

# Keysight Technologies N9030B Signal Analyzer

Option BBA  
Analog Baseband IQ Inputs  
Upgrade Kit

# Notices

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N9030-90077

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## Option BBA, Analog Baseband I/Q Inputs Upgrade Kit

Products Affected:	N9030B, PXA Signal Analyzer with Options 503, 508, 513, or 526
Serial Numbers:	All
Option	BBA
To Be Performed By:	(X) Keysight Service Center (X) Personnel Qualified by Keysight ( ) Customer
Estimated Installation Time:	3.0 Hours
Estimated Adjustment Time:	0.5 Hours
Estimated Verification Time <sup>a</sup> :	3.0 Hours

a. To ensure that this newly installed option is functioning properly, the procedure that follows includes the requirement of performing certain adjustments and performance verification tests. However, the completion of these tests does not guarantee that the instrument meets all advertised specifications.

Software and test equipment is required for making adjustments and for performance verification testing.

Information on how to obtain this software can be found at:

[www.keysight.com/find/calibrationsoftware](http://www.keysight.com/find/calibrationsoftware)

While Keysight does recommend that a full calibration be performed after the installation of this upgrade, the end user must ultimately determine whether they want this service or not. If a full calibration is required, arrangements regarding the level of calibration must be made between the end user and the calibration provider.

## Introduction

This kit provides all parts and instructions necessary to install Option BBA, Analog Baseband I/Q Input, into the Keysight N9030B with frequency range 26.5 GHz and below.

### NOTE

1. This upgrade kit is **not compatible** with N9030B PXA signal analyzers with any of the following options currently installed:

N9030B-B5X - 510 MHz Analysis Bandwidth

N9030B-544 - Frequency Range, 3 Hz to 44 GHz

N9030B-550 - Frequency Range, 3 Hz to 50 GHz

2. This upgrade kit installation requires that you re-install instrument software.

The latest revision of the PXA Signal Analyzer software may be downloaded from

[http://www.keysight.com/find/xseries\\_software](http://www.keysight.com/find/xseries_software)

The instrument software must be installed AFTER the hardware in the kit is installed. Follow the procedure in this document for redeeming and installing the option upgrade license key.

3. The option is licensed for one instrument model/serial number combination. The license key will only install on the designated instrument.
-

## Installation Kit Parts List

Quantity	Description	Keysight Part Number
1	BBIQ Main Board	N9020-60093
1	LED Board	N9020-63095
1	BBIQ Interface Board	N9020-60094
1	LED Board Overlay, Bottom	N9020-80166
1	LED Board Overlay, Top	N9020-80163
1	Cable, Flex Ribbon <sup>a</sup>	8121-2090
1	Cable, Flex Ribbon <sup>b</sup>	8121-1683
1	Option BBA Cable Kit (with wire markers)	N9030-60018
1	Core Bracket, top	N9020-00071
1	Core Bracket, bottom	N9020-00072
60	Screws, M3 X 0.5 (8 mm long)	0515-0372
1	Vibration Mount	0460-2725
15	Screws, M3 X 0.5 (6 mm long), flat head	0515-1946
9	Screws, M3 X 0.5 (8 mm long), flat head	0515-2032
2	Screws, Hex Shoulder	N9020-20017
2	Main Board Warning Labels	N9020-80036
1	Entitlement Certificate	5964-5178
1	Entitlement Certificate Envelope	5967-7169
5	Tie Wrap	1400-0249
1	Installation Note	This note
1	Probe tip BNC adapter	5063-2143
1	Cable	8120-2682

a.Only needed when installing on N9030B

b.Only needed when installing on N9020B

## Option BBA, Analog Baseband I/Q Inputs Upgrade Kit

### Tools Required

- T-10 Torx Driver
- T-20 Torx Driver
- 5/16-inch torque wrench
- 1/4-inch open end wrench
- 1/4-inch socket on 4 lb torque wrench
- scissors or knife
- diagonal cutters
- USB storage device with > 2 GB free memory

#### **WARNING**

Before you disassemble the instrument, turn the power switch to Standby, wait until the instrument has completely shut down, and unplug the instrument. Failure to unplug the instrument can result in personal injury.

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#### **CAUTION**

Electrostatic discharge (ESD) can damage or destroy electronic components. All work on electronic assemblies should be performed at a static-safe workstation. Refer to the documentation that pertains to your instrument for information about static-safe workstations and ordering static-safe accessories.

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### Keysight Service Center or Customer Calibration Lab:

The following kit items are not installed in the analyzer upgrade and need to be shipped back to the end user for their use:

- 5063-2143, Probe tip BNC adapter
- 8120-2682, cable

## Installation Procedure

### CAUTION

If the instrument is placed on its face during any of the following procedures, be sure to use a soft surface or soft cloth to avoid damage to the front panel, keys, or input connector.

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### NOTE

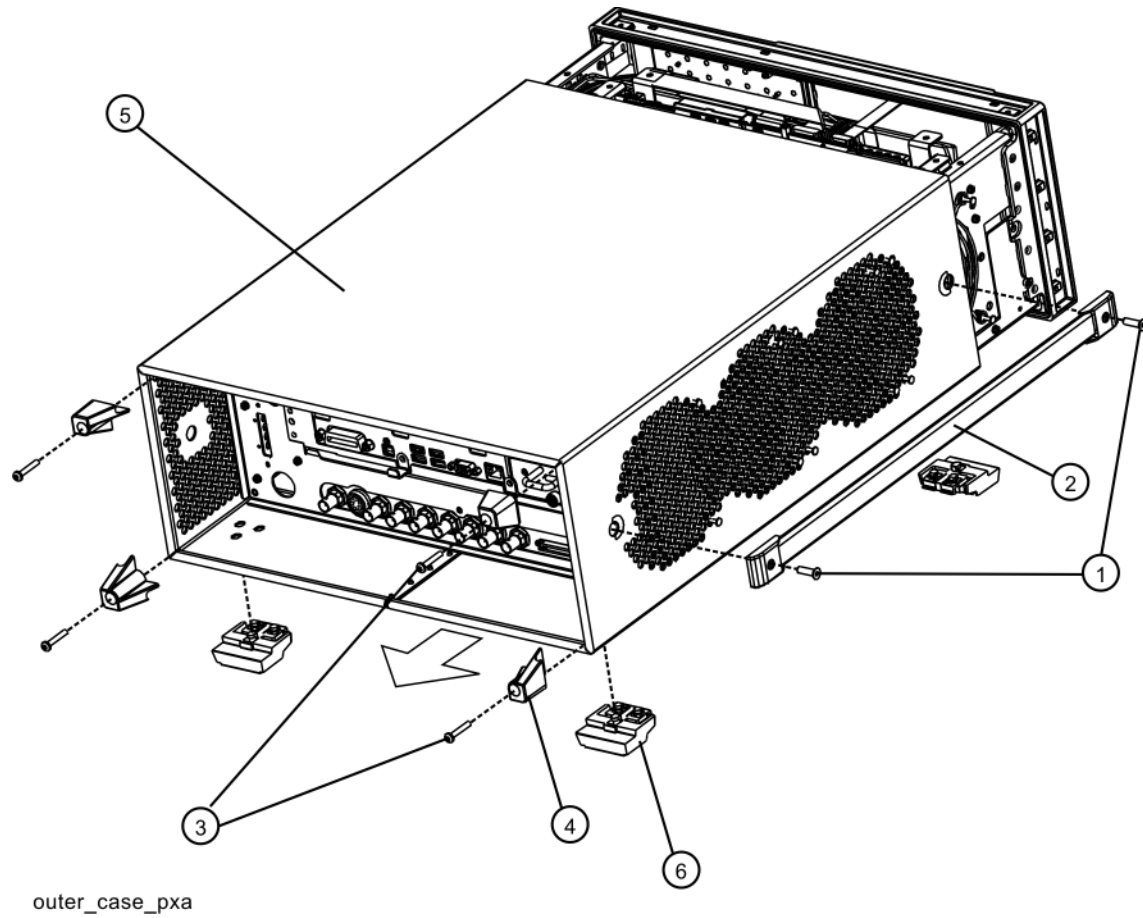
Make sure any adapters on the front panel are removed.

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## Instrument Cover Removal

1. Power down the instrument and wait for the standby light to come on. Disconnect the instrument from ac power.
2. Refer to **Figure 1**. Using the T-20 driver, remove the 4 screws (1) (two on each side) that attach the strap handles (2) on each side of the instrument.
3. Remove the four key locks from the instrument four bottom feet.
4. Remove the four instrument bottom feet.
5. Using the T-20 driver, remove the four screws (including washers) (3) that hold the rear feet (4) in place.
6. Pull the instrument cover (5) off towards the rear of the instrument.

**Figure 1** Instrument Outer Case Removal





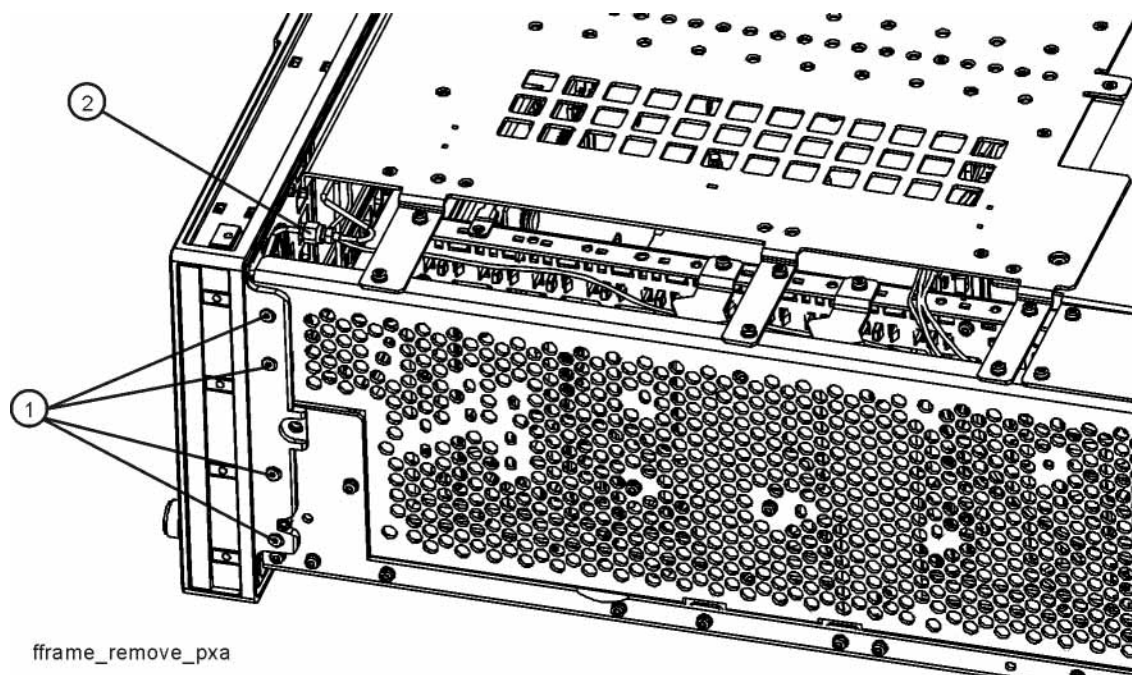
## Front Frame Assembly Removal

1. Refer to **Figure 2**. Look at the upper right corner of the front panel. If EXT MIXER SMA connector is present (Option EXM), locate the connection where the two semi-rigid cables mate behind the front frame (2). Disconnect the connections using a 1/4-inch wrench and a 5/16-inch wrench.
2. Using the T-10 driver, remove and discard the eight screws (1), four on each side, to detach the front frame from the chassis.
3. Refer to **Figure 3**. Pull the front frame carefully away from the chassis. Remove the ribbon cable W1 from the A8 Motherboard.

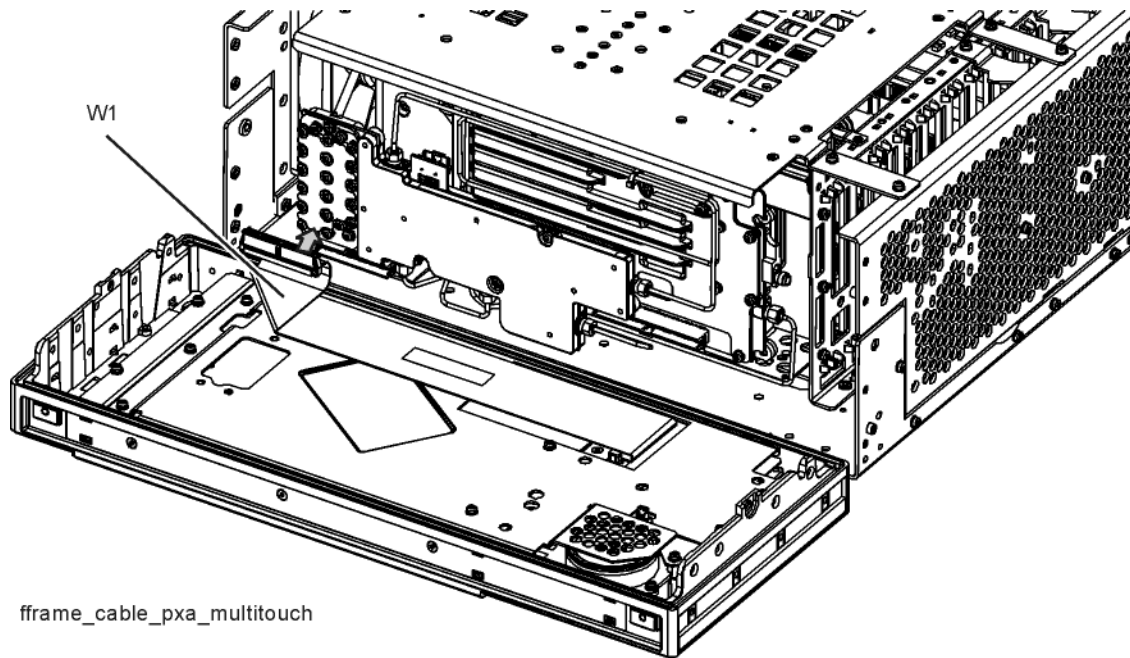
**NOTE**

W1 may have locking springs on each side. Depress the spring on each side of the connector to remove from the motherboard.

**Figure 2** Front Frame Removal



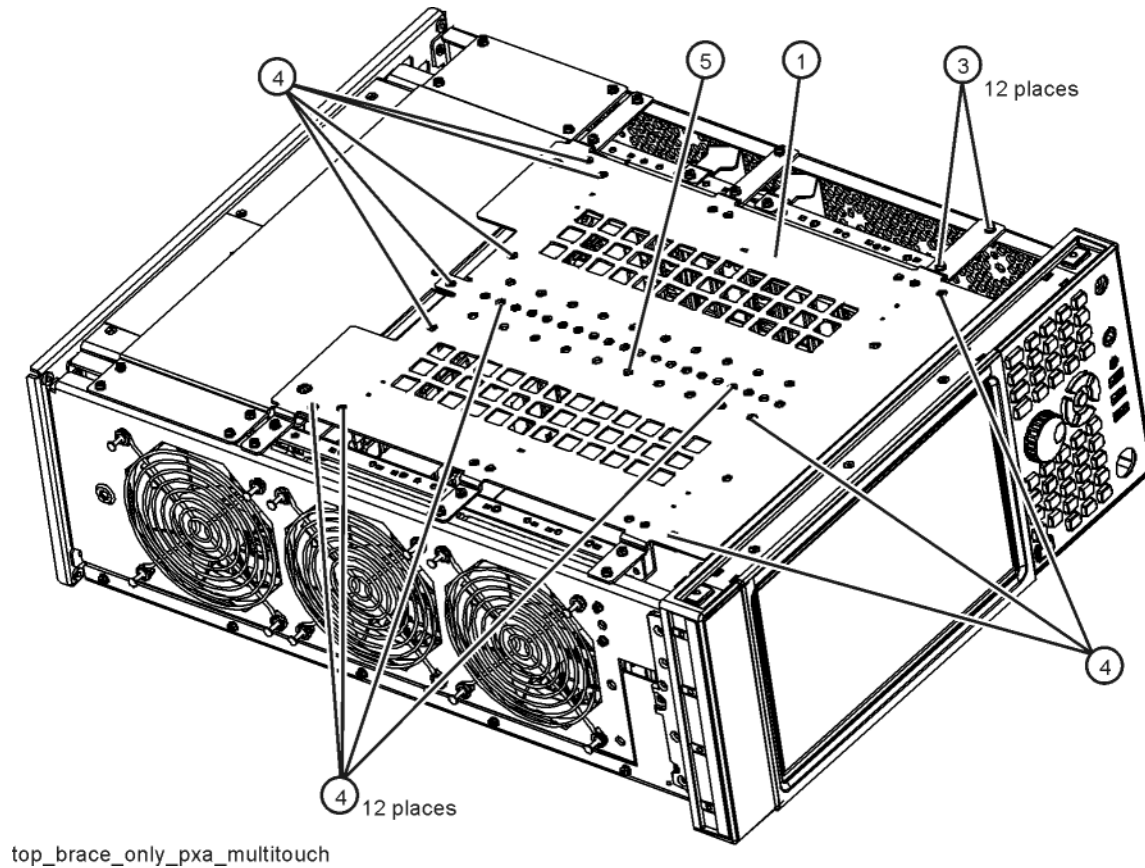
**Figure 3** Front Panel Cable



## Top Brace Removal

1. Refer to **Figure 4**. To remove the top brace (1), use the T-10 driver to remove the twelve panhead screws (3) (0515-0372) attaching the top brace to the chassis. Remove and discard the twelve screws (fourteen screws with Option B1X) (4) (0515-1946) attaching the top brace to the boards.

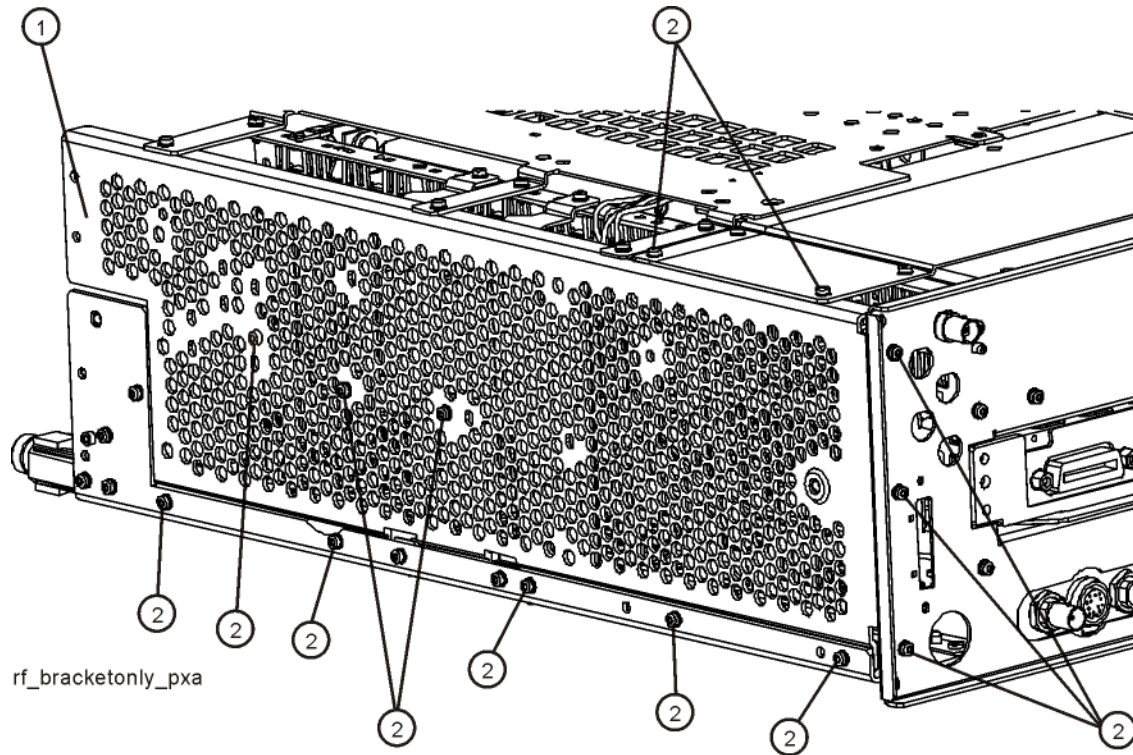
Figure 4 Top Brace Removal



## RF Bracket Removal

1. Refer to **Figure 5**. Remove the RF bracket (1) by removing the thirteen screws (2) (0515-0372) using the T-10 driver.

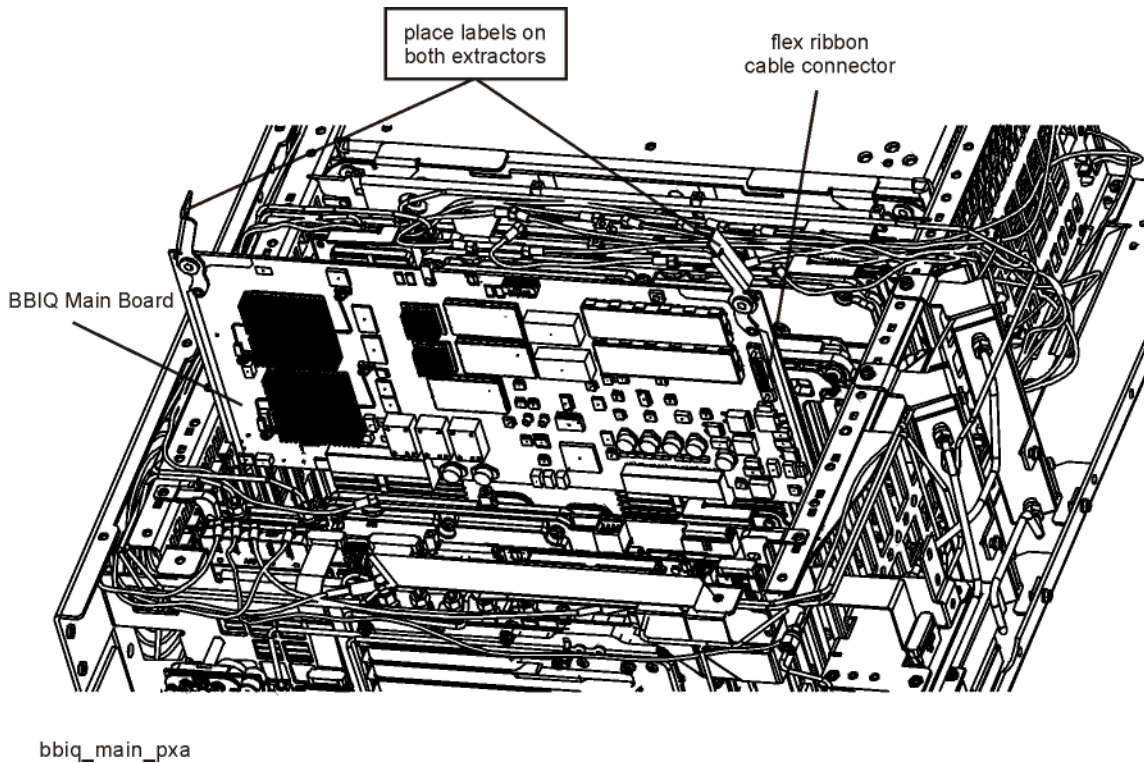
**Figure 5** RF Bracket Removal



## Option BBA Hardware Installation

1. Refer to **Figure 6**. Locate and install the **N9020-60093** BBIQ Main Board into slot 7. Notice the connector on the right side of the board where the flex ribbon cable will connect.

**Figure 6** Option BBA Main Board



2. Locate and install labels **N9020-80036**, "Remove Both Cables Before Lifting" on the top of each board extractor, both the right and left hand side.

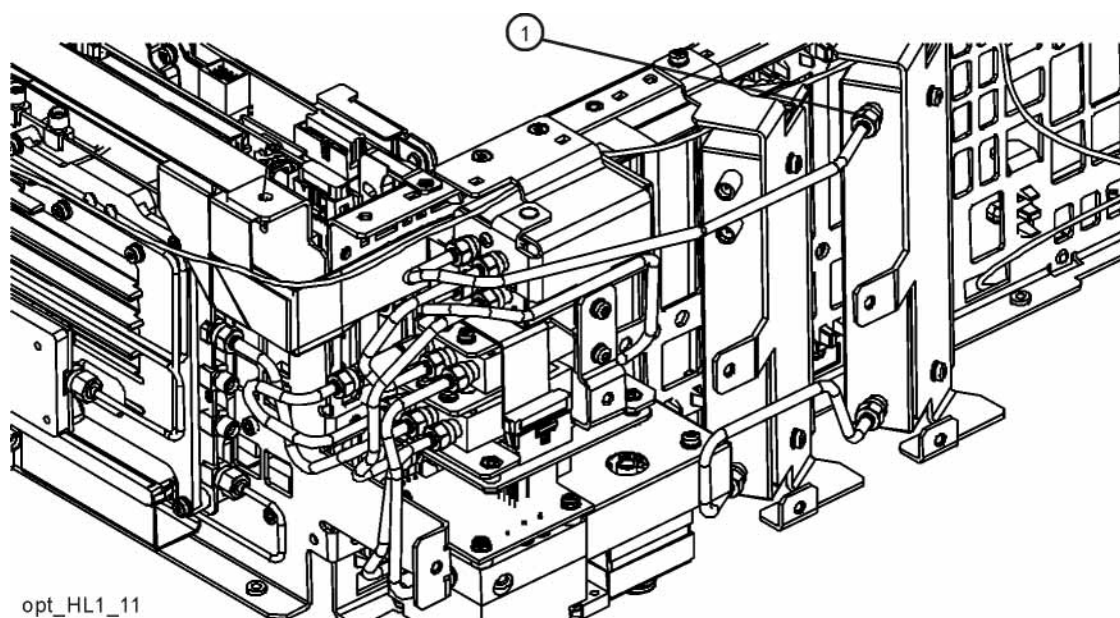


## Look for Optional Switches

See **Figure 7**. If your instrument does not have the switches shown, skip to **“Installation of the Flex Ribbon Cable” on page 18**. If the instrument does have the switches shown, continue with the following procedure.

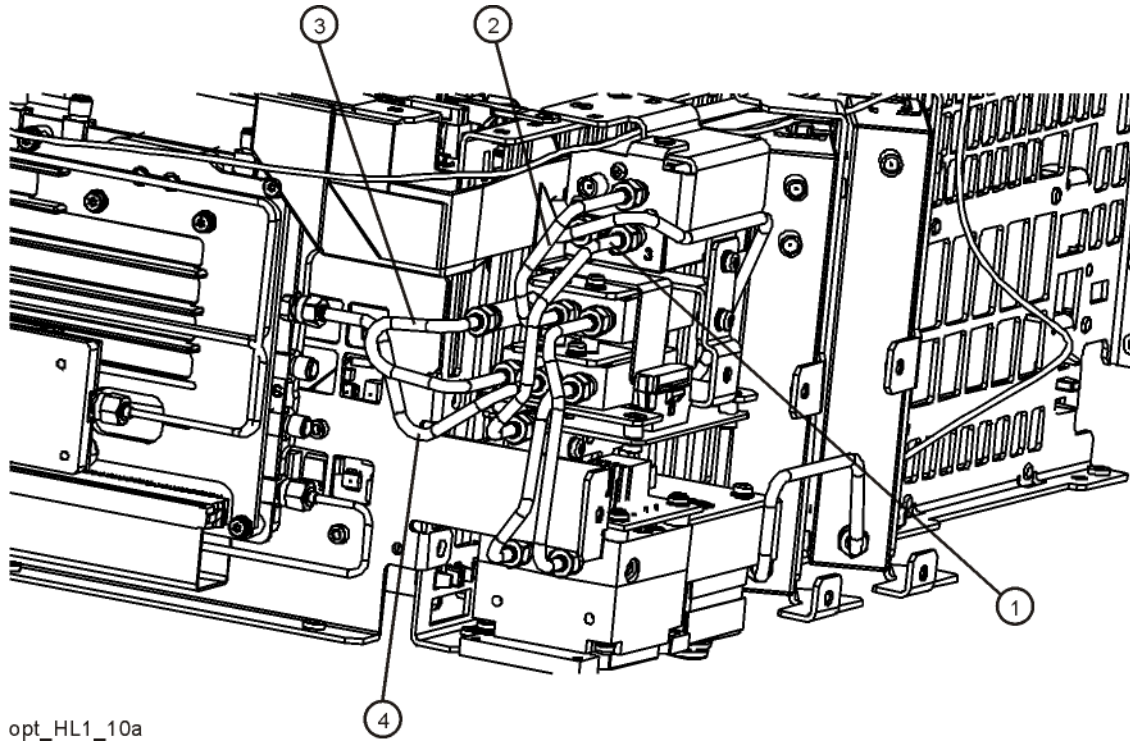
1. Refer to **Figure 7**. Remove rigid cable W51 (1) from top switch port 1 to Attenuator B output.

**Figure 7** W51 Cable Removal



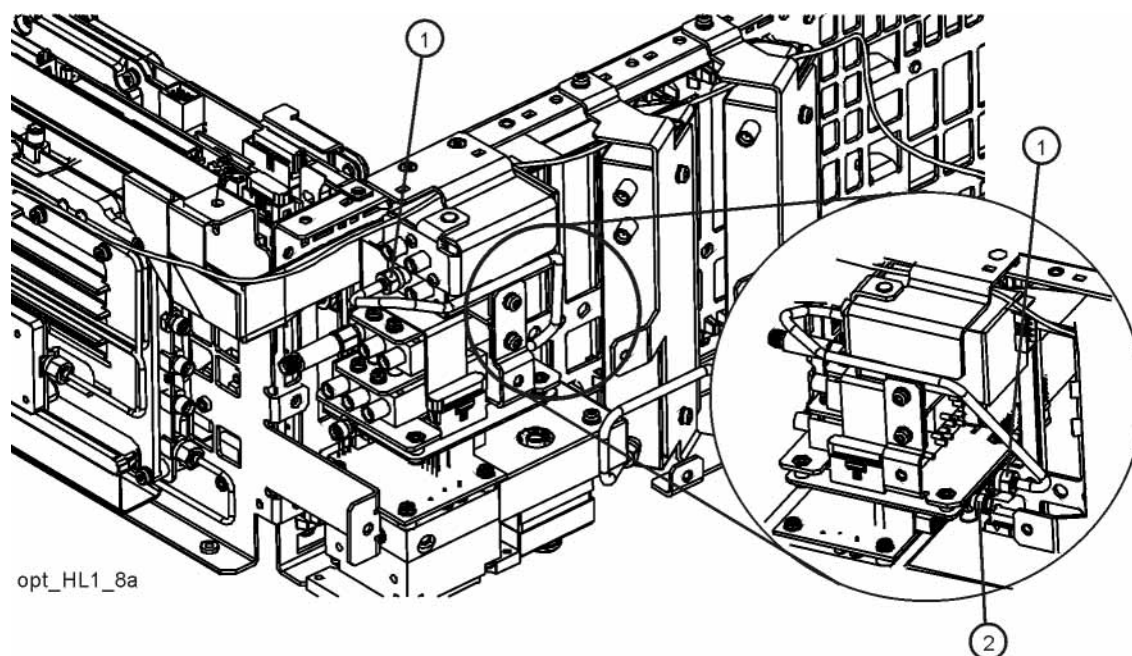
2. Refer to **Figure 8**. Remove cable W54 (1) from top switch port 3.
3. Remove cable W53 (2) from top switch port 2.

**Figure 8** W13, W53, and W54 Cable Removal



4. Refer to **Figure 9**. Remove cable W8 at (2) by unscrewing cable and pulling cable free of connector.
5. Remove cable W52 (1) between top switch port 4 and Low Band Switch Assembly connector that is closest to the inner chassis.

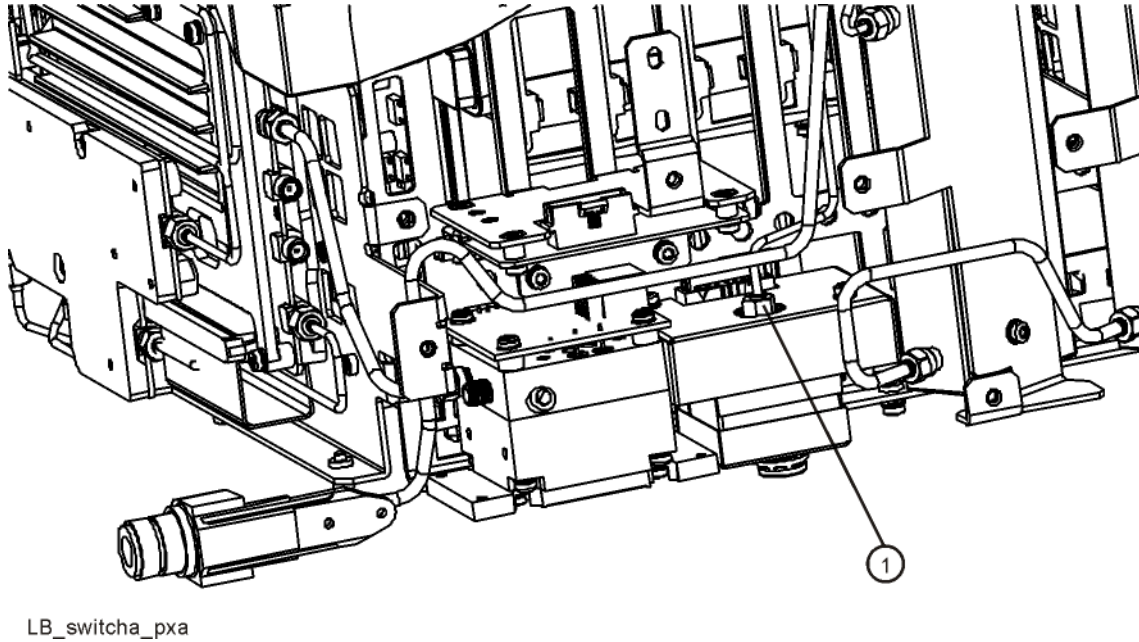
**Figure 9** W52 Cable Removal





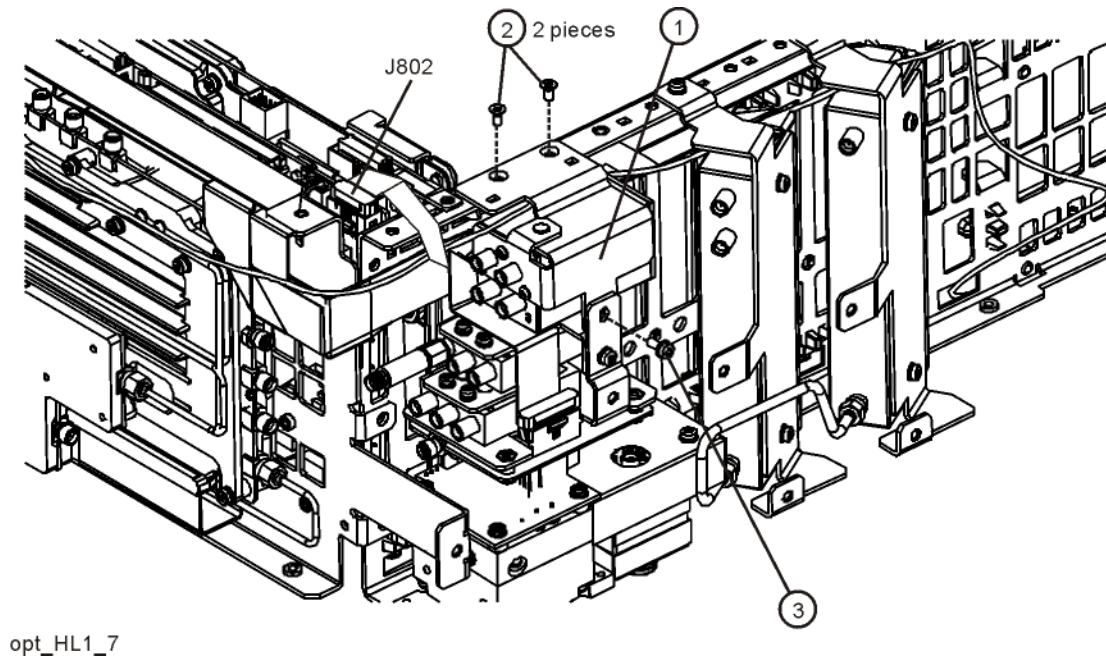
6. Refer to **Figure 10**. Completely loosen cable W2 (1) on the LO assembly.

**Figure 10** Disconnect LO Cable



7. Refer to **Figure 11**. Loosen the switch assembly (1) by removing the two screws at the frame (2) and the single screw on the side (3).

**Figure 11** Switch Assembly

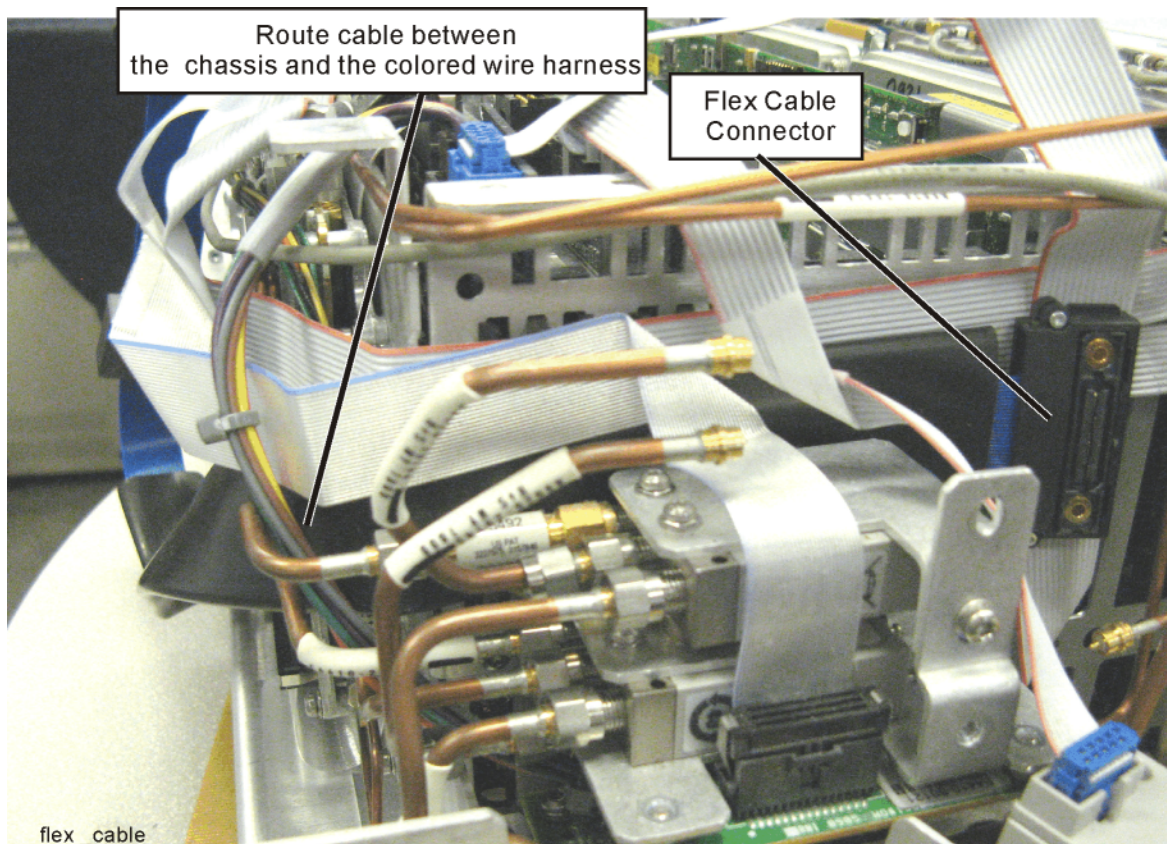


8. Carefully slide the switch assembly towards the back of the instrument. Assure the cables in the switch ports are free to slide out.
9. Slightly lift the two semi-rigid cables above the switch assembly and pull the switch away from the chassis.

### Installation of the Flex Ribbon Cable

1. Locate the **8121-1683** flex ribbon cable in the kit. Push the rubber cable protector against the cable connector on the end of the cable that does not have the ferrite block. When installed, the end of the cable with the ferrite block will attach to the front panel.
2. Refer to **Figure 12**. Notice the flex cable orientation. The cable is routed between the chassis and the colored wire harness. The connection side of the cable is pointing outward. The switch assembly ribbon cable (if present) and low band assembly ribbon cables are on the outside of the flex ribbon cable.

**Figure 12** Flex Cable



3. Install the flex ribbon cable onto the BBIQ main board. Slide the flex ribbon cable through the slot in the chassis nearest the BBIQ main board. Make sure the rubber cable protector is against the cable connector. Assure the pins of the BBIQ main board connector are aligned with the ribbon cable connector and carefully make the connection.

4. Assure the flex ribbon cable is flat against the chassis and partially behind the switches (if present). Also ensure there is a very small bit of slack in the flex ribbon cable where it goes through the chassis so the cable can easily be removed from the BBIQ main board.

#### Instruments with the Switch Assembly

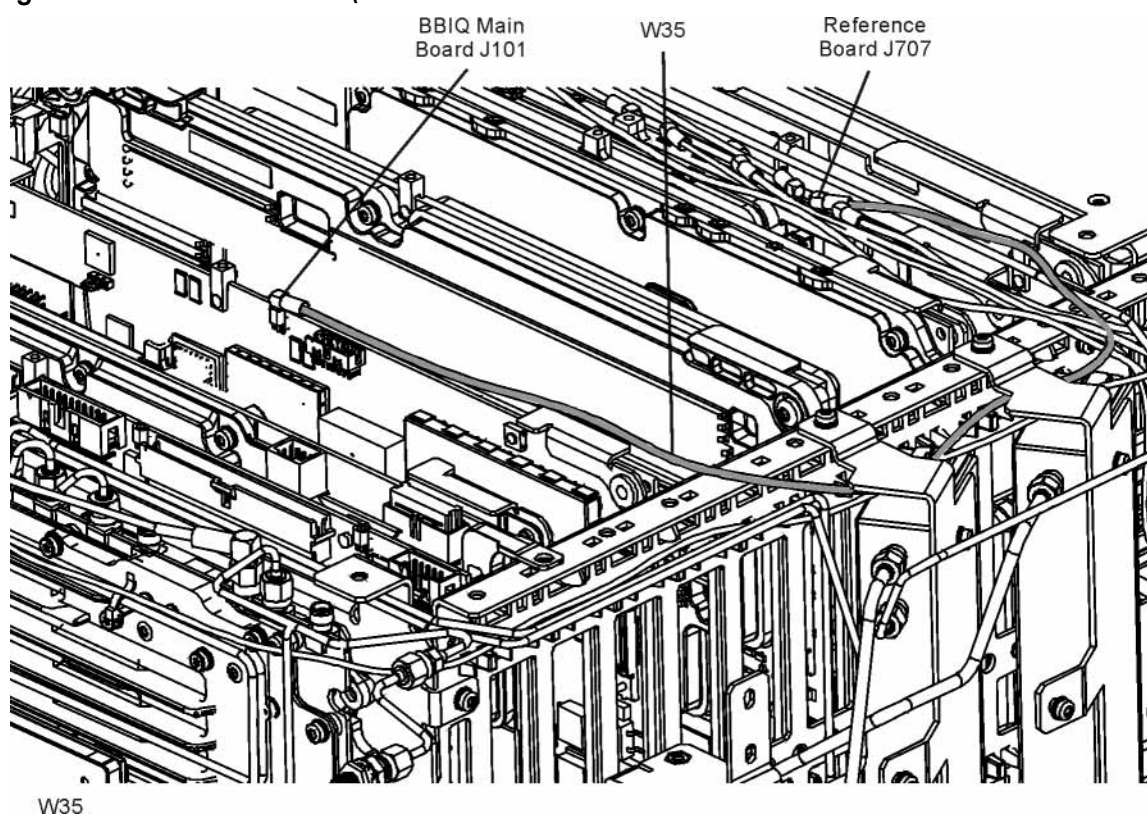
1. Position the switch assembly, removed earlier in its mounting location, being careful to align the semi-rigid cable with the switch ports. Assure the lower threaded mounting tab is behind the low band switch bracket. Do not attach the switch bracket with screws yet.
2. Assure the gray coax cable is routed under the switch bracket, laying on top of the switch body.
3. Reinstall W52 and tighten W54 and W53. Attach cables W2 and W8. Reinstall W51. Torque to 10 inch-pounds.
4. Attach the switch assembly using the 3 screws removed previously



## Install the BBIQ Coax Cable

1. Locate coax cable 8121-1401 and cable labels in the Opt BBA cable kit, **N9030-60018**.
2. Label one end of the cable with marker 707 and the other end with 101.
3. Remove the wire cable holder from the side frame.
4. Refer to **Figure 13** for cable routing diagram.
5. Install the “707” end of the 8121-1401 cable to J707 on the Reference board.
6. Route the cable as shown under the attenuator brackets.
7. Install the “101” end of the 8121-1401 cable to J101 on the BBIQ Main board.
8. Replace the wire cable holder. Assure the cables are routed to avoid pinching when the top brace is re-installed.

**Figure 13** W35 - BBIQ Coax Cable Location



## RF Bracket Replacement

1. Refer to **Figure 5**. Replace the RF bracket (1) by replacing the thirteen screws provided in this kit, 0515-0372 (2) using the T-10 driver. Torque to 9 inch-pounds.

## LED Board and Overlay

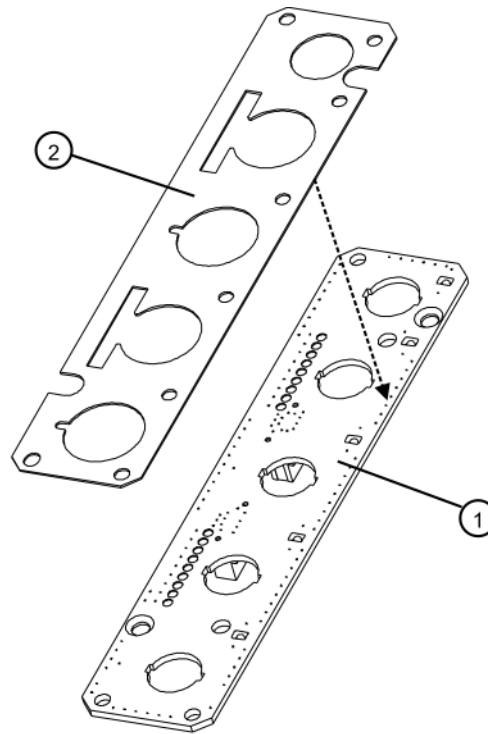
### Installation

#### NOTE

You will need to remove the blank label on the front frame by peeling it off. Then remove the filler plate by removing two screws with a T10 driver.

1. Refer to **Figure 14**. Locate the **N9020-63095**, LED board (1) and **N9020-80166** LED board overlay (2).

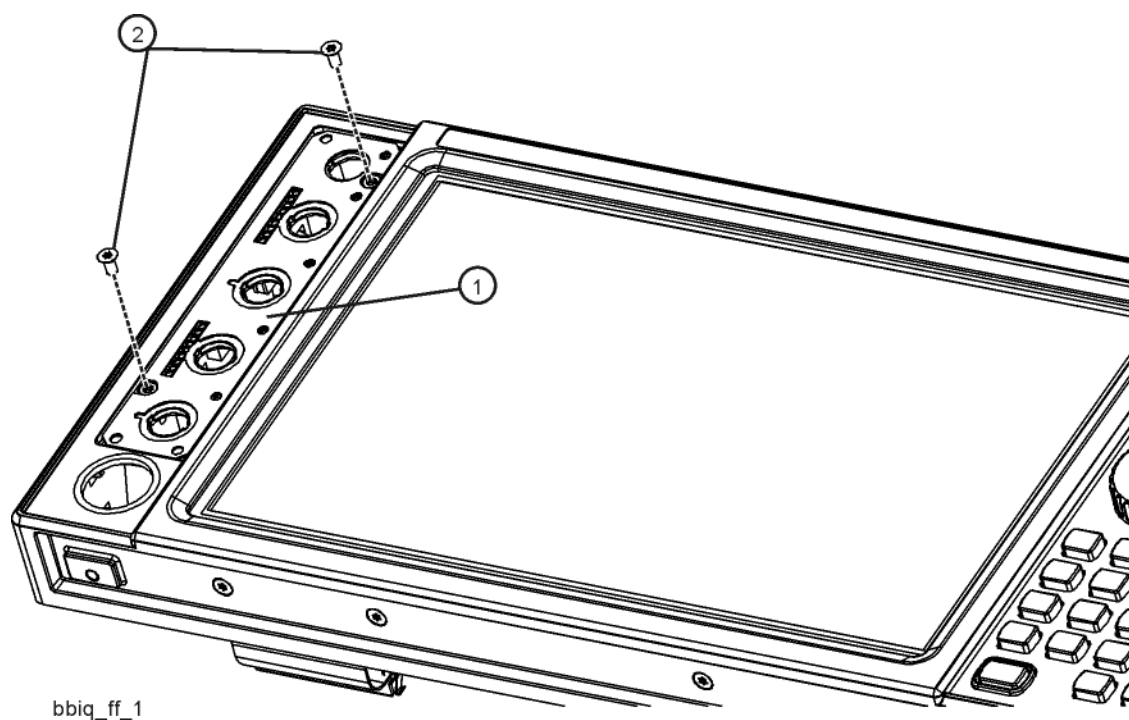
**Figure 14** LED Board and Overlay



bbiq\_overlay\_led

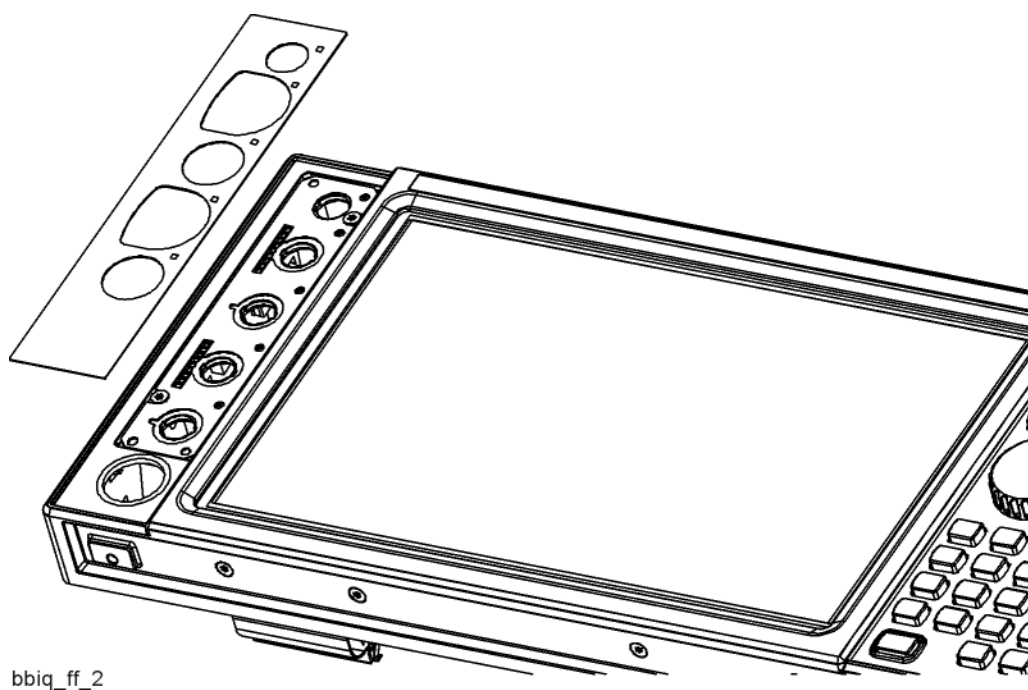
2. Refer to **Figure 15**. Line up the holes and carefully attach the **N9020-80166** overlay to the LED board.
3. Install the LED board with overlay attached (1) into the front frame.
4. Secure the LED board with **0515-1946** screws (2) in two places. Torque to 9 in-lbs.

**Figure 15** LED Board Installation



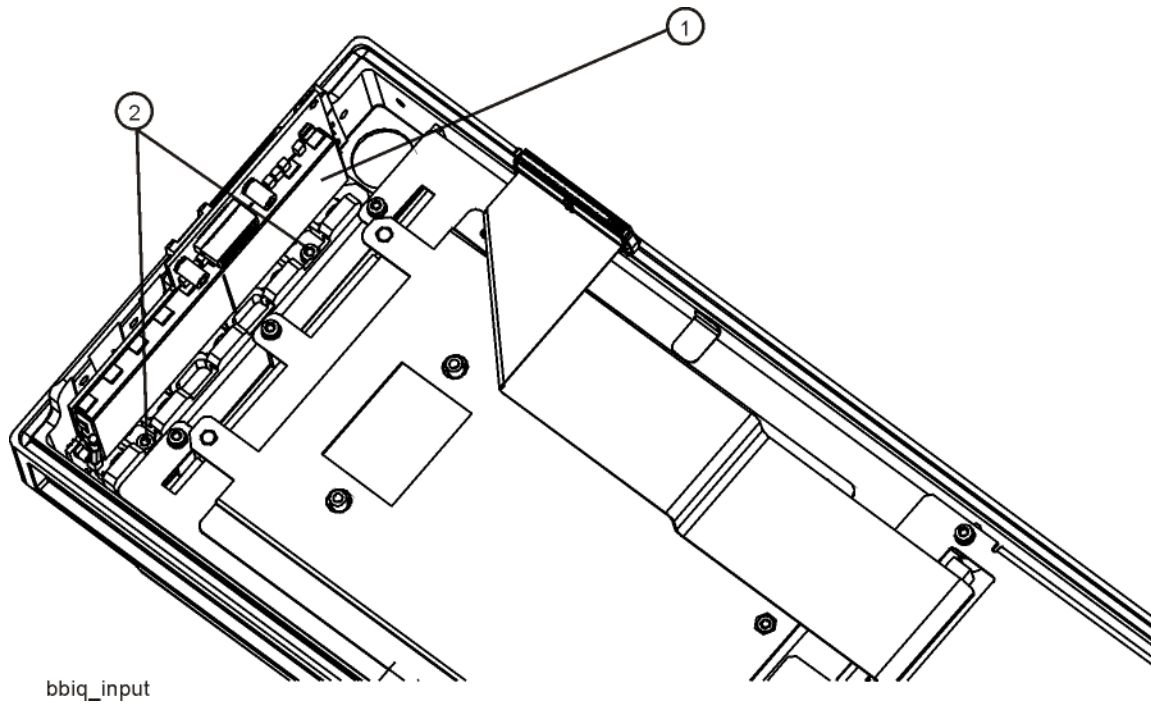
5. Refer to **Figure 16**. Line up and carefully attach the top overlay **N9020-80163** over the lower overlay.
6. Press firmly down over the entire surface area of the top overlay.

**Figure 16**      Overlay Alignment



7. Refer to **Figure 17**. Install the **BBIQ Interface Board**, N9020-60094 into the front frame passing the BNC connectors through the holes.
8. Secure the **BBIQ Interface Board** with two 0515-0372 screws (2). Torque to 9 in-lbs.

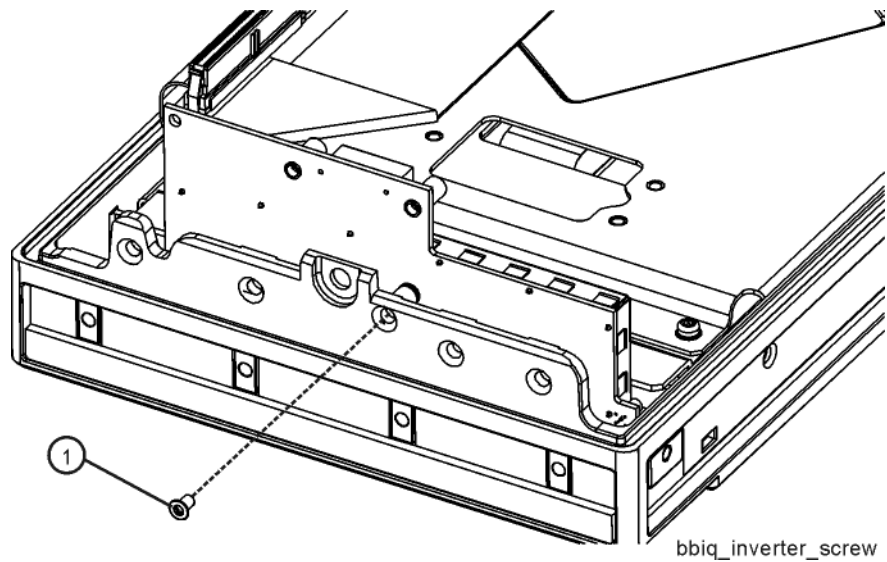
**Figure 17** BBIQ Interface Board Installation





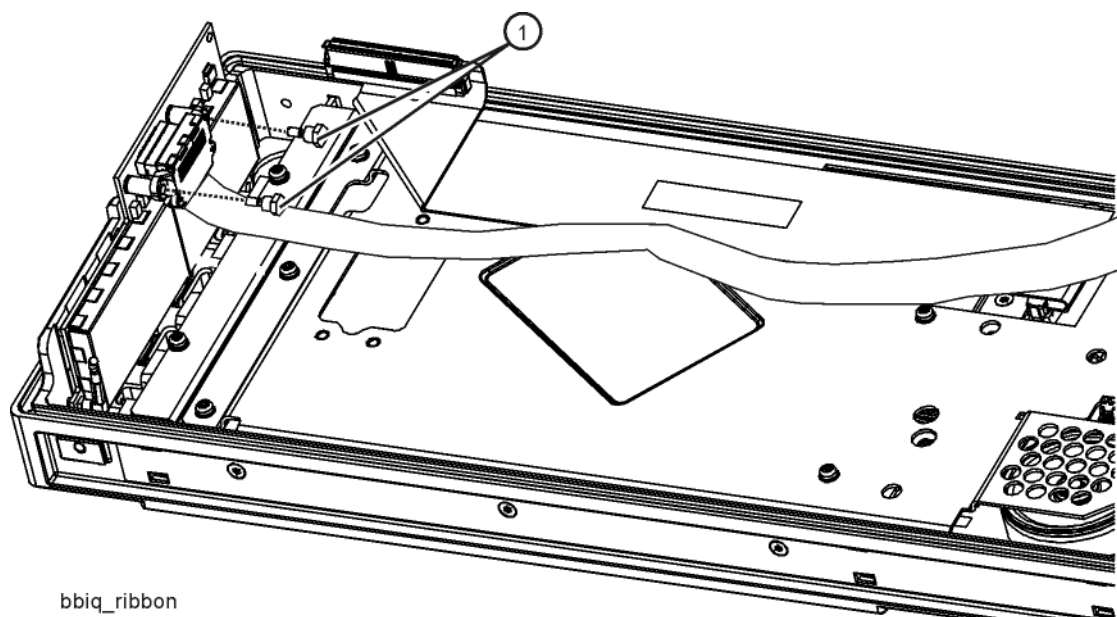
9. Refer to **Figure 18**. Secure **BBIQ Interface Board** to the side of the front frame with a single **0515-2032** screw (1). Torque to 9 in-lbs.

**Figure 18** BBIQ Interface Board Side Screw Installation



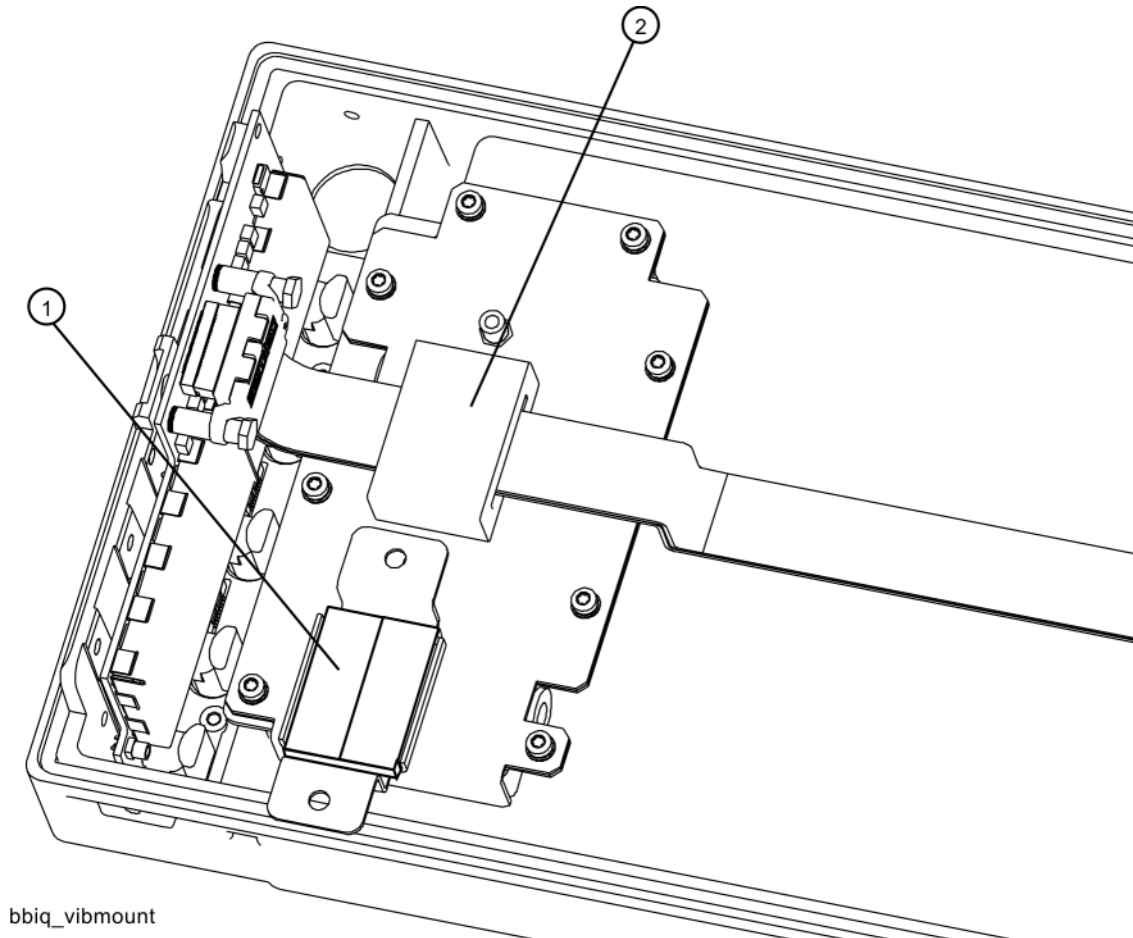
10. Refer to **Figure 19**. Connect the ribbon **8121-1683** to the **BBIQ Interface Board, N9020-60094**.
11. Install two **N9020-20017** Hex screws (1) to secure the flex ribbon into the connector. Torque to 4 in-lbs with the ¼-inch socket.

**Figure 19** Inverter Ribbon Cable Installation



12. Refer to **Figure 20**. Cut the Vibration Mount **0460-2725** (3) supplied in the kit into four pieces with scissors or a knife to fit the Core Bracket, Top (2) **N9020-00071** and the Core Bracket, Bottom (4) **N9020-00072**.

**Figure 20** Vibration Mount Installation



13. Position the Core Bracket, Bottom with the vibration mount facing upward into the opening of the display shield.
14. Position the ferrite core that is on the ribbon cable over the Core Bracket, Bottom.
15. Position the Core Bracket, Top over the ferrite core. Secure with four 0515-0372 screws (5). Torque to 9 in-lbs.
16. Plug the ribbon cable W1 into the motherboard.
17. Refer to **Figure 2**. Carefully install the front panel assembly making sure that the flex cable is not pinched. Also, align the **BBIQ Interface Board** properly so the components do not become damaged by the fan bracket sheet metal.
18. Secure the front panel with screws **0515-2032** in 8 places, 4 on each side. Torque to 9 in-lbs.

## Top Brace Replacement

1. Refer to **Figure 4**. Replace the top brace (1) using the **0515-1946** screws included in this kit. There is an additional screw provided in this kit (**0515-1946**) (5) to attach the top brace to the BBIQ Main board. Torque to 9 inch-pounds.

## Final Installation

1. Refer to **Figure 1**. Carefully slide the instrument cover back onto the instrument from the rear of the analyzer, making sure not to damage any internal cables. The seam on the cover should be on the bottom of the instrument. Be sure the cover seats into the gasket groove in the Front Frame Assembly.
2. Replace the four rear feet (4) to the rear of the instrument using the four screws (3). Torque to 21 inch pounds.
3. Replace the strap handles (2) on both sides of the instrument using the four screws (1). Torque to 21 inch pounds.
4. Replace the four instrument bottom feet.
5. Replace the four key locks to the bottom feet.

## Install Instrument Software

[http://www.keysight.com/find/pxa\\_software](http://www.keysight.com/find/pxa_software)

This will guarantee:

- The analyzer has the latest instrument software version to support Option BBA.
- FPGA updates are done to the BBIQ hardware.
- The drivers are installed for the new hardware.

## Licensing the Option

### Installation Procedure over USB

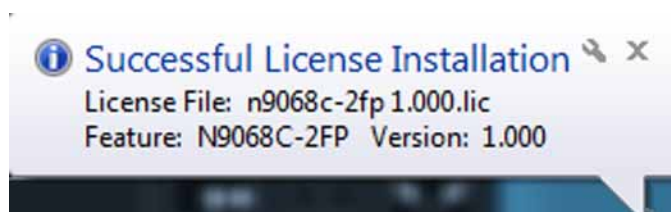
1. Locate the Option Upgrade Entitlement Certificate (**5964-5178**) from the kit.
2. Redeem the Option Upgrade Entitlement Certificate by following the instructions on the Certificate.
3. After redeeming your Option Upgrade Entitlement Certificate you will receive an email with an attached License File.
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 one of the PXA USB ports. Windows will detect the new hardware and may display the configuration menu shown in **Figure 21**. This menu may be configured according to your preferences.

**Figure 21** USB Storage Device Configuration Menu



7. The PXA 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 similar to the one shown in **Figure 22**.

**Figure 22** 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 PXA C:\Program Files\Agilent\licensing.

## Verify the Installation

1. Turn on the analyzer and wait for the instrument to fully boot up.
2. Verify the spectrum analyzer application loads and sweeps as expected. Press **System, Show Hardware** on the analyzer and verify that the Main board and the **BBIQ Interface Board** identify themselves as:
  - BBIQ
  - BBIQ Interface
3. Press **System, Show System** on the analyzer to display a list of all installed options. You should see N9030B-BBA.

Before performing adjustments and performance verification tests using the N7814A Calibration and Adjustment Software for Keysight RF and Microwave Instruments, press **MODE/MEAS, I/Q Analyzer (Basic), OK**. Press **Input/Output**, Select **Input, I/Q, I/Q, I/Q Cable Calibrate...** on the analyzer and follow the on-screen directions.

If the newly installed hardware is functioning properly the cable cal should work fine. Press **MODE/MEAS, Spectrum Analyzer, Swept SA, OK**. Press **Input/Output, Select Input, RF**.

## Adjustments and Performance Verification

Calibration Software and specified test equipment is required to perform the adjustments, and can be used to automate the performance verification testing.

Information on how to obtain this software can be found at

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

1. Perform the following adjustments, located in the TME field software.
  - Absolute Amplitude (Option BBA) Adjustment
2. Perform the following performance verification tests using the TME field software:
  - All Frequency Response Tests (if the switch and cables were disturbed)
  - Absolute Amplitude Accuracy at 250 kHz (Option BBA)
  - Frequency Response Below 250 kHz (Option BBA)
  - Frequency Response Above 250 kHz (Option BBA)
  - Channel Match (Option BBA)

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<b>IMPORTANT</b>	<b>A full calibration is required to assure the instrument meets all specifications</b>
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The end user must ultimately determine whether they want a full calibration to be performed after the installation of this upgrade or not. If a full calibration is required, arrangements regarding the level of calibration must be made between the end user and the calibration provider.

If you require further assistance, please contact the Keysight support team.

Online assistance:

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

If you do not have access to the Internet, contact your local Keysight Technologies Sales and Service Office, or if in the United States, call 1-800-829-4444 (8 am - 8 pm ET, Monday - Friday).



