Single Wire Multifunction Wrist Strap Monitor Operation and Maintenance

Description
The ESD Systems.com 61000 contains all the monitoring functions required to ensure that the wrist straps, worksurface, and ground connections of a workstation are fully functional at all times.

The 60100 continuously monitors:
1. The operator wrist strap for changes in load, or open circuit
2. The worksurface for resistance
3. Electrical ground (or earth ground) for continuity and low resistance

Installation
Fasten the 61000 with the supplied hook-and-loop self adhesive strip. The 61000 requires only 4 connections to work properly: 1) electrical ground, 2) worksurface, 3) single wire wrist strap, and 4) electrical power.

GROUND
The electrical ground connection is made through the cord of the three-wire US/CSA approved AC adapter. Per the ESD Association ANSI/ESD S20.20, electrical ground is preferred.

If you are using earth ground, make the connection by attaching a wire to a water pipe clamp or use an 8" to 12" copper ground stake. A large number of workstations can be connected to a single heavy gauge ground wire. Attach the ground wire to the pin jack adapter on the back of the unit labeled “GND”. Solder the wire directly to the banana plug-to-pin jack adapter or use a banana plug on the ground wire. This pin jack is internally connected to the banana jack on the front of the unit marked “WRIST STRAP/GUEST”. This jack may be used as an auxiliary electrical ground connection point for another piece of equipment, or as a plug-in point for a wrist strap by persons visiting the workstation.

Make the worksurface monitoring connection by attaching two wires to the worksurface. Use “snap” connectors or a CK-1 contact kit with the two contact points positioned approximately 1" or less apart. Attach one wire to the pin jack adapter on the back of the unit labeled “BENCH” and the other wire to system ground.

Complete the installation by plugging the UL/CSA approved aC adapter DIN plug into the DIN jack on the rear panel marked “POWER”, and the adapter into a grounded outlet. Proper installation is indicated by a red “STRAP” LED, a green “BENCH” LED, a green “GND” LED, and an approximately 3 second activation on the audible alarm. (NOTE: All three LEDs must be green in order to reset the audible alarm circuit after an alarm condition.)

Wear the single wire wrist strap and plug the cord into the front panel “WRIST STRAP MONITOR” jack. Observe that all three green LEDs are on.
Operation

Ground Monitor:
The green “GND” indicator will illuminate when the total resistance to ground measures less than 100 ohms. Ground loop resistance greater than 100 ohms will produce a red “GND” indicator and an audible alarm for approximately 3 seconds.

Check for proper operation by disconnecting the ground wire from the “GND” terminal or by floating the ground pin on the power adapter by way of a two-prong to three-prong adapter (readily available in hardware stores). The “GND” indicator should illuminate red and the alarm should sound for approximately 3 seconds when either ground is interrupted.

Wrist Strap Test:
When power is supplied to the 61000, the “STRAP” indicator will illuminate red until a functional single wire wrist strap is worn and plugged into the “WRIST STRAP MONITOR” jack. Plug a single wire wrist strap into the connector marked “WRIST STRAP OPERATOR” place the strap securely around either wrist. the “STRAP” indication will be green if the total capacitance of operator and wrist strap is above approximately 50 picofarads and the series resistance of the wrist strap cord is less than approximately 2 megohms. Should the capacitance or resistance change above or below these thresholds, the “STRAP” indication will illuminate red and the alarm will sound for approximately 3 seconds.

A wrist strap, plugged into the “WRIST STRAP/GUEST” banana jack, is connected directly to earth ground and is not continuously monitored.

Because of the inherent nature of single-wire wrist strap monitoring based on the body capacitance principle, it may sometimes be necessary to adjust an individual unit to a particular operator’s body capacitance. Adjust the unit by removing the top cover of the unit and turning calibration potentiometer R7 until the “STRAP” indicator just turns red while the operator is wearing the wrist strap. Then, slowly turn the potentiometer in the opposite direction until the “STRAP” indicator just returns to
green. Verify that removing the wrist strap will cause the indicator to turn red and that the alarm sounds for approximately 3 seconds.

**Worksurface Test:**
Wear a plugged-in wrist strap to produce a “PASS” condition for all circuits (all green LEDs are on). Disconnect the worksurface wire at the rear of the 61000 or at the bench surface. Observe that the “BENCH” red LED turns on and the audible alarm is activated for approximately 3 seconds. Reset the alarm circuit by reconnecting the worksurface wire to the 61000. The green “BENCH” LED remains on, indicating a bench top condition when the resistance between the worksurface to ground connection and the worksurface measurement connection from the 61000 is less than 50 megohms.

**NOTE:** Special order 61000 units may have special factory set bench top trip-points and may also include the optional STANDBY switch. Specially ordered 61000 units may also be factory set for continuous alarm. The volume of the audible alarm may be adjusted with potentiometer R37.

**Calibration Procedure**

**Required Material:**
1. Either a 56pF dipped mica capacitor, ±5%, soldered in series with a 1.3 Megohm ±5% resistor, or a single wire wrist strap identical to the type of strap to be used with the 61000, or a SpectraScan brand calibration unit.
2. SpectraScan brand Decade Resistance Calibrator or decade resistors covering 50 ohms to 100 Megohm, ±1%.
3. A SpectraScan brand 14V RMS power adapter.
4. Patch cords
5. #2 Phillips screwdriver
6. Insulated calibration screwdriver

**Procedure:**
- Remove the top cover the 61000 using a #2 Phillips screwdriver
- Connect the 61000 power adapter to the large DIN connector at the rear of the 61000
- Observe that all three red LEDs are lit and the audible alarm is sounding for approximately 3 seconds

**Ground Test/Calibration**
- Connect a known ground (an independent earth ground is preferred) to the jack marked “GND” at the rear of the 61000. A metal cord water pipe is ideal for this ground connection.
- Observe that the green “GND” LED turns on.
- Connect a decade resistor set to 50 ohms, in series with the “GND” connection, and increase the resistance in small increments until the red “GND” LED turns on. The value of resistance that causes the “GND” indication to go from green to red should be 100 ohm, ±20%. If the trip point is not within this range, adjust R21 for a trip point as close to 500 k ohm as possible. If the 61000 was special ordered with a different setpoint, test and adjust to this special value so that the trip point is within 20% of the special value.

4. Set the decade resistor to 35 Megohm. The “BENCH” LED indication should be green. Increase the resistance in increments until the “BENCH” indication just turns red. The value of resistance that causes the “BENCH” LED indication to go from green to red should be 10 Megohm, ±20% for all older units or 50 Megohm ±30% for newer units made after April 8, 1996. This trip point is not user adjustable. If the trip point is outside the calibration limits, the unit must be returned to ESD Systems.com for recalibration. If the 61000 was special ordered with a different set point, test to this special value. Custom set points between 20 Megohm and 100 Megohm should be tested to ±30%.
Wrist Strap Test/Calibration

This can be done three different ways: By using a single wire wrist strap, or by using a capacitor/resistor combination, or by using a SpectraScan brand calibration unit.

Wrist Strap Method:
Rotate R7 until the green wrist strap LED just turns on. Connect a single wire wrist strap to the “MONITOR” jack at the front left of the 61000. Wear the wrist strap. Turn R7 until the red “STRAP” LED turns on, then reverse the direction of R7 until the green “STRAP” LED just turns on. Alternately wear and remove the strap to verify that the “STRAP” indication changes from green to red. The detection circuitry is now calibrated.

Capacitance Method:
A 56pF, ±5% dipped mica capacitor, in series with a 1.3 Megohm, ±5% resistor may be connected with short leads between the “WRIST STRAP OPERATOR” jack and the “WRIST STRAP GUEST” jack on the front panel. Adjust R7 until the “STRAP” indication just changes from red to green. The detection circuitry is now calibrated. (Note: Verify proper operation with a wrist strap. Recalibrate if necessary.)

SpectraScan Brand Calibration Unit Method:
Connect the calibration unit leads to the “WRIST STRAP OPERATOR” and “WRIST STRAP GUEST” jacks on the front panel. Adjust R7 until the “STRAP” indication just changes from red to green. The detection circuitry is now calibrated.

Alarm Volume Calibration
Set the alarm volume pot, R39, to desired volume and replace the cover. The unit is now calibrated.

Note: The audible alarm should sound for approximately 3 seconds following a fault condition. The alarm will only sound when ALL circuits are reset, i.e., all green LEDs must be “ON” to reset the alarm circuit. (The 61000 may also be special ordered with a continuous alarm.) The “BENCHTOP” monitoring circuits work with very high impedances (up to 50 Megohm) and very low currents (less than 0.5 microamperes). In testing these circuits, take care to avoid pick-up of extraneous signals, especially strong 60 Hz fields.

Limited Warranty
ESD Systems.com expressly warrants that for a period of one (1) year from the date of purchase, our Single Wire Multifunction Wrist Strap Monitors will be free of defects in material (parts) and workmanship (labor). Within the warranty period, the product will be tested, repaired, or replaced at our option, free of charge. Call our Customer Service Department at 508-485-7390 for a Return Material Authorization (RMA) and proper shipping instructions and address. Include a copy of your original packing slip, invoice, or other proof of purchase date. Any unit under warranty should be shipped prepaid to the ESD Systems.com factory. Warranty repairs will take approximately two weeks.

If your unit is out of warranty call Customer Service at 508-485-7390 for a Return Material Authorization (RMA) and proper shipping instructions and address. Desco will quote repair charges necessary to bring your unit up to factory standards.

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 ESD Systems.com 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.

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