

# Jewel<sup>®</sup> Workstation Continuous Mini Monitor

## Operation, Installation, and Maintenance



Figure 1. Jewel<sup>®</sup> Workstation Continuous Mini Monitor

### Description

Leading companies use continuous monitors as a cost effective component in satisfying the paragraph 6.1.3 Compliance Verification Plan requirements of ANSI/ESD S20.20. The EMIT Jewel<sup>®</sup> Workstation Continuous Mini Monitor continuously monitors the integrity of one operator and an ESD protective work surface's discharge path to ground. The Monitor will provide virtually instantaneous notification of static control equipment failures, eliminating the need of periodic testing and costly record keeping. This unit is highly cost effective as it is designed to monitor any conventional single conductor wrist strap and ground cord system. **There are no additional wires to connect and its small package makes it highly suitable to install on a worksurface.**

Continuous Monitors pay for themselves, improving quality, productivity, and eliminating wrist strap daily testing and test result logging. Per ESD-S1.1 paragraph 6.1.3 Frequency of Functional Testing, "The wrist strap system should be tested daily to ensure proper electrical value. Daily testing may be omitted if constant monitoring is used."

Per ESD Handbook TR20.20 paragraph 5.3.2.4.4, "Typical test programs recommend that wrist straps that are used daily should be tested daily. However, if the products that are being produced are of such value that knowledge of a continuous, reliable ground is needed, and then continuous monitoring should be considered or even required."

The Jewel<sup>®</sup> Workstation Continuous Mini Monitor is available in two models.

Model	Color	Voltage AC	Calibration
<a href="#">50502</a>	Sapphire	120	NIST
<a href="#">50503</a>	Sapphire	220	NIST

The Jewel<sup>®</sup> Workstation Continuous Mini Monitor is a Real Time instrument that ensures that critical ESD generators in a sensitive area are effectively grounded. It independently monitors the operator and the work surface. The instant an operator's wrist strap or cord fails, the monitor will issue audible and visual alarms alerting the user of the problem. In the same manner, the unit also confirms that an electrical discharge path to ground of less than 500 megohms exists from the ESD protective work surface. No user adjustment or calibration required.

### ADVANTAGES OF CONTINUOUS MONITORING OVER PERIODIC TESTING

Many customers are eliminating periodic testing and are utilizing continuous monitoring to better ensure that their products were manufactured in an ESD protected environment. Full time continuous monitoring is superior to periodic or pulsed testing, and can save a significant amount of money in testing costs and rejected product. Periodic testing detects failures after ESD susceptible products have been manufactured. The costs of dealing with the resulting catastrophic or latent defects can be considerable. Jewel<sup>®</sup> Workstation Continuous Mini Monitors eliminate the need for users to test wrist straps and log the results; by their function, these monitors satisfy the ISO 9000 and ANSI/ESD S20.20 test logging. ANSI/ESD S20.20 Paragraph 6.2.2.2 Personnel Grounding Guidance states "A log should be maintained which verifies that personnel have tested their personal grounding devices." Per ESD-S1.1 Paragraph 6.1.3 "Daily (wrist strap system) testing may be omitted if constant monitoring is used."

### WAVE DISTORTION DETECTION TECHNOLOGY PROVIDES TRUE 100% CONTINUOUS MONITORING

From all the technical alternatives available, EMIT has chosen wave distortion technology for some of its Continuous Monitor product offerings. Wave distortion circuitry monitors current/voltage phase shifts and provides true 100% continuous monitoring. Electrical current will lead voltage at various points due to the combinations of resistance and capacitive reactance. By monitoring these "distortions" or phase shifts, the wave distortion Workstation Continuous Mini Monitor will reliably determine if the circuit is complete.

Wave distortion technology can be referred to “vector impedance monitoring”. This description is valid as the wave distortion technology measures the impedance at the monitored banana jack and looks for changes in either the capacitance or resistance of the circuit which includes the wrist strap and its wearer. It uses filtering and time domain sampling to filter out false signals caused by voltage offsets, 60 Hz fields and other electro-magnetic and electrostatic interference.

In normal factory environments, and with persons whose capacitance with respect to ground is within design limits (5 feet tall 90 pound person to 6 foot 5 inch 250 pound person), the Jewel® Workstation Continuous Mini Monitor cannot be “fooled”. It will provide a reliable alarm only when the wrist strap or work surface becomes dysfunctional or unsafe according to accepted industry standards. The Jewel® Workstation Continuous Mini Monitor is drift-free and designed to be insensitive to the effects of squeezing or stretching the coil cord.

**ADVANTAGES OF WAVE DISTORTION AND SINGLE-WIRE TECHNOLOGY**

The Jewel® Workstation Continuous Mini Monitor allows the use of any standard, single-wire wrist strap and coil cord. The monitor/wrist strap/cord system life-cycle costs are by far lower than alternative systems which require expensive & fragile dual-wire cords and special wrist straps. Dual-wire cords are expensive and are the weak link of the system, the most likely component to need replacement. Over a five year period, this can make the dual-wire system three to five times as expensive as a system utilizing single-wire wrist straps and cords. See Calibration (page 4) to minimize life-cycle costs.

The dictionary defines constant as uniform and unchanging, and continuous as uninterrupted. Nonetheless, some dual-wire resistance monitors utilize a pulsed test current and do not really provide continuous monitoring. For example, during each 2.2 second pulse cycle of a leading “constant” resistive monitor, electrical current is pulsed for only 0.2 seconds followed by an unmonitored interval of 2 seconds. This leaves the user/wrist strap unmonitored for over 90% of each cycle. Damaging static charges can easily occur in the portion of the time in between the pulses. The off period of 2 seconds equals 2 billion nanoseconds, and “it takes only about 25 volts applied for 100 nanoseconds to blow most memories or microprocessors”.\* The dual-wire system does not reliably meet all industry specifications, as the cords do not meet the EOS/ESD S-1.0 paragraph 4.1.6, 1 to 5 pound “breakaway force” requirement for operator safety.

By using the reliable wave distortion technology to determine if the circuit is complete, there are no false alarms. There is no need to adjust or tune the monitor to a specific user or installation. The miniscule amount of electrical current (less than 1 volt coil cord signal) required to generate the waveform has never caused reported skin irritation and is extremely safe for use in voltage sensitive applications such as disk drive manufacturing.

**Installation**

Confirm that the Surface Resistance (RTG) of the mat is  $5 \times 10^8$  Ohms or less. We recommend the EMIT [50557](#). Remove the monitor from its packaging and inspect for any shipping damage. Included with each Jewel® Workstation Continuous Mini Monitor should be:

- 1 Power Adapter (50502 only)
- 1 IEC Universal Adapter (50503 only)
- 2 Push and clinch snaps
- 1 Certificate of Calibration

The Continuous Mini Monitor is normally installed toward the front edge of a workstation where the LEDs are easily visible. The unit is designed to be mounted using the 10mm studs mounted at the bottom of the monitor. See Figure 2.

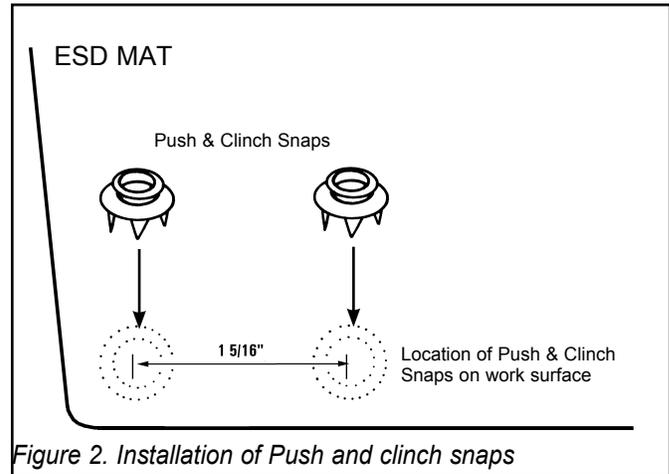


Figure 2. Installation of Push and clinch snaps

Figure 3 illustrates how the monitor is snapped to the work surface

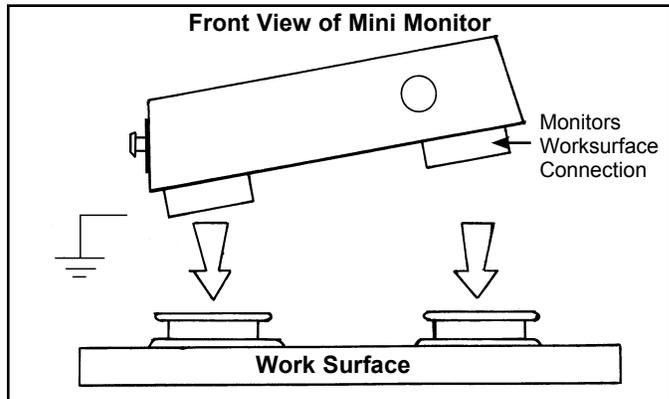


Figure 3. Attaching monitor to work surface

**Note:** Install the monitor to the worksurface by aligning one snap at a time and applying a downward force directly above that snap.

\*1981 article by Donald E. Frank - Electrical Overstress / Electronic Discharge Symposium Proceedings

Figure 4 shows the wiring connection for the Jewel® Workstation Continuous Mini Monitor.

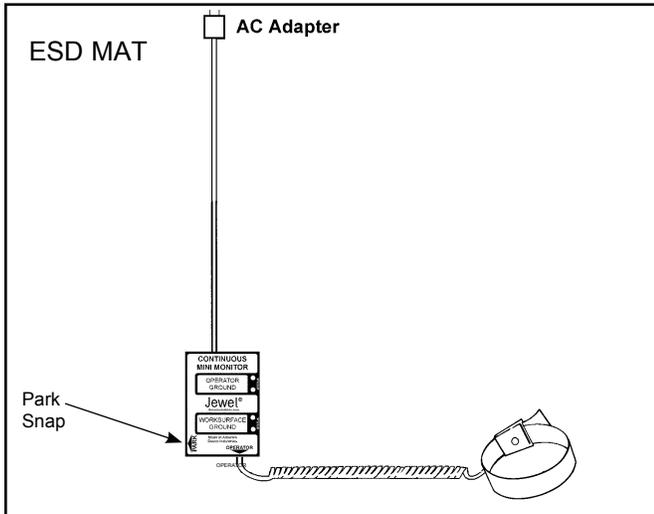


Figure 4. Operating the Jewel® Workstation Continuous Mini Monitor.

The following procedure will outline how to correctly wire the Jewel® Workstation Continuous Mini Monitor so as to properly monitor an ESD protected workstation.

1. Confirm that the worksurface surface resistance is  $5 \times 10^8$  Ohms or less.
2. A convenient 120 VAC outlet should be located and tested for proper wiring and grounding. We recommend Desco Item [98130](#) AC Outlet Analyzer to verify integrity of building ground.
3. Plug the transformer into the outlet and connect the mini plug into the back side of the monitor. The green Work Surface LED should be lit. The monitor is now ready for use. If the red Work Surface LED is flashing, check the snap fasteners for proper connection.

## Installation on Micastat® Laminate

Materials Needed:

- 2 Flush Mount Laminate Ground Inserts
  - 1 Installation Tool for Flush Mount Insert
  - 1 10mm Socket and Rivet (100 per pack)
  - 2 8-32 button cap screws
1. Install the Flush Mount Inserts in the snap pattern for the monitor.
  2. Once installed, remove the 8-32 screw supplied.
  3. Place a 10mm snap socket on top of the installed brass insert.
  4. Screw the 10mm snap socket into place on the insert using an 8-32 button cap screw.
  5. Do this for both inserts and snap attach the mini monitor into place; it is now grounded to and monitoring the Micastat®.

## Operation

When the Jewel® Workstation Continuous Mini Monitor is installed and is connected to an ESD protective work surface, and it is grounded via an AC adapter cord, the monitor's green Work Surface LED and its red Operator LEDs should be on. The monitor takes 6 seconds to activate its alarm circuitry when it is first plugged in.

- The AC adapter must include the ground reference on the barrel of the output plug.
- The AC adapter therefore supplies the monitor with ground.
- The mat resistance is measured between the two snaps on the bottom of the unit.
- This monitor simplifies the workstation because no other wiring is needed.

### TO USE THE MONITOR:

1. Plug a wrist strap cord, not attached to the wristband, into the monitored jack on the front of the unit. This automatically activates the selected operator channel. The red operator LED should turn on.
2. Snap the cord to the wristband, and slip it on your wrist. (It should fit snugly.) This should silence the audio and cause the LEDs to switch from red to green. If this does not happen, check the coil cord for continuity or damage. Examine your wrist and ensure that it has a secure fit. If you have dry skin use antistatic hand lotion such as Item [35660](#) Reztore™ ESD Hand Lotion. When leaving the area, a person can take the coil cord along or leave it attached to the monitor in park position. Alarm will shut off in approximately 8 seconds when operator grounding cord is removed from unit or will instantly shut off when cord is parked.

### PARK SNAP

The audible alarm is designed to alert both operator and supervisor. The Park Snap feature provides a means for an operator to disconnect when normally leaving the work area, without the audible alarm sounding, and it provides a means of wrist cord storage (visual red LED will illuminate). By the operator touching the Park Snap, the audible alarm is disabled for about 8-10 seconds. The operator can remove the wrist strap cord and attach socket and cord to Park Snap for storage. If the cord is plugged into the jack marked "Operator" the monitor will alarm continuously until you either park the cord, or remove the cord from the operator jack. In the case of removing the cord from the jack, the audio alarm will only sound for 8-10 seconds.

### WORK SURFACE CHANNEL

The Jewel® Workstation Continuous Mini Monitor monitoring circuitry is sufficiently sensitive to detect extremely low current, allowing it to be used with mats having a resistance of up to  $5 \times 10^8$  Ohms RTG.

When the monitor is connected to an ESD Mat work surface, the amount of current that flows is a function of the total resistance between the monitor and through the work

surface to ground. When the resistance of the work surface is below a pre-set threshold, the monitor will indicate good. Conversely, if the resistance level is high when compared to the monitor's reference, the unit will alarm. This is an integrating resistance measuring circuit, therefore it is relatively insensitive to externally induced electromagnetic fields. The resistance threshold is factory set to 500 megohms. (It can be special ordered to other limits. Limits can be varied and set to 1 gigohm maximum.)

## Specifications:

Work Surface Limit*	Set to 500 Megohms $\pm$ 20%
Operating Voltage	
<a href="#">50502</a>	120VAC, 50-60 Hz
<a href="#">50503</a>	220VAC, 50-60 Hz
Response time to alarm	<50mS
Operating Temperature	32 - 100°F
Humidity Range:	0-95% RH, non-condensing
Size	2.77"L x 2.07"W x .710"H

\* Contact factory for special limits.

## Maintenance and Calibration

The Jewel<sup>®</sup> Workstation Continuous Mini Monitor is solid state and designed to be maintenance free. It is calibrated to NIST traceable standards. There are no user adjustments necessary. Because of the wave distortion sensing nature of the test circuit, special equipment is required for calibration. We recommend that calibration be performed annually using the [50512](#) Continuous Monitor Calibration Unit. The Calibration Unit is a most important product which allows the customer to perform NIST traceable calibration on continuous monitors. The [50512](#) is designed to be used on the shop floor at the workstation, virtually eliminating downtime, verifying that the continuous monitor is operating within tolerances. The [50512](#) provides a simple and quick means to assure accurate performance in accordance with ANSI/ESD S20.20 paragraph 6.2.2.2 initial and periodic check Personnel Grounding Guidance.

## Limited Warranty

EMIT expressly warrants that for a period of five (5) years from the date of purchase EMIT Continuous Monitors will be free of defects in material (parts) and workmanship (labor). Within the warranty period, a credit for purchase of replacement EMIT Continuous Monitors, or, at EMIT's option, the Continuous Monitor will be repaired or replaced free of charge. If product credit is issued, the amount will be calculated by multiplying the unused portion of the expected five year life times the original unit purchase price. Call Customer Service at 909-664-9980 (Chino, CA) or 781-821-8370 (Canton, MA) for Return Material Authorization (RMA) and proper shipping instructions and address. Include a copy of your original packing slip, invoice, or other proof of date of purchase. Any unit under warranty should be shipped prepaid to the EMIT factory. Warranty replacements will take approximately two weeks.

If your unit is out of warranty, EMIT will quote repair charges necessary to bring your unit up to factory standards. Call Customer Service at 909-664-9980 (Chino, CA) or 781-821-8370 (Canton, MA) for a Return Material Authorization (RMA) and proper shipping instructions and address.

## Warranty Exclusions

THE FOREGOING EXPRESS WARRANTY IS MADE IN LIEU OF ALL OTHER PRODUCT WARRANTIES, EXPRESSED AND IMPLIED, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WHICH ARE SPECIFICALLY DISCLAIMED. The express warranty will not apply to defects or damage due to accidents, neglect, misuse, alterations, operator error, or failure to properly maintain, clean or repair products.

## Limit of Liability

In no event will EMIT or any seller be responsible or liable for any injury, loss or damage, direct or consequential, arising out of the use of or the inability to use the product. Before using, users shall determine the suitability of the product for their intended use, and users assume all risk and liability whatsoever in connection therewith.