

Installation Note

**Agilent Technologies ESG Series Signal Generators
CPU/Motherboard (Q501 relocated to Chassis)
Replacement Kit: Part Number E4400-60220**



Agilent Technologies
Innovating the HP Way

Part Number E4400-90369

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ESG Series Signal Generators: Part Number E4400-60220

Product Affected:	Agilent E4400B, E4420B, E4421B, E4422B, Agilent E4430B, E4431B, E4432B, and E4433B Series Signal Generators
Serial Numbers:	All below serial prefix 3934
Options:	All
To Be Performed By:	(X) Agilent Technologies Service Center () Personnel Qualified by Agilent Technologies () Customer
Estimated Installation Time:	2 hours
Estimated Verification Time:	8 hours

Introduction

This replacement kit enables you to install a replacement CPU/Motherboard and relocate Q501 on the instrument chassis. The relocation of Q501 to the instrument chassis eliminates mechanical stress imposed upon this component. You will perform the following major steps:

- check instrument functionality
- disassemble the instrument - external shell, rear panel, PC Boards and cables
- remove Q501 and the CPU/Motherboard
- inspect the CPU/Motherboard
- install the new CPU/Motherboard
- install Q501 onto the signal generator's chassis
- connect Q501 to the CPU/Motherboard
- reassemble, verify, and calibrate the signal generator

Installation Kit Parts List

Item	Quantity	Description	Part Number
1	1	CPU/Motherboard	*
2	1	Q501 Assembly	E4400-60221
3	1	Q501 Plate with PEM	E4400-00040
4	1	Q501 Plate without PEM	E4400-00041
5	1	Insulator Bushing	0340-1162
6	1	Screw 3MMX10	0515-0374
7	1	Installation Note	E4400-90369

*Not available as a stand-alone

Tools Required

- ❑ Ratchet 21 in-lb
- ❑ Hand Torque Driver 9 in-lb
- ❑ Hand Torque Driver 6 in-lb
- ❑ Torxdriver T-10
- ❑ Torxdriver T-15
- ❑ 5/8 Socket
- ❑ 3/16 Socket
- ❑ 9/32 Socket

Safety Considerations

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.**

Check Instrument Functionality

This procedure verifies that the signal generator powers up and that the internal instrument check identifies no errors. The internal check evaluates the correctness of operation and returns an error message if it detects a problem.

1. Turn on power to the signal generator. Let the instrument warm up for at least 60 minutes.
2. Cycle the power to the signal generator. The green LED should light, and the instrument performs a check.
3. When the display lights, check to see if the **ERR** annunciator is on.
4. If the **ERR** annunciator is on, review the error messages in the queue by pressing **Utility > Error Info > View Next Error Message**. The first error message in the queue appears in the display text area. Refer to the signal generator error messages document for information about the error message.

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

5. After you resolve all of the errors, press **Clear Error Queue(s)** to delete the messages.

NOTE For instruments with Option 1E5, the error message **ERROR 514, Reference Oven Cold** occurs when you first connect the signal generator to AC line power. The **OVEN COLD** annunciator and the **ERR** annunciator both turn on. The **OVEN COLD** annunciator automatically clears after approximately 5 minutes. The error queue cannot be cleared, however, until the **OVEN COLD** annunciator turns off.

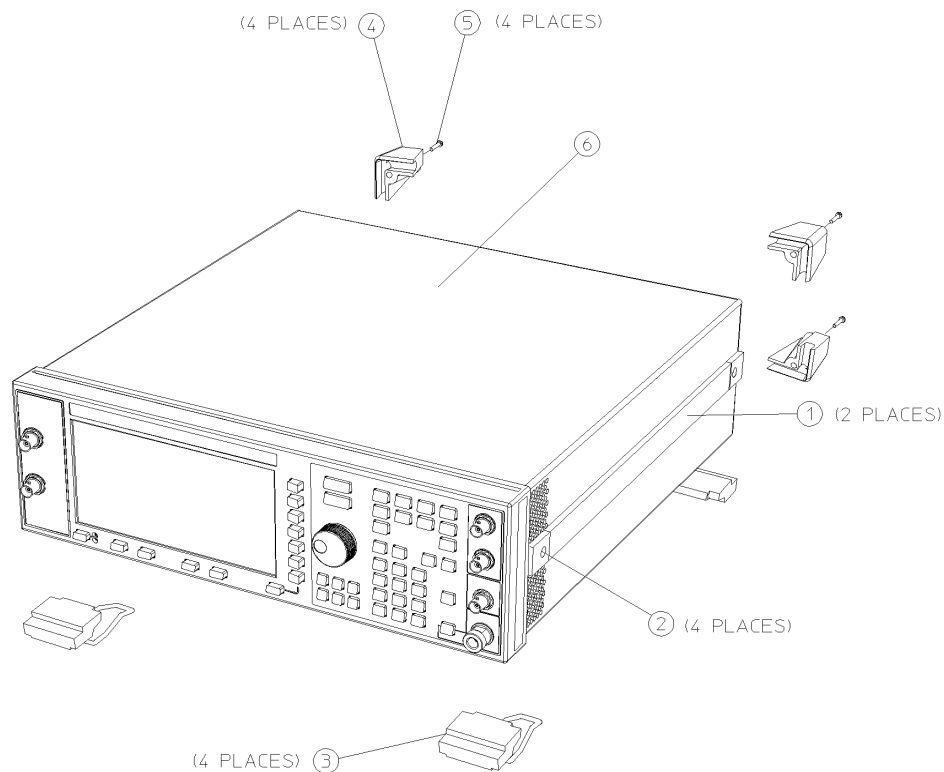
Disassemble the Instrument - External Shell

1. Turn the instrument off.
2. Remove the two strap handles (item 1) from each side of the signal generator by loosening the two screws (item 2). Refer to Figure 1, "Instrument Cover and Associated Parts".

NOTE Save all hardware so it can be reinstalled.

3. Remove the four bottom feet (item 3).
4. Remove the rear feet (item 4) from the signal generator by removing the four screws (item 5) that secure them.
5. Slide the instrument cover (item 6) off the back of the signal generator.

Figure 1 Instrument Cover and Associated Parts

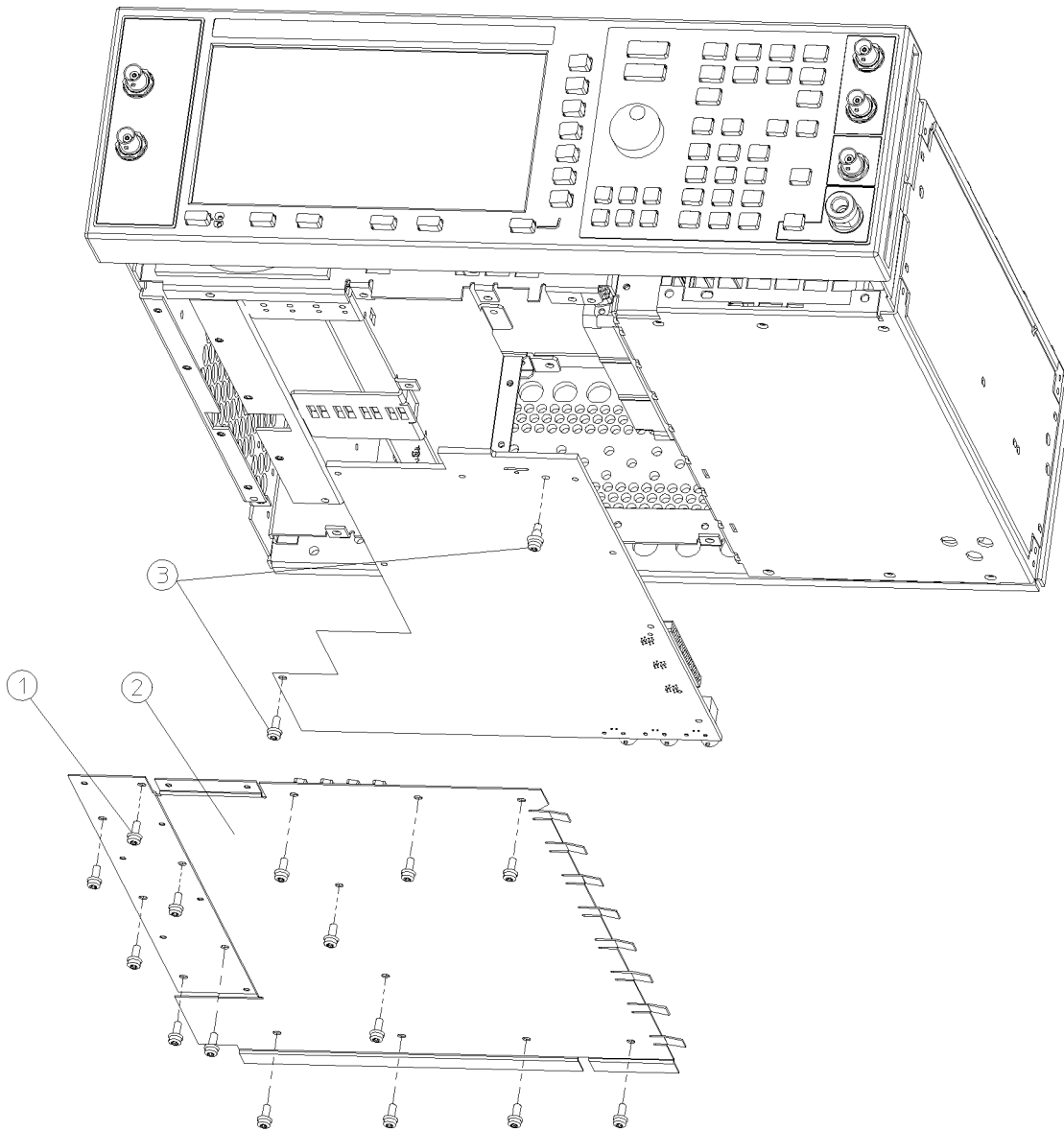


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6. Remove the cover-top chassis by removing the 11 screws that secure it.

7. Turn the instrument on its side and remove the cover-bottom chassis (item 2) by removing the 15 screws (item 1) that secure it. Refer to Figure 2, "Instrument's Side and Bottom View".

Figure 2 Instrument's Side and Bottom View



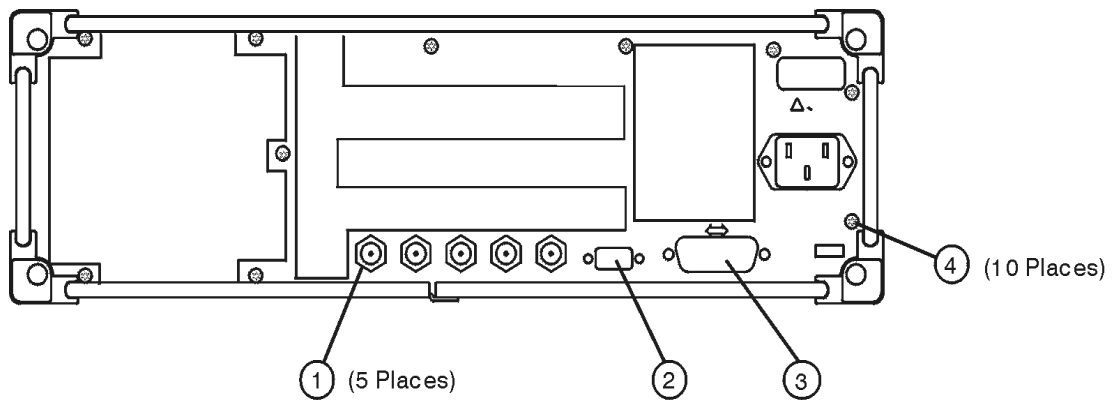
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NOTE Do not remove the CPU/Motherboard's screws (item 3) at this time.

Removing the Rear Panel

1. Remove the nuts and washers securing the five BNC connectors (item 1) at the base of the rear panel. Refer to the Figure 3, "Rear Panel View".
2. Remove the hex screws and washers that secure the AUXILIARY INTERFACE (item 2) and the GPIB connector (item 3) to the rear panel.
3. Remove the 10 screws (item 4) that secure the rear panel to the instrument chassis.
4. Pull the rear panel assembly away from the instrument chassis.

Figure 3 Rear Panel View



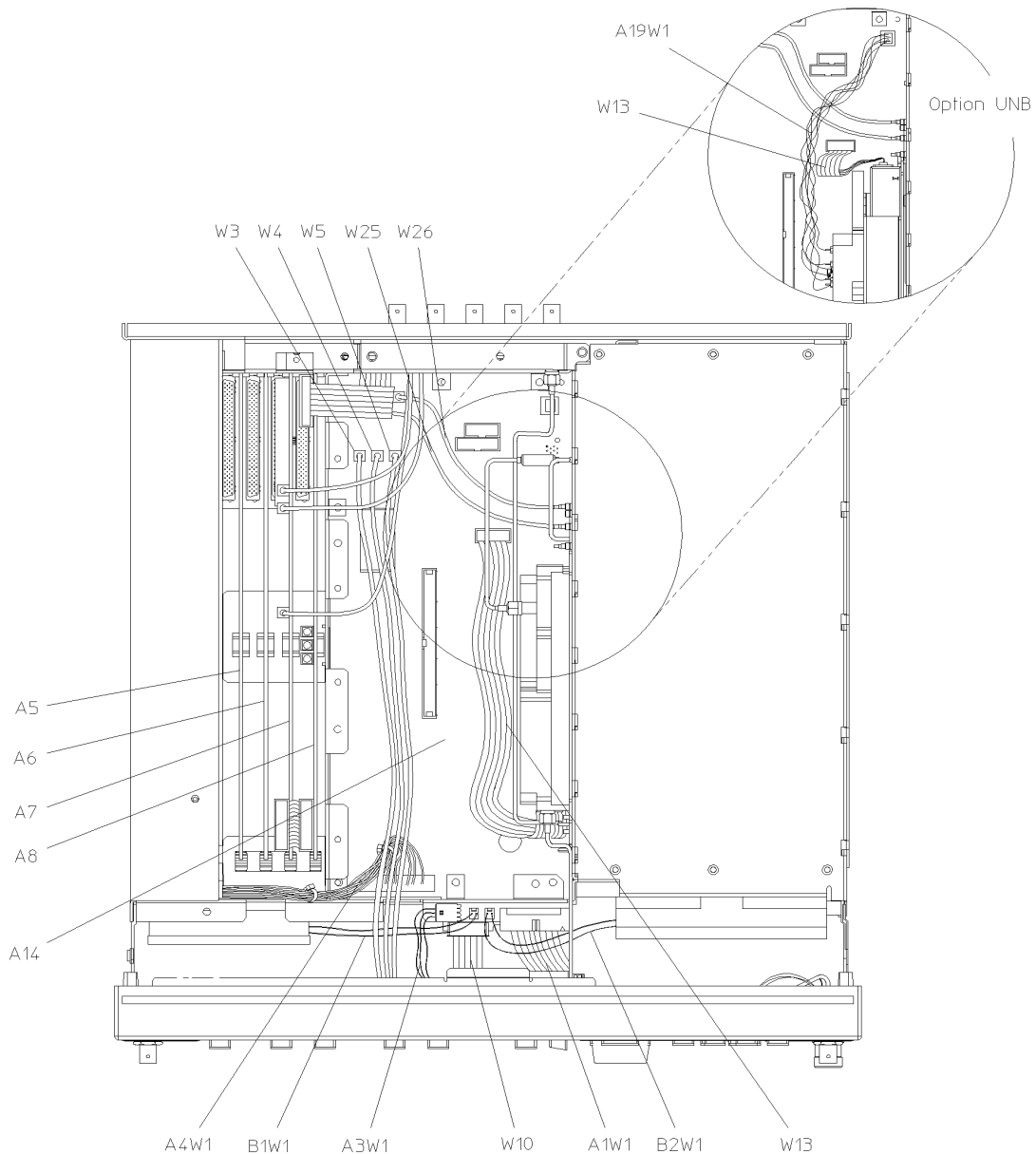
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Remove the PC Boards and Cables

The signal generator should be on its bottom side with the PC boards visible. Refer to Figure 4, "Instrument's Top View".

1. If the signal generator has Option UN3/4 or UN8/9, remove the Baseboard Generator board (A7) and the Pattern Generator board (A8).
2. If the instrument has Option UN7, remove the Bit Error Rate Test board (A6).
3. If the instrument has Option UND, remove the Dual Arbitrary Waveform Generator board (A5).

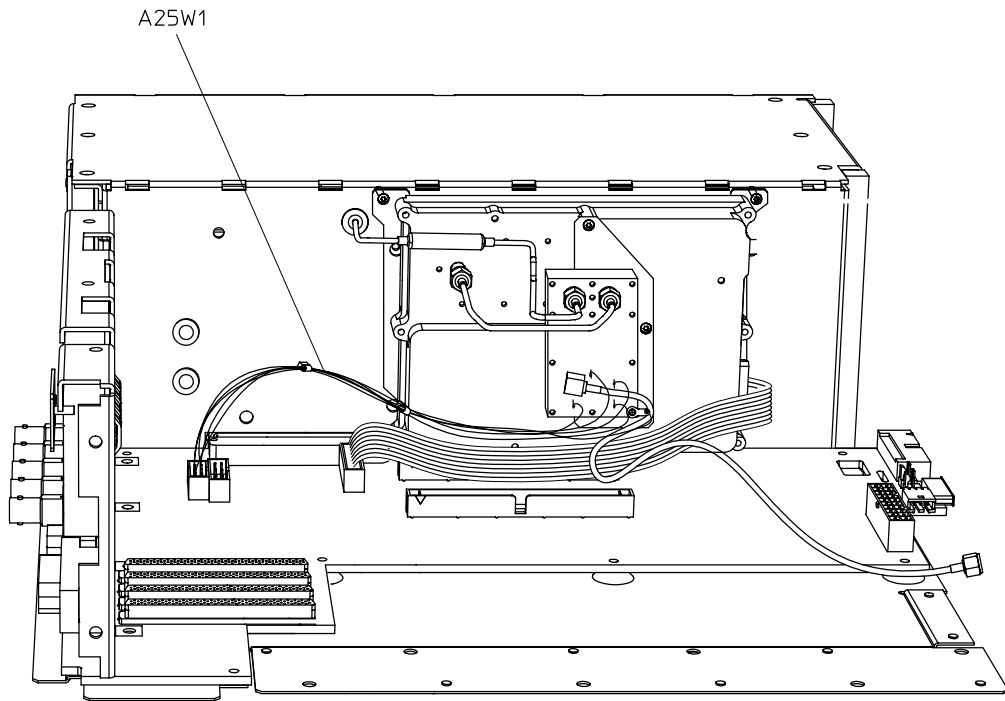
Figure 4 Instrument's Top View



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4. Disconnect A1W1, A3W1, A4W1, B1W1, B2W1, W10, and W13 from the CPU/Motherboard. If the instrument has Option UNB, mechanical attenuator, also disconnect A19W1 from the CPU/motherboard.
5. Disconnect W25 and W26 from the CPU/Motherboard. If the instrument has Option UN8, disconnect W3, W4, and W5 from the CPU/motherboard.
6. If the instrument has Option 1E6, also disconnect A25W1 from the CPU/Motherboard. Refer to Figure 5, "Option 1E6".

Figure 5 **Option 1E6**

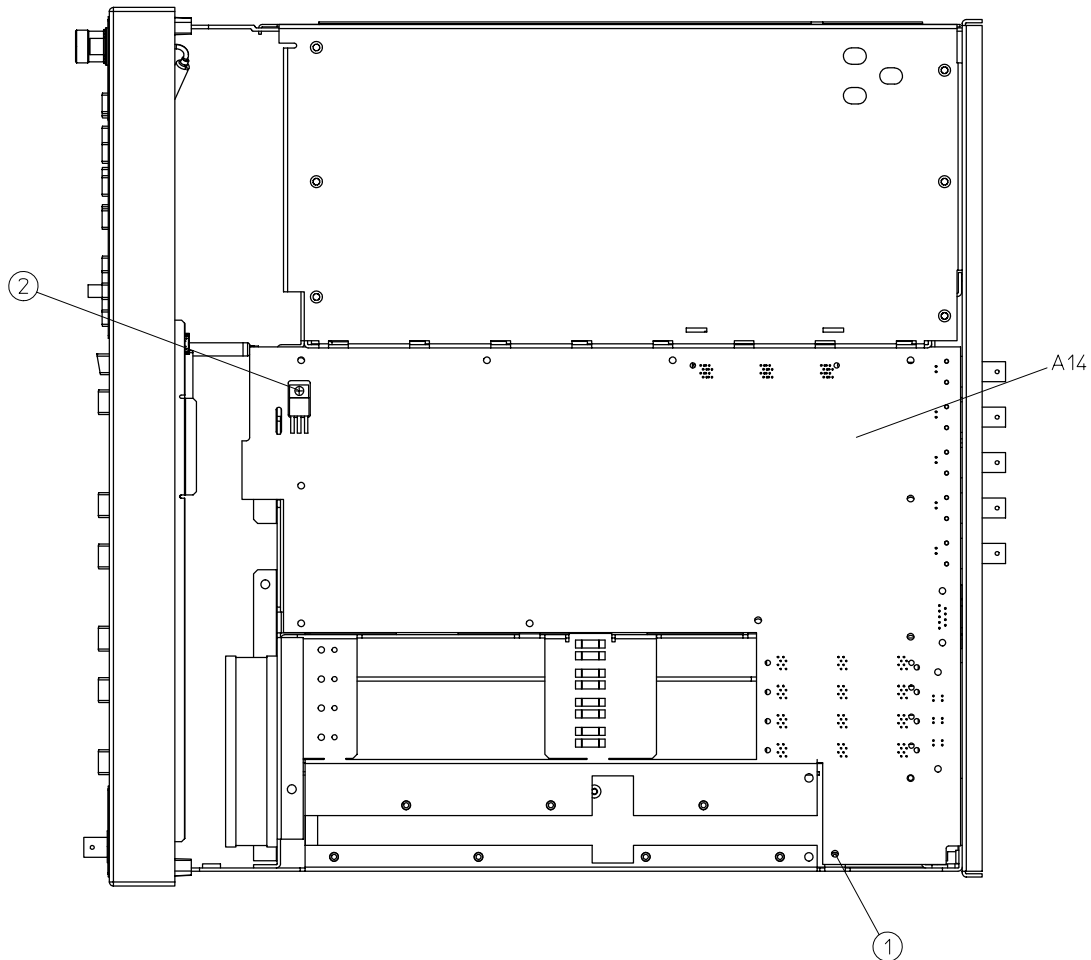


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Removing Q501 and the CPU/Motherboard

1. Q501 is located on the CPU/Motherboard (A14). Turn the signal generator upside-down and remove the screw (item 1) from the CPU/Motherboard. Refer to Figure 6, "Instrument's Bottom View".
2. Remove the screw that secures the transistor Q501 on the CPU/Motherboard to the instrument chassis (item 2). An insulator bushing is between the CPU/Motherboard and the transistor.

Figure 6 Instrument's Bottom View



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3. Remove the old CPU/Motherboard.

Inspecting the CPU/Motherboard

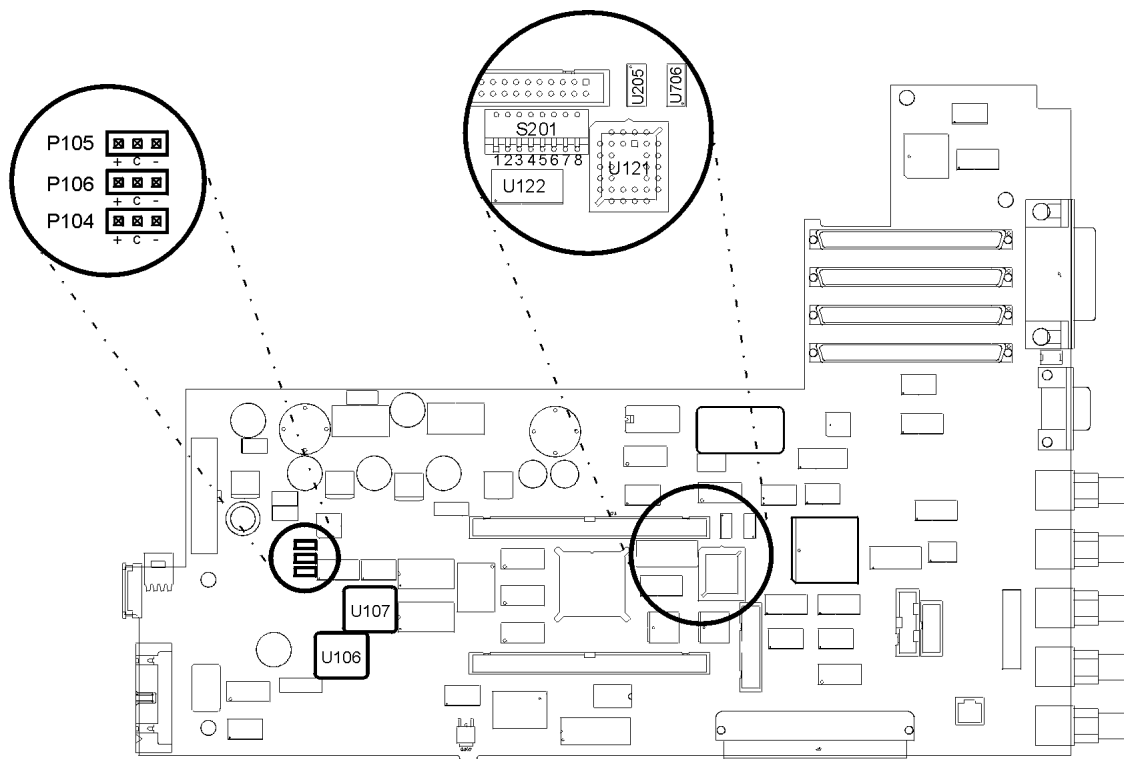
1. Inspect the setting of the display jumper connectors. Notice how the display jumper connections are set for P104, P105, and P106. Refer to Figure 7, "CPU/Motherboard".

NOTE You will need this information when you install the new CPU/Motherboard. The older CPU/Motherboards do not have these components.

2. If the CPU/Motherboard has these jumpers, set the jumpers P104, P105, and P106 to the same positions as the previous board.

NOTE If the previous CPU/Motherboard did not have P104, P105, and P106, set all three jumpers to the – position which represents the old display that requires a negative supply voltage. For the new display, position these three jumpers in the + position which requires a positive supply voltage.

Figure 7 CPU/Motherboard



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3. If you do not know how the jumpers for P104, P105, and P106 were set on the previous CPU/Motherboard, do the following:
 - a. On the new CPU/Motherboard set the jumpers for P104, P105, and P106 to the + position.

CAUTION **Damage can occur to the CPU/Motherboard if the signal generator remains turned on for a prolonged period with the jumpers for P104, P105, and P106 positioned incorrectly.**

- b. Once the new CPU/Motherboard is installed, turn the signal generator on and observe the display.
 - c. If the display does not show text or characters within 5 seconds, turn the signal generator off and move the jumpers for P104, P105, and P106 to the – position. Now repeat the previous step.
4. On the CPU/Motherboard (refer to Figure 7, "CPU/Motherboard"), set switch #4 on the switch pack S201 to the correct position for your display:
 - a. If P104, P105, and P106 are set to the + position, set switch #4 of S201 to the up (open) position, away from the CPU/Motherboard.
 - b. If P104, P105, and P106 are set to the – position, set switch #4 of S201 to the down (closed) position, towards the CPU/Motherboard.

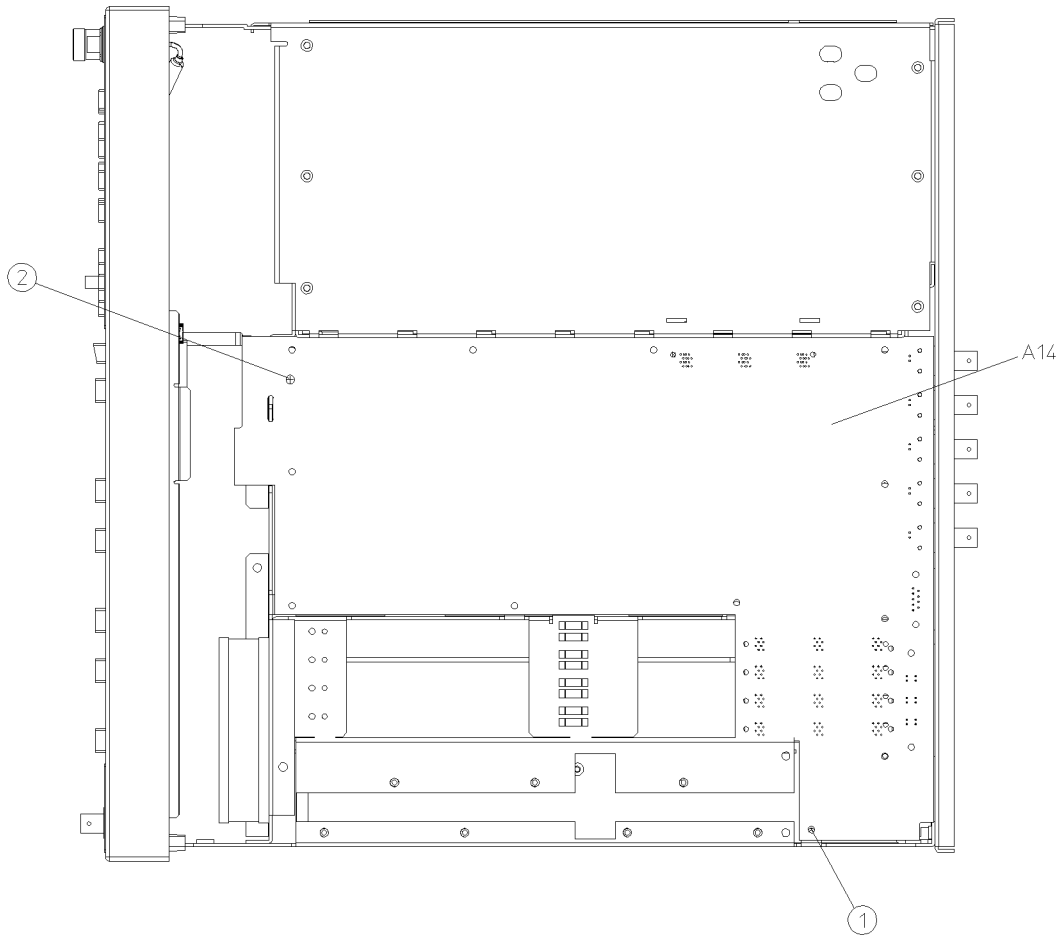
NOTE Switch #5, of S201, is set to the up (open) position in all circumstances. You must reset the signal generator for the switch settings to take effect.

Installing the New CPU/Motherboard

NOTE When installing the new CPU/Motherboard, remember to insert the tab and daughterboard connector into the corresponding slots of the instrument chassis before securing it with screws.

1. Secure the new CPU/Motherboard into the chassis by inserting a screw into the hole that is directly adjacent to item 2. Torque to 9 in-lbs. Refer to Figure 8, "Instrument's Bottom View".
2. Install the second screw (item 1) into the CPU/Motherboard. Torque to 9 in-lbs.

Figure 8 Instrument's Bottom View



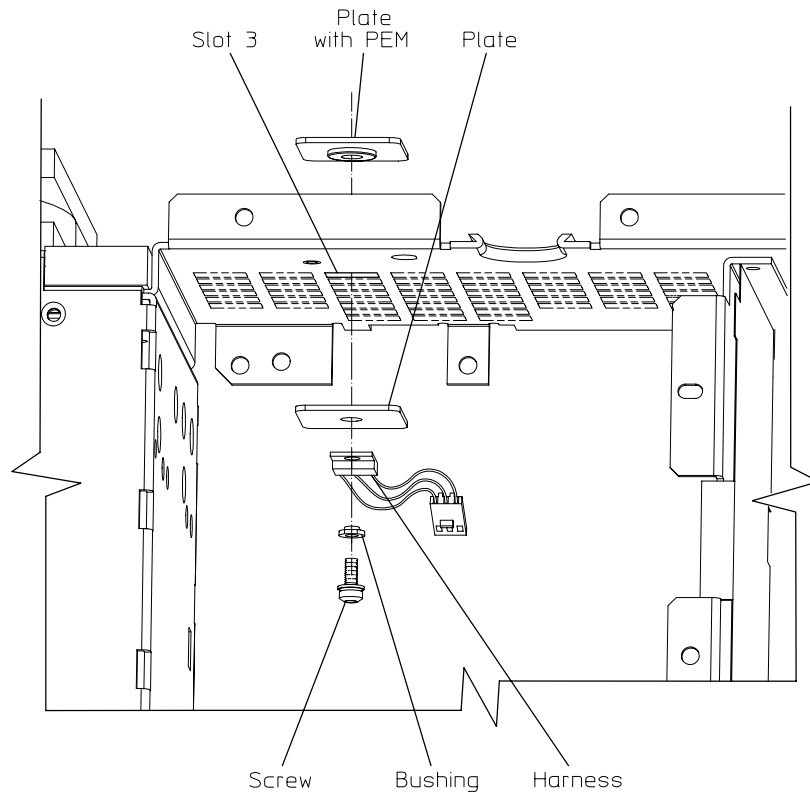
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Installing Q501 onto the Signal Generator's Chassis

NOTE Q501 is attached to the harness.

1. Place the plate (with pem) through the top opening in slot 3. Refer to Figure 9, "Relocation of Q501 on the Instrument's Chassis".
2. While holding onto Q501, the inner plate, and the outer plate (with the pem), place the bushing against Q501. Make sure you have the proper orientation of the bushing against Q501.
3. Insert the screw through the bushing, Q501, inner plate, chassis, and the outer plate. Make sure the plates and Q501 are properly seated.
4. Torque the screw to 9 in-lbs.

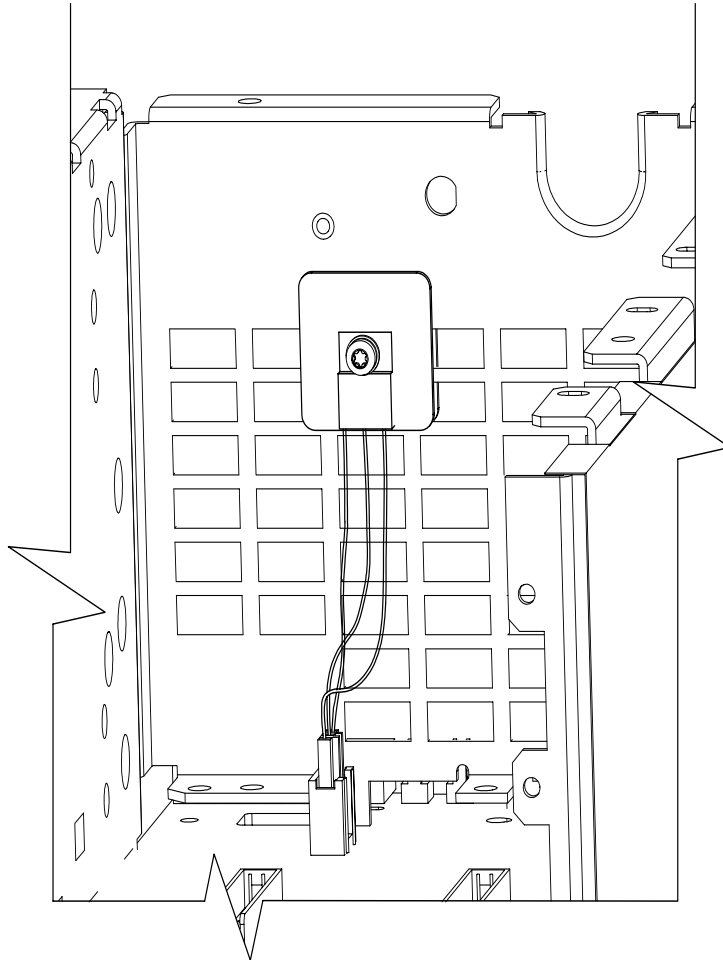
Figure 9 Relocation of Q501 on the Instrument's Chassis



Connect Q501 to CPU/Motherboard

1. Connect Q501 assembly's wiring harness connector to the CPU/Motherboard as shown in Figure 10, "Q501 Wiring Harness to CPU/Motherboard".
2. Make sure the harness is seated properly.

Figure 10 **Q501 Wiring Harness to CPU/Motherboard**



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Reassemble the Signal Generator

1. Reconnect all cables to the CPU/Motherboard. Refer to the service guide for the ESG Family Signal Generators. Verify that all cables are reconnected in the correct locations.
2. Reinstall the rear panel to the signal generator. Reverse the rear panel procedure to attach the rear panel. Torque the screws and nuts to the following:
 - Torque all T-10 TORX screws to 9 in-lbs.
 - Torque the AUXILIARY INTERFACE hex screws to 6 in-lbs.
 - Torque the GPIB hex screws to 9 in-lbs.
 - Torque the five BNC connector nuts to 21 in-lbs.
3. Reinstall the signal generator's cover-bottom with the 15 screws. Torque to 9 in-lbs.
4. Reinstall any existing option boards.
5. Reinstall the signal generator's cover-top with the 11 screws. Torque to 9 in-lbs.
6. Slide the instrument's cover back on the signal generator.
7. Attach the rear feet, the four bottom feet, and then the two strap handles to the signal generator's cover. Torque the strap screws to 21 in-lbs.

Verification of Signal Generator Operation

1. Turn on the power on the signal generator and check the display for text or characters.
2. If the display is still blank after 5 seconds, turn off the signal generator immediately. Recheck to confirm that the proper display jumper positions are selected.
3. If the display is correct with text or characters, check the signal generator for errors messages. Let the signal generator warm up for at least 5 minutes.
4. Press the front panel **PRESET** button to reset the signal generator.
5. Review the functionality check on page 4.

Instrument Calibration

Refer to the service guide for the ESG Family Signal Generators, post-repair procedures. Follow the adjustments and performance tests chapters for the signal generator test procedures and calibration.