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ESD SYSTEMS.com **TECHNICAL BULLETIN TB-20686**

SPI Ground Gard 5 / 5.5
Operation, Installation, and Maintenance

Made in the
United States of America

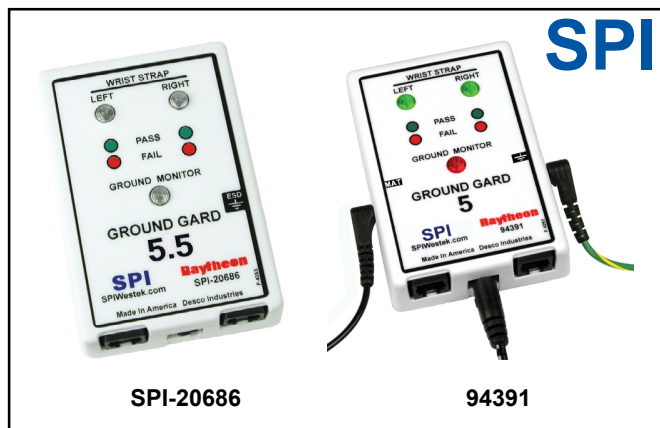*Figure 1. SPI Ground Gard items SPI-20686 and 94391.*

Description

The SPI-20686 and 94391 are wrist strap and ground monitoring devices for the electronics work station. It is designed to constantly monitor two single wire wrist straps using a Remote Operator Module for each user.

These units provide continuous monitoring of:
• One or two users wearing a wrist strap
• Ground (Verification between electrical and ESD ground)

Leading companies use continuous monitors as a cost effective component in satisfying the paragraph 6.1.3 Complicance Verification Plan requirements of ANSI/ESD S20.20. The SPI-20686 and 94391 Continuous Monitors provide continuous monitoring of two operators and also functions to ensure connection to ground. If the monitor, using capacitance technology, detects improper grounding of the operator, the monitor will issue an audible alarm along with an illuminated red LED to notify the user of a problem.

Many customers are eliminating periodic testing and are utilizing continuous monitoring to better ensure that their products were manufactured in an ESD controlled environment. Continuous monitoring is superior to periodic testing. "While effective at the time of testing, wrist strap checker use is periodic. The failure of a wrist strap between checks may expose products to damage from electrostatic charge. If the wrist strap system is checked at the beginning of a shift and subsequently fails, then an entire shift's work could be suspect." (ESD TR 12-1 Section 1.0 Survey of Constant Monitors for Wrist Straps)

Continuous 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 Paragraph 6.2.2.2 test logging requirements. Per ESD-

S1.1 paragraph 6.1.3 Frequency of Functional Testing "Daily (Wrist Strap) testing may be omitted if constant monitoring is used."

"Because wrist straps have a finite life, it is important to develop a test frequency that will guarantee integrity of the system. 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." (ESD Handbook TR 20.20 section 5.3.2.4.4)

The SPI-20686 and 94391 will alarm if preset values are exceeded for capacitance, high resist and ground loss conditions. The grounding system is redundant and will still provide a limited grounding even if the utility ground is lost and the system is in an alarm state.

Capacitance Type Continuous Monitors
"These types of monitors are used with a single wire (single conductor) wrist strap. Monitors in this category operate by "sensing" body capacitance. For capacitance monitors, an AC voltage is applied to the wrist strap through the single conductor ground cord. Due to capacitive coupling of the person to ground based on the surroundings, the monitor will indicate either good or bad depending on the manual adjustment or preset tolerance. Since a capacitor or capacitive network responds like a resistor to an AC current, the single conductor wrist strap monitor only provides an estimate of the wrist strap wearer's apparent resistance." (ESD Handbook TR 20.20 section 5.3.9.2 Types of Continuous Monitors)

Packaging

Item SPI-20686
1 Ground Gard 5.5 Monitor
2 94340 Remote Operator Modules
2 10 Foot Phone Cords
1 12 Foot Ground Cord
1 Velcro® Set
4 Screws
1 Power Adapter - 3 Prong, 12 Volts

Item 94391
1 Groud Gard 5 Monitor
2 94340 Remote Operator Modules
1 Power Adapter - 2 Prong, 12 Volts
2 Remote Operator Cables
1 Black Ground Cord
1 Green ground Cord
2 Velcro® Strips
4 Screws
1 Certificate of Calibration

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Installation

1. SPI-20686 and 94391 Monitor Head:

The SPI-20686 and 94391 Monitors are designed to maximize valuable work area and should be mounted at eye level above the workstation, either on a post or shelf support. A double-sided adhesive Velcro® attachment is provided to hold the lightweight head in place.

2. GROUND CONNECTION:

The green wire extending from the monitor must be attached to a facility ground.

Caution: The total amount of resistance through all monitored parts should not exceed 10.0 megohms total.

3. REMOTE OPERATOR MODULES:

The remote operator modules can be mounted at the front of the work surface, usually under the tabletop and flush with the front edge. Two screws for each unit are provided for mounting. Connect each remote to the monitor unit using the telephone cable with RJ11 connectors.

4. POWER UP TEST

After installing the Monitor , remote units, and making the necessary connections without the wrist straps connected, the unit should POWER UP with the wrist strap LED's OFF and the audible alarm SILENT. If you have no response to power or a red LED, check AC outlet for proper ground or refer to trouble shooting section.

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. You may also disconnect the coil cord by unplugging the banana plug from the Remote Module. Both a 7mm and 4mm Park Snap is provided on each module.

Remote Module Description

Inside both remote modules are infrared sensors that react to the insertion of a wrist strap wire with a banana plug. When the banana plug is inserted, the base unit is activated for that remote module. The Monitor LED for the left or right wrist strap will light showing the condition of that strap. If correct, the LED should be GREEN.

Should the wrist strap fail, be worn incorrectly or removed by the operator, the red indicator will flash, calling attention to a problem. Should the ground connection be lost, the red light and alarm will be activated. The monitors are continuous and even a momentary break will cause alarms. The remote modules are set at the factory to allow for sensitivity of the "average" human body model.

Calibration Procedure Using 94373 Tester

Testing the Remote Modules

Refer to Figure 2 to see the connection setup for the 94373 tester to the SPI-20686 and Figure 3 for the 94391 monitor. Make sure that the switch located on the face of the tester is toggled to LEFT WS / RIGHT WS. If connected properly, all three LEDs on the monitor should be illuminated green.
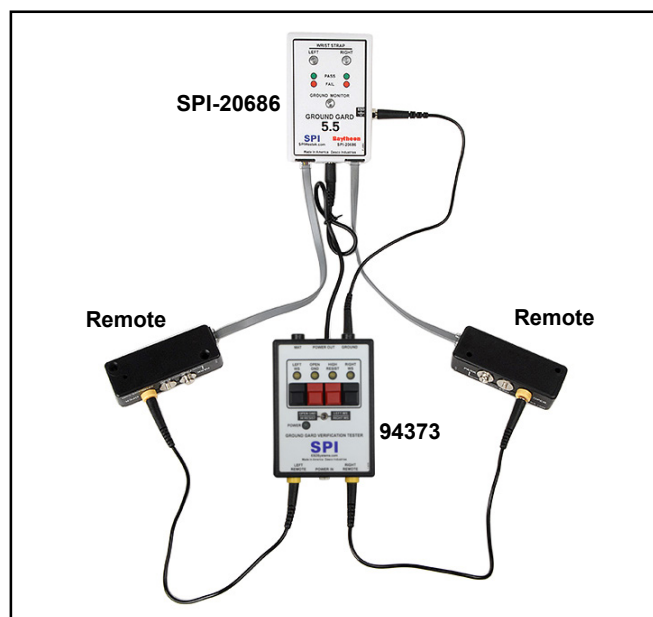

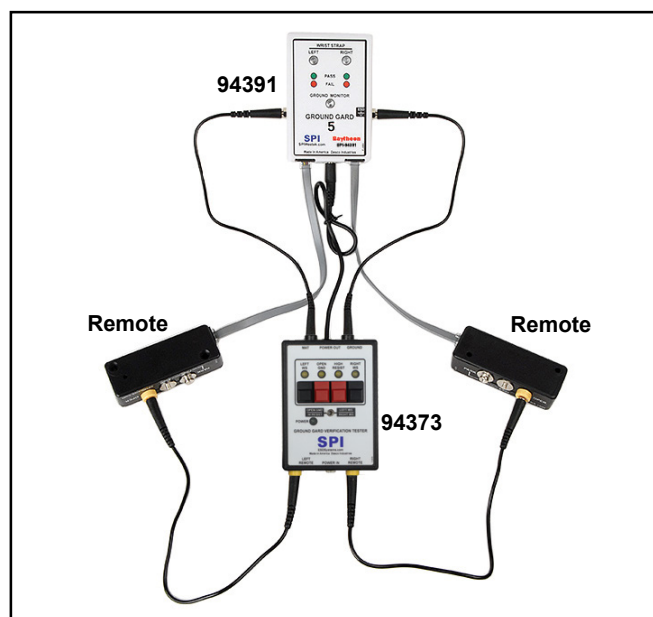*Figure 2. Connecting the SPI-20686 to the 94373 Tester.*

Figure 3. Connecting the 94391 to the 94373 Tester.

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To test the resistance of the left remote module, press the black button labeled LEFT WS on the tester. If the remote module is properly calibrated, the monitor's audible alarm will sound and the LEFT WRIST STRAP LED will illuminate red. If the LED remains green, locate the trim pot underneath the respective remote module. Hold down the tester's LEFT WS button and carefully adjust the trim pot in a counter-clockwise direction until the monitor indicates a FAIL condition. If properly calibrated, the monitor should now indicate a FAIL condition when the tester's LEFT WS button is pressed.

To test the resistance of the right remote module, press the black button labeled RIGHT WS on the tester. If the remote module is properly calibrated, the monitor's audible alarm will sound and the RIGHT WRIST STRAP LED will illuminate red. If the LED remains green, locate the trim pot underneath the respective remote module. Hold down the tester's RIGHT WS button and carefully adjust the trim pot in a counterclockwise direction until the monitor indicates a FAIL condition. If properly calibrated, the monitor should now indicate a FAIL condition when the tester's RIGHT WS button is pressed.

Testing the Ground Monitor
Refer to Figure 2 to see the connection setup for the 94373 to the SPI-20686 and Figure 3 for the 94391. Make sure that the switch located on the face of the tester is toggled to LEFT WS / RIGHT WS. If connected properly, all three LEDs on the SPI-20686 and 94391 should be illuminated green.

Disconnect the cords from the banana jacks on both remote modules. Next, toggle the switch located on the face of the tester to OPEN GND / HI RESIST. Press the red button labeled OPEN GND on the tester, and if the monitor is functioning properly, its audible alarm should sound and the GROUND MONITOR LED should illuminate red.

Press the red button labeled HI RESIST on the tester, and the monitor's audible alarm should sound and the GROUND MONITOR LED should illuminate amber. If any of these conditions are not met, contact the manufacturer for repair.

Installation Adjustments
Should your system alarm without obvious cause, first troubleshoot and verify all connections. If all the connectionsare correct, the base unit should be adjusted to compensate for a different HBM (human body model). We preset the units at the factory at 100pF and your operator might be out of the tolerance range caused either by body chemistry, bulk capacitance or impedance differences.

Follow these steps to adjust and personalize the base unit:

Locate the small hole underneath the desired remote module. Inside this hole is a trim pot device that is adjustable by using a small flat-head screwdriver.

With the system set up and operating, and the operator's wrist strap connected to the remote module:

Turn the trim pot clockwise until the LED illuminates green. Disconnect the wrist cord from the band. An audible alarm will sound and the LED will illuminate red. If not, carefully turn the trim pot counter-clockwise until the LED illuminates red. Reconnect the cord to the wrist band. The alarm should cease and the LED should illuminate green.

Ground Monitor
The SPI-20686 and 94391 include a ground monitoring system that assures a positive ground connection for the workstation. The resistance range is preset at the factory to monitor that the connection to ground is within the resistance range of 0.01 to 10 megohms. A visual and/or audio alarm will verify pass or fault conditions.

CONDITION	INDICATOR
PASS - Properly Grounded with Resistance less than 10 Meg.	- LED Green - No Audible Alarm
HI RESIST - Grounded, but Resistance exceeds 10 Meg.	- LED Oscillate Green to Amber or Flashing Red - Audible Alarm
FAIL - Loss of 1 or both redundant grounds, failure of monitor, worktop, mat, etc.	- LED Flashing Red - Audible Alarm

Safety Issues
With regards to the safety issue, it is hard to conceive of a safer situation than exists with the Ground Gard 5.5 as designed.

1. The SPI-20686 and 94391 have a built-in safety resistance of no less than 500k ohms at each remote unit.
2. The transformer is wound on a split bobbin with 1500 volt insulation to assure no possible line leakage.
3. The circuits are double insulated by virtue of the insulated plastic boxes.
4. 500k ohms internal to the SPI-20686 and 94391 and one megohm in the wrist strap isolate the operator.

This may be varified by using a miltimeter set on ohms. Connect the telephone type wire to the monitor and to the remote unit. Place one end of the probe into the banana receptacle at the remote, and the other to the collar (power supply jack) located at the monitor.

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

See ESDSystem.com's Terms and Conditions -
http://esdsystems.descoindustries.com/TermsAndConditions.aspx

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