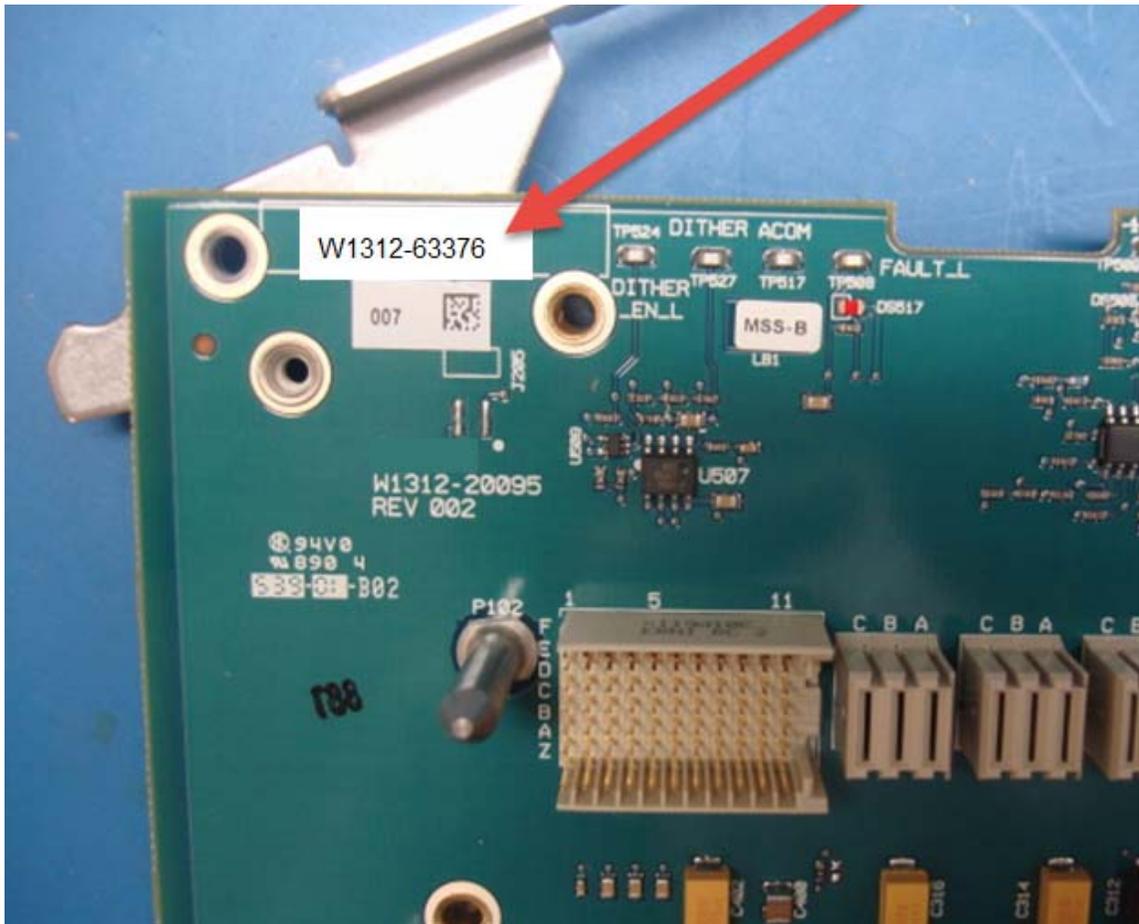
Step 12. Install the Dress Panel on the New Front Panel Assembly

Install the new lower dress panel onto the new front panel using the 10 flat head screws (0515-1946) provided.

Figure 8   Front Dress Panel Installation
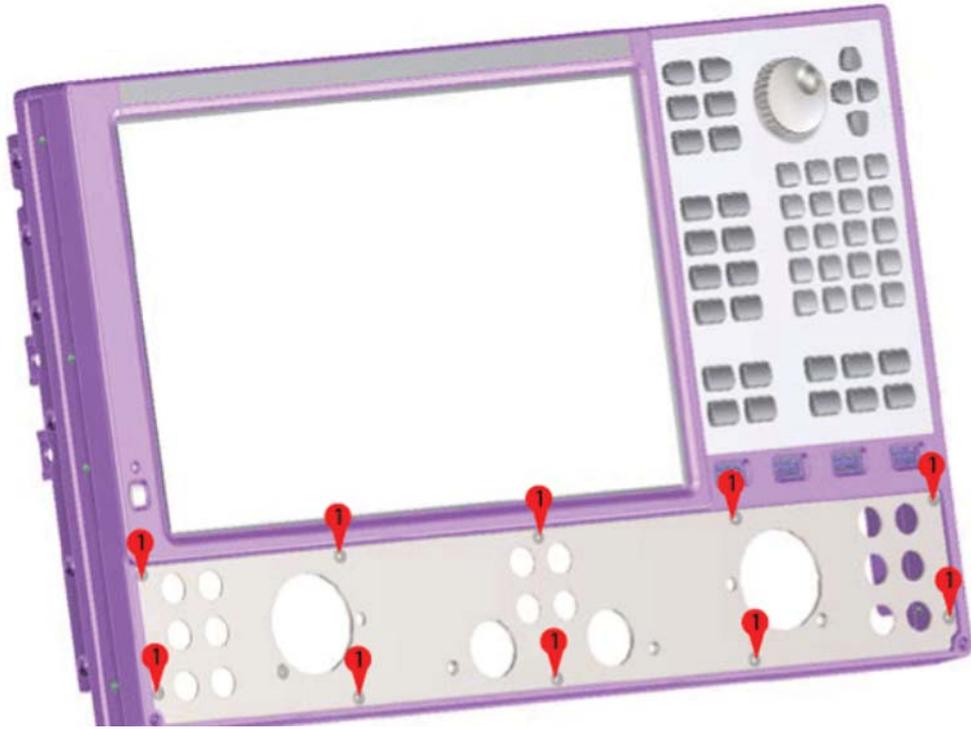
Step 13. Install the New Overlays on the New Front Panel Assembly

CAUTION

IMPORTANT! To avoid possible damage to the lower front panel overlay (label), do not attempt to attach the lower front panel label until "Step 14. Install the New Front Panel Assembly and the Lower Overlay" on page 39, step 7.

There should also be a nameplate overlay included with the kit that matches your new analyzer; the same number as the old one except it will be a "B" model. There are multiple overlays provided in the kit; be sure that you use the proper one for your analyzer. If there is not an overlay that matches your analyzer, contact Keysight. Refer to "Getting Assistance from Keysight" on page 6 of this installation note. Refer to Figure 11 on page 41.
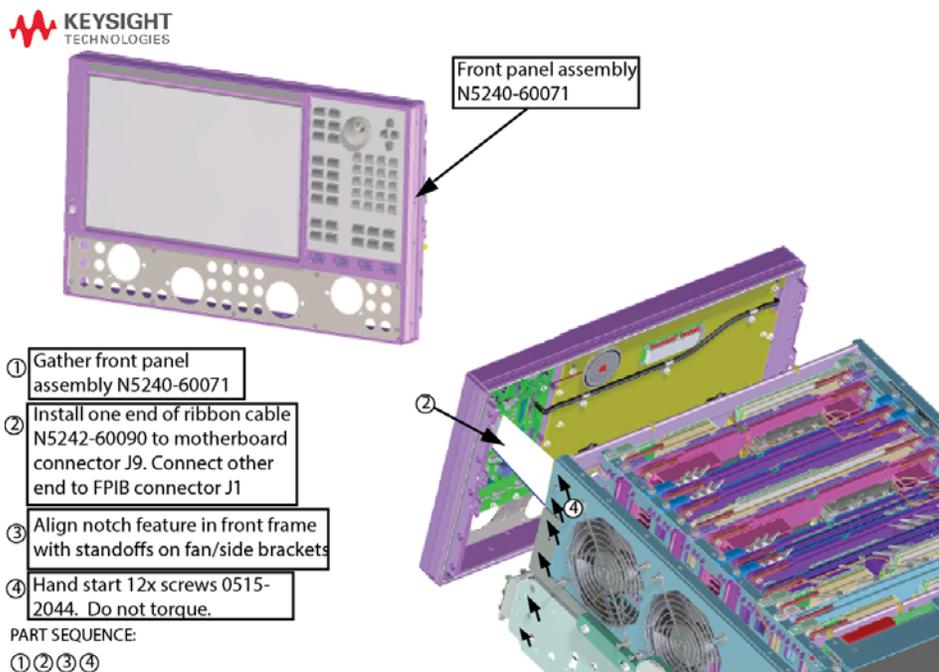
Step 14. Install the New Front Panel Assembly and the Lower Overlay

CAUTION   Before installing the front panel assembly onto the analyzer, place the analyzer right side up and lift and support the front of the analyzer chassis.

1. Reconnect the ribbon cable (item ②) to the A1 front panel interface board. Refer to Figure 9.

2. Slide the front panel over the test port connectors. Ensure that the ribbon cable (item ②) connectors are seated.

Figure 9   New Front Panel Assembly Installation

Front panel assembly
N5240-60071

① Gather front panel assembly N5240-60071
② Install one end of ribbon cable N5242-60090 to motherboard connector J9. Connect other end to FPIB connector J1
③ Align notch feature in front frame with standoffs on fan/side brackets
④ Hand start 12x screws 0515-2044. Do not torque.

PART SEQUENCE:
①②③④

3. Hand start the twelve 0515-2044 screws (item ②) in the sides of the frame. Use new screws from the kit and those retained earlier. Do not torque. Refer to Figure 9 on page 39 and Figure 10.

4. Install 0515-1946 (x4) screws (item ①) into lower front panel. Do not torque. Refer to Figure 10.

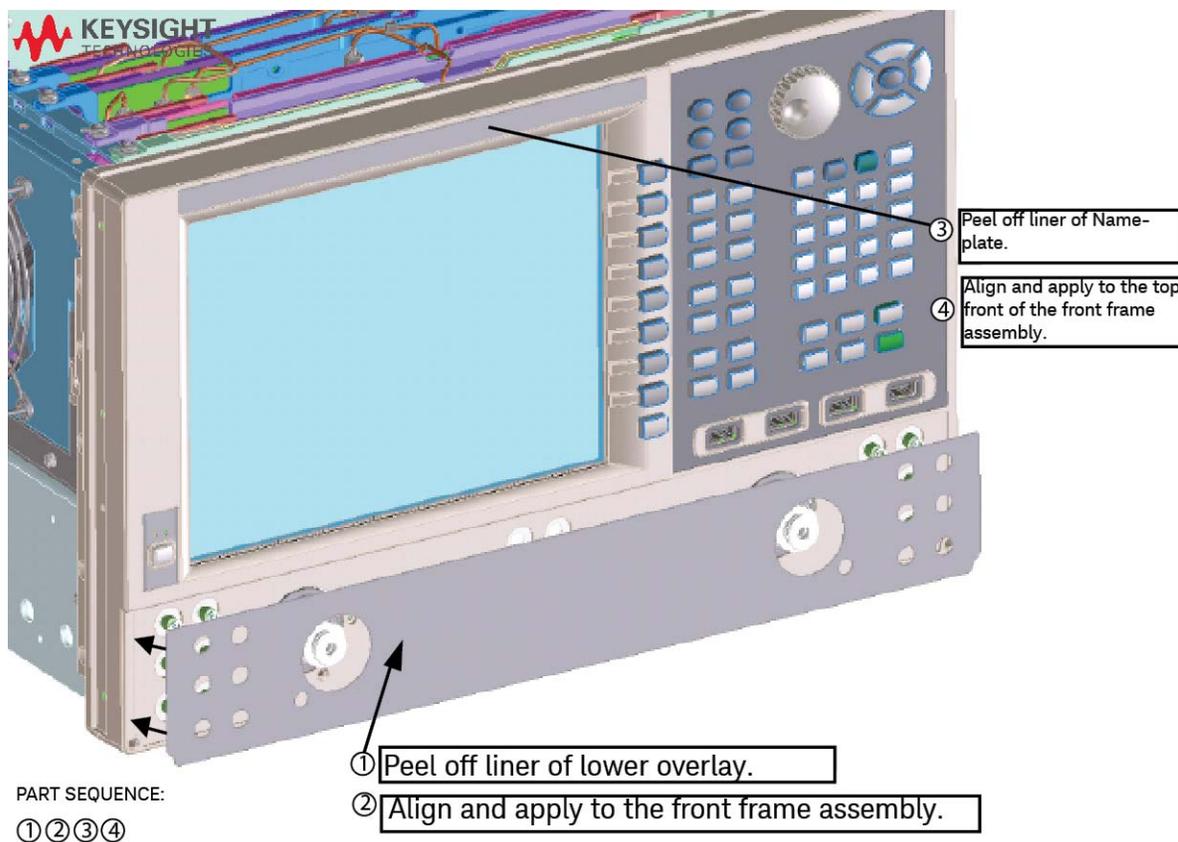Figure 10   New Front Panel Assembly Torque Screws
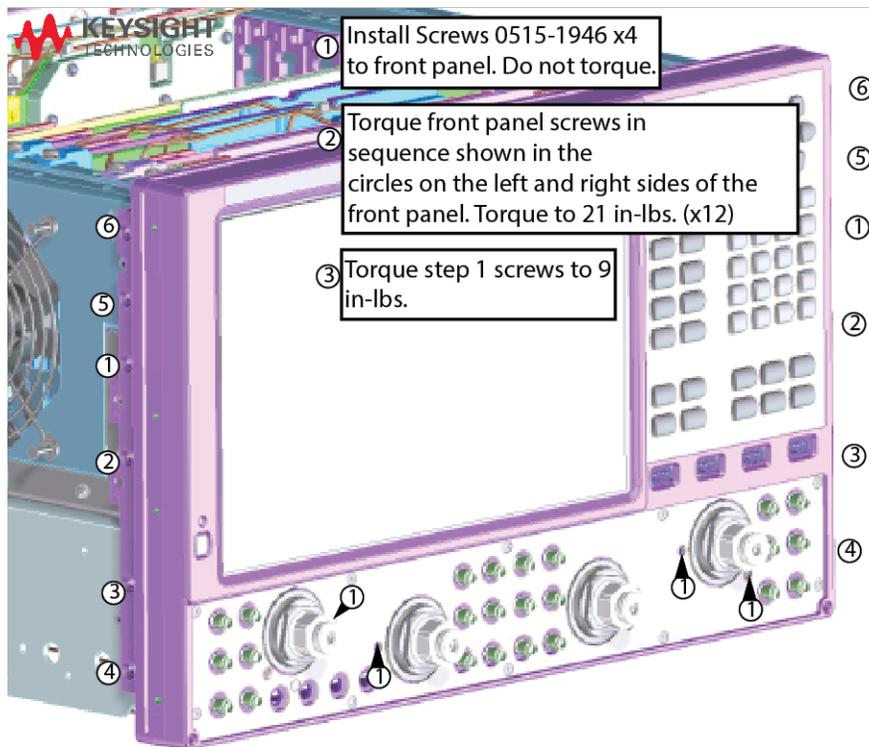
PART SEQUENCE:
①②③

5. Torque the twelve 0515-2044 screws in the order shown in Figure 9 on page 39.

6. Torque the four 0515-1946 (x4) screws to 9 in-lbs. Refer to Figure 10.

7. Install each of the overlays as follows (refer to Figure 11):

– Remove the protective backing to expose the adhesive.

– Carefully align the overlay to its location and gently position it.

– Once the overlay is properly positioned, press it firmly into place.

Figure 11   Front Panel Overlays Installation

③ Peel off liner of Nameplate.

④ Align and apply to the top front of the front frame assembly.

PART SEQUENCE:
①②③④

① Peel off liner of lower overlay.
② Align and apply to the front frame assembly.

8. If equipped with front panel jumpers, reinstall the semi–rigid jumpers (Figure 12) on the front panel using a 5/16 inch torque wrench set to 8 in-lbs (N5227B only) and 10 in-lbs (N5221/2/4/5B).

9. If available, install the jumper covers (not shown).

Figure 12   Install front panel jumpers

Front Panel Jumpers
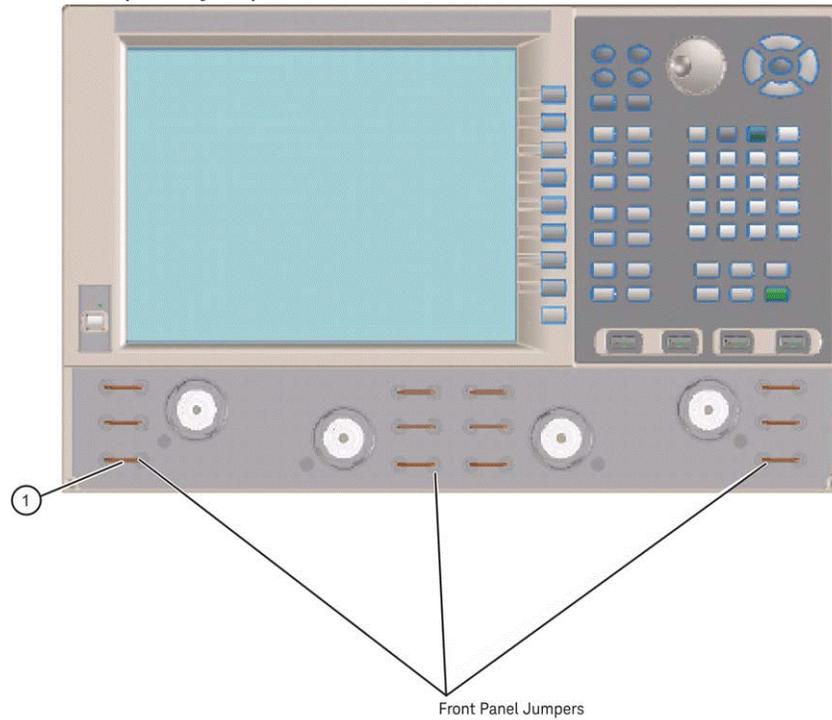
Description of this Upgrade
Step 15. Install New version SPAM V, Synth, IF Multiplexer, and Test Set Mother boards
(If Necessary)

Step 15. Install New version SPAM V, Synth, IF Multiplexer, and Test Set Mother boards (If Necessary)

A) Install the new SPAM V Boards

If your PNA already has the SPAM V boards, skip to next step.

Install the new SPAM V boards by referring to your Service Guide on www.keysight.com.

B) Install the new Synthesizer Boards

If your PNA already has the correct synthesizer boards, skip to next step.

Install the new synthesizer boards by referring to your Service Guide on www.keysight.com.

C) Install the new IF Multiplexer Board

If your PNA already has the correct IF multiplexer board, skip to next step.

Install the new IF multiplexer board by referring to your Service Guide on www.keysight.com.

D) Install the new Test Set Motherboard

If your PNA already has the correct test set motherboard (N5221/2A: "N524063043" or "N524563163"; N5224/5/7A: N524563157), skip to next step.

If **not**, install the new test set motherboard by referring to your Service Guide on www.keysight.com.

Step 16. Install the New Handler I/O Cable

Refer to your instrument Service Guide's section "Remove and Replace the A19 Test Set Motherboard" on www.keysight.com.

1. Remove the A19 TSMB and be careful to mark all of the cables before removal (i.e., If your TSMB needs to be replaced–if it is **not** N5221/2A: "N524063043" or "N524563163" or for N5224/5/7A: "N524563157"), discard this older board).

2. Remove the old handler I/O cable and discard, it will not be reused.

3. Install the new I/O cable (8121-2919) using (x2) 0515-0372 screws. Torque to 9 lb-ins.

4. Reinstall the A19 TSMB by reversing the procedure in the Service Guide's "Remove and Replace the A19 Test Set Motherboard" section.
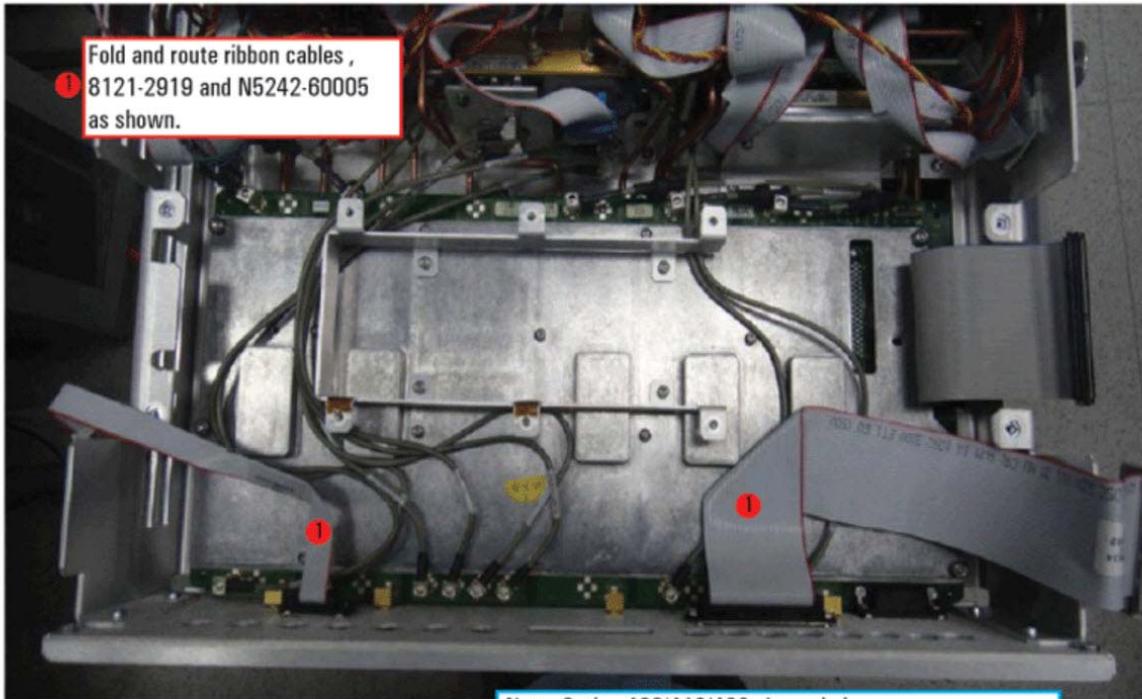
Figure 13   Install the Handler I/O Cable (8121-2919 and 0515-0372 (x2))
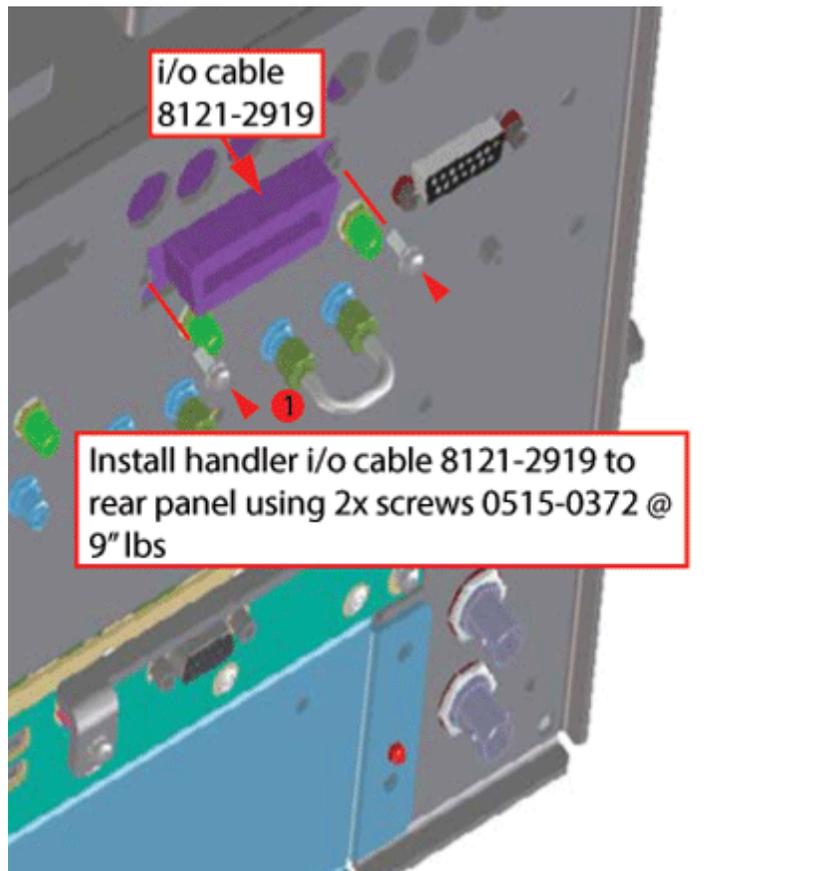
Figure 14   Fold the Handler I/O Cable (8121-2919 and N5242-60005)

Fold and route ribbon cables ,
8121-2919 and N5242-60005
as shown.

Note: Option 400/419/423 shown in image.
This may not match the current option mix being built

PART SEQUENCE:

Step 17. Install the *NEW* N5242-60135 Solid-State Disk Drive Assembly (SSDA) from the -690 Upgrade Kit; OR Install the *NEW* Version 9 CPU W1312-60563 and *NEW* N5242-60137 Solid-State Disk Drive Assembly (SSDA) from the -691 Upgrade Kit

If a instrument currently has successfully booted up a Version 7 CPU (N5242-60211) and Windows 7 with A.10.40 or greater SSDA (N5242-60133): then choose from one of the following:

— **If a instrument has a version 7 CPU W1312-60211, BUT you are Installing Option 690 Windows 10 OS SSDA:** then install the Windows 10 OS SSDA (N5242-60135) into the analyzer by referring to your instrument's Service Guide's Chapter 7 "Repair and Replacement Procedures" on www.keysight.com.

— **If a instrument is installing Option 691 Version 9 CPU (W1312-60563) AND Win 10 OS SSDA (N5242-60137):** Install the new CPU and SSDA by referring to your instrument's Service Guise's Chapter 7 "Repair and Replacement Procedures" on www.keysight.com.

1. Install the new SSDA in the analyzer by reversing the Hard Disk Drive Removal procedure in the Service Guide for your model. Refer to Figure 3 on page 31 and to your instrument's Service Guide on www.keysight.com.

2. Install the Win 10 sticker (9010-0350) to the rear-panel side of the SSD tray.

Step 18. Reboot the Instrument

CAUTION

IMPORTANT! If you have not installed your Version 7 CPU (W1312-60211)[1] or and Windows 10 OS SSDA (N5242-60135) or your Option 691 Version 9 CPU (W1312-60563) with Windows 10 OS SSDA (N5242-60137), refer back to "Step 7. Install the Version 7 CPU W1312-60211 and SSDA N5242-60133 *Service Center* Assembly with A.10.40 Firmware or Greater" on page 31.

1. The system CPU must be a version 7 or greater. Option 690 is for PNA's that already have the version 7 CPU installed, you must have a W1312-60211 version 7 CPU installed, to use the N5242-60135 Win 10 OS SSDA. If a PNA has an older CPU version that needs to be replaced, the customer will need to order the Option 691 kit, which includes a Version 9 or greater CPU. Refer to Table 1 on page 12, Table 2 on page 15, Table 3 on page 17 and "Contacting Keysight" on page 6.

NOTE

When you power up your instrument there will be many errors, because your instrument does not have any licenses installed. This is as expected and will be corrected in later steps.

IMPORTANT! The "B" firmware automatically updates the CPU BIOS. When the drive that comes with the upgrade kit is first booted, it is as expected that the PNA display is distorted for 10 to 15 seconds, then go blank and reset to a normal screen view.

If your display remains blurry beyond ~15 seconds, the PNA BIOS needs to be manually set to 24-bit. (i.e., this display blurriness is indicated by a lavender background and screen text that is difficult to read.) Refer to Appendix B: "Manually Setting the PNA Display to 24-Bit".

This section contains the power up process for all of the following:

— **Option 690 and Option 691 upgrades:**

— **Option 690 instruments** that *already* had a version 7 CPU (W1312-60211) installed, but have a newly installed Windows 10 OS SSDA (N5242-60135).

— **Option 691 upgraded instruments** with a Version 9 CPU and Windows 10 OS SSDA (N5242-60137).

1. Power up the instrument and allow it to run for a couple of minutes to stabilize.

2. Verify the instrument has the correct "A" model number and serial number using the embedded Keysight Licensing Manager (KLM) tool on your analyzer: Press **Start** > **All Programs** > **Keysight Licensing Manager** > **Keysight Licensing Manager**.

    This verifies the instrument is working correctly, so the licenses can be loaded in Step 22. Install Multiple License Files.

3. If the instrument stabilizes with no errors and has the correct "A" model number and serial number, continue to the next step.

Else, if the unit still has initialization problems that cannot be resolved, contact the Keysight Technologies, because the model and serial number needs to be updated via the Keysight network. Refer to "Getting Assistance from Keysight" on page 6.

NOTE

If the PNA does not have the correct "A" model number and or serial number, it means that somewhere in the process the instrument was initialized with the incorrect model number or serial number. For these cases, connect the PNA to the LAN and contact to the support team for assistance. Refer to "Getting Assistance from Keysight" on page 6.

Step 19. Reinstall the Outer Covers

Reinstall the Outer Cover

1. Slide the cover onto the frame.

2. Using a T-20 TORX driver, install the four rear panel feet (item ③) by installing the center screws (item ④).

3. Slide the four bottom feet (item ⑤) onto the cover.

4. Using a T-20 TORX driver, install the strap handles (item ①) by tightening the screws (item ②) on both ends.

Figure 15   Outer Cover Reinstallation
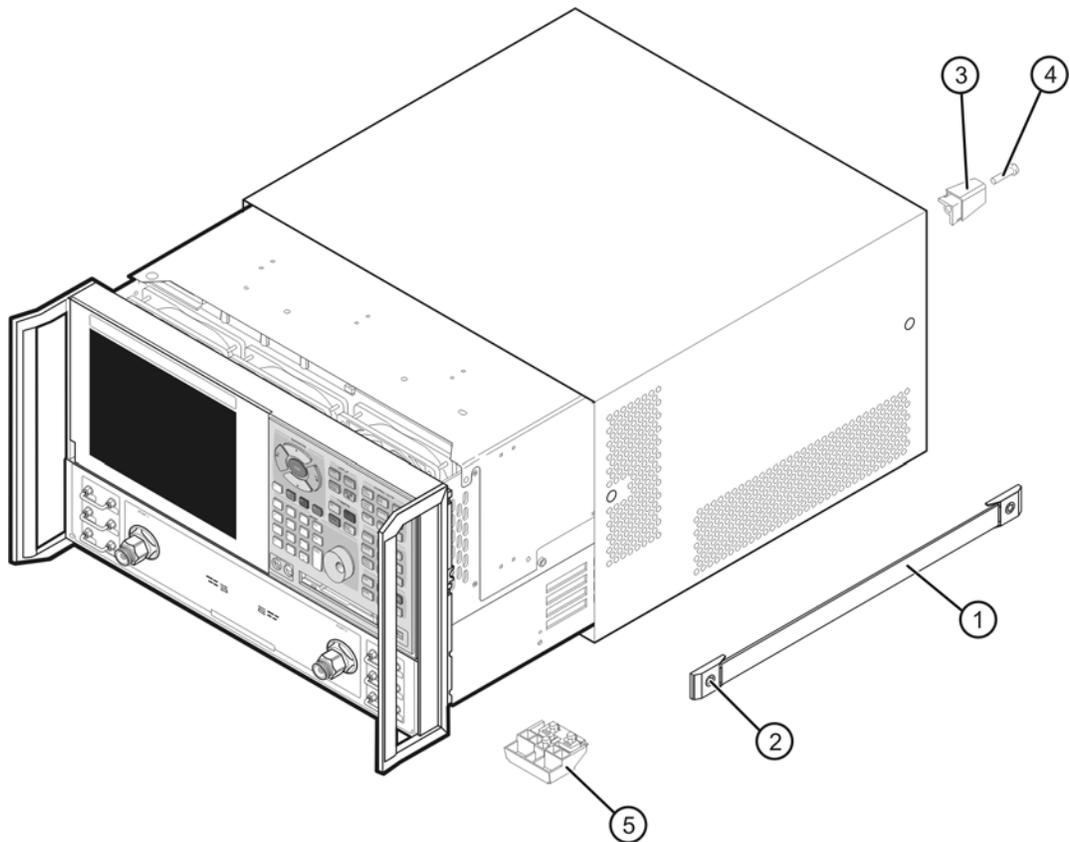
n5230_90027_003

Step 20. Install Option N52xxAU-690 or N52xxAU–691

After completing this process your instrument will be a "B" model Network Analyzer.

Procedure Requirements

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

— Obtain a license key file for installation of this upgrade by following the instructions on the supplied Software Entitlement Certificate. Refer to "License Key File Redemption" on page 7.

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

— A keyboard must be connected to the network analyzer.

— On your computer, copy the downloaded license key file to the top level on a USB memory device.

Option Enable Procedure

1. Verify your PNA is powered up.

2. Insert the USB memory device into your PNA.

3. Within ~5 seconds the PNA should display a small "New Licenses Installed" message.

   Open a Windows Explorer window(s) and manually move your license file to `C:\Program Files\Agilent\licensing`. It may take Keysight License Manager an extra ~30 seconds to enable the license and automatically power down your PNA.

   `Successful License Installation` is displayed on the bottom of the window.

| NOTE | If your PNA does not automatically reboot, contact Keysight Technologies. See "Getting Assistance from Keysight" on page 6. |

4. If the license file installed and the PNA rebooted as expected, remove your USB memory device.

Option Verification Procedure

> **NOTE**
>
> When you power up your instrument there will be many errors, because your instrument does not have any licenses installed. This is as expected and will be corrected in later in this procedure.

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

1. 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**.

2. If the instrument stabilizes and has the correct "B" model number and serial number, continue to the next "Step 22. Install Multiple License Files" on page 53.

3. Else, proceed to "Step 21. Changing your PNA's Computer Name from an A model to a B model" on page 52.

> **NOTE**
>
> **IMPORTANT!** For PNAs that are still A models, proceed to "Step 21. Changing your PNA's Computer Name from an A model to a B model" on page 52.
>
> If the PNA does not have the correct "B" model number and or serial number, it means that somewhere in the process the instrument was initialized with the incorrect model number or serial number. For these cases, connect the PNA to the LAN. Refer to "Getting Assistance from Keysight" on page 6.

Step 21. Changing your PNA's Computer Name from an A model to a B model

If the PNA does not have a B model after the upgrade, it is necessary to run the **ChangeHostame** program to change the PNA from an A model to a B model.

1. Open a Windows Explorer window and navigate to:
   `C:\Keysight\PNA\tools\ChangeHostName`

2. Right click on the **ChangeHostname** file and click:
   Run as administrator

   The program automatically runs and terminates in ~two seconds (i.e., without any user interaction).

3. To verify:

   On the toolbar click **Help** > **About NA...**

   And, verify that the Hostname has the correct B model number.

Step 22. Install Multiple License Files

After completing this process all of your license files should be loaded into your instrument.

Procedure Requirements

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

— Obtain your multiple license key files by following contacting Keysight Technologies. Refer to "Obtain Multiple License Key Files" on page 9 and "Getting Assistance from Keysight" on page 6.

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

— A keyboard must be connected to the network analyzer.

— Use a USB memory device to download your license key file(s) to a USB memory device.

Option Enable Procedure

1. Verify your PNA is powered up.

2. Locate the email(s) from Keysight which contain license file attachments. These emails are the result of "Getting Assistance from Keysight" on page 6.

3. Copy the license file(s) from the email(s) to a 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 feature.

4. Connect the USB flash drive to the PNA.

    Within 5 seconds, the PNA should display a small "New licenses installed" message.

    If your license did not load automatically via USB memory device, open a Windows Explorer window(s) and manually move your license file to `C:\Program Files\Agilent\licensing`. It may take Keysight License Manager an extra ~5 seconds to enable the license and automatically power down your PNA.

    `Successful License Installation` is displayed on the bottom of the window.

5. Shut down the PNA application and restart.

    Optional: Cycle power on the instrument to activate the newly installed option upgrade(s). (Press the power button once to power down the instrument.)

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

6. Disconnect the USB flash drive from the PNA.

Step 23. Verify the PNA Analyzer Program is Running with the Correct Options

NOTE	If the options have been enabled, skip to "Step 24. Copy the Unique Files Back to the Analyzer's SSD" on page 55.

Verify the Option Numbers

Once the Network Analyzer program is again running:

1. 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.

2. Press **OK**.

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/.

NOTE	If the options have not been enabled, refer to "Getting Assistance from Keysight" on page 6.

Step 24. Copy the Unique Files Back to the Analyzer's SSD

The files that were previously saved onto a USB flash memory drive must now be installed onto the new SSD.

— For a list of possible files (and their directory paths), refer to one of these installation notes:

— Windows 7
https://www.keysight.com/us/en/assets/9018-04311/installation-guides/9018-04311.pdf

— Windows 10

https://www.keysight.com/us/en/assets/9018-04733/installation-guides/9018-04733.pdf

1. Connect the power cord to the analyzer and turn ON the power.

2. Insert the USB flash memory drive into a USB port.

3. Open Windows Explorer.

4. Navigate to:

   — Data and state files storage: `D:\`

   — Support files: `c:\programdata\Keysight\network analyzer`

5. After all files have been copied, remove the USB flash memory drive from the USB port.

6. Exit Windows Explorer.

Step 25. Perform Post-Upgrade Adjustments and Calibration

Adjustments

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

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

— 10 MHz frequency reference adjustment

— EE default adjustment (Only, if the synthesizer board is changed)

— synthesizer Bandwidth adjustment (Only, if the synthesizer board is changed)

— 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[1].

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

Else, all adjustments must be run per the instrument's Service Guide on www.keysight.com.

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 10.

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 16   EEPROM Backup Menu
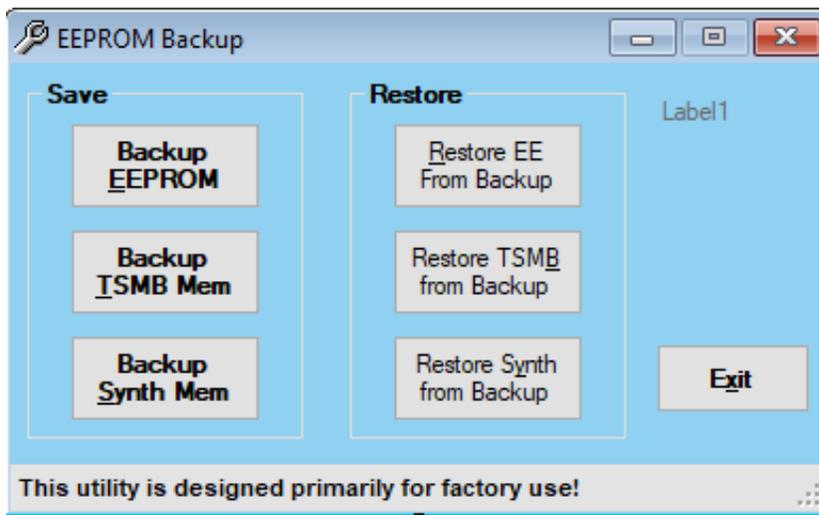
Operator's Check

Perform the Operator's Check to check the basic functionality of the analyzer. For instructions, refer to the "Tests & Adjustments" chapter of the Service Guide.

If you experience difficulty with the basic functioning of the analyzer, contact Keysight. Refer to "Getting Assistance from 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 N7840A performance test software or the instrument's embedded performance tests. Refer to the analyzer's service guide for information on the performance test software.

Step 26. Prepare the PNA for the User

1. If necessary, reinstall front jumper cables.

2. Install the cable guards, pushing them over the front jumper cables until the cushioning material touches the front panel of the PNA.

3. Install the dust caps on the test ports.

4. Clean the analyzer, as needed, using a damp cloth.

A: Midplane Board Upgrade (W1312-63095 to a W1312-63376)

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 midplane board and or the instrument! See also "Procedure" on page 3.

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".

This process requires the following:

– Training by Keysight support personnel to perform this upgrade

– RoHS compliant soldering materials and components

– Variable power surface-mount equipment

– 10s magnifier or greater

Else, you may damage your midplane board and or your instrument

This section is only required if the Midplane board is not a W1312-63376 part number. If your midplane board does not require this modification, skip this process and continue to the step 9. After this section is completed, your midplane board will be a W1312-63376 midplane board. Refer to Figure A-6 on page 8.

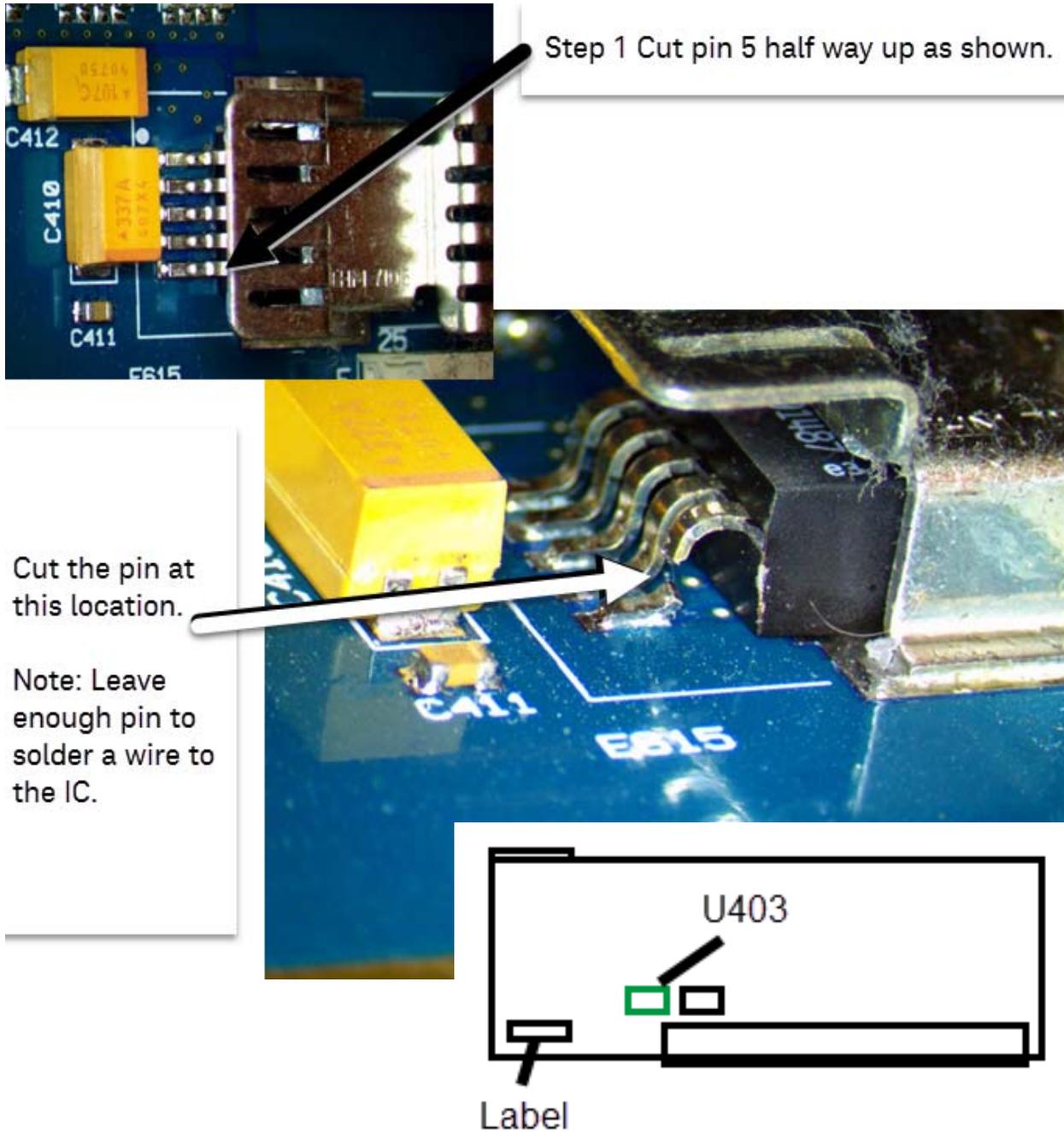**Table 0-1**   **Parts List for Midplane Board Upgrade Kit Modification[a]**

Part number	Description
0699-1429	Resistor U403–383 ohm (attach to pin 5)
216–2632GR005–ND[b]	32 AWG wire (Operating temperature 300C) – (0.5 inch)
5184-4489	Label-Brady blank label
0470-0954	Loctite 495

a. The factory will provide these items upon request.
b. This spool of 32 AWG 100' (30.5m) wire part number can be ordered from Digi-Key here: https://www.digikey.com/en/products/detail/alpha-wire/2632-GR005/15194125.

Procedure

1. To remove your midplane board, refer to the Service Guide for your instrument that can be downloaded from www.keysight.com.

2. Cut pin 5 on U403, so that half of the lead is left near on the IC. Refer to Figure 1.

Figure A-1   Step 1 Cut pin 5 half way up as shown—Top Side View

Step 1 Cut pin 5 half way up as shown.

Cut the pin at this location.

Note: Leave enough pin to solder a wire to the IC.

U403

Label

3. Clean pad and remove cut off portion of U403–pin 5 from the pad. Refer to Figure A-2.

Figure A-2   Cleaning the pad for pin 5—Top Side View
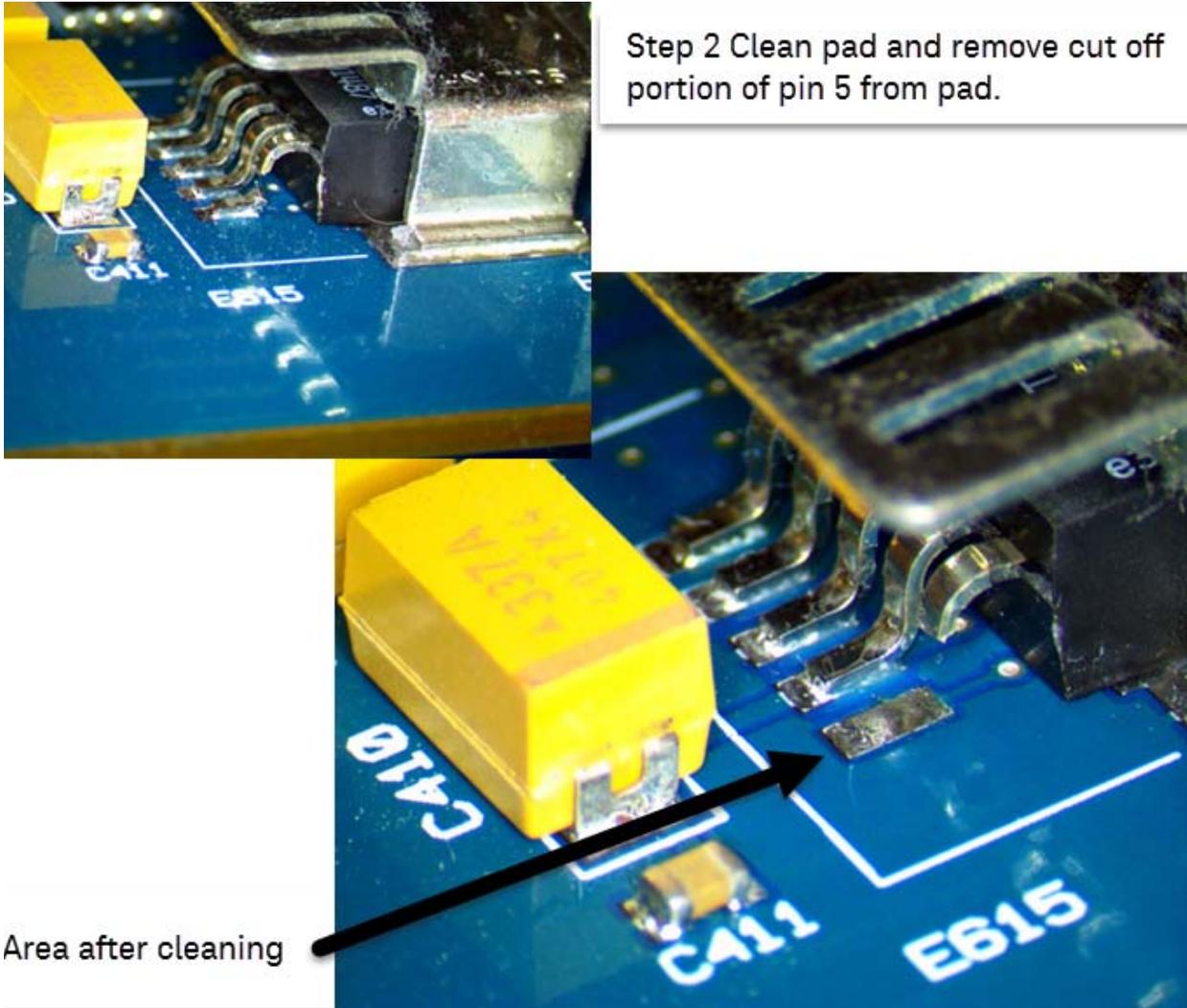
4. Add 383 ohm resistor as shown. Refer to Figure A-3.

Figure A-3   Add 383 ohm resistor

Step 3 Add 383 ohm resistor as shown.

383 ohm
0699-1429
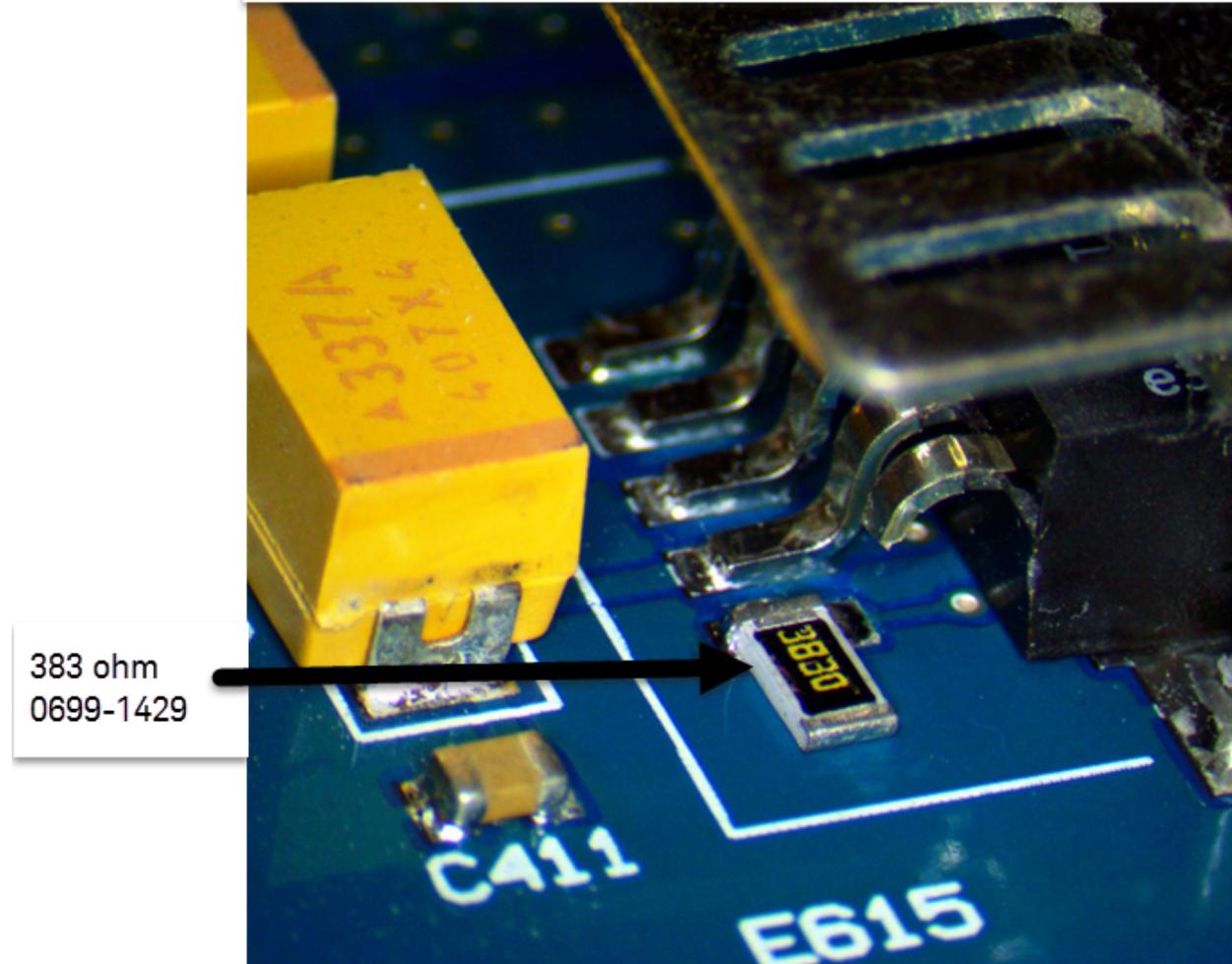
5. Add a 1/2 inch 32 gauge wire. Refer to Figure A-4.

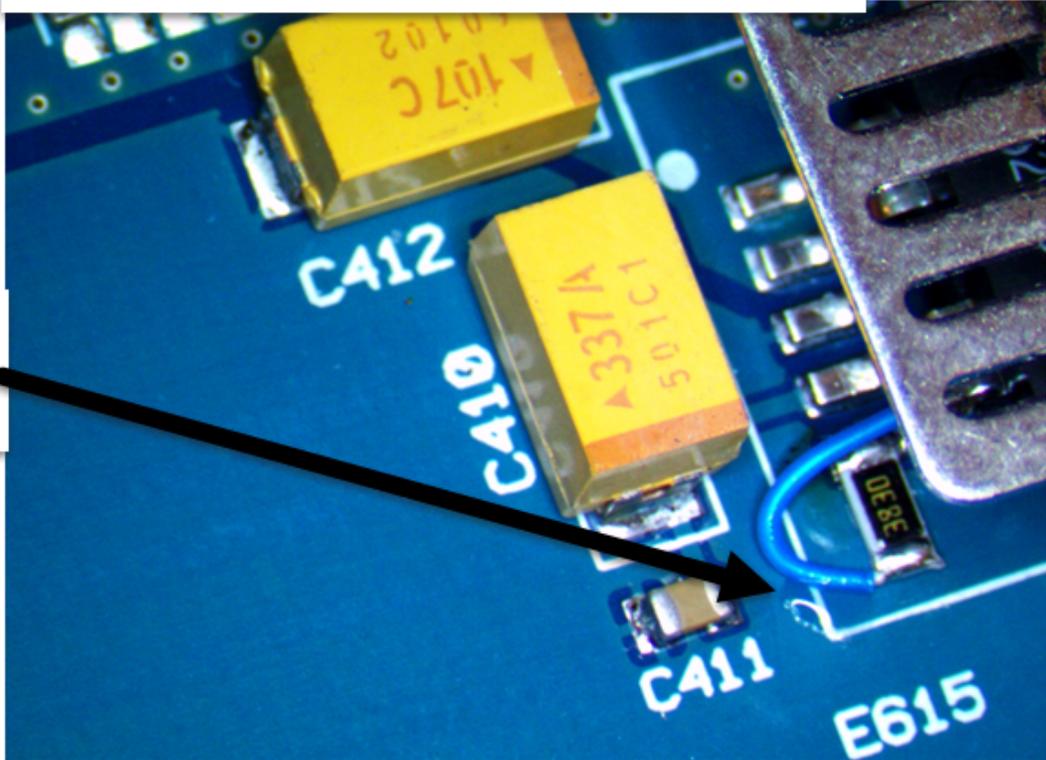Figure A-4   Add a 1/2 inch 32 gauge wire—Top SideView
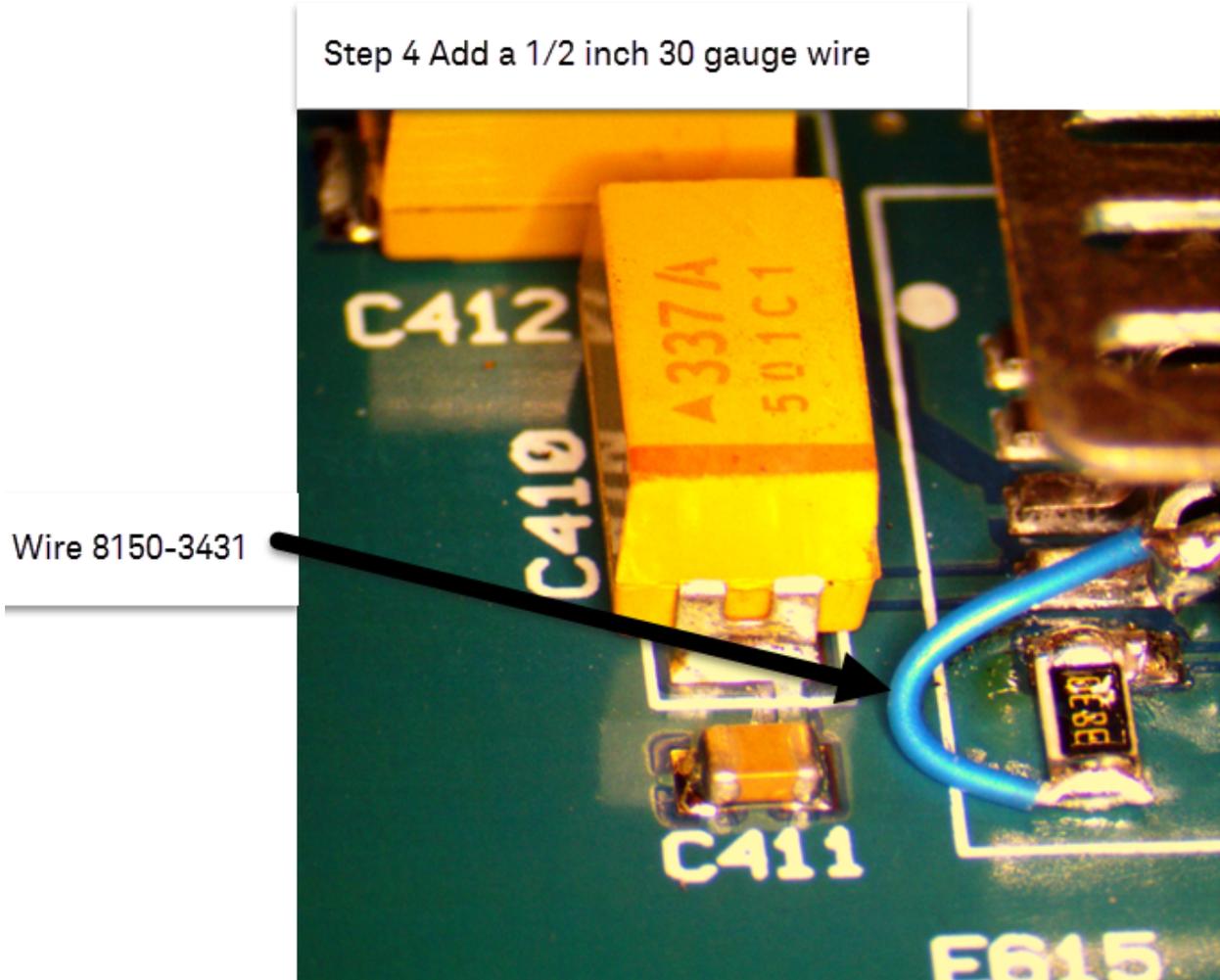
6. Add glue as shown to hold the wire in place. Refer to Figure A-5 on page 7.

Figure A-5   Add glue as shown to hold the wire in place—Top Side View

Step 5 Add glue as shown to hold the wire in place.

Loctite 545
0470-0954

7. Add the W1312-63376 sticker. Verify that the sticker does not interfere with the PCA screw holes. Refer to Figure A-6.

Figure A-6   Adding sticker to new board number W1312-63376—Top Side View

8. Re-install the midplane board per the Service Guide for your instrument that can be downloaded from www.keysight.com.

B: Manually Setting the PNA Display to 24-Bit

This section is only required if, after installing the new SSD that comes with this upgrade kit (refer to "Step 17. Install the *NEW* N5242-60135 Solid-State Disk Drive Assembly (SSDA) from the -690 Upgrade Kit; OR Install the *NEW* Version 9 CPU W1312-60563 and *NEW* N5242-60137 Solid-State Disk Drive Assembly (SSDA) from the -691 Upgrade Kit" on page 46), your PNA reboots and does not automatically adjust the display to 24-bit. If your PNA does not have a blurry display, skip this process and continue to the "Step 19. Reinstall the Outer Covers" on page 49.

Procedure

In this procedure, you will need to navigate through the PNA's BIOS menu, even though you are unable to clearly read the menus.

1. During the bootup of your PNA: Press **F7** on bootup until the BIOS screen opens.

2. In the window that opens, the top row of the screen will have various menu selections: **Main**, **Advanced, Chipset, Boot, Security**, and **Save&Exit**.

    Use the arrow keys to move the selection from Main over to **Chipset**, then press **Enter**.

3. In the window that opens, the first of three rows should be have white text which says **Graphics Configuration**. With this row highlighted, press **Enter**.

4. In the window that opens, use the down arrow to move the selected text to the bottom row: **LCD Control**. Press **Enter**.

5. In the window that opens, use the down arrow to move the selected text to the bottom row: **Panel Color Depth**. Press **Enter**.

6. At this point, a small blue box with two items pops up. The top one is "18 bit", the bottom one is "**24 bit**". Select this bottom one and press **Enter**.

7. Now press **F10** (to Save & Exit).

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C: Motherboard Clearing the Event Log and Modification to Replace L1

CAUTION

STOP!

Any return to factory (RTF) that will have CPU, Midplane, Motherboard, Front Panel, or Front Panel Ribbon replaced will need to have it's event log cleared after the hardware replacements are complete.

Older System motherboards with serial numbers <N52476300223194500002 need to be reworked to remove L1, per Appendix , "System Motherboard Modification." If you have an older system board, call Keysight Support to verify, if your instrument has previously been upgraded. Refer to "Getting Assistance from Keysight" on page 6.

Refer to Refer to Table 4, "Overview of Assembly Requirements for B Model Upgrade," and Appendix C:, "Motherboard Clearing the Event Log and Modification to Replace L1."

NOTE

IMPORTANT!

Any return to factory (RTF) that has its CPU, Midplane, Motherboard, Front Panel, or Front Panel Ribbon replaced, will need to have it's event log cleared after the hardware replacements are complete.

This section is required to modify the following motherboard p/n's: N5230-63133, N5242-63151, and N5247-63002. This modification is required to avoid USB 2152 errors, which indicates intermittent USB connections in the instrument. Refer to Table 1, "Models and Motherboards for L1 N5240-60111 Jumper Wire Modification."

Table 1   Models and Motherboards for L1 N5240-60111 Jumper Wire Modification

Model Number	System Motherboard p/n
N5239A/B, N5231A/B, N5232A/B, N5234A/B, N5235A/B	N5230-60133
N5249A/B, N5241A/B, N5242A/B, N5264A/B, N5221A/B, N5222A/B	N5242-60151

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Table 1   Models and Motherboards for L1 N5240-60111 Jumper Wire Modification

N5244A/B, N5245A/B, N5247A/B, N5224A/B,   N5247-60002
N5225A/B, N5227A/B

Table 2   Tools for N5240-60111 Jumper Wire Modification

Description	Part Number
Jumper wire	N5240-60111
Solder (Lead free)	––
Soldering iron	––
Surface mount iron and tips (Optional, but recommended)	––

Procedures

This section contains the following:

— "System Motherboard Modification"

— "Clearing the Event Log and Verifying the Motherboard Modification Removed the USB Errors (2152)"

System Motherboard Modification

These procedure assumes you have disassembled the instrument and have removed the system motherboard from the chassis.

This procedure shows how to remove L1 and to replace it with some green wires connecting the motherboard traces.

1. Locate L1 on the motherboard. Refer to Figure 1 on page 3.

2. Remove L1 using a surface mount soldering iron and appropriate tip or use two soldering irons. Refer to Figure 2 on page 3.

3. Clean motherboard traces. Refer to Figure 2 on page 3.

4. Prepare green wire (x3). Refer to Figure 3 on page 4.

5. Solder green wire x3 to L1 traces. Refer to Figure 4 on page 5.

6. Mark motherboard as shown with black dot. Refer to Figure 5 on page 5.

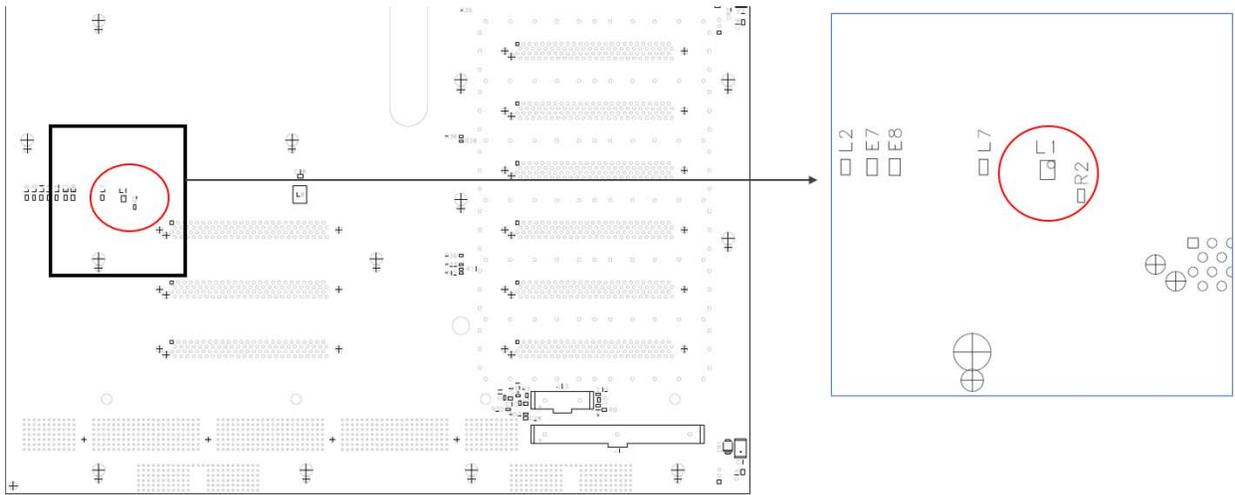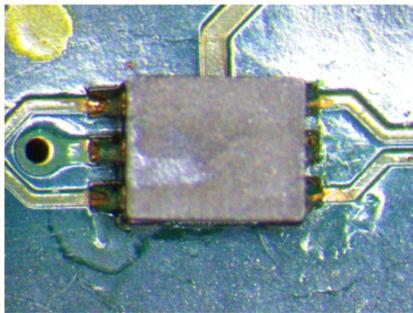Figure 1   Locate L1 on System Motherboard

Figure 2   Remove L1 and Clean Traces

- L1 is a 6 pin part with no ground pin on the belly
- It can be removed by using two soldering irons on either side of the part
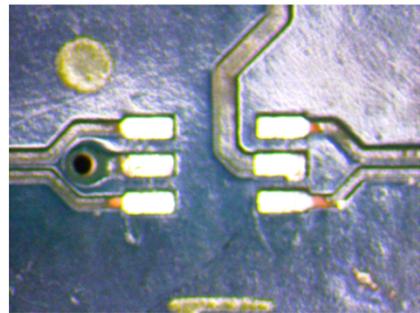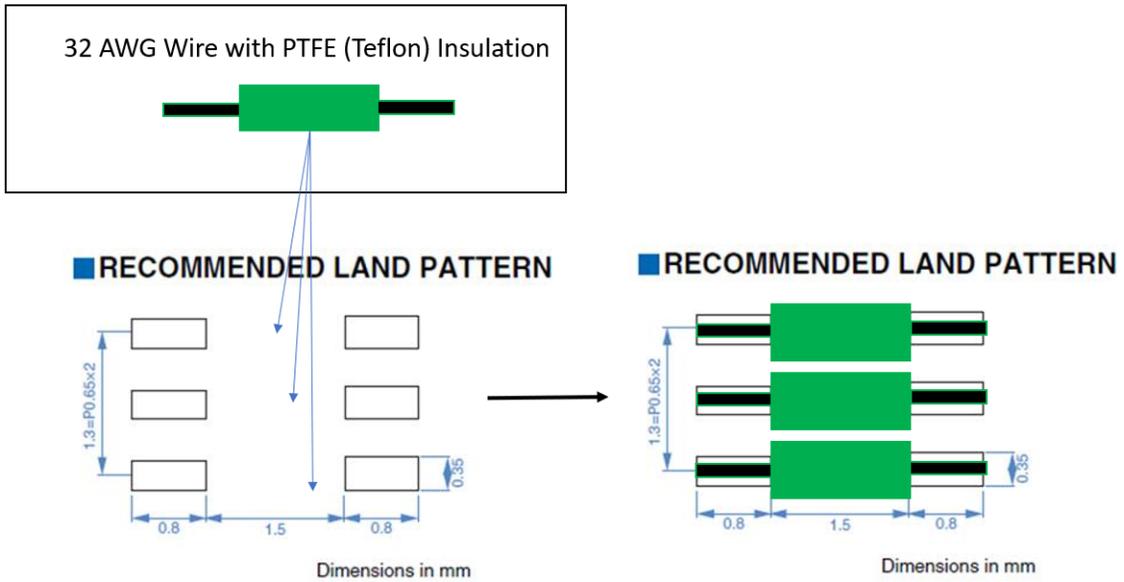

Remove L1 and clean area

Figure 3   Prepare Green Wire (x3)

32 AWG Wire with PTFE (Teflon) Insulation

■ RECOMMENDED LAND PATTERN

Dimensions in mm

■ RECOMMENDED LAND PATTERN

Dimensions in mm

- Wire (N5240-60111) will come in with slight curve
- Insulation will not be centered

Push insulation to center
and straighten as needed

Figure 4   Solder Green Wires (x3) to Motherboard

- Start with the wire near the dot (this is the most important wire as it crosses over a ground trace).
- It is easier to pre-tin the pad before placing the wire onto it.
- The wire gets hot rapidly so one side can come loose while soldering the other.
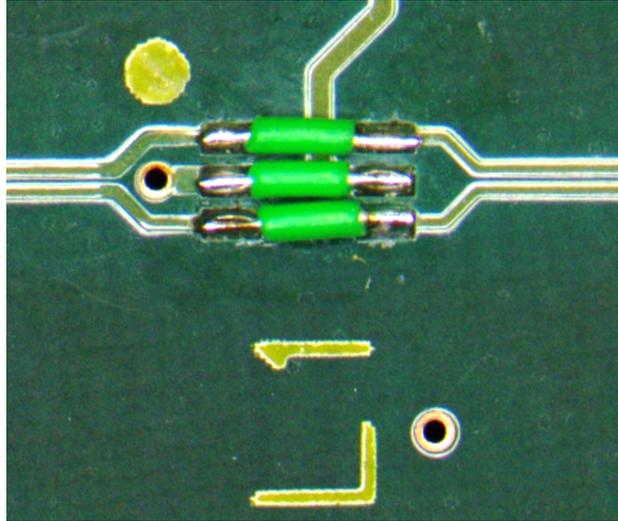
Figure 5   Mark the Motherboard Serial Number Label With a Black Dot

- Place a small black circle to the left of the serial number to show that L1 has been removed
- Make a note on the assembly document that this L1 has been removed **"L1 Removed"**

Clearing the Event Log and Verifying the Motherboard Modification Removed the USB Errors (2152)

This section clears the event logs and runs a *.bat (`CheckEventID.bat`) file to verify the motherboard repairs are correct. In this procedure, you will need to navigate through the PNA's **Event Viewer** menu, even though you may not be able to clearly read the menus.

1. Press the **Win** + **R** keys to open the **Run** dialog box.

2. Type eventvwr.msc into **Run**, and then click/tap on **OK** to open the **Event Viewer** window.

3. Select a log (ex. **Application**) that you want to clear in the left pane of the Event Viewer, and click/tap on **Clear Log...** in the far right **Actions** pane. (i.e., see screenshot in Figure 6, "Using the Event Viewer to Clear an Event Log,").
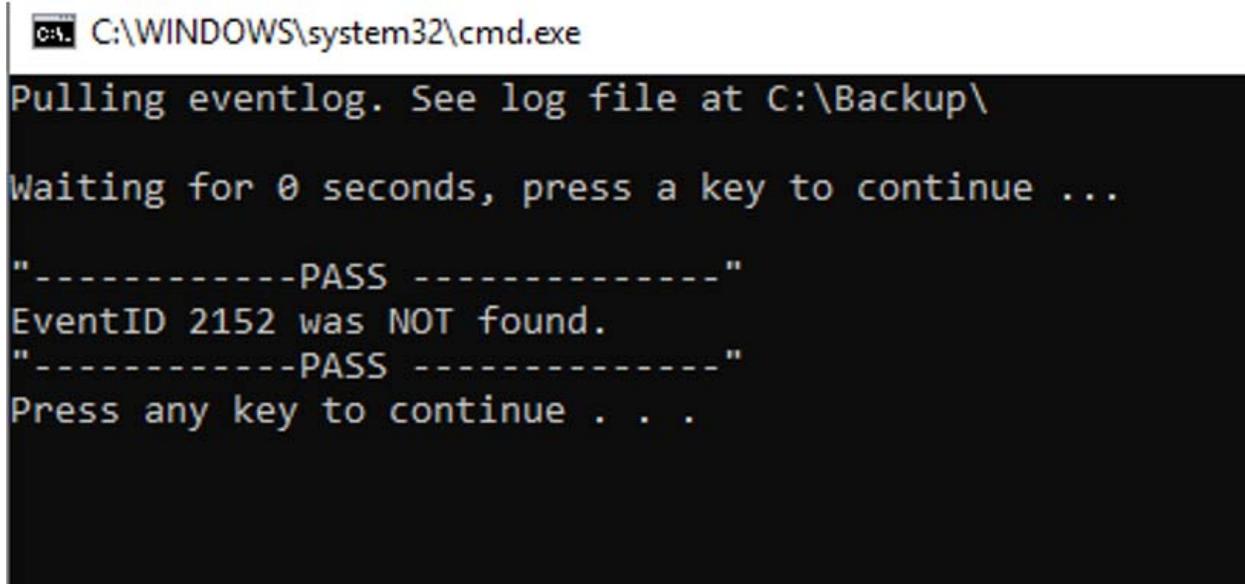
Figure 6   Using the Event Viewer to Clear an Event Log
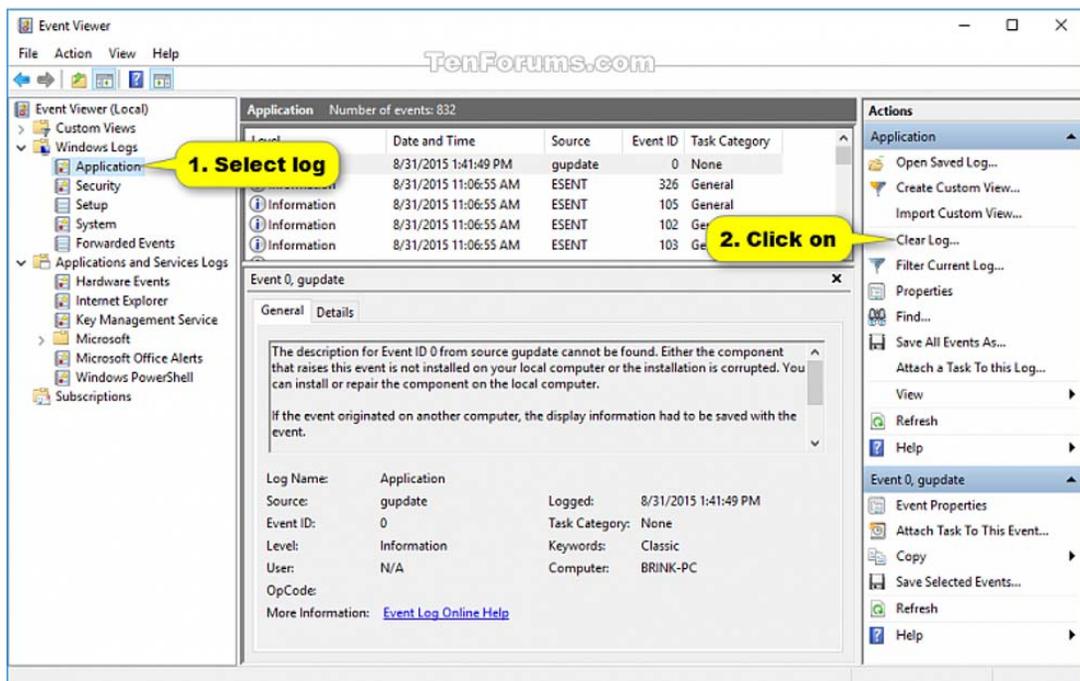
4. Using the Windows **Run** window, used in step 1, the *.bat file (`CheckEventID.bat`) can be run to verify that there are no 2152 error events (i.e., this takes ~three seconds to run).

For a CheckEventID.bat results example, refer to Figure 7 on page 7.

Figure 7   CheckEventID.bat to Verify Instrument USB Drives are Error Free

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N5222-90115