Installation Note

Agilent PSA Series Spectrum Analyzer E4440A Option 122 80 MHz Bandwidth Digitizer Retrofit Kit

Agilent Technologies

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80 MHz Bandwidth Digitizer Retrofit Kit

Products Affected:	PSA E4440A
Serial Numbers:	US4430 /US99999999 MY4430 /MY99999999
To Be Performed By:	(X) Agilent Service Center
	(X) Personnel Qualified by Agilent
	( ) Customer
Estimated Installation Time:	3 Hours
Estimated Adjustment and Verification Time:	7.5 Hours

Introduction

This retrofit kit provides all parts and instructions for installing Option 122, the 80 MHz Bandwidth Digitizer, into your E4440A spectrum analyzer with the serial number range listed above. The kit installs an alternate 80 MHz wide bandwidth IF path consisting of wide band Analog IF and wide band Digital IF assemblies. The standard IF path requires the addition of a new Digital IF assembly unless the instrument currently has Option 124, Y-Axis Video Out installed. Also, a wide bandwidth bandpass filter and lowpass filter replaces the existing bandpass filter in the lowband (<3 GHz) path.

NOTE The instrument must be performance tested to assure the instrument meets specifications following the hardware installation. The PSA Series Performance Verification and Adjustment Software must be used. All adjustments are automated.

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

Contents

Reference Designator	Description	Agilent Part Number
A7	Digital IF Assembly	E4440-60206
A31	Wide Band Analog IF Assembly	E4440-60215
A32	Wide Band Digital IF Assembly	E4440-60216
FL2	Bandpass Filter, 3.900 GHz	0955-1391
FL3	Lowpass Filter, 4.4 GHz	0955-0519
W60	Cable, ribbon, A31 Wide Band Analog IF to A32 Wide Band Digital IF	E4440-60341
W61	Cable (65), coax, 100 MHz Ref from A11 Reference Assy J2 to A31 Wide Band Analog IF P200	E4440-60344
W62	Cable (95), coax, 300 MHz Ref from A11 Reference Assy P4 to A31 Wide Band Analog IF P103	E4440-60346
W64	Cable (60), coax, Wide Band IF CAL from A31 Wide Band Analog IF P101 to A10 3rd Converter J6	E4440-60345
W65	Cable (40), coax, 321.4 MHz IF from A10 3rd Converter J4 to A31 WB Analog IF P100	E4440-60343
W66	Cable (66), coax, 321.4 MHz from A31 WB Analog IF P104 to Rear Panel	E4440-60385
W67	Cable, Video Out from Digital IF J100 to rear panel	8121-0964
W78	Cable, semi-rigid, FL2 to FL3	E4446-20047
W79	Cable, Semi-rigid, FL3 to A20 Lowband J4	E4446-20048
	Nut, 15/32 for Video Out BNC connector	0590-2332
	Washer for Video Out BNC	2190-0102
	Installation Note	This note
	Option Upgrade Entitlement Certificate	---
	Cable tie .062D .09W	
	Basic Mode Guide	
	Specification Guide	

Tools Required

- ❏ T-20 Torx driver
- ❏ T-10 Torx driver
- ❏ 5/16-inch torque wrench
- ❏ 9/16-inch nut driver/torque driver
- ❏ 8 mm deep socket or open end wrench
- ❏ 7/32 inch or 6 mm open end wrench
- ❏ PSA Series Performance Tests and Adjustment Software, E.01.00 or later
- ❏ Test equipment supported by the PSA Series Performance Tests and Adjustment Software.
- ❏ PSA Series Spectrum Analyzer and Service Guide. This manual is available as part of the E4440AU, E4443AU, or E4445AU Option OBW kits.
- ❏ Microsoft Windows based personnel computer
- ❏ Windows XP Professional, Windows 2000
- ❏ Firmware A.0 6.00 or later. Download the latest revision form http://www.agilent.com/find/psa_firmware, or order the Firmware Update kit.

  The firmware update kit is ordered as E4440AU, Option UE2.

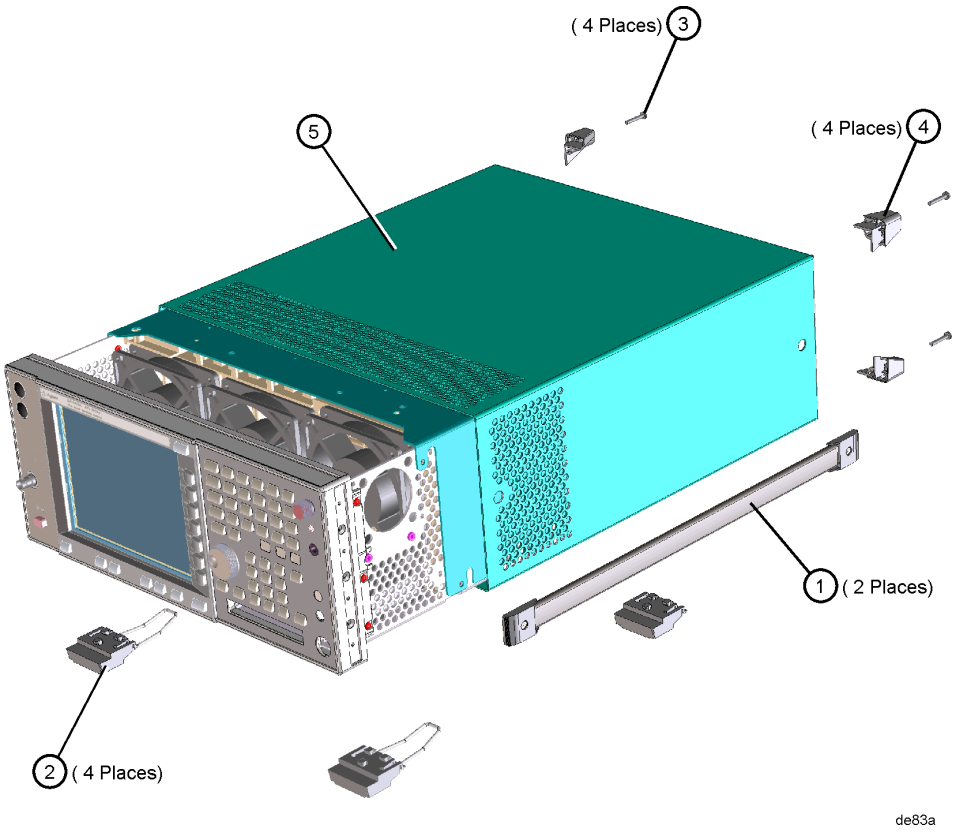
Installation Procedure

Remove the Outer Case

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.

1. Disconnect the instrument from ac power.
2. Refer to Figure 1. Remove the two handles on the sides of the instrument as shown. Use the T-20 driver to loosen the screws that attach each handle **(1)**. Remove the handles.
3. Remove the four bottom feet **(2)**. Lift up on the tabs on the feet, and slide the feet in the direction indicated by the arrows.
4. Remove the four screws **(3)** that hold the rear feet **(4)** in place.
5. Pull the instrument cover **(5)** off toward the rear of the instrument.

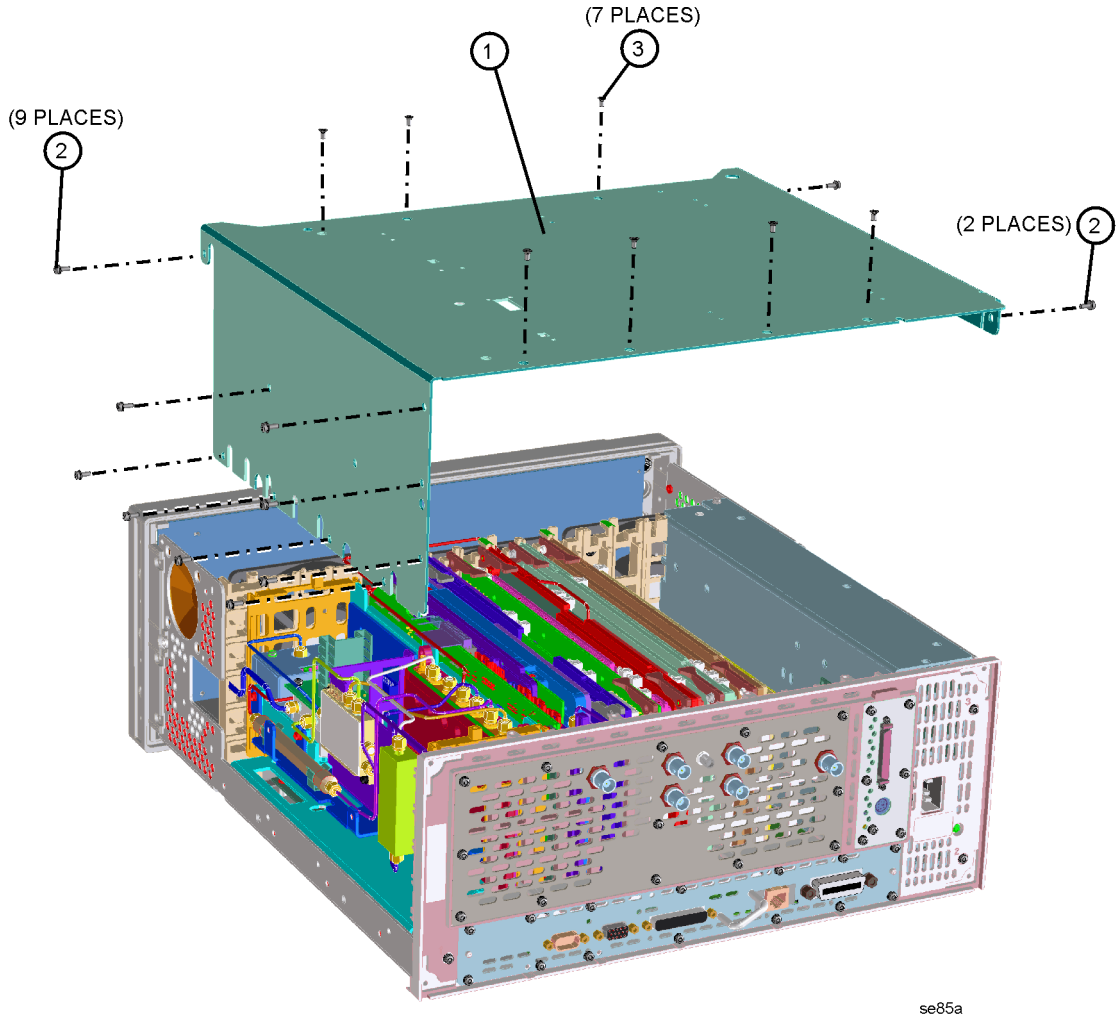
Figure 1 Instrument Outer Case Removal



Remove the Top Brace

1. Refer to Figure 2. Use the T-10 driver to remove the top screws **(3)** (one screw is under the security label), and the side screws **(2)** attaching the top brace **(1)** to the deck.
2. Remove the top brace from the deck.

Figure 2 Top Brace Removal

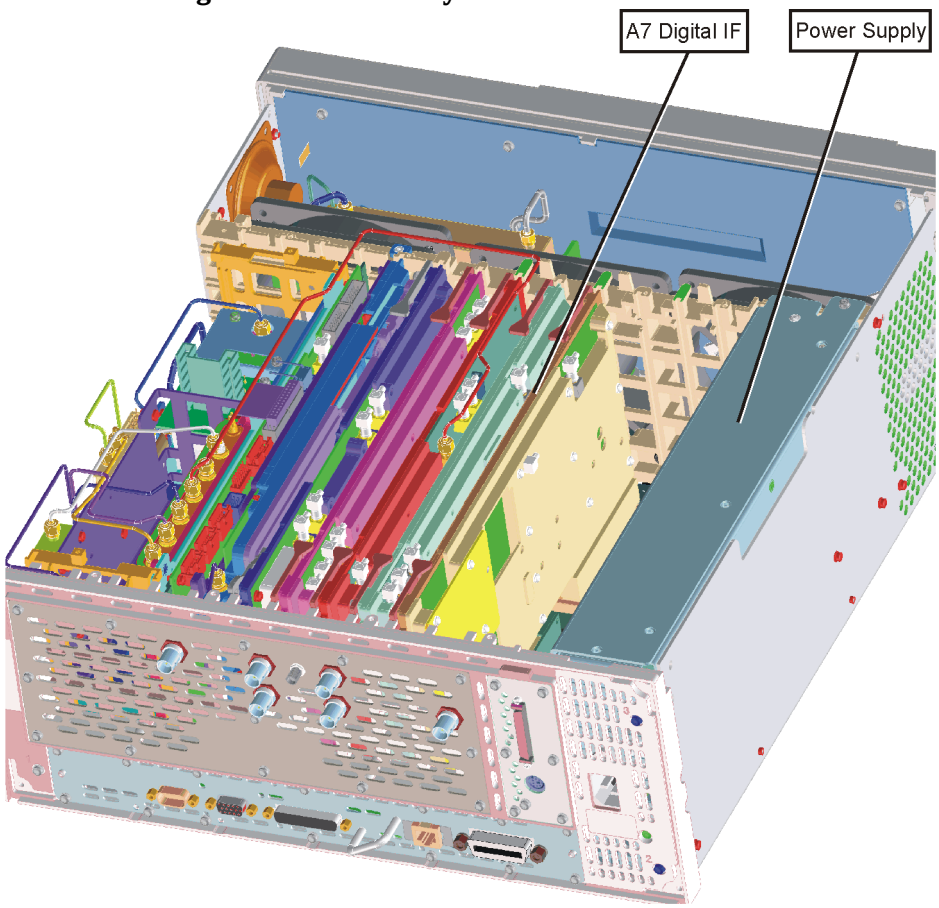


Install the Retrofit Kit

Changes to the Card Cage Area

1. Locate the A7 Digital IF assembly. It is in the forth card slot from the power supply. Refer to Figure 3.

Figure 3 A7 Digital IF Assembly Location

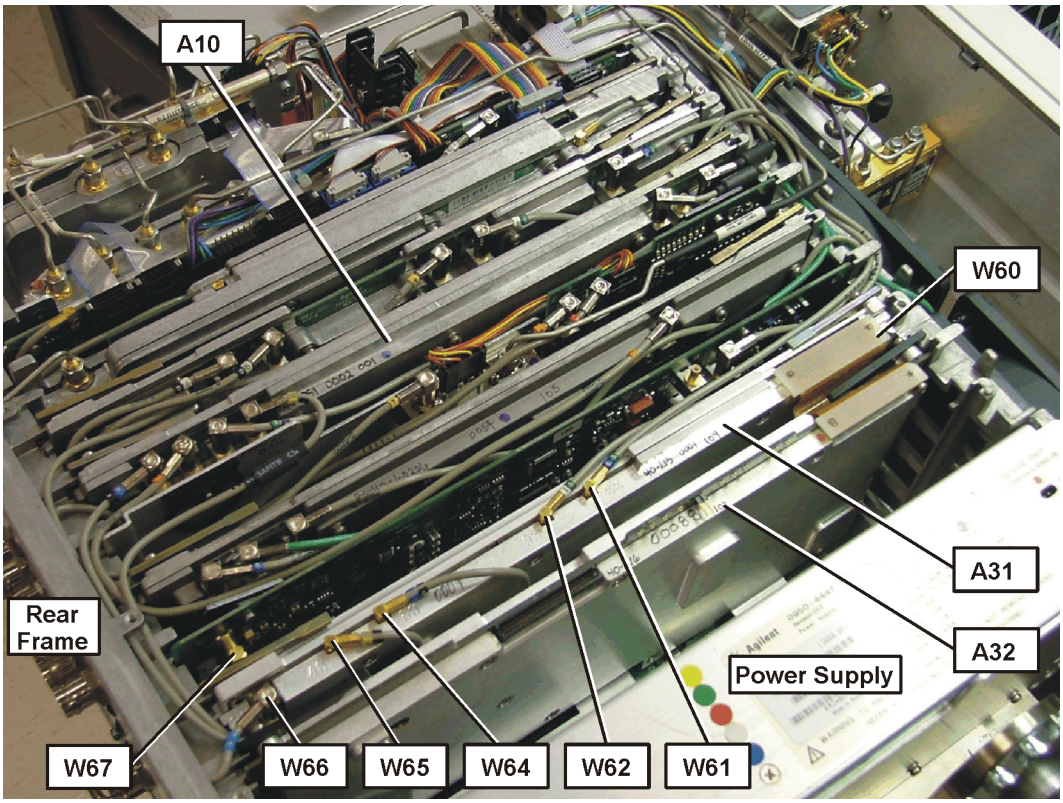


digitalif

2. If the A7 Digital IF assembly has no casting covers (you can see all components on the assembly), go to step 5.
3. If the A7 Digital IF assembly has casting covers, remove the gray flexible coax cable from P1, and remove the board from the instrument. Discard this assembly since it will be replaced.
4. Install the A7 Digital IF assembly from the kit. The A7 Digital IF assembly is the only assembly in the retrofit kit without casting covers. Re-attach the gray cable removed in step 3 to P3. Cable designator “P3” and “GRAY (8)” are silk-screened on the board
5. Look at the instrument's rear dress panel and determine if there is a Video Out BNC connector located near the A7 Digital IF assembly. If there is a BNC already installed go to step 7.

6. If there is a hole plug where the Video Out connector should be, remove the plug and install the BNC to MCX Video Output cable W67 contained in the kit. You will be able to insert the BNC connector through the rear frame. Attach the MCX connector to J100 of the A7 Digital IF assembly. Install the washer and hex nut, included in the kit, and torque to 21 inch pounds.
7. Locate the A31 Wideband Analog IF assembly in the kit. This assembly is the one with the MCX connectors visible on top of the board.
8. Refer to Figure 4. Install the A31 Wideband Analog IF assembly into the board slot next to the A7 Digital IF. This slot is the third slot from the power supply.
9. Locate in the kit, and install the A32 Wideband Digital IF assembly next to the A31 Wideband IF assembly just installed.

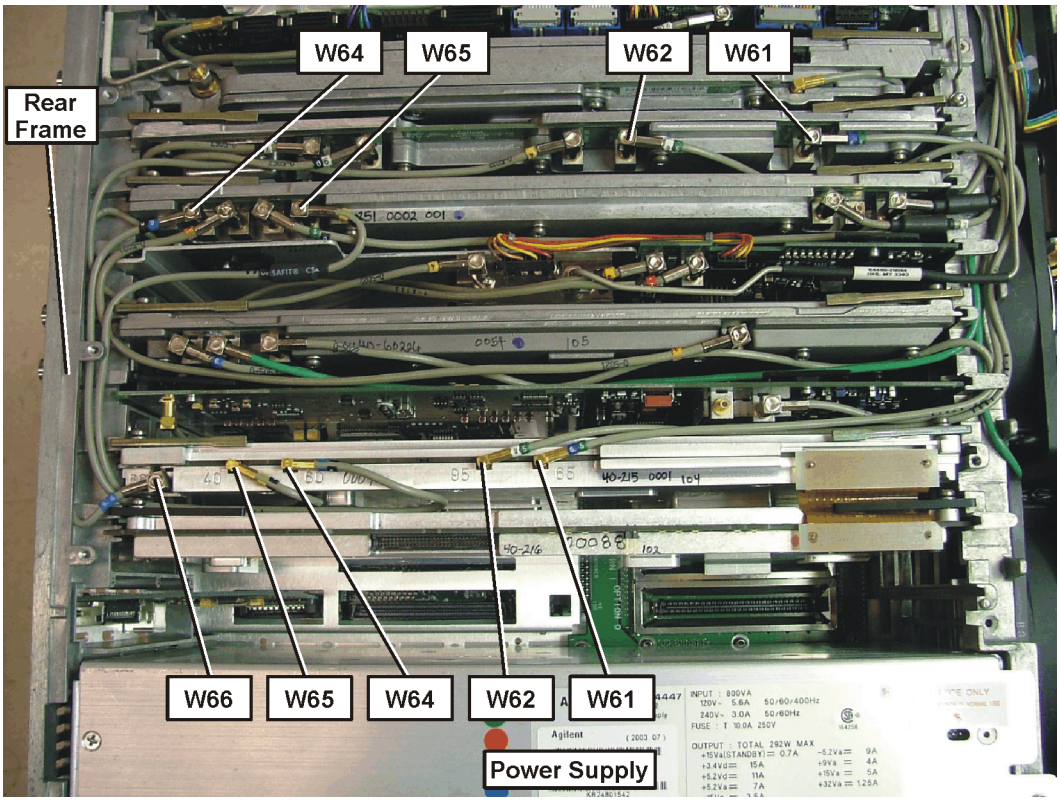
Figure 4 Option 122 Assembly and Cable Locations



10. Remove all cables from the A10 3rd Converter assembly. Please note that all cables are color-coded and the cable color is silk-screened on the 3rd Converter board. Remove the 3rd Converter from the instrument.
11. Remove the 321.4 MHz IF Out SMA cable from the rear panel. Use the 8mm deep socket or open end wrench. Avoid scratching the dress panel.
12. Locate in the kit, and install the replacement 321.4 MHz IF Out cable W66, that has the 66 color bands. Install the washer between the nut and the rear panel and Torque to 21 inch pounds.

13. Refer to Figure 5. Route the end of the W66, 321.4 MHz Out cable along the rear frame and leave the SMB end near, but not attached to the SMB connector on the A31 Wideband Analog IF. Tuck the cable under the top brace mounting tab so the cable will lay tightly against the rear frame.

Figure 5 Cable Routing



14. Reinstall the A10 3rd Converter assembly. Re-attach all cables being sure to follow the color code on the board.

15. Locate the cable with the “60” color code in the kit. Connect the SMB end to the A10 3rd Converter J6 (60). Route the cable along the rear frame and tuck the cable under the top brace mounting tab so the cable will lay tightly against the rear frame. Continue routing the cable between the A31 Wideband Analog IF and A32 Wideband Digital IF assemblies. This routing is critical. Connect the other end to the A31 Wideband Analog IF at the jack marked “60”.

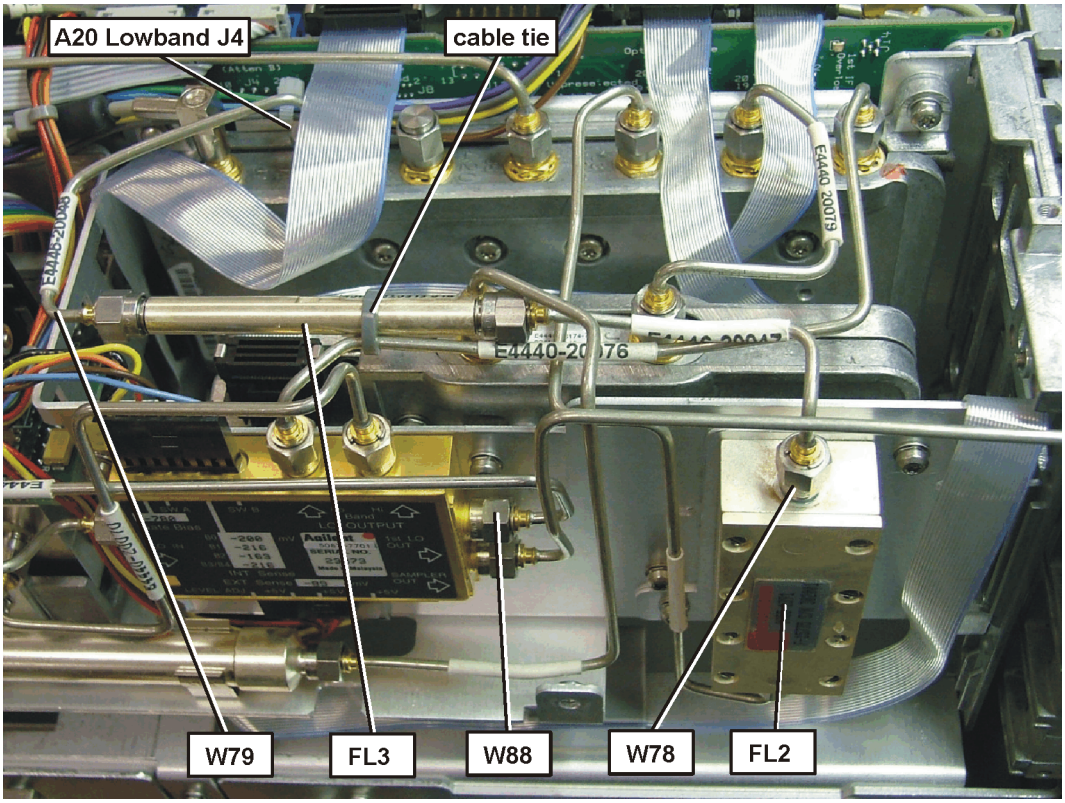
16. Locate the cable with the “40” color code in the kit. Connect the SMB end to the A10 3rd Converter J4 (40). Route the cable along the rear frame. Continue routing the cable between the A31 Wideband Analog IF and A32 Wideband Digital IF assemblies. This routing is critical. Connect the other end of the cable to the A31 Wideband Analog IF at the jack marked “40”.

17. Attach the W66 cable to the SMB connector on the A31 Wideband Analog IF assembly. This is the cable you left unattached in step 13.
18. Locate the cable with the “95” color code in the kit. Connect the SMB end of the cable to the A11 Reference assembly's 300 MHZ Out connector. Route the cable towards the fans and then between the A7 Digital IF assembly and the A31 Wideband Analog IF assembly. Connect the other end of the cable to the A31 Wideband Analog IF at the jack marked “95”.
19. Locate the cable with the “65”color code in the kit. Connect the SMB end of the cable to the A11 Reference assembly's 100 MHZ Out connector. Route the cable towards the fans and then between the A7 Digital IF assembly and the A31 Wideband Analog IF assembly. Connect the other end of the cable to the A31 Wideband Analog IF at the jack marked “65”.
20. Locate the ribbon cable in the kit. Notice that the cable is marked for proper orientation to assure the WB AIF end and the WB DIF end is connected to the correct wideband IF assembly. Install the cable by sliding the middle of the cable under the board extractor on the A32 wideband Digital IF assembly. Connect the cable to one of the wideband IF assemblies then push the cable down between the two assemblies. Connect the other end of the cable. Assure the connectors are well seated and check that the board extractor lays flat and does not pinch the cable.

Changes to the RF Section

21. Figure 6 shows the completed installation of replacement filter FL2, the additional filter FL3 and the associated cables. Refer to this figure when completing the rest of the installation, and to determine the location of the components.

Figure 6 RF Section Part Locations



22. Locate FL2 in the instrument and completely remove the cable that connects from the top of the filter to the A20 Lowband Assembly at J4. Discard this cable.

23. Disconnect the cable from the bottom of FL2. Do not remove the other end of this cable.

24. Remove the two screws that secure the FL2 bracket, and remove the filter/bracket assembly.

25. Remove the 3 screws that secure the filter to the bracket and discard the filter.

26. Locate the FL2 replacement filter in the kit and install it on the bracket and then install the filter /bracket assembly. Torque screws to 9 inch pounds.

27. Reinstall the cable to the bottom of the filter and torque to 10 inch pounds.

28. Locate the two semi-rigid cables and the FL3 filter in the kit.

29. Refer to Figure 6. Install the W78 cable from the top of FL2 to FL3. Connect the W79 cable from the other end of FL3 to A20 Lowband Assembly at J4. Use a 7/32 or 6mm open end wrench to hold the center of FL3 when torquing the cable connectors to 10 inch pounds
30. Use the cable tie contained in the kit to secure FL3 to the semi rigid cable that runs parallel to FL3. Securing the filter will prevent problems if the instrument is subjected to excessive vibration or mechanical shock.

Replace the Top Brace and Outer Case

1. Refer to Figure 2.
2. Carefully position the top brace on the deck. The alignment pin at the center of the web/fan assembly must mate with the alignment hole on the top brace. Make sure that no coaxial cables will get pinched underneath the brace.
3. Use the T-10 driver to replace and tighten the top screws first; then replace the side screws. Torque to 101 Ncm (9 in-lb).
4. Refer to Figure 1.
5. Slide the instrument cover back onto the deck from the rear. The seam on the cover should be on the bottom. Be sure the cover seats into the gasket groove in the front frame.
6. Replace the four rear feet onto the rear of the instrument. Torque to 236 Ncm (21 in-lb).
7. Use the T-20 driver to replace the handles. Torque to 236 Ncm (21 in-lb).
8. Replace the four bottom feet by pressing them into the holes in the case and sliding them in the opposite direction of the arrows until they click into place. Note that the feet at the front have the tilt stands.

Installing the Option Designator and License Keyword

NOTE The option designator 122 and the license keyword must be entered into instrument memory in addition to the correct firmware before the hardware will function.

1. Follow the directions on the Option Upgrade Entitlement Certificate included in the kit. A License Key Certificate that has the license keyword will be e-mailed to you.
2. Plug in instrument and power up. There may be several error messages since new hardware was installed.
3. On the instrument front panel press: **System**, **More**, until the **Licensing** softkey is visible. Press **Licensing** and **Option**. This will activate the alpha editor menu. Use the alpha editor and the front panel numerical keypad to enter the upper-case option designator 122. Enter the letters using the alpha editor and the numeric keypad to enter the numbers. Press the **Enter** key. Note that 122 now appears on the **Option** key.
4. Press **License Key**. The license key number is a hexadecimal number that will require the entry of both letters and numbers. Use the alpha editor and the front panel numerical keypad to enter the license key number. Your entry will appear in the active function area of the display. If you make a typing error, use the backspace key to correct the error. Check the license key number you entered. Press **Enter**, **Activate License**.

Install Firmware A.06.00 or Greater if Needed

1. Press **System, More, Show System**. The Firmware Revision needs to be A.06.00 or later.
2. If the firmware needs to be updated, do the following:
   Download the PSA Update Program and the PSA Firmware Procedure from http://www.agilent.com/find/psa_firmware. Follow the directions to install the firmware.

   Alternate Method:
   Install the Firmware Update Kit E4440AU Option UE2. Follow the directions in the kit.

The installation program senses the presence of the option 122 license and enables the wideband IF circuitry just installed. Unlike some of the other instrument options, there is no check box for option 122 in the firmware update program.

Once the firmware update process is complete, press **System, More, Show System** and verify that 122 appears in the option field.

Perform Adjustments and Performance Tests

NOTE This procedure requires the use of the PSA Performance Tests and Adjustment Software, revision E.01.00 or later.

Adjustments Required

Option 122 Calibration Upgrade Utility

Performance Testing Required

Since so many changes were made to the instrument hardware, perform all possible performance verification tests for your instrument.

Verify the Option

Turn on the wideband IF path and view the internal calibration signal as follows:

The wideband IF is only accessible in the Basic instrument mode.

Press **Mode**, **Basic**

Press **Meas Setup**, **IF Path**, **Wide**. This selects the wideband IF path.

Press **Input/Output**, **Input Port**, **IF Align**

Press **IF Align Signal**

Press **Signal Type** and select **Comb**. The comb signal stimulates the entire 80 MHz IF bandwidth

Press **Meas Setup**, **Res BW** and type in **150 kHz**

You will see a display of the internal comb signal that is generated on the A31 Wideband Analog IF assembly and sent through both the Wideband Analog IF assembly and the A32 Wide Band Digital IF assemblies. Disregarding the center tone, all comb teeth should be within 15 dB of each other, and at least 20 dB above the noise floor.

Press **Input/Output**, **Input Port**, **WB Align (f=300 MHz)**

Press **Frequency**, type in **300 MHz**

You must tune the analyzer to 300 MHz because the WB Align comb signal is injected into the A14 input attenuator and goes through the RF path and the A10 3rd Converter before entering the A31 wideband analog and A32 digital IF assemblies.

The displayed comb signal level will decrease about 10 dB referenced to the displayed level of the IF Align signal in the first part of this verification process. The comb spacing and relative comb amplitudes will remain the same.

End of installation.

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

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

1-800-452-4844 (8am-8pm EST)