Iron Man® Plus Workstation Monitor
Installation, Operation and Maintenance

Made in the
United States of America

Figure 1. Iron Man® Plus Workstation Monitor

Description

The SCS Iron Man® Plus Workstation Monitor:

- Monitors a voltage level that is being generated on a printed circuit board while working on it.
- Monitors resistance to ground of a conductive or dissipative static control type of worksurface.
- Monitors resistance and voltage on a dual conductor wrist strap while being worn by a person.

The Iron Man® Plus Workstation Monitor is available in one model:

Item	Description
CTC331-WW	Iron Man® Plus Workstation Monitor, with World Wide Power Adapter

SCS offers the following accessories for the Iron Man® Plus Workstation Monitor:

Item	Description
CTA212	Power Adapter, 100-240VAC Input, 12VDC 1.5A Output, All Plugs
CTA251	Replacement Jack PCB, Iron Man® Plus
CTE701	Workstation Monitor Checker

Packaging

- 1 Iron Man® Plus Workstation Monitor
- 1 Mat Monitor Cord (White)
- 1 PCB Cord with Alligator Clip (Yellow)
- 1 Monitor Ground Cord (Green and Yellow)
- 1 Power Adapter, 12VDC, with interchangeable plugs (North America, UK/Asia, Europe)
- 1 Push and Clinch Snap, 10 mm
- 1 Countersunk Washer
- 1 Flat Head Screw, 6-32 x 1/4"
- 1 Certificate of Calibration
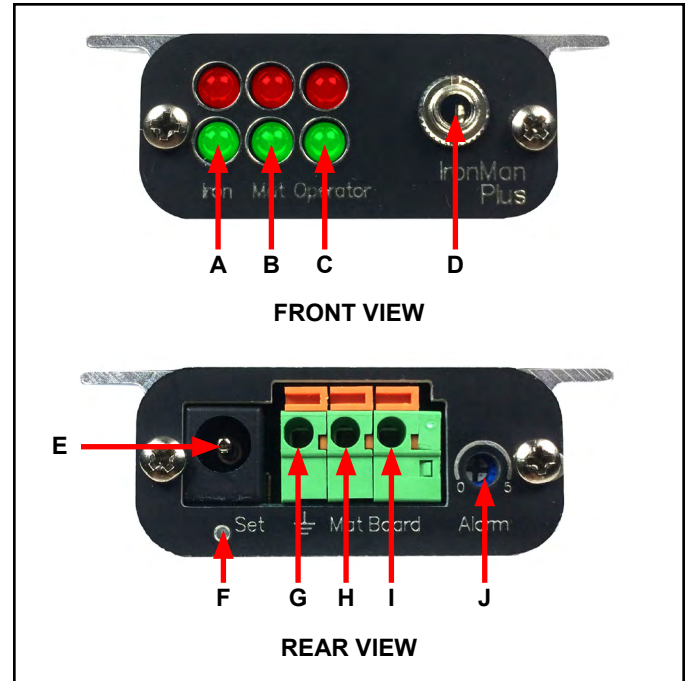
Features and Components

Figure 2. Iron Man® Plus Worstation Monitor features and components

A. Iron LED: When the LED is illuminated green, the voltage level on the monitored PCB ground plane is below the preset alarm level. When the LED is illuminated red and the alarm sounds, the the voltage level on the monitored PCB ground plane is above the preset alarm level.

B. Mat LED: When the LED is illuminated green, the worksurface mat is properly grounded. When the LED is illuminated red and the alarm sounds, the worksurface mat is not properly grounded.

C. Operator LED: When the LED is illuminated green, the operator is properly grounded and their voltage level is below the preset alarm level. When the LED is illuminated solid red and the alarm sounds, the operator is not properly grounded. When the LED is blinking red and the alarm sounds, the body voltage on the operator above the preset alarm level.

D. Monitored Operator Jack: The operator connects to the monitor here.

E. Power Jack: Connect the included 12VDC power adapter here.

F. Audible Alarm Switch: Press the switch to enable or disable the audible alarm.

G. Ground Terminal: Common ground point for the monitor.

H. Monitored Mat Terminal: Monitors a worksurface mat for proper dissipative resistance and static charges.

I. Monitored Board Terminal: Monitors the voltage level on a PCB ground plane.

J. Voltage Alarm Adjustment: Turn the trimpot clockwise to increase the voltage alarm threshold. Turn the trimpot counter-clockwise to decrease the voltage alarm threshold.
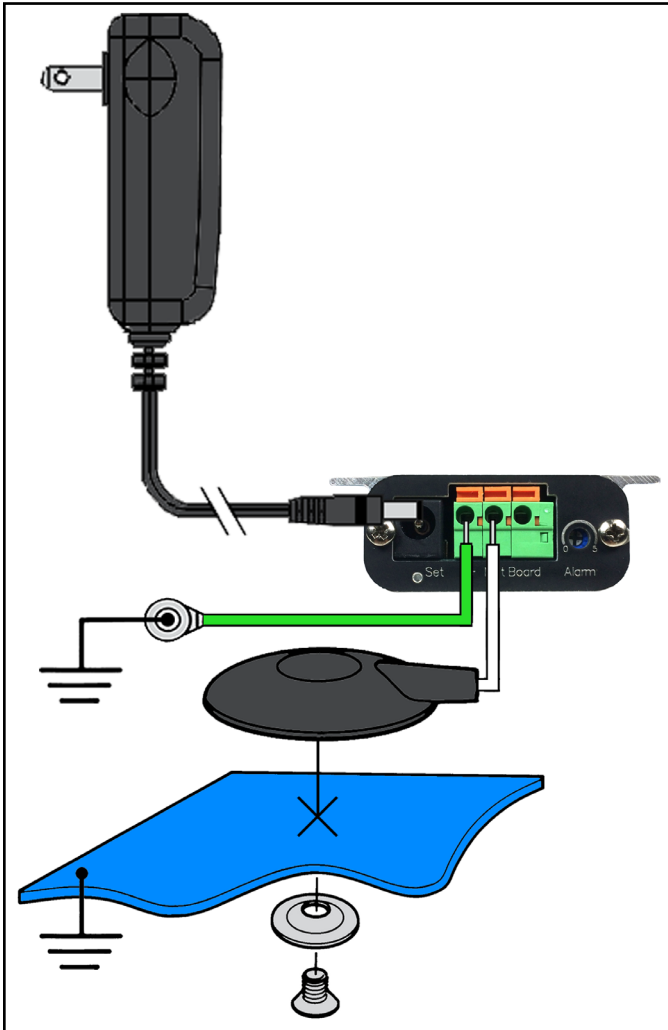
Installation

Figure 3. Installing the Iron Man® Plus Workstation Monitor

Placement
Set the Iron Man® Plus Workstation Monitor in a clearly visible, convenient location where it does not interfere with normal work.

Connecting Reference Ground
Prepare an 18 AWG wire. Strip off the wire insulation approximately 8mm (1/3" in) at each end of the wire. Twist the stranded wire on each end. In order to attach the wire to the Iron Man® Plus Workstation Monitor, insert a small blade screwdriver into the orange slot above the reference ground connector. Gently push inward and insert the stripped wire fully into the hole in the green connector. Release the screwdriver to allow the wire to catch. Attach the other end of the reference ground wire to a known-good-ground in the area.

Connecting Mat Worksurface
Prepare an 18 AWG wire. Strip off the wire insulation approximately 8mm (1/3" in) at each end of the wire. Twist the stranded wire on each end. In order to attach the wire to the Iron Man® Plus Workstation Monitor, insert a small blade screwdriver into the orange slot above the Mat connector. Gently push inward and insert the stripped wire fully into the hole in the green connector. Release the screwdriver to allow the wire to catch. Use the suppliers recommended method to connect the mat worksurface to the other end of the wire.

Connecting Cable to Board Under Test
Attach the provided cable with alligator clip to the back of the Iron Man® Plus Workstation Monitor. In order to attach the wire to the Iron Man®, insert a small blade screwdriver into the orange slot above the Board connector. Gently push inward and insert the stripped wire fully into the hole in the green connector. Release the screwdriver to allow the wire to catch. Attach the other end of the cable to the targeted PCB using the alligator clip.

Connecting Power
Plug the power adapter into a power outlet, and plug the cord into the Iron Man® Plus Workstation Monitor.

Mounting
Determine the mounting location of the Iron Man® Plus Workstation Monitor. Mount the unit using one of the following recommended methods:

- Screws
- Dual Lock Fastener

Enabling and Disabling Monitoring of Worksurface

Follow the procedure below to disable the monitoring of the worksurface mat. No jumpers or shunts are required.

- Unplug the DC input from the device.
- Remove or do not insert any wire in the Mat connector.
- Using a thin pin, such as a paper clip, press and hold the Setup button.
- While the button is pressed, plug in the DC input and then release the Setup button.
- Wait for about 30 seconds until the unit recognizes the absence of a mat. The unit will beep and the Mat LED will be off.
- To re-enable mat monitoring, follow the same procedure except connect the mat to the Mat input in step 2.

Selecting Lo or Hi Alarm Level

Follow the procedure below to change the sensitivity range for overvoltage monitoring. The user should be grounded by wearing a wrist strap grounding system before disassembling the Iron Man® Plus monitor.

- Remove the two screws using Philips screwdriver #1 from the front plate.
- Slide the internal board assembly out.
- Locate Hi - Lo 3-pin header connector on the main board.
- To select the Lo setting, position the shunt between the center pin and the Lo pin.
- For the Hi setting, position the shunt between the center pin and the Hi pin.
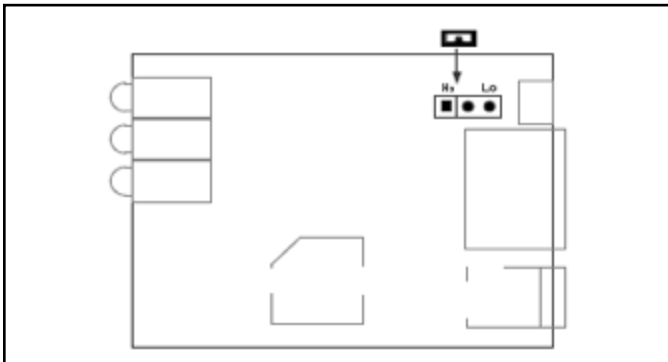- Slide the printed circuit board back into the housing and replace front cover screws.

Figure 4. Locating the Hi - Lo 3-pin header

Adjustment of Voltage Alarm Level

Follow the procedure below to adjust the voltage alarm level of the Iron Man® Plus Workstation Monitor.

- A DC Variable Power Supply with output of 0 to 50V Range is required
- Adjust DC power supply output to 0 initially.
- Plug in AC/DC adapter and power the Iron Man® Plus Workstation Monitor.
- Turn the monitor voltage Threshold Adjust fully clockwise using a small screwdriver.
- Connect the monitor ground wire to the Common output of the DC power supply.
- Connect the monitor Board wire to the V output of the DC power supply.
- Turn on the DC power supply and set the output to the required alarm level.
- Slowly turn the monitor alarm potentiometer counterclockwise until the audible alarm and red LED activates.
- Plug in power and resume to normal operation.

Operation

The SCS Iron Man® Plus Workstation Monitor can be used at most workstations with manual assembly and testing activity. It has the following three functions:

- Overvoltage monitor
- Mat monitor
- Wrist strap monitor

The unit uses green and red LED visual indicators and an audible alarm.

Printed Circuit Board Overvoltage Monitor

The Iron Man® Plus Workstation Monitor continuously monitors the voltage level between ground and a printed circuit board (PCB) while in contact with the ground plane, any grounded part of the PCB or of the product in process. The Iron Man® Plus Monitor uses a potentiometer located at the back of the unit which allows adjustment of the voltage alarm level.

When a soldering iron, tweezers, or other type of tool touches the grounded pad of a board, the Iron Man® Plus Monitor will alarm if overvoltage was introduced onto the PCB. If a soldering iron is not grounded properly, the components on a PCB can be subjected to an overvoltage that can cause component damage. When the voltage (AC or DC) on the PCB exceeds the preset level, the alarm and red LED activate. If the operator is not grounded and holding a tweezers to touch a PCB, the tweezers may also induce a damaging discharge.

Overvoltage conditions generate an electrostatic overstress (EOS) or electrostatic discharge (ESD) event. To prevent this, 1) conductive objects, tools, and personnel need to be grounded properly, 2) non-conductive objects must be neutralized by ionization and remain in a neutral state, and 3) surface materials must dissipative and connected to ground.

Worksurface Ground Resistance Monitor

The Iron Man® Plus Workstation Monitor continuously monitors the resistance between ground and the ESD worksurface. The dissipative worksurface must be grounded using the recommended means. The Iron Man® Plus Workstation Monitor does not ground dissipative surfaces; it only monitors proper grounding of such surfaces. If the resistance of the conductive path from such dissipative surface to ground exceeds the threshold, the alarm will activate. There is a slight delay in time before the alarm activates.

Voltage on Person Wrist Strap Monitor

The Iron Man® Plus Workstation Monitor continuously monitors the voltage on a person through the dual conductor wrist strap. The loop resistance is monitored, which includes the resistance of the operator's wrist between the two halves of the wrist band.

Overvoltage Alarm Level

The alarm level can be adjusted for low or high ranges. This setting is selected by moving an internal jumper socket inside the unit. The Iron Man® Plus Workstation Monitor will respond to either a positive or negative voltage. If the voltage is higher than the pre-set level, a visual red LED and audible alarm are activated. The alarm will be on for at least 1 second. If the voltage level is below the preset alarm level, a green LED remains illuminated. A wire must be attached from the Iron Man® Plus monitor to a ground plane of PCB or a fixture to complete the monitoring system.

PERFORMANCE
Worksurface Ground Resistance Monitor

The alarm level is factory programmed. When the alarm is activated, the red LED indicates that the ground path resistance for the worksurface has either increased beyond preset level or is disconnected.

Person Voltage and Resistance Monitor

The alarm level is monitored when a person is wearing a dual conductor wrist strap and plugged into the front jack. The Iron Man® Plus Workstation Monitor will respond to either a positive or negative voltage. There is a short hold on the body voltage alarm so that it is not missed. The alarm is also activated when the wrist strap is worn too loosely and the loop resistance level is exceeded.

Enabling and Disabling Audible Alarm

The audible alarm can be enabled or disabled by momentarily pressing a recessed miniature push-button set switch located on the back of the unit. Use of a small wire form allows activation of the switch.

Calibration

The Iron Man® Plus Workstation Monitor is calibrated to standards traceable to NIST. Frequency of recalibratrion 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.

Use the SCS CTE701 Workstation Monitor Checker to perform periodic testing (once every 6-12 months) of the Iron Man® Plus Workstation Monitor. The Workstation Monitor Checker can be used on the shop floor within a few minutes virtually eliminating downtime, verifying that the monitor is operating within tolerances.

Figure 5. SCS CTE701 Workstation Monitor Checker

Verification of Worksurface Monitoring

1. Disconnect the wire connected to Mat.

2. Connect the ground input of the checker to the ground connector of the SCS Iron Man® Plus Workstation Monitor. Set the checker to a proper Soft Ground alarm level (see the Workstation Monitor Checker User Guide).

3. Connect the red wire tip of the checker to the Mat terminal. The red LED of Mat should remain on.

4. Press the Soft Ground button on the checker. The green LED of Mat should turn on.

Verification of Wrist Strap Monitoring

1. Connect the 3.5 mm test cable to both the checker and to the operator jack of the monitor. At this point the monitor should indicate failure.

2. Press the wrist strap button on the Checker. The monitor should show a green LED on.

3. While pressing the wrist strap button, press body voltage "high." The monitor should show a green LED on, and a blinking red LED.

4. If all conditions are met, the monitor is operating normally. Reconnect all wires and power to resume operations.

Replacing the Wrist Strap Input Jack

If the wrist strap input jack begins to show wear and tear damage, it can be replaced using the following procedure.

1. Unplug the power adapter.

2. The jack can be accessed from the front of the unit. Remove the collar nut on the input jack.

3. Unscrew the two phillips head screws and remove the front cover.

4. Pull the two PCB's towards the front.

5. Pull and lift up the smaller PCB with the input jack. Replace with the PCB with the SCS CTA251 Replacement Wrist Strap Jack.

6. Push the 2 PCB back through its slotted guide.

7. Place the front cover back and secure with the two phillips head screws.

8. Secure the collar nut onto the input jack.

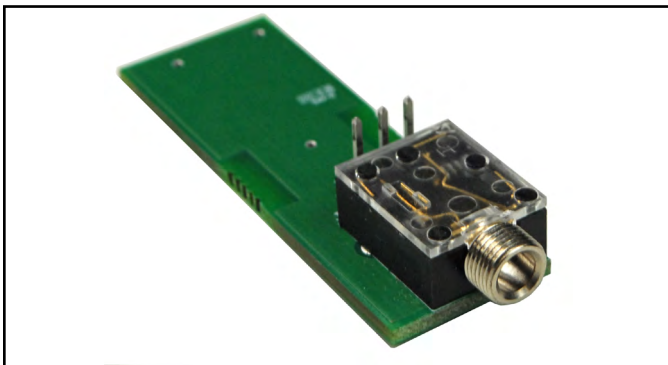9. Plug in power and resume to normal operation.

Figure 6. SCS CTA251 Replacement Wrist Strap Jack

Specifications

Power	
AC/DC Adapter	Universal: 100-240VAC, 0.5A, ~50/60Hz
Overvoltage Alarm	
Alarm Threshold Ranges	0 to ±5V (default set point); 0 to ±50V
Threshold Adjustment	Potentiometer
Threshold Range	Range selected by jumper
Operator	
Wrist Strap	Dual, 3.0mm plug
Number of Wrist Straps monitored	1
Body Resistance Alarm Level	10 megohms
Body Voltage Alarm Level	±2.5V (default)
Worksurface Mat	
Resistance Alarm Level	500 megohms
Alarm	
Visual	LED
Audio	Buzzer
General	
Dimensions (approx)	0.85" H x 2.4" W x 2.6" L 22mm H x 61mm W x 66mm L

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

See the SCS Warranty - StaticControl.com/Limited-Warranty.aspx

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