Keysight E8257D/57N/67D and E8663D PSG Signal Generators

Add Option UNX (Ultra-Low Phase Noise Performance)
Kit Part Numbers: E8257DK-UNX and E8267DK-UNX

Note: For the latest revision of this installation note, go to the following website:
http://www.keysight.com/find/psg or
http://www.keysight.com/find/e8663d

KEYSIGHT
TECHNOLOGIES

Installation Note

Notices

Add Option UNX (Ultra-Low Phase Noise Performance) Kit Part Numbers: E8251-60417, E8251-60980, and E8251-60991

Product Affected:	E8257D/57N/67D and E8663D
Serial Numbers:	All
Options:	
To Be Performed By:	(X) Keysight Technologies Service Center (X) Personnel Qualified by Keysight Technologies (X) Customer
Estimated Installation Time:	2.0 hours
Estimated Verification Time:	2.0 hours

Add Option UNX (Ultra-Low Phase Noise Performance) Kit Part Numbers: E8251-60417, E8251-60980, and E8251-60991

Introduction

This upgrade kit adds Option UNX (Ultra-Low Phase Noise Performance) to an E8257D (Analog) or E8267D (Vector) PSG Signal Generator. This kit applies to instruments that have either a standard reference assembly or Option UNR.

Installation includes the following major steps, starting on :

1. Check signal generator functionality.

2. Record A31 Motherboard version number.[1]

3. Check firmware version and upgrade if <C.04.23.

4. Update the Arrays if Serial Number Prefix is < US/MY 4805

5. Update the Arrays if Serial Number Prefix is ≥ US/MY 5150 or ≥ US/MY 5111

6. Remove the outer and inner signal generator covers.

7. Remove the A32 10 MHz Crystal Oscillator (for instruments with Option UNR).[1]

8. Install the A32 10 MHz Crystal Oscillator.

9. Replace the A31L400 (E8257D) or A31L44 (E8267D) (for instruments with motherboard versions less than A0101)[1]

10. Install W122 Cable and 50 Ohm termination.[1]

11. Connect W135 to W122.[2]

12. Install the A7 Reference assembly.[1]

13. Install A43 board and cables.[3]

14. Activate Option UNX

15. Verify proper installation of Option UNX.

16. Re-assemble the signal generator.

17. Verify signal generator calibration.

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1. For instruments with serial prefixes <US4805/MY4805.
2. For instruments with serial prefixes >US4805/MY4805.
3. For instruments with serial prefixes >US5150/MY5150.

Installation Note E8251-90309

Installation Kit Parts List

E8251-60417

(For instruments with serial prefix < US4805/MY4805)

Item	Quantity	Description	Part Number
1	2	Screw M3 x 0.5 8mm–lg	0515-0372
2	2	Screw M3 x 0.5 4mm–lg	0515-0663
3	3	Cable Tie	1400-0249
4	1	Termination-SMA male coaxial 50 ohm	1810-0118
5	2	Inductor–Fixed 470nH ± 2%	9140-2044
6	1	Bracket, Adapter, Reference Oscillator	E8251-00338
7	1	Cable Assy semi–rigid, UNX 1 GHz	E8251-20595
8	1	A7 Reference Board Assy (Option UNX)	E8251-60648
9	1	A32 10 MHz Crystal Oscillator–UNX	E8251-60626
10	1	Installation Note, UNX Upgrade Kit	E8251-90309
11	1	Entitlement Certificate	n/a

E8251-60980

(For instruments with serial prefix ³ US4805/MY4805)

Item	Quantity	Description	Part Number
1	2	Screw M3 x 0.5 4mm–lg	0515-0663
2	1	Bracket, Adapter, Reference Oscillator	E8251-00338
3	1	A32 10 MHz Crystal Oscillator–UNX	E8251-60626
4	1	Installation Note, UNX Upgrade Kit	E8251-90309
5	1	Entitlement Certificate	n/a

Add Option UNX (Ultra-Low Phase Noise Performance) Kit Part Numbers: E8251-60417, E8251-60980, and E8251-60991

E8251-60991

(For E8257D/57N and E8663D with serial prefix ³ US5150/MY5150)

Item	Quantity	Description	Part Number
1	2	Screw M3 x 0.5 4mm–lg	0515-0663
2	1	Bracket, Adapter, Reference Oscillator	E8251-00338
3	1	A32 10 MHz Crystal Oscillator–UNX	E8251-60626
4	1	Cable Retainer	E8251-40001
5	1	Retainer, Cable Top	E8251-40007
6	1	Cable, LB Output to Amp Filter Board, 2 Piece, Bottom	E8251-20488
7	1	Cable, LB Output to Amp Filter Board, 2 Piece, Top	E8251-20489
8	1	A43, Assembly, Amp Filter Board	E8251-60633
9	1	Installation Note, UNX Upgrade Kit	E8251-90309
10	1	Entitlement Certificate	n/a

Tools Required

— TORX T-10 driver

— TORX T-15 driver

— TORX T-20 driver

— Needle-nose pliers

Safety Considerations

WARNING Before you disassemble the signal generator, turn the power switch off and unplug the power cord. Failure to unplug the signal generator 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.

Check Signal Generator Functionality

Use the following procedure to confirm that the signal generator powers up and the internal check identifies no errors. The internal check evaluates the operation of the signal generator and returns an error message if it detects a problem.

NOTE When the signal generator is first connected to ac line power, the error message `ERROR 514, Reference Oven Cold` occurs which causes both the `OVEN COLD` annunciator and the ERR annunciator to turn on.

After approximately five minutes, the `OVEN COLD` annunciator automatically clears, but the `ERR` annunciator remains on until all errors are cleared from the error queue.

1. Turn on the signal generator and let it warm up for at least five minutes.

2. Run the signal generator self-test by pressing **Utility** > **Instrument Info/Help Mode** > **Self Test** > **Run Complete Self Test**. Upon completion, a summary of the self-test will be displayed. Use the E8257D/67D PSG Service Guide, E8251-90359, to troubleshoot any failures detected by the test.

NOTE Some circuits may require up to 50 minutes to warm up before passing the self-test. If self-tests continue to fail after 50 minutes of warm up, troubleshoot the instrument.

3. Check to see if the `ERR` annunciator is on.

   — If the `ERR` annunciator is on, review the error messages in the error queue by pressing **Utility** > **Error Info**. The first page of error messages in the error queue appears in the display text area. (Refer to the signal generator error messages document for information about each error message.)

   After resolving all problems causing errors, press **Clear Error Queue(s)**.

   — If the `ERR` annunciator is off, the signal generator functionality check has passed.

Add Option UNX (Ultra-Low Phase Noise Performance) Kit Part Numbers: E8251–60417, E8251–60980, and E8251–60991

Record A31 Motherboard Version Number (For Instruments with Serial Prefixes <US4805/MY4805)

1. Press **Utility** > **Instrument Info/Help Mode** > **Installed board info**.

2. Find the information for the Motherboard.

3. Write down the version number of the Motherboard.

Check Firmware Version and Upgrade if < C.04.23

1. Press **Utility** > **Instrument Info/Help Mode** > **Diagnostic Info**.

2. Find the firmware information.

3. If the version of firmware is <C.04.23, upgrade the firmware.

Update the Arrays if Serial Number Prefix is < US/MY 4805

1. Connect the instrument to a LAN and write down the IP address.

   Press **Utility** > **Instrument Info/Help Mode** > **Diagnostic**.

2. Load the IP address into the instrument.

   Press **Utility** > **GPIB/RS-232/LAN** > **LAN Setup** > **IP Address**. Enter the IP address.

3. Using the web browser on the PC, enter the following URL, replacing <ip-address> with the actual IP address you entered into the instrument in the previous step.
   Type: http://<ip-address>/update.

4. Copy the script below and paste it into the text area on the System Update page shown in Figure 1.

   Figure 1   System Update Web Page
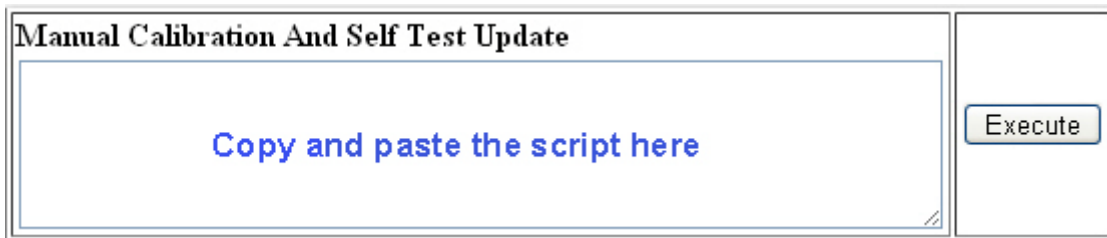
Array Script:

```
cs "REF BANDWIDTH INDEX", 8
cd "REF BANDWIDTH INDEX", 0, 2.5e01
cd "REF BANDWIDTH INDEX", 1, 5.5e01
cd "REF BANDWIDTH INDEX", 2, 1.25e02
cd "REF BANDWIDTH INDEX", 3, 3.0e02
cd "REF BANDWIDTH INDEX", 4, 6.5e02
cd "REF BANDWIDTH INDEX", 5, 1.55e03
cd "REF BANDWIDTH INDEX", 6, 3.65e03
cd "REF BANDWIDTH INDEX", 7, 1.05e04
cc "REF BANDWIDTH INDEX"
cs "REF BANDWIDTH LATCH VALUES", 8
cd "REF BANDWIDTH LATCH VALUES", 0, 0
cd "REF BANDWIDTH LATCH VALUES", 1, 1
cd "REF BANDWIDTH LATCH VALUES", 2, 2
cd "REF BANDWIDTH LATCH VALUES", 3, 3
cd "REF BANDWIDTH LATCH VALUES", 4, 4
cd "REF BANDWIDTH LATCH VALUES", 5, 5
cd "REF BANDWIDTH LATCH VALUES", 6, 6
cd "REF BANDWIDTH LATCH VALUES", 7, 7
cc "REF BANDWIDTH LATCH VALUES"
ky 58881
```

5. Press Execute.

Add Option UNX (Ultra-Low Phase Noise Performance) Kit Part Numbers: E8251–60417, E8251–60980, and E8251–60991

Update the Arrays if Serial Number Prefix is ≥ US/MY 5150 or ≥ US/MY 5111

1. Connect the instrument to a LAN and write down the IP address.

    Press **Utility** > **Instrument Info/Help Mode** > **Diagnostic**.
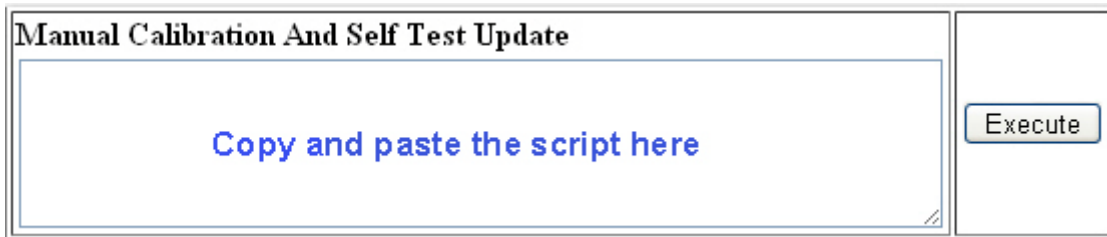
2. Load the IP address into the instrument.

    Press **Utility** > **GPIB/RS-232/LAN** > **LAN Setup** > **IP Address**. Enter the IP address.

3. Using the web browser on the PC, enter the following URL, replacing ‹ip-address› with the actual IP address you entered into the instrument in the previous step.
    Type: http://‹ip-address›/update.

4. Copy the script below and paste it into the text area on the System Update page shown in Figure 1.

    Figure 2   System Update Web Page

Array Script:

```
cs "SPECIALS LATCH VALUE", 18
cd "SPECIALS LATCH VALUE",0,+5.4000000000000E+01
cd "SPECIALS LATCH VALUE",1,+5.4000000000000E+01
cd "SPECIALS LATCH VALUE",2,+5.4000000000000E+01
cd "SPECIALS LATCH VALUE",3,+5.4000000000000E+01
cd "SPECIALS LATCH VALUE",4,+5.4000000000000E+01
cd "SPECIALS LATCH VALUE",5,+5.4000000000000E+01
cd "SPECIALS LATCH VALUE",6,+4.9000000000000E+01
cd "SPECIALS LATCH VALUE",7,+4.9000000000000E+01
cd "SPECIALS LATCH VALUE",8,+5.3000000000000E+01
cd "SPECIALS LATCH VALUE",9,+5.3000000000000E+01
cd "SPECIALS LATCH VALUE",10,+5.1000000000000E+01
cd "SPECIALS LATCH VALUE",11,+5.1000000000000E+01
cd "SPECIALS LATCH VALUE",12,+1.1000000000000E+01
cd "SPECIALS LATCH VALUE",13,+1.1000000000000E+01
cd "SPECIALS LATCH VALUE",14,+4.3000000000000E+01
cd "SPECIALS LATCH VALUE",15,+4.3000000000000E+01
cd "SPECIALS LATCH VALUE",16,+2.7000000000000E+01
cd "SPECIALS LATCH VALUE",17,+2.7000000000000E+01
cc "SPECIALS LATCH VALUE"
cs "FREQ DIV FRACN OUTFILT VAL",18
cd "FREQ DIV FRACN OUTFILT VAL",0,+7.2940000000000E+03
cd "FREQ DIV FRACN OUTFILT VAL",1,+7.2930000000000E+03
cd "FREQ DIV FRACN OUTFILT VAL", 2,+7.4210000000000E+03
cd "FREQ DIV FRACN OUTFILT VAL", 3,+7.4190000000000E+03
cd "FREQ DIV FRACN OUTFILT VAL", 4,+7.9270000000000E+03
cd "FREQ DIV FRACN OUTFILT VAL", 5,+7.9190000000000E+03
cd "FREQ DIV FRACN OUTFILT VAL", 6,+7.9270000000000E+03
cd "FREQ DIV FRACN OUTFILT VAL", 7,+7.9190000000000E+03
cd "FREQ DIV FRACN OUTFILT VAL", 8,+7.9270000000000E+03
cd "FREQ DIV FRACN OUTFILT VAL", 9,+7.9190000000000E+03
cd "FREQ DIV FRACN OUTFILT VAL",10,+7.9270000000000E+03
```

Add Option UNX (Ultra-Low Phase Noise Performance) Kit Part Numbers: E8251-60417, E8251-60980, and E8251-60991

```
cd "FREQ DIV FRACN OUTFILT VAL",11,+7.9190000000000E+03

cd "FREQ DIV FRACN OUTFILT VAL",12,+7.9270000000000E+03

cd "FREQ DIV FRACN OUTFILT VAL",13,+7.9190000000000E+03

cd "FREQ DIV FRACN OUTFILT VAL",14,+7.9270000000000E+03

cd "FREQ DIV FRACN OUTFILT VAL",15,+7.9190000000000E+03

cd "FREQ DIV FRACN OUTFILT VAL",16,+7.9270000000000E+03

cd "FREQ DIV FRACN OUTFILT VAL",17,+7.9190000000000E+03

cc "FREQ DIV FRACN OUTFILT VAL"

ky 16015
```

5. Press Execute.

Remove the Outer and Inner Signal Generator Covers

Remove the Outer Cover

Refer to Figure 3.

1. Disconnect the power cord.

2. Using a T-20 driver, loosen the two screws (1) and remove the strap handle (2).

3. Using a T-15 driver, remove the center screws (3) on the four rear-panel feet (4).

4. Remove the four bottom feet (5) from the cover by lifting the tab and sliding the foot toward the tab.

5. Place the signal generator on its side.

6. Tilt the signal generator forward and slide the outer cover (6) back to remove it from the frame.

Remove the Inner Top Cover

Refer to Figure 4.

1. Using a T-10 driver, remove the screws (1) from the inner-top cover (2). There are twelve screws for E8257D and eleven screws for E8267D.

2. Remove the inner-top cover.

Add Option UNX (Ultra-Low Phase Noise Performance) Kit Part Numbers: E8251-60417, E8251-60980, and E8251-60991
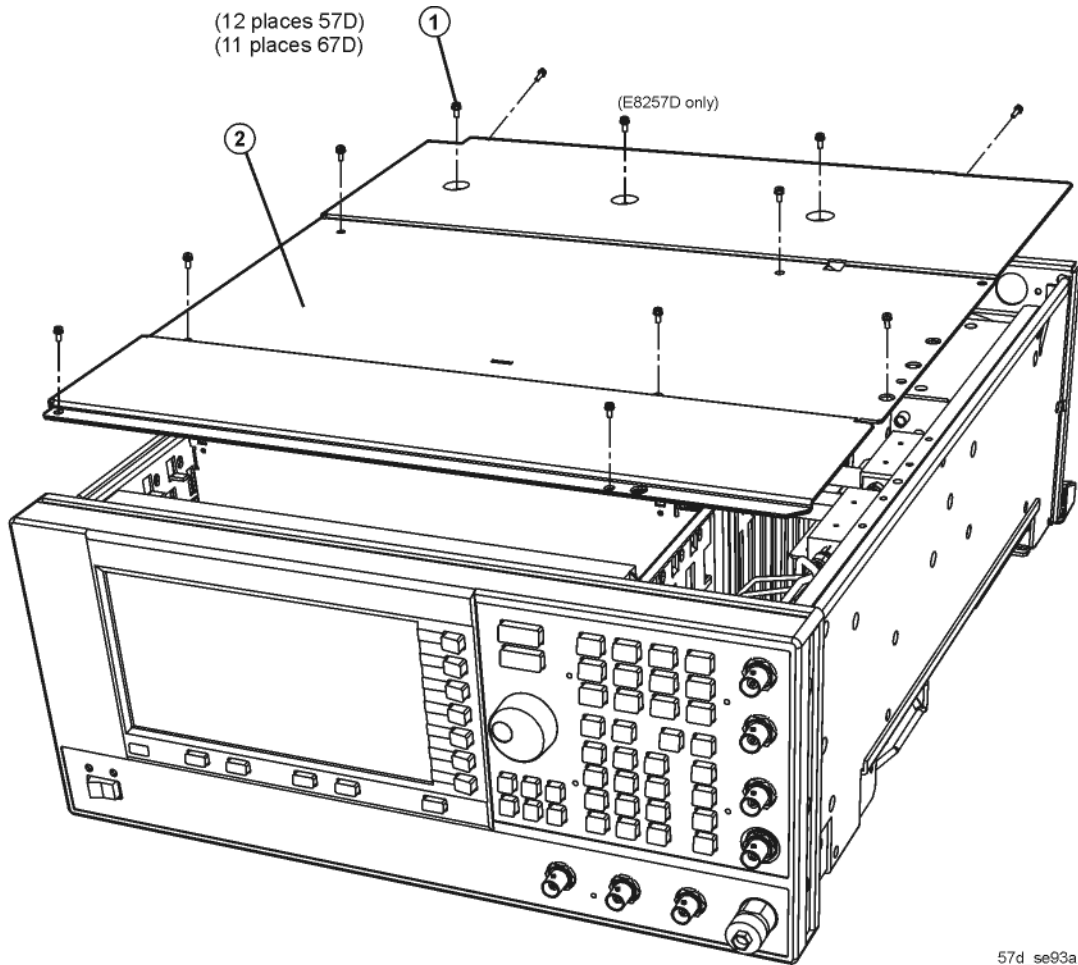
Figure 3   **Outer Cover Removal**
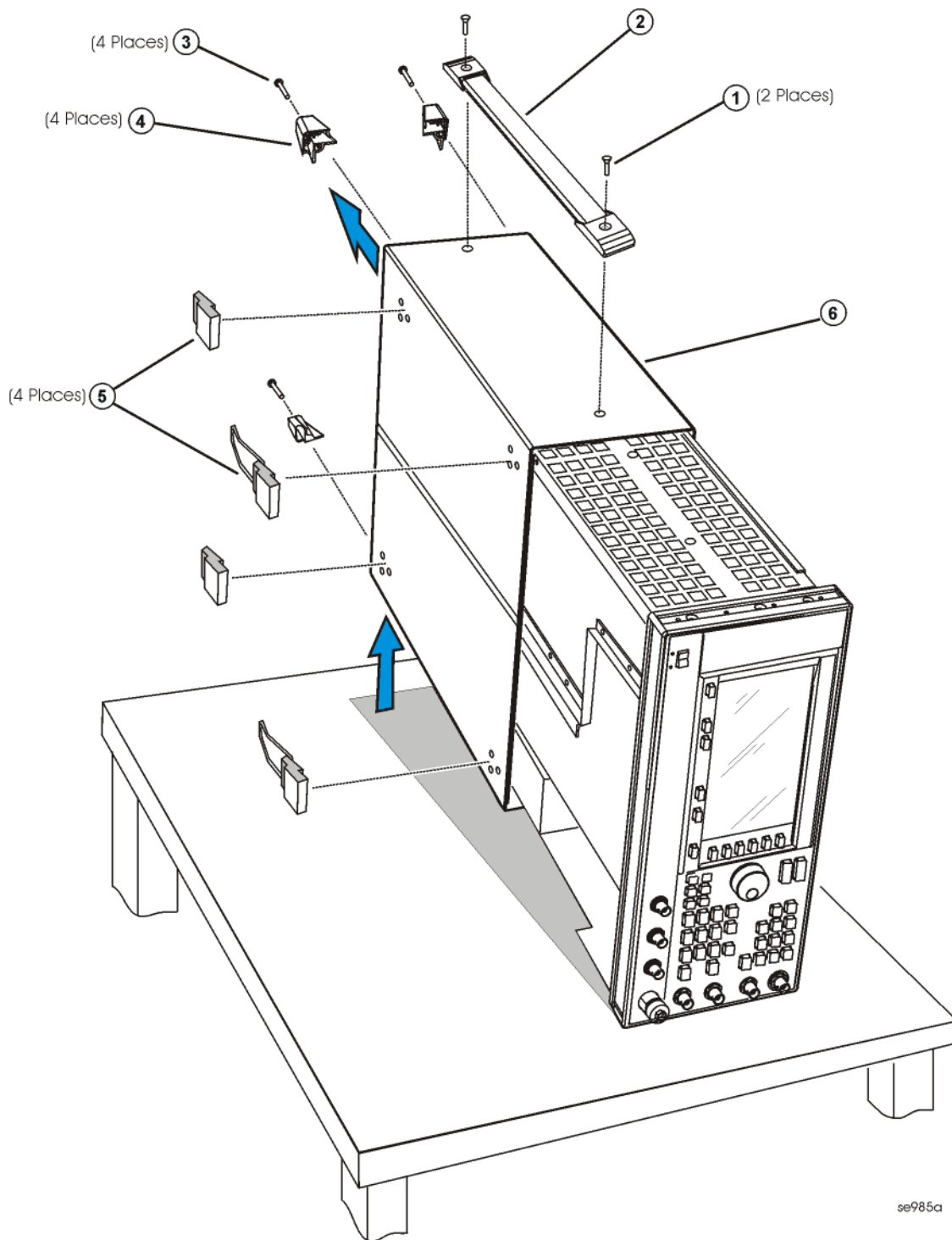
Figure 4   Inner Top Cover Removal

(12 places 57D)
(11 places 67D)

(E8257D only)

57d_se93a

Add Option UNX (Ultra-Low Phase Noise Performance) Kit Part Numbers: E8251–60417, E8251–60980, and E8251–60991

Remove the A32 10 MHz Crystal Oscillator (For instruments with Option UNR) (For Instruments with Serial Prefixes <US4805/MY4805)

Refer to Figure 5 for this procedure.

1. Position the signal generator with the rear panel facing you.

2. Using the needle-nose pliers, disconnect the W47 flexible cable (A31 Motherboard J1041) from A32J2.

3. Using the needle-nose pliers, disconnect the W48 flexible cable (10 MHz EFC) from A32J1.

4. Disconnect the A32W1 bias cable from the A21 Rear Panel Interface P2.

5. Using the T–10 driver, remove the three screws (3) that attach the A32 10 MHz Crystal Oscillator to the rear panel.

6. Remove the A32 10 MHz Crystal Oscillator.

## Install the A32 10 MHz Crystal Oscillator

NOTE	W47 may be shipped disconnected from the A32 10 MHz Crystal Oscillator. If it is disconnected, connect one end of the cable to A32J2 before you start the installation procedure.

Refer to Figure 5.

1. Position the signal generator with the rear panel facing you.

2. For E8257D (all) and E8267D instruments with serial prefix <US4824/MY4824; use the T–10 driver to attach the bracket adapter (1) to the A32 housing frame using the two 4mm screws (2).

3. Using a T–10 driver, install the three screws (3) to secure the A32 10 MHz Crystal Oscillator to the rear panel.

4. Connect the A32W1 bias cable to the A21 Rear Panel Interface Board, A21P2.

5. Using the needle-nose pliers, connect the W48 flexible cable from 10 MHz EFC (rear panel connector) to A32J1.

6. Using the needle-nose pliers, connect the W47 flexible cable to J1041 of the A31 Motherboard.

Figure 5   A32 10 MHz Crystal Oscillator

p-se940a

A32   A32W1   A21P2   A47   A48
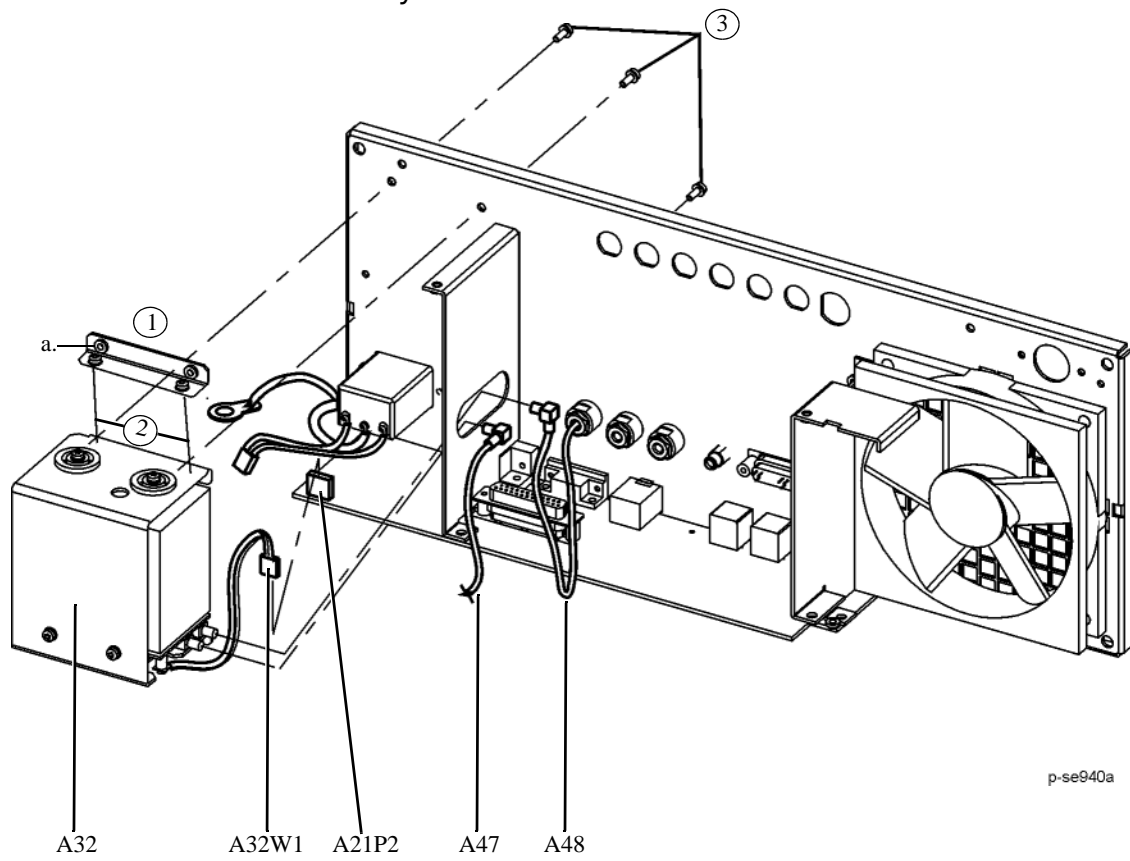
a.Used only on E8267D with serial prefix <US4824/MY4824 and all E8257D.

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For Instruments with Motherboard Versions Less than A0101, replace A31L400 (E8257D) or A31L44 (E8267D) (For Instruments with Serial Prefixes <US4805/MY4805)
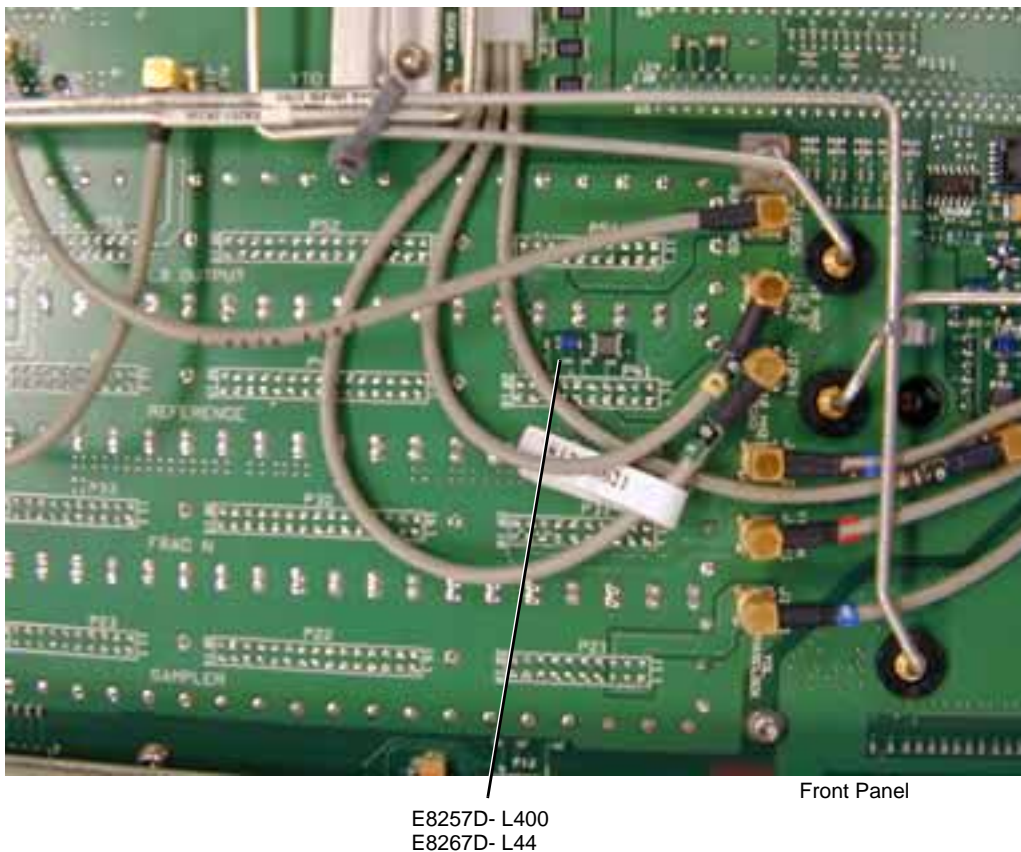
Refer to Figure 6.

1. Position the signal generator with the A31 Motherboard facing you.

2. Remove A31L400 (E8257D) or A31L44 (E8267D).

3. Install the new inductor, provided in this kit.

NOTE	There is a spare replacement inductor provided in this kit.

Figure 6   A31L400 and A31L44


Front Panel

E8257D- L400
E8267D- L44

Install W122 Cable and 50 ohm Termination

Refer to Figure 7.

1. Position the signal generator with the front panel facing you.

2. Lift the retention levers and disconnect the A5 Sampler, A6 Frac-N, A7 Reference, and A8 Output boards from the A31 Motherboard.

3. Lift the boards out of the slots.

4. Position the signal generator with the A31 Motherboard facing away from you and the RF deck on top.

5. Using your hand or a pair of pliers, remove the W39 cable retainer tab.

6. Slightly pull W39 away from the A31 Motherboard.

7. Install W122 (E8251-20595, provided in this kit). Slide it under W46 and W39 and insert it into the 1GHz Ref Out.

8. Reattach W39 to the A31 Motherboard.

9. Using the cable ties provided in this kit, tie W122 to W46 and W39.

10. Position the signal generator with the front panel facing you.

11. Re-install the A5 Sampler, A6 Frac-N, and A8 Output boards.

Add Option UNX (Ultra-Low Phase Noise Performance) Kit Part Numbers: E8251–60417, E8251–60980, and E8251–60991
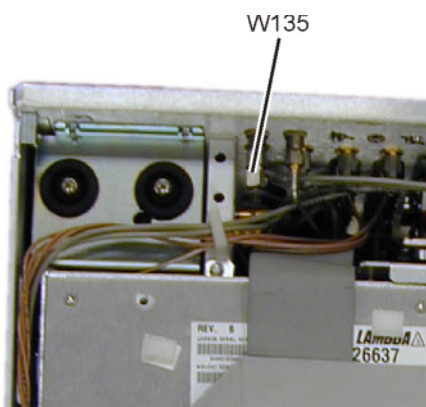
Figure 7   W122 Installation
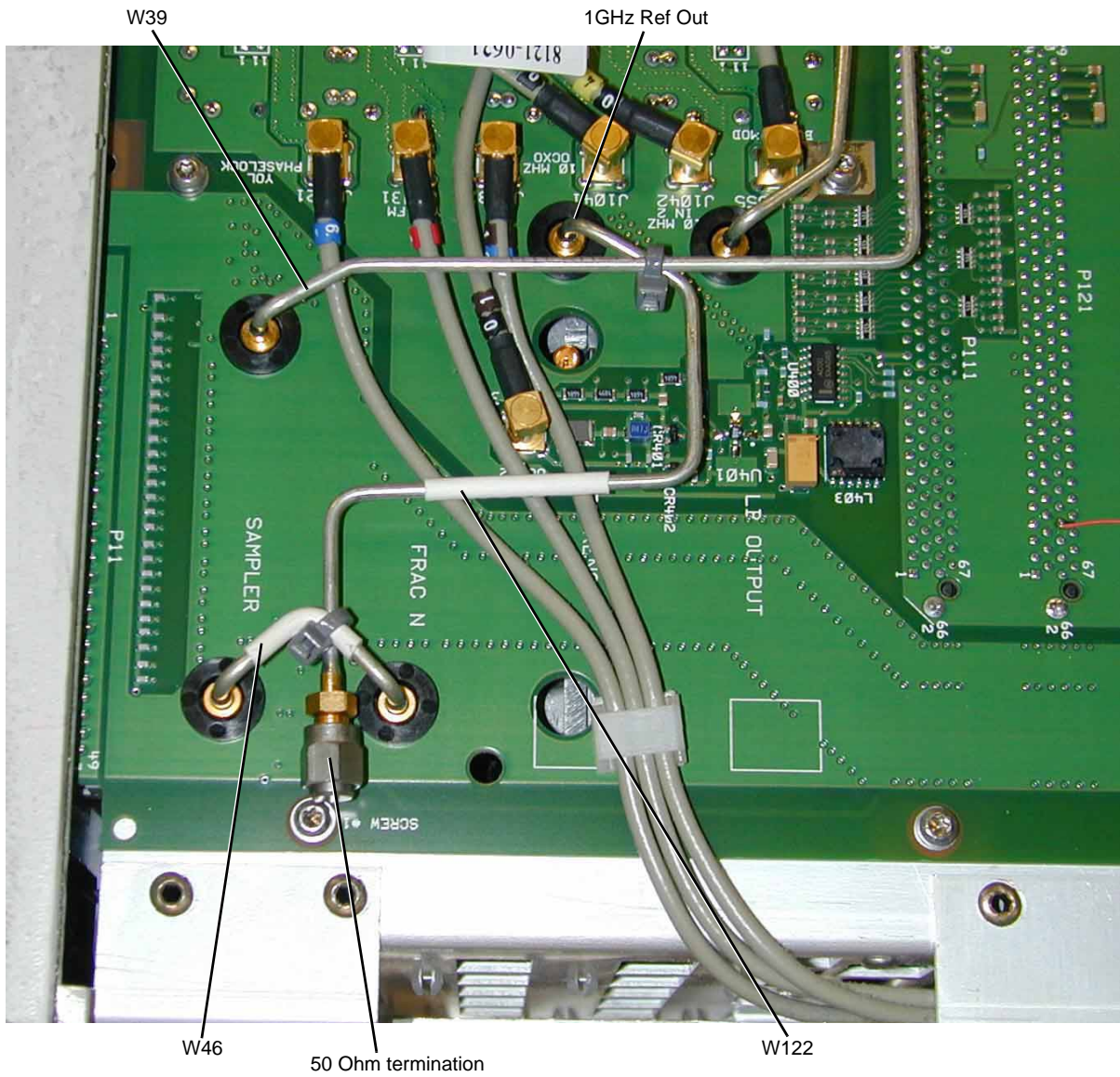
Connect W135 to W122 (For Instruments with Serial Prefixes >US4805/MY4805)

Refer to Figure 7 and Figure 8.

1. Position the signal generator with rear panel facing you.

2. Remove the zip tie from the 1 GHz out cable (W135) on the rear panel, refer to Figure 8.

3. Position the signal generator with the A31 Motherboard on top.

4. Remove the 50 Ohm terminator from W122.
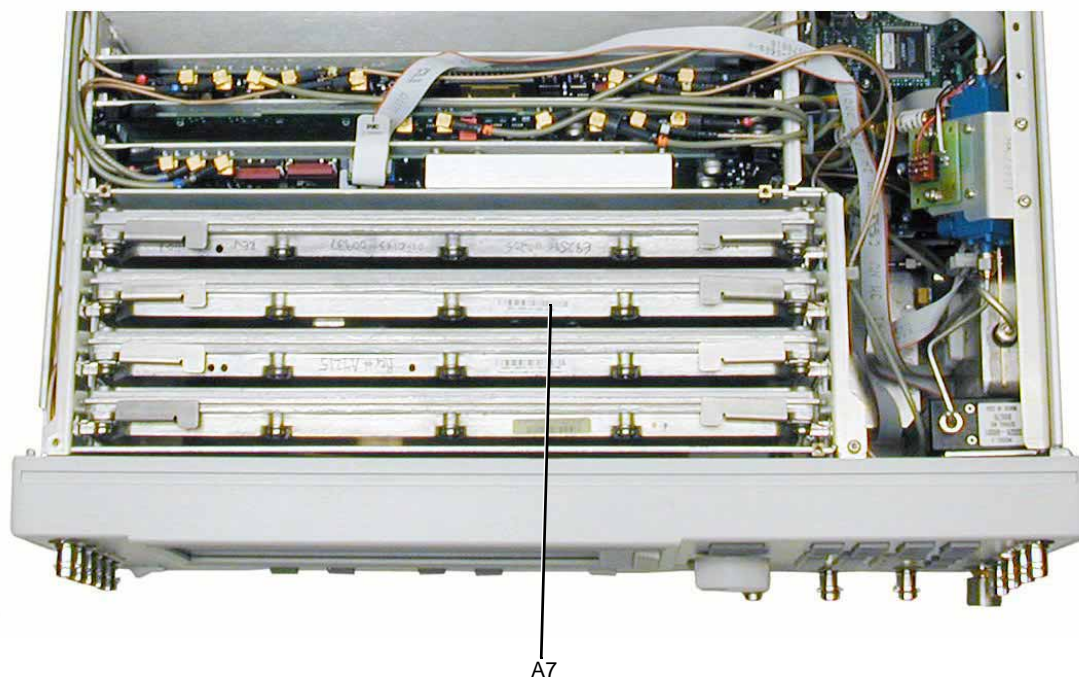
5. Connect the W135 to W122.

Figure 8   W135

Add Option UNX (Ultra-Low Phase Noise Performance) Kit Part Numbers: E8251–60417, E8251–60980, and E8251–60991

Install the New A7 Reference Board (For Instruments with Serial Prefixes <US4805/MY4805)

Refer to **Figure 9**.

1. Position the signal generator with the front panel facing you.

2. Install the new A7 Reference board into the empty slot.

Figure 9   A7 Reference

A7

Install new A43 board and cables (For E8257D/57N and E8663D with Serial Prefixes >= US5150/MY5150)

Refer to Figure 10.

1. Position the signal generator with the front panel facing you.

2. Disconnect W139 and remove A43.

3. Replace A43 with the new part, E8251-60633 and reconnect W139.
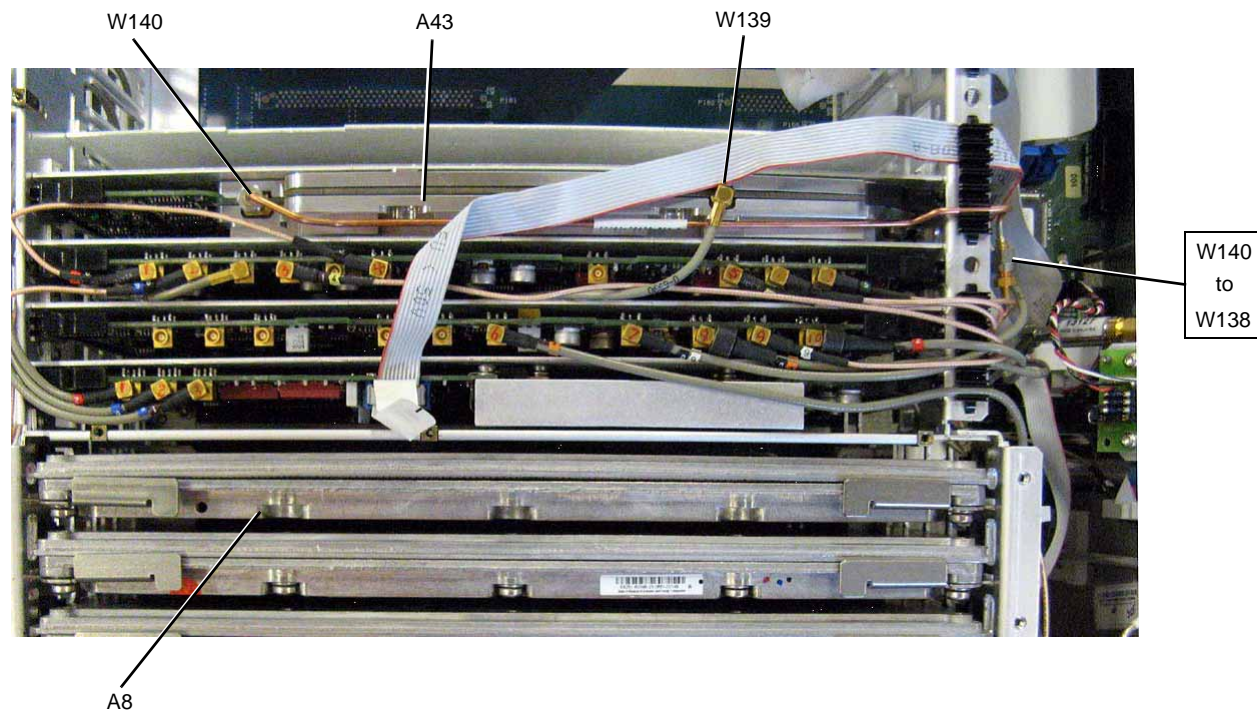
4. Remove A8 board to install cables.

   Use cable retainer within the kit to Install W138, E8251-20488. Refer to Figure 11.

   Install W140, E8251-20489. Refer to Figure 10.

   Connect remaining end of W138 to remaining end of W140.

   Re-install A8 board.

Figure 10

Add Option UNX (Ultra-Low Phase Noise Performance) Kit Part Numbers: E8251–60417, E8251–60980, and E8251–60991

Figure 11

W138

Activate Option UNX

1. Follow the instructions on the Entitlement Certificate.

Verify Proper Installation of Option UNX

1. Turn the instrument on and allow it to warm up for 5 minutes.

2. Press: **Utility** > **Instrument Info/Help Info** > **Options Info**.

3. Make sure Option UNX is listed.

4. Press: **Utility** > **Instrument Adjustments** > **Reference Oscillator Adjustment** > **Restore Factory Defaults**.

5. Make sure Internal Ref Bandwidth (125 Hz) and External Ref Bandwidth (650 Hz) are listed.

NOTE	If you enable an option that does not have the required hardware installed, the menus for that option will be activated but the option cannot operate.

Re-Assemble the Signal Generator

Refer to Figure 3 and Figure 4.

1. Turn the signal generator off and unplug it.

2. Reinstall the inner and outer instrument covers by reversing the order for removal.

3. Torque all T-10 screws to 9 in-lbs.

4. Torque all T-15 and T-20 screws to 21 in-lbs.

Verify Signal Generator Calibration

1. Turn the signal generator on and allow it to warm up for 30 minutes.

2. Perform the following adjustment/performance tests to verify signal generator calibration. Refer to the PSG Family Signal Generators Calibration Software:

    a. ADC Calibration

    b. Self Tests

    c. Harmonic Spurious

    d. Sub-Harmonic Spurious

    e. Non-Harmonic Spurious

    f. Single-Sidedband Phase Noise