

Keysight Technologies

EXA Signal Analyzer, Serial Prefix < MY/SG/US5648

MXA Signal Analyzer, Serial Prefix < MY/SG/US5233

Option HL4, 40 MHz Analysis Bandwidth (B40)  
and Microwave Preselector Bypass (MPB)  
Upgrade 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](http://www.keysight.com).

# Notices

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## **Manual Part Number**

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## Option HL4, 40 MHz Analysis Bandwidth (B40) + Microwave Preselector Bypass (MPB) Upgrade Kit

Products Affected:	N9010A, EXA Signal Analyzer N9020A, MXA Signal Analyzer
Serial Numbers:	N9010A, < MY/SG/US56480000 N9020A, < MY/SG/US52330000
Options:	B40, MPB
To Be Performed By:	(X) Keysight Service Center (X) Personnel Qualified by Keysight <sup>a</sup> ( ) Customer
Estimated Installation Time:	3.0 Hours
Estimated Adjustment Time:	5.5 Hours
Estimated Verification Time:	3.5 Hours

- a. To ensure that these newly installed options are 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 includes parts to upgrade older EXA or MXA signal analyzers with Option 507, 508, 513, or 526 to add Options B40, 40 MHz analysis bandwidth, and MPB, microwave preselector bypass. As a result, some parts included in this kit will not be needed for upgrading some analyzers (newer analyzers require fewer parts to be changed). Also, some parts might not be necessary if other certain options are already installed. As a result, some of the procedures, such as Replace A13A1 Bandpass Filter, might not need to be performed.

In addition to installing the hardware to support options B40 and MPB, licenses for the following options will also be installed (the 'x' is either 1 for EXA or 2 for MXA):

- N90x0A-B40, 40 MHz Analysis Bandwidth
- N90x0A-B25, 25 MHz Analysis Bandwidth
- N9020A-S40, 40 MHz/Channel Baseband Bandwidth (for use with Option BBA, if also installed; only included with N9020AK-HL4)
- N90x0A-DP2, Digital Processor & 2 GB Capture Memory
- N90x0A-RTL, Real Time Link
- N90x0A-FS1, Fast Sweep Capability, enabled with B40, DP2, or MPB
- N90x0A-MPB, Microwave Preselector Bypass
- N9060A-3FP, Amplitude Correction and Limit Lines
- N9060A-4FP, TOI and Harmonics
- N9060A-5FP, ACP 18 Carrier Measurement
- N9060A-6FP, TV Trigger and IQ Analyzer Enhancement

The installation procedure begins with an “inventory” of the analyzer serial number, currently-installed options, installed hardware, and software version. This information will be used to determine which sub-procedures, if any, can be skipped.

## Installation Kit Parts List

Quantity	Description	Keysight Part Number
1	A2 Enhanced Analog IF Assembly	N9020-60290
1	A3 40 MHz Digital IF Assembly	N9020-60165
1	A15 Front End Controller w/ IF MUX	N9020-60172
1	W2 Cable Assembly, A2 to A3	N9020-60046
1	Opt HL4 Cable Kit with Wire Markers (includes cables W36 through W43, listed below)	N9020-60171
1	Coaxial Fixed Attenuator, DC to 26.5 GHz, Option 006, PB Free (AT1)	08493-60026
1	Bracket, PS Bypass Switch 1	E4410-00104
1	Bracket, PS Bypass Switch 2	E4410-00110
1	Cable Assembly, SW - SW2 (W31)	E4410-20161
1	Cable Assembly, Switch 2 - YIG Tuned Filter (W32)	E4410-20163
1	Cable Assembly, Switch 1 - RF Assembly (W34)	E4410-20164
1	Cable Assembly, YIG Tuned Filter - Switch 1 (W33)	E4410-20165
1	Cable RF Switch 1 - Switch 2 (W35)	N9020-20210
1	Cable Assembly, Switch Control (W30)	E4410-60159
1	Cable Assembly, A11J2 to A13J2 (W3)	N9020-20101
1	Cable Assembly, J1 to A9 Input (W10)	N9020-20141
1	Cable Assembly, A10 Output to A11J1 (W9)	N9020-20153
2	Coaxial Switch (SW1 and SW2)	N1810-60069
1	Bracket HB Switch	N9020-00023
1	Bracket, RF Side (for older instruments)	N9020-00031
1	Bracket, RF Side (for newer instruments)	N9020-00034
1	Microwave Filter Bandpass 5175 MHz Max SMA (A13A1)	0955-2176
1	Cable Assembly RF Semi-R SMA (m) Str SMA (m) Str 65 mm LG (A13W1)	E6607-21178
1	Cable Assembly RF Semi-R SMA (m) Str SMA (m) Str 195 mm LG (A13W2)	E6607-21179
1	Spacer, Filter Mounting Adapter	E6607-25005
1	Cable Assembly, YTF (W22)	N9020-60059
1	Cable Assembly, Coaxial 530 mm LG (W43)	8121-1401 <sup>a</sup> with ends labeled '705' and '18'
1	Cable Assembly, Coaxial 530 mm LG (W42)	8121-1401 <sup>a</sup> with ends labeled '706' and '14'
1	Cable Assembly, Coaxial 530 mm LG (W37)	8121-1401 <sup>a</sup> with ends labeled '900' and '100'
1	Cable Assembly, Coaxial 560 mm LG (W40)	8121-1940 <sup>a</sup> with ends labeled '6' and '17'
1	Cable Assembly, Coaxial 620 mm LG (W38)	8121-1861 <sup>a</sup> with ends labeled '901' and '15'
1	Cable Assembly, Coaxial 240 mm LG (W36)	8121-1862 <sup>a</sup> with ends labeled '902' and '7'

## Introduction

Quantity	Description	Keysight Part Number
1	Cable Assembly, Coaxial 280 mm LG (W41)	8120-8868 <sup>a</sup> with ends labeled '601' and '19'
1	Cable Assembly, Coaxial 525 mm LG (W39)	8121-2028 <sup>a</sup> with one end labeled '1100'
4	Screw M2 x 0.4 (6 mm long)	0515-0658
3	Screw M2 x 0.4 (14 mm long)	0515-0661
4	Screw M3 x 0.5 (8 mm long)	0515-0372
1	Screw M3 x 0.5 (6 mm long) Flathead	0515-1227
4	Screw M2.5 x 0.45 (20 mm long)	0515-1992
12	Cable Tie, Self-Locking, Nylon Gray	1400-0249
1	Label, Information, AUX IF OUT	N9020-80081
1	Entitlement Certificate	5964-5178
1	Entitlement Certificate Envelope	5967-7169
1	Installation Note	This note

a. This cable is included in the Option HL4 Cable Kit with Wire Markers, p/n N9020-60171

## Tools Required

- T-8 TORX Driver
- T-6 TORX Driver
- T-10 TORX Driver
- T-20 TORX Driver
- 5/16-inch torque wrench
- 9/16-inch nut driver
- 1/4-inch socket on 4-pound torque wrench
- Scissors or knife
- Diagonal cutters
- Keysight Calibration and Adjustment Software, N7814A (revision E.06.00 or later)
- Test equipment and computer supported by the X-Series Performance Tests and Adjustment Software
- EXA or MXA Signal Analyzer Service Guide (as appropriate). This manual is available as:
  - [http://www.keysight.com/find/n9010a\\_manuals](http://www.keysight.com/find/n9010a_manuals)
  - [http://www.keysight.com/find/n9020a\\_manuals](http://www.keysight.com/find/n9020a_manuals)
- Microsoft Windows based personnel computer with internet access and USB port
- USB storage device with >2GB free memory

## Initial Instrument Functionality Check

Power on the instrument and allow the instrument to boot up. Run an alignment and display the measurement screen. (The instrument will probably display a spectrum analyzer screen and you will see the instrument sweeping.)

There should be no alignment failures. If there are failures, investigate and fix the problem before continuing.

### WARNING

Before you disassemble the instrument, turn the power switch to Standby. After the instrument has completely shut down, 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.

## 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 (“x” is 1 for an EXA and 2 for an MXA). Put a check mark or “X” after each option listed below that appears in the Show System menu.

N90x0A-503 \_\_\_\_\_

N9010A-532 \_\_\_\_\_

N9010A-544 \_\_\_\_\_

N90x0A-B25 \_\_\_\_\_

N90x0A-BBA \_\_\_\_\_

N90x0A-CR3 \_\_\_\_\_

N90x0A-CRP \_\_\_\_\_

N90x0A-B40 \_\_\_\_\_

N90x0A-DP2 \_\_\_\_\_

N90x0A-MPB \_\_\_\_\_

4. On the analyzer, press **System, Show, Hardware**. Note the Part #, Matl Rev, Rev, OF Rev, and Hw Id of the Front End Controller and Front End in the table below.

Assembly Name	Part #	Matl Rev	Rev	OF Rev	Hw Id
Front End Controller					
Front End					

5. If the analyzer is equipped with any of the following options (refer to the data in **step 3** above),

N90x0A-B40

N90x0A-DP2

N90x0A-MPB

**Do not proceed** with the installation of this upgrade kit. If any of these options are already installed, you do not need this upgrade kit, since the necessary hardware is already present.



6. Refer to the data in **step 3** above. If the analyzer has N90x0A-503, N9010A-532, or N9010A-544 **do not proceed** with the installation of this kit. This kit can only be installed in analyzers with frequency range options 507, 508, 513, and 526.
7. Refer to the data in **step 2** above. If the analyzer is an N9010A and the serial number is  $\geq$  MY/SG/US56480000 **do not proceed** with the installation of this kit, This kit is only for older N9010A and N9020A analyzers.
8. Refer to the data in **step 2** above. If the analyzer is an N9020A and the serial number is  $\geq$  MY/SG/US52330000 **do not proceed** with the installation of this kit, This kit is only for older N9010A and N9020A analyzers.
9. Refer to the data in **step 2** above. If the Instrument S/W Revision is earlier than A.10.05, you must upgrade the instrument software. The hardware and licenses being added with this upgrade are only supported by software revisions A.10.05 and later.

Even if the Instrument S/W Revision is A.10.05 or later, we recommend upgrading to the latest software revision to ensure that you get the benefit of any defect fixes that have been made since A.10.05.

The latest instrument software can be downloaded from the following web site:

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

10. Refer to the data in **step 4** above. If the Front End has a Hw Id of 70, it already has the 150 MHz wide 1st IF bandpass filter and you do not need to perform the Replace A13A1 Bandpass Filter procedure.
11. Refer to the data in **step 3** and **step 4** above. If the analyzer has N90x0A-CR3 and/or N90x0A-CRP installed, verify that it also has a Front End Controller with Hw Id of 41 or 75. If the Front End Controller has a Hw ID of 41 or 75, you do not need to perform the Replace Front End Controller procedure.

### Update Instrument Software

If the analyzer does not have instrument software that supports the new hardware, many errors will occur onscreen when the analyzer boots up. Updating the instrument software and installing the necessary licenses before installing the new hardware will help ensure that the hardware installation was successful.

Go to the following website and determine whether or not the analyzer has the latest instrument software already installed:

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

If the analyzer does not have the latest instrument software already installed, download and install the latest version.

## Licensing the New Options

### License 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 analyzer's USB ports. Connect a mouse to another USB port. 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



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 2**. Since the license file contains multiple licenses, multiple “Successful License Installation” messages will appear. Wait until all licenses have been consumed before removing the USB Storage Device.

### NOTE

If you will also be installing any of the following upgrade products:

N90x0AK-CR3, 2nd IF Output

N90x0AK-CRP, Arbitrary IF Output

N9010AK-P07, Preamplifier, 7 GHz

now would be the best time to install the licenses for these other upgrades. By installing the licenses now, the adjustments and performance verifications for these other upgrades will also be performed.

**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 analyzer folder: C:\Program Files\Agilent\licensing.

### Verify the License Installation

1. Before the licenses will be recognized, the XSA application must be restarted. Press **File, Exit**. An Exit Analyzer dialog box will appear; press Enter to confirm the exit.
2. Double-click on the LaunchXSA icon on the Windows desktop. Wait for the XSA application to finish starting (the analyzer should be sweeping).
3. Press **System, Show, System** on the analyzer to display a list of all displayed options. You should see the following options listed ("x" is 1 for an EXA and 2 for an MXA):
  - N90x0A-B40    Analysis bandwidth, 40 MHz
  - N90x0A-B25    Analysis bandwidth, 25 MHz
  - N90x0A-DP2    Digital Processor, 2 GB Deep Capture Memory
  - N90x0A-MPB    Microwave Preselector Bypass
  - N90x0A-RTL    Real Time Link
  - N90x0A-S40    Baseband I/Q Analysis bandwidth, 40 MHz (MXA only)
  - N9060A-3FP    Amplitude Correction and Limit Lines
  - N9060A-4FP    TOI and Harmonics
  - N9060A-5FP    ACP 18 Carrier Measurement
  - N9060A-6FP    TV Trigger and IQ Analyzer Enhancement
4. Press **System, Show, Errors, Clear Error Queue**. This will remove out-of-date errors.
5. Press **System, Alignments, Align Now, All**.
6. Several alignments will be performed related to optional functionality you just installed.
7. Watch for any errors during the alignments.
8. Press **System, Show, Errors** to view the instrument error log.
9. Verify that there were no errors during alignment.

### Analyzer Disassembly

#### 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

If the analyzer has Option PRC, Portable Configuration, refer to the “[Portable Instrument \(Option PRC\)](#)” section on [page 16](#) to remove the outer case.

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#### NOTE

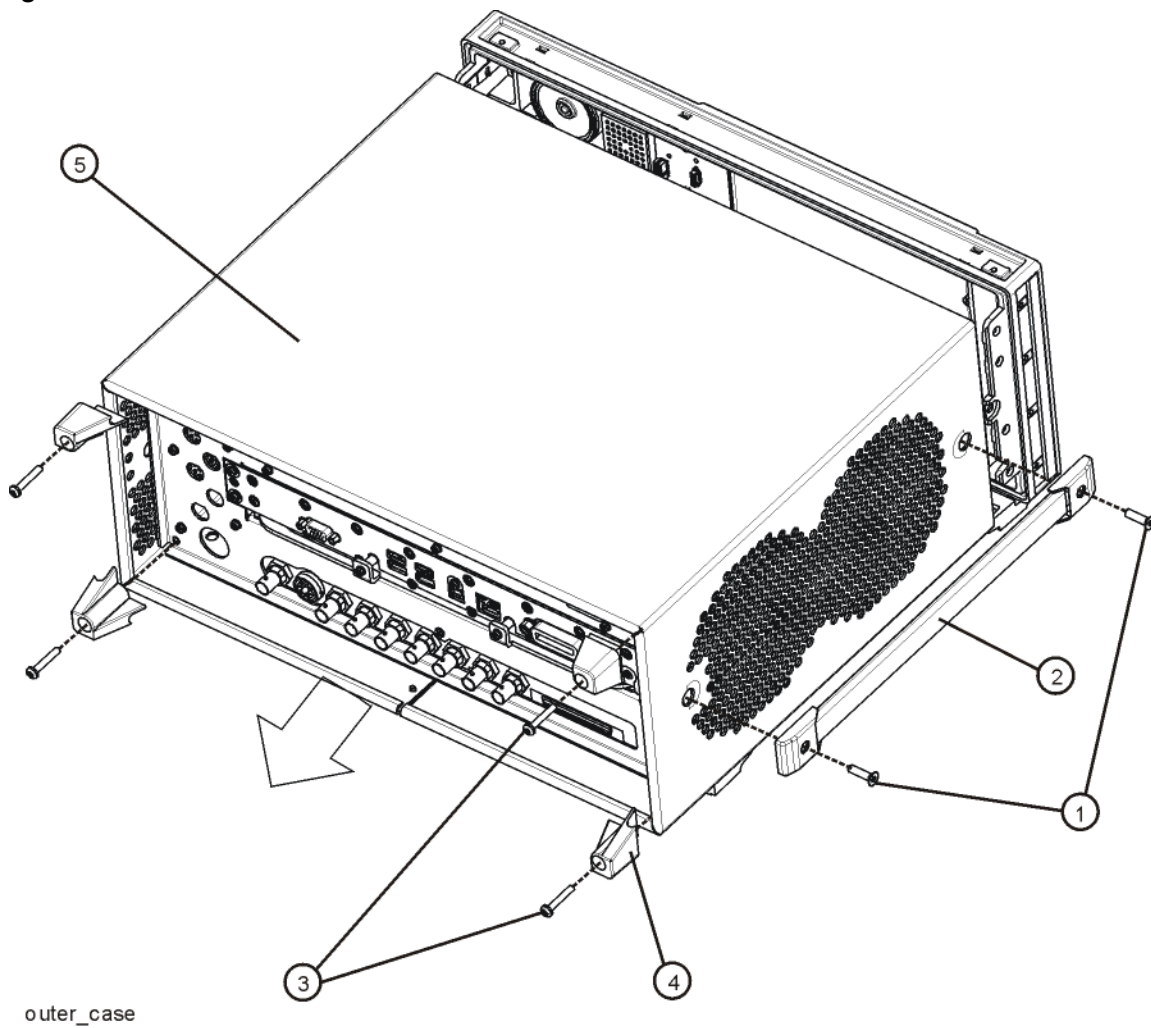
Make sure any adapters on the front panel are removed.

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### Standard Instrument (Benchtop Configuration)

1. Disconnect the instrument from ac power.
2. Refer to [Figure 3](#). Using the T-20 driver, remove the four screws (two on each side) (1) that attach the handle strap (2) on each side of the instrument.
3. Using the T-20 driver, remove the four screws (including washers) (3) that hold the rear feet (4) in place.
4. Pull the instrument cover (5) off towards the rear of the instrument.

**Figure 3** Standard Instrument Outer Case Removal



5. Proceed to the Front Frame Assembly Removal section to remove the front frame.

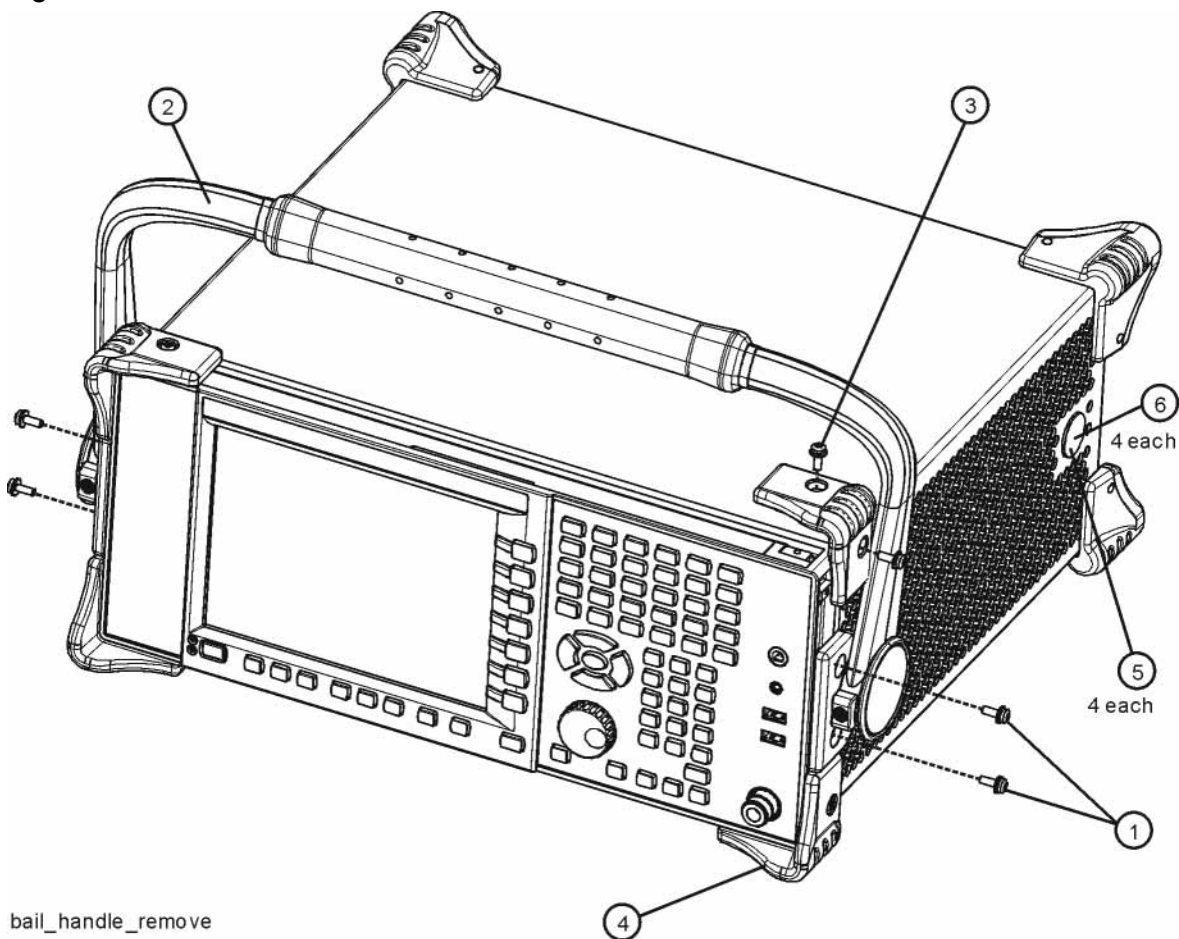
## Portable Instrument (Option PRC)

**NOTE**

Make sure any adapters on the front panel are removed.

1. Disconnect the instrument from ac power.
2. Refer to **Figure 4**. Using the T-20 driver, remove the four screws (two on each side) (1) that hold the bail handle (2) to the front frame.

**Figure 4** Bail Handle Removal

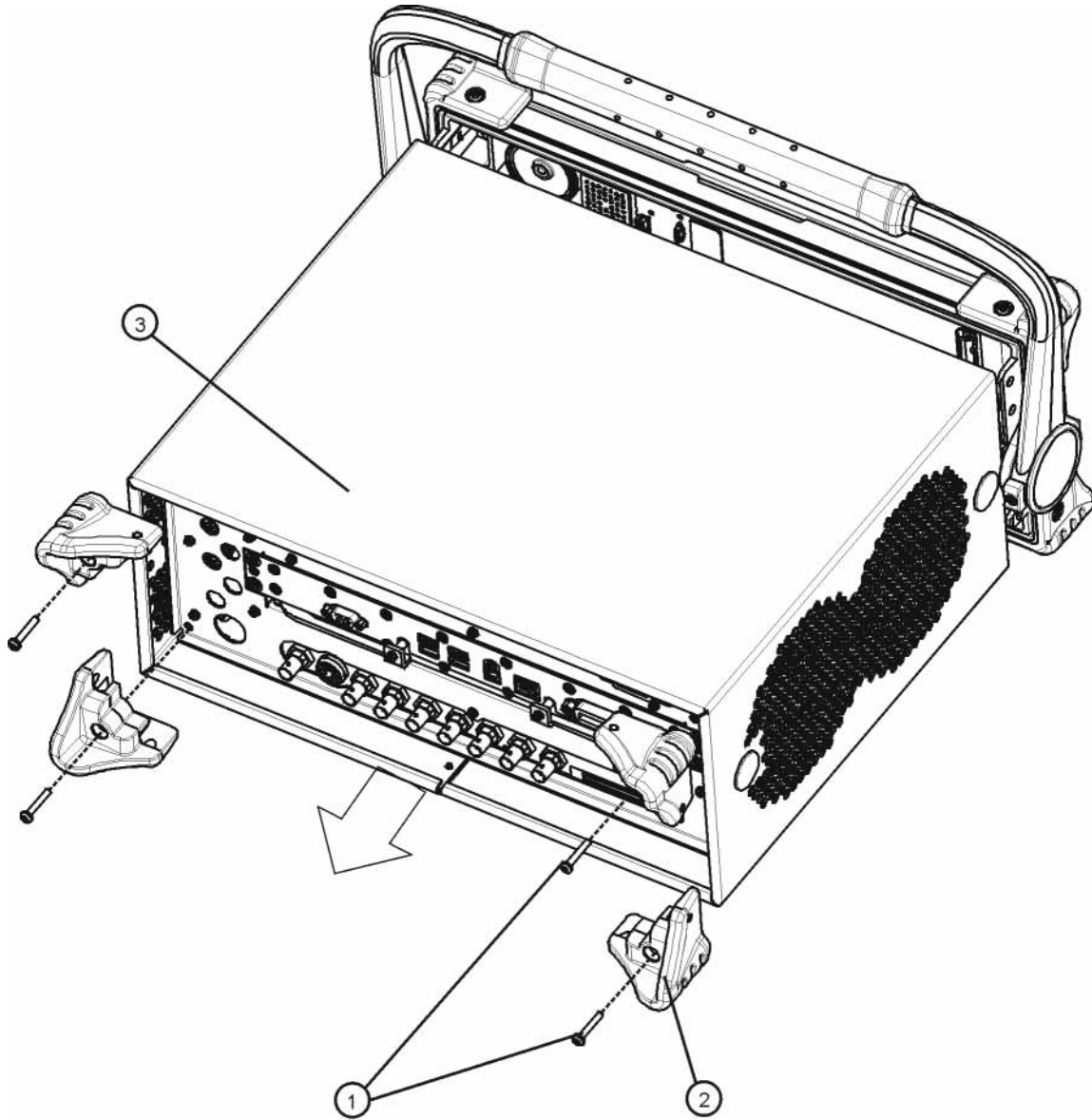


3. Using the T-20 driver, remove the four screws (two on each side) (6) that hold the strap handle plugs (5) in place.



4. Refer to **Figure 5**. Using the T-20 driver, remove the four screws including washers (1) that hold the rear bumpers (2) in place.
5. Pull the instrument cover (3) off towards the rear of the instrument.

**Figure 5** Option PRC Instrument Outer Case Removal

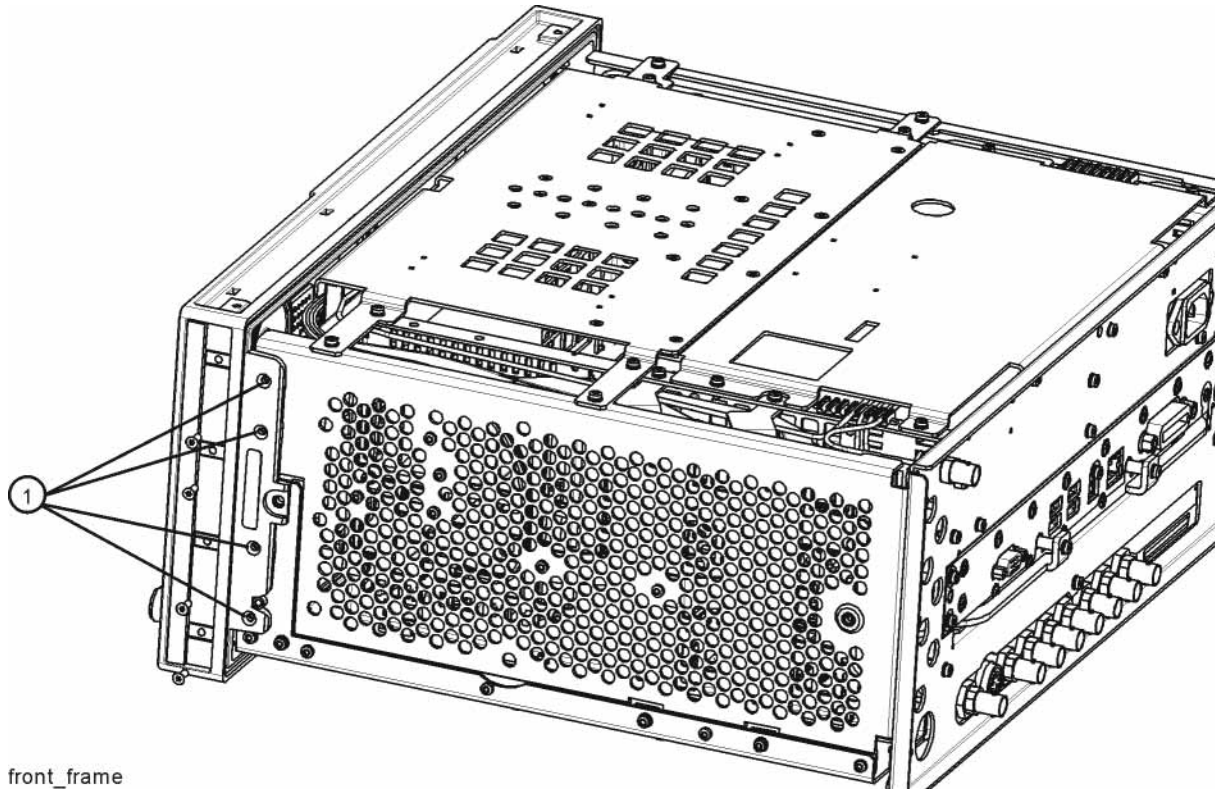


rear\_bumper\_remove

## Front Frame Assembly Removal

1. Refer to **Figure 6**. Using the T-10 driver, remove the eight screws (1), four on each side, to detach the front frame from the chassis.

**Figure 6** Front Frame Removal

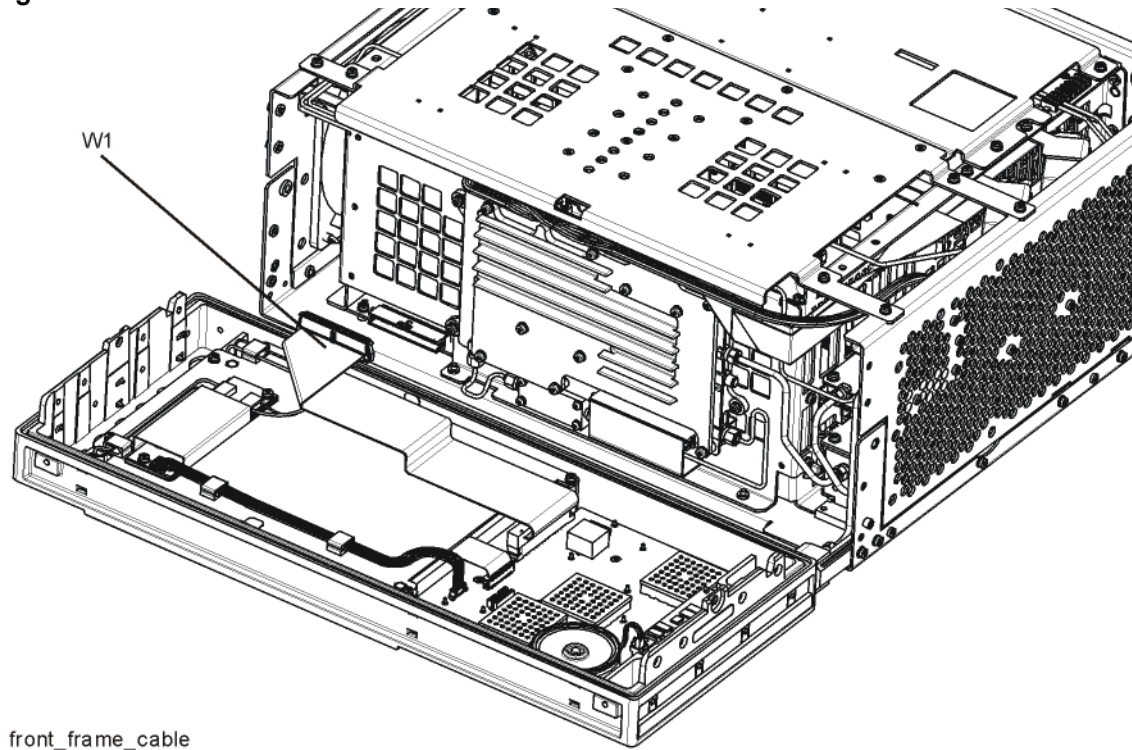


2. Refer to **Figure 7**. Pull the front frame carefully away from the chassis. Remove the ribbon cable W1 from the A8 Motherboard.

**NOTE**

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

**Figure 7** Front Panel Cable

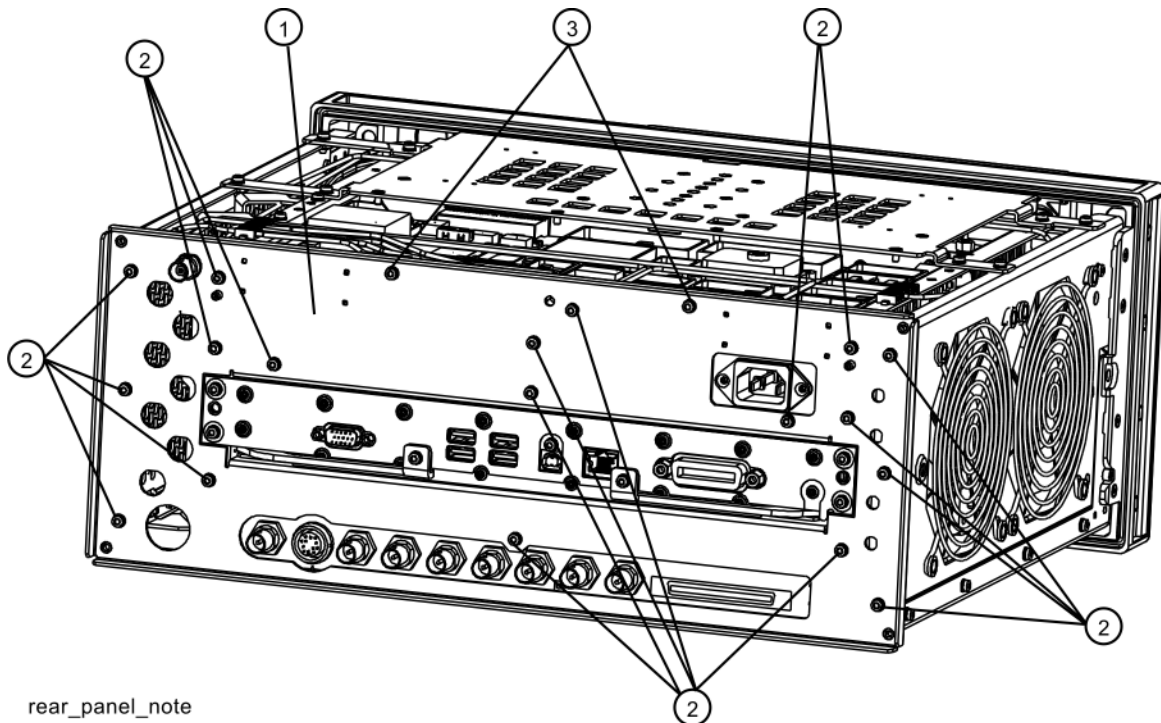


## Rear Panel Removal

1. Refer to **Figure 8**. Using the T-10 driver, remove the twenty screws (2) and (3) attaching the rear panel (1) to the chassis. The rear panel can now be removed.
2. Use a 9/16-inch socket wrench to remove the nut securing the EXT REF IN connector from the rear panel.
3. The rear panel can now be removed.

Figure 8

Rear Panel Removal



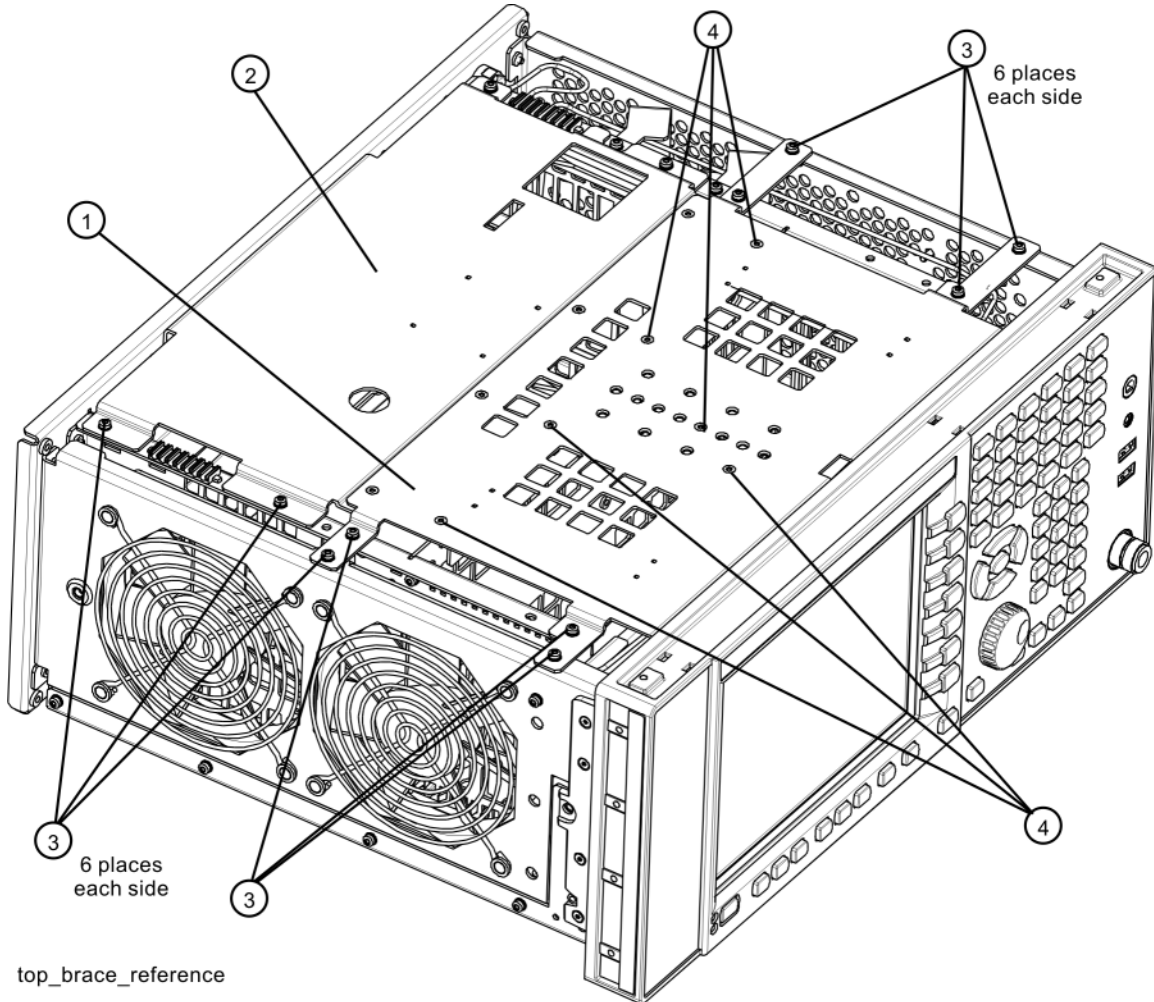
rear\_panel\_note



## Top Brace and Reference Bracket

1. Refer to **Figure 9**. To remove the top brace (1) and reference bracket (2), use the T-10 driver to remove the twelve panhead screws (3) (0515-0372), six on each side, attaching the braces to the chassis. Also remove the six flathead screws (4) (0515-1227) attaching the top brace to the boards.

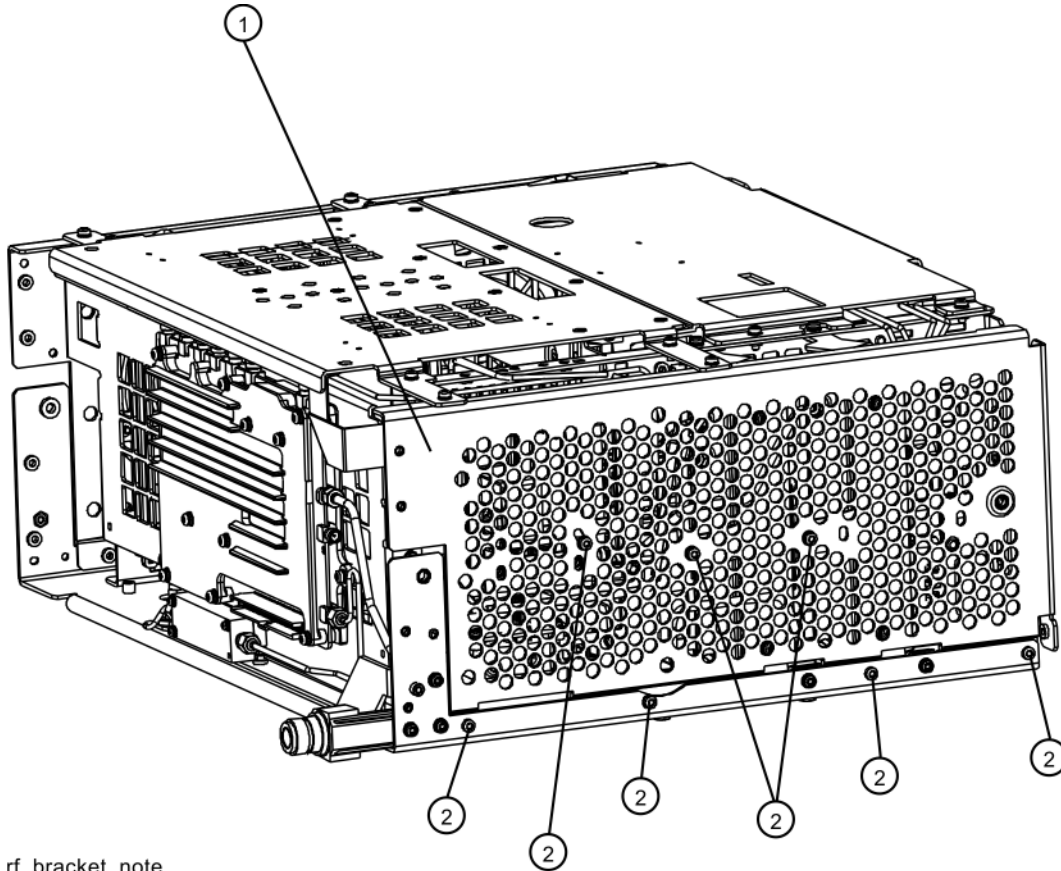
Figure 9 Top Brace and Reference Bracket Removal



## RF Bracket Removal

1. Refer to **Figure 10**. Remove the RF bracket (1) by removing the remaining eight screws (2) using the T-10 driver.

**Figure 10** RF Bracket Removal



rf\_bracket\_note

## Replacing A13A1 Bandpass Filter

**NOTE**

Refer to Analyzer Information at the beginning of the Installation Procedure. Do not perform this procedure if the Front End has a Hw Id of 70.

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1. Cut the cable ties securing the flexible coax cables and wire harnesses to the semi-rigid coax cables above the A13 RF Front End Assembly.
2. Refer to **Figure 11**. Using the 5/16 inch wrench, remove the cables W3, W4, W5, W7, W15, and W20 attached to the RF Front End Assembly (1).

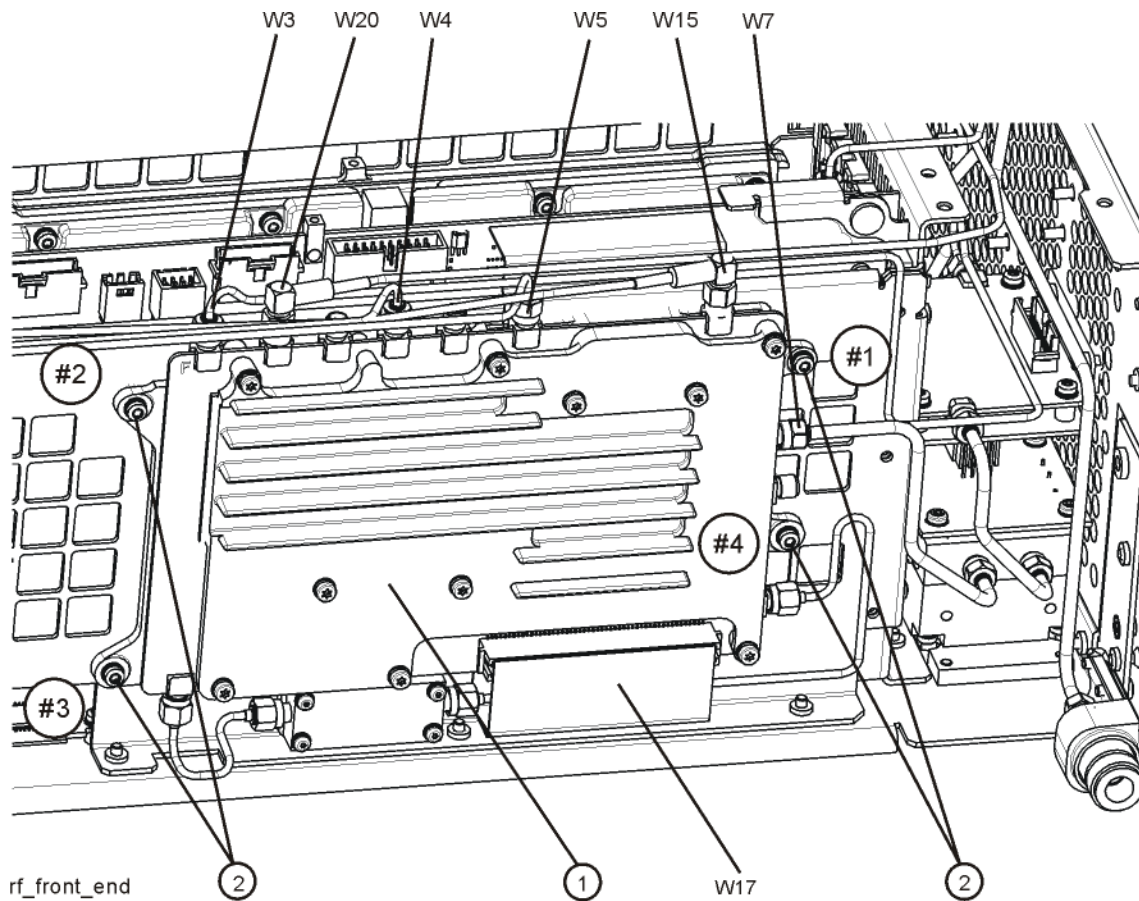
**NOTE**

W7 will not be present in instruments with Option 503.

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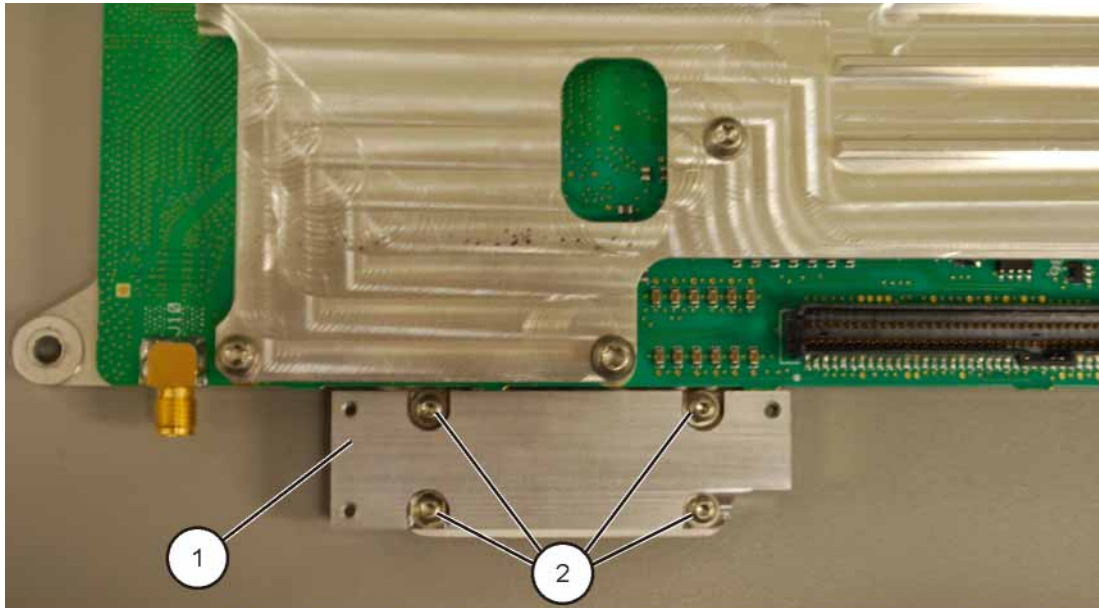
3. Disconnect the ribbon cable W17 from the Front End Control Assembly.
4. Remove the four screws (2) using the T-10 driver. The RF Front End Assembly can now be removed from the chassis.

**Figure 11** RF Front End Assembly Removal



5. Using the T-6 driver, remove the four screws (3) securing the A13A1 bandpass filter (4) to the A13 Front End Assembly. Discard these screws.
6. Disconnect ribbon cable W17 from A13J12.
7. Disconnect A13W1 (5) and A13W2 (6) from A13 Front End Assembly and remove the combination of A13W1, A13W2, and A13A1 as a unit. This unit will be used as a guide to assemble the new A13W1 and A13W2 to the new A13A1.
8. Refer to **Figure 12**. Locate the spacer, **E6607-25005**, in the kit. Install the spacer (1) where the old A13A1 bandpass filter was located. Secure with four 0515-0658 screws (2) and torque to 3 inch-pounds using the T-6 driver.

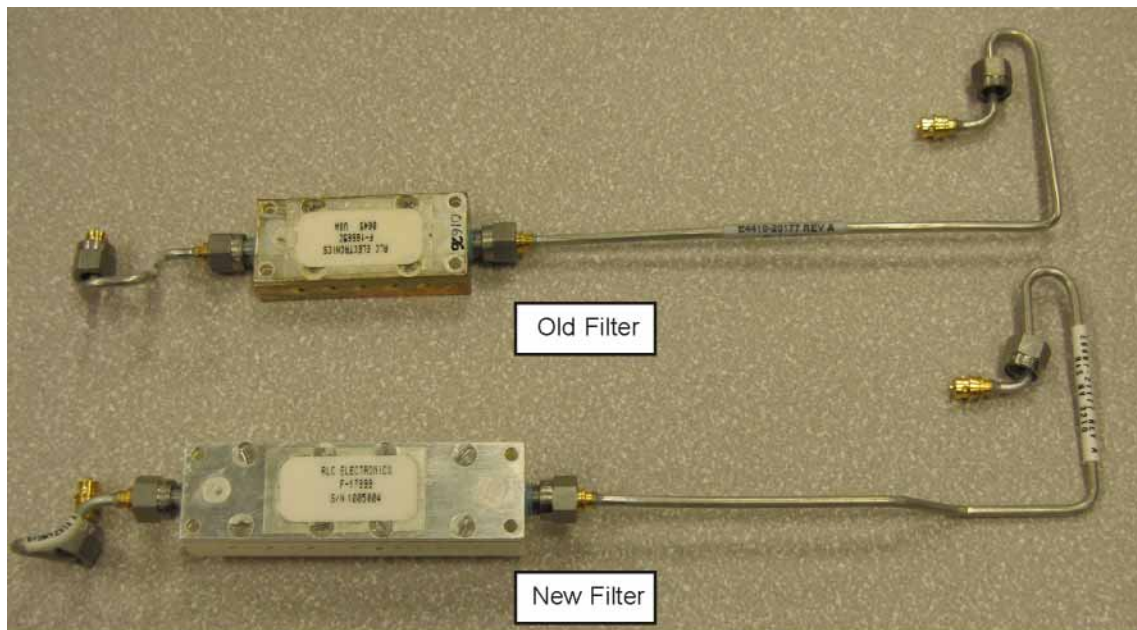


**Figure 12** Install Spacer

spacer

9. In the kit, locate the new A13W1 (E6607-21178) and A13W2 (E6607-21179) semi-rigid coax cables and the new A13A1 (0955-2176) bandpass filter.
10. Refer to Figure 13. Position the A13A1 on the table with the SMA connectors to the left and right. Using the old A13A1/A13W1/A13W2 assembly as a guide, connect the new A13W1 (E6607-21178) to the left SMA connector of the new A13A1. Connect the new A13W2 (E6607-21179) to the right SMA connector of the new A13A1.

**Figure 13** Connect Cables to New A13A1 Bandpass Filter

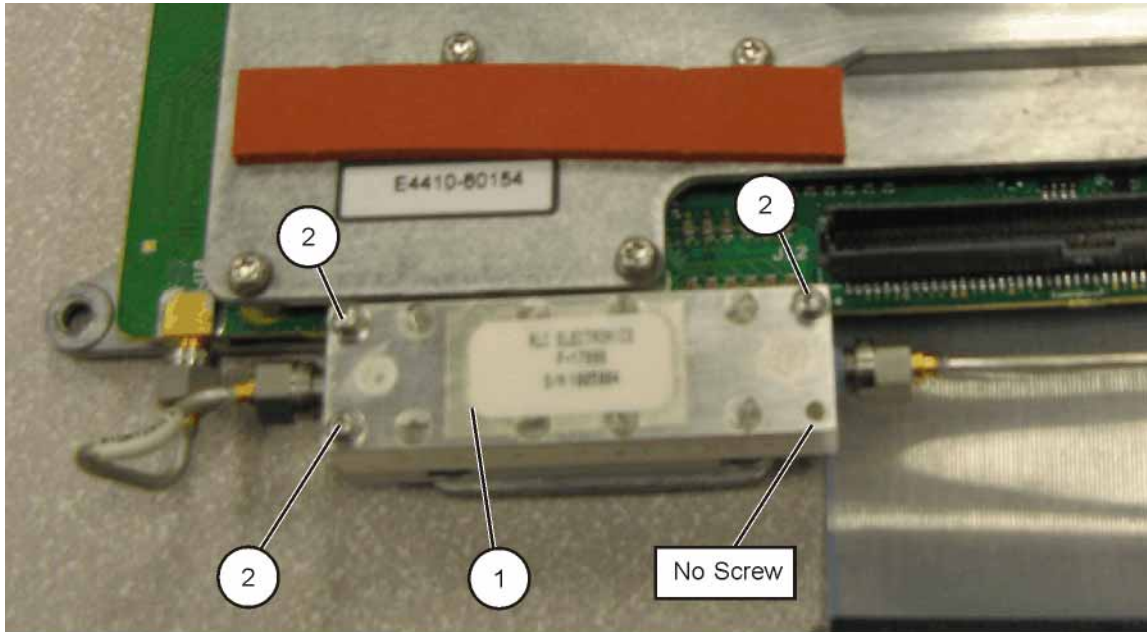


old\_new\_filter

11. Position the new A13W1 and A13W2 cables as necessary so that their unconnected ends align with the unconnected ends of the old A13W1 and A13W2 cables. Tighten the connectors at A13A1 until they are just finger tight.

12. Refer to **Figure 14**. Position the new A13A1 (1) on the spacer such that the holes in the A13A1 housing align with the holes in the spacer. Screws in only three of the four holes in the A13A1 housing will be used to secure A13A1 to the spacer. No screw will be used in the hole in the lower right corner of A13A1. Secure A13A1 (1) to the spacer using three 0515-0661 screws (2) and torque to 3 inch-pounds using the T-6 driver.

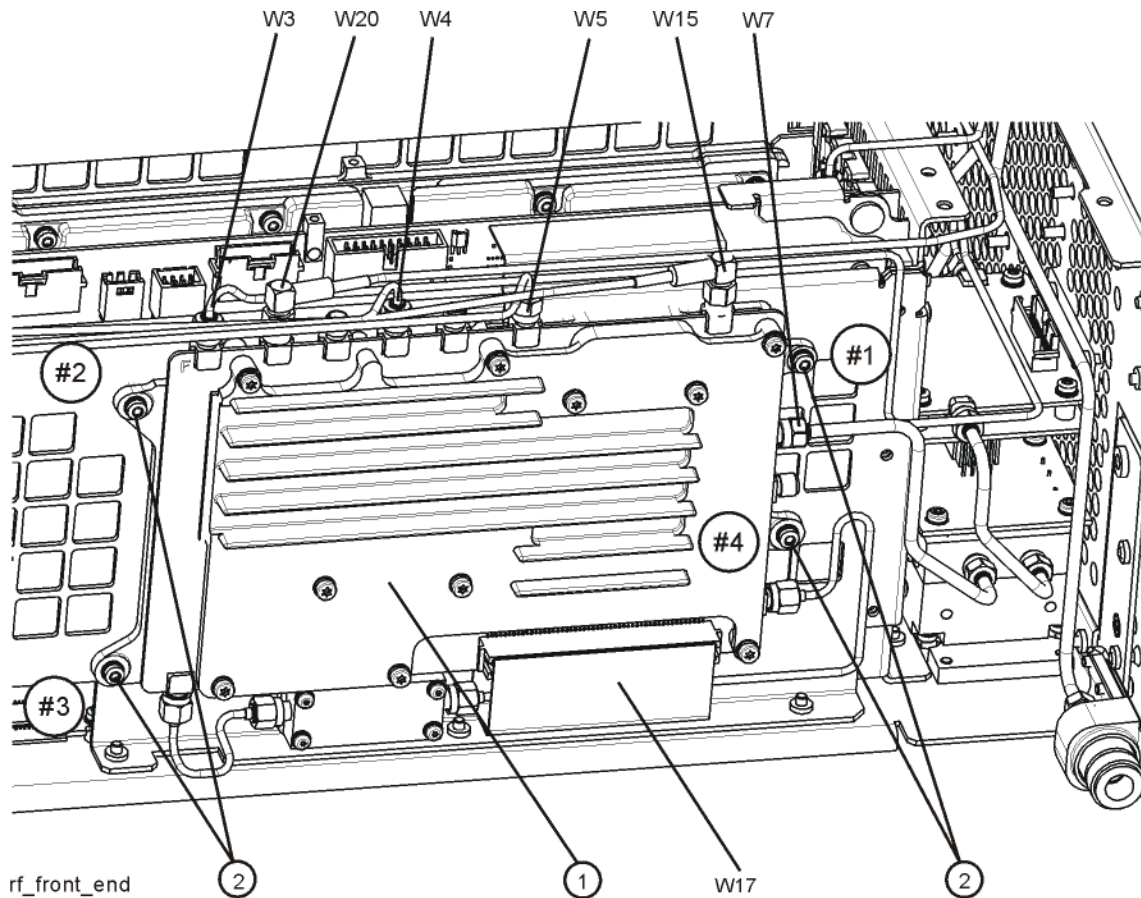
**Figure 14** Mount New A13A1 Bandpass Filter



13. Connect A13W1 to A13J10 and torque to 10 inch-pounds.  
14. Connect A13W2 to A13J11 and torque to 10 inch-pounds.  
15. Torque the SMA connectors on A13A1 to 10 inch-pounds.  
16. Reconnect ribbon cable W17 to A13J12.

17. Refer to **Figure 15**. Place the RF Front End Assembly into the chassis. Replace the four screws (2). Using the T-10 driver, torque to 9 inch-pounds in the sequence shown, starting with #1.

**Figure 15** RF Front End Assembly Replacement



18. Reattach the cables W4 and W5 to the RF Front End Assembly (1). Torque the semi-rigid cables to 10 inch-pounds. W3, W7, W15, and W20 should not be reattached; these cables will be replaced with new cables later in the process.

**NOTE**

W7 will not be present in instruments with Option 503.

## Replace Front End Control Assembly

**NOTE**

Refer to Analyzer Information at the beginning of the Installation Procedure. Do not perform this procedure if the Front End Controller has a Hw Id of 41 or 75.

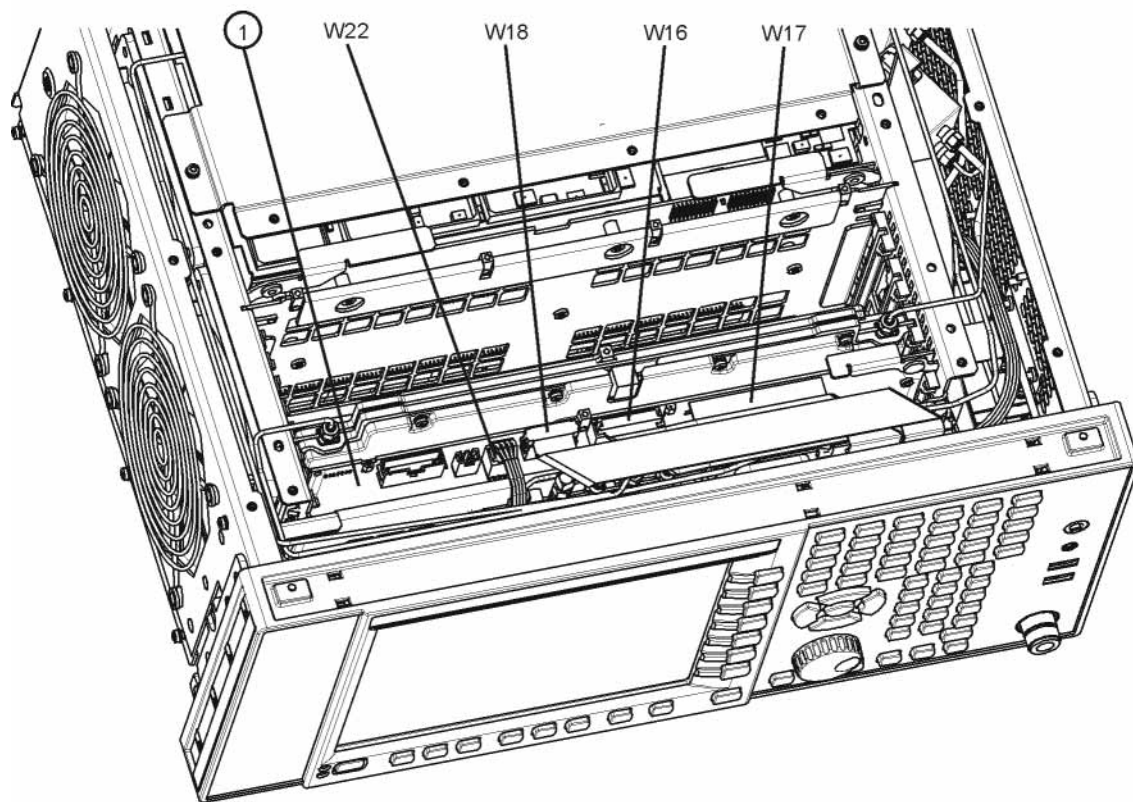
1. Refer to **Figure 16**. Remove the ribbon cables W16, W17, and W18 and the wire harness W22 from the Front End Control assembly (1).

**NOTE**

W22 will not be present in instruments with Option 503.

2. The Front End Control assembly can now be unplugged from the motherboard by leveraging up on the ejector and lifting the board up on the other side.

**Figure 16** Front End Control Assembly Removal



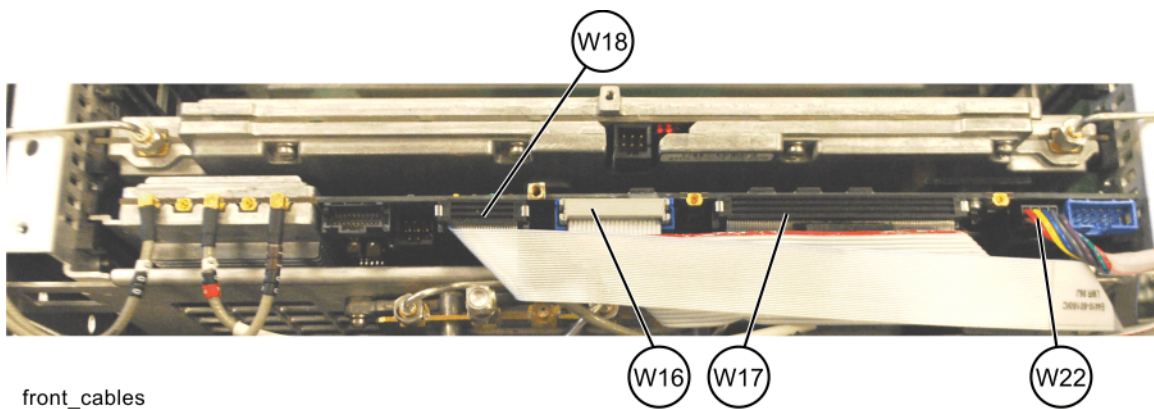
front\_end\_control



## Installation Procedure

3. Refer to **Figure 17**. Install the Enhanced Front End Control assembly included in this kit into slot 6 in the chassis securing with the ejector.
4. Reattach the ribbon cables W16, W17, and W18 to the Front End Control assembly (1).
5. If the analyzer does not have Option 503, replace the existing W22 wire harness with the new W22 (**N9020-60059**) included in the kit. Connect W22 between J300 on the Front End Control and the A12 YTF Preselector.

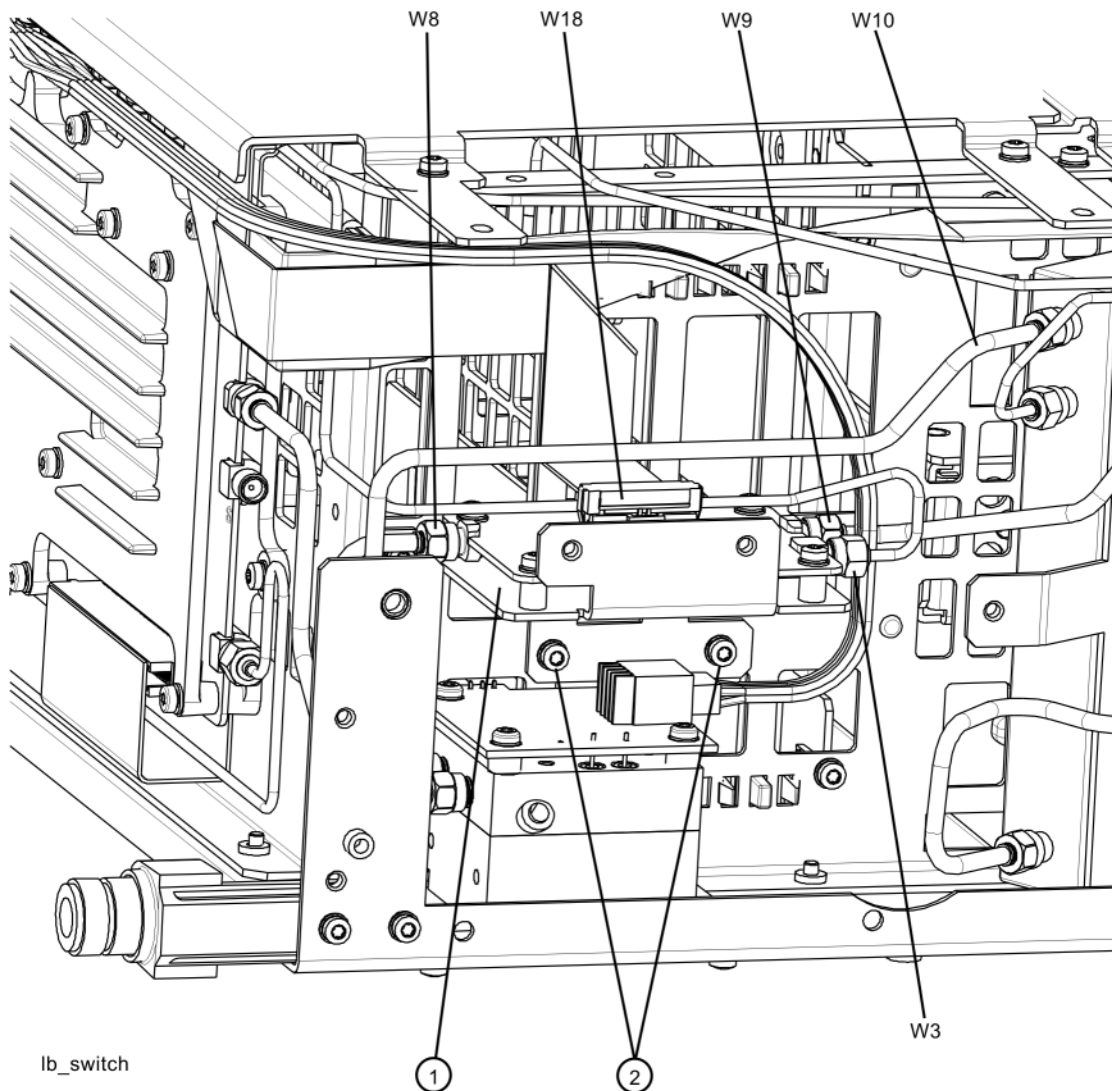
**Figure 17** Enhanced Front End Control Assembly Installation



## Installing Microwave Preselector Bypass Switches

1. Refer to **Figure 18**. Remove the ribbon cable W18.

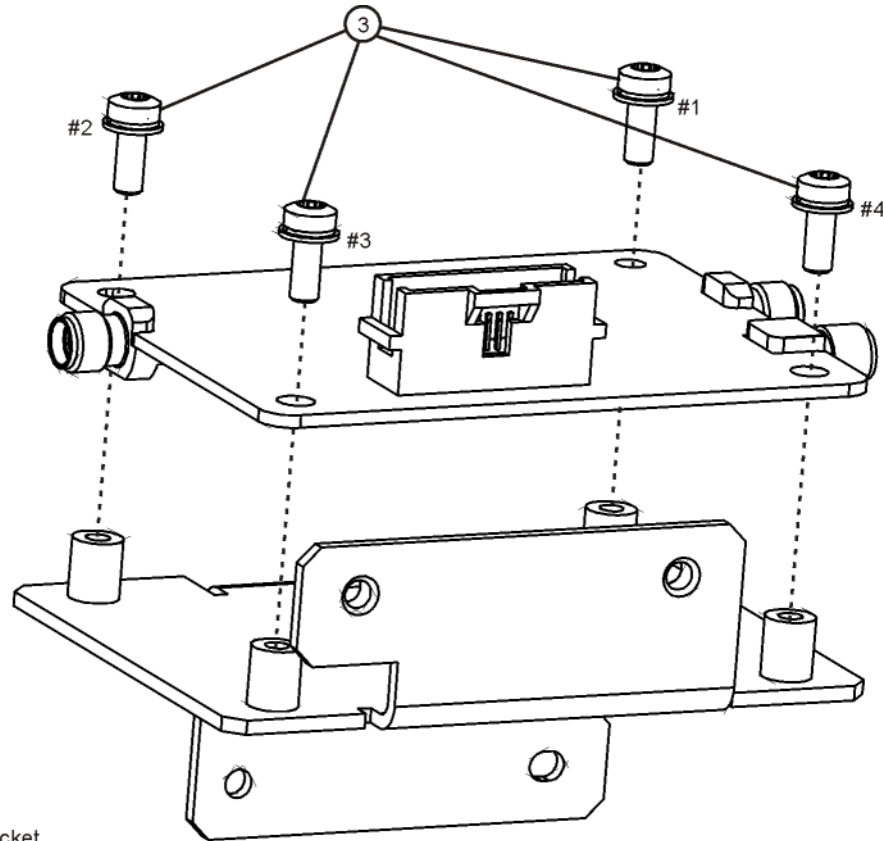
**Figure 18** Low Band Switch Removal



2. Remove the semi-rigid cables W3, W8, W9, and W10 using the 5/16 inch wrench. These cables will not be used when the Low Band Switch is re-installed.
3. Remove the two screws (2) using the T-10 driver. The low band switch (1) can now be removed from the chassis.

4. Refer to **Figure 19**. To separate the switch from the bracket, remove the four screws (3) using the T-10 driver.

**Figure 19** Low Band Switch and Bracket Disassembly

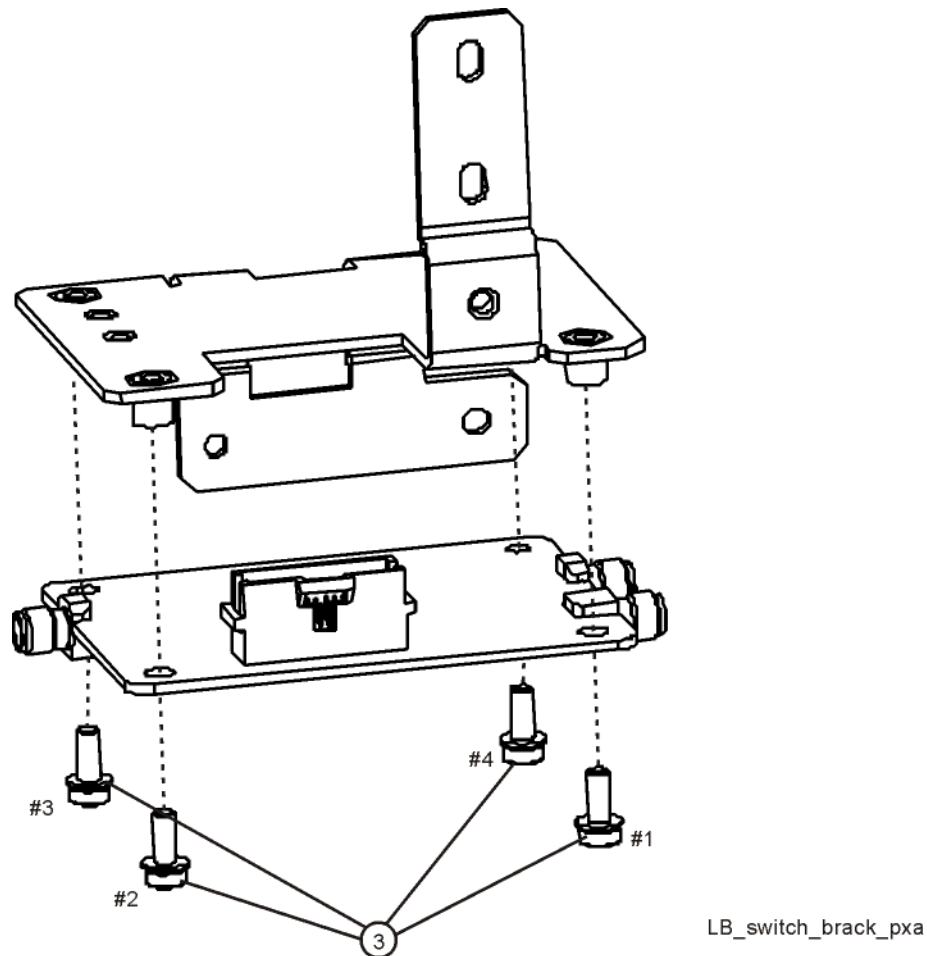


lb\_switch\_bracket



5. Refer to **Figure 20**. Place the switch onto the new low band switch bracket (**N9020-00023**) included in this kit and replace the four screws (3) (0515-0372). Note how the low band switch mounts beneath the new low band switch bracket. Torque to 9 inch-pounds in the sequence shown, starting with #1.

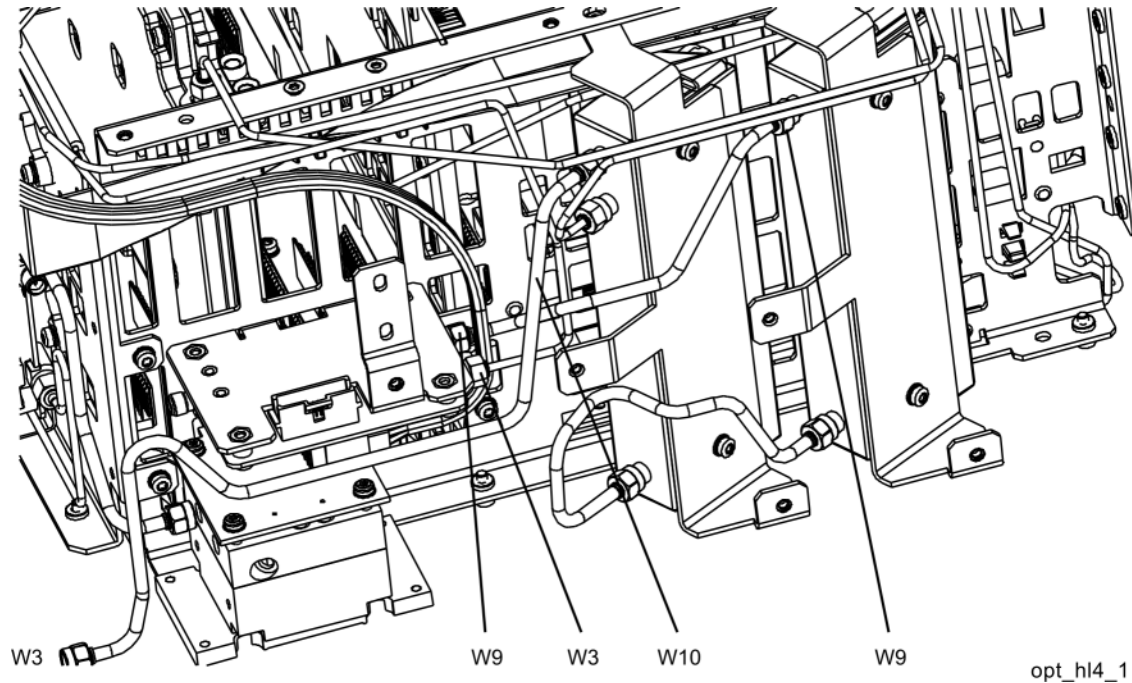
**Figure 20** Low Band Switch and Bracket Replacement



6. Place the switch/bracket into place into the chassis and replace the two screws (0515-0372). Torque to 9 inch-pounds starting with the screw closest to the front of the instrument.

7. Refer to **Figure 21**. Locate the new W9 (**N9020-20153**) semi-rigid coax cable in the kit. Install W9 between the output of the A10 Input Attenuator and A11J1. Torque to 10 inch-pounds.

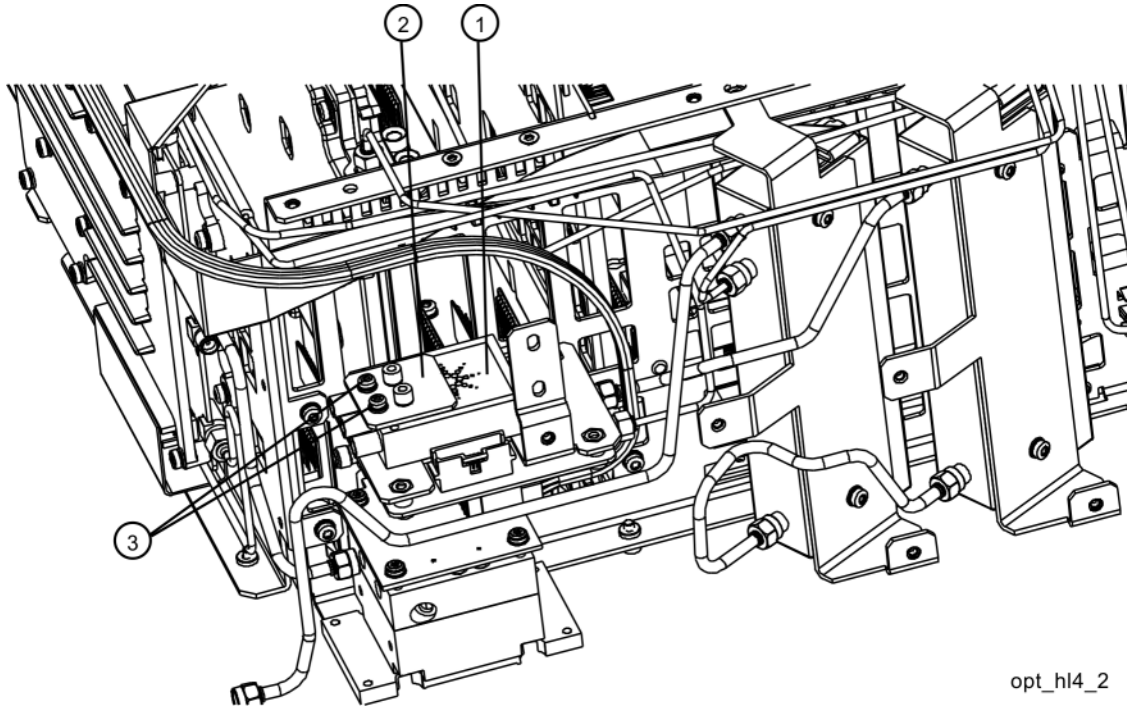
**Figure 21**      Installing New Coax Cables



8. Locate the new W3 (**N9020-20101**) semi-rigid coax cable in the kit. Install W3 between the J2 of the A13 Front End Assembly and J2 of the A11 Low Band Switch. Torque to 10 inch-pounds.
9. Locate the new W10 (**N9020-20141**) semi-rigid coax cable in the kit. Install W10 between the Type N input connector and the input of the A9 Input Attenuator. Torque to 10 inch-pounds.

10. Refer to **Figure 22**. Locate one of the two coaxial switches (N1810-60069) (1) and the PS Bypass Switch 1 Bracket (E4410-00104) (2) in the kit.

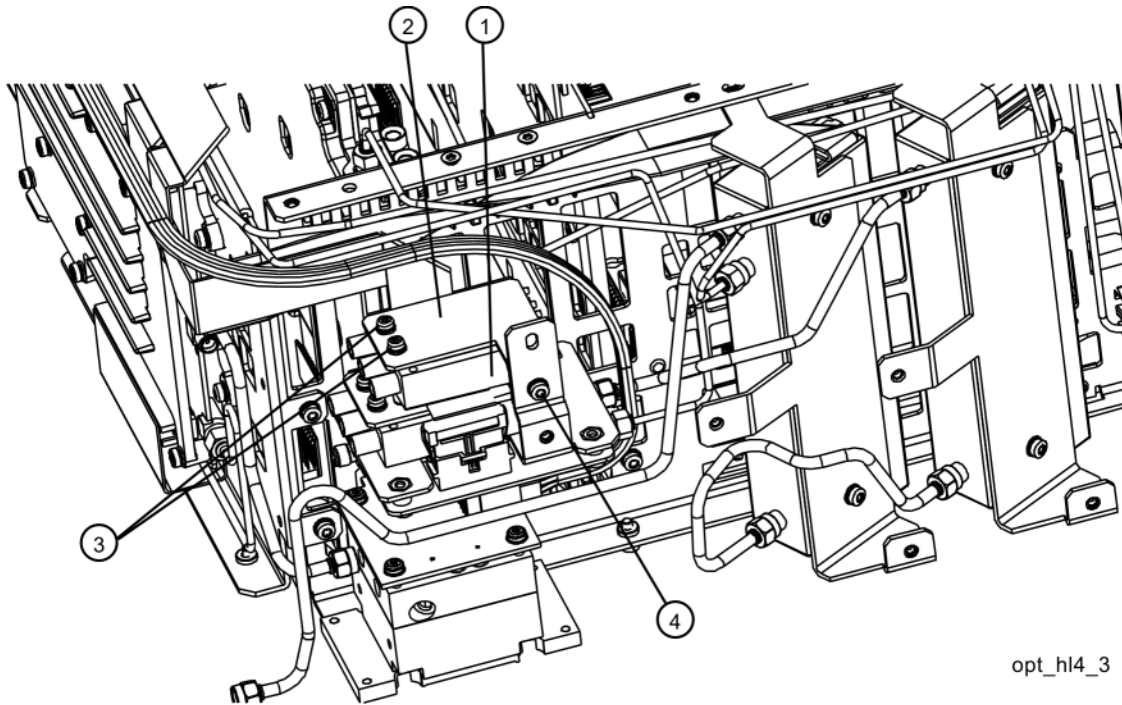
**Figure 22**      Switch 1 Placement



11. Mount the switch with the Keysight label facing up.
12. Attach the bracket and switch to the low band switch bracket using two 0515-1992 screws (3) included in the kit using the T-8 driver. Do not torque the screws at this time.

13. Refer to **Figure 23**. Locate the other coaxial switch (N1810-60069) (1) and the PS Bypass Switch 2 Bracket (E4410-00110) (2) in the kit.

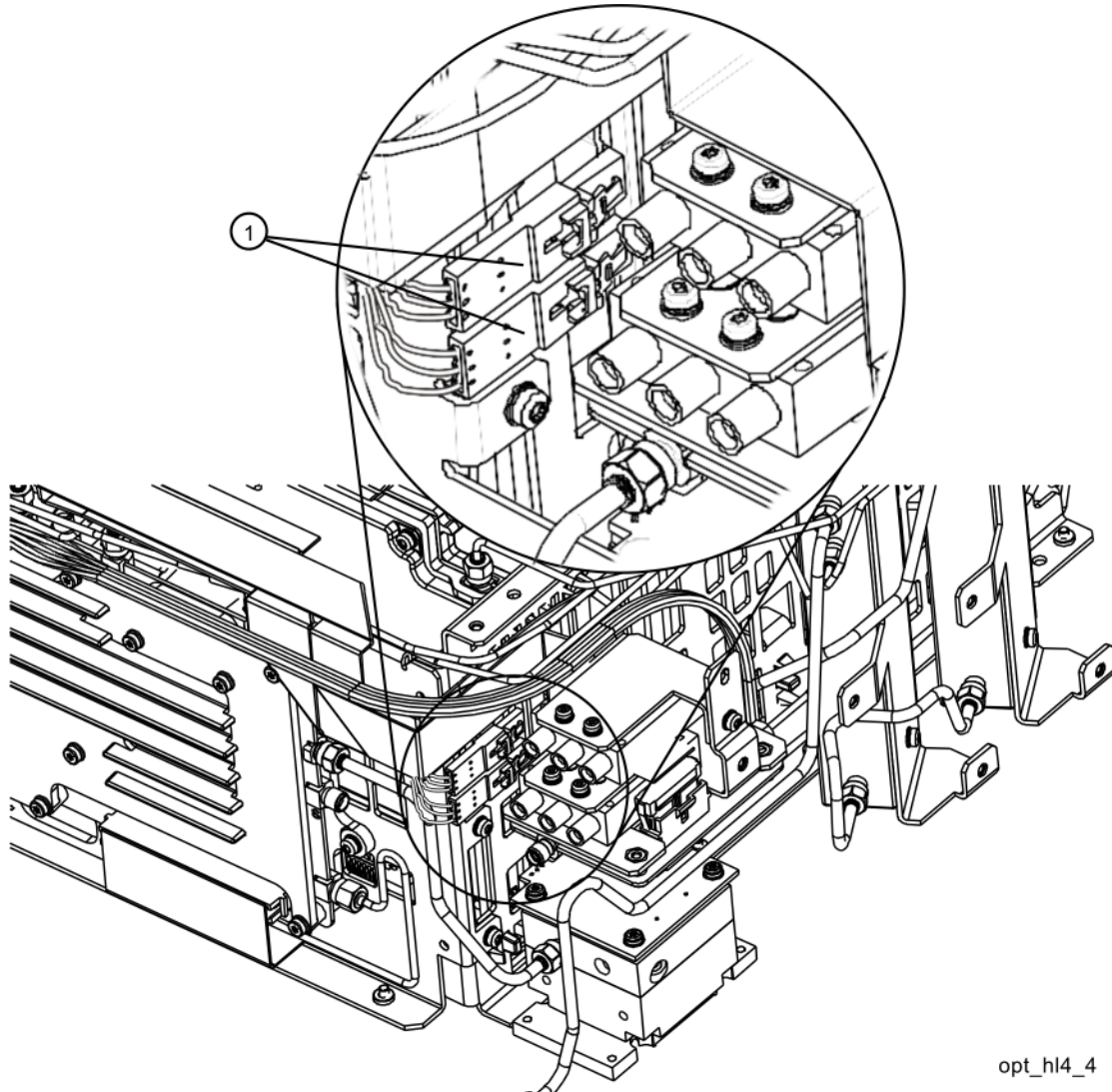
**Figure 23** Switch 2 Placement



14. Place the second switch/bracket assembly (1)/(2) on the bracket previously installed. Assure Keysight label on switch is facing up. To attach use the two screws (3) (0515-1992) included in the kit using the T-8 driver.
15. Secure the bracket to the Low Band Switch bracket with a single screw (4) (0515-0372) included in the kit using the T-10 driver. Do not torque.
16. Align switches so they are parallel with the side of the instrument then torque the four screws (3) securing the switches to the brackets to 6 inch-pounds using the T-8 driver. Torque the screw (4) that secures the switch brackets together to 9 inch-pounds using the T-10 driver.

17. Locate the switch control cable harness (E4410-60159) in the kit.
18. Refer to **Figure 24**. Connect the end of the switch control harness with only one connector to J801 on the A15 Enhanced Front End Control Assembly.

**Figure 24** Wire Harness Routing



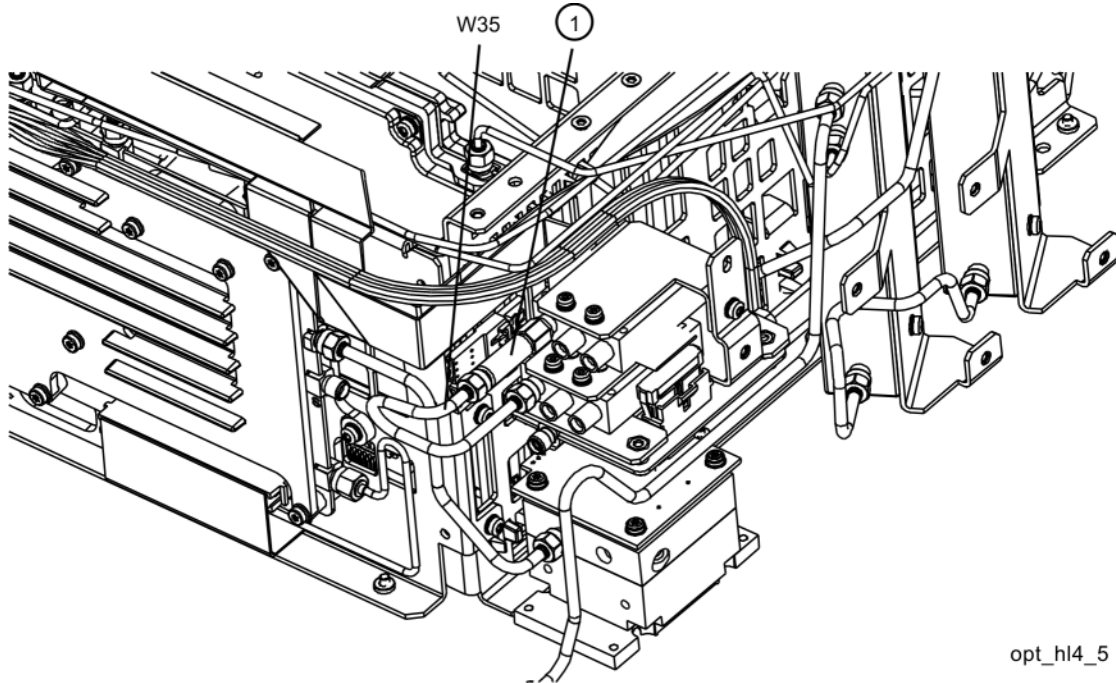
opt\_hl4\_4

19. Connect the remaining two wire harness connectors (1) to the switches. Once connected, position the connections along side the switches.
20. Connect ribbon cable W18 to J4 of the A11 Low Band Switch.



21. Refer to **Figure 25**. Attach the coaxial fixed attenuator (1) included in the kit to Switch 2 port 1. Torque to 10 inch-lbs.

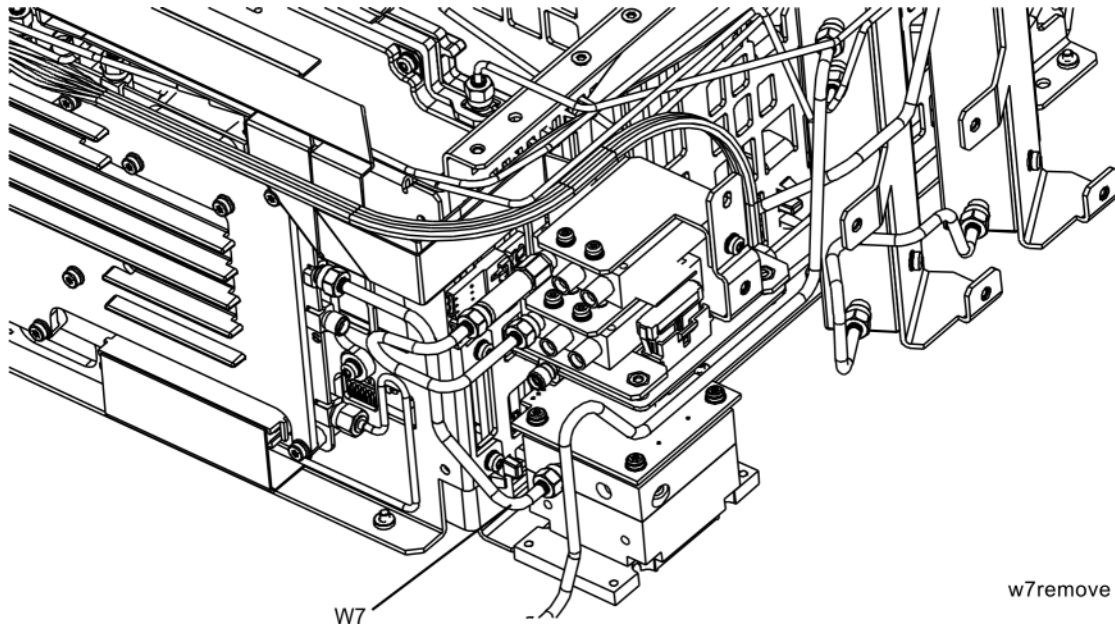
**Figure 25** Attenuator Installation



22. Locate W35 semi-rigid coax cable (**N9020-20210**) in the kit. Connect the cable between the coaxial fixed attenuator (1) and port 1 of Switch 1 (the lower switch). Torque to 10 inch-pounds.

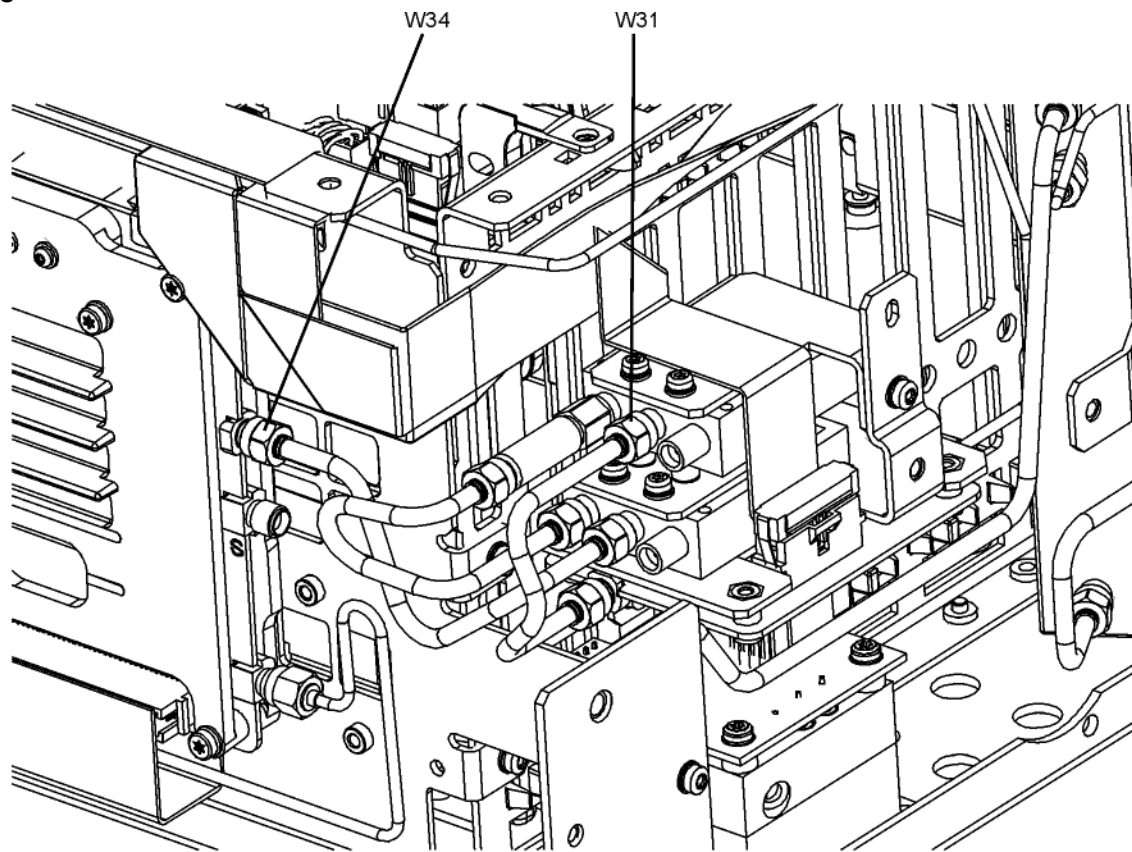
23. Refer to **Figure 26**. Remove semi-rigid coax cable W7 between the output of the A12 YTF preselector and the J9 of the A13 Front End Assembly.

**Figure 26** Remove W7'



24. Refer to **Figure 27**. Locate W34 semi-rigid coax cable (**E4410-20164**) in the kit. Connect the cable between the center port of Switch 1 (the lower switch) and J9 of the A13 Front End Assembly. Torque to 10 inch-pounds.
25. Locate W31 semi-rigid coax cable (**E4410-20161**) in the kit. Connect the cable between the center port of Switch 2 (the upper switch) and J3 of the A11 Low Band Switch. Torque to 10 inch-pounds.

**Figure 27** Install W34 and W31

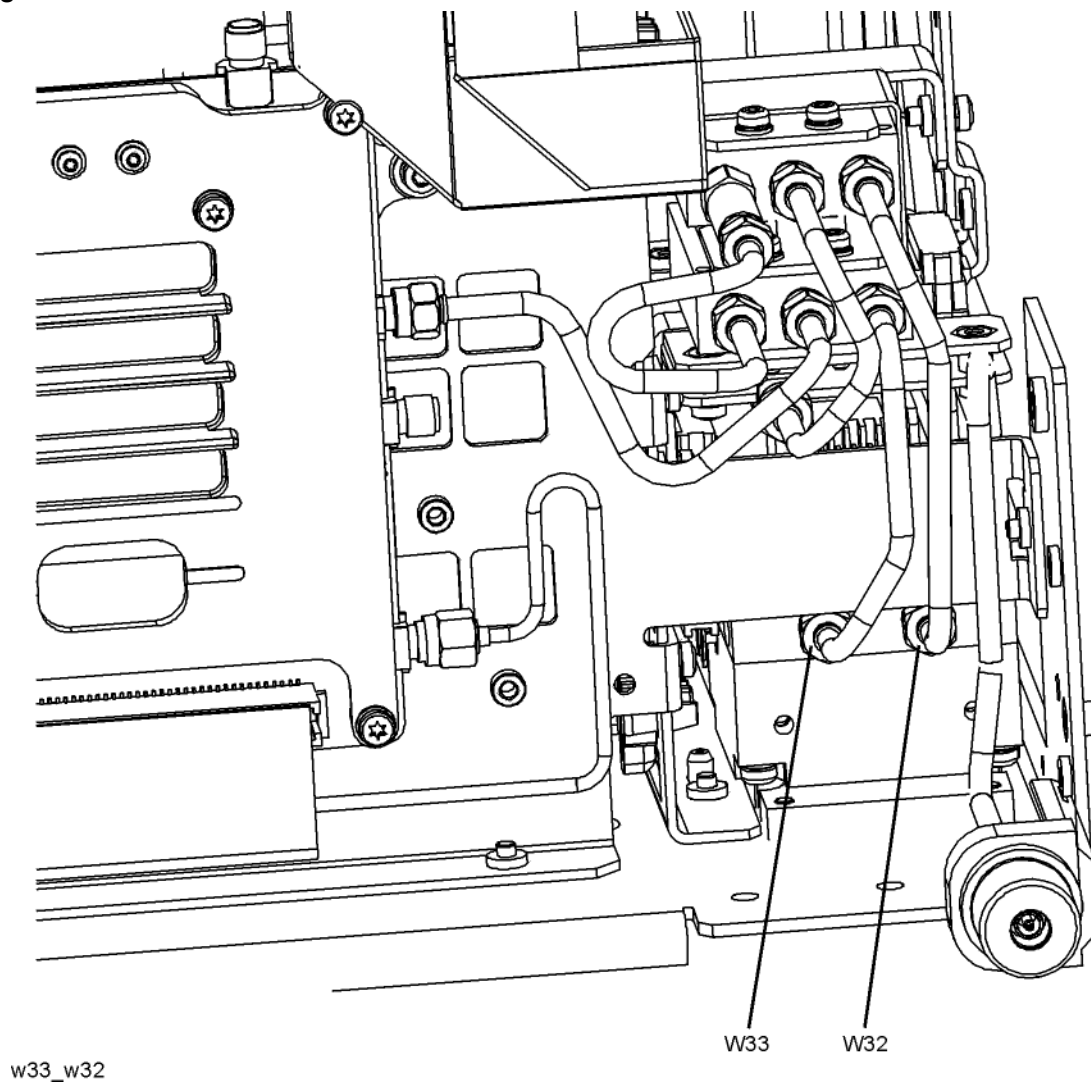


w34\_w31



26. Refer to **Figure 28**. Locate W33 semi-rigid coax cable (E4410-20165) in the kit. Connect the cable between port 2 of Switch 1 (the lower switch) and the output of the A12 YTF Preselector. Torque the cable at the A12 end first to 10 inch-pounds and then torque the cable at the Switch 1 end to 10 inch-pounds.
27. Locate W32 semi-rigid coax cable (E4410-20163) in the kit. Connect the cable between port 2 of Switch 2 (the upper switch) and the input of the A12 YTF Preselector. Torque the cable at the A12 end first to 10 inch-pounds and then torque the cable at the Switch 2 end to 10 inch-pounds.

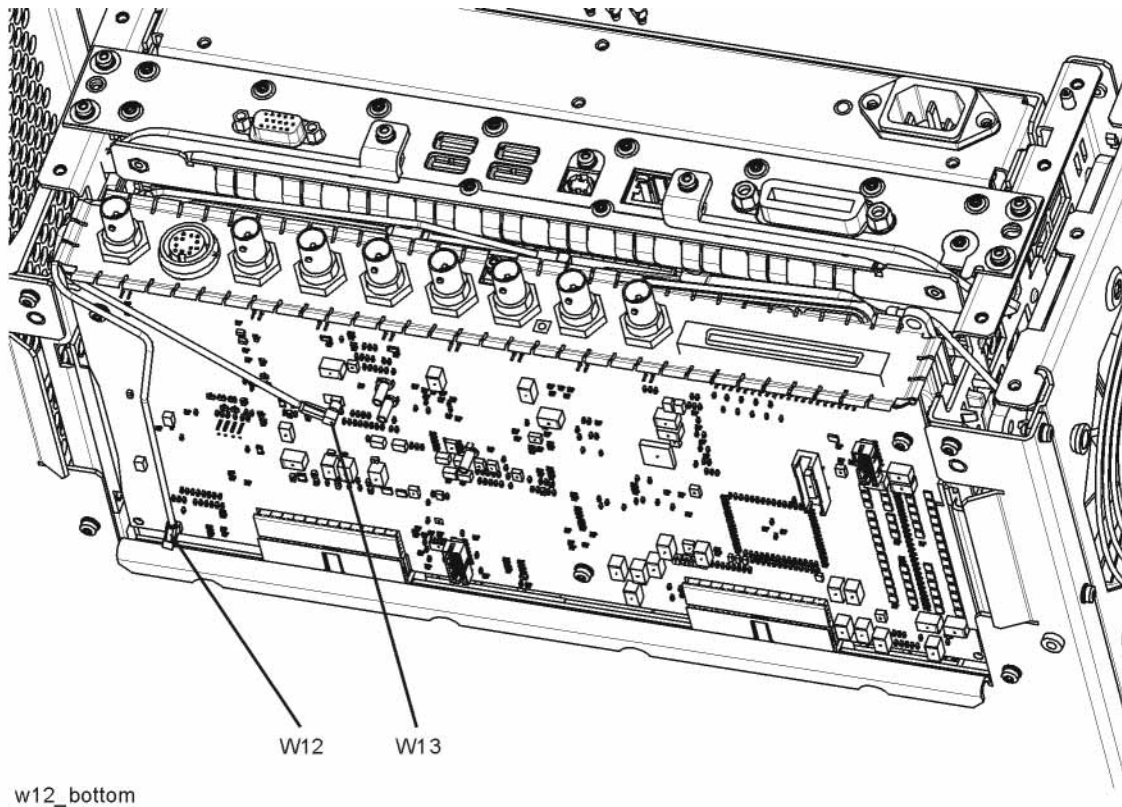
**Figure 28** Install W33 and W32



## Replace A2 Analog IF and A3 Digital IF Assemblies

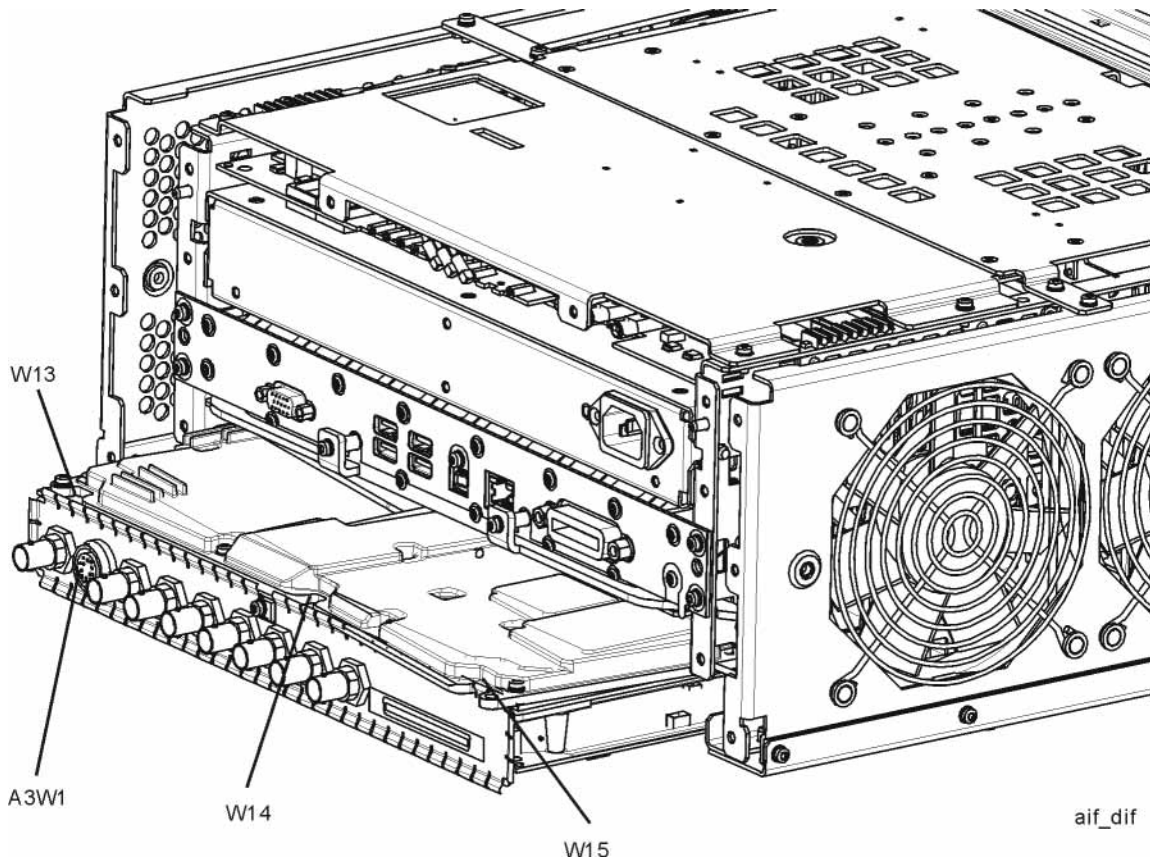
1. Refer to **Figure 29**. Disconnect cables W12 and W13 from the bottom of the DIF assembly.

**Figure 29** W12 and W13 Removal



2. Refer to **Figure 30**. Pull the AIF/DIF assembly part way out of the chassis. Disconnect cables W13, W14, and W15 from the AIF assembly.

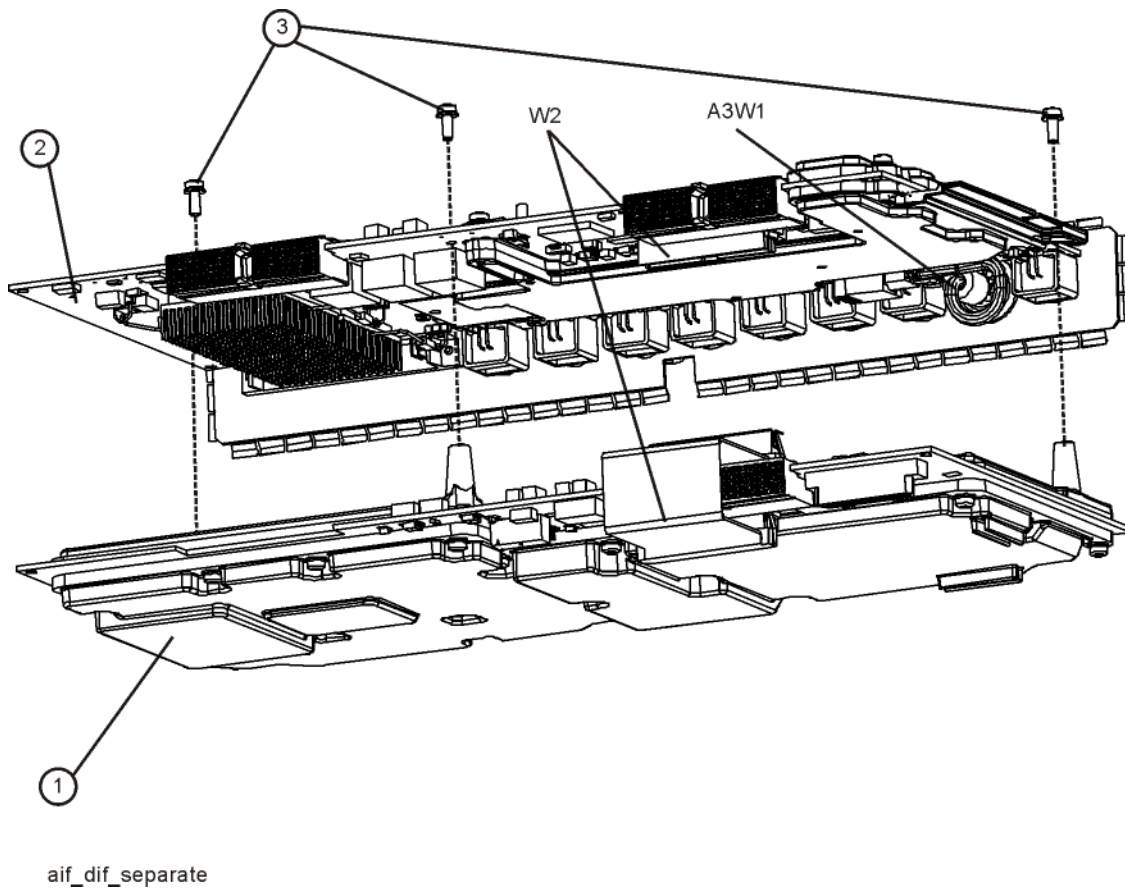
**Figure 30** AIF/DIF Assembly Removal



3. Discard cable W13.
4. The AIF/DIF assembly can be removed from the chassis by pulling straight out the back.
5. Locate the A2 Enhanced Analog IF (**N9020-60290**) and A3 40 MHz Digital IF (**N9020-60165**) assemblies in the kit. Locate the W2 Cable Assembly, A2 to A3 (**N9020-60046**) in the kit.
6. Connect the W2 ribbon cable to J20 on the DIF (2).

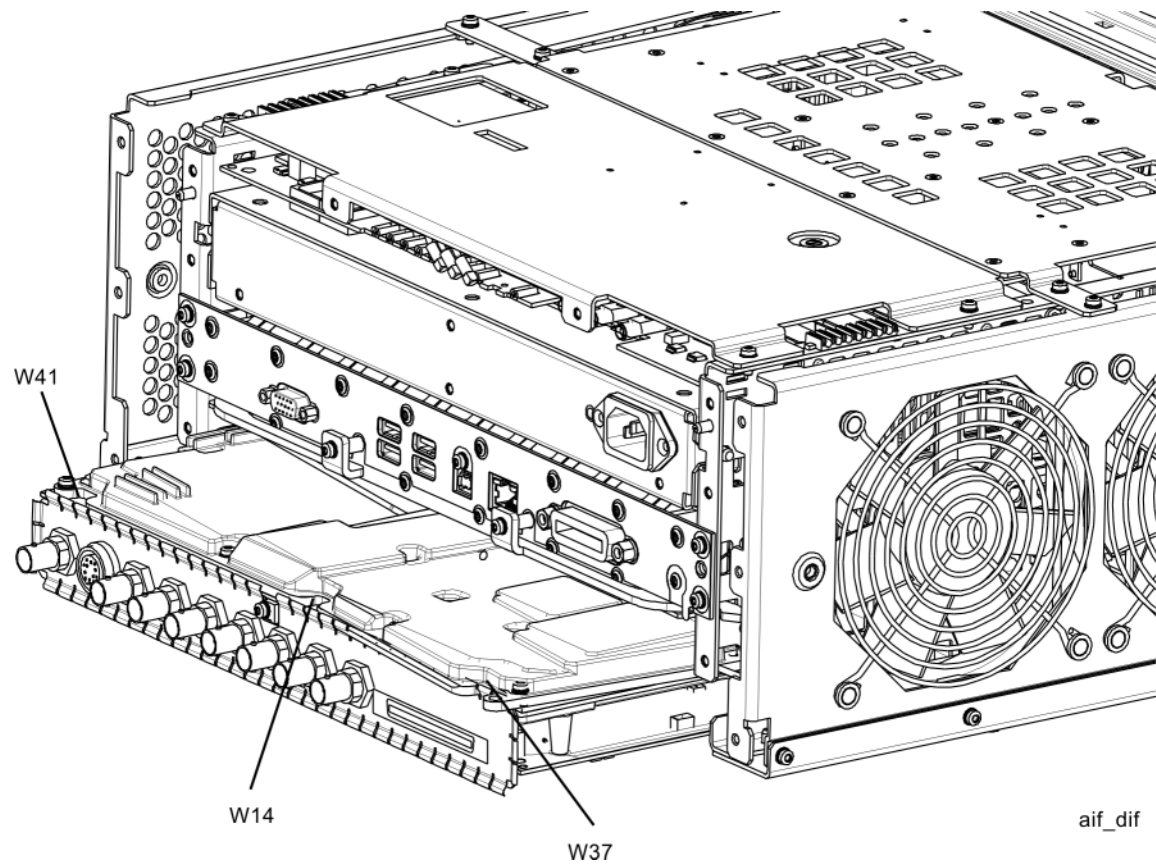
7. Refer to **Figure 31**. To pair the AIF and DIF together again, set the DIF (2) in position over the AIF (1). Attach the AIF to the DIF with three screws (3) (0515-0372) included in the kit. Torque to 9 inch-pounds, starting with the middle screw.

**Figure 31**      AIF/DIF Pairing

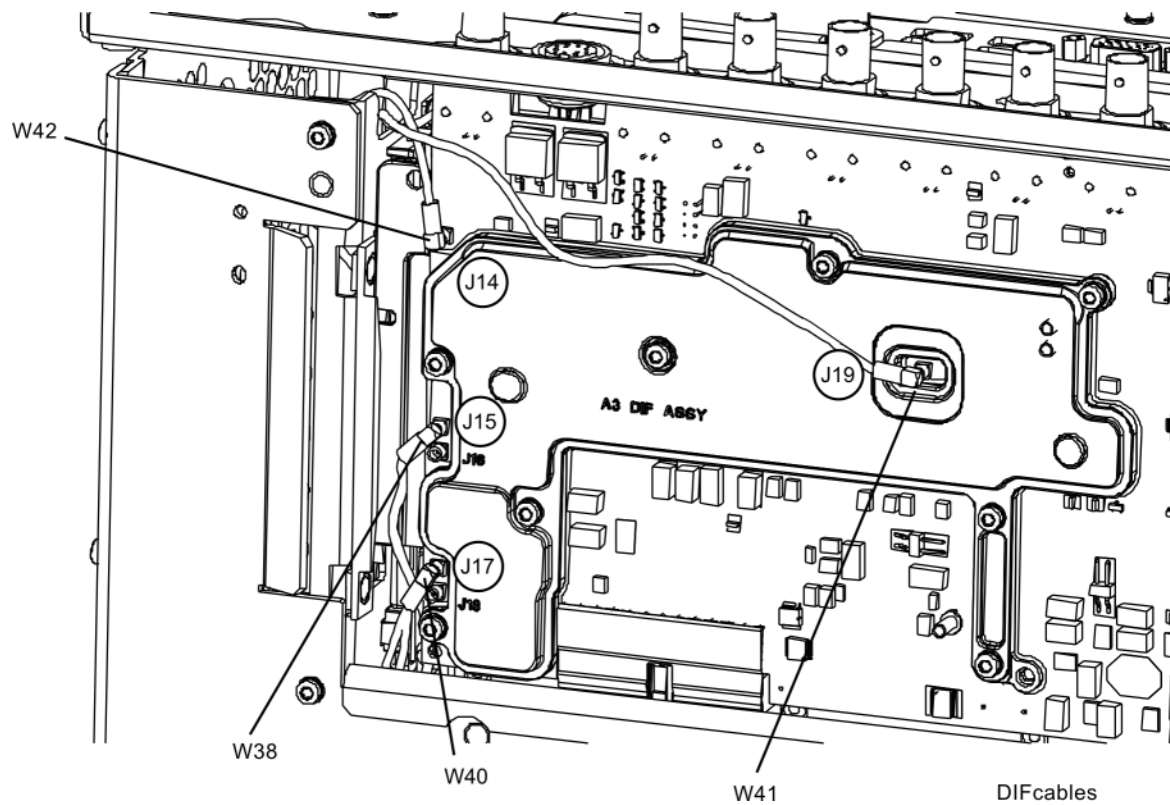


8. Connect the ribbon cable W2 to J820 on the AIF (1).
9. Slide the AIF/DIF assembly into the slot at the rear of the instrument and push on the assembly to mate the connectors to the motherboard assembly.

**Figure 32**      AIF Cables



**Figure 33** DIF Cables

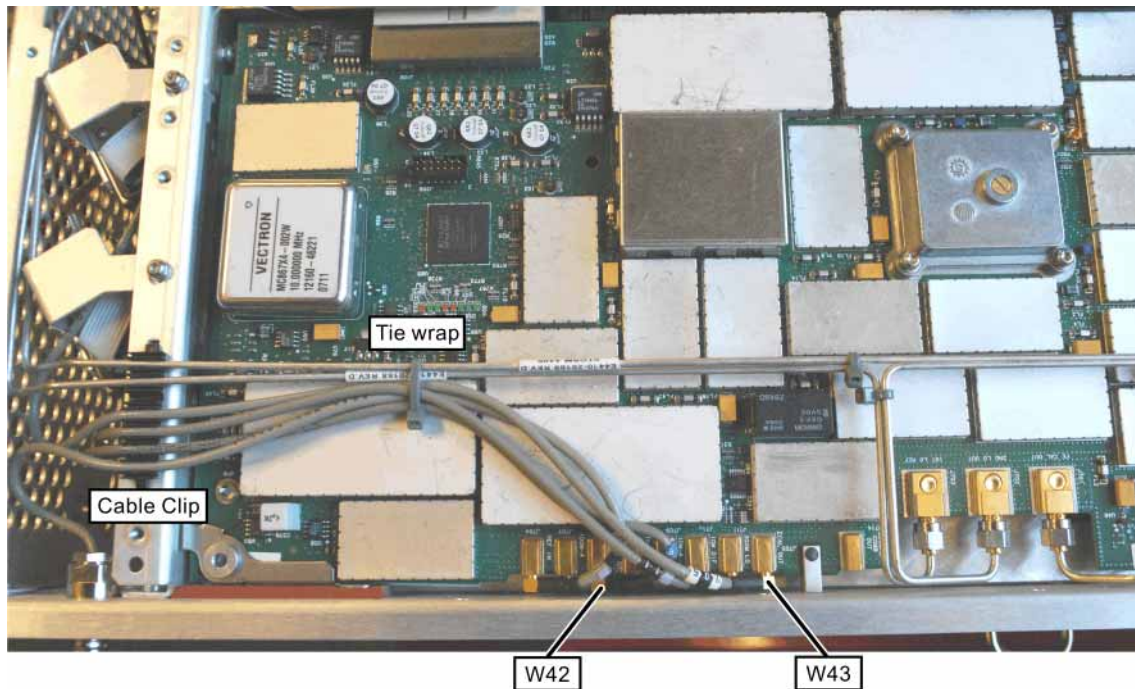


**10.** Remove W20 from between A16J705 on the A16 Reference Assembly and A13J6 on the A13 RF Front End.



11. Refer to **Figure 34**. Locate W43 in the Opt HL4 Cable Kit. This cable will be one of three that have part number 8121-1401, but only W43 will be labeled “705” on one end and “18” on the other. Connect the end labeled “705” to A16J705 on the A16 Reference Assembly. Route the cable along the right side wall behind the A9 and A10 Input Attenuators and through the cutout in the chassis between A9 and A12. Connect the other end to A3J18 on the A3 Digital IF (DIF) Assembly.

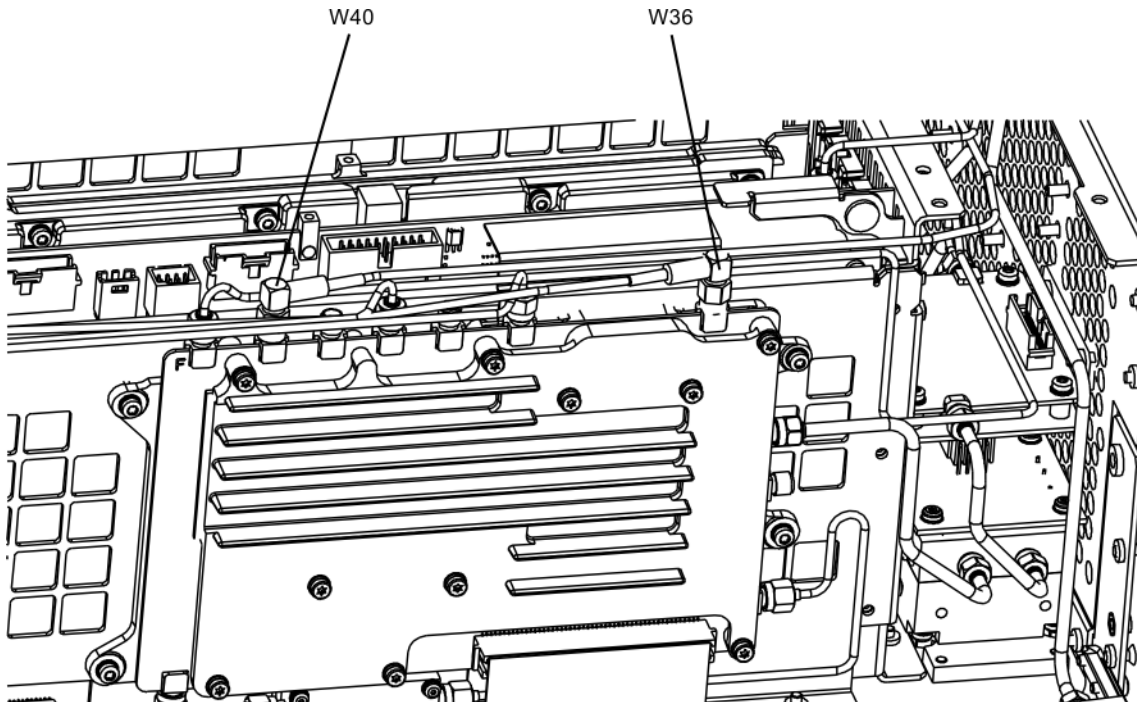
**Figure 34** W42 and W43 Cables





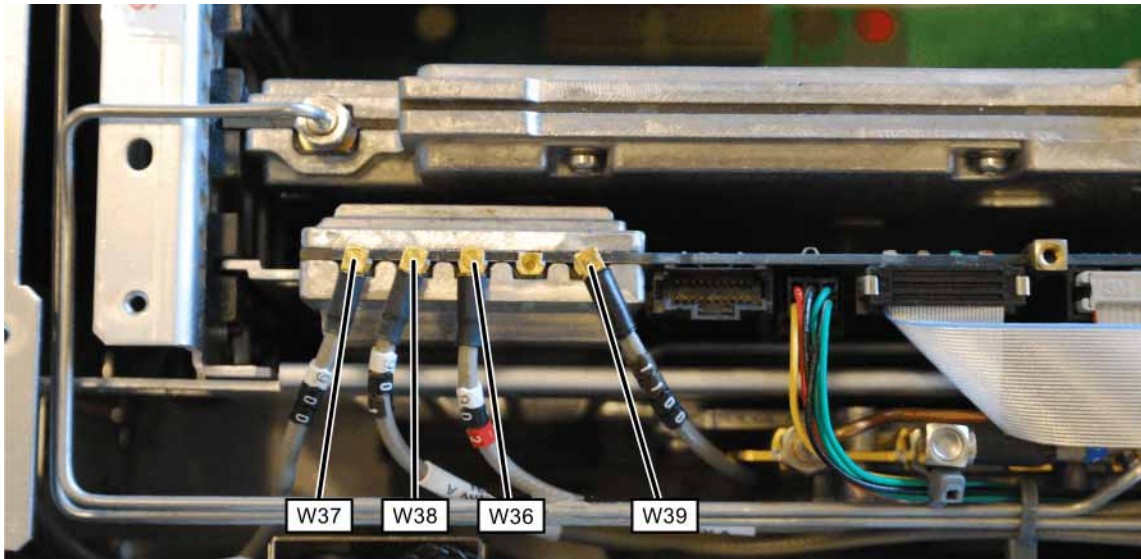
12. Refer to **Figure 35**. Locate W40 in the Opt HL4 Cable Kit. This cable will have a part number of 8121-1940 and will be labeled “6” on one end and “17” on the other. Connect the end labeled “6” to A13J6 on the A13 RF Front End Assembly. Route the cable along the right side of the analyzer and through the cutout in the chassis between A9 and A12. Connect the other end to A3J17 on the A3 DIF Assembly. Torque the connector on A13J6 to 10 inch-pounds.

**Figure 35** W36 and W40 Cables



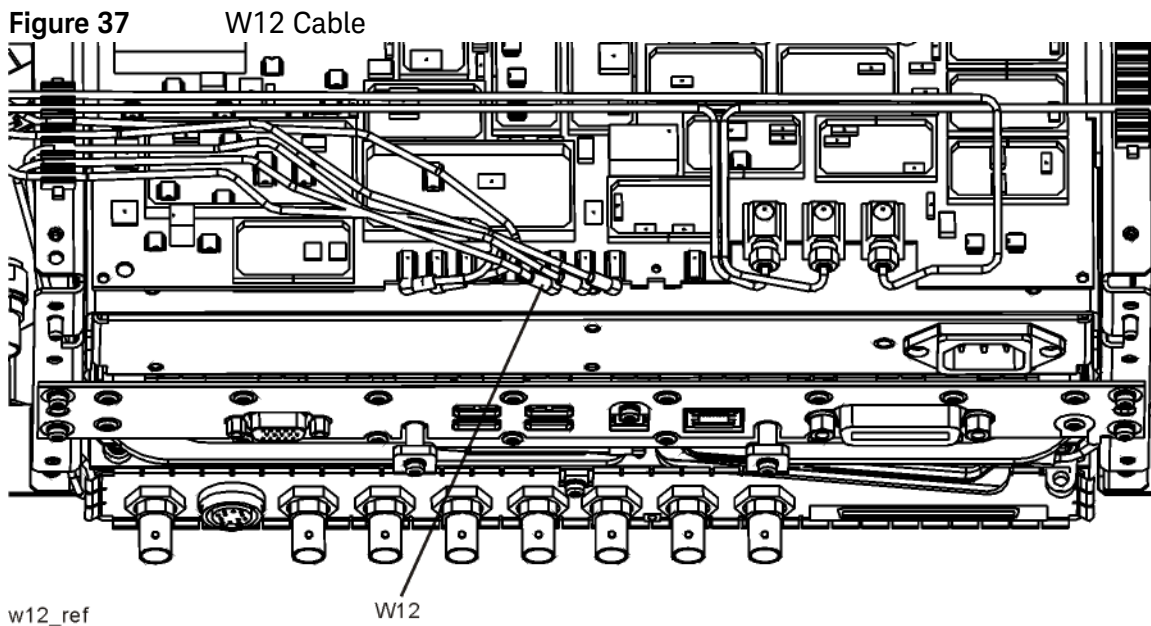
13. Refer to **Figure 36**. Locate W38 in the Opt HL4 Cable Kit. This cable will have part number 8121-1861 and will be labeled “901” on one end and “15” on the other. Connect the end labeled “901” to A15J901 on the A15 Enhanced Front End Controller (EFEC) Assembly. Route the cable along the side of the EFEC board to the right side of the instrument and through the cutout in the chassis between A9 and A12. Connect the other end to A3J15 on the A3 DIF Assembly.

**Figure 36** W36, W37, W38, and W39 Cables



14. Refer to **Figure 15**. Disconnect W15 from A13J7 of the A13 RF Front End Assembly and remove the cable; it will not be used.
15. Refer to **Figure 35** and **Figure 36**. Locate W36 in the Opt HL4 Cable Kit. This cable will have part number 8121-1862 and will be labeled “902” on one end and “7” on the other. Connect the end labeled “902” to A15J902 on the A15 EFEC Assembly. Connect the other end to A13J7 on the A13 Front End Assembly. Torque the connector on A13J7 to 10 inch-pounds.

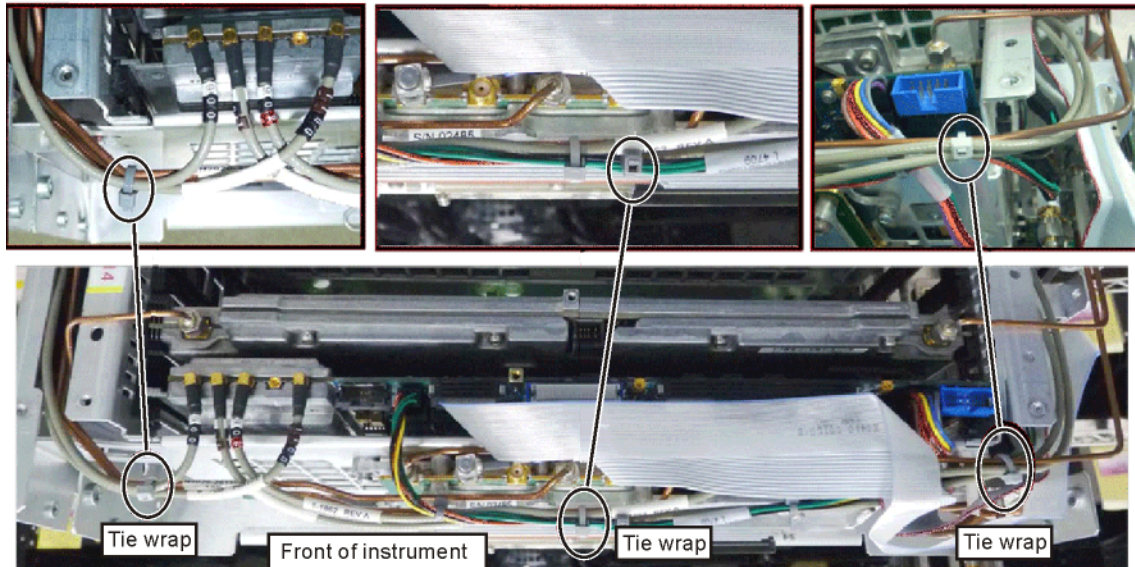
16. Refer to **Figure 37**. Disconnect cable W12 from A16J710 on the A16 Reference Assembly and discard.



17. Refer to **Figure 34**. Locate W42 in the Opt HL4 Cable Kit. This cable will be one of two remaining that has part number 8121-1401, but only W42 will be labeled “706” on one end and “14” on the other. Connect the end labeled “706” to A16J706 on the A16 Reference Assembly. Route the cable along the right side wall to A3J14 on the A3 DIF Assembly. Add this cable to the spiral wrap around W14.
18. Refer to **Figure 32** and **Figure 33**. Locate W41 in the Opt HL4 Cable Kit. This cable will have part number 8120-8868 and will be labeled “601” on one end and “19” on the other. Connect the end labeled “19” to A3J19 on the A2 DIF Assembly. Route the cable to the right side of the instrument and up to the A2 EAIF Assembly. Connect the cable to A2J601 with the cable routed behind the screw head near A2J601.
19. Refer to **Figure 32**. Connect W14 to A2J300 on the A2 EAIF Assembly.
20. Refer to **Figure 32**. Locate W37 in the Opt HL4 Cable Kit. This cable will have part number 8121-1401 and will be labeled “900” on one end and “100” on the other. Connect the end labeled “900” to A15J900 on the A15 EFEC Assembly. Route the cable along the left side of the instrument above the fans. Route the cable down behind the rear of the second (rearmost) fan. Connect the cable to A2J100 on the A2 EAIF Assembly.
21. Locate W39 in the Opt HL4 Cable Kit. This cable will have part number 8121-2028 and will be labeled “1100” one end and no label on the other. Connect the end labeled “1100” to A15J1100 on the A15 EFEC Assembly. Route the cable along the left side of the chassis above the fans toward the rear panel. The other end of the connector will be secured to the rear panel later.

22. Refer to **Figure 38**. Dress the coaxial cables and semi-rigid cables neatly and tie together using cable ties (1400-0249) at the locations indicated.

**Figure 38** Adding Cable Ties near A13 and A15 Assemblies

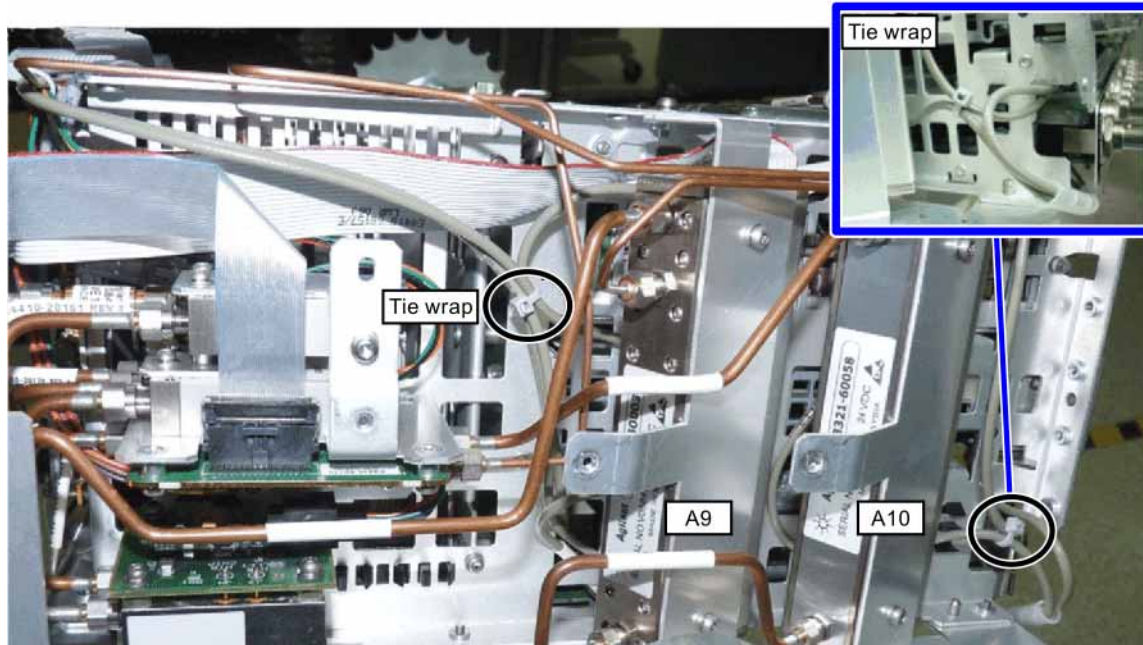


tiewrap



- 23.** Refer to **Figure 39**. Dress the coaxial cables and semi-rigid cables neatly and tie together using cable ties (1400-0249) at the locations indicated.

**Figure 39** Adding Cable Ties near A9 and A10 Assemblies



- 24.** Refer to **Figure 34**. Attach the flexible and semi-rigid coax cables in the cable clip as indicated.
- 25.** Dress the coaxial cables and semi-rigid cables neatly and tie together using cable ties (1400-0249) at the locations indicated.

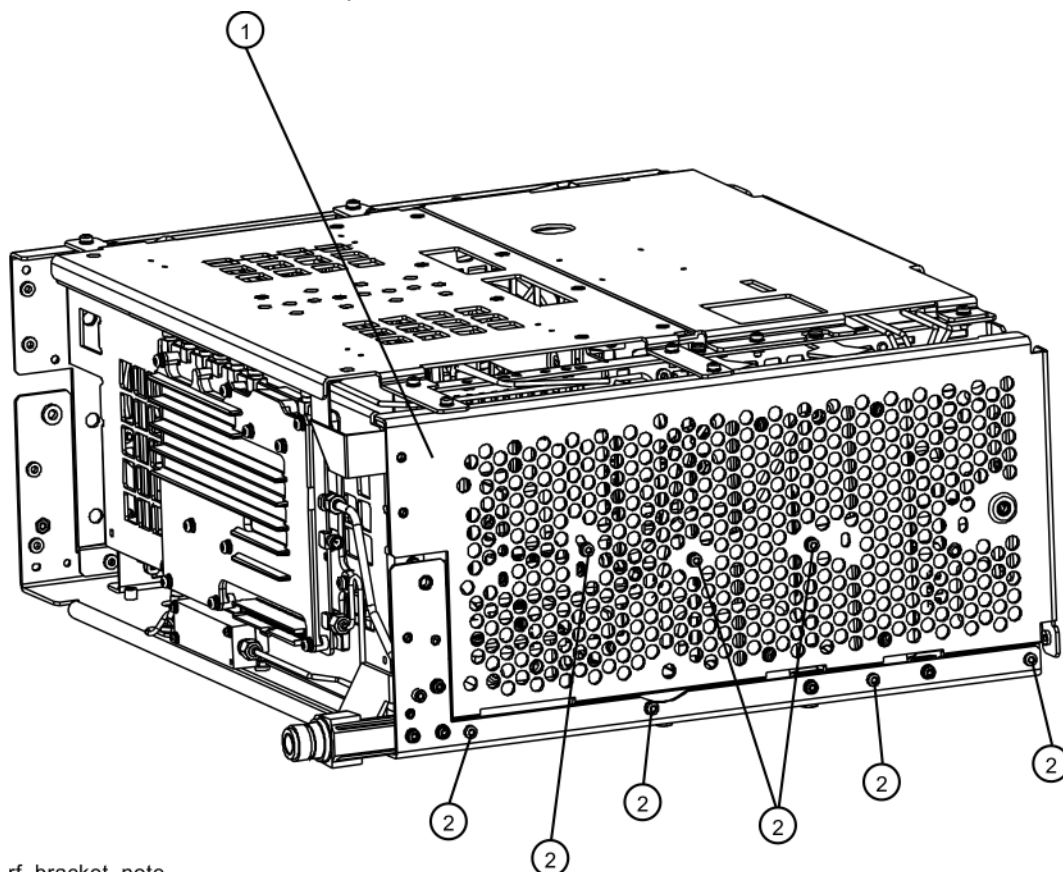
## Reassembly

1. This kit contains two RF Brackets. One bracket is for older analyzers and the other is for newer analyzers. Select the appropriate bracket based upon the model and serial number of your analyzer.

Model Number	Serial Number	RF Bracket Part Number
N9010A	< MY/SG/US52180000	N9020-00031
N9010A	> MY/SG/US52180000	N9020-00034
N9020A	All	N9020-00031

2. Refer to **Figure 40**. Using the appropriate RF Bracket included in the kit, position the RF bracket (1) onto the chassis and replace seven of the eight screws (2) (the previous RF Bracket secured to the Low Band Switch Bracket using two screws; the new RF Bracket only requires one screw). Torque to 9 inch-pounds.

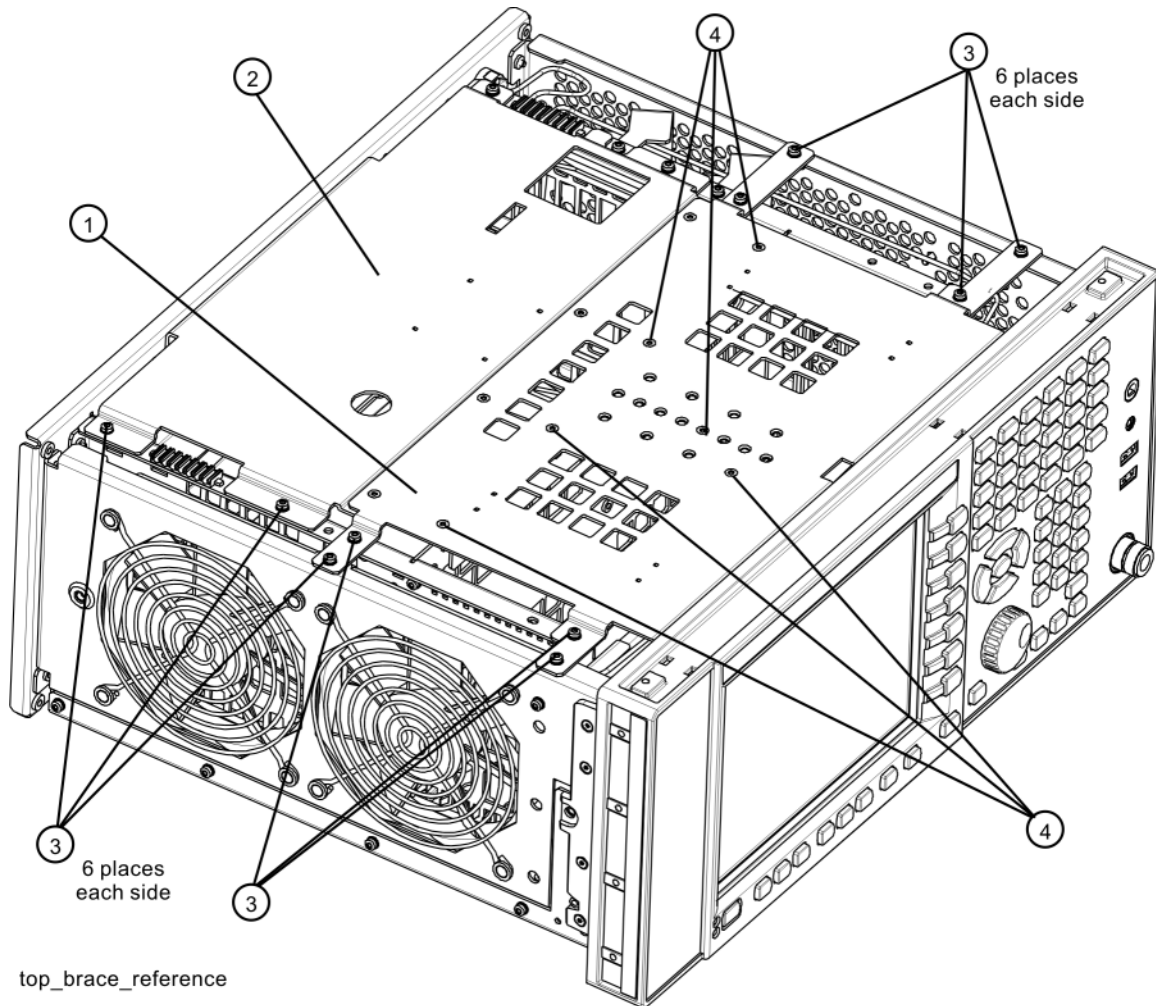
**Figure 40** RF Bracket Replacement



rf\_bracket\_note

3. Refer to **Figure 41**. To replace the top brace (1) and the reference bracket (2), place them in the correct position and attach the appropriate screws. There is an additional screw (0515-1227) (5) that is required to attach the top brace to the BBIQ Main board, if installed. Torque to 9 inch-pounds.

**Figure 41** Top Brace and Reference Bracket Replacement

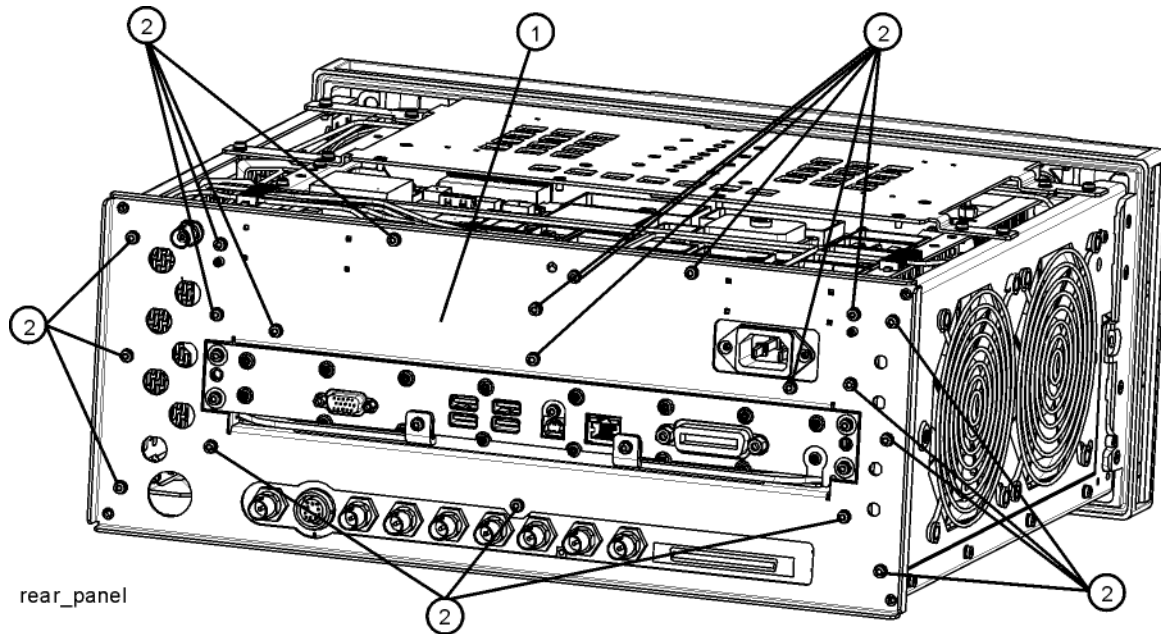


4. Lay the rear panel on the table with the silk-screened side facing up and the text right-side up. Along the right side of the rear panel are a number of holes with hole plugs. The top right hole will be labeled either "AUX IF OUT" or "PORT 9". If it is labeled "PORT 9", cover the label with the AUX IF OUT Label (**N9020-80081**) supplied in this kit.
5. Remove the hole plug from the AUX IF OUT hole.
6. Attach the W23 External Reference cable to the rear panel and secure with a lock washer (2190-0102) and nut (0590-2332). Torque to 21 inch-pounds using a 9/16" nut driver.
7. Attach the W39 Aux IF Out cable to the rear panel and secure with the lock washer and nut that came with the cable. Torque to 9 inch-pounds with a 5/16" nut driver.



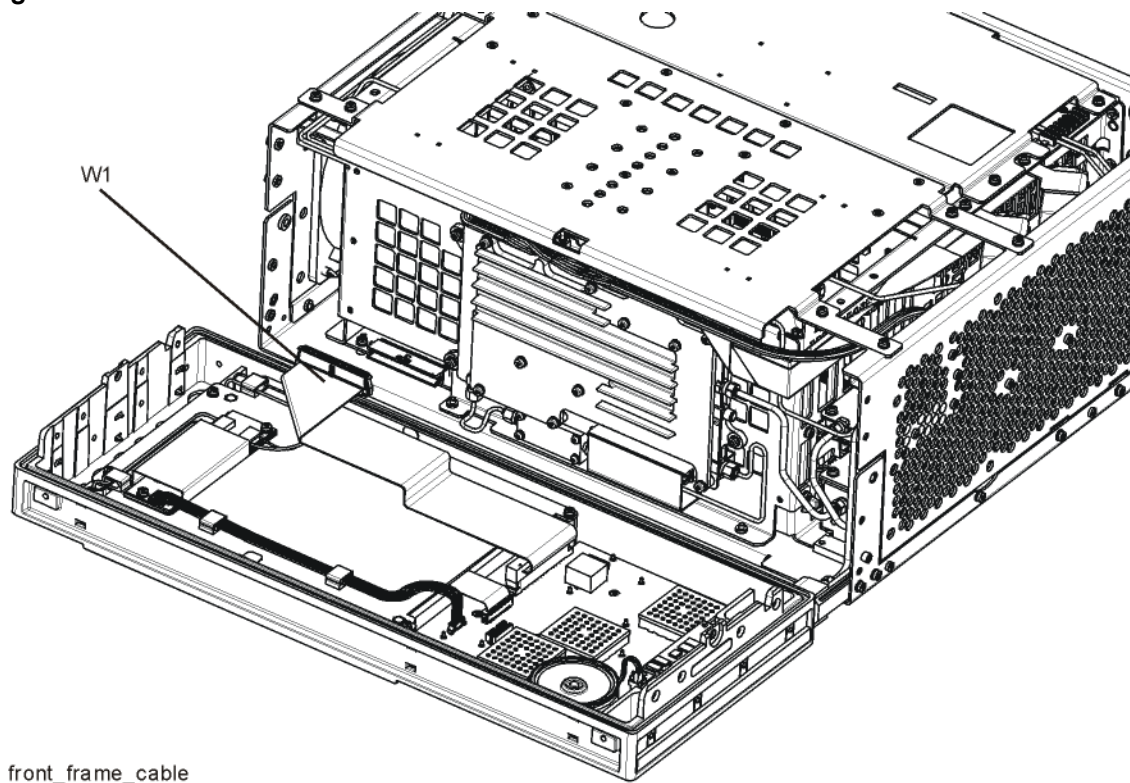
8. Refer to **Figure 42**. Place the rear panel (1) into position in the chassis. Replace the twenty screws (2) to attach the rear panel to the chassis. Torque to 9 inch-pounds.

**Figure 42** Rear Panel Replacement



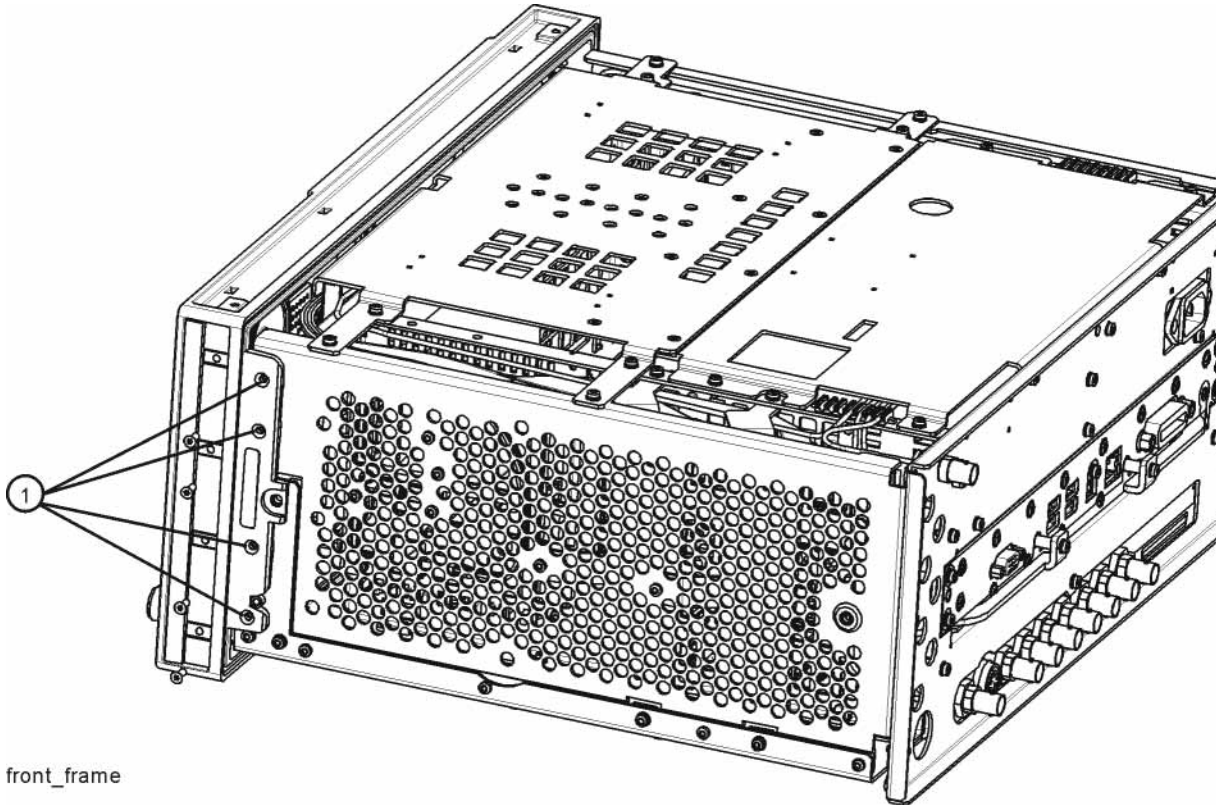
9. Refer to **Figure 43**. Reattach the ribbon cable W1.

**Figure 43** Front Panel Cable



10. Refer to **Figure 44**. Carefully position the Front Frame Assembly onto the chassis. Ensure no cables are crushed. Replace the eight screws (1), four on each side of the chassis. Torque to 9 inch pounds.

**Figure 44** Front Frame Replacement



### Final Installation for Standard Instruments (Benchtop Configuration, [Figure 3](#))

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.

### Final Installation for Portable Instruments (Option PRC, [Figure 4](#) and [Figure 5](#))

1. Refer to [Figure 5](#). 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. Refer to [Figure 5](#). Replace the four rear bumpers (2) to the rear of the instrument using the four screws (1). Torque to 21 inch pounds.
3. Refer to [Figure 4](#). Replace the four hole plugs (5) to both sides of the instrument.
4. Refer to [Figure 4](#). Replace the bail handle (2) (using the four screws (1)) to the Front Frame Assembly. Torque to 21 inch pounds.

## Loading New Hardware Drivers

On the first boot-up after installing the new hardware, the analyzer will detect the new hardware and will need to load drivers for the new hardware. The analyzer will boot-up as Instrument user, but loading the new drivers requires administrator privileges.

1. Turn on the analyzer and wait for the XSA application to launch.
2. During the start up of the XSA application, it will detect the new hardware and need to load new drivers. You will be prompted for an administrator login and password. The default administrator login is “administrator” and the default password is “agilent4u”.
3. You will receive two prompts as described above. The first prompt is for the “Agilent PXA DIF” and the other is for the “Agilent Receiver Module”. Both of these relate to the new A3 40 MHz Digital IF Assembly.
4. After the hardware drivers have been installed, the XSA application will continue to start up. Continue to Verify Hardware Installation.

## Update FPGA Code

On the first boot-up after installing the new hardware, the analyzer will detect the new A3 40 MHz BW Digital IF and A15 Front End Controller. However, the FPGA code in the new assemblies will not necessarily be synchronized with the instrument software installed earlier. The following procedure ensures that the FPGA code in the new assemblies is updated to the correct revision.

1. Turn on the analyzer and wait for the XSA application to launch.
2. Close the instrument application software by pressing **File, Exit, Enter** using the front panel keys.
3. Connect a USB mouse to one of the instrument front panel USB ports.
4. Using the mouse, click **Start, Log Off, Log Off**.
5. Relogin as “administrator”. The default password is “agilent4u”. Click **OK**.
6. Using the mouse, double-click on the Windows Explorer link on the desktop and navigate to the following folder:

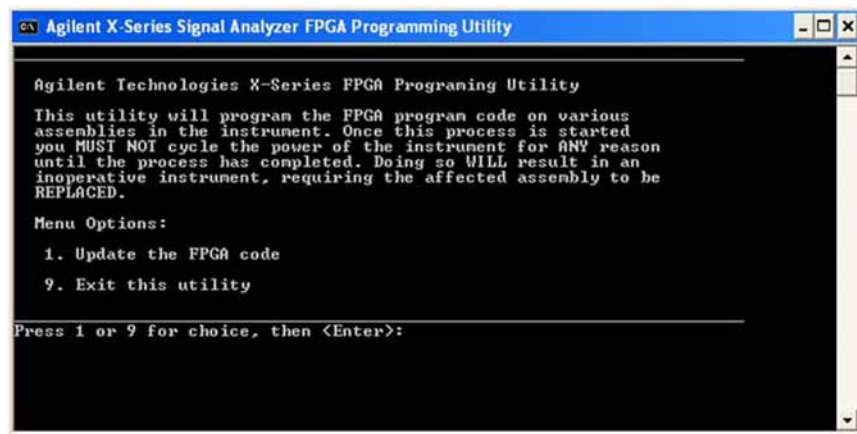
C:\Program Files\Keysight\SignalAnalysis\Physics

7. In this folder find and execute the file named:

FPGA\_Prog.bat

8. The FPGA Programming Utility will start and a window as shown in **Figure 45** will appear.

**Figure 45**      FPGA Programming Utility



9. To program the FPGA code enter 1 and press Enter. You will need to confirm this selection by pressing 1 and Enter one more time.
10. The programming of the FPGA code could take several minutes to complete. Once it has finished the instrument will reboot itself to use the new code and this process will then be completed.

## Verify Hardware Installation

1. Verify the spectrum analyzer application loads and sweeps as expected.
2. Press **System, Show, Hardware** on the analyzer and verify that the DIF, EAIF, and EFEC boards identify themselves as:
  - Analog IF (Hw Id = 57)
  - Digital IF (Hw Id = 72)
  - Front End Controller (Hw Id = 41 or 75)

## Verify Optional Functionality

1. Press **Mode, IQ Analyzer (Basic)**.
2. Press **Mode Setup**.
3. Press **IF Path**.
4. Verify that softkeys appear labeled “**25 MHz**” and “**40 MHz**”.
5. Press **AMPTD Y Scale, More 1 of 2, uW Path Control**.
6. Verify that softkeys appear labeled “**Standard Path**” and “**uW Preselector Bypass**”.
7. Press **uW Preselector Bypass**. If the path was previously set to **Standard Path**, you should hear a click.
8. Press **Standard Path**. If the path was previously set to **uW Preselector Bypass** path, you should hear a click.

## Perform Preselector Characterization

1. Press **System, Alignments, More, Advanced**.
2. Press **Characterize Preselector, Enter**. The characterization will take several minutes.
3. Wait until the analyzer resumes sweeping.



## Utilities, Adjustments, and Performance Verification Tests

Calibration software and specified test equipment is required to perform the adjustments and performance verification testing. Information on how to obtain this software can be found at

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

### Utilities Required

- None

### Adjustments Required

The following adjustments are the minimum set required to ensure that the newly installed hardware is functioning properly.

- Perform all adjustments

### Performance Tests Required

The following performance verification tests are the minimum set required to ensure that this newly installed option is functioning properly.

- Perform all performance tests

### **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 the calibration must be made between the end user and the calibration provider.

For assistance, get in touch with 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 (8am-8pm EST Monday -Friday)

