

Installation Note

**Agilent Technologies ESG-D Series Signal Generators
E4430B, E4431B, E4432B, and E4433B
Upgrade Kit BERT Measurement (Option UN7)
Kit Number E4400-60143**



Agilent Technologies

Part Number E4400-90171

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Standard Digital to Option UN7 Upgrade Kit

Product Affected:	Agilent Technologies ESG-D Series
Serial Numbers:	---
To Be Performed By:	(X) Agilent Technologies Service Center (X) Personnel Qualified by Agilent Technologies (X) Customer
Estimated Installation Time:	1.5 hours
Estimated Verification Time:	0.2 hours

Introduction

This installation note contains the instructions to install Option UN7, Bit Error Rate Test (BERT) measurement in an ESG-D series signal generator with Option UN3 and UN4. Perform all of the procedures provided here starting with the functionality check and ending with verification.

Equipment Required

- None required

Tools Required

- T-10 TORX screwdriver
- T-15 TORX screwdriver
- Break away torque wrench, 9 in-lbs
- Ratchet, 21 in-lbs
- Long nose pliers
- Socket, 9/16
- Socket 3/8
- Hand torque driver, 9 in-lbs, socket 9/32
- Hand torque driver, 6 in-lbs, socket 3/16
- Scissors
- BNC-BNC cable (2)

Installation Kit Parts List

Table 1 **Parts Kit E4400-60143**

Item	Quantity	Description	Part Number
1	1	A6, board assy - BERT measurement	E4400-60072
2	1	A18, board assy - SMB connector	E4400-60075
3	1	W20, BERT DATA IN to A6P1	8120-5055
4	1	W21, BERT CLK IN to A6P2	8120-5055
5	1	W22, BERT GATE IN to A6P3	8120-5055
6	5	Washer for SMB	2190-0124
7	5	Nut for SMB	2950-0078
8	1	Marker (RED)	7121-5602
9	1	Marker (ORG)	7121-5603
10	1	Marker (YEL)	7121-5604
11	3	Marker (BLK)	7121-5610
12	1	Option UN7 serial number label	7120-1232
13	1	Label, connector diagram	E4400-80066
14	1	Installation note	E4400-90171
15	3	Washer	2190-0102
16	3	Nut	2950-0035
17	1	Rear panel	E4400-00025

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.

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.

1. Switch on the instrument's line power. The green LED will light. Let the instrument warm up for one hour.
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.

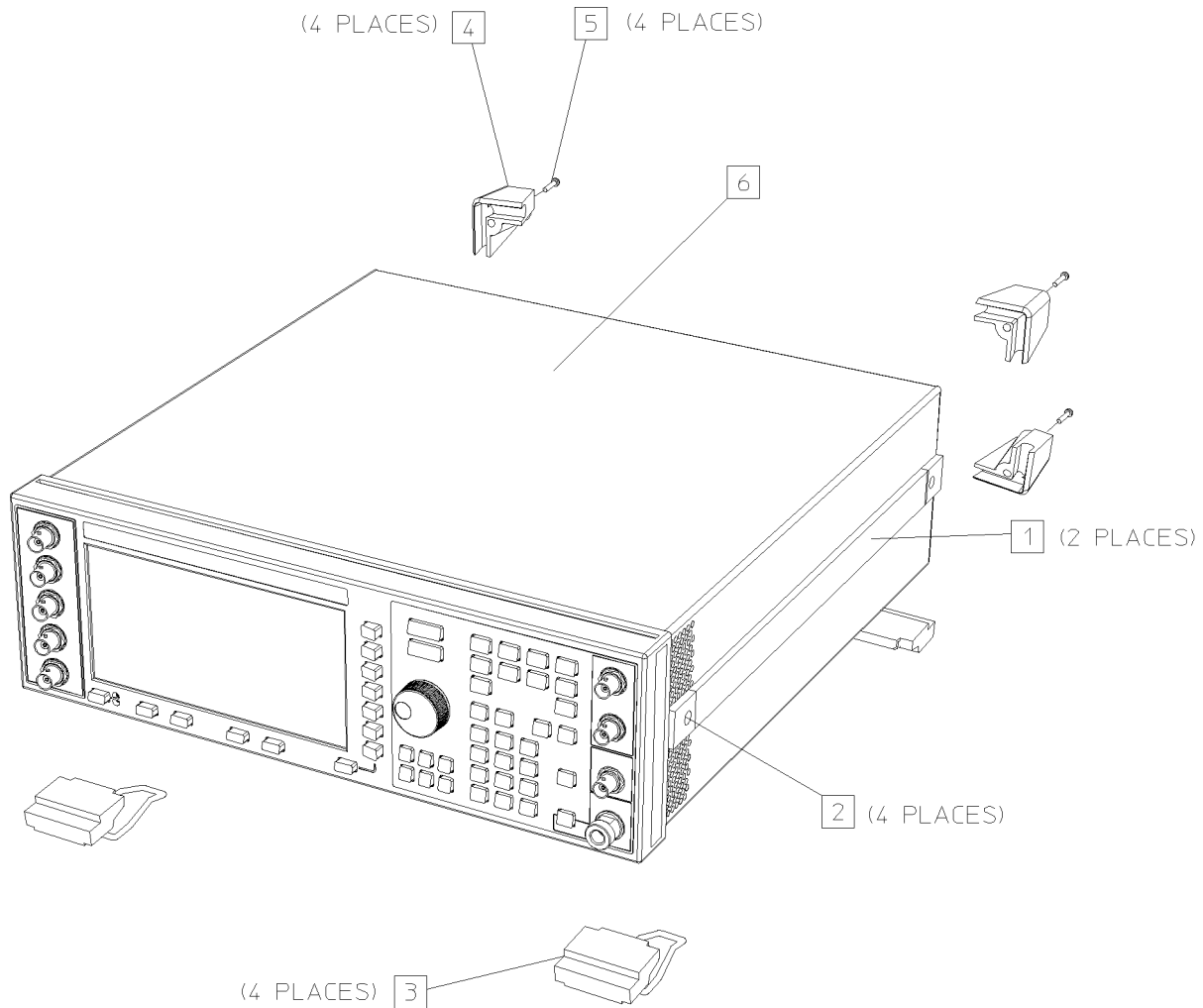
NOTE

For instruments with Option 1E5, **ERROR 514, Reference Oven Cold** will occur whenever the signal generator is first connected to 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 UN7 Hardware

Remove the Instrument Covers

Figure 1 **Top Cover Removal**

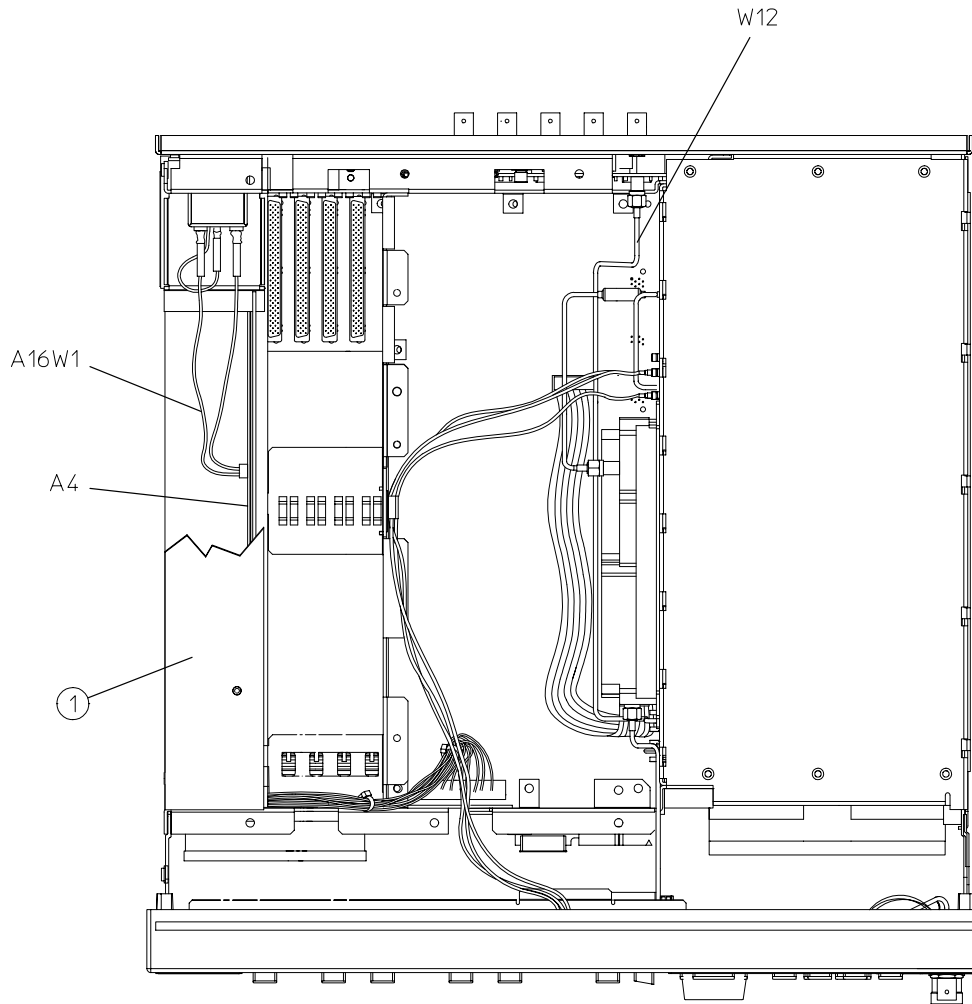


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1. Turn the power switch off and unplug the signal generator.
2. Remove the two strap handles (item 1 in Figure 1) from each side of the signal generator by loosening the two screws (item 2 in Figure 1) on each handle.
3. Remove the four bottom feet (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.

8. 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).

Figure 2 A16W1 Location



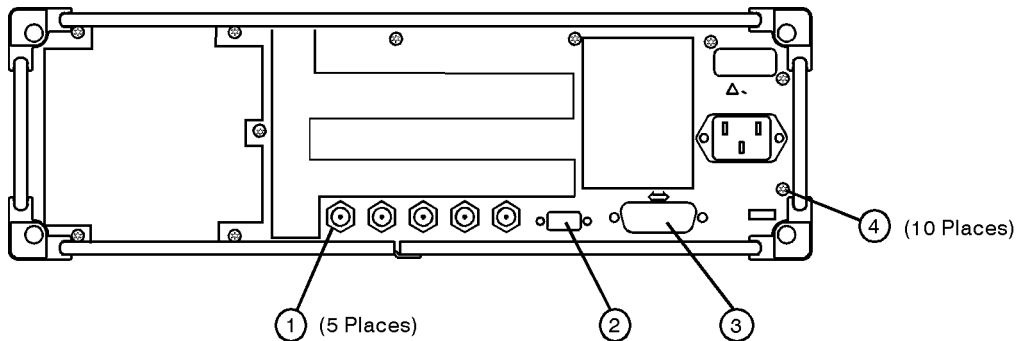
dk71b

Remove the Standard Instrument Rear Panel

1. Disconnect the COHERENT CARRIER cable, W12, from the rear panel.
2. Remove the nuts and washers securing the five BNC connectors (item 1 in Figure 3) at the base of the rear panel.
3. Remove the hex screws and washers that secure the AUXILIARY INTERFACE (item 2 in Figure 3) and the GPIB connector (item 3 in Figure 3) to the rear panel.
4. Remove the 10 screws (item 4 in Figure 3) that secure the rear panel to the instrument chassis.
5. Pull the rear panel assembly away from the instrument chassis.
6. Remove the screws securing the line module and the nut that attaches the green ground wire.
7. Loosen the nut that secures the COHERENT CARRIER cap. Also, remove the screw that holds the chain and remove it from the rear panel.

8. Loosen the nut that secures the serial tag and remove it.
9. Remove 3 BNC cables (BASEBAND GEN REF IN, I-OUT, and Q-OUT) and set the standard rear panel aside.

Figure 3 Rear Panel



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Assemble the Option UN7 Rear Panel

1. Gather the Option UN7 rear panel (E4400-00025).
2. Insert W20 into the rear panel hole for the BERT DATA IN connector. Secure the cable using a washer and a hex nut. Torque to 21 in-lbs.
3. Insert W21 into the rear panel hole for the BERT CLK IN connector. Secure the cable using a washer and a hex nut. Torque to 21 in-lbs.
4. Insert W22 into the rear panel hole for the BERT GATE IN connector. Secure the cable using a washer and a hex nut. Torque to 21 in-lbs.
5. Insert the three BNC cables (BASEBAND GEN REF IN, I-OUT, and Q-OUT) into the Option UN7 rear panel. Secure the cable using a washer and a hex nut. Torque to 21 in-lbs.
6. Secure the COHERENT CARRIER cap and chain to the rear panel. Torque to 9 in-lbs.
7. Insert SMB connector board into the rear panel hole for the 5 BER connector. Secure the cable using a washer and a hex nut. Torque to 21 in-lbs.
8. Assemble the COHERENT CARRIER connector to the rear panel using a washer and a hex nut. Torque to 21 in-lbs.
9. Re-install the serial tag. Torque to 9 in-lbs.
10. Cut out a single UN7 label and attach it to the serial tag option location. This identifies the signal generator as having Option UN7 installed.
11. Re-install the line module using the two flat head screws. Make certain that the ground plug is pointed down. Torque to 9 in-lbs.
12. 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 UN7 Rear Panel in the Instrument

1. Secure the rear panel to the instrument chassis with the 10 screws. Torque to 9 in-lbs.

2. Replace the hex screws and washers on the AUXILIARY INTERFACE. Torque to 6 in-lbs.
3. Replace the hex screws and washers on the GPIB connector. Torque to 9 in-lbs.
4. Replace the nuts and washers securing the five BNC connectors at the base of the rear panel. Torque to 21 in-lbs.
5. Reconnect the nut connecting the COHERENT CARRIER cable (W12) to the rear panel. Torque to 9 in-lbs.
6. Reconnect A16W1 to the A4 power supply.
7. Replace the bottom cover and the 15 screws that secure it. Torque to 9 in-lbs.

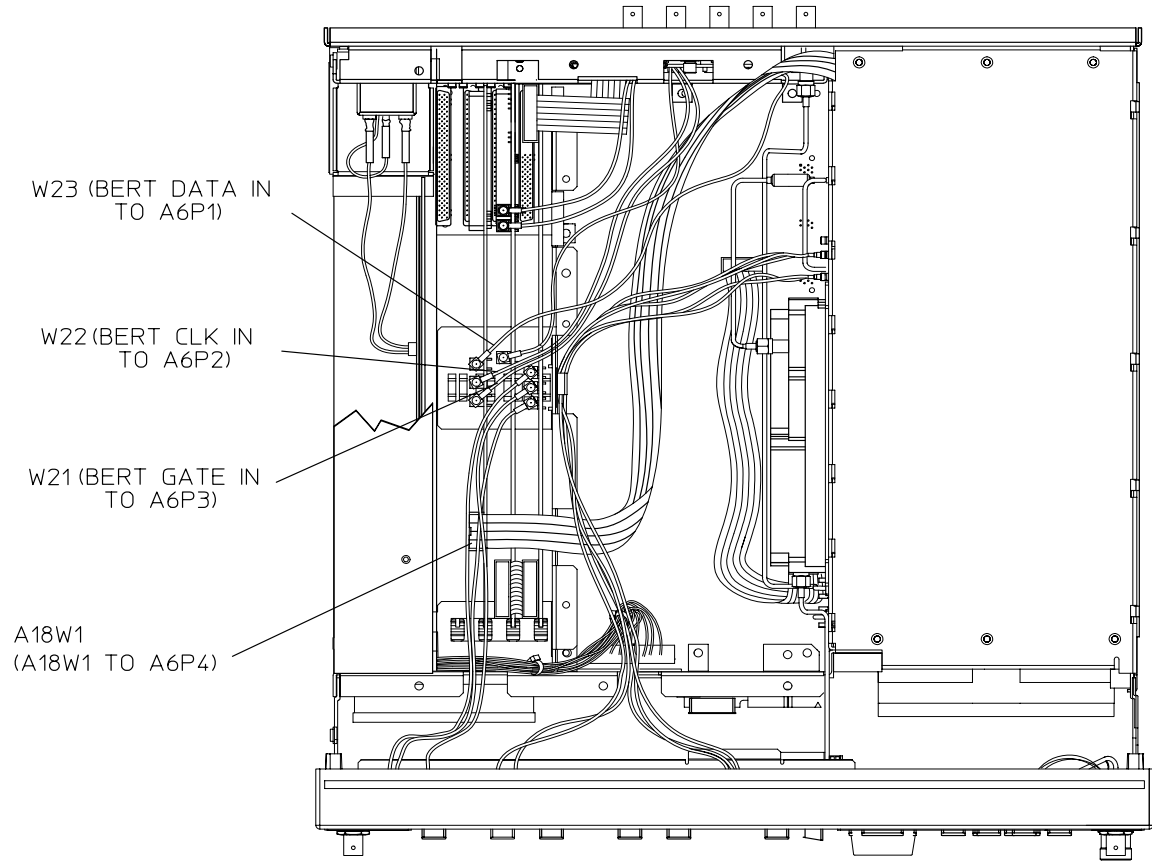
Replace the Connection Diagram Label

1. Remove the existing connection diagram from the top of the chassis. Use Safety Solvent Cleaner to remove any remaining glue from the chassis.
2. Install the Option UN7 connection diagram on the top of the chassis. Press firmly on the overlay, from the center outward, to eliminate air bubbles.

Install the Option UN7 Board Assemblies

1. Insert the A6 the BERT measurement board assembly in the motherboard connector A14J2.
2. Affix a RED and BLACK marker to W23.
3. Affix an ORANGE and BLACK marker to W22.
4. Affix a YELLOW and BLACK marker to W21.
5. Connect W23 from the BER DATA IN to A6P1 on the BERT measurement board.
6. Connect W22 from the BER CLK IN to A6P2 on the BERT measurement board.
7. Connect W21 from the BER GATE IN to A6P3 on the BERT measurement board.
8. Route SMB connector board A18W1 to A6P4 on the BERT measurement board.
9. Verify that all cables are installed and routed as shown in Figure 4.

Figure 4 Cable Routing



TOP_1

Activate Option UN7

1. Plug in and turn on the signal generator. Let it warm up at least 30 minutes.
2. On the front panel, press **Preset > Utility > Instrument Adjustments > Hardware Options**. Highlight Option UN7 using the up/down arrow keys or the front panel knob. Then press **Select Item > Proceed With Reconfiguration**.
3. Press **Confirm Change**. The instrument will reboot and return to preset conditions.

Replace the Top Cover and Instrument Cover

1. Turn the power switch off and unplug the signal generator.
2. Replace the instrument top cover with the 11 screws that secure it. Torque to 9 in-lbs.
3. Slide the instrument cover on to the chassis.
4. Replace the four rear feet with the four screws. Torque to 21 in-lbs.
5. Replace the four bottom feet with the four screws. Torque to 21 in-lbs.
6. Replace the strap handles. Torque to 21 in-lbs.

Verifying Bit Error Rate Test Operation

The operator's check is appropriate as a daily functional verification, or whenever the integrity of the bit error rate test function is questioned. Use the operator's check to verify proper operation of the bit error rate test function. The operator's check does not ensure performance to specifications.

Operator's Check

Perform the following tasks in order:

1. Connect the cables between the rear panel connectors as follows:
 - DATA OUT to BER DATA IN
 - DATA CLK OUT to BER CLK IN

Use the BNC-BNC cables, or the BNC-SMB cables if the signal generator is equipped with Option 1EM.

2. Press the **Mode** key and then press **Real Time I/Q BaseBand > TDMA > PHS**. Then set the following softkeys as shown:
 - **PHS Off On to On**
 - **Data Format Pattern Framed to Pattern**
 - **Data to PN9**
3. Press the **Mode** key and press the **BERT** softkey. Set the following softkeys as shown to start BER measurements:
 - **BERT Off On to On**
 - **Display BER % Exp to %**
 - **Display Update Cycle End Cont to Cont**
 - **Max. Data Rate 2Mbps 10Mbps to 2Mbps**

- Total Bits to 100 000
- Special Pattern Ignore Off On to Off
- BERT Resync Off On to Off
- Pass/Fail Off On to Off
- Clock Polarity Pos Neg to Neg
- Data Polarity Pos Neg to Pos
- Clock Gate Off On to Off
- Impedance 75 Ohm TTL to TTL
- BERT Trigger to Immediate
- Cycle Cont to 0
- Bit Delay Off On to Off

4. You will see the following results shown on the display:

Table 4-1

Total Bits	Error Bits	BER
0 to 100,000 bits	0 bits	0.00000000%
(counting up)	(always)	(always)

5. Disconnect the cable between the DATA OUT connector and the BER DATA IN connector. You will see the No Data annunciator on the lower left corner of the display. This annunciator will turn off at the moment you connect the cable again.
6. Disconnect the cable between the DATA CLK OUT connector and the BER CLK IN connector. You will see the No Clock annunciator on the lower left corner of the display. This annunciator will turn off at the moment you connect the cable again, and you will also see the BER result is almost 50%. Toggle the BERT Off On softkey to Off and then to On. You will see the new BER result is the same as observed in Table 4-1.
7. Toggle the Clock Gate Off On softkey to On and the Clock Gate Polarity Pos Neg softkey to Pos. You will see the same display as shown in the Table 4-1. Change Clock Gate Polarity Pos Neg to Neg and you will see Sync Loss and No Clock on the lower left corner of the display. Connect a short connector to the rear panel BER GATE IN connector and notice that a new BER measurement has begun.