Installation Note

HP ESG-D Series Signal Generators
HP E4430B, HP E4431B, HP E4432B, and HP E4433B
Upgrade Standard ESG-D "B"
Add Option UN9 (UN8 + UN9)
HP Kit Part Number E4400-60185

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Standard ESG-D "B" to Option UN9 Upgrade Kit

Product Affected:	ESG-D Series Signal Generators
Models Affected:	HP E4430B, HP E4431B, HP E4432B, and HP E4433B
Serial Numbers:	All
Options:	( )
Compatibilities:	( )
To Be Performed By:	(X) HP Service Center (X) Personnel Qualified by HP (X) Customer
Estimated Installation Time:	2.0 hours
Estimated Verification Time:	0.1 hour

Introduction

The combination of Option UN8 (Real-Time I/Q Baseband Generator with TDMA Standards) and Option UN9, which provide an additional 7 M of data pattern RAM is added to the standard ESG-D Model B Series Signal Generator.

Kit Part Number	Description
E4400-60185	Install Option UN9 (UN8 + UN9).

To install this kit, the following major steps need to be performed.

1. Install Option UN8 and UN9 hardware.

2. Change cable assemblies W25 and W26.

3. Install the new firmware.

4. Verify the firmware.

5. Recalibrate and reassemble the RF signal generator.

After Option UN9 (UN8 + UN9) has been installed, the following major steps need to be performed to verify the operation of the signal generator.

1. Activate Option UN9 (UN8 + UN9).

2. Internally, recalibrate the instrument.

Upgrade Kit E4400-60185

The tools and kit contents required to install the Option UN9 upgrade.

Tools Required

❏ T-10 TORX screwdriver

❏ T-15 TORX screwdriver

❏ Ratchet, 21 in-lbs

❏ Socket, 9/16

❏ Socket, 9/32

❏ Socket, 3/8

❏ Socket, 3/16

❏ Socket, 5/8

❏ Socket, 5.5 mm

❏ Hand torque driver, 9 in-lbs, socket 9/32

❏ Hand torque driver, 6 in-lbs, socket 3/16

❏ Long-nose pliers

❏ Scissors

WARNING   **Before you disassemble the instrument, turn the power switch off and unplug the instrument. Failure to unplug the instrument can result in personal injury.**

CAUTION   Electrostatic discharge (ESD) can damage or destroy electronic components. All work on electronic assemblies should be performed at a static-safe workstation.

Upgrade Kit E4400-60185 Contents

Item	Quantity	Description	Part Number
1	1	This installation note	E4400-90252
2	1	Rear panel (Option UN8)	E4400-00031
3	1	Rear- panel board assembly (A17)	E4400-60145
4	1	Real-time I/Q baseband generator board assembly (A7)	E4400-60070
5	1	8 M generator board assembly (A8)	E4400-60195
6	1	Firmware upgrade kit, digital	E4400-60172
7	1	Front-panel overlay (Option UN8)	E4400-80006
8	1	W3, DATA to motherboard UN3/4: DATA to Data Generator (A8J2)	8120-5063
9	1	W4, DATA CLOCK to motherboard UN3/4: DATA CLOCK to Data Generator (A8J1)	8120-5063
10	1	W5, SYMBOL SYNC to motherboard UN3/4: SYMBOL SYNC to Data Generator (A8J3)	8120-5063
11	1	W15, dual arbitrary waveform generator (A5) to BASEBAND GEN REF (13 MHz)	8120-5055
12	1	W16, dual arbitrary waveform generator (A5J2) to Q OUT	8120-5055
13	1	W17, dual arbitrary waveform generator (A5J1) to I OUT	8120-5055
14	1	W18, rear-panel interface board (A17) to dual arbitrary waveform generator (A8)	8120-8457
15	1	W19, real-time I/Q baseband generator (A7) to generator (A8)	8120-8349
16	2	W25 and W26 SMB cable assembly	8120-8748
17	11	Washer, lock 0.4721D	2190-0102
18	3	Washer, lock 0.4901D	3050-1919
19	14	Nut, hex 15/32-32	2950-0035
20	3	Plug, hole 0.500D	6960-0002
21	1	Label, Option UN9 serial number	7120-1232
22	1	Safety solvent cleaner	8500-6269

WARNING   **Before you disassemble the instrument, turn the power switch off and unplug the instrument. Failure to unplug the instrument can result in personal injury.**

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Functionality Check

This procedure verifies that the signal generator powers up and that the internal instrument check does not identify any errors. The internal check returns an error message if a problem is detected. It is recommended that this procedure is performed prior to installing the upgrade kit.

1. Switch on the instrument line power. The green LED will light. Let the instrument warm up for at least 5 minutes.

2. Cycle the power to the signal generator. The green LED should again be lit and the instrument will perform a check.

3. When the display is lit, check to see if the ERR annunciator is displayed.

4. If the ERR annunciator is displayed, review the error messages in the queue by pressing **Utility**, **Error Info**. The first error message in the queue will be shown in the text area of the display. Refer to the service guide for information about the error message.

   If there is more than one error message (each message will be designated as 1 of n), continue pressing the **View Next Error Message** softkey until you have seen all of the messages.

5. When you have resolved all of the error messages, press **Clear Error Queue(s)** to delete the messages. Afterwards, restart this procedure at step two.

NOTE   For instruments with Option 1E5, ERROR 514, Reference Oven Cold will occur whenever the signal generator is first connected to the AC line power. This error cannot be cleared from the error queue until the internal reference has warmed up (up to approximately 5 minutes).

Install the Option UN9 (UN8 + UN9) Hardware

The following procedures describe how to install the hardware for the Option UND upgrade.

Remove the instrument covers

1. Turn the power switch off and unplug the signal generator.

2. Remove the two strap handles (item 1 in Figure 1) from each side of the signal generator by loosening the two screws (item 2 in Figure 1) on each handle.

3. Remove the four bottom feet (item 3 in Figure 1).

4. Remove the four rear feet (item 4 in Figure 1) from the signal generator by removing the four screws (item 5 in Figure 1) that secure them.

5. Slide the instrument cover (item 6 in Figure 1) off the back of the signal generator.

6. Remove the top cover by removing the 11 screws that secure it.

7. Remove the bottom cover by removing the 15 screws that secure it.
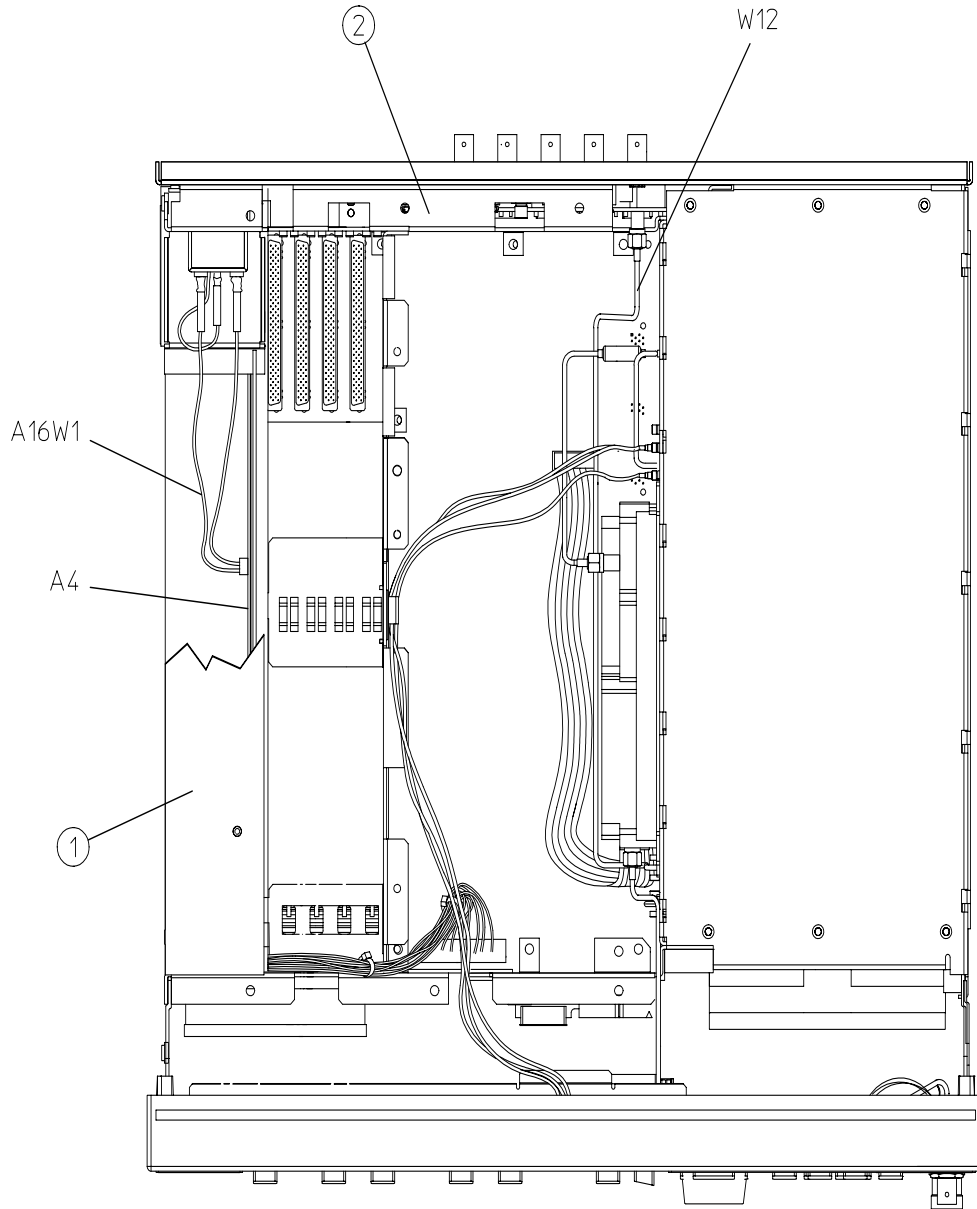
Figure 1   **Top Cover Removal**
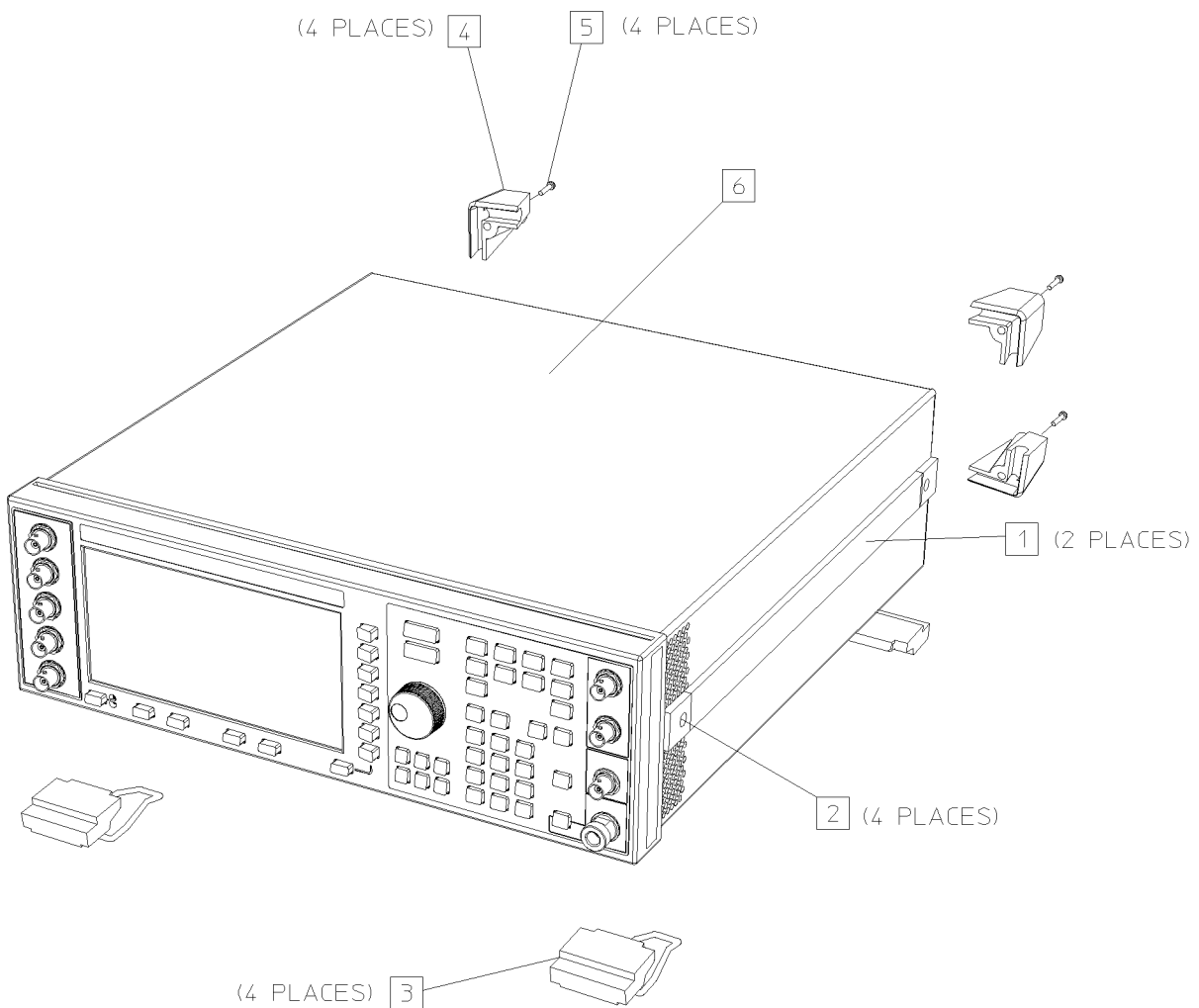
Remove the standard instrument rear panel

1. Disconnect A16W1 from the power supply (A4). A16W1 can be accessed through an opening on the bottom of the power supply shield (item 1 in Figure 2).

2. Disconnect the COHERENT CARRIER cable, W12, from the rear panel.

Figure 2   A16W1 Location

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3. Remove the two screws from the top bracket (item 2 Figure 2) that is located on the top of the rear chassis. Set the bracket aside for replacement later.

4. Remove the nuts and washers securing the five BNC connectors (item 1 in Figure 3) at the base of the rear panel.

5. Remove the hex screws and washers that secure the AUXILIARY INTERFACE (item 2 in Figure 3) and the HP-IB connector (item 3 in Figure 3) to the rear panel.

6. Remove the 10 screws (item 4 in Figure 3) that secure the rear panel to the instrument chassis.

7. Pull the rear-panel assembly away from the instrument chassis.

Figure 3   Rear Panel
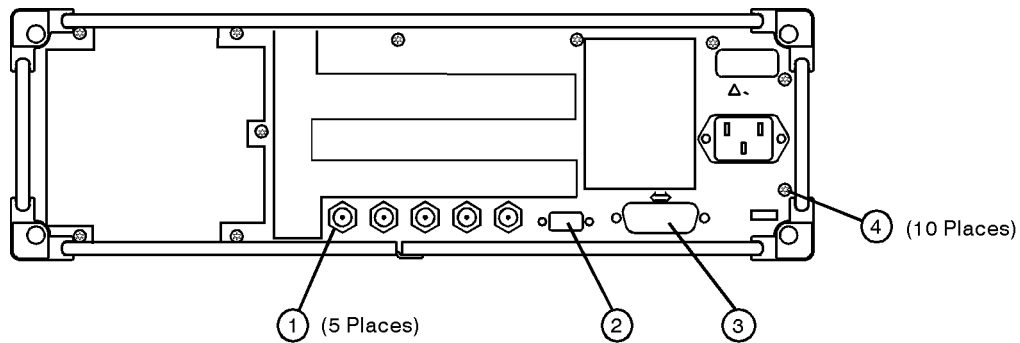
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8. Remove the screws securing the line module and the nut that attaches the green, ground wire.

9. Loosen the nut that secures the COHERENT CARRIER cap. Also, remove the screw that holds the chain and remove it from the rear panel.

10. Loosen the nut that secures the serial tag and remove it.

11. Remove three BNC cables (BASEBAND GEN REF IN, I-OUT, and Q-OUT) and set the standard rear panel aside.

12. Pull the standard rear-panel assembly away from the instrument chassis.

Remove the hardware from the standard rear panel

1. Remove the screws securing the line module and the nut that attaches the green ground wire.

2. Loosen the nut that secures the COHERENT CARRIER cap. Also remove the screw that holds the chain and remove from the rear panel.

3. Loosen the nut that secures the serial tag and remove. Discard the old rear panel.

Assemble the Option UN9 (UN8 + UN9) rear panel

1. Attach the A17 rear-panel interface to the new Option UN9 (UN8 + UN9) rear panel with eight washers and eight hex nuts. Torque to 21 in-lbs.

2. Assemble the COHERENT CARRIER connector to the rear panel using a washer and a hex nut. Torque to 21 in-lbs.

3. Secure the COHERENT CARRIER cap and chain to the rear panel. Torque to 9 in-lbs.

4. Insert W15 into the rear-panel hole for the 13 MHz connector. Secure the cable using a washer and a hex nut. Torque to 21 in-lbs.

5. Insert W16 into the rear-panel hole for the Q-OUT connector. Secure the cable using a washer and a hex nut. Torque to 21 in-lbs.

6. Insert W17 into the rear-panel hole for the I-OUT connector. Secure the cable using a washer and a hex nut. Torque to 21 in-lbs.

7. Insert three hole plugs into the three remaining rear-panel holes.

8. Reinstall the serial tag. Torque to 9 in-lbs.

9. Cut out single UN9 label and attach to the serial tag option location. This identifies the instrument as having Option UN9 (UN8 + UN9) installed.

10. Reinstall the line module using the two flat-head screws. Make certain that the ground plug is pointed down. Torque to 9 in-lbs.

11. Replace the nut that attaches the ground wire from the line module to the ground stud on the rear panel. Torque to 9 in-lbs.

Install the Option UN9 (UN8 and UN9) rear panel

1. Reconnect the line module A16W1 to the power supply (A4).

2. Secure the new Option UN9 (UN8 + UN9) rear panel to the instrument chassis with the 10 screws. Torque to 9 in-lbs.

3. Replace the hex screws on the AUXILIARY INTERFACE. Torque to 6 in-lbs.

4. Replace the hex screws and washers on the HP-IB connector. Torque to 9 in-lbs.

5. Replace the nuts and washers securing the BNC connectors at the base of the rear panel. Torque to 21 in-lbs.

6. Reconnect the nut connecting the COHERENT CARRIER cable (W12) to the rear panel. Torque to 9 in-lbs.

7. Reconnect the bracket at the rear of the instrument using the two screws.

8. Replace the bottom chassis cover with the 15 screws. Torque to 9 in-lbs.

Modify the front panel

Refer to Figure 4 for the following steps.

1. Remove the nut and washer that secures the front panel I INPUT connector to W1.

2. Remove the nut and washer that secures the front panel Q INPUT connector to W2.

3. Remove the existing INPUT overlay from the left side of the front panel. Use Safety Solvent Cleaner to remove any remaining glue from the front panel.

CAUTION   Always read and follow all precautions and directions for the Safety Solvent Cleaner.

Figure 4   **Front Panel**
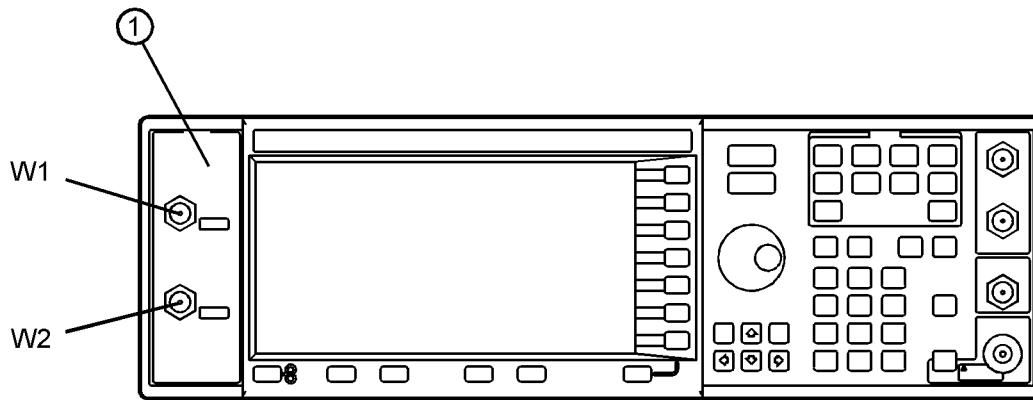
Standard ESG-D Front Panel
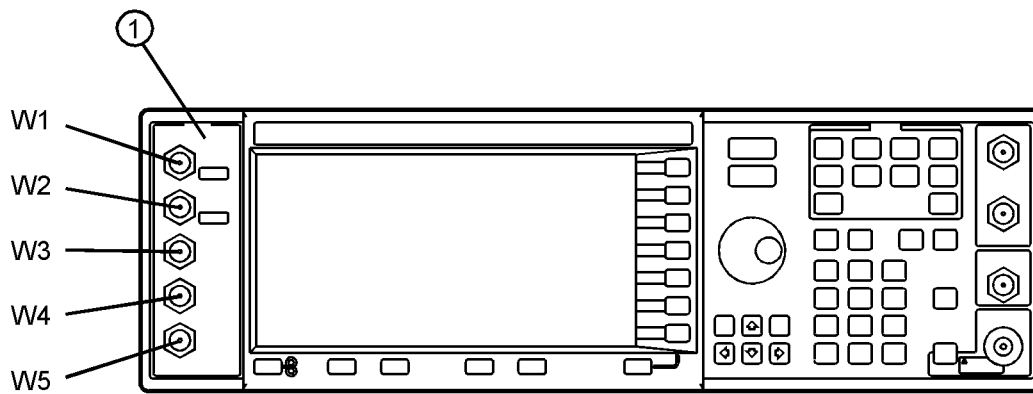
UN8, UN9

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4. Install Option UN9 (UN8 + UN9) overlay and align it with the connector holes. Press firmly on the overlay, from the center outward, to eliminate air bubbles.

5. Reinstall W1 in the I INPUT hole (now located at the top). Attach it to the BNC with a hex nut and spring washer. Torque to 21 in-lbs.

6. Reinstall W2 in the Q INPUT hole (now located at the top). Attach it to the BNC with a hex nut and spring washer. Torque to 21 in-lbs.

7. Install W3 in the DATA INPUT hole. Attach it to the BNC with a hex nut and spring washer. Torque to 21 in-lbs.

8. Install W4 in the DATA CLOCK INPUT hole. Attach it to the BNC with a hex nut and spring washer. Torque to 21 -in-lbs.

9. Install W5 in the SYMBOL SYNC hole. Attach it to the BNC with a hex nut and spring washer. Torque to 21 in-lbs.

Install the Option UN9 (UN8 + UN9) board assemblies

Refer to Figure 5 for the following procedure.

1. Insert the A8 generator/8M assembly into the motherboard connector A14J4.

2. Insert the A7 real-time baseband generator assembly into the motherboard connector A14J3.

3. Connect W3 from DATA to A14P5.

4. Connect W4 from DATA CLOCK to A14P6.

5. Connect W5 from SYMBOL SYNC to A14P7.

6. Connect W18 from the A17 rear-panel interface board assembly to the A8P2 and A17 ribbon cable interconnect.

7. Connect W17 from the A7P405 to the rear-panel I OUT.

8. Connect W16 from the A7P404 to rear-panel Q OUT.

9. Connect W15 from the A7P403 to rear-panel BASEBAND GENREF IN.

10. Connect W19 from A7P300 to A8P3.

Figure 5 **Option UN9 (UN8 + UN9) Top View**

W16 W17 W18 W3 A14P103 W4 W5 A14P102 A17 Rear Panel W26 INT I W25 INT Q

W15

A7

A8

W19
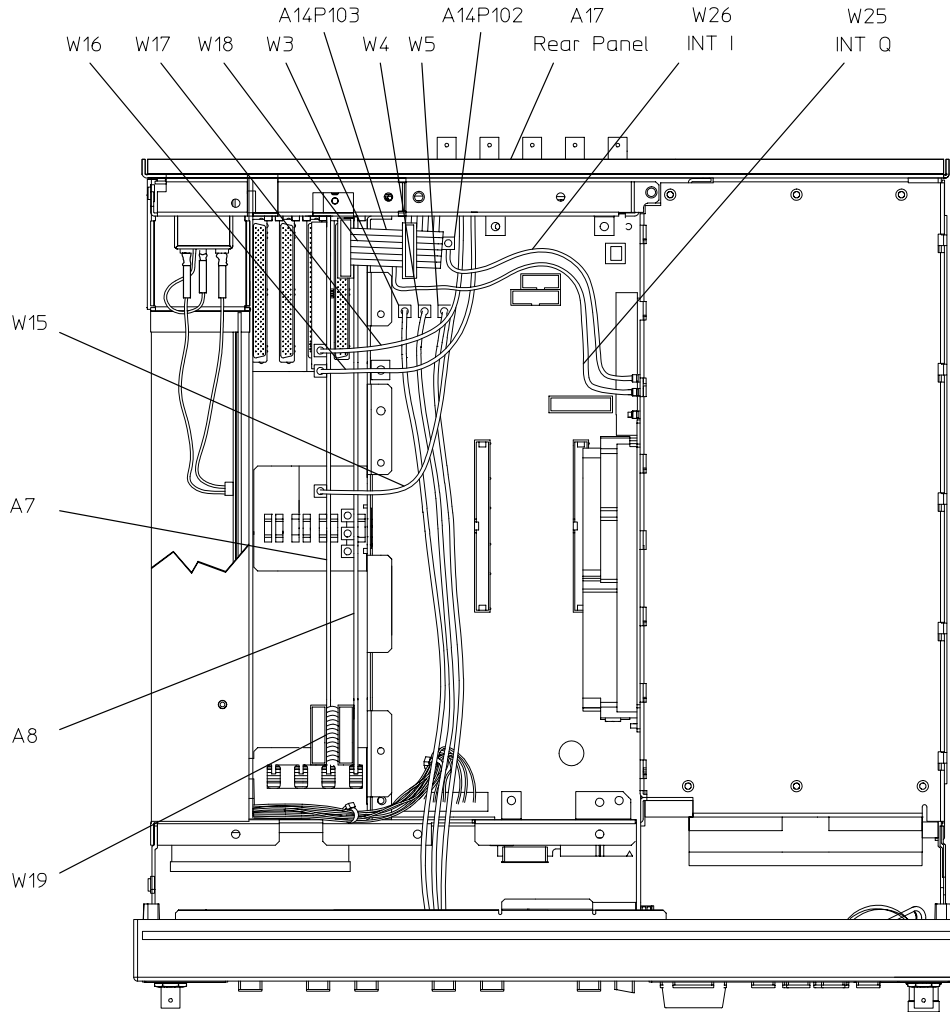
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Install the new Internal I and Q cables

1. Remove W25 cable from between the motherboard (A14P103) and the daughterboard INT Q. Refer to the cable diagram located on the top chassis for location of INT Q. Discard the old cable.

NOTE   A14P103 and A14P102 are located under W18 on the A14 motherboard.

2. Insert the new W25 cable assembly between A14P102 and A15 daughterboard INT Q.

3. Remove W26 cable from between the motherboard (A14P103) and the daughterboard INT I. Refer to the cable diagram located on the top chassis for location of INT I. Discard the old cable.

4. Insert the new W26 cable assembly between A14P102 and A15 daughterboard INT I.

5. Verify all cables listed in Table 1 are installed and routed as shown in Figure 6.

Table 1   **Cable Routing (front to rear)**

Cable Description	Reference Designator	Color Number*	Connection Point to Point
Ribbon Cable Interconnect	W19	–	A7P300 to A8P3
BASEBAND GENREF IN	W15	8	Rear Panel to A7P403
Q OUT	W16	9	Rear Panel to A7P404
I OUT	W17	09	Rear Panel to A7P405
DATA	W3	5	Front Panel to A14P5
SYMBOL SYNC	W5	6	Front Panel to A14P7
DATA CLOCK	W4	7	Front Panel to A14P6
Rear Panel Interface Cable	W18	–	Rear Panel Interface (A17) to A8P2
INT Q	W25	05	Daughter Board (A15) to A14P103
INT I	W26	06	Daughter Board (A15) to A14P102
I OUT	W17		Rear Panel to A5J1
Rear Panel Interface Cable	W18		Rear Panel Interface (A17) to A5P1
*Cable color numbers appear in the Connector/Cable Diagram located on the top of the inside cover of the instrument.			

Figure 6   Cables W25 and W26
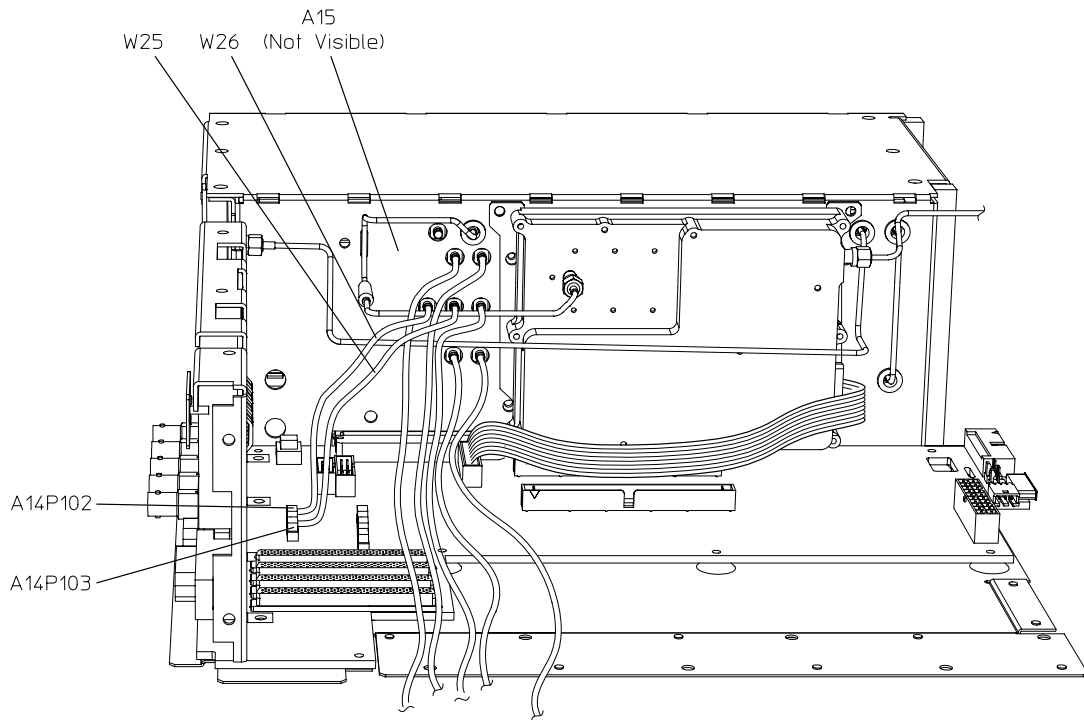
Install the Firmware

New firmware is required to operate the Option UN((UN8 + UN9) real-time I/Q baseband generator. Install the firmware performing all the instructions included in the firmware upgrade kit (HP part number E4400-60172)

Verify the Firmware

Verify the firmware by performing the operate the Option UN((UN8 + UN9) real-time I/Q baseband generator. Install the firmware performing all the instructions included in the firmware upgrade kit (HP part number E4400-60172)

Activate Option UN9 (UN8 + UN9)

1. Plug in and turn the signal generator on. Let it warm up for at least 30 minutes.

2. Press **Preset, Utility, Instrument Adjustments, Hardware Options.**

3. Select Option UN8 and UN9 by highlighting `Option UN8` and `UN9` using the arrow keys, or the front-panel knob, then press **Select Item**. An `X` will be placed in each of the "selected" column.

4. Press **Proceed With Configuration, Confirm Change** to install Options UN8 and UN9. The instrument will reboot and return to preset conditions.

NOTE   If you enable an option that does not have the required hardware installed the menus for that option will be activated, but they will be inoperable, despite what the menus may seem to indicate

Calibrate the signal generator and verify performance

1. Press **Preset, Utility, Instrument Adjustments, Hardware Options, Calibrate Selected Items.**

2. Press **Start Calibration** and **Store Results**. The calibration takes several minutes. During the calibration, a message is displayed indicating the calibration is in progress and showing the percent complete. When the calibration is finished, the Hardware Options menu is returned.

Replace the top cover and instrument cover

Refer to Figure 1 for the following procedure.

1. Turn the power switch off and unplug the signal generator.

2. Reinstall the instrument top cover with the 11 screws that secure it. Torque to 9 in-lbs.

3. Slide the instrument cover in the chassis.

4. Replace the rear four feet with the four screws. Torque to 21 in-lbs.

5. Replace the bottom four feet with the four screws. Torque to 21 in-lbs.

6. Replace the two strap handles with the two screws. Torque to 21 in-lbs.

Installation of the Option UN9 (UN8 + UN9) upgrade kit is now complete.