

Keysight Technologies

N9030B PXA Signal Analyzer

Option BUG, 510 MHz Analysis Bandwidth Upgrade
for millimeter instruments.

Includes Option EPO upgrade also.

or

Option BUJ, 85 MHz or 160 MHz Analysis Bandwidth to 510 MHz
Analysis Bandwidth Upgrade for millimeter instruments.

Includes Option EPO upgrade also.

Notices

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Option BUG or Option BUJ, 510 MHz Analysis Bandwidth

Products Affected	N9030B, PXA Signal Analyzer
Serial Numbers:	All
Options Required	N9030B-MPB, Microwave Preselector Bypass N9030B-544 or 550 frequency range
To Be Performed By:	(X) Keysight Service Center () Personnel Qualified by Keysight () Customer
Estimated Installation Time:	5.0 Hours
Estimated Adjustment Time:	6.0 Hours
Estimated Verification Time:	4.0 Hours

Introduction

This installation note explains how to install Option B5X, 510 MHz Analysis Bandwidth, into a millimeter PXA that does not have Option EP0 (Enhanced Performance DDS LO) previously installed.

Option B5X requires Option EP0, and that is why this kit contains hardware for both B5X and EP0.

Installing Option EP0 consists of replacing the standard Option EP1 (Enhanced Phase Noise Performance) hardware with the DDS LO hardware and replacing the EP1 license with the EP0 license.

Instruments that currently have Option B85, 85 MHz Analysis BW or Option B1X, 160 MHz Analysis BW can be upgraded to Option B5X, 510 MHz Analysis BW using this retrofit kit (N9030BU-BUJ). Option B85 and B1X share common wide bandwidth hardware. The Option B85/B1X hardware is replaced by the Option B5X wide bandwidth hardware. The license for B85 or B1X and EP1 are removed and replaced with the license for B5X and EP0.

In addition, the existing Front End Assembly is replaced with a Front End Assembly capable of 510 MHz bandwidth, and the power supply is replaced.

The option is licensed for one instrument model number/serial number combination. The license file that is downloaded from the web will only install on the designated instrument.

When Option B5X is licensed, Option B2X is also licensed.

NOTE

N9030BU-BUT is the retrofit kit to upgrade to the 510 MHz Analysis BW when the instrument already has Option EP0 installed.

Contents

Quantity	Description	Keysight Part Number
1	Installation Note	This note
1	Option Upgrade Entitlement Certificate	-----
1	Wideband Analog IF assembly	N9030-60038
2	Wideband Digital IF assembly	N9020-60311
1	Flex Circuit, B5X 80 conductor	N9030-60034
1	Wire Harness, 4 switch control	N9030-60035
1	Flex Circuit, WB Stream	N9020-60278
2	Spring Clip (for flex cable)	N9030-00002
1	Cable Kit, B2X/B5X	N9030-60037
1	Front End assembly, 50 GHz, 510 MHz IF BW	N9020-60337
1	Cable Kit, EPO	N9030-60039
1	Front End Control Assembly	N9020-60295
1	Synthesizer Assembly	N9020-60227
1	Reference Assembly	N9020-60387
1	Power Supply	0950-5748
1	7.2 GHz Tubular Bandpass Filter	9135-6218
3	Screw, Pan Head, M3x0.5 8 mm long	0515-0372
5	Screw, Flat Head, M3x0.5 5.8 mm long	0515-1035
6	Screw, Flat Head, M3x0.5 6 mm long	0515-1946
1	Connector Plug	1252-1873
10	Cable tie	1400-0249

Tools Required

- Personal computer with internet access and USB port
- USB storage device with > 2 GB free memory
- T-10 TORX Driver
- T-20 TORX Driver
- 5/16-inch torque wrench, 10 inch-pounds
- 1/4-inch open-end wrench (for External Mixing cable)
- 9/16-inch nut driver (for rear panel Ext Ref connector)
- Keysight Calibration and Adjustment Software, N7814A (revision E.20.00 or later required)
- Test equipment and computer supported by the Keysight Calibration and Adjustment Software
- PXA Signal Analyzer Service Guide, N9030-90071. Available online.

Initial Instrument Functionality Check

1. Power on the instrument and allow the instrument to boot up, run the alignments and display the measurement screen. The instrument will probably display a spectrum analyzer screen and you will see the instrument sweeping.
2. There should be no alignment failures. If there are failures, investigate and fix the problem before continuing.

Installation Procedure

Analyzer Information

1. Connect a power cord to the analyzer and turn on the analyzer.
2. After the analyzer has completed turning on, press **System, Show, System**. Make note of the following information from the Show System screen:

Product Number _____

Serial Number _____

Instrument S/W Revision _____

3. Check for the presence of the options listed below in the Show System screen. Put a check mark after each option listed below that appears in the show System menu.

N9030B-544 or 550 _____

N9030B-MPB _____

N9030B-B85 or B1X _____

4. Refer to the data in **step 2** above. Verify that the Product Number in **step 2** is appropriate for the upgrade being installed:

Kit to be Installed	Product Number (Step 2)
N9030BU-BUG or BUJ	N9030B

If the Product Number in **step 2** is not appropriate for the Option BUG/BUJ upgrade, **do not proceed** with the installation.

5. Refer to the data in **step 3** above.

Verify that N9030B-544 or 550 is checked (currently installed). This retrofit kit is for instruments with frequency range > 26.5 GHz. It will not work on 3.6 GHz, 8.4 GHz, 13.6 GHz, or 26.5 GHz instruments.

Verify that N9030B-MPB is checked (currently installed).

If N9030B-MPB is not installed, do not proceed with the installation of this kit. Option MPB, Microwave Preselector Bypass is required to obtain the wide 510 MHz analysis bandwidth for input frequencies above 3.6 GHz.

For information on how to order the Microwave Preselector Bypass, refer to the PXA upgrade page at:

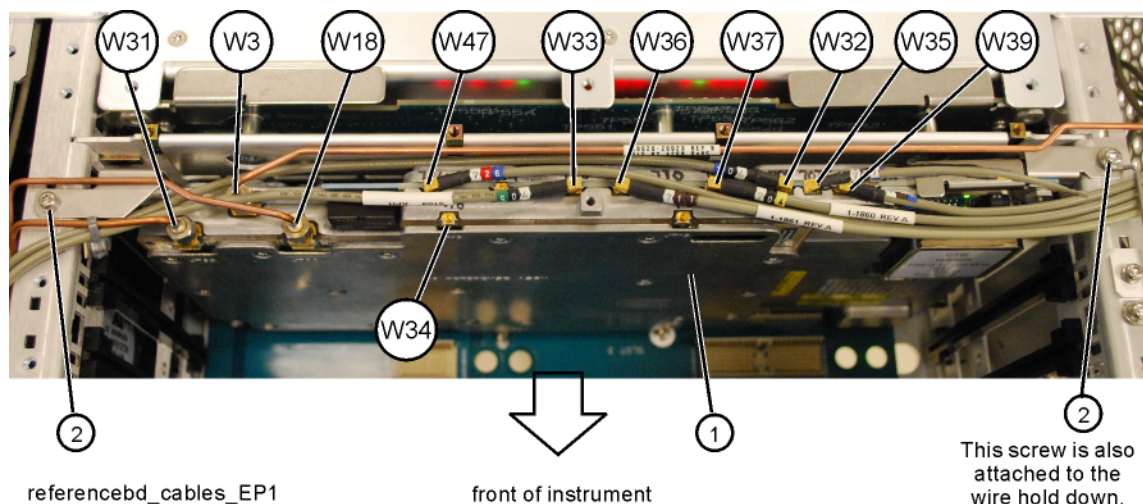
http://www.keysight.com/find/pxa_upgrades

If N9030B-B85 or B1X is installed, this hardware will be removed.

Removal of existing Reference Assembly (Option EP1), and installation of Reference Assembly (Option EP0)

1. Power down the instrument, wait till the standby light comes on, and remove the power cord.
2. Remove the instrument side strap handles, feet, outer case, top brace and power supply bracket. See the PXA Service Guide Assembly Replacement Procedure section for the Top Brace and Power Supply Bracket removal. Save all screws for reuse.
3. Refer to **Figure 1**. Locate the A16 Reference Assembly (1).

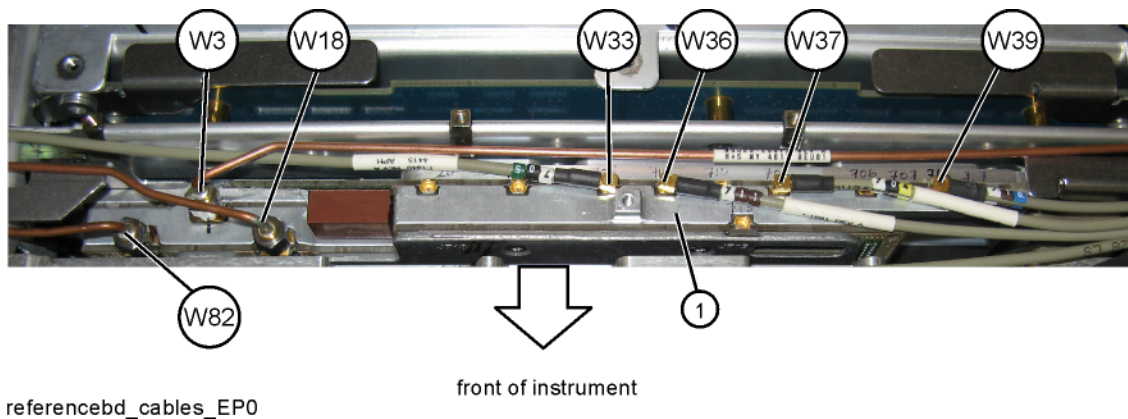
Figure 1 Existing EP1 Reference Assembly



4. Remove semi-rigid cables W3, W18 and W31 from the Reference assembly using a 5/16" wrench.
5. Disconnect the other end of cable W31 from the Synthesizer Assembly and discard this cable.
6. Remove the flat head screw on the left side (2) attaching the Reference assembly to the chassis.
7. Remove the pan head screw on the right side (2) attaching the wire hold down to the chassis. This will free the coax cables that attach to the Reference assembly.
8. Remove all coax cables from the Reference assembly. W32 (color 706) will not be reused. W34 (color 718) will only be present if Option B1X or B85 is installed, and W34 cable will be discarded. W35 (color 707) will only be present if Option BBA is installed.

9. Remove the Reference assembly from the chassis using the ejectors to pull the assembly up out of the chassis.
10. Locate the **N9020-60387** Reference assembly in the kit, and install this assembly into the instrument in the same location the original assembly was removed from.
11. Refer to **Figure 2** showing the Reference assembly for Option EP0 installed in the instrument. Replace semi-rigid cables W3 and W18. Torque cables to 10 inch-pounds using 5/16" torque wrench.

Figure 2 Replacement EP0 Reference Assembly

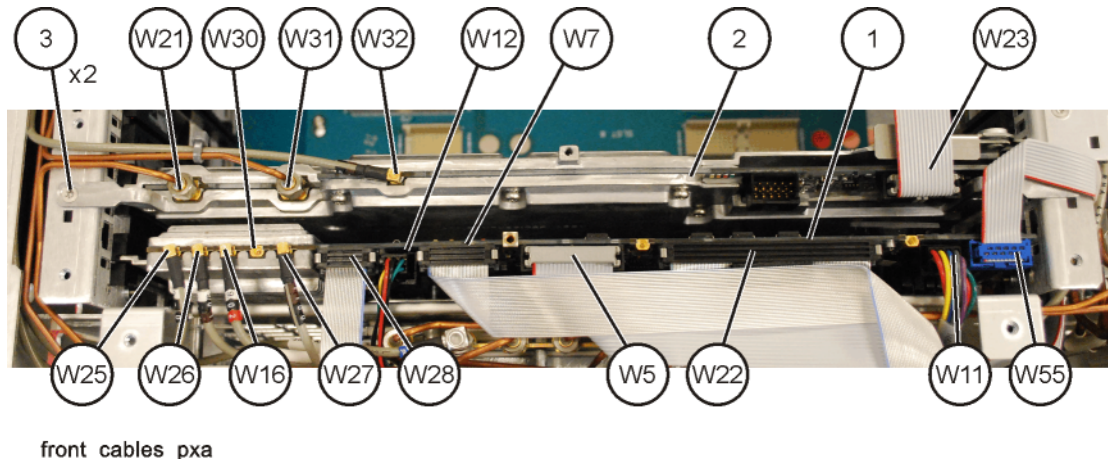


12. Re-install coax cables W33 (color 705), W36 (color 711), W37 (color 704) and W39 (color 716).
13. Locate one flat head screw, 0515-1035 in the kit and attach board hold down bracket to chassis on left hand side. Assure flex coax cables are routed neatly along frame and reinstall the wire cable hold down using ONE screw (0515-0372) in the hole closest to the front panel. Do not install the other screw that attaches the Reference board and wire hold down to the chassis, because additional wire routing is required when the Wideband Analog IF is installed.

Removal of existing Synthesizer Assembly (Option EP1), and installation of Synthesizer Assembly (Option EP0)

1. Refer to **Figure 3**. Locate the Synthesizer Assembly (1).

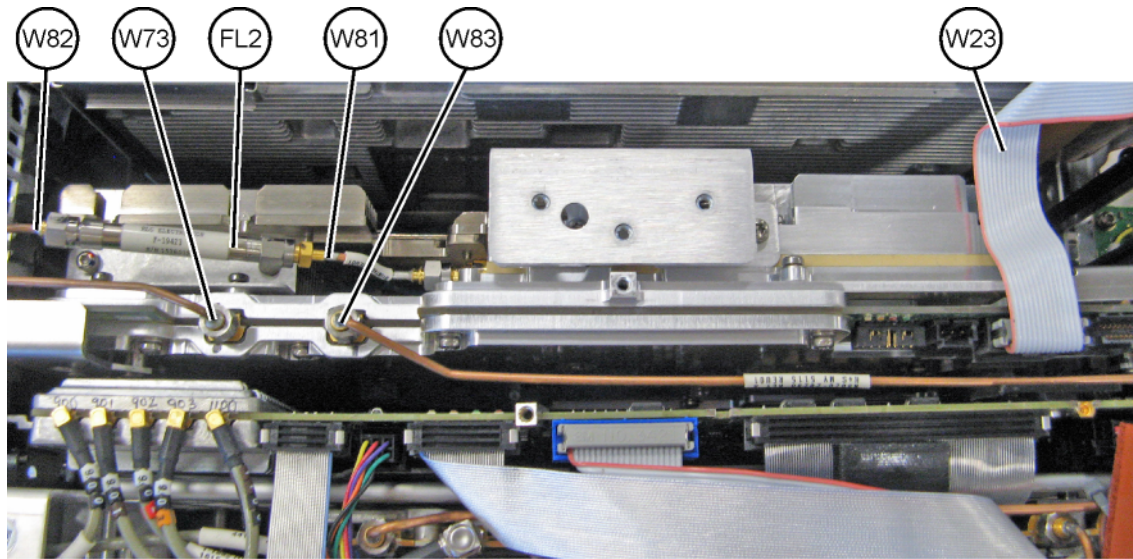
Figure 3 Existing EP1 Synthesizer Assembly



2. Remove the semi-rigid cable W21 from the Synthesizer assembly and A13 Front End assembly using a 5/16" wrench. Discard this cable.
3. Remove W32 coax cable and discard. Remove W23 Ribbon cable connection.
4. Remove the two screws (3) holding the Synthesizer assembly to the chassis. Discard screws
5. Use the ejectors on the Synthesizer assembly to unplug from the motherboard and lift out of the chassis.

6. Locate the replacement Synthesizer assembly, **N9020-60227**, in the kit. Install this assembly into the instrument in the same motherboard connectors the original assembly was removed from. Refer to **Figure 4** showing the Synthesizer assembly for Option EP0 installed in the instrument.

Figure 4 Replacement Option EP0 Synthesizer Assembly



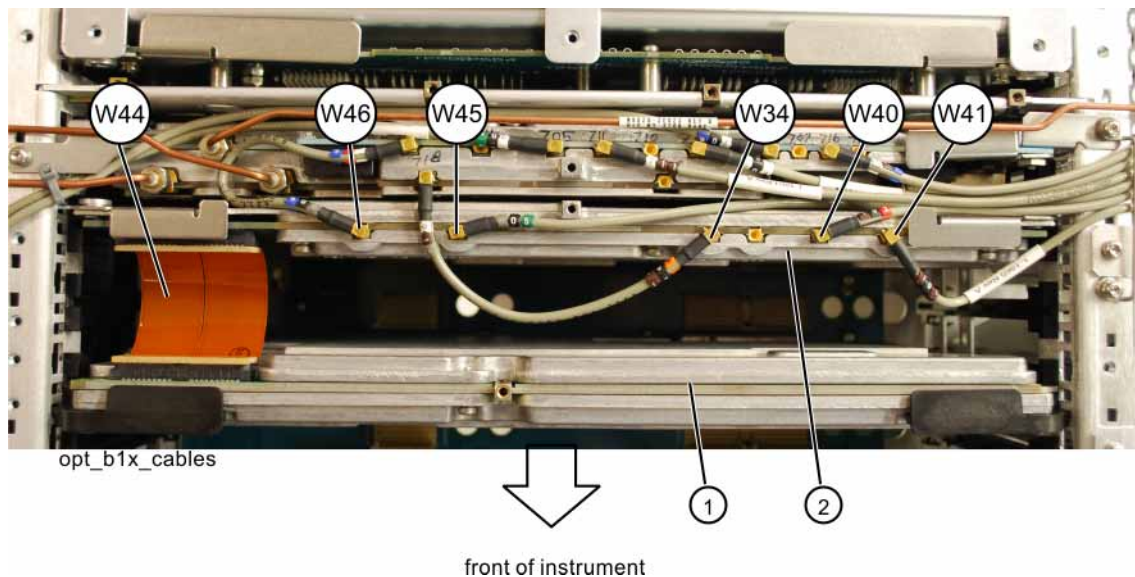
synthbd_cables_510

7. Locate two flathead screws (0515-1035) in the kit and attach the Synthesizer assembly to the chassis.
8. Re-connect W23 Ribbon cable.
9. Locate the short semi-rigid cable W81, N9020-20226 in the EP0 cable kit. Connect the male end of this cable to the Synthesizer assembly as shown in **Figure 4**. Do not torque this cable.
10. Locate the 7.2 GHz Tubular Bandpass Filter in the kit and attach to the end of the W81 cable installed in **step 9**. Do not torque this cable.
11. Locate the semi-rigid cable W82, N9020-20303 in the EP0 cable kit and install this cable between the 7.2 GHz tubular filter and the Reference Assembly W82 connector shown in **Figure 2**.
12. Torque all semi-rigid cable connections to 10 inch-pounds.
13. Remove the Front frame assembly and the right side RF Bracket from the instrument. See the Front Frame Assembly Removal and RF Bracket Removal procedure in the Service Guide. This will provide access to the YTO assembly.
14. Locate the YTO assembly on the right side of the instrument and remove the W20 semi-rigid cable from A20 YTO output connector. Remove the other end of W20 at A13J4. Discard this cable.
15. Locate semi-rigid cable W83, N9020-20302 in the EP0 cable kit. Connect this cable from the Synthesizer connector to the A20 YTO output connector. Torque to 10 inch-pounds.

Removal of Option B85 or B1X hardware, if present

1. Refer to [page 6, step 3](#) of this installation note and determine if Option B85 or B1X is present. You can also look at [Figure 5](#) below and verify the B85/B1X hardware is present. If Option B85 or B1X hardware is present, follow the procedure below. If B85/B1X hardware is not present go to the [“Installation of Option B5X Wide Bandwidth hardware” on page 12](#).

Figure 5 Option B1X Cables

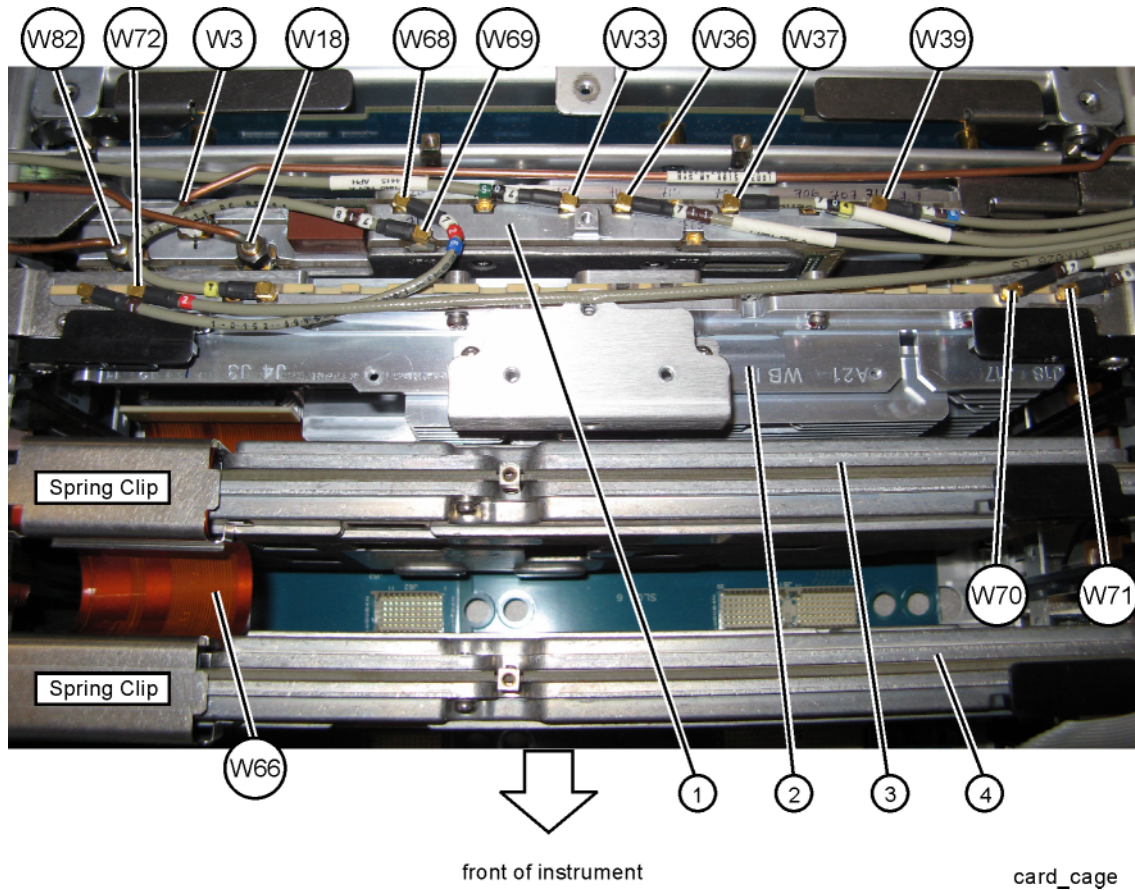


2. Refer to [Figure 5](#). Remove Flex Circuit W44 and coax cables W46, W45, W34, W40 and W41. Discard W44, W34 and W46 now. W45, W40 and W41 will be discarded later.
3. Inspect the right side of the Wideband Digital IF assembly (1), and look for a flex circuit cable attached to the board. Instruments with Option RTS will have this flex circuit cable. Disconnect this flex circuit cable from the board.
4. Remove the Wideband Analog IF (2) and Wideband Digital IF (1) assemblies by pulling up on the extractors to remove from the chassis. Discard these assemblies. Since the replacement Wideband Digital IF assembly looks exactly like the Digital IF assembly just removed, it is recommended that you place the Digital IF just removed in a location away from your work area, or somehow identify the assembly as the one you need to discard.

Installation of Option B5X Wide Bandwidth hardware

1. Locate the replacement Wideband Analog IF, both Wideband Digital IF's, and the Flex Circuit, B5X in the kit. Connect the flex circuit to the header on left side of the Wideband Analog IF assembly, with the cable pointing down.
2. Refer to **Figure 6**. Install the Wideband Analog IF (2) into motherboard slot 3. Be sure to avoid damaging the flex circuit cable and the coax cables that run over the right hand chassis rail.
3. The flex circuit cable will attach to the upper left side of both Wideband Digital IF assemblies once these are installed. Assure the loose end of flex circuit cable is above the chassis rail.
4. Install one of the Wideband Digital IF assemblies (3) into motherboard slot 5. If the instrument currently has Option RTS, avoid damaging the Option RTS flex circuit cable you removed earlier from the right side of the board assembly. Re-insert this flex cable into the right side board header.
5. Install the other Wideband Digital IF (4) into motherboard slot 7. Both boards are identical, so it does not matter which board goes into which slot.
6. Connect the flex circuit, B5X cable (W66) to both Wideband Digital IF boards as shown in **Figure 6**.
7. Locate two metal Spring Clips in the kit, and carefully install them over the Wideband Digital IF Flex Circuit connectors.
8. Locate two flathead screws (0515-1035) in the kit and attach the Wideband Analog IF to the chassis.

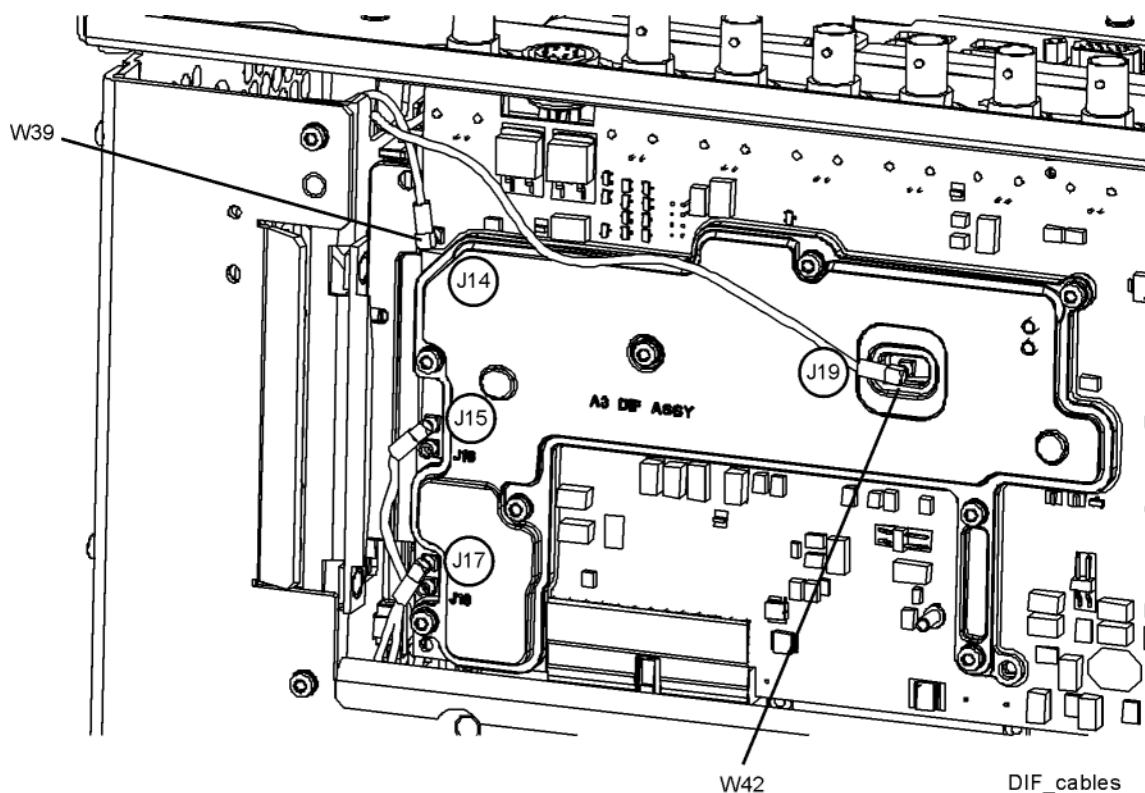
Figure 6 Wideband Analog IF and Wideband Digital IF installed in card cage



9. Locate the B5X cable kit. Locate the coax cable with color code bands 726 on one end and color code 1 on the other end (W68). Install the cable as shown in **Figure 6**. Color code 1 end is connected to A21 WB AIF at J1.
10. Locate the coax cable with color bands 718 and 4 (W69), and install the cable as shown in **Figure 6**. Color code 4 end is connected to WB AIF at J4.

11. Remove the instrument rear panel. See the PXA Service Guide Assembly Replacement Procedures
12. Refer to **Figure 7** showing the A3 Digital IF assembly. Remove the coax cables from J15 and J17. These cables will be discarded after you separate them from the rest of the cables. You will need to cut some cable ties to free these two cables.

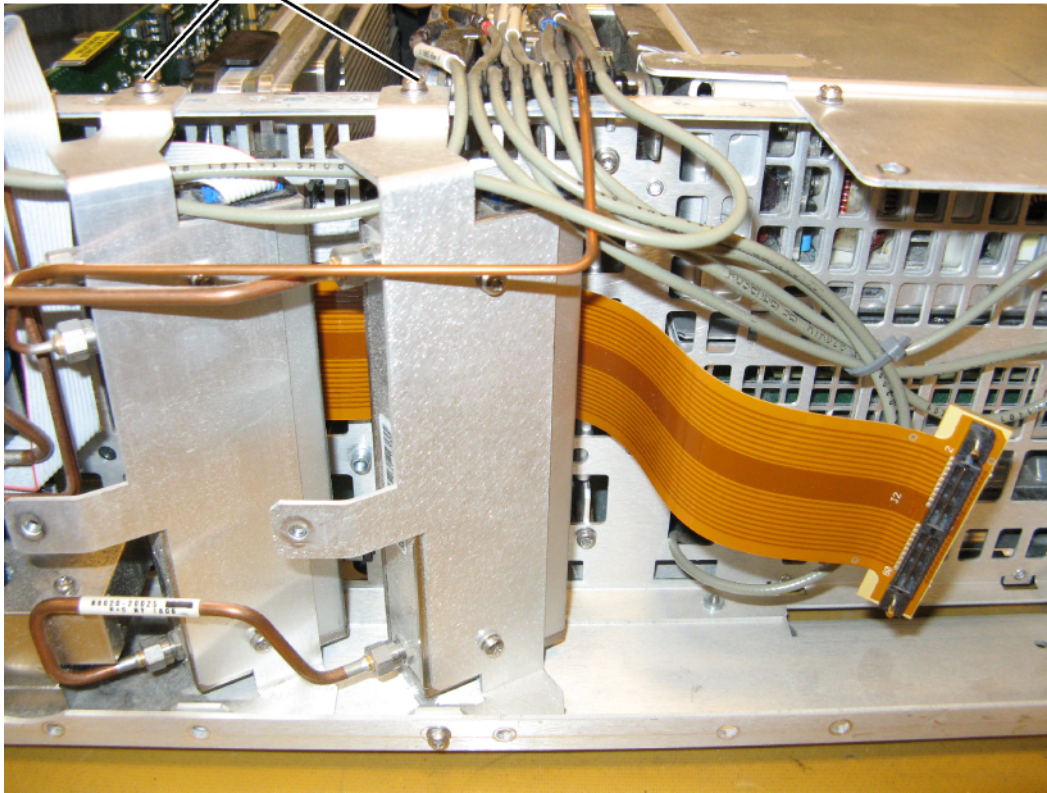
Figure 7 A3 Digital IF Assembly and Cable Connections



13. Locate the coax cable with color code 2 and color code 17 in the B5X Cable kit. Insert the color 2 end to the Wideband Analog IF assembly at J2. This is cable W72. See **Figure 6**.
14. Route the other end of this cable down the right side of the instrument to the A3 Digital IF board, and insert the cable into J17 of the Digital IF board. See **Figure 7**.
15. Locate the coax cable with color code 18 and color code 15 in the B5X Cable kit. Insert the color 18 end to the Wideband Analog IF assembly at J18. This is cable W71. See **Figure 6**.
16. Route the other end of this cable down the right side of the instrument to the A3 Digital IF board, and insert the cable into J15 of the Digital IF board. See **Figure 7**.
17. Replace any cable ties removed to bundle the coax cables going to the A3 Digital IF.

- 18. Perform the following steps ONLY if the instrument currently has Option RTS.** If the instrument does not have Option RTS go to the "**Replace the Power Supply Assembly**" section.
- 19.** When Option RTS was installed previously on instruments that have Option B1X or B85, there was only one Wideband Digital IF in the instrument. This WB Digital IF assembly was connected to the WBDIF Extension board located on the right rear of the instrument, with a single Flex Circuit cable. Now that the instrument is being upgraded to Option B5X, there are two WB Digital IF assemblies, and an additional Flex Circuit cable is required so that both WB DIF assemblies can connect to the WBDIF Extension board.
- 20.** Verify that you re-connected the Option RTS Flex Circuit cable, removed previously, on the right side of the new Digital IF assembly in slot 5.
- 21.** Refer to **Figure 8**. Remove the two screws holding both top attenuator brackets to the chassis. This is to allow room for the flex cable to be routed in back of the attenuators.
- 22.** Locate Flex Circuit, WB Stream in the kit. Notice one end of the flex cable has a connector that has NO locator pins, and the other end of the flex cable has two locator pins.
- 23.** Starting at the attenuator near the back of the instrument, push the end of the flex cable that does not have the locator pins behind both attenuators. This cable will route next to the attenuators and on the outside of the flex cable previously installed. The cable will route between the frame and the small ribbon cable, and through the opening in the instrument frame where the second Wideband Digital IF is located in motherboard slot 7.
- 24.** Locate the connector on the right side of the Wideband Digital IF, and carefully align the flex cable over the two alignment pins on the PC board connector. Press the cable into the Wideband Digital connector.

Figure 8 Attenuator Bracket Screws
Attenuator Bracket Screws



25. The other end of the flex circuit cable plugs into the WBDIF Extension board. You should not need to remove the WBDIF Extension board and bracket.

Replace the Power Supply Assembly

1. See the PXA Service Guide Power supply removal procedure.
2. Locate the replacement power supply in the kit. Install this power supply into the instrument.
3. Re install the rear panel.
4. Re install the power supply bracket.

Replace the A13 Front End Assembly

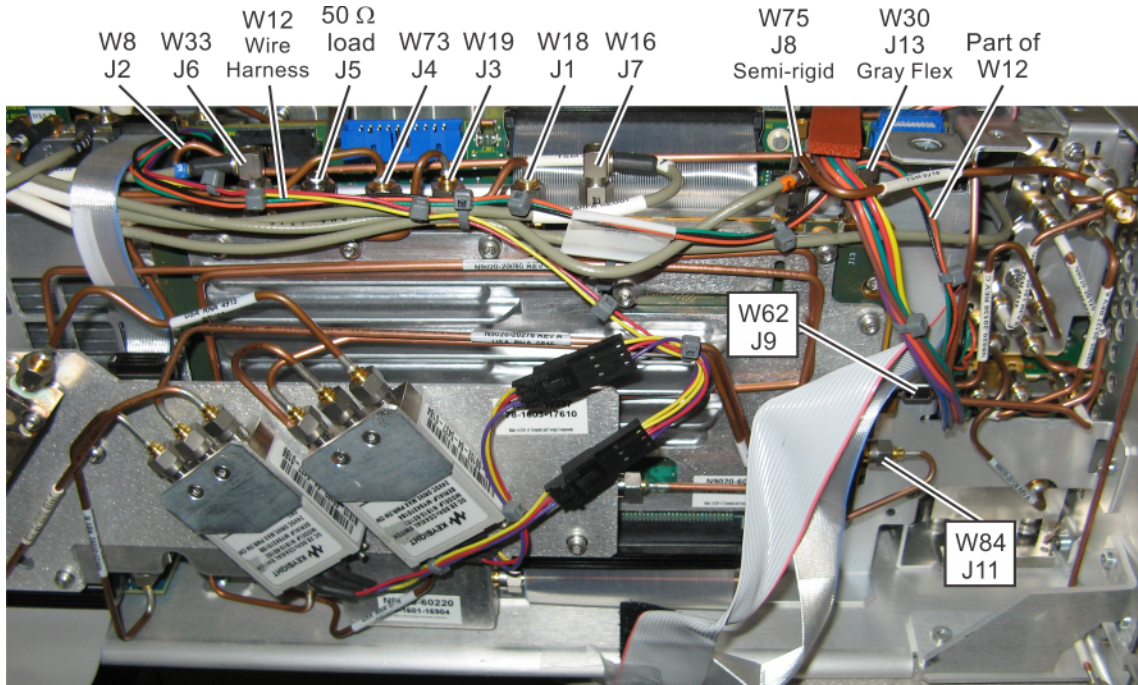
NOTE

The A15, Front End Control assembly will be replaced later. Therefore you do not need to reconnect cables that attach to the A15 Front End Control assembly.

1. See the PXA Service Guide RF Front End Assembly removal procedure.
2. Locate the replacement Front End Assembly in the kit. Notice this replacement Front End assembly has some switches and a filter that are necessary for switching in the 510 MHz IF path.
3. Install the replacement Front End Assembly. Do not connect cables to the A15 Front End Control assembly.
4. Locate semi-rigid cable W73, N9020-20301 in the EP0 cable kit. Connect this cable from Front End J4 to A14 Synthesizer, left connector.
5. Locate semi-rigid cable W62, N9020-20130 in the cable kit. Connect this cable from Front End J9 to the lower coax switch port 2. You will need to remove the cable already attached to port 2.
6. Locate semi-rigid cable W75, N9020-20167 in the cable kit. Connect this cable to Front End J8. This is a replacement for the Option EXM cable removed earlier.
7. Assure 50 ohm load is attached to Front End J5.

8. Locate the Wire Harness, 4 switch control in the kit. See **Figure 9**. This wire harness replaces the existing W12 harness that goes to the Preselector Bypass switch. This new harness also has two more connectors that connect to the replacement Front End Assembly coax switches.

Figure 9 B5X Front End Assembly showing W12 Wire Harness



front_end_microwave

9. Locate the connector plug in the kit. Insert this connector plug into one of the wire harness orange/black/green connectors. It does not matter which connector the plug attaches to.
10. See the PXA service guide section on removal and replacement of Option MPB and LNP. You need to unplug the current W12 wire harness from the MPB transfer switch wire connector, and replace with one pigtail from the new wire harness W12 in the kit. The yellow/black/gray wire connector on the MPB transfer switch connects to the wire harness orange/black/green connector. Loosening the LNP/MPB switch brackets will allow access to the wire harness connection.
11. Route cables and install cable ties as shown in **Figure 9**.

Replace the A15 Front End Control Assembly

1. See the PXA Service Guide Front End Assembly removal procedure. Once the Front End Control Assembly is removed place it in a location it will not be confused with the replacement Front End Control from the retrofit kit, since the assemblies look similar.
2. Locate the coax cable with color code 901 that was removed from J901 on the left side of the board assembly. Discard this cable.
3. Locate the replacement Front End Control Assembly in the kit. Install this assembly into the instrument. Reconnect all cables.
4. Locate the coax cable with color code 901 and color code 17 in the B5X Cable kit. This is cable W70. Insert the color 17 end to the Wideband Analog IF assembly at J17. Route the cable forward behind the attenuator and switch brackets. Route the cable in front of the Front End Assembly, and attach the cable to the A15 Front End Control board at J901. See **Figure 6** that shows the color code 17 end connected to WB AIF J17.
5. Route Front End and Front End Controller cables and re-attach cable ties. Check cable routing to assure cables will not be pinched when covers are installed.
6. Replace the pan head screw, 0515-0372, in the wire cable hold down to the right of the WB AIF and Reference assemblies.
7. Replace the right side RF Bracket.
8. Replace the Front Frame Assembly. Be sure to reconnect the semi-rigid cable to the front panel Ext Mixer connector (if Option EXM installed).
9. Plug in the power cord and power on the instrument. Assure the instrument boots up. Some auto alignment failures may occur because the instrument may contain early software, and the adjustments have not been performed.
10. Turn on the 50 MHz calibrator and tune the instrument to 50 MHz. Verify the 50 MHz signal is present.

Instrument Software Installation

Upgrade the software to the latest revision. Even if the software is at the latest revision, reinstall the software because the software installation re-programs the FPGAs in the instrument.

The latest revision of the X-Series software can be downloaded from:

http://www.keysight.com/find/N9030B_software

License Installation Procedure over USB

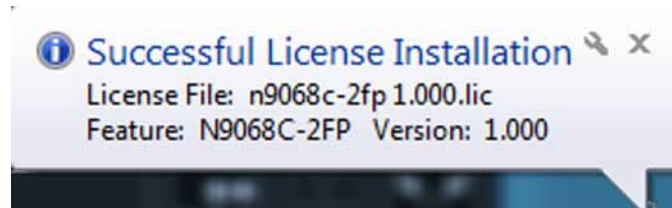
1. Locate the Option Upgrade Entitlement Certificate from the kit.
2. Redeem the Option Upgrade Entitlement Certificate by following the instructions on the Certificate.
3. After redeeming your Option Upgrade Entitlement Certificate you will receive an email with an attached License File.
4. Locate a USB storage device. Perform a virus scan on this device before use.
5. Save the License File to the root directory of the USB storage device.
6. Connect the USB storage device to the signal analyzer USB port. Windows will detect the new hardware and may display the configuration menu shown in **Figure 10**. This menu may be configured according to your preferences.

Figure 10 USB Storage Device Configuration Menu



7. The signal analyzer will automatically consume the License File (this may take a few minutes). When the License File is consumed the Keysight License Manager will display a “Successful License Installation” message as shown in **Figure 11**.

Figure 11 Successful License Installation



Alternate Installation Procedure

The License File can be manually installed over USB or LAN by placing the license file in the following folder on the signal analyzer

C:\Program Files\Agilent\licensing

Verify the License Installation and Hardware

1. Cycle power on the signal analyzer and wait until the analyzer boots to the measurement application screen.
2. Press **System, Show System** to display a list of installed options.
3. Verify that the installed options list contains the newly installed N9030B-EP0, N9030B-B2X, and N9030B-B5X.

Removal of Option EP1 and Option B85/B1X/B1Y

NOTE

Contact the division for removal of Option EP1; and if BUJ was ordered, removal of Option B85/B1X/B1Y.

1. Connect the instrument to the Keysight LAN. The division will need to log into the instrument and remove the license for Option EP1, and also B85 or B1X/B1Y if the N9030BU-BUJ kit was ordered.
2. E-mail the division at Support,CMS (K-Somoma.oxgen1).
Message subject: Bandwidth Upgrade.
In this E-mail provide:
 - Instrument Model number
 - Order number from the License Entitlement Certificate
 - The LAN address of the instrument
3. The division will e-mail you when the license(s) removal process is complete.

Complete the Hardware Installation

1. Replace the top brace, instrument cover and bottom and rear feet.
2. Power up the instrument.

Verify Option B5X Functionality

1. Press **MODE/MEAS**, and select I/Q Analyzer (Basic). Assure Complex Spectrum is highlighted. Tap OK. Tap Frequency to view the pull down menu and select Meas Setup. Tap IF Path, then IF Path again and verify 510 MHz appears. You will not see a listing for 255 MHz path even though Option B2X is licensed. Select this 510 MHz path.
2. Turn on the 4.8 GHz calibrator signal (**Input/Output, RF Calibrator**, select **4.8 GHz**), and set the span to 510 MHz. Press **Frequency**, select **Span, 510 MHz**. Tune the analyzer center frequency to 4.8 GHz. The 4.8 GHz signal should appear on screen.

Option BUG or Option BUJ, 510 MHz Analysis Bandwidth

Utilities, Adjustments, and Performance Verification Tests

Utilities Required

None

Adjustments Required

Adjustment Name
Perform all adjustments
Remember to perform YTF Alignment. Press System, Alignments, Advanced, Characterize Preselector .
Perform Characterize Noise Floor. Press System, Alignments, Advanced, Characterize Noise Floor .

Performance Testing Required

Verification Test Name
Perform all tests

For assistance, contact your nearest Keysight Technologies Sales and Service Office. To find your local Keysight office access the following URL, or if in the United States, call the following telephone number:

<http://www.keysight.com/find/assist>

1-800-829-4444 (8 am - 8 pm ET, Monday - Friday)

