Keysight Technologies N9020B MXA Signal Analyzer

Option BU1, 40 MHz to 85 MHz Analysis Bandwidth Upgrade
Option BU2, 40 MHz to 125 MHz Analysis Bandwidth Upgrade
Option BU3, 40 MHz to 160 MHz Analysis Bandwidth Upgrade

KEYSIGHT TECHNOLOGIES

Installation Note

Notices

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Option BU1/BU2/BU3, 40 MHz to 85/125/160 MHz Analysis Bandwidth Upgrade

Products Affected:	N9020B MXA Signal Analyzer
Serial Numbers:	
Options:	B40, MPB (for frequency range options 508, 513, or 526)
To Be Performed By:	(X) Keysight Service Center
	(X) Personnel Qualified by Keysight
	( ) Customer
Estimated Installation Time:	1.5 Hours
Estimated Adjustment Time:	1.5 Hours
Estimated Verification Time:	3.5 Hours

Introduction

This installation note explains how to install the hardware and provides guidelines for adjustment and verification for the following upgrade kits for MXA N9020B signal analyzers:

- Option BU1, Analysis Bandwidth Upgrade, 40 MHz to 85 MHz, Hardware and License
- Option BU2, Analysis Bandwidth Upgrade, 40 MHz to 125 MHz, Hardware and License
- Option BU3, Analysis Bandwidth Upgrade, 40 MHz to 160 MHz, Hardware and License

Installing this kit requires that the analyzer already have hardware and licenses installed to provide analysis bandwidths up to 40 MHz. Other upgrade kits are available to upgrade analyzers that only have analysis bandwidths up to 25 MHz.

Refer to http://www.keysight.com/find/mxa_upgrades for information of available upgrades.

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

NOTE The instrument must be readjusted and the performance tested to assure the instrument meets specifications following the hardware installation. The X-Series Performance Verification and Adjustment Software must be used. All adjustments are automated. This software is included in the N7814A, Keysight X-Series Signal Analyzer Calibration Application software.

Installation Kit Parts List

Quantity	Description	Keysight Part Number
1	A25 Wideband Analog IF	N9020-60044
1	A26 Wideband Digital IF	N9020-60311
1	Opt BU1/BU2/BU3 Cable Kit with Wire Markers (includes cables W51 through W56, listed below)	N9020-60303
1	Cable Assembly, Flat Flexible 80-conductor 3-in-LG (W44)	8121-1854
1	Cable Assembly, Coaxial 700 mm LG (W20)	8121-1400[a] with ends labeled '705' and '6'
1	Cable Assembly, Coaxial 530 mm LG (W51)	8121-1401[a] with ends labeled '301' and '718'
1	Cable Assembly, Coaxial 380 mm LG (W52)	8121-2288[a] with ends labeled '102' and '15'
1	Cable Assembly, Coaxial 380 mm LG (W54)	8121-2288[a] with ends labeled '716' and '14'
1	Cable Assembly, Coaxial 480 mm LG (W55)	8121-2290[a] with ends labeled '805' and '17'
1	Cable Assembly, Coaxial 710 mm LG (W56)	8121-2291[a] with ends labeled '806' and '726'
1	Cable Assembly, Coaxial 570 mm LG (W53)	8121-2292[a] with ends labeled '901' and '101'
2	Cable Tie	1400-0249
14	Screw, M3 x 0.5, (6 mm long), flathead	0515-1946
1	Entitlement Certificate	5964-5178
1	Entitlement Certificate Envelope	5967-7169
1	Installation Note	This note

a.This cable is included in the Option BU1/BU2/BU3 Cable Kit with Wire Markers, p/n N9020-60303

Tools Required

- T-10 TORX Driver
- T-20 TORX Driver
- Keysight Calibration and Adjustment Software, N7814A (revision E.16.00 or later)
- Test equipment and computer supported by the X-Series Performance Tests and Adjustment Software
- MXA Signal Analyzer Service Guide. This manual is available online at the following URL: www.keysight.com/find/N9020B_service_guide
- Microsoft Windows based personal 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 _____

NOTE Do not attempt to install this kit on an N9020A. Although much of the hardware is identical, the licenses included in this kit will only work on an N9020B.

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

   N9020B-503 _____

   N9020B-508 _____

   N9020B-513 _____

   N9020B-526 _____

   N9020B-BBA _____

   N9020B-B40 _____

   N9020B-DP2 _____

   N9020B-MPB _____

   Refer to the following conditions:

   – If the analyzer is not equipped with N9020B-B40, do not proceed with the installation of this upgrade kit. If N9020B-B40 is not installed, other upgrade kits are available to upgrade to 85 MHz, 125 MHz, or 160 MHz analysis bandwidth.

   – If the analyzer has N9020B-BBA, do not proceed with the installation of this kit. N9020B analyzers with Option BBA do not have sufficient room to install the two additional boards required for analysis bandwidths of 85 MHz and wider.

   – If the N9020B-MPB is not already present and either frequency range option N9020B-508, N9020B-513, or N9020B-526 is present, it will be necessary to upgrade the analyzer to add option N9020B-MPB before installing this kit. Refer to http://www.keysight.com/find/mxa_upgrades for details on how to upgrade to N9020B-MPB.

Update Instrument Software

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

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) in the kit.
2. Redeem the Option Upgrade Entitlement Certificate by following the instructions on the Certificate.
3. After redeeming the upgrade products from the Certificate(s), you will receive one or two e-mails, each 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(s) 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 similar to the one shown in Figure 2. If 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.

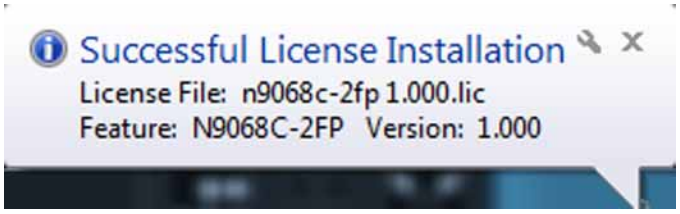
NOTE

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

N9020BU-MPB
N9020BU-CR3, 2nd IF Output
N9020BU-CRP, Arbitrary IF Output

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



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.

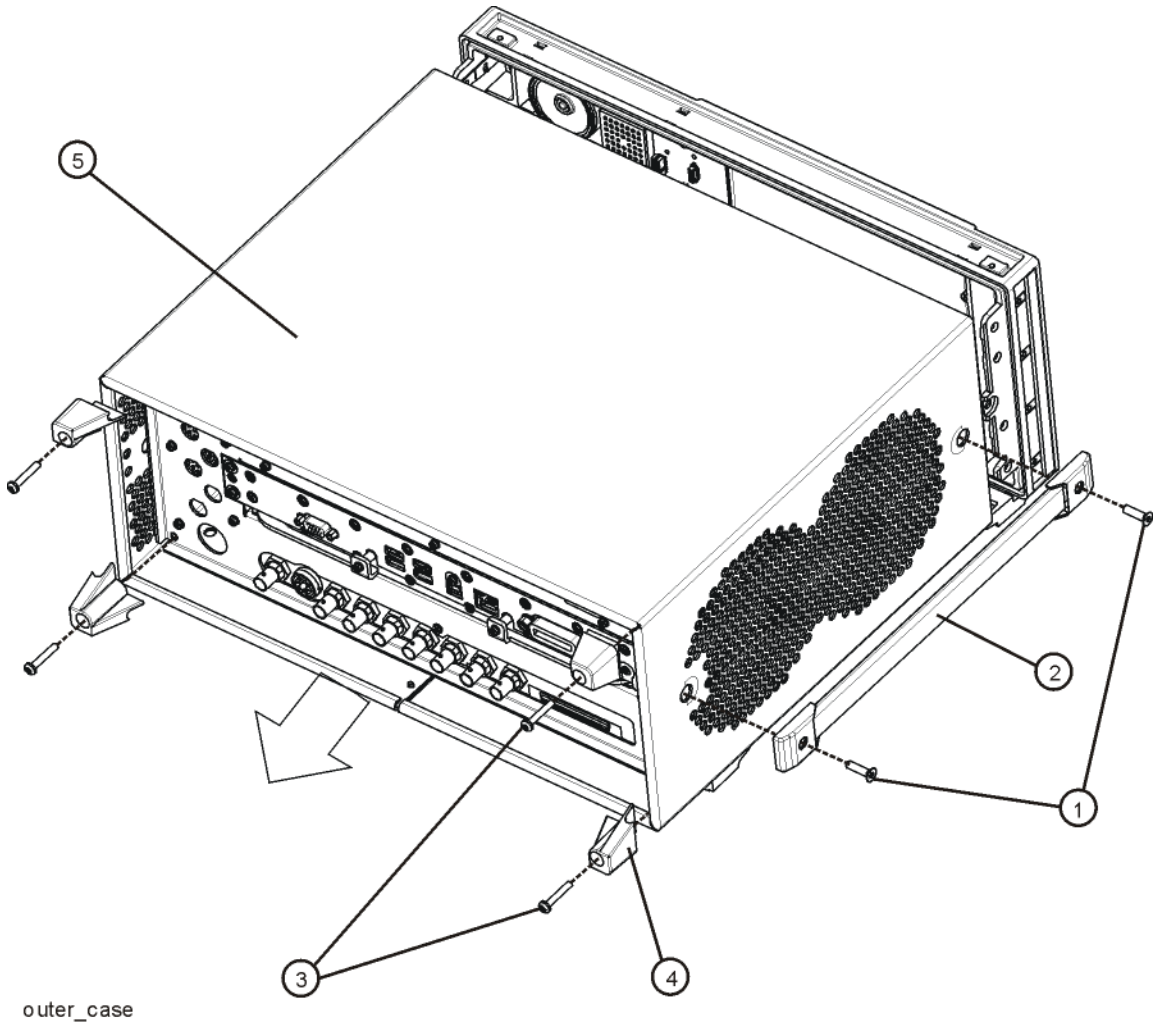
NOTE If the analyzer has Option PRC, Portable Configuration, refer to the "Portable Instrument (Option PRC)" section on page 13 to remove the outer case.

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

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



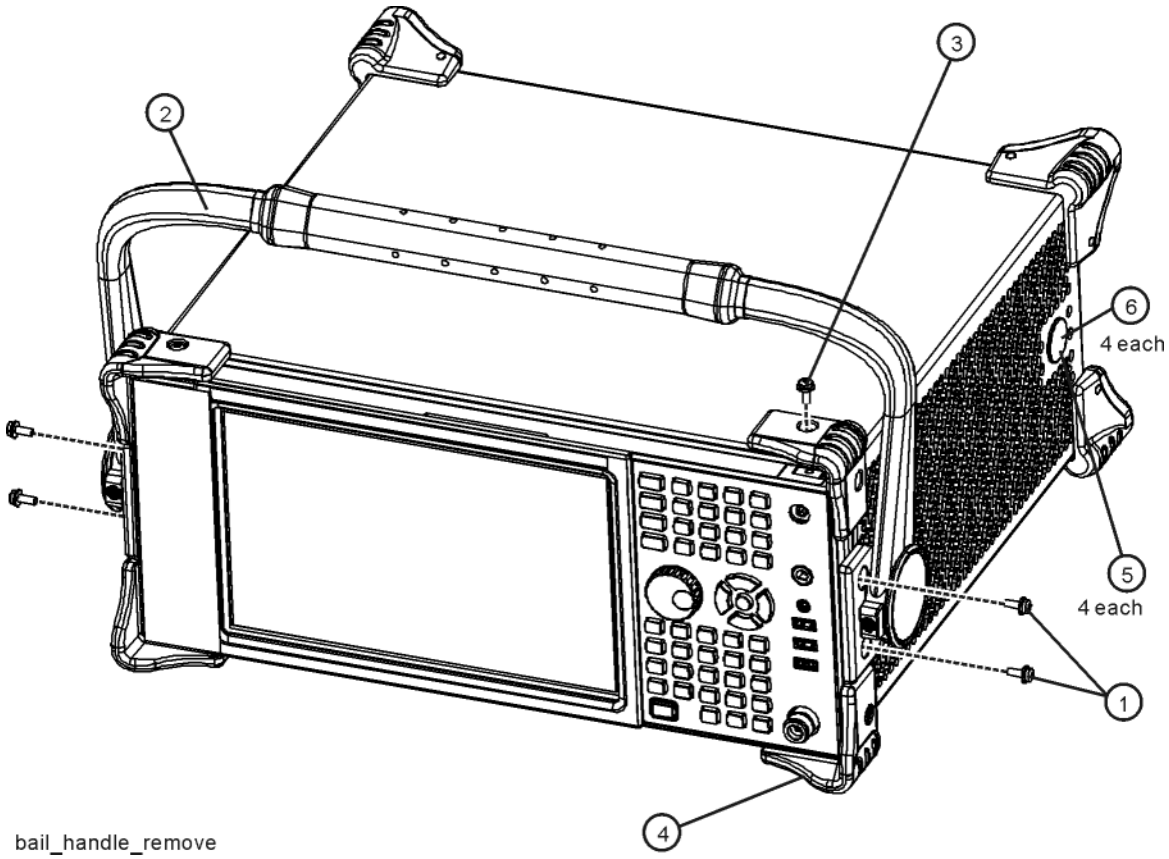
5. Proceed to the Front Frame Assembly Removal section to remove the front frame.

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.

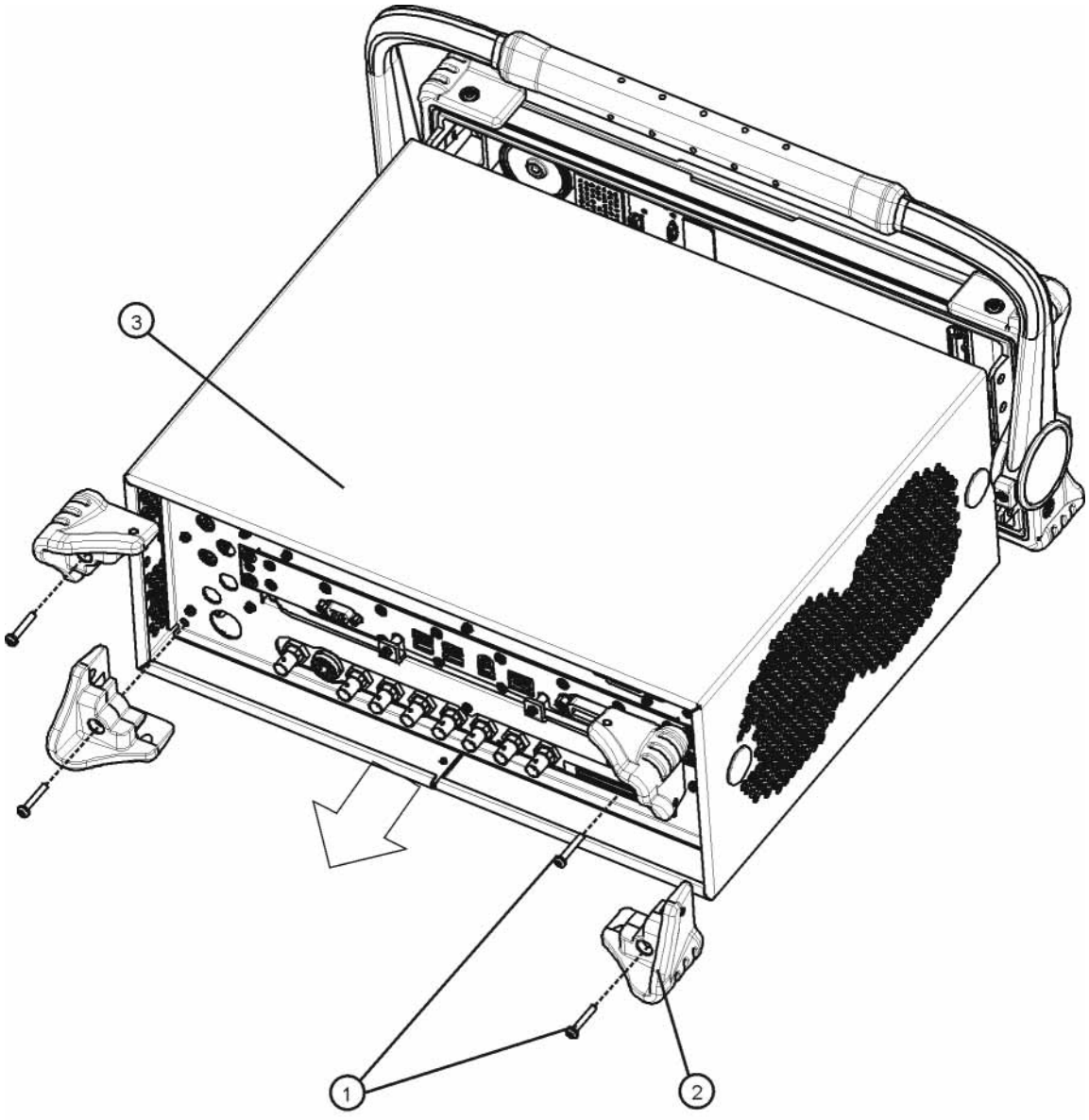
Figure 4 Bail Handle Removal



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

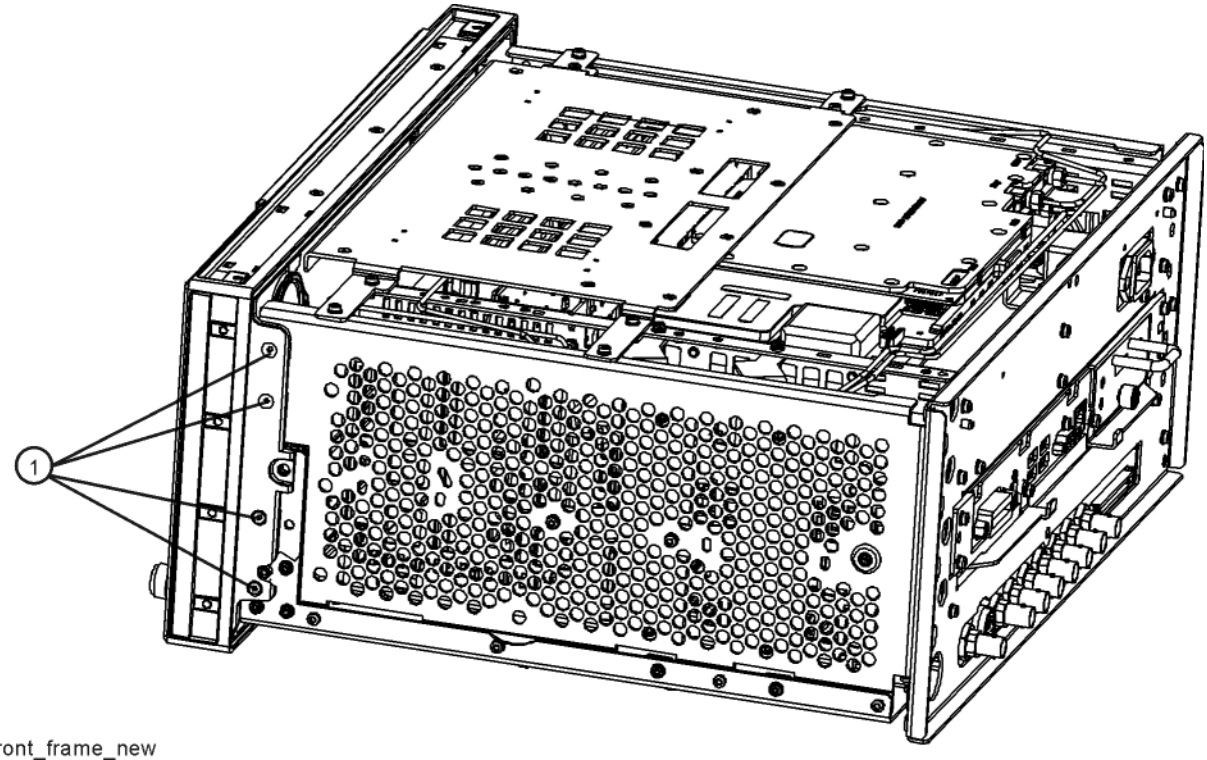


rear_bumper_remove

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



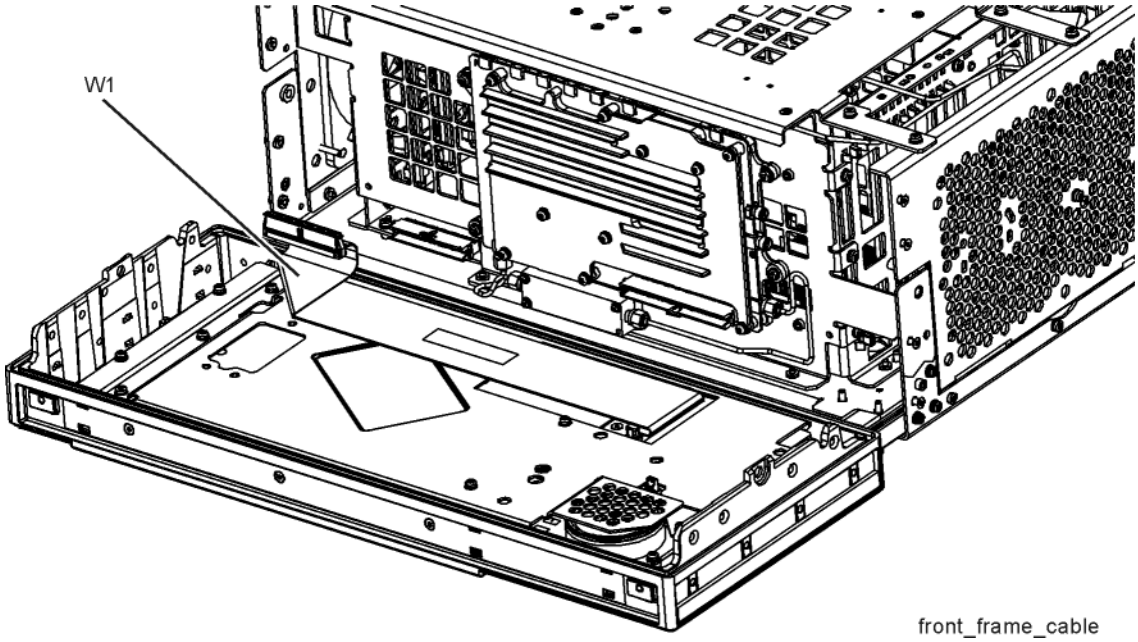
front_frame_new

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.

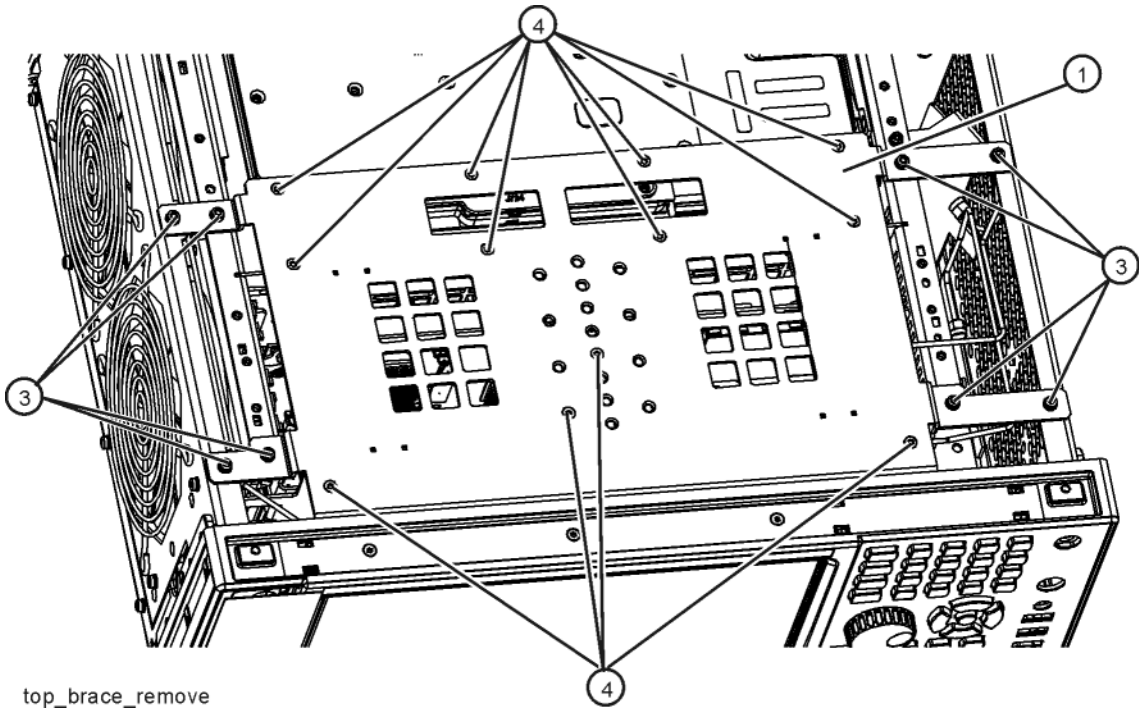
Figure 7 Front Panel Cable



Top Brace

1. Refer to Figure 8. To remove the top brace (1), use the T-10 driver to remove the eight panhead screws (3) (0515-0372), four on each side, attaching the brace to the chassis. Also remove and discard the twelve flathead screws (4) (0515-1946) attaching the top brace to the boards.

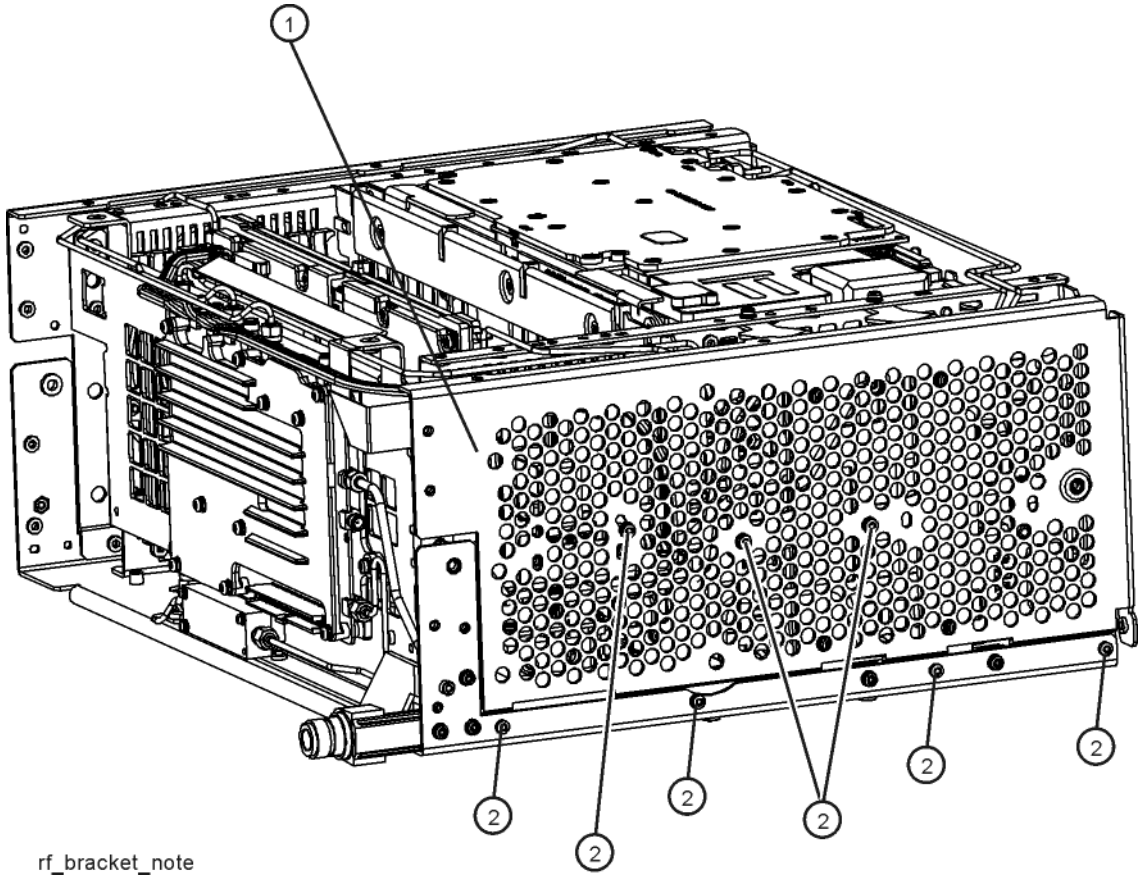
Figure 8 Top Brace Removal



RF Bracket Removal

1. Refer to Figure 9. Remove the RF bracket (1) by removing the remaining seven screws (2) using the T-10 driver.

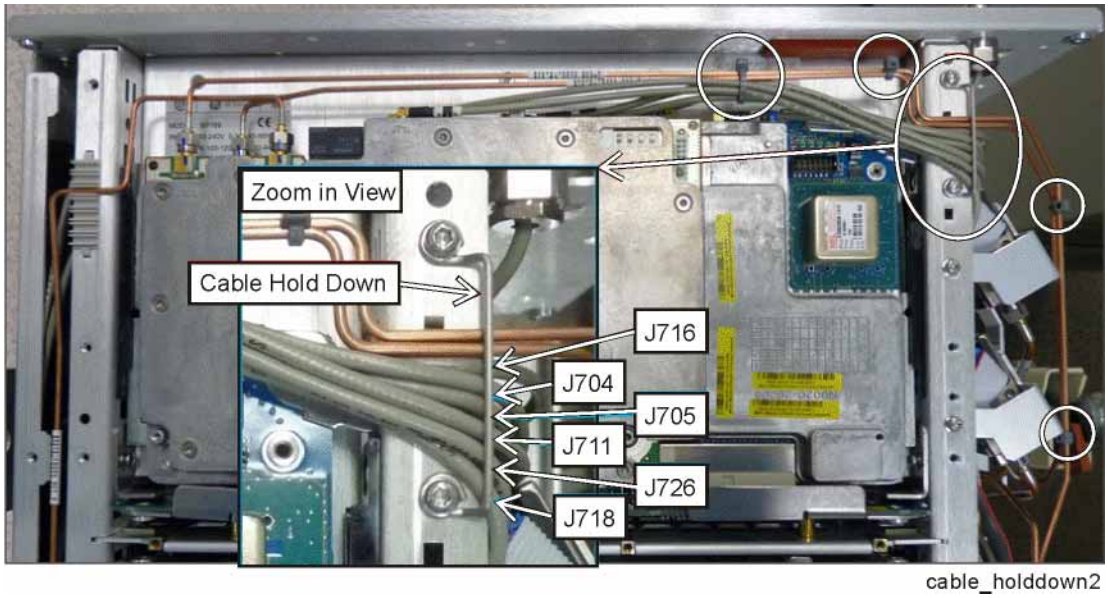
Figure 9 RF Bracket Removal



Removing Cables

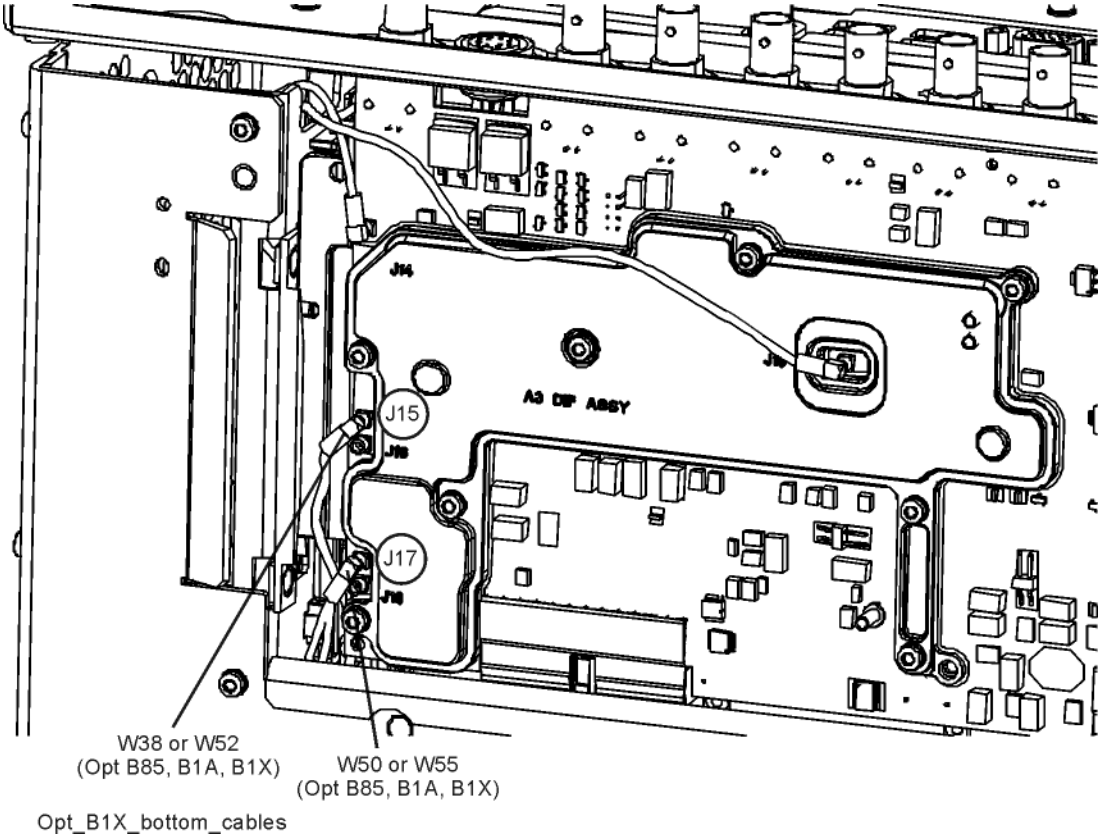
1. Refer to Figure 10. Remove the wire cable hold down on the right side of the chassis to free the gray coax cables going to the A16 Reference Assembly.
2. Remove cable ties from bundle of gray coax cables.

Figure 10 Cables Under Cable Hold Down



3. Refer to Figure 11. Remove cable W50 connecting A3 Digital IF J17 to A16 Reference Assembly J726. Note cable routing from Digital IF J17 through the opening in the side panel. This cable will not be reused.
4. Remove cable W38 connecting A15 Front End Controller J901 to A3 Digital IF J15. Note cable routing from Digital IF J15 through the attenuator brackets and switches. This cable will not be reused.

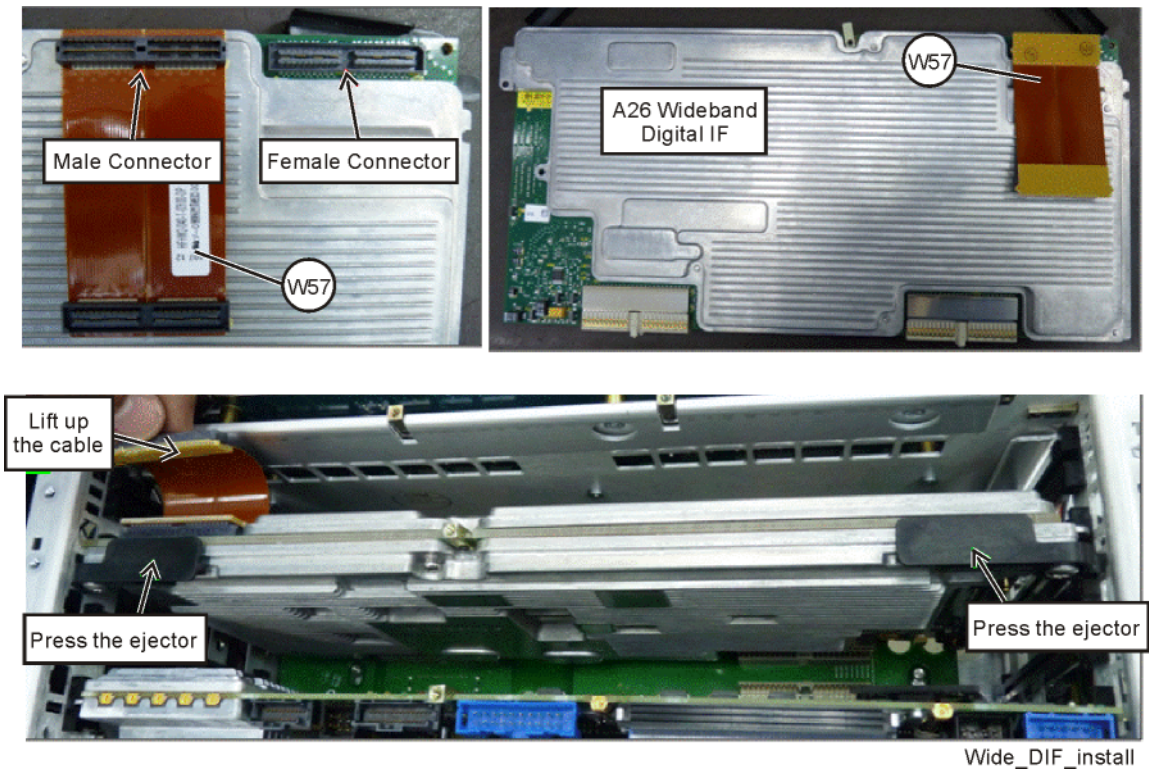
Figure 11 A3 Digital IF Assembly Cables



Installing Boards and Cables

1. Refer to Figure 12. Locate ribbon cable 8121-1854 (W44) and the A26 Wideband Digital IF in the kit. Connect W44 to the ribbon cable connector on the A26 Wideband Digital IF.
2. Install the A26 Wideband Digital IF into slot 4 by pressing the ejector. Lift the free end of the ribbon cable up as shown in Figure 12.

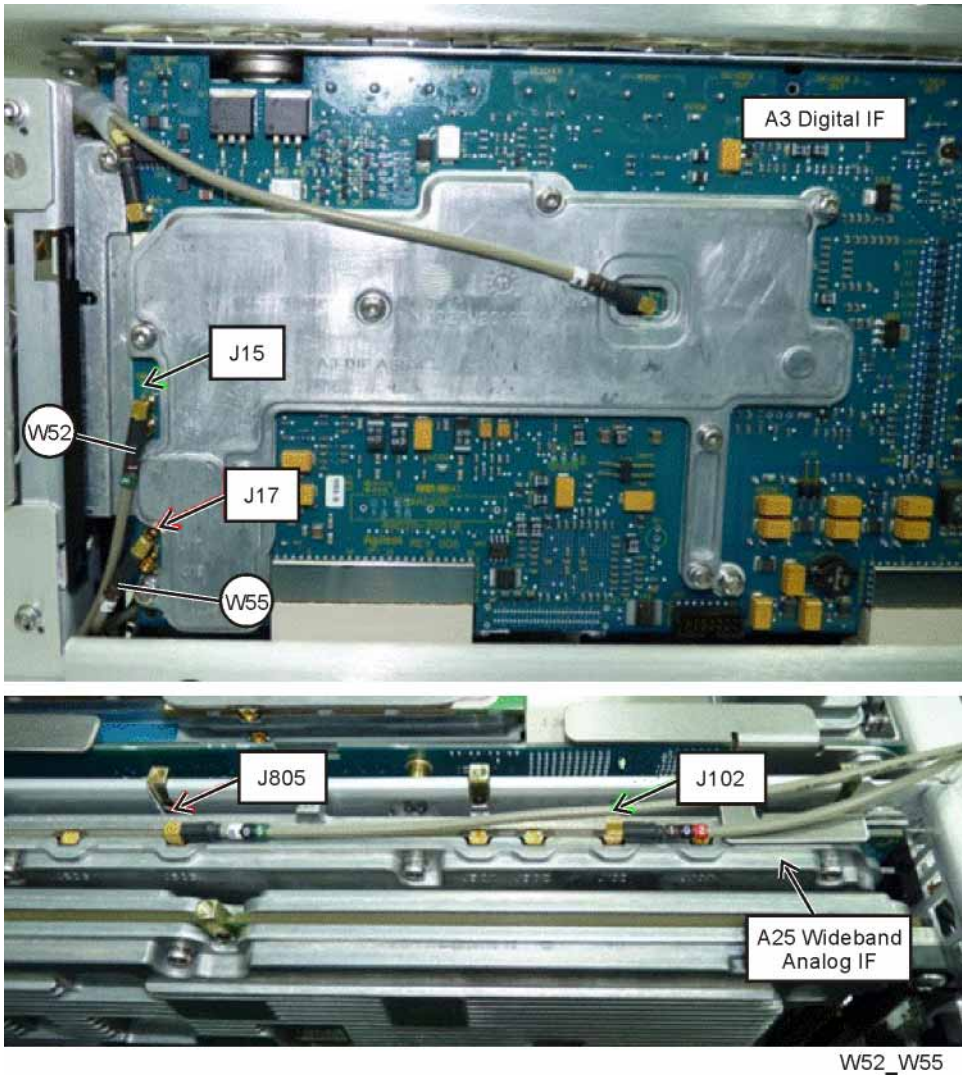
Figure 12 Installing A26 Wideband Digital IF



3. Locate A25 Wideband Analog IF in the kit. Insert A25 loosely into slot 3. Do not seat A25 completely in the slot.
4. Lift A25 up slightly and connect ribbon cable W44 to the ribbon cable connector on A25.
5. Use the ejectors to fully seat the A25 Wideband Analog IF into slot 3.

6. Refer to Figure 13. Locate W55 in the Opt BU1/BU2/BU3 Cable Kit. This cable will have part number 8121-2290 and will have ends labeled “805” and “17”. Connect the end labeled “17” to A3J17 on the A3 DIF Assembly. Route the cable through cutout in the right side chassis near A10 Attenuator B and connect the other end to A25J805 on the A25 Wideband Analog IF Assembly.
7. Refer to Figure 13. Locate W52 in the Opt BU1/BU2/BU3 Cable Kit. This cable will have part number 8121-2288 and will have ends labeled “102” and “15”. Connect the end labeled “15” to A3J15 on the A3 DIF Assembly. Route the cable through cutout in the right side chassis near A10 Attenuator B and connect the other end to A25J102 on the A25 Wideband Analog IF Assembly.

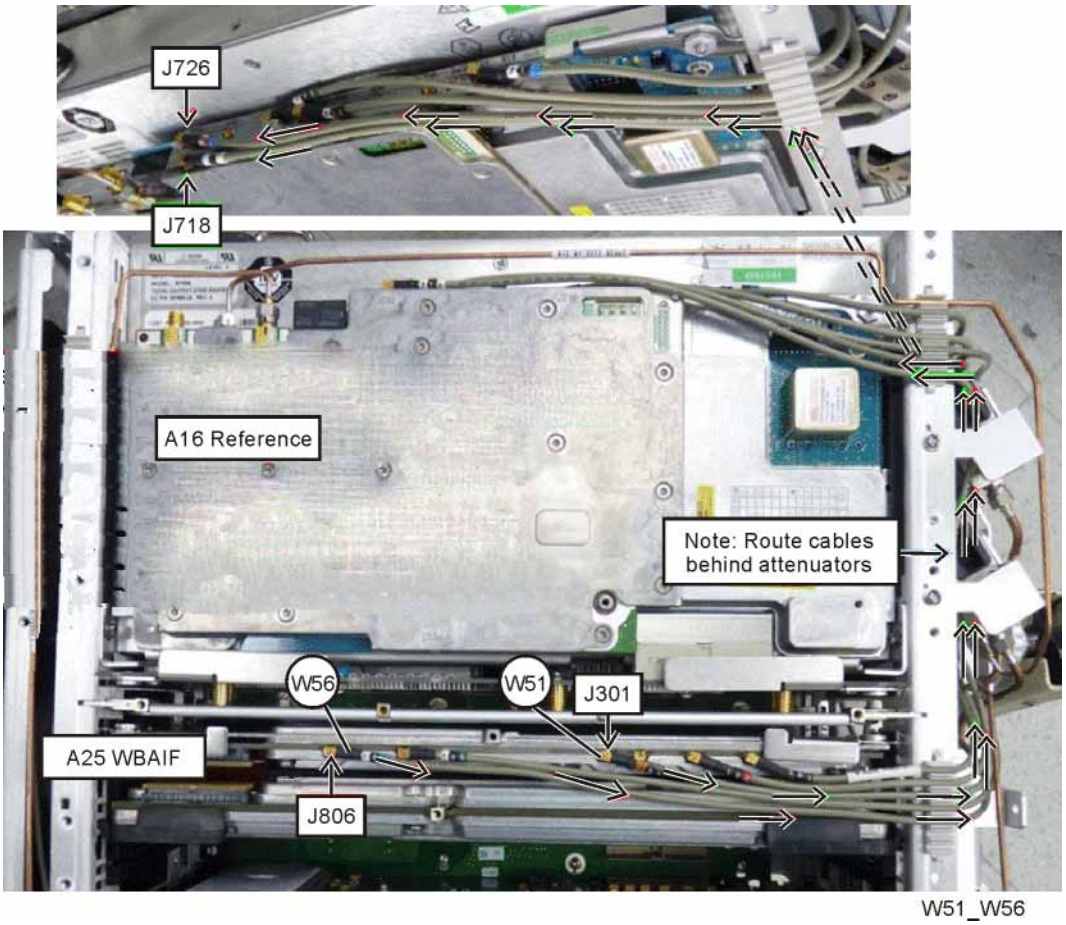
Figure 13 Connecting Cables W55 and W52



W52_W55

8. Refer to Figure 14. Locate W56 in the Opt BU1/BU2/BU3 Cable Kit. This cable will have part number 8121-2291 and will have ends labeled “806” and “726”. Connect the end labeled “806” to A25J806 on the A25 Wideband Analog IF Assembly. Route the cable along the right side chassis behind attenuators A9 and A10 and connect the other end to A16J726 on the A16 Reference Assembly.
9. Refer to Figure 14. Locate W51 in the Opt BU1/BU2/BU3 Cable Kit. This cable will have part number 8121-1401 and will have ends labeled “301” and “718”. Connect the end labeled “301” to A25J301 on the A25 Wideband Analog IF Assembly. Route the cable along the right side chassis behind attenuators A9 and A10 and connect the other end to A16J718 on the A16 Reference Assembly

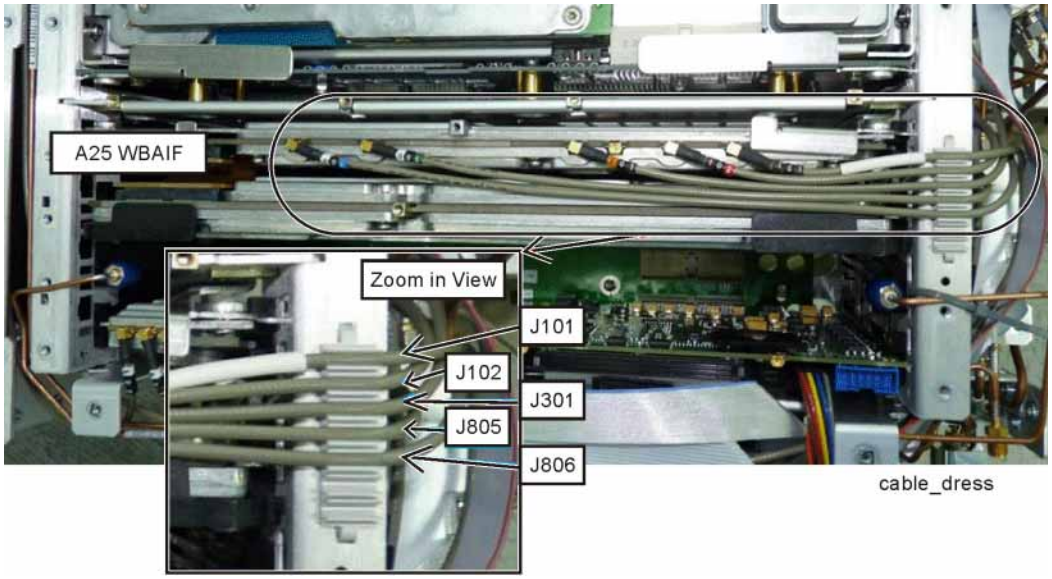
Figure 14 Connecting Cables W56 and W51



10. Locate W53 in the Opt BU1/BU2/BU3 Cable Kit. This cable will have part number 8121-2292 and will have ends labeled “901” and “101”. Connect the end labeled “901” to A15J901 on the A15 Enhanced Front End Control Assembly. Route the cable along the right side chassis and connect the other end to A25J101 on the A25 Wideband Analog IF Assembly.

11. Refer to Figure 15. Dress the coaxial cables neatly and snap into the cable clip with the correct sequence as shown in Figure 8.

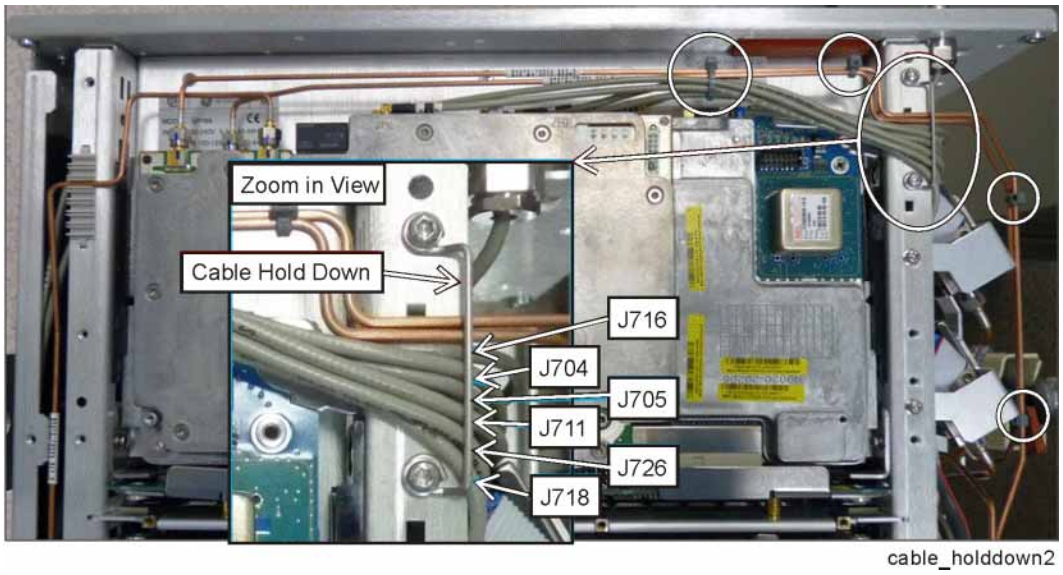
Figure 15 Dressing Cables to A25 Wideband Analog IF



12. Refer to Figure 16. Re-install the wire cable hold down. Assure the cables lay flat.

13. Attach two cable ties around the bundle of gray cables.

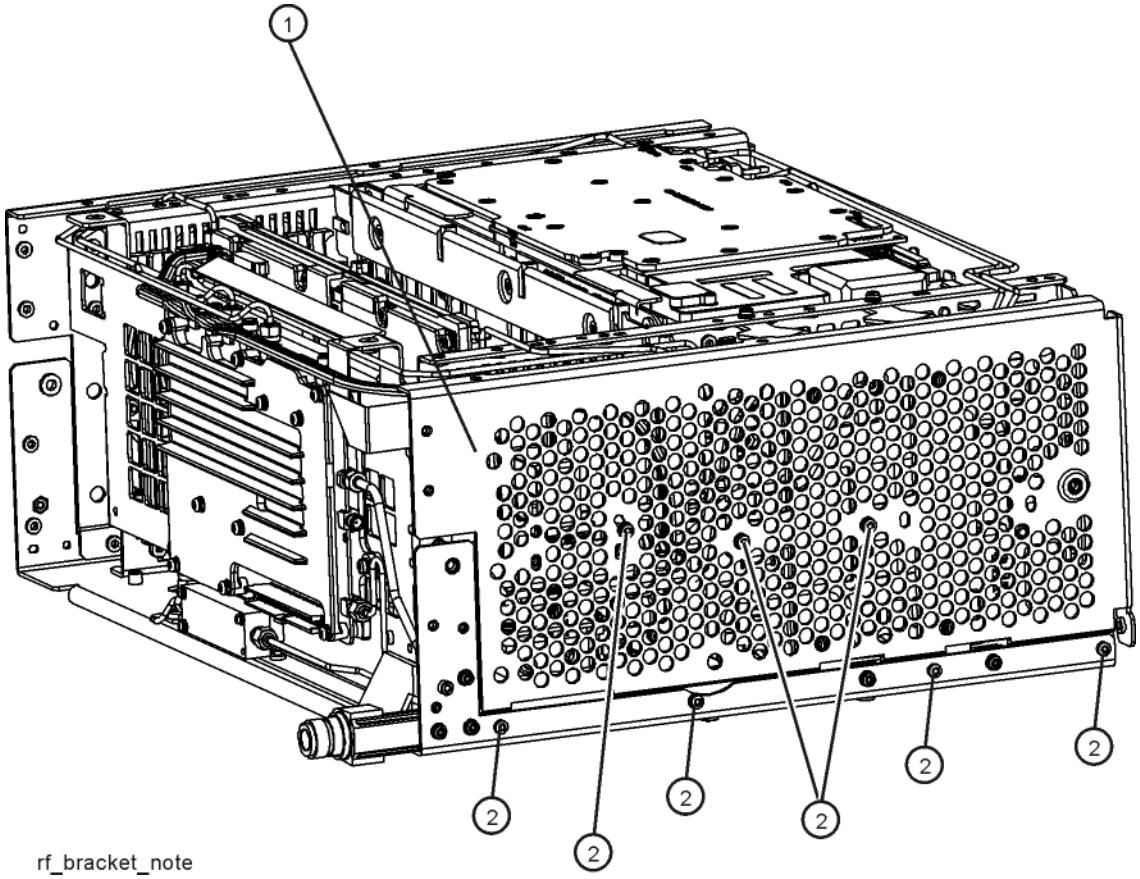
Figure 16 Cables Under Cable Hold Down



Reassembly

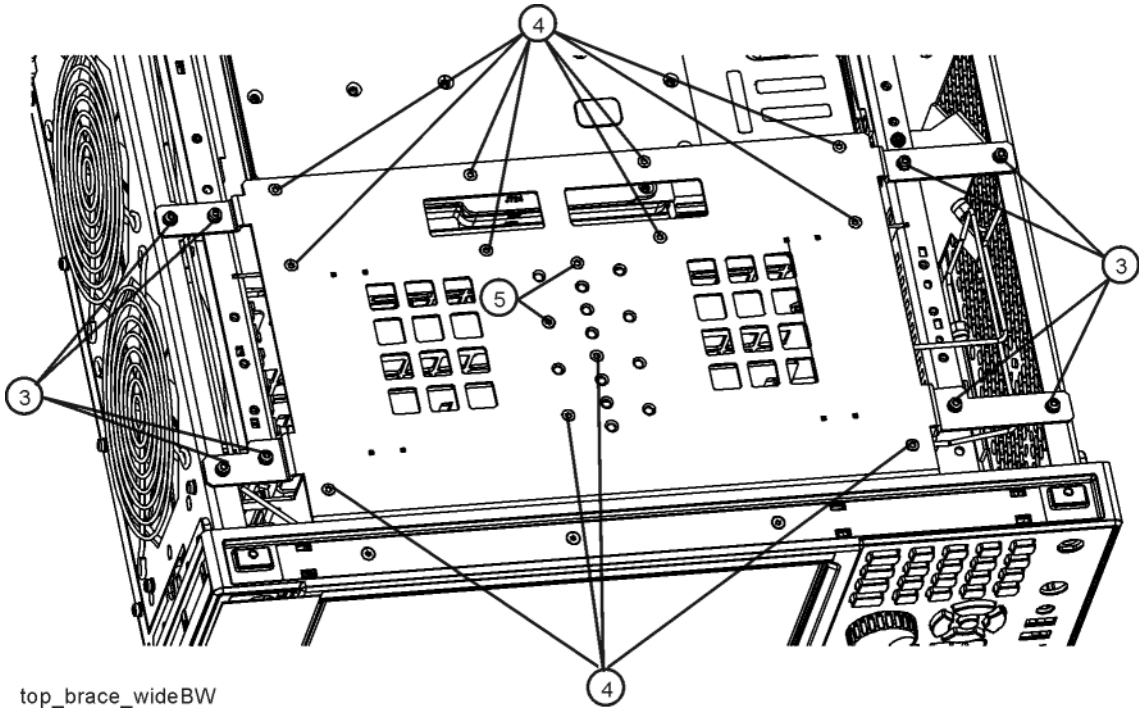
1. Refer to Figure 17. Reinstall the RF bracket (1) onto the chassis using seven screws (2). Torque to 9 inch-pounds.

Figure 17 RF Bracket Replacement



2. Refer to Figure 18. To replace the top brace (1), place it in the correct position and attach the appropriate screws. There are fourteen screws provided in this kit (0515-1946) (4) and (5) to attach the top brace. Torque to 9 inch-pounds.

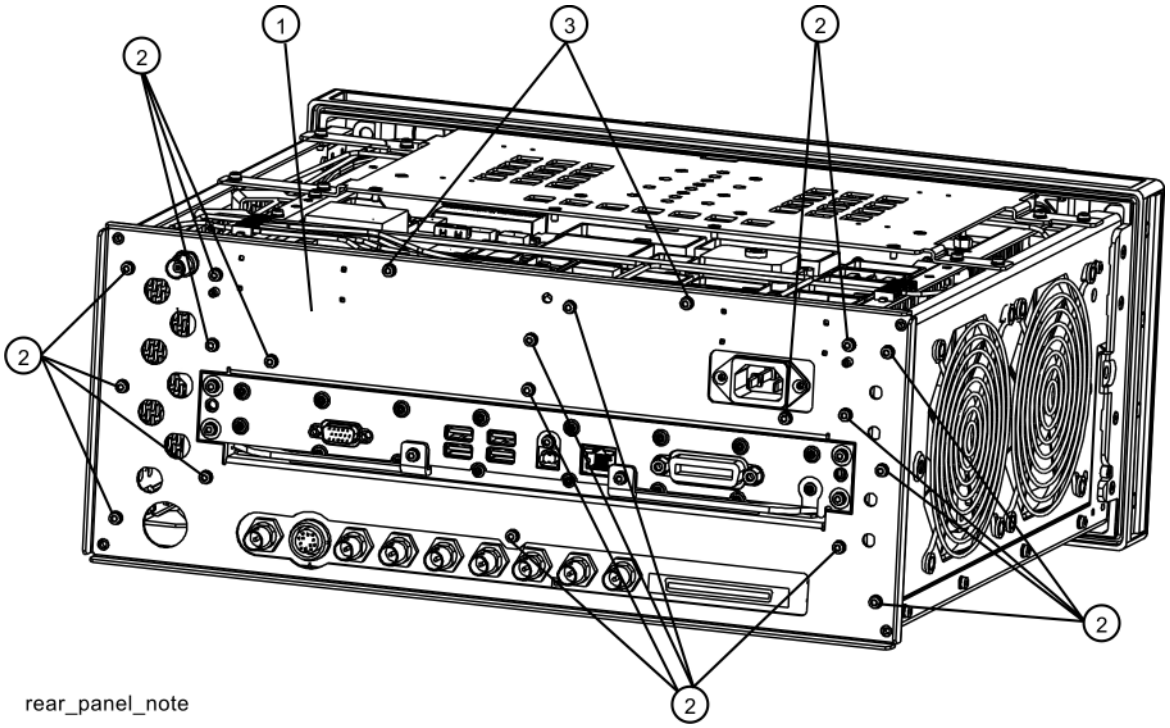
Figure 18 Top Brace and Reference Bracket Replacement



3. 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.
4. 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.

5. Refer to Figure 19. Place the rear panel (1) into position in the chassis. Replace the screws (2) to attach the rear panel to the chassis. Torque to 9 inch-pounds.

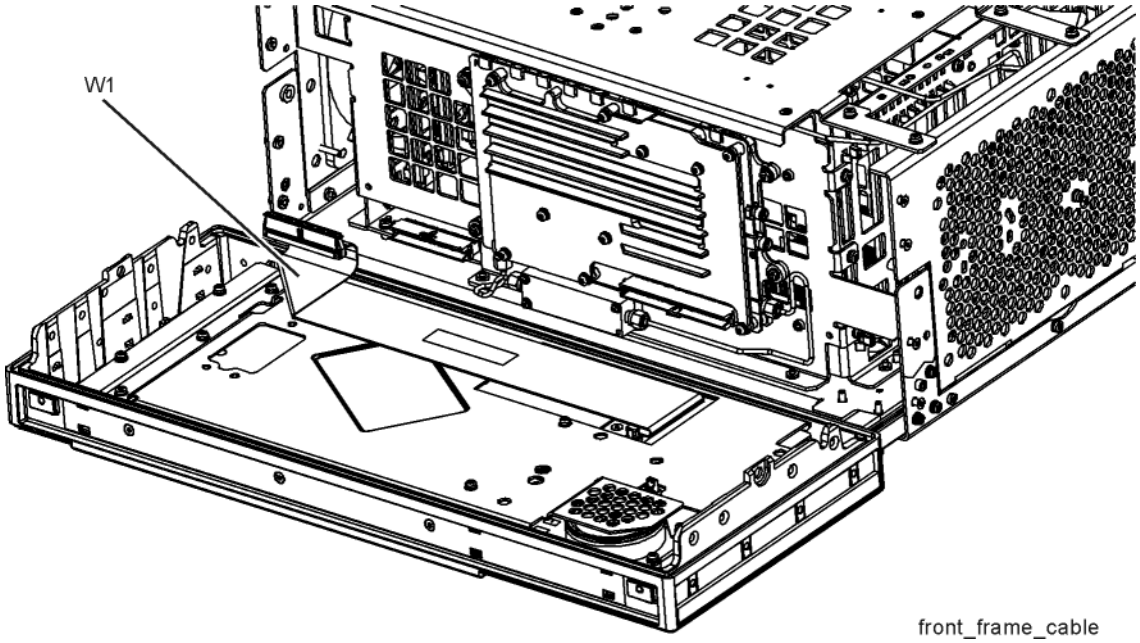
Figure 19 Rear Panel Replacement



rear_panel_note

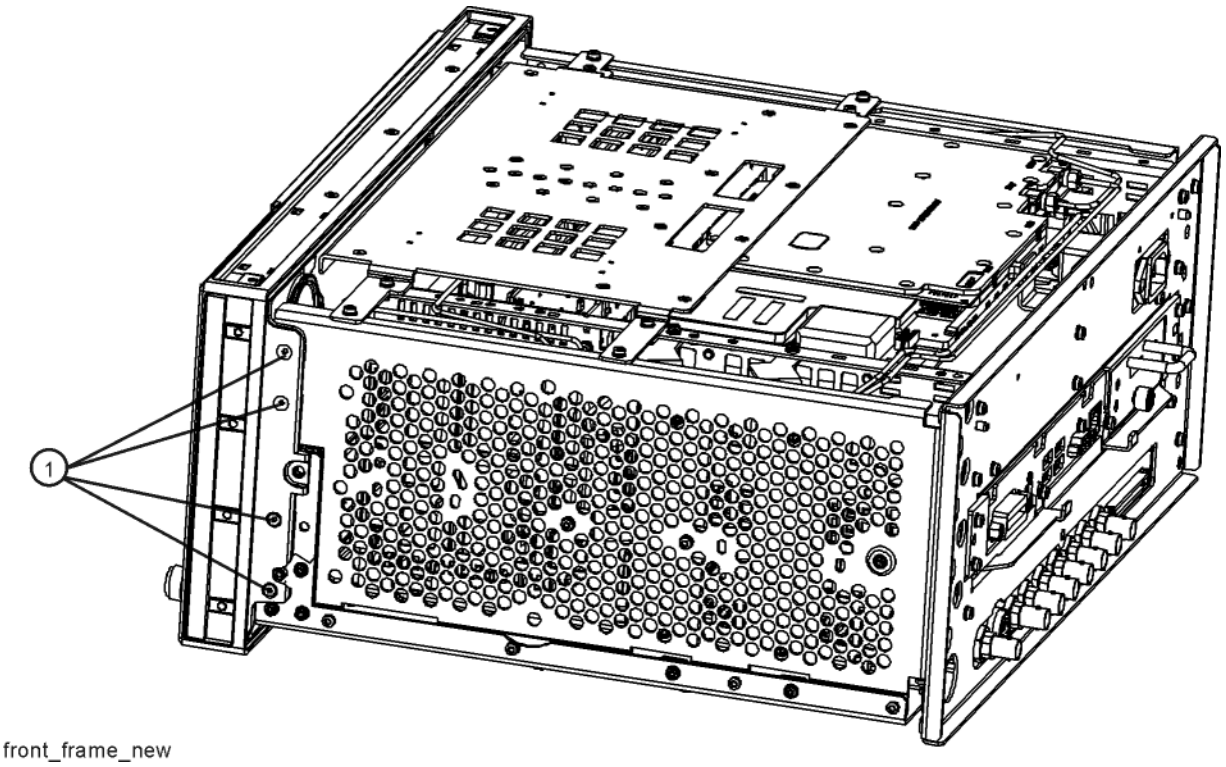
6. Refer to Figure 20. Reattach the ribbon cable W1.

Figure 20 Front Panel Cable



7. Refer to Figure 21. 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 21 Front Frame Replacement



front_frame_new

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.

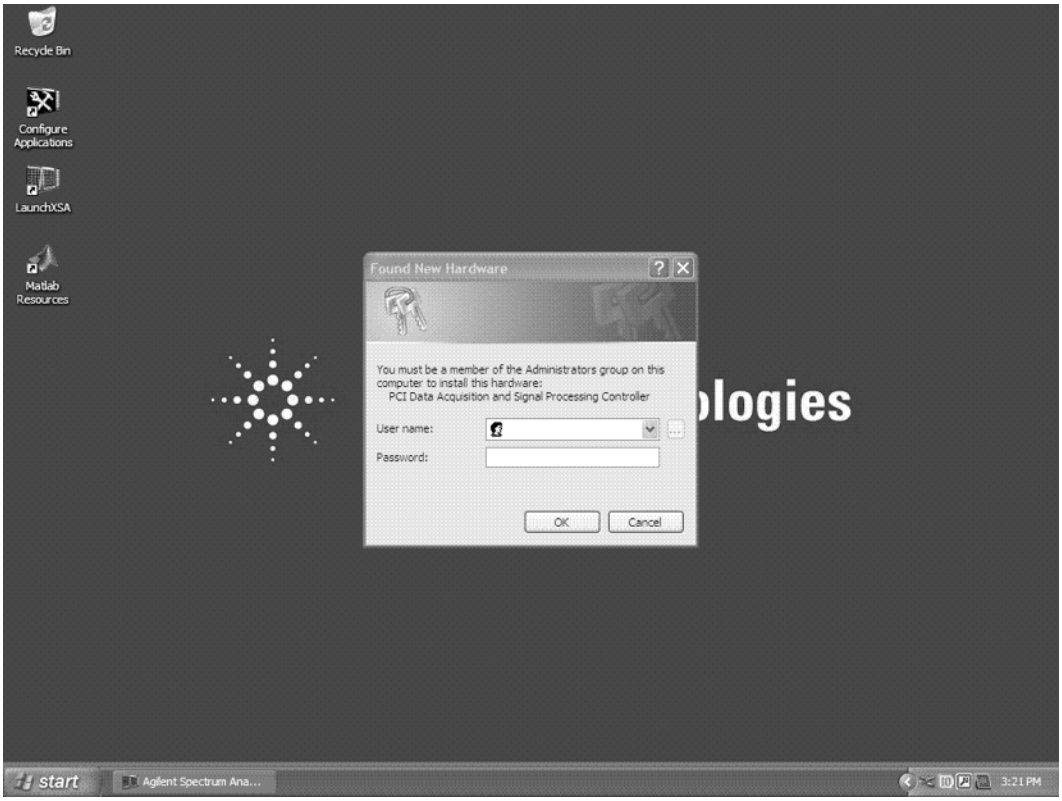
Final Installation for Portable Instruments (Option PRC, Figure 4 and Figure 5)

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.

Power Up and New Hardware Wizard

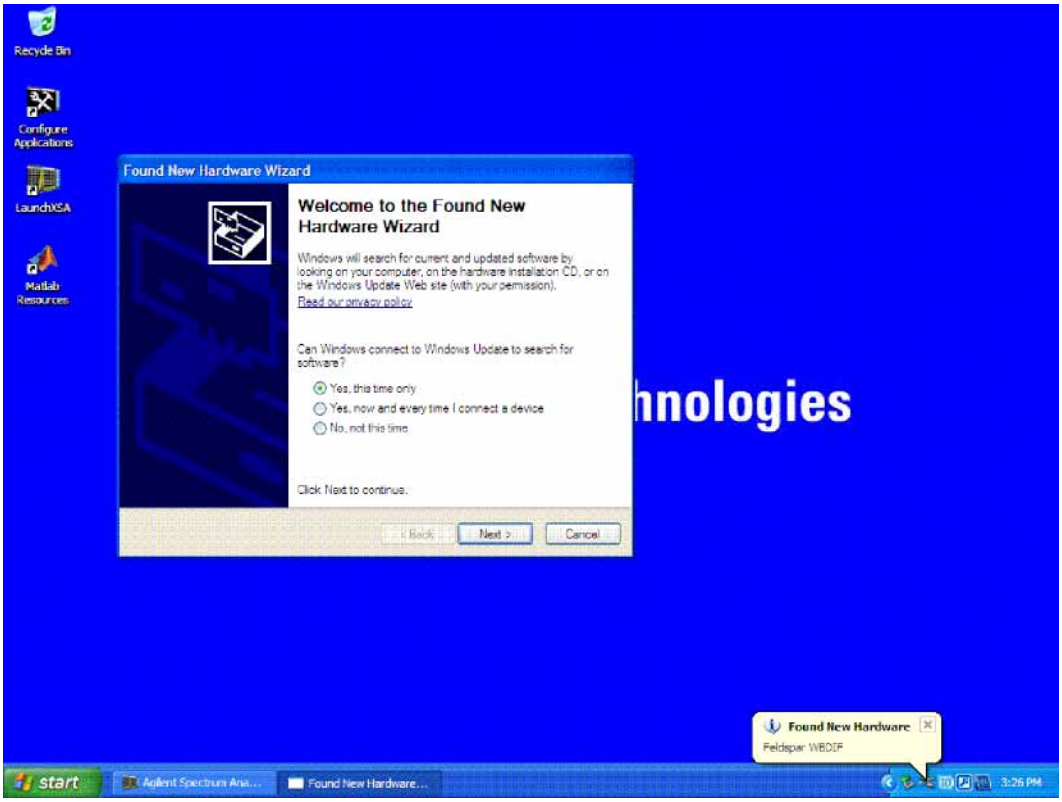
1. Connect a keyboard and mouse to the instrument.
2. Power on the instrument.
3. During the boot up process you may notice that the “Found New Hardware” bubble appears in the lower right screen, and a “Found New Hardware’ message window appears for a short period, and then is covered by the analyzer splash screen.
4. After the instrument is completely booted, press the front panel File key, select Exit, and click OK to view the desktop and see the “Found New Hardware” window shown in Figure 22.

Figure 22



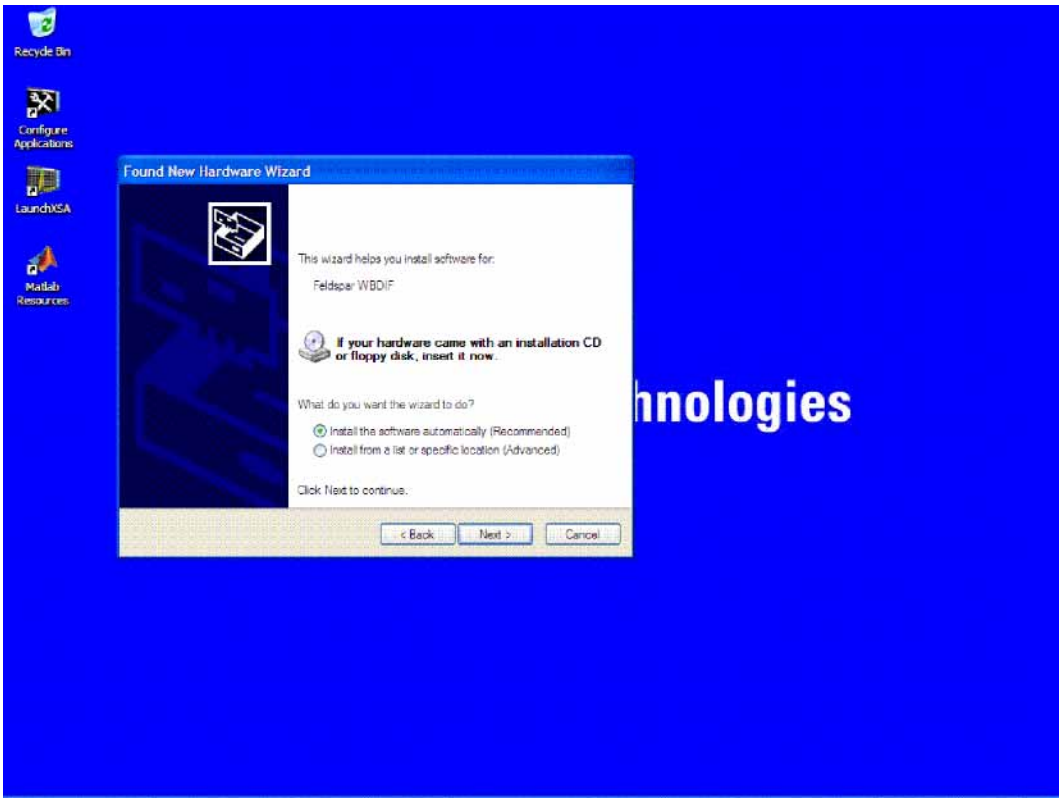
5. Enter administrator as the user name, and Keysight4u! as the password. Select OK.
6. The screen in Figure 23 appears. Select Yes, This time only. Click Next.

Figure 23



7. The screen in Figure 24 appears. Ensure “Install the software automatically’ is selected and click Next.

Figure 24



8. The wizard will install the required software. Once you see the “Completing the Found New Hardware Wizard” screen appear, click Finish.

Update the Instrument Software

1. Loading the latest instrument software is required to assure all FPGAs and drivers located on the newly installed hardware and in the base instrument are synchronized. Therefore, even if the instrument contains the latest revision of software, you must reinstall the software to assure proper operation.

   The latest revision of instrument software may be downloaded from:
   http://www.keysight.com/find/Xseries_software

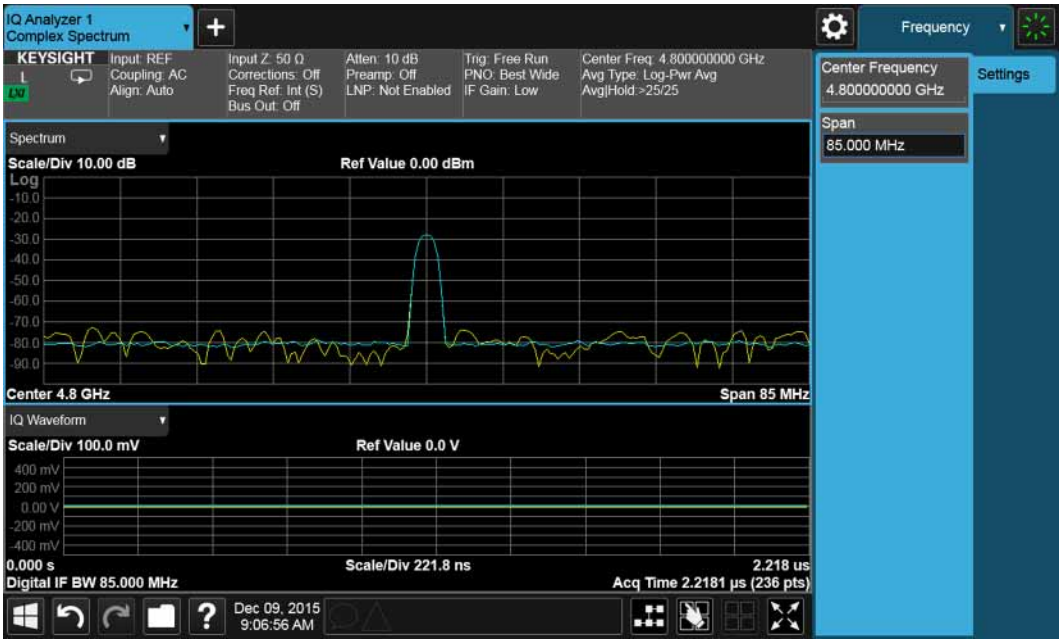
Verify Hardware Installation

1. Verify the spectrum analyzer application loads and sweeps as expected.
2. Press **System, Show Hardware** on the analyzer and verify that the Wideband Analog IF and Wideband Digital IF boards identify themselves as:
   - WB Analog IF (Hw Id = 38)
   - WB Digital IF (Hw Id = 40)

Verify Optional Functionality

1. Press **MODE/MEAS, I/Q Analyzer (Basic), OK**.
2. Press **MEAS SETUP, IF Path**, and select the **IF Path** drop-down menu.
3. Verify that selections appear labeled either "**85 MHz**", "**125 MHz**" or "**160 MHz**" appear, depending upon whether upgrade Option BU1, BU2, or BU3, respectively, was installed.
4. Select IF Path of either 85 MHz, 125 MHz, or 160 MHz, as appropriate.
5. Press **FREQ, Center Frequency, 4.8 GHz**. If the frequency range option is 503, set the Center Frequency to 1 GHz.
6. Press **Input/Output, RF Calibrator**, and select **4.8 GHz** from the **RF Calibrator** drop-down menu. If the frequency range option is 503, apply a 1 GHz, -28 dBm CW signal from a signal generator to the analyzer input.
7. Press **FREQ, Span, 85 MHz**.
8. The analyzer should display a signal in the center of the screen with an amplitude of approximately -28 dBm (see Figure 25).

Figure 25 4.8 GHz Signal



Utilities, Adjustments, and Performance Verification Tests

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

Obtain Keysight X-Series Signal Analyzer Calibration Application SW, N7814A TME Calibration Application, version E.16.00 or later. Information on how to obtain this software can be found at:

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

The following tests are required to assure the installation was performed correctly. The instrument may not have been in spec before the upgrade was begun. Performing only these tests does not guarantee that the analyzer meets all specifications.

Utilities Required

– None

Adjustments Required

Adjustment Name
IF Frequency Response Adjustment

Performance Tests Required

Verification Test Name
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. If a full calibration is required, arrangements regarding the level of the calibration must be made between the end user and the calibration provider.

End of installation.

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

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

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

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