

Keysight N9030A Signal Analyzer

Option BBA

Analog Baseband IQ Inputs

Retrofit Kit

Notice: This document contains references to Agilent. Please note that Agilent's Test and Measurement business has become Keysight Technologies. For more information, go to www.keysight.com.

Installation Note

Notice.

The information contained in this document is subject to change without notice.

Keysight Technologies makes no warranty of any kind with regard to this material, including but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Keysight Technologies shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this material.

Option BBA, Analog Baseband I/Q Inputs Retrofit Kit

Products Affected:	N9030A, PXA Signal Analyzer with Options 503, 508, 513, or 526
Serial Numbers:	All
Option	BBA
To Be Performed By:	(X) Agilent Service Center (X) Personnel Qualified by Agilent () Customer
Estimated Installation Time:	3.0 Hours
Estimated Adjustment Time:	0.5 Hours
Estimated Verification Time ^a :	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.agilent.com/find/calibrationsoftware

While Agilent 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 Agilent N9030A with frequency range 26.5 GHz and below.

NOTE

1. The signal analyzer requires software revision A.08.54 or newer.

This retrofit kit installation requires that you re-install instrument software even if the current software meets the revision requirement above.

The latest revision of the PXA Signal Analyzer software may be downloaded from http://www.agilent.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.

2. 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	Agilent Part Number
1	BBIQ Main Board	N9020-65093
1	LED Board	N9020-63095
1	BBIQ Interface Board	N9020-65094
1	LED Board Overlay, Bottom	N9020-80013
1	LED Board Overlay, Top	N9020-80014
1	Cable, Flex Ribbon	8121-2090
1	Core Bracket	N9020-00012
1	Cable, Small Coaxial	8121-1401
1	Cable, RF Switch 1 - Switch 2	N9020-20210
1	Display Bracket	W1312-00115
60	Screws, M3 X 0.5 (8 mm long)	0515-0372
1	Vibration Mount	0460-2725
9	Screws, M3 X 0.5 (6 mm long)	0515-1227
9	Screws, M3 X 0.5 (8 mm long)	0515-1035
2	Screws, Hex Shoulder	N9020-20017
2	Main Board Warning Labels	N9020-80036
1	Entitlement Certificate	5964-5178
1	Entitlement Certificate Envelope	5967-7169
2	#1 Cable Label	7121-5601
2	#7 Cable Label	7121-5607
2	#0 Cable Label	7121-5610
5	Tie Wrap	1400-0249
1	Installation Note	This note
1	Probe tip BNC adapter (send to end user)	5063-2143
1	Cable, BNC - BNC (send to end user)	8120-2682

Option BBA, Analog Baseband I/Q Inputs Retrofit Kit

Tools Required

- ☐ PXA Service Guide as N9030A-0BW or N9030-90030
- ☐ 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.

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.

Agilent 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:

- USB storage device
- 5063-2143, Probe tip BNC adapter
- 8120-2682, cable
- Entitlement Certificate

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.

NOTE Make sure any adapters on the front panel are removed.

Licensing the Option

Installation Procedure using USB Storage Device

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. Assure the instrument is fully booted.
7. Connect the USB Storage Device to one of the USB ports. Windows will detect the new hardware and may display the configuration menu shown in [Figure 1](#). This menu may be configured according to your preferences.

Figure 1 USB Storage Device Configuration Menu



Option BBA, Analog Baseband I/Q Inputs Retrofit Kit

8. The instrument will automatically consume the License File (this may take a few minutes). When the License File is consumed the Agilent License Manager will display a “Successful License Installation” message as shown in [Figure 2](#).

Figure 2 **Successful License Installation**



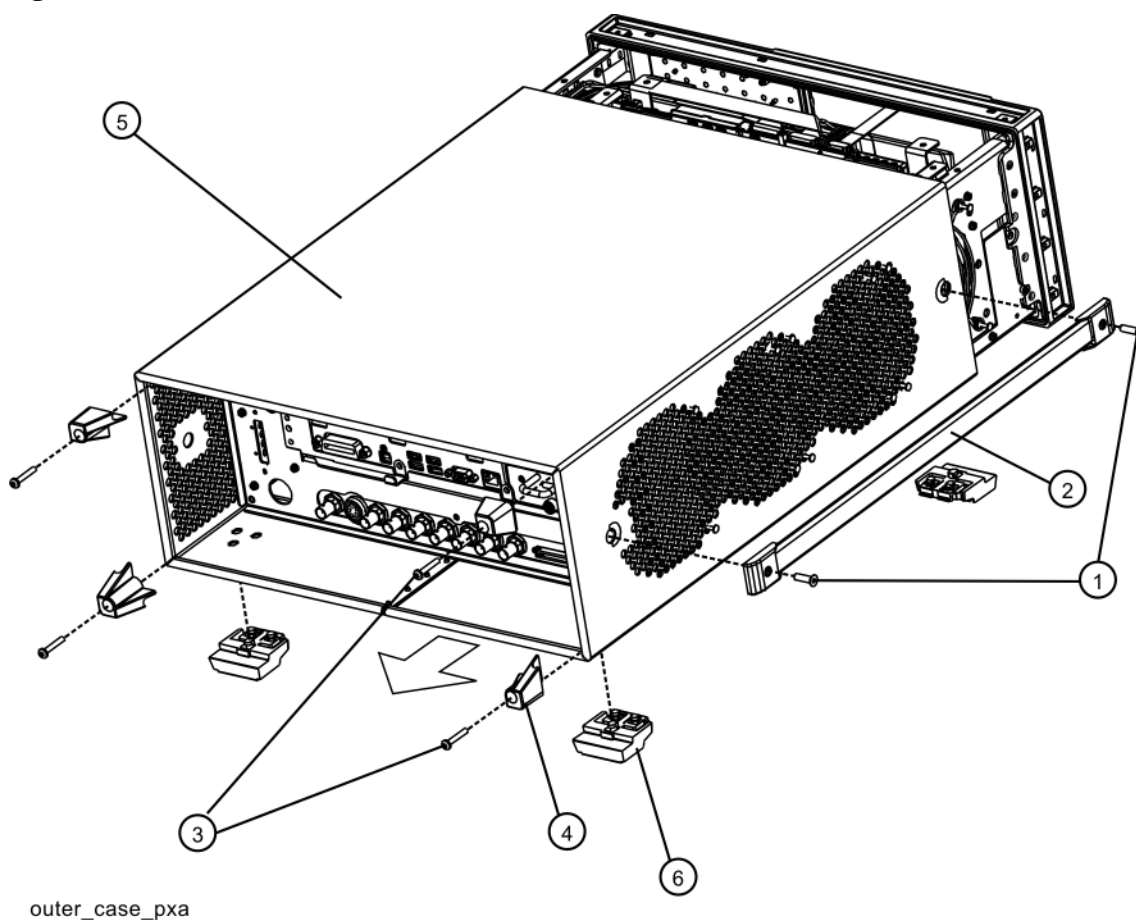
Alternate Installation Procedure

The License File can be manually installed over USB or LAN by placing the license file in the following folder on the MXA C:\Program Files\Agilent\licensing.

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 3](#). 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 3 Instrument Outer Case Removal



Front Frame Assembly Removal

1. Refer to [Figure 4](#). 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 the eight screws **(1)**, four on each side, to detach the front frame from the chassis.
3. Refer to [Figure 5](#). 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 4 Front Frame Removal

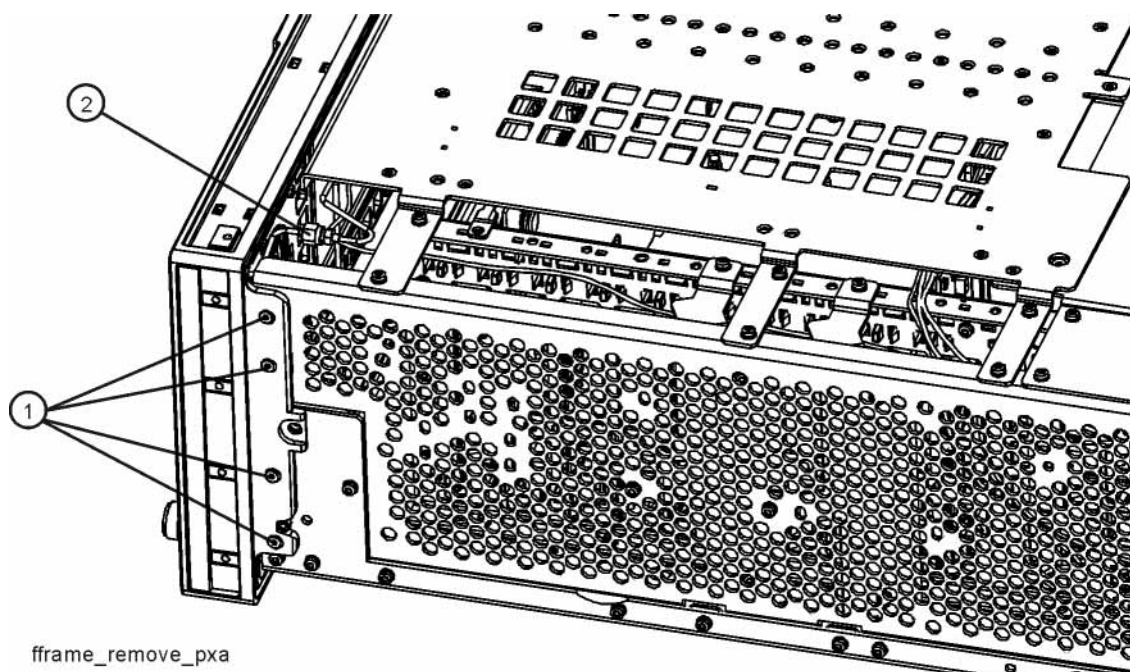
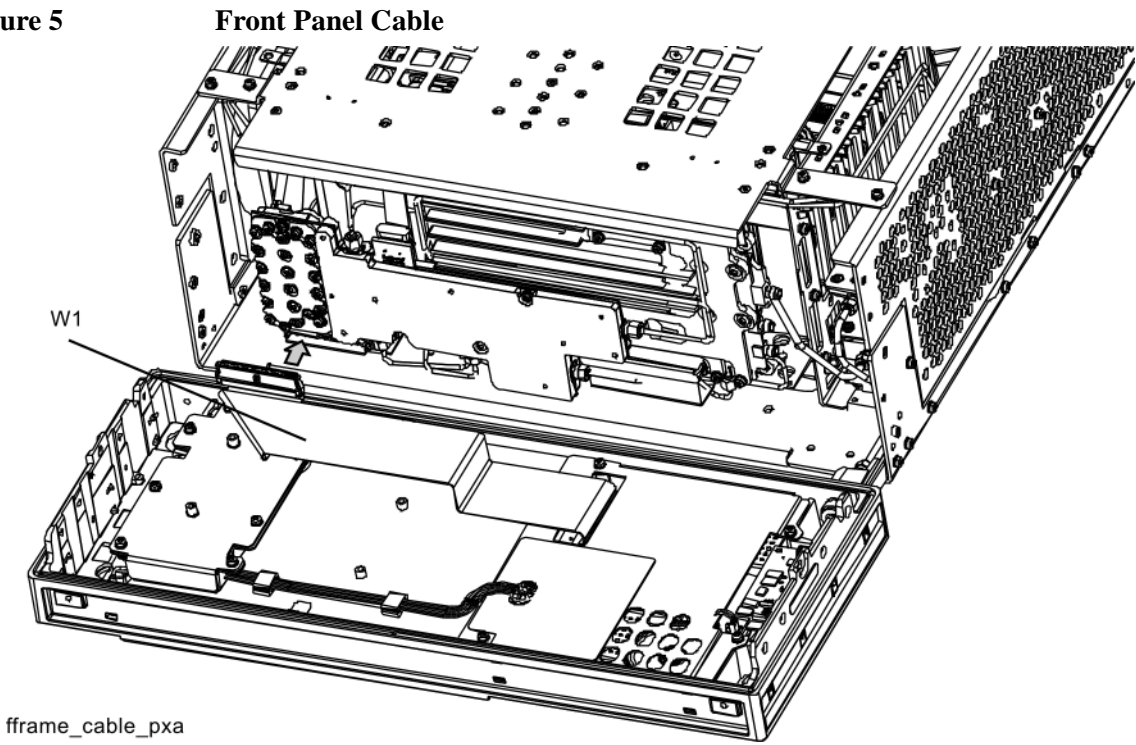


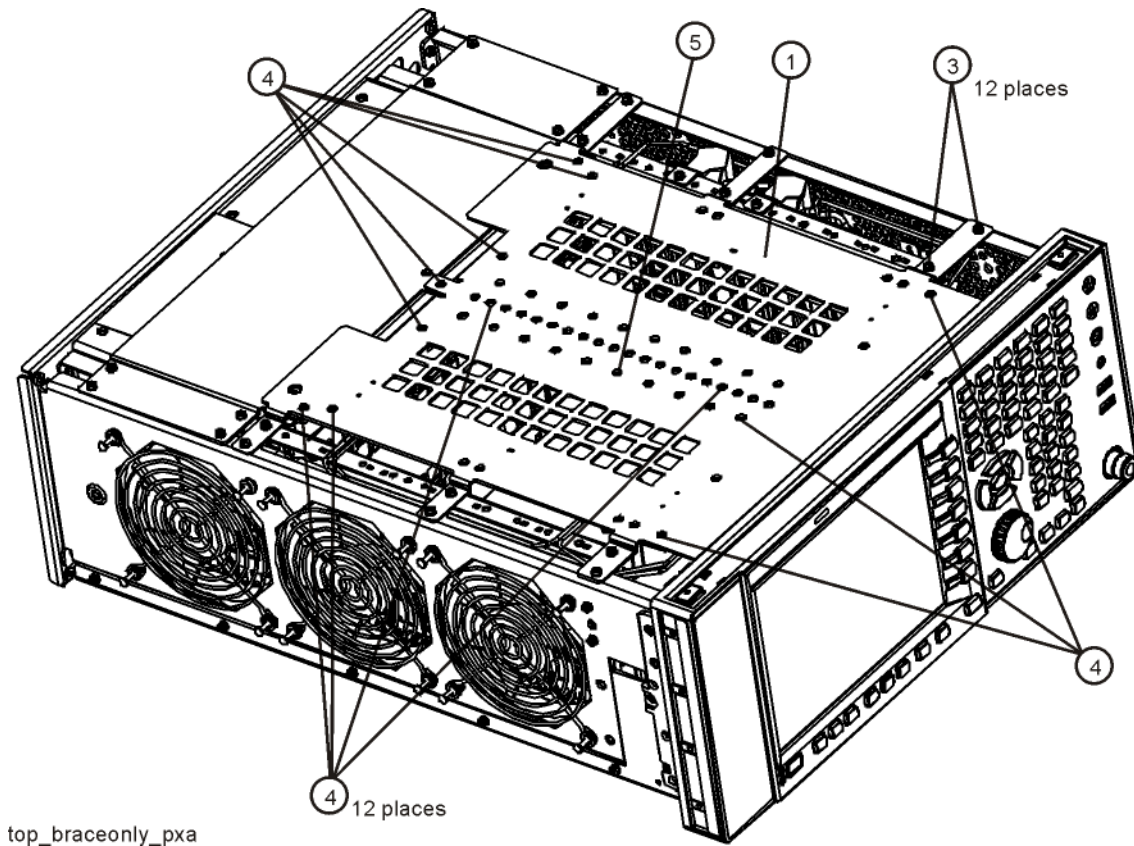
Figure 5



Top Brace Removal

1. Refer to [Figure 6](#). 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 the twelve screws (fourteen screws with Option B1X) (**4**) (0515-1227) attaching the top brace to the boards.

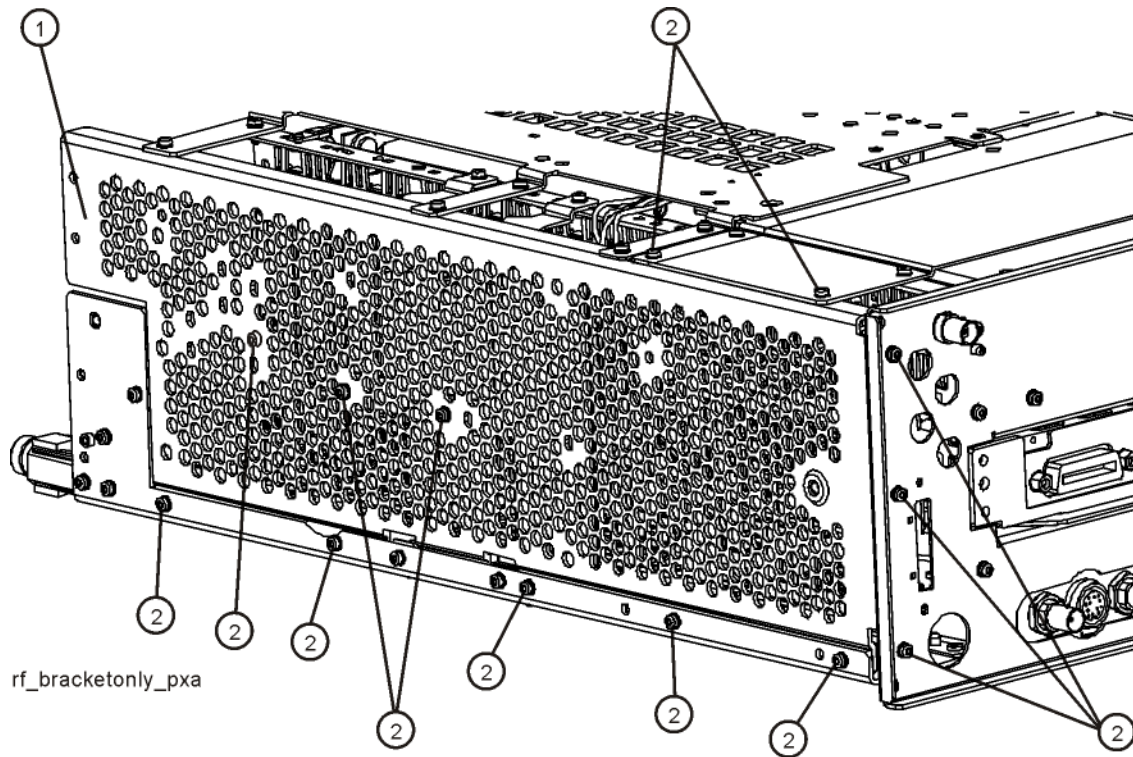
Figure 6 **Top Brace Removal**



RF Bracket Removal

1. Refer to [Figure 7](#). Remove the RF bracket (1) by removing the thirteen screws (2) (0515-0372) using the T-10 driver.

Figure 7 RF Bracket Removal

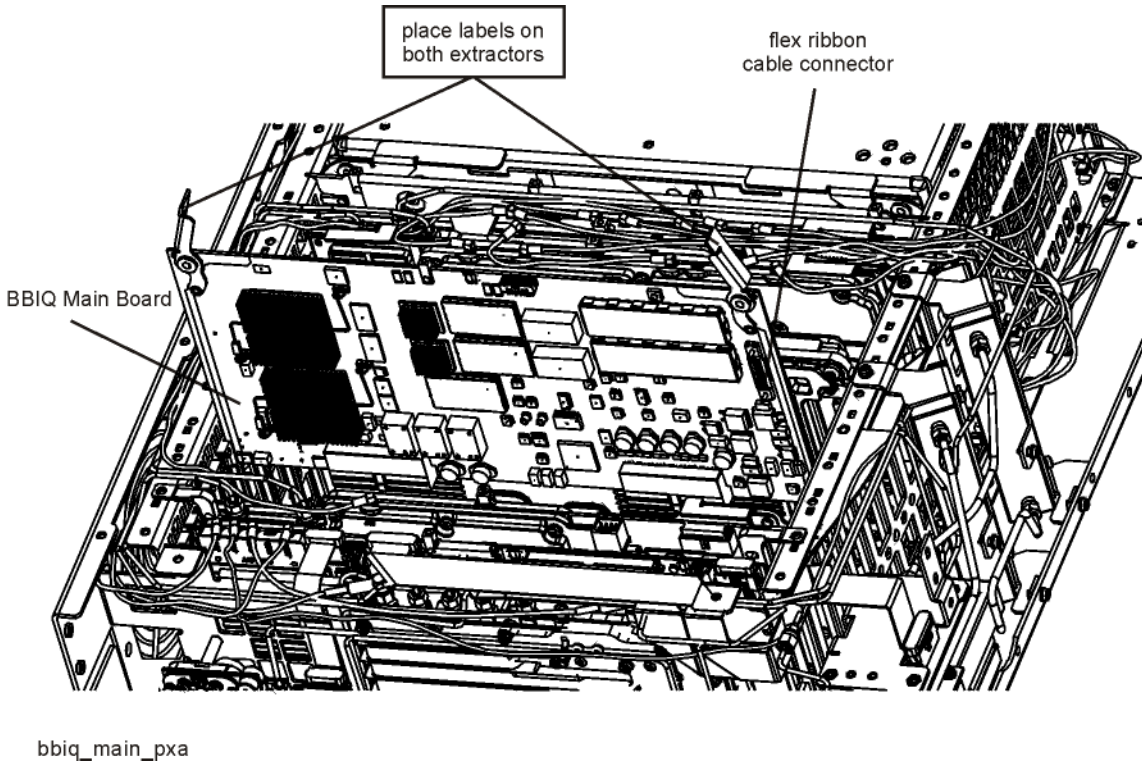


Option BBA, Analog Baseband I/Q Inputs Retrofit Kit

Option BBA Hardware Installation

1. Refer to [Figure 8](#). Locate and install the [N9020-65093](#) BBIQ Main Board into slot 7. Notice the connector on the right side of the board where the flex ribbon cable will connect.

Figure 8 **Option BBA Main Board**



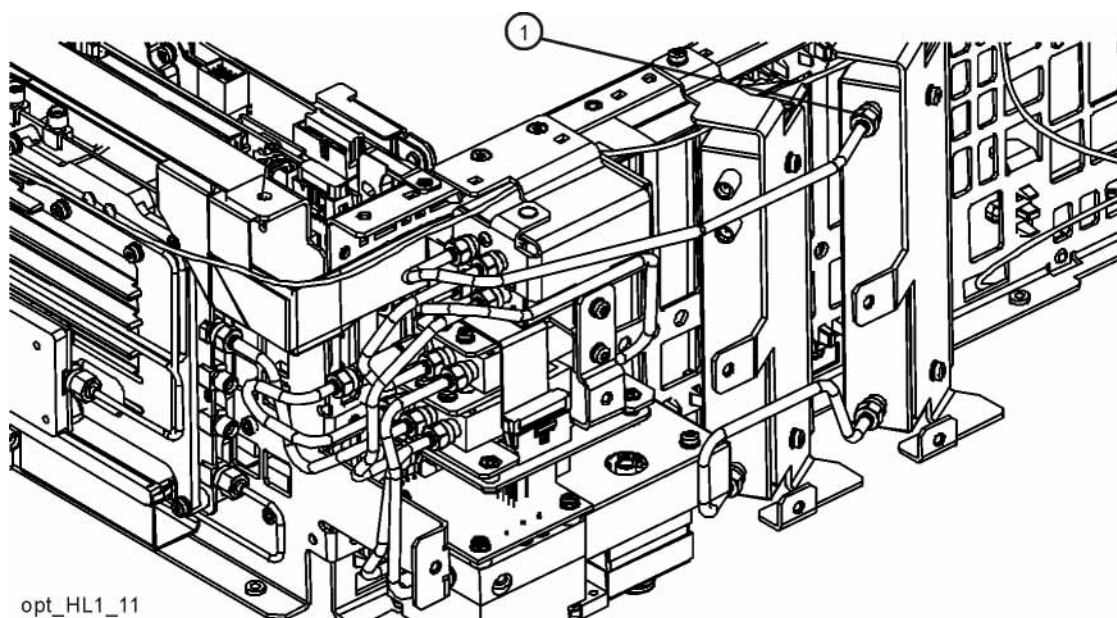
2. Locate and install labels [N9020-80036](#), “Remove Both Cables Before Lifting” on the top of each board extractor, both the right and left hand side.

Look for Optional Switches

See [Figure 9](#). If your instrument does not have the switches shown, skip to “[Installation of the Flex Ribbon Cable](#)” on page 19. If the instrument does have the switches shown, continue with the following procedure.

1. Refer to [Figure 9](#). Remove rigid cable W51 (1) from top switch port 1 to Attenuator B output.

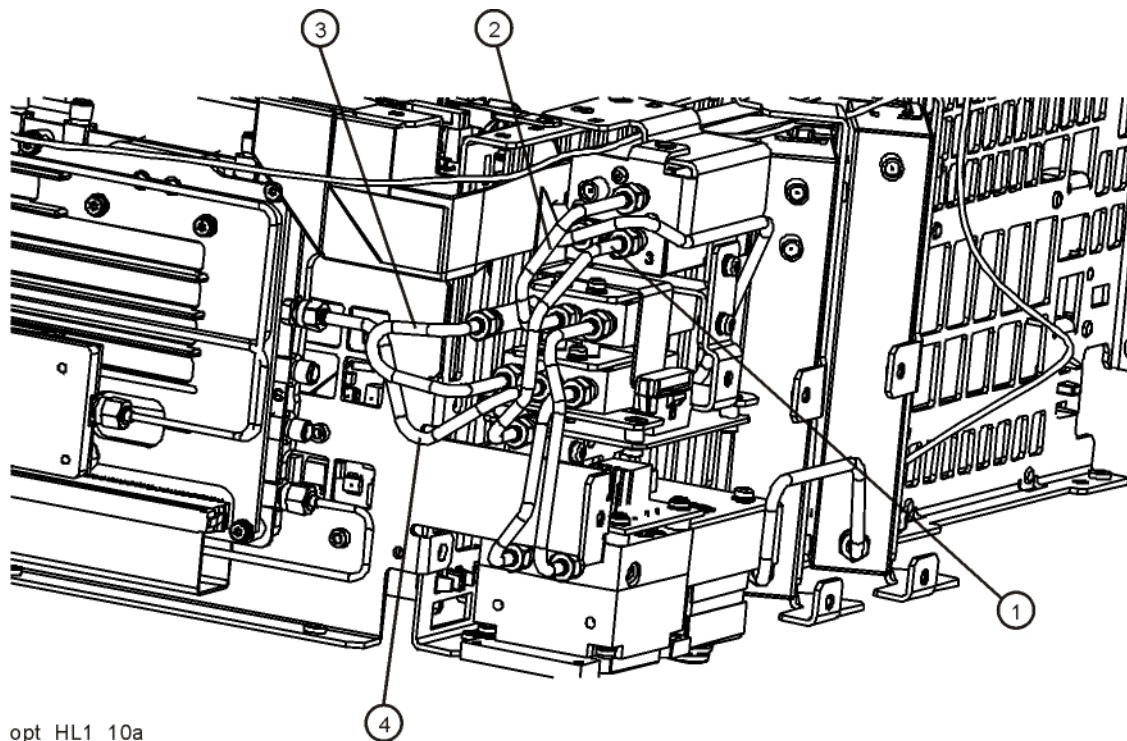
Figure 9 **W51 Cable Removal**



Option BBA, Analog Baseband I/Q Inputs Retrofit Kit

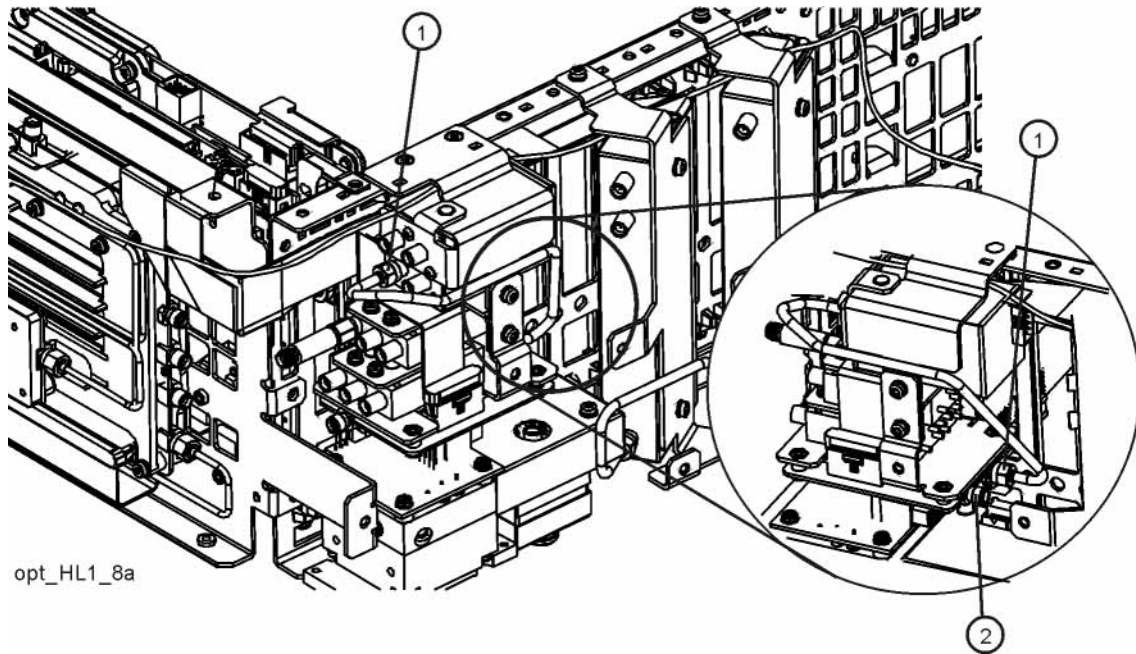
2. Refer to [Figure 10](#). Remove cable W54 (1) from top switch port 3.
3. Remove cable W53 (2) from top switch port 2.
4. Look at the part number printed on the cable W13 (3). If it is [N9020-20210](#) the cable does not need to be replaced. If the part number is E4410-20178, replace the cable with the [N9020-20210](#) cable in the kit. You may need to remove cable W15 (4)

Figure 10 W13, W53, and W54 Cable Removal



5. Refer to [Figure 11](#). Remove cable W8 at **(2)** by unscrewing cable and pulling cable free of connector.
6. Remove cable W52 **(1)** between top switch port 4 and Low Band Switch Assembly connector that is closest to the inner chassis.

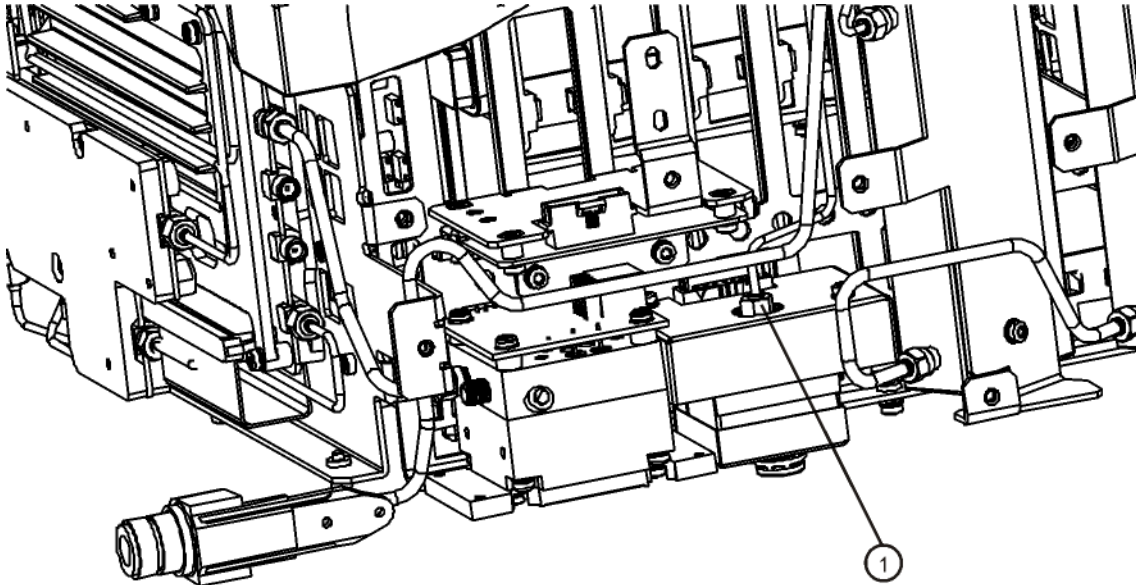
Figure 11 **W52 Cable Removal**



Option BBA, Analog Baseband I/Q Inputs Retrofit Kit

7. Refer to [Figure 12](#). Completely loosen cable W2 (1) on the LO assembly.

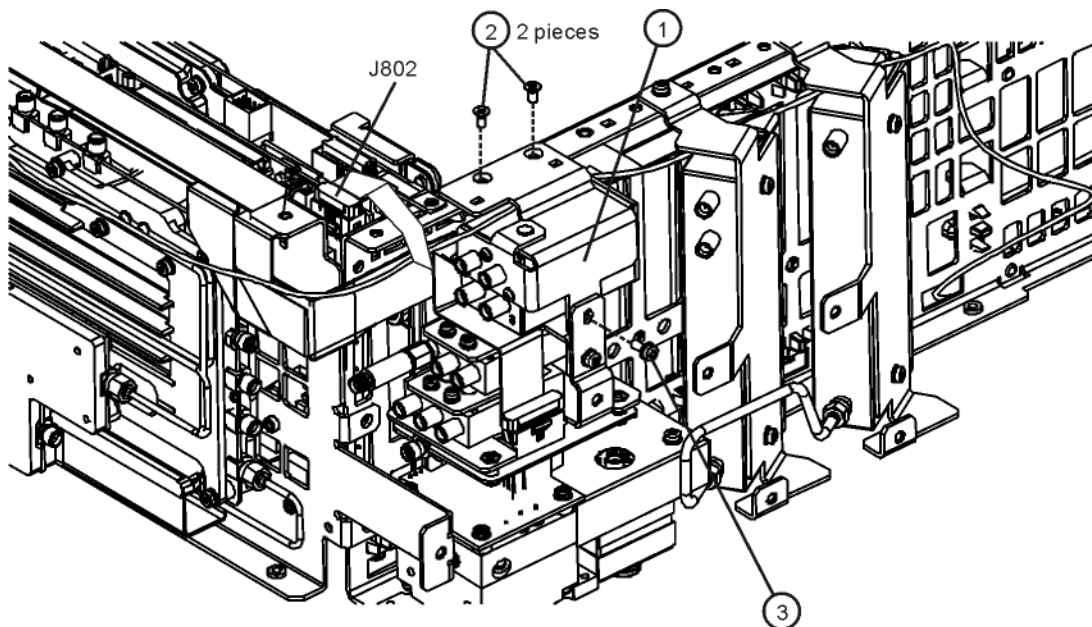
Figure 12 Disconnect LO Cable



LB_switcha_pxa

8. Refer to [Figure 13](#). Loosen the switch assembly (1) by removing the two screws at the frame (2) and the single screw on the side (3).

Figure 13 Switch Assembly



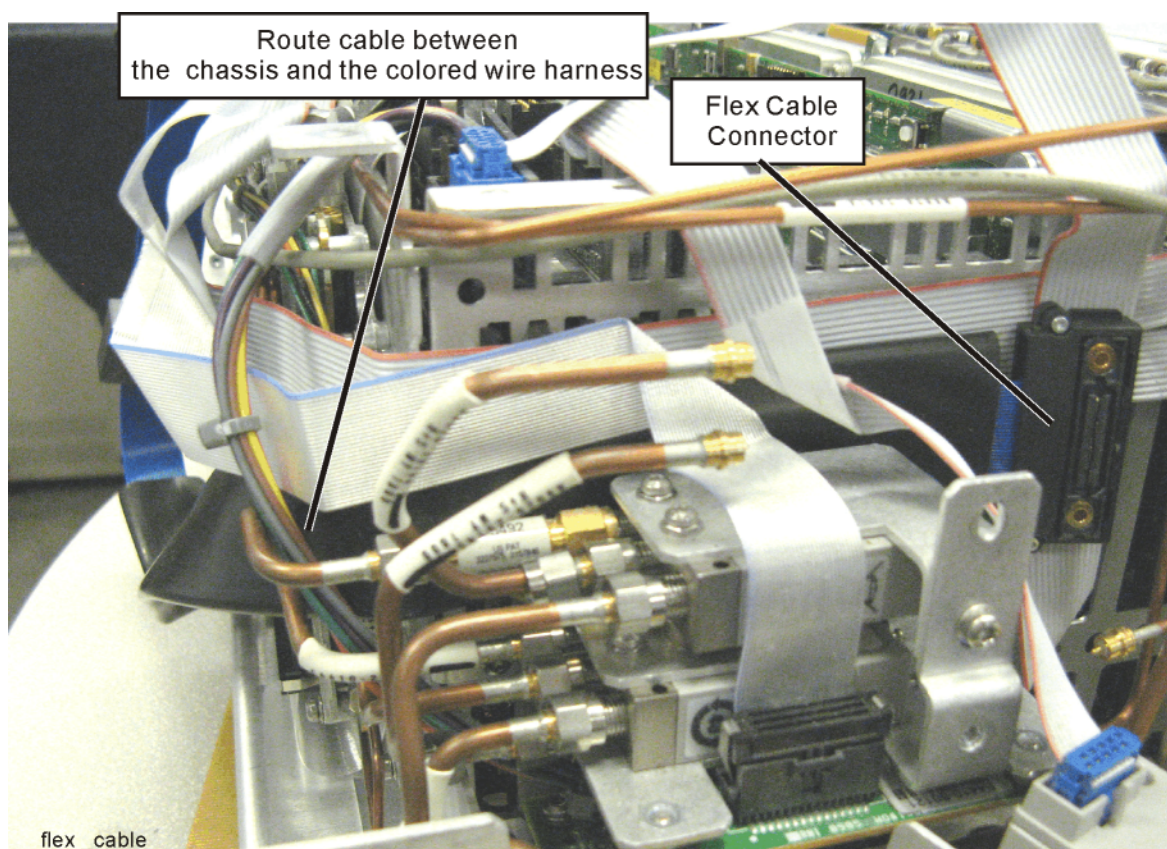
opt_HL1_7

9. Carefully slide the switch assembly towards the back of the instrument. Assure the cables in the switch ports are free to slide out.
10. 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 8121-2090 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 14. 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 14 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.

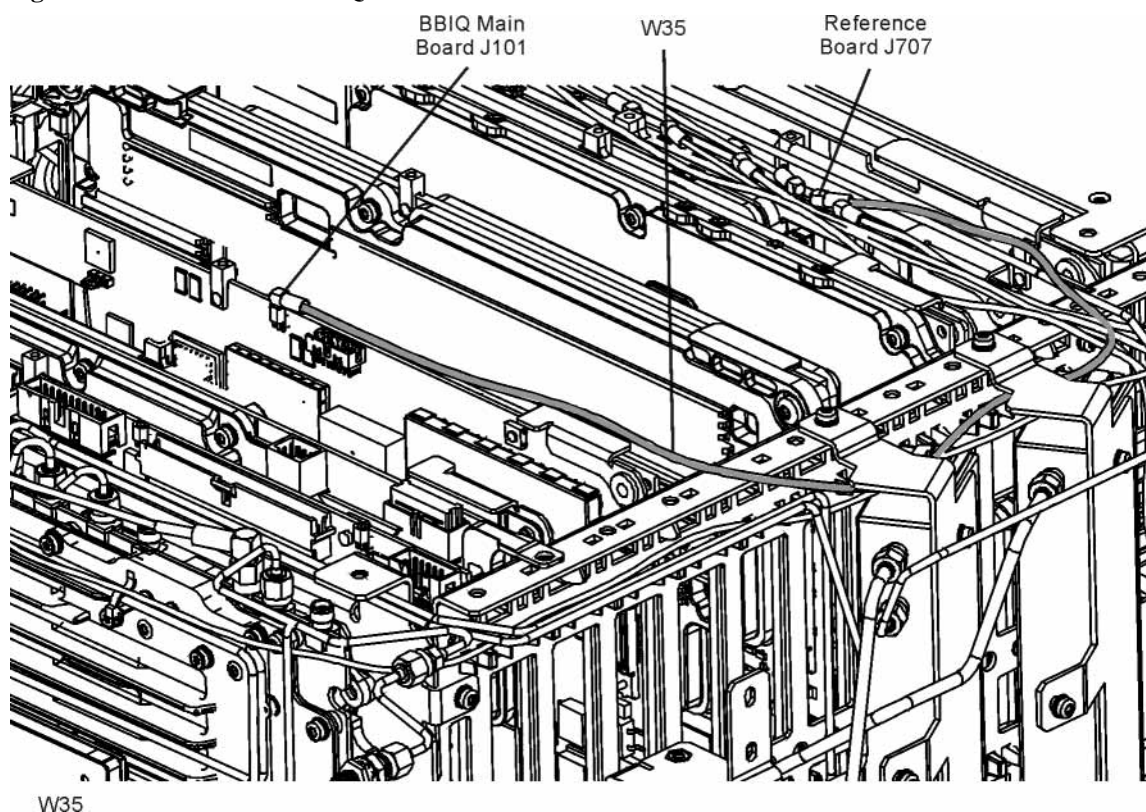
Instruments with the Switch Assembly

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 kit.
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 15 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 15 W35 - BBIQ Coax Cable Location



RF Bracket Replacement

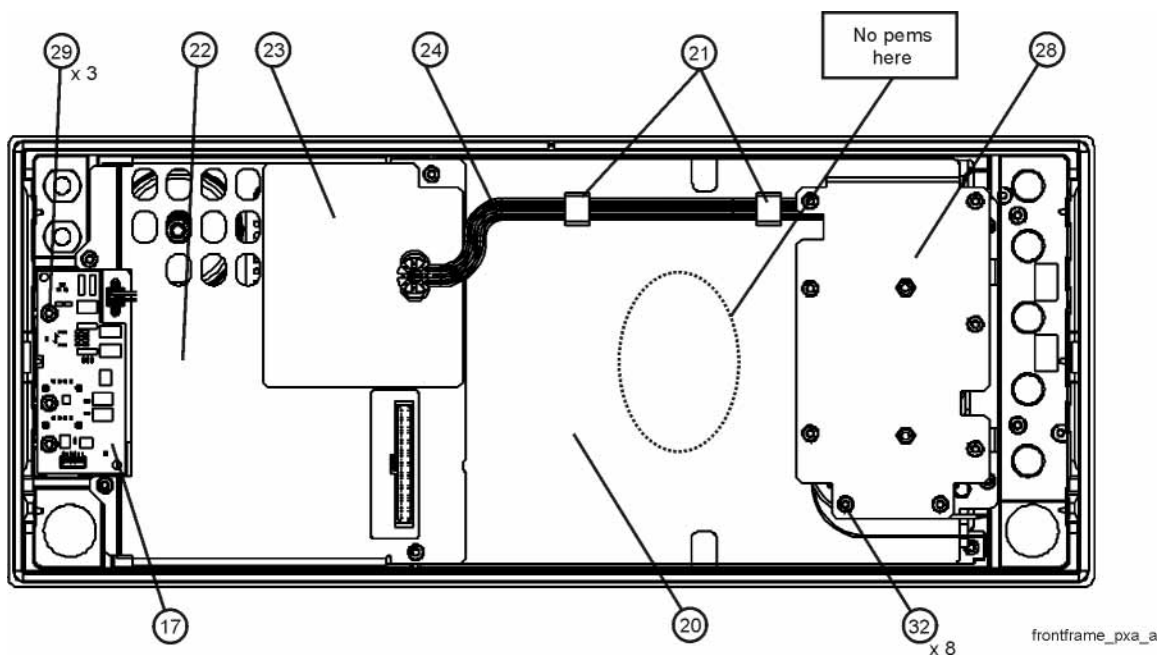
1. Refer to [Figure 7](#). Replace the RF bracket (1) by replacing the thirteen screws provided in this kit, 0515-0372 (2) using the T-10 driver. Torque to 9 inch-pounds.

Determine if the display bracket on the front panel must be replaced

Some instruments do not have pems in the display bracket for mounting the ferrite core shield on the BBA flex ribbon cable.

Refer to [Figure 16](#). If the display bracket in the instrument looks like [Figure 16](#), continue with the steps below to replace the display bracket with the one in the kit.

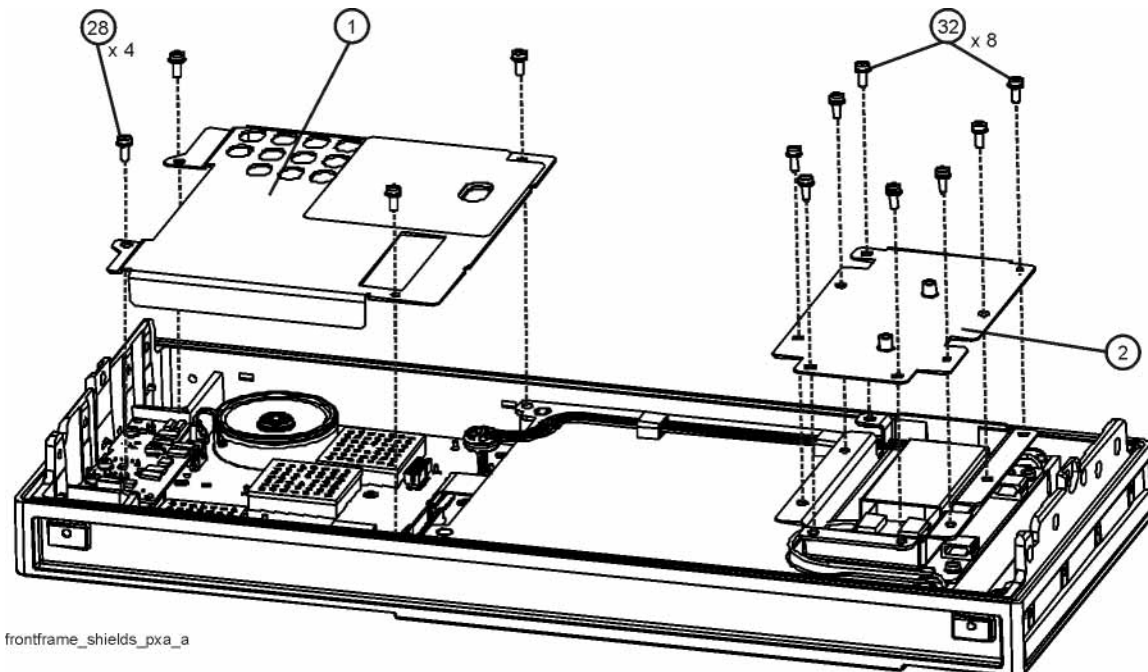
Figure 16 Front Frame



If the display bracket in the instrument looks like the display bracket in the kit, or looks like [Figure 27](#), skip to the section “[Installing boards into the front frame](#)” on page 27.

1. Refer to [Figure 17](#). Remove the eight screws (32) and the inverter top shield (2).

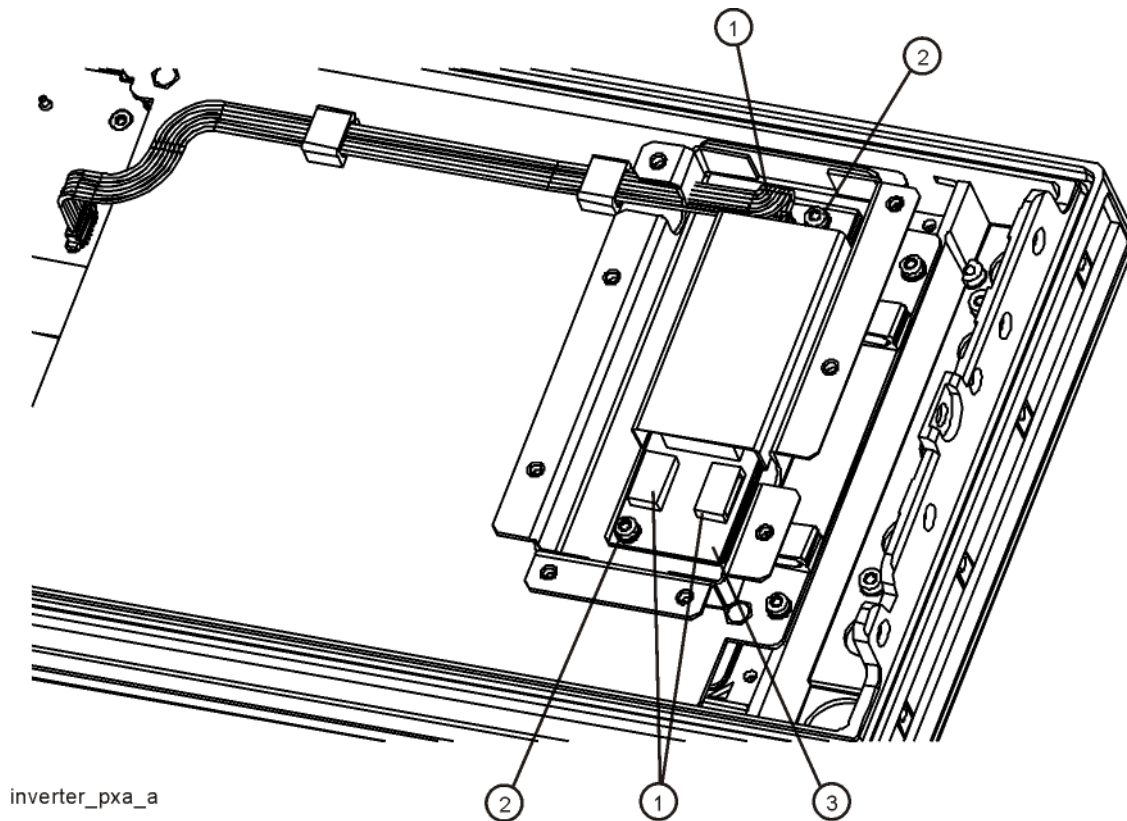
Figure 17 **Front Frame Assembly Shields**



Option BBA, Analog Baseband I/Q Inputs Retrofit Kit

2. Refer to [Figure 18](#). Disconnect the wires **(1)** from the Inverter board **(3)**.

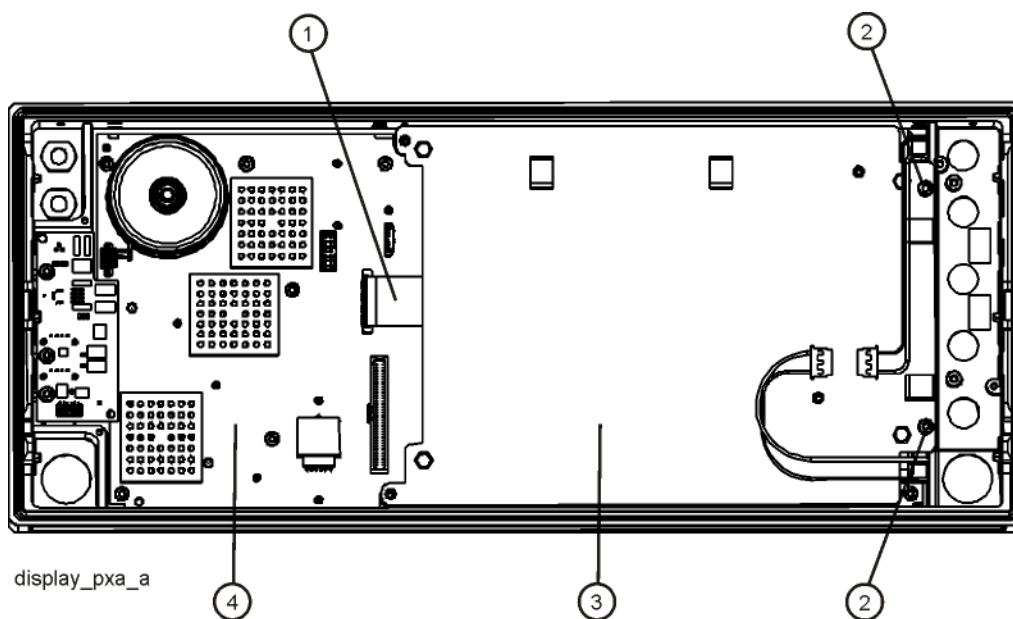
Figure 18 Inverter Board Removal



3. Remove the two screws **(2)** securing the Inverter board **(3)**. The Inverter board and inverter bottom shield can now be removed.
4. Refer to [Figure 17](#). Remove the front panel shield by removing the four screws **(28)**.
5. Disconnect the cable A1W2 **(25)** from the LCD Inverter board **(13)** and unclip the cable from the cable clamps.

6. Refer to [Figure 19](#). Disconnect the flex circuit A1W1 (1) from the front panel interface board (4).

Figure 19 **Display Removal**



7. Remove the two screws (2) securing the display bracket (3) to the Front Frame Assembly. The display can now be removed from the Front Frame Assembly.

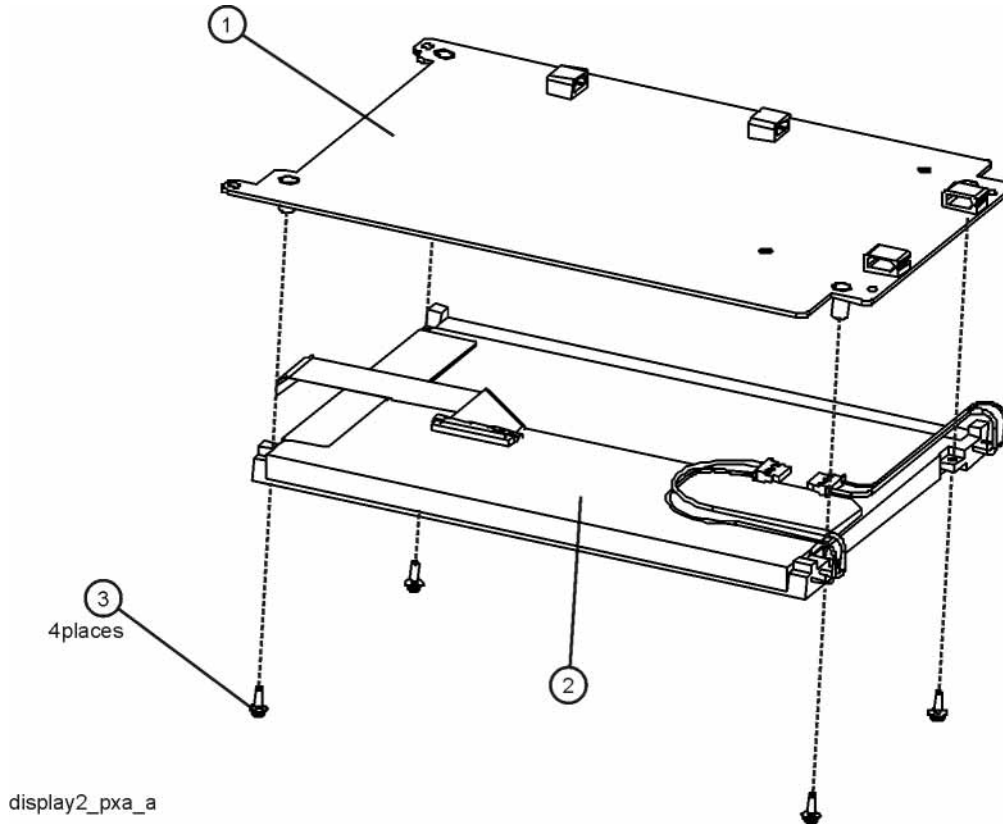
CAUTION

Once the display assembly has been removed from the Front Frame Assembly, the glass filter is no longer secured. DO NOT tip the assembly in such a manner that would cause it to fall out of place, as this may cause injury and/or damage to the glass.

Option BBA, Analog Baseband I/Q Inputs Retrofit Kit

8. Refer to [Figure 20](#). To separate the LCD (1) from the display bracket (2), remove the four screws (3). Avoid getting fingerprints or debris in the display or glass filter.

Figure 20 LCD and Display Bracket Separation

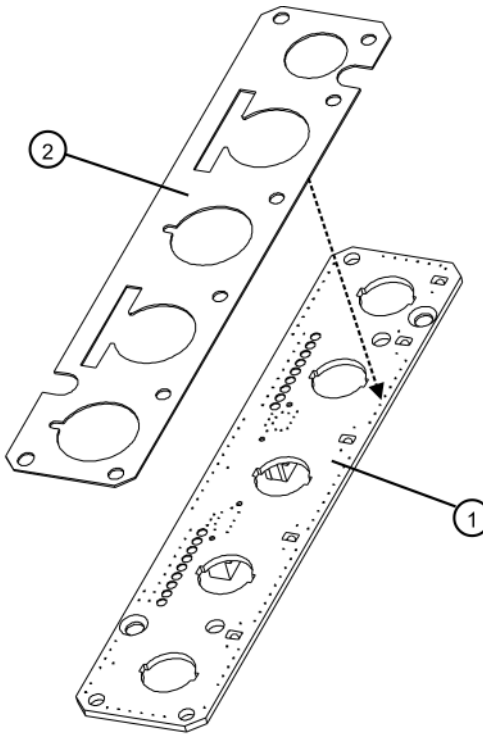


9. Locate the replacement display shield in the kit and attach it to the display. Torque the four screws to 5 inch-pounds.
10. Carefully wipe any dirt or lint from the display before replacing the assembly into the front frame.
11. Reassembly the front frame components. Refer to the PXA Service manual Assembly Replacement Procedures.

Installing boards into the front frame

1. Remove the blank label on left side of the front frame by peeling it off.
2. Remove the filler plate by removing two screws with a T10 driver.
3. Refer to [Figure 21](#). Locate the [N9020-63095](#), LED board (**1**) and [N9020-80013](#) LED board overlay (**2**).

Figure 21 LED Board and Overlay

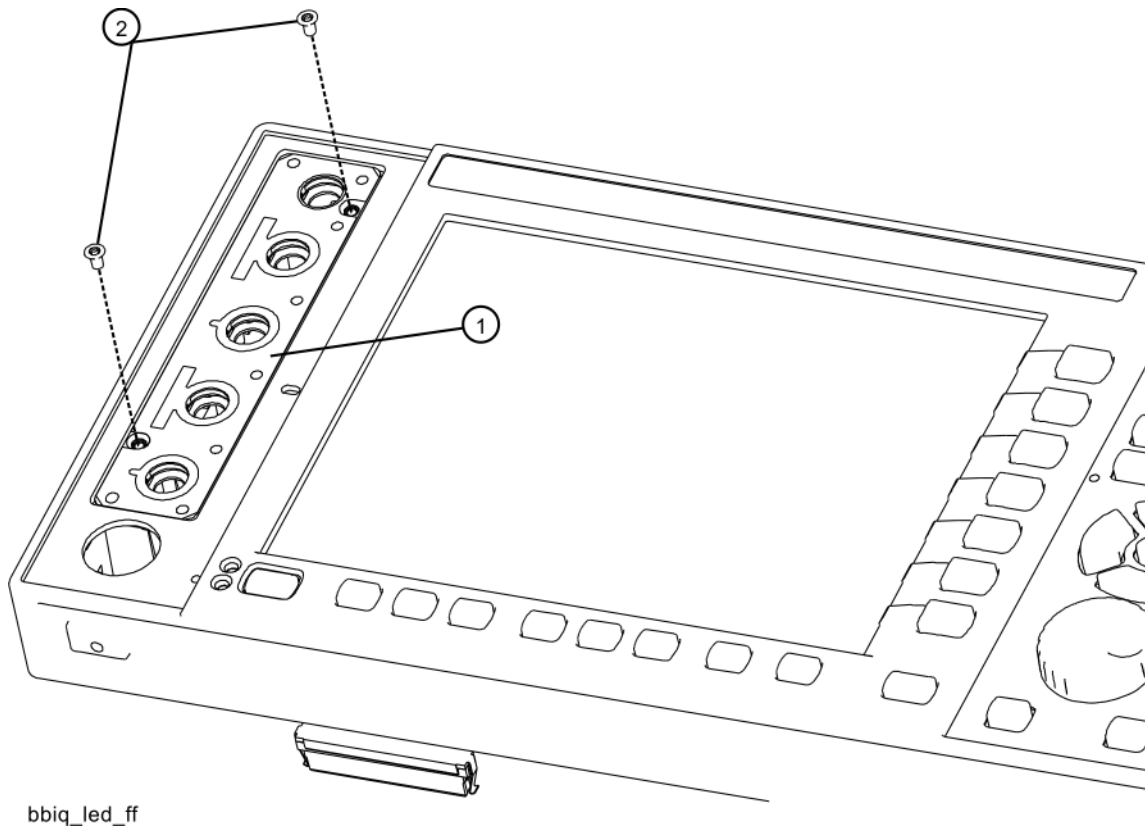


bbiq_overlay_led

Option BBA, Analog Baseband I/Q Inputs Retrofit Kit

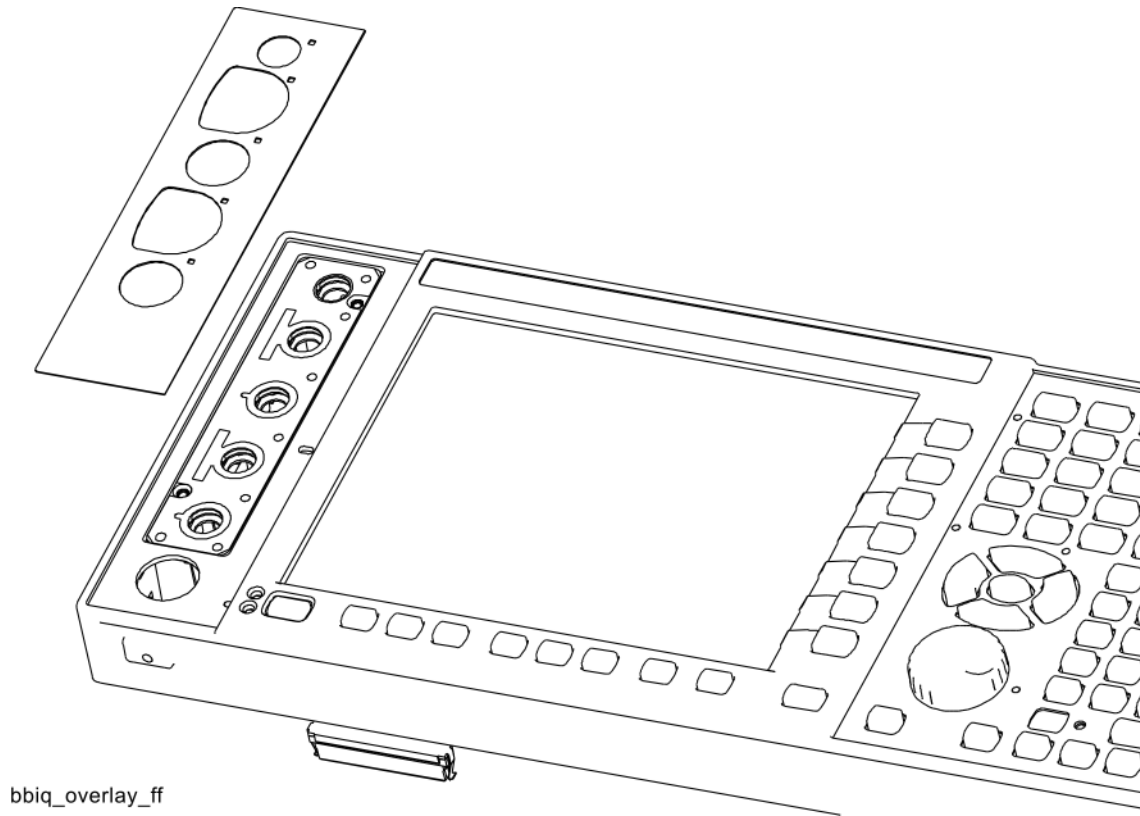
4. Refer to [Figure 22](#). Line up the holes and carefully attach the [N9020-80013](#) overlay to the LED board.
5. Install the LED board with overlay attached **(1)** into the front frame.
6. Secure the LED board with 0515-1227 screws **(2)** in two places. Torque to 9 in-lbs.

Figure 22 **LED Board Installation**



7. Refer to [Figure 23](#). Line up and carefully attach the top overlay [N9020-80014](#) over the lower overlay.
8. Press firmly down over the entire surface area of the top overlay.

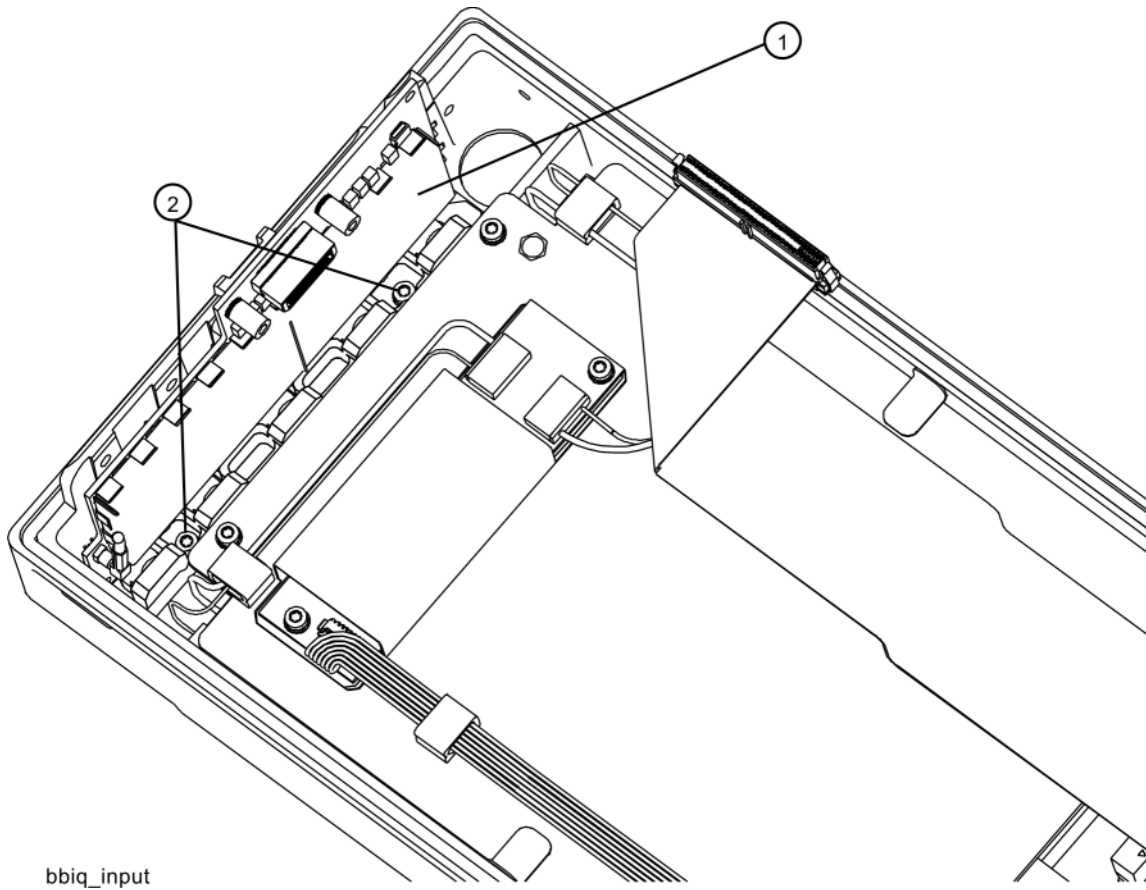
Figure 23 **Overlay Alignment**



Option BBA, Analog Baseband I/Q Inputs Retrofit Kit

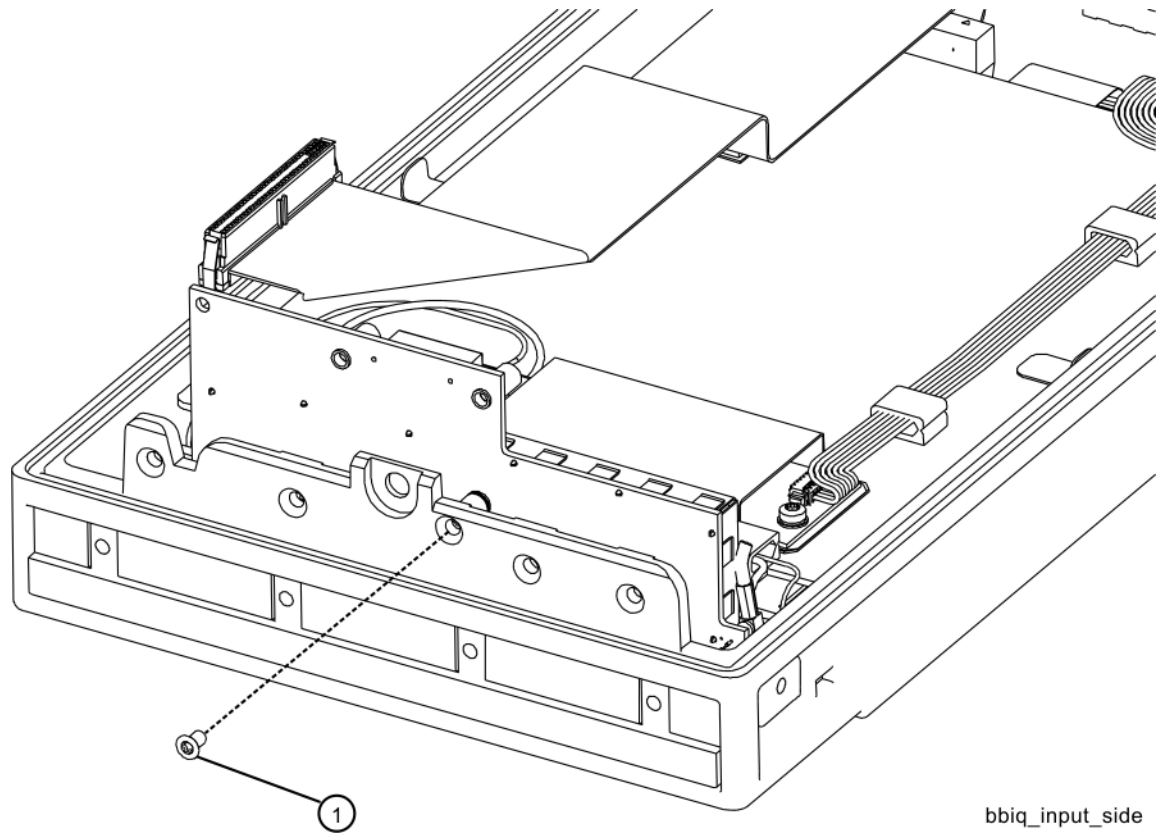
9. Refer to [Figure 24](#). Install the [BBIQ Interface Board, N9020-65094](#) into the front frame passing the BNC connectors through the holes.
10. Secure the [BBIQ Interface Board](#) with two 0515-0372 screws (2). Torque to 9 in-lbs.

Figure 24 **BBIQ Interface Board Installation**



11. Refer to [Figure 25](#). Secure [BBIQ Interface Board](#) to the side of the front frame with a single 0515-1035 screw (1). Torque to 9 in-lbs.

Figure 25 **BBIQ Interface Board Side Screw Installation**



Option BBA, Analog Baseband I/Q Inputs Retrofit Kit

12. Refer to [Figure 26](#) and [Figure 27](#).

[Figure 26](#) shows an LCD front frame. If you have an LCD front frame perform steps 13 to 17, then continue with step 23.

[Figure 27](#) shows an LED front frame. If you have an LED front frame skip steps 13 to 17 and continue with step 18.

Figure 26 Front Frame Parts Locator - LCD

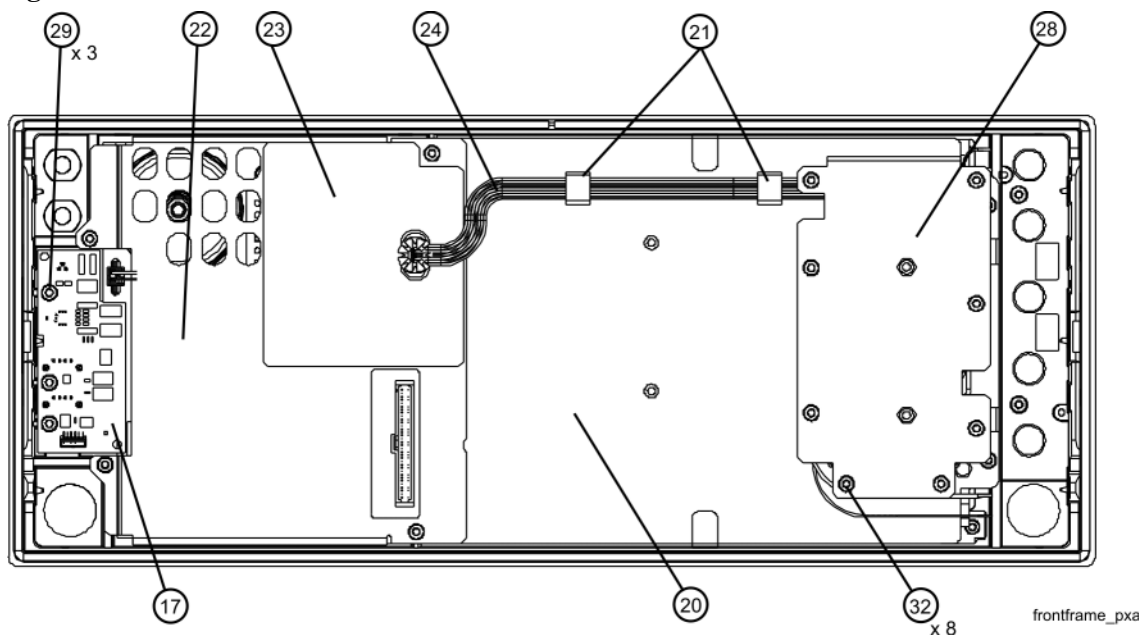
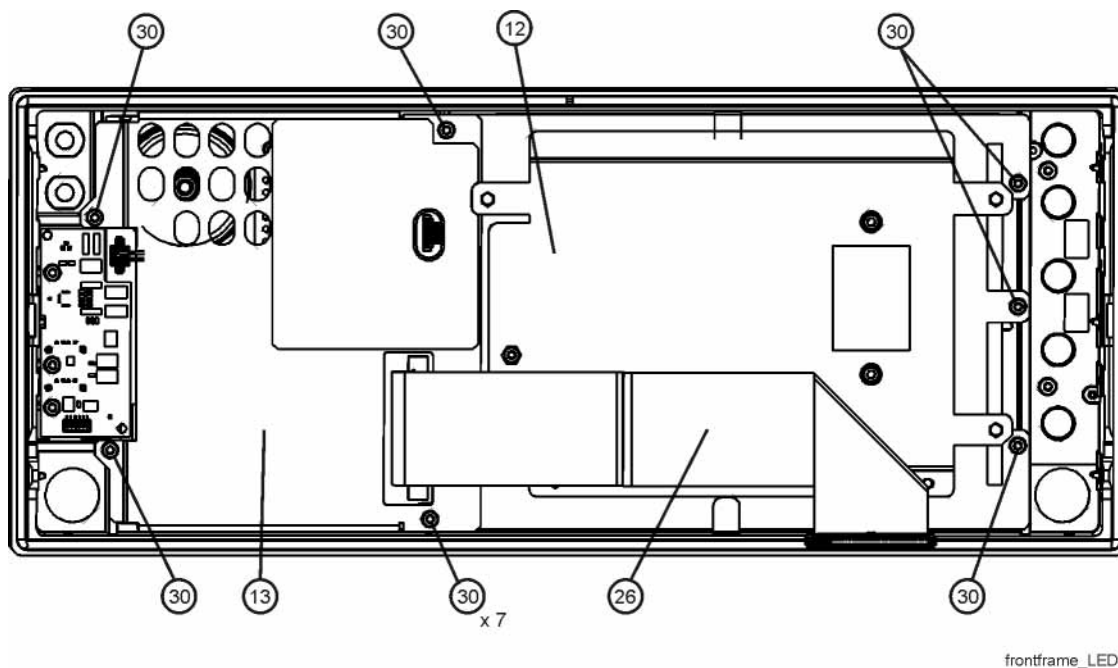


Figure 27 Front Frame Parts Locator - LED

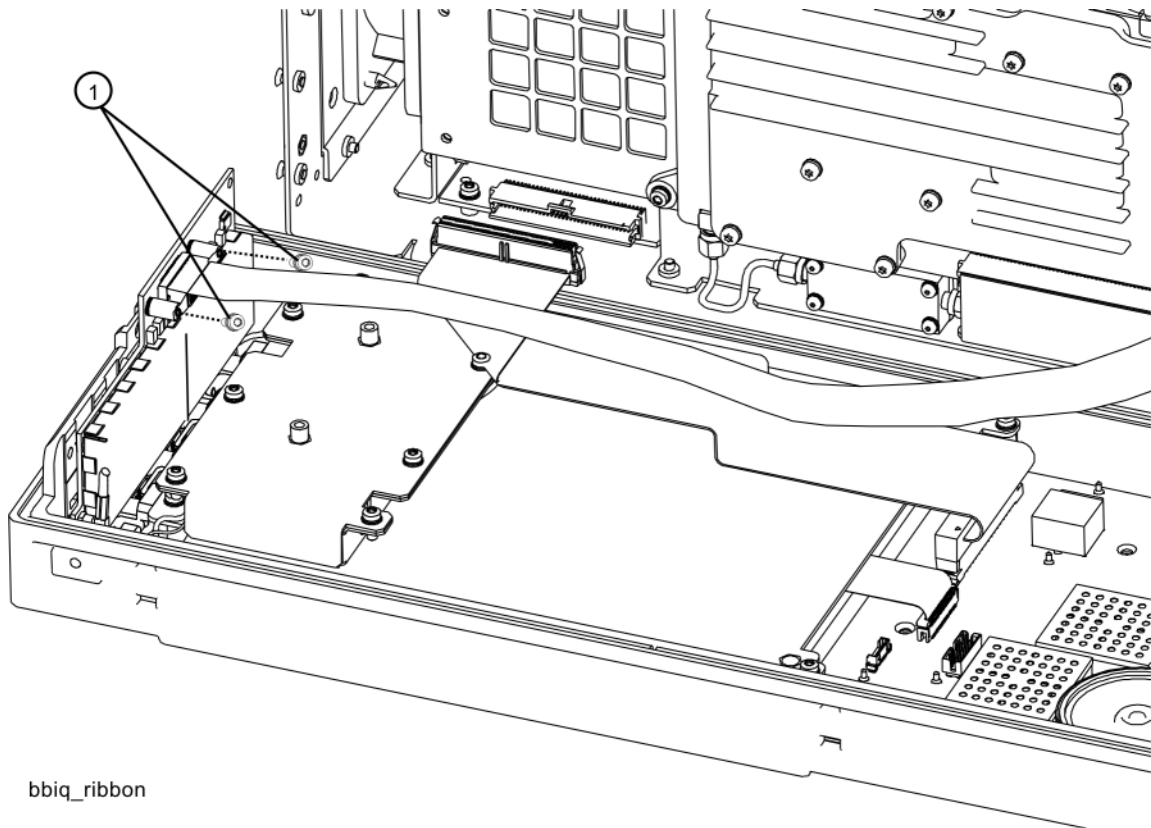


13. Refer to [Figure 28](#). Connect the ribbon [8121-2090](#) to the [BBIQ Interface Board](#), [N9020-65094](#).

The front frame assembly will need to be positioned slightly to the right in order for the ribbon cable to reach the BBIQ Interface board.

14. Install two [N9020-20017](#) Hex screws (**1**) to secure the flex ribbon into the connector. Torque to 4 in-lbs with the 1/4-inch socket.

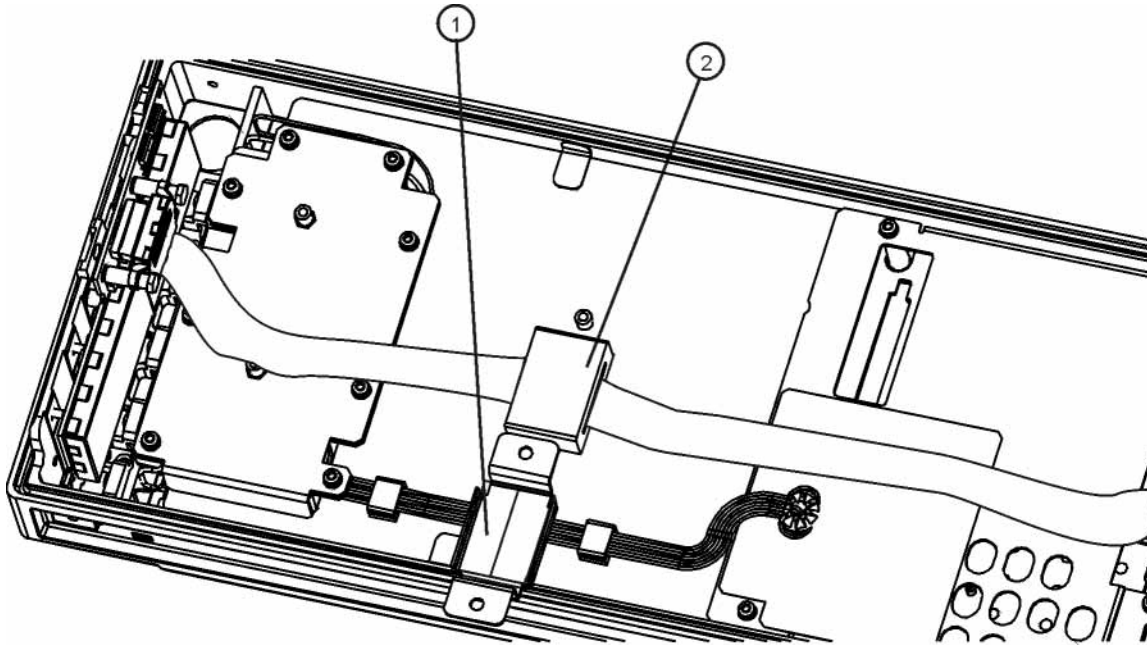
Figure 28 Inverter Ribbon Cable Installation



Option BBA, Analog Baseband I/Q Inputs Retrofit Kit

15. Refer to [Figure 29](#). Cut the Vibration Mount [0460-2725](#) (1) supplied in the kit with scissors or a knife to fit the Core Bracket [N9020-00012](#).
16. Position the Core Bracket over the ferrite core (2) that is on the flex ribbon cable.

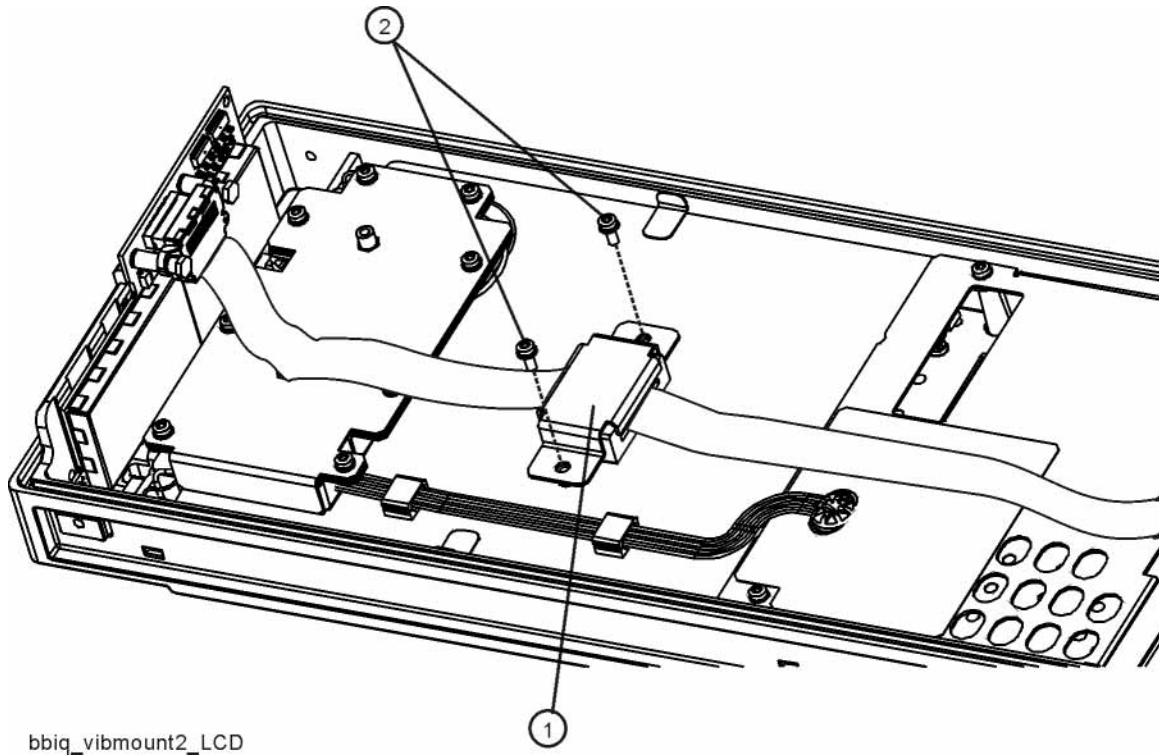
Figure 29 **Vibration Mount Installation**



bbaq_vibmount_LCD

17. Refer to [Figure 30](#). Secure with two 0515-0372 screws **(2)**. Torque to 9 in-lbs.
Continue with step 23.

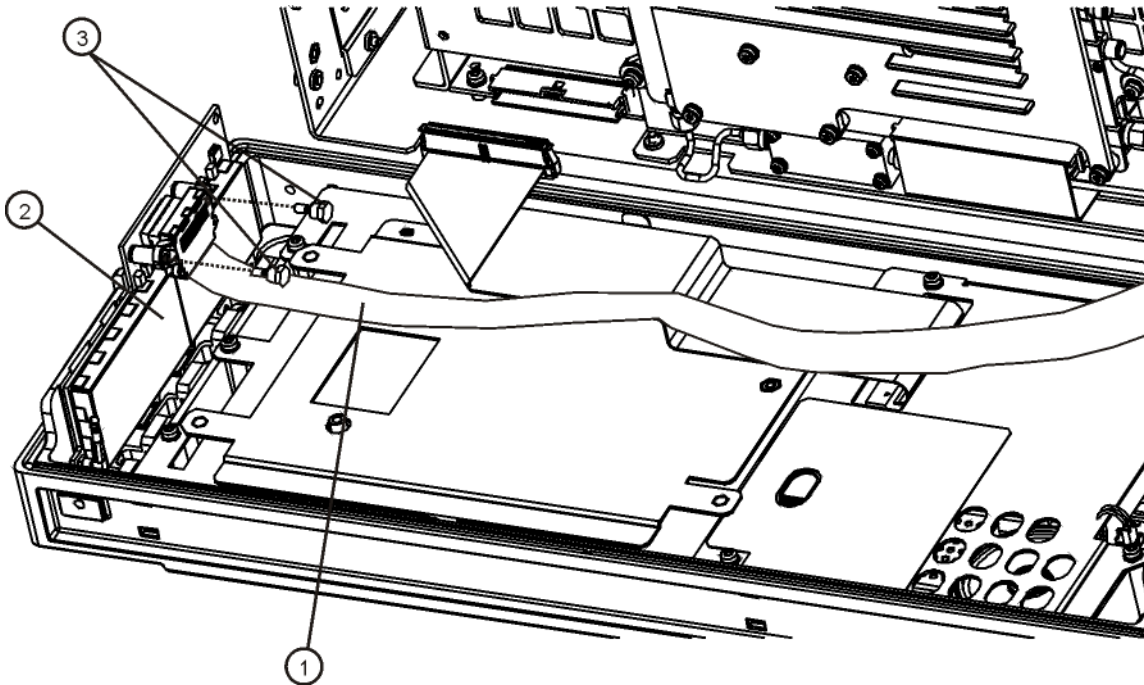
Figure 30 **Core Bracket Installation**



Instruments with LED Display

18. Refer to [Figure 31](#). Connect the flex ribbon cable [8121-2090](#) (1) from the BBIQ Main board to the BBIQ Interface board (2) as shown. The front frame assembly will need to be positioned slightly to the right in order for the ribbon cable to reach the BBIQ Interface board.

Figure 31 BBIQ Ribbon Cable Installation

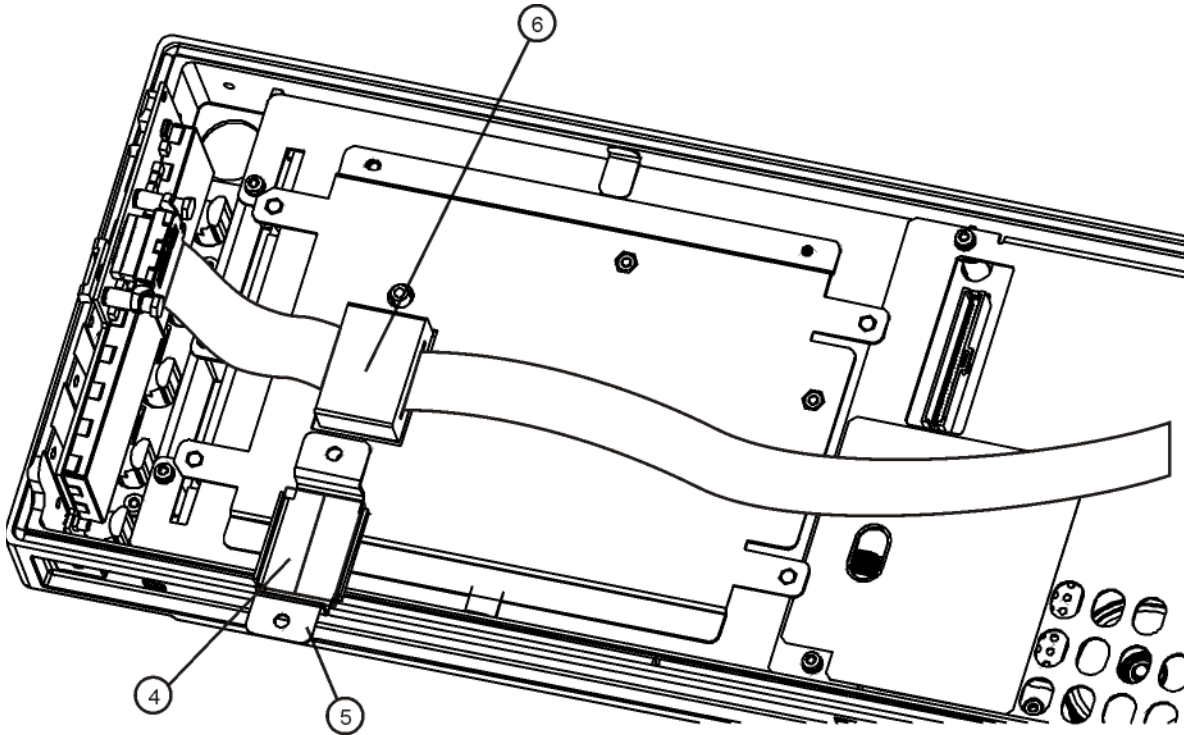


bbiq_ribbon+LED

19. Use two N9020-20017 Hex shoulder screws (3) to affix the ribbon cable connector to the BBIQ Interface board connector. Torque to 4 in-lbs with the 1/4-inch socket.

20. Refer to [Figure 32](#). Cut the Vibration Mount [0460-2725](#) (**4**) supplied in the kit with scissors or a knife to fit the Core Bracket [N9020-00012](#) (**5**). Peel backing from the vibration mount material and install onto the core bracket.

Figure 32 **Vibration Mount Installation**



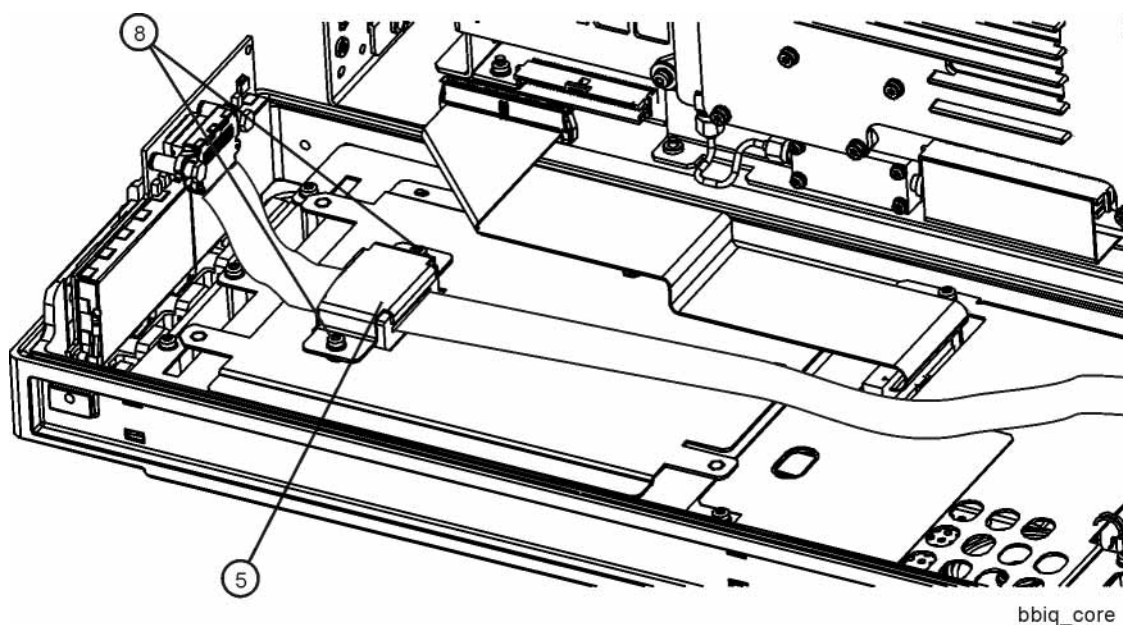
bbaq_vibmount_LED

21. Position the ferrite core (**6**) on the display bracket cut-out as shown.

Option BBA, Analog Baseband I/Q Inputs Retrofit Kit

22. Refer to [Figure 33](#). Secure the Core Bracket (5) to the display bracket stand-offs with two 0515-0372 screws (8). Torque to 9 inch pounds.

Figure 33 **Core Bracket Installation**



23. Plug the ribbon cable W1 into the motherboard.
24. Refer to [Figure 4](#). 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 chassis sheet metal.
25. Secure the front panel with screws 0515-1035 in 8 places, 4 on each side. Torque to 9 in-lbs.
26. On instruments with external mixing, reconnect the semi-rigid cable.

Top Brace Replacement

1. Refer to [Figure 6](#). To replace the top brace (1). There is an additional screw provided in this kit (0515-1227) (5) to attach the top brace to the BBIQ Main board. Torque to 9 inch-pounds.

Final Installation

1. Refer to [Figure 3](#). 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.agilent.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.

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 N9030A-BBA.

Before performing adjustments and performance verification tests using the N7814A Calibration and Adjustment Software for Agilent RF and Microwave Instruments, press **Mode, I/Q Analyzer, Input/Output, 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, Spectrum Analyzer, Input/Output, RF Input**.

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.agilent.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)

IMPORTANT	A full calibration is required to assure the instrument meets all specifications
------------------	--

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 Agilent support team.

Online assistance: <http://www.agilent.com/find/assist>

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

