GF-25A

Ground Circuit Tester

Instruction Manual

COMPLIANCE
WEST USA

Dear Customer:

Congratulations! Compliance West USA is proud to present you with your Ground Fault Circuit Tester. Your instrument features a groundbreaking circuit design and ergonomic front panel and represents the latest in high current production line testing.

To fully appreciate all the features of your new meter, we suggest that you take a few moments to review this manual. Compliance West USA stands by your instrument with a full one-year warranty and a loaner instrument policy. If the need arises, please don't hesitate to call on us.

Thank you for your trust and confidence.

Rev. 1.20 Dec. 7, 1993

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Introduction and Specifications

Introduction

This manual contains complete operating, maintenance and calibration instructions for the Compliance West USA Model GF-25A Ground Circuit Tester.

The instrument is a bench-type ground circuit tester.

The GF-25A features automatic one button operation, with PASS or FAIL test result indicated by lights on the front panel and an internal buzzer. A supervisor-adjustable test duration circuit allows the test to continue for a predetermined amount of time after the Test Button has been released. The instrument advises the operator of any internal malfunction affecting the output. A one-time setup procedure allows the instrument to compensate for lead resistance, allowing the instrument to measure the true resistance of the grounding circuit of the equipment under test.

The GF-25A meets TÜV criteria for automatic production line ground circuit testers.

Your tester is warranted for a period of one year upon shipment of the instrument to the original purchaser.

Specifications

Specifications for the Testers are listed in Table 1-1.

ELECTRICAL	
Output	25 Amps dc ± 3% into any load - short circuit to 100 milliohms
Pass/Fail Criterion	100 - 200 milliohms user adjustable. 100 milliohm calibration resistor supplied. See Table 1-2.
Pass/Fail Repeatability	± 3%
Ramp Time	10 msec
Overshoot	none
Test Duration Timer	0-10 sec. approx.
Duty cycle	100 %
ENVIRONMENTAL	
Operating Temperature	15-40°C
Relative Humidity Range	0-90% non-condensing
GENERAL	
Input power requirements	90-127 or 180-254 volts, 50/60 Hz
Weight	12 lbs

Table 1-1. GF-25A Specifications

Non-Detachable Cordset AWG	Non-Detachable Cordset Maximum Length*
18	6 feet
16	10 feet
14	14 feet
12	20 feet

Table 1-2. GF-25A Non-Detachable Cordset Maximum Length.
*Custom configurations available for longer non-detachable cords. Contact factory.

Operation

This section describes how to set up and make measurements with your tester. We recommend that you read the entire section carefully so that you can use all of the features of your Tester.

Setting up your tester

Your tester is shipped in a special protective container that should prevent damage to the instrument during shipping. Check the shipping order against the contents of the container and report any damage or short shipment to Compliance West USA. The container should include the following:

- The GF-25A Tester
- A 12 AWG Test Return Lead
- An 18 AWG Line Power Cord
- A 14 AWG Test Power Cord
- A plastic calibration screwdriver
- An alligator clip/wire assembly
- This Instruction Manual

If reshipment of the instrument is necessary, please use the original shipping container. If the original shipping container is not available, be sure that adequate protection is provided to prevent damage during shipment. We recommend that the instrument be surrounded by at least one inch of shock-absorbing material on all sides of the container.
Remove the Tester from its container and place it on a test bench.

AC Line Voltage Requirements

AC line voltage requirements for your Tester are noted on the rear panel of the instrument. Do not connect the instrument to a different voltage source.

Fuse Replacement

There is a user-replaceable fuse (F1) located on the rear panel of the instrument. It is located behind a door in the Power Inlet-Power Switch-Fuseholder device. The fuse rating is noted on the rear panel. Do not attempt to replace it with a fuse of any other rating.

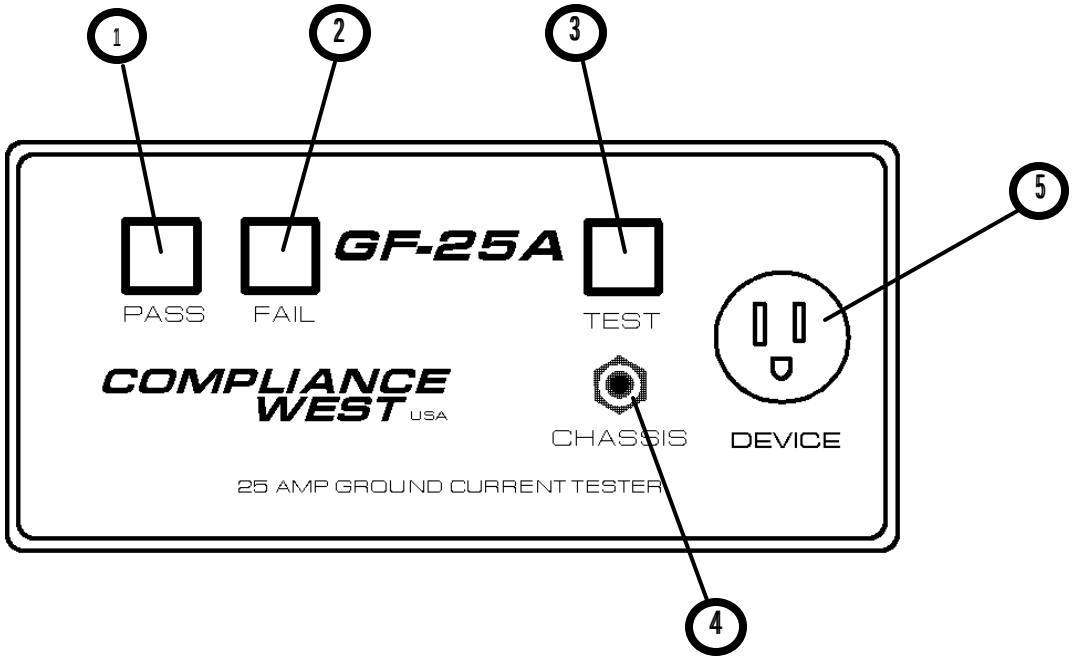
Use the following procedure to replace the fuse F1:

1. Turn the power switch to the O or off position.
2. Unplug the instrument from the source of supply.
3. Remove the power inlet cord from the instrument.
4. Using a small screwdriver, pry open the fuseholder door.
5. Replace the fuse with a new one of the correct rating.
6. Replace the fuseholder door and power inlet cord.

Front Panel Features

Before using your Tester, take a few minutes to become familiar with the use of its controls, indicators and connectors. The front panel features of the GF-25A are shown in Figure 2-1 and described in Table 2-1. The rear panel

Figure 2-1. Controls, Indicators, Connectors - Model GF-25A Front Panel



ITEM NO.	NAME	FUNCTION
1	Green (Pass) Indicator Lamp	Incandescent lamp. When lit, indicates that equipment under test has less than 100 milliohms in grounding path. Replace with 6.3V lamp.
2	Red (Fail) Indicator Lamp	Incandescent lamp. When lit, indicates that equipment under test has more than 100 milliohms in grounding path or is incorrectly connected to tester. Replace with 6.3V lamp.
3	Test Button / Blue Indicator Lamp	Switch and incandescent lamp. When lamp is lit, indicates tester power is on and ready to test. When button is pushed, 25A test is applied to equipment under test. The test continues for a preset time. Lamp voltage is 12V.
4	Return Lead Receptacle	Isolated banana plug receptacle. The 12 AWG Test Return Lead provided is connected here.
5	Test Power Receptacle	NEMA 5-15R receptacle. For connection of the Equipment under test with non-removable power cord or with 14 AWG test cord provided.

Table 2-1. Controls, Indicators, Connectors - Model GF-25A Front Panel

features of the GF-25A are shown in Figure 2-2 and described in Table 2-2.

Initial Checkout Procedure

The following procedure will allow you to verify that the Tester is working correctly before use. The only test equipment required is the unit itself, the 12 AWG Test Return Lead, the 14 AWG Test Cord, and the alligator clip/wire assembly .

CAUTION

High current. Risk of burns. Remove any conductive jewelry before using the Tester.

1. Connect your Tester to a correctly rated source of supply, remove any other test leads, and turn the power switch to the I or ON position. The tester will perform a self-diagnostic test. Make sure the buzzer sounds and the red light is illuminated during the self-test. Confirm that the blue test button is illuminated. If it is not, check the source of supply.
2. Plug the split end plug of the 14 AWG Test return lead into the Return Lead Receptacle of the Tester.
3. Plug the Test Power Cord into the Test Power Receptacle of the Tester. Attach the alligator clip/wire assembly to the center lead of the IEC connector on the exposed end of the Test Power Cord. Connect the two Test cords together.
4. Push the Test Button. The GF-25A should indicate a "Pass" by lighting the green light.
5. Disconnect the Test leads from each other and carefully lay them on a non-conductive surface. Push the Test button. The GF-25A should indicate a "Fail" by lighting the red light and sounding the internal buzzer.

If your Tester yielded the proper results, it is working properly. If it did not, call Compliance West USA for assistance.

Adjusting the Pass/Fail Point

This adjustment allows the GF-25A to compensate for the resistance of the cordset and test return lead. If done properly, it allows the GF-25A to measure only the resistance of the ground circuit of the EUT, while compensating for cord resistance.

It is necessary to check the calibration point each time a different length or gauge Test Lead or Cord is used, and every time the instrument is returned to service following an annual calibration. The 25 amp output level is not adjustable. In the following Section, EUT means Equipment Under Test.

CAUTION

High current. Risk of burns. Remove any conductive jewelry before using the Tester.

NOTE

The duty cycle of the rear-panel mounted calibration resistor is 50%, maximum one minute continuous. Failure to adhere to this duty cycle may damage the calibration resistor.

NOTE

This adjustment procedure sets the tester Pass/Fail indication point only. It does not take the place of the required annual calibration required for the GF-25A.

Adjusting the Pass/Fail Point using the supplied Test Cordset

Use this adjustment procedure if the equipment under test uses a detachable power cord. Always use the test cord supplied with the GF-25A. Do not use the cordset of the EUT for this test.

1. Connect your GF-25A Tester to a correctly rated source of supply and turn the power switch to the I or ON position. The tester will perform a self-diagnostic test. Make sure the buzzer sounds and the red light is illuminated during this test.
2. Plug the split end plug of the 12 AWG Test return lead into the Return Lead Receptacle of the Tester. Connect the other end to the calibration resistor bolted to the rear panel.
3. Plug the Test Power Cord into the Test Power Receptacle of the Tester. Attach the alligator clip/wire assembly to the center lead at the end of the Test Power Cord and to the calibration resistor.
4. Insert the plastic calibration screwdriver into the potentiometer on the rear panel marked "CAL".

5. Push and hold the Test Button. (Holding the test button will continue the test until the button is released.)
6. With the Test Button depressed, turn the screwdriver until both the red and green lights are on. The internal buzzer may sound at the calibration point.
7. Now, set the duration of the test. As shipped from the factory, the GF-25A will only test while the test button is depressed. By inserting the plastic calibration screwdriver into the potentiometer marked "DUR", the test time can be set. A time of approximately 5 seconds is recommended, subject to approval by safety agency inspection personnel.

Adjusting the Pass/Fail Point for products with non-removable power cords

Use this adjustment procedure if the equipment under test uses a non-detachable power cord. (A non-detachable power cord is permanently connected to the EUT with a strain relief bushing.)

NOTE

Ensure that the non-detachable power cord meets the length and conductor size requirements of Table 1-1 before attempting to calibrate the tester. If a non-detachable power cord not meeting Table 1-1 is used, the tester calibration procedure may not be successful. However, if the calibration procedure is successful, the GF-25A will test products correctly.

1. This procedure requires the use of a power cord assembly from the EUT. Obtain one from stock and trim it to the total length used in the EUT, making sure to include the length of the cord inside the enclosure of the EUT. Crimp or solder an alligator clip to the green or green with yellow stripes (grounding) conductor of the cord at the open end.
2. Connect your GF-25A Tester to a correctly rated source of supply and turn the power switch to the I or ON position. The tester will perform a self-diagnostic test. Make sure the buzzer sounds and the red light is illuminated during this test.
3. Plug the split end plug of the 12 AWG Test return lead into the Return Lead Receptacle of the Tester. Connect the other end to the calibration resistor bolted to the rear panel.
4. Plug the EUT Power Cord prepared in Step 1 above into the Test Power Receptacle of the Tester. Attach its alligator clip to the other lead of the calibration resistor.
5. Insert the plastic calibration screwdriver into the potentiometer on the rear panel marked "CAL".
6. Push and hold the Test Button. (Holding the test button will continue the test until the button is released.)
7. With the Test Button depressed, turn the screwdriver until both the red and green lights are on. The internal buzzer may sound at the calibration point.
8. Now, set the duration of the test. As shipped from the factory, the GF-25A will only test while the test button is depressed. By inserting the plastic calibration screwdriver into the potentiometer into the potentiometer marked "DUR", the test time can be set. A time of approx. 5 seconds is recommended, subject to approval by safety agency inspection personnel.

Time Duration Adjustment

1. Connect your GFM-25A Tester to a correctly rated source of supply and turn the power switch to the I or ON position. The tester will perform a self-diagnostic test. If the Volts-V/2-Amps switch is set to Volts or V/2, the meter will swing to full scale. The meter movement is fully protected and operation in this manner will not harm it.
2. Insert the plastic calibration screwdriver into the potentiometer behind the lower hole in the rear panel marked "DUR".

Figure 2-2. Control, Indicators, Connectors - Model GF-25A Rear Panel

ITEM NO.	NAME	FUNCTION
1	Legend	Truth table indication of results.
2	Directions	Provides directions for tester operation to line test personnel.
3	CAL Adjustment	Used to adjust PASS/FAIL point. See "Calibrating the GF-25A Tester" section of this manual for procedure.
4	Duration Adjustment	Used to adjust automatic test duration. See "Calibrating the GF-25A Tester" section of this manual for procedure.
5	Appliance Inlet / Fuseholder / Power Switch	Use 18 AWG cordset to connect tester to appropriate source of supply. Replace line fuse. Turn tester ON/OFF.
6	Fuse replacement warning / Rating of supply	Specifies replacement fuse and supply voltage used.

Table 2-2. Control, Indicators, Connectors - Model GF-25A Rear Panel

3. Push and release the Test Button. The test duration is counted from the RELEASE of the Test Button and is controlled by the setting of the DUR control. Please note that if a manually timed test is conducted, the test will continue for the amount of time set during this Procedure after the Test Button is released. Therefore, we recommend that the Test Duration control be adjusted to its minimum position when a manual test is conducted.
4. Adjust the control with the calibration screwdriver until the desired test duration is set.

Operating Techniques

The following paragraphs describe how to operate your GF-25A Tester. In the following sections, EUT means Equipment Under Test.

Setting the Test Time Duration

1. Set the test duration as shown in "Time Duration Adjustment" to ensure the production line test will be done for the desired amount of time. A test time of 5 seconds is recommended, subject to acceptance by safety agency inspection personnel.

Testing the EUT

This section describes how the Tester is used to conduct an actual test.

CAUTION

High current. Risk of burns. Remove any conductive jewelry before using the Tester.

NOTE

If the EUT uses a detachable power cord, use the Test Power Cord packed with the instrument, not the EUT power cord. The accuracy of the test procedure depends on use of the same power cord type for every test.

1. Connect your Tester to a correctly rated source of supply and turn the power switch to the I or ON position. The tester will perform a self-diagnostic test. Make sure the buzzer sounds and the red light is illuminated during this test.
2. Plug the split end plug of the 12 AWG Test return lead into the Return Lead Receptacle of the Tester.
3. Plug the Test Power Cord or non-detachable EUT power cord into the Test Power Receptacle of the Tester, and then into the power inlet of the equipment to be tested.
4. Connect the alligator clip end of the Test Return Lead to the chassis of the equipment to be tested.
5. Push the test button. (If the GF-25A duration control has been set according to the calibration procedure, the test will automatically continue for the duration set in the calibration procedure. If the duration control of the GF-25A is set to zero, the test will continue only as long as the test button is depressed.)
6. The result of the test will be shown by a combination of lights and a buzzer. Results are interpreted below and in a truth table on the rear of the instrument.

Test results

Green Light

A green light indicates the ground system of the EUT has less than 100 milliohm resistance. For most categories of equipment, this result is acceptable.

Red Light

A red light indicates the ground system of the EUT has more than 100 milliohm resistance. If a red light occurs, the grounding circuit of the EUT should be reworked and then retested.

Red Light and Buzzer Sound

A red light and a buzzer sound indicates an open grounding circuit condition. Check the test lead connections, correct, and retest. If the test lead connections are correct, a red light and buzzer sound indicates an open grounding connection within the EUT. The grounding circuit of the EUT should be reworked and then retested.

Simultaneous Red and Green Light

A simultaneous red and green light, with or without the buzzer sound indicates the resistance

of the ground circuit of the EUT is exactly at the pass/fail point.

Green Light and Buzzer Sound

WARNING

If you obtain a green light and buzzer test result, the GF-25A is not generating full test current. The GF-25A will report unreliable test results. Service is required. Discontinue use of the tester immediately.

Troubleshooting Guide

Unit "sings" when test button is pressed.	Normal operation.
Unit will not pass Pass/Fail Point adjustment when the EUT has a non-detachable power cord	Cord is too long. Check Table 1-2.
Blue light does not light.	Blue light is the pilot light for secondary AC power. Check for proper operation. If unit does not work, check supply voltage and fuse. If unit works correctly, replace pilot light with 12V bulb.
Red/Green lights do not work.	Check for proper operation (unit "singing" when test button pressed). If unit works correctly, go to next paragraph. If unit does not "sing", power supply may be inoperative. Conduct Power Supply check If Red light burns out, neither light will light. If green light burns out, red light will still light. To check for burned out bulb, switch bulbs to determine which one is defective, then replace with 6.3V bulb.

Technical Assistance

For Technical Assistance
Phone: (800) 748-6224

Technical Assistance is available from Compliance West USA between the hours of 8:30 AM and 5:00 PM Pacific Time.

Compliance West USA
3910 Sorrento Valley Blvd.
San Diego, CA 92121

Phone: (619) 452-9754
FAX: (619) 452-1512

Section 3

Maintenance

WARNING

THESE SERVICE INSTRUCTIONS ARE FOR USE BY QUALIFIED PERSONNEL ONLY. TO AVOID ELECTRIC SHOCK, DO NOT PERFORM ANY SERVICING OTHER THAN THAT CONTAINED IN THE OPERATING INSTRUCTIONS UNLESS YOU ARE QUALIFIED TO DO SO.

Introduction

This section of the manual contains maintenance information for the Model GF-25A High Current Ground Tester. This maintenance information is divided into service information, general maintenance, a performance test, and a calibration procedure. The performance test is recommended as an acceptance test when the instrument is first received, and later as a preventative maintenance tool to verify proper instrument operation. A 1-year calibration cycle is recommended to maintain the specifications given in Section 1. The Test equipment required for both the performance test and calibration procedure is a DMM able to read true rms 0-25 V ± 1%.

Service Information

The GF-25A is warranted to the original purchaser for a period of 1 year . This warranty does not cover problems due to misuse or neglect.

Malfunctions which occur within the limits of the warranty will be corrected at no charge. Mail the instrument post paid to the manufacturer. Dated proof of purchase is required for all in-warranty repairs.

The manufacturer is also available for calibration and / or repair of instruments that are beyond their warranty period. Contact the manufacturer for a cost quotation. Ship the instrument and your remittance according to the instructions given by the manufacturer.

General Maintenance

Interior Access

NOTE

To avoid contaminating the PWB with oil from your fingers, handle it by the edges or wear gloves. If the PWB becomes contaminated, refer to the cleaning procedures given later in this section.

Calibration Access

Use the following procedures to gain access to the calibration adjustments of your instrument.

1. Set Line Power switch to OFF.

2. Disconnect the power cord from the rear of the instrument.

3. Remove the two upper screws on each side of the unit.

4. Grasp the top of the enclosure clamshell and lift it off the front and rear panels.

5. Slide the rear panel / PWB assembly upward until it is clear of the bottom enclosure clamshell.

6. All calibration adjustments are now accessible.

NOTE
With the power cord replaced, the instrument is operational for service.

WARNING
Dangerous voltages exist on the IEC power inlet assembly when energized. Exercise extreme care when working on an energized circuit.

7. To reassemble, reverse steps 1-6 above.

Main PWB Removal

Use the following procedure to remove the Main PWB from the instrument.

1. Perform the calibration access procedure.

2. Remove PWB connectors P4P3 (Fail Lamp), P6P5 (Pass Lamp), P11P10 (Power On Lamp), and P1P2 (Test Switch).

3. Remove leads to the Test Power Receptacle and Return Lead Receptacle by unbolting them at the front panel.

4. Remove all five nuts and nylon washer sets holding the Main PWB assembly to the rear panel.

5. Unsolder the three leads P7, P8 and P9 from the transformer at the PWB.

6. To reassemble, reverse the above steps.

NOTE
When reinstalling the PWB assembly, ensure that the nylon washers are reinstalled correctly.

Front Panel Removal

Use the following procedures to remove the front panel of the instrument. Refer to Figure 3-1 for the location of PWB connectors:

1. Perform the calibration access procedure.

2. Remove PWB connectors P4P3 (Fail Lamp), P6P5 (Pass Lamp), P11P10 (Power On Lamp), and P1P2 (Test Switch).

3. Remove leads to the Test Power Receptacle and Return Lead Receptacle by unbolting them at the front panel.

4. To reassemble, reverse the above steps.

Cleaning

CAUTION
Do not use aromatic hydrocarbons or chlorinated solvents for cleaning. These solutions will react with the plastic materials used in the instrument.

Clean the front panel and case with a mild solution of detergent and a damp sponge. Clean dust from the PWB with clean, dry, low pressure (<20 psi).

Performance Test

The performance test compares the performance of your instrument with the list of specifications given in Section 1. This test is recommended for incoming inspection, as a preventative maintenance check, and to verify the specifications. It is not necessary to disassemble the instrument to conduct these tests. If the instrument fails any part of the performance test, calibration and / or repair is indicated.

Allow the instrument to stabilize and perform the test at an ambient temperature of 23°C ±5°C (73°F

±9°F). During the performance test (and the calibration procedure) your Tester is referred as the UUT.

Operation/Lamp Function Test

Use the following procedure to determine proper operation of the UUT and Lamps of the GF-25A:

1. Connect the UUT to a proper source of supply using the included 18 AWG power supply cord.

2. Disconnect all other leads and turn the UUT on.

3. Verify the blue lamp is lit.

4. Push the Test button and hold.

5. Verify the red lamp is lit and the internal buzzer sounds.

6. Using a test lead, short the ground of the front panel test power receptacle to the return lead receptacle.

7. Press the Test button briefly.

8. Verify the green lamp is lit and the buzzer is not sounding.

Current Output Test

1. Plug the Test Power Cord and the Test Return Lead into the front panel.

2. Connect the Test Return Lead and the ground of the IEC Test Cordset to the back panel calibration resistor using the alligator clip/wire assembly.

3. Connect the DMM across the calibration resistor.

4. Push and hold the Test Button on the front panel. For a 25 amp output, the DMM should read 2.5 volts dc ± 5%.

NOTE

After these tests confirm proper operation, the tester must be adjusted as shown in Section 2 above before use if you have not already done so.

Calibration Procedure

The Calibration Procedure should be used any time your instrument has been repaired or fails to pass the performance test. The calibration procedure consists of three parts:

- The Turn-On Check verifies the proper power supply voltage.

- The Voltage Calibration adjustment calibrates the range of the voltage output.

- The Current Calibration adjustment calibrates the current output.

Before starting the Calibration procedure, perform the Voltage Zero Adjustment Procedure given in the Operation Section of this manual and the Calibration access procedure given earlier in this Section. **The Voltage Zero adjustment Procedure must be performed prior to the calibration or calibration results will be erroneous.** During the calibration procedure, the tester is referred to as the UUT.

NOTE

Allow the instrument to stabilize for approximately five minutes. Perform all calibration adjustments at an ambient temperature of 23°C ±5°C (73°F ±9°F).

WARNING

CALIBRATION ADJUSTMENTS ARE PERFORMED ON ENERGIZED CIRCUITS. EXERCISE CAUTION AT ALL TIMES, AND USE A NON-CONDUCTIVE TOOL FOR ALL ADJUSTMENTS.

Test Point	Voltage Function	Voltage Limits
P7 - P9	Transformer Main Output	21 -23 Vac
P7 - P8	Transformer Center Tap Output	10.5 - 11.5 Vac
P12 - P16	Main Output	28 - 32 Vdc
Cathode D1 - P16	Center Tap Circuit Output	13 - 14.5 Vdc
Anode D2 - P16	Regulator Output	4.75 - 5.25 Vdc

Table 3-2. Power Supply Voltages

Power Supply Check

Use the following procedure to verify the power supply voltages:

On the UUT, ensure that all test leads are removed and the test button is not depressed.

For each test point in Table 3-2, use the DMM to verify the voltage limits specified.

Voltage Range Adjustment

Use the following procedure to calibrate the output voltage range. R14 is located on the PWB below the heat sink. To facilitate access, lift the rear enclosure panel-PWB assembly out of the bottom clamshell of the enclosure and place it on a non-conductive surface.

1. On the UUT, ensure that all test leads are removed and the test button is not depressed.

2. Connect the DMM between the ground point of the test power receptacle and the return lead receptacle.

3. Push the Test Button on the front panel of the UUT and simultaneously adjust R14 so the DMM reads 6.9 volts dc.

Current Calibration Adjustment

Use the following procedure to adjust the output Current: R5 is located on the PWB below the heat sink near R14.

1. Perform the voltage range adjustment procedure above.

2. Connect the Test Return Lead and the ground of the IEC Test Cordset to the back panel (or other) 0.1 ohm resistor using the alligator clip/wire assembly.

3. Connect the DMM across the 0.1 ohm resistor.

4. Push and hold the Test Button on the front panel of the UUT and adjust R5 so the DMM reads 2.5 volts dc.