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United States of America

## Dual Independent Footwear and Wrist Strap Tester Installation, Operation and Maintenance



Figure 1. EMIT Dual Independent Footwear and Wrist Strap Tester and Dual Foot Plate

### Description

The EMIT Dual Independent Footwear and Wrist Strap Tester is designed to test personnel grounding devices, wrist strap and ESD footwear, to satisfy the requirements of the ESD Association.

Per ANSI/ESD- S1.1 Section 6.1.3 Frequency of Functional Testing "The wrist strap system should be tested daily to ensure proper electrical value."

Per ESD Handbook ESD TR20.20 Section 5.3.2.4.2 Additional User Wrist Strap Testing "Proper testing of the wrist strap includes the resistance of the groundable point on the end of the cord, the cord itself, the resistor, the cord-to cuff snap connector, the resistance of the interface of the cuff, the cuff/wrist interface, and the resistance of the person between the wrist and the hand that contacts the test electrode."

Per ESD Handbook ESD TR20.20 Section 5.3.2.2.2 Wrist Strap Ground Cord "At first glance, the ground cord appears to be a relatively simple assembly. However, the design requirements are considerable, given the wide range of user applications and the durability requirements of constant tugging, flexing, and dragging over the edge of workstation tops and equipment chassis."

"Compliance verification should be performed prior to each use (daily, shift change, etc.). The accumulation of insulative materials may increase the foot grounder system resistance. If foot grounders are worn outside the ESD protected area testing for functionality before reentry to the ESD protected area should be considered." (ESD SP9.2 APPENDIX B - Foot Grounder Usage Guidance)

"A log should be maintained which verifies that personnel have tested their personal grounding devices. (Wrist Straps and ESD Footwear)" (ANSI/ESD S20.20 Section 6.2.2.2 Personnel Grounding Guidance)

The EMIT Dual Independent Footwear and Wrist Strap Tester is available in three models:

Model	Voltage	Power Adapter
50407	120 VAC	USA
50562	220 VAC	UK / Asia
50413	220 VAC	Sold separately, see web site

### Packaging

- 1 Dual Independent Footwear and Wrist Strap Tester
- 1 Dual Foot Plate
- 1 Power Adapter †† (50407 / 50562 only)
- 1 Stereo Plug to Stereo Plug Cord
- 1 Banana Plug to Ring Terminal Cord
- 1 Certificate of Calibration

### Installation

The resistance limits for footwear and wrist strap tests are controlled by the DIP switches located on the left-side of the tester (see Figure 2). See the following tables for the DIP switch settings and their corresponding test values.

### Footwear Resistance

DIP switches 1 and 2 control the "HIGH" test limit.

Switch 1	Switch 2	HIGH Limit Resistance
ON	ON	10 Megohms ( $1 \times 10^7$ )
OFF	OFF	35 Megohms ( $3.5 \times 10^7$ )*
ON	OFF	100 Megohms ( $1 \times 10^8$ )
OFF	ON	1 Gigohm†

DIP switches 3 and 4 control the "LOW" test limit.

Switch 3	Switch 4	LOW Limit Resistance
ON	OFF	100 Kilohms ( $1 \times 10^5$ )
OFF	ON	1 Megohm ( $1 \times 10^6$ )*

\* Default Setting

† NOTE: At 1 Gigohm high limit resistance, a dirty foot plate could result in a false pass. Be sure to keep the foot plate clean, particularly when using this setting. Not suitable for relative humidity greater than 50%.

†† NOTE: This unit must be used with the proper power adapter - a 12V adapter with positive center, 0.5 amp, 3.5mm phone plug.

## WRIST STRAP RESISTANCE

DIP switches 5 and 6 control the “HIGH” test limit.

Switch 5	Switch 6	HIGH Limit Resistance
OFF	OFF	Wrist Strap Test Disabled
ON	OFF	35 Megohms ( $3.5 \times 10^7$ )*
ON	ON	10 Megohms ( $1 \times 10^7$ )**

\* Default Europe Setting

\*\* Default USA Setting

DIP switch 5 must be ON (default setting) for the wrist strap test to be active. If the wrist strap test is disabled by DIP switch 5 being OFF, the 3 LEDs for this test will remain OFF at all times.

The “LOW” limit for the wrist strap test is set to 1 Megohms and cannot be changed by the user.

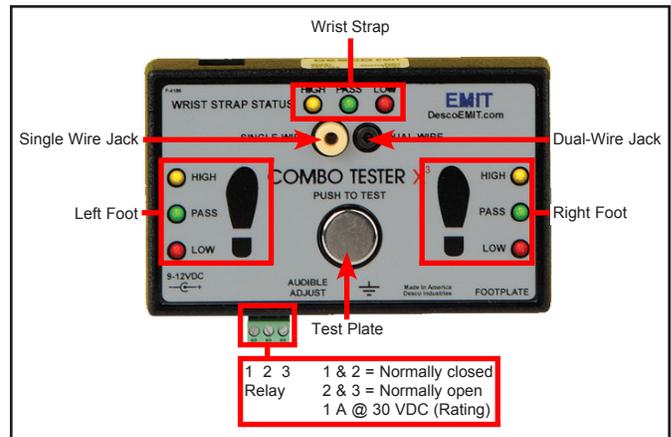


Figure 3. Dual Independent Footwear and Wrist Strap Tester features and components

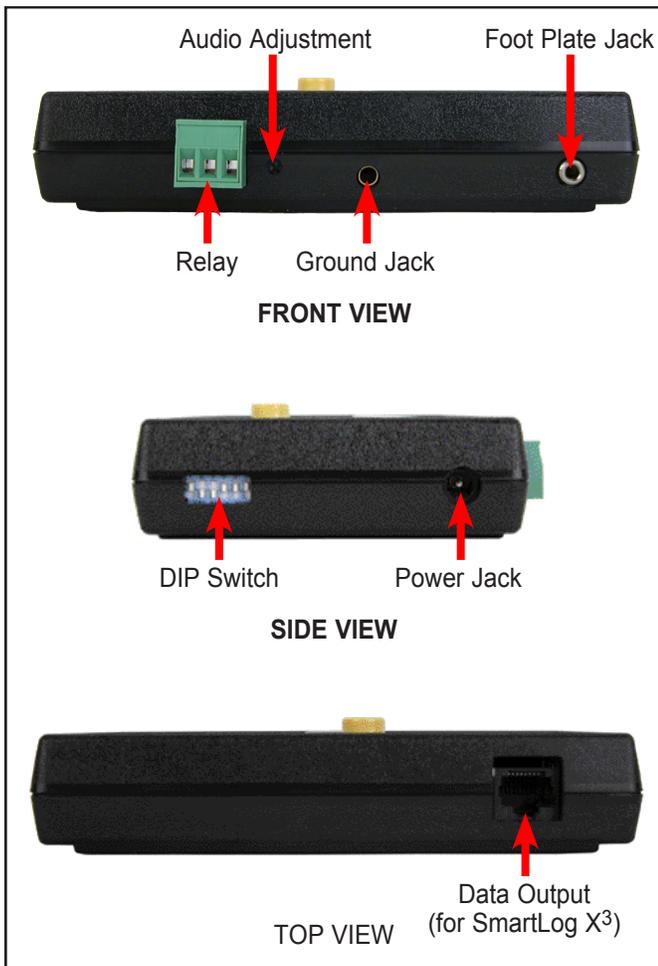


Figure 2. Dual Independent Footwear and Wrist Strap Tester side views

## Installing The Tester And Foot Plate

Mount the tester at the desired location using the four mounting holes in the corners of the yellow mounting plate. Set the foot plate below the tester. Insert one end of the Stereo Plug to Stereo Plug cord into the stereo jack located at the bottom of the tester (see Figure 2). Insert the other end of the cord into the stereo jack at the back of the foot plate.

Insert the banana plug end of the Banana Plug to Ring Terminal cord into the ground jack located at the bottom of the tester (see Figure 2). Connect the ring terminal end of the cord to earth ground. This connection will remove any static charge from the user before the test. NOTE: Failure to correctly ground the tester may result in damage not covered under warranty.

Insert the power supply plug into the power jack located on the left-side of the tester (see Figure 2). Plug the power supply into an appropriate power outlet.

## Relay Terminal

A relay with both “normally open” and “normally closed” contacts is included for your convenience. Going from left to right, the terminal block on the bottom of the tester has terminals for “normally closed,” “common,” and “normally open” (see Figure 3). The relay can be used for opening an electric lock to an ESD sensitive area. The maximum contact rating is: 1A@30VDC.

## Operation

Upon power up, the alarm will sound and all of the LEDs for the activated tests will be illuminated. The tester is now ready for use.

Pushing the test button on the front panel starts the test. During the test all LEDs will turn off to indicate that a test is in progress. Contact with the test plate must remain until the test results are displayed. Depending on the configuration of the tester, the test could require up to three (3) seconds.

The resistance is checked from the touch plate to the corresponding foot plate for each foot and from the touch plate to the wrist strap connector jacks through the operator. A wrist strap must be plugged into the appropriate jack before the touch plate is depressed if the wrist strap option is activated.

The Dual Independent Footwear and Wrist Strap Tester can test both single and dual wrist straps. Single-wire wrist straps are to be plugged into the banana jack labeled "SINGLE-WIRE" located on the front panel of the tester (see Figure 3). Dual-wire wrist straps are to be plugged into the phono jack labeled "DUAL-WIRE" located on the front panel of the tester (see Figure 3). The tester automatically determines what type of wrist strap is being tested.

The LED(s) will turn off while the test is in progress. The test results for each foot and wrist strap will then be displayed for approximately three (3) seconds. If all tests result in a "PASS" condition, the internal relay will activate.

If any of the test results fail "HIGH" or "LOW," an audible alarm will sound. The LED(s) indicating the failed test will be displayed for approximately three (3) seconds, and the internal relay will not activate.

## Calibration

The Dual Independent Footwear and Wrist Strap Tester is calibrated to standards traceable to NIST. Frequency of recalibration should be based on the critical nature of those ESD sensitive items handled and the risk of failure for the ESD protective equipment and materials. In general, we recommend that calibration be performed annually.

The accuracy of the Dual Independent Footwear and Wrist Strap Tester is specified as:

- $\pm 10\%$  for  $< 1$  Megohm range
- $\pm 10\%$  for 1 Megohm and higher resistance ranges
- $\pm 20\%$  for 1 Gigohm Range

A periodic check (once every 6 to 12 months) using a precision resistance box should be performed to verify proper operation.

The EMIT 50424 Limit Comparator is available for the convenient period testing of the Dual Independent Footwear and Wrist Strap Tester .

The Limit Comparator allows the customer to perform NIST traceable calibration on the Dual Independent Footwear and Wrist Strap Tester . The Limit Comparator can be used on the floor shop within a few minutes virtually eliminating downtime, verifying that the Dual Independent Footwear and Wrist Strap Tester is operating within tolerances.

See [TB-6581](#) for more information.



Figure 4. EMIT 50424 Limit Comparator

## Specifications

**Operating Voltage:**  
12 VDC

**Test Switch Voltage:**  
5 VDC @ open circuit

**Wrist Strap and Footwear Test Voltage:**  
12 VDC @ open circuit

**Test Current:**  
Limited by resistors and varies on the test range setting (100 kilohms - 1 gigohm)

**Relay Contact Rating:**  
1 A @ 30 VDC max

**Temperature Range:**  
41°F - 104°F (5°C - 40°C)

**Operating Conditions:**  
Indoor use only at altitudes less than 6500 ft. (2 km)  
Maximum relative humidity of 80% up to 88°F (31°C) decreasing linearly to 50% @ 104°F (40°C)  
Maximum relative humidity of 50% at 1 Gigohm setting

**Pollution Degree:**  
2 per IEC 644

### Limited Warranty, Warranty Exclusions, Limit of Liability and RMA Request Instructions

See EMIT's Warranty -  
<http://emit.descoindustries.com/Warranty.aspx>