3M™ Wrist Strap Monitor Model 725

User's Guide

Index

SAFETY INFORMATION

Please read, understand, and follow all safety information contained in this User's Guide prior to the use of this 3M™ Wrist Strap Monitor Model 725. Retain these instructions for future reference.

Intended Use:

The 3M Wrist Strap Monitor Model 725 is designed to monitor the operation of a wrist strap grounding system for a single operator. This product has been designed and tested for use with 3M™ Dual Conductor Wrist Straps and 3M™ Work Surfaces Grounding Systems. This unit is powered by a 9 volt alkaline battery. Use of other components or use in any other application not evaluated by 3M may cause improper performance and/or an unsafe condition. To avoid damage to the 3M Wrist Strap Monitor Model 725, do not use this monitor outside of the operating conditions listed in this user's guide.

Explanation of Symbols

	CAUTION
	Operator(s) Wrist Strap Assembly Ground
	Work Surface Ground
	Earth; ground
	Power input connector polarity (center negative)

Explanation of Signal Word Consequences

	**WARNING**	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury and/or property damage.
	**CAUTION**	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury and/or property damage.
	NOTICE	Indicates a situation which, if not avoided, could result in property damage.

⚠ WARNING

To reduce the risks associated with medical device malfunction which, if not avoided, could result in serious injury or death:

- Persons with active implanted medical devices (such as heart pacemaker devices) should never use this monitor.

⚠ CAUTION

To reduce the risks associated with environmental contamination which, if not avoided, could result in minor or moderate injury:

- Dispose of monitor in accordance with all applicable local and government regulations.

NOTICE

To prevent damage to the 3M™ Wrist Strap Monitor Model 725:

- Users should not attempt to service this device.
- Do not use in wet or humid environments.

To reduce the risk of damage to components or assemblies being handled:

- Always properly ground your tools and dissipative surfaces to known good ground before connecting the Wrist Strap Monitor Model 725 for monitoring. If unsure of suitable ground, contact a licensed electrician before installation.
- Always ensure operator grounding during use of monitor. The Wrist Strap Monitor Model 725 does not provide grounding.

ENVIRONMENTAL CONDITIONS

This equipment has been tested and found to be safe to operate within these environmental conditions.

This is not a warranty of equipment performance within these conditions.

- Indoor use only
- Ingress Protection: IPX0
- Altitude: Up to 2,000 m
- Pollution degree 2.
- Temperature: Maximum 110°F / 43°C Minimum 50°F / 10°C
- Humidity: Maximum relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40°C .

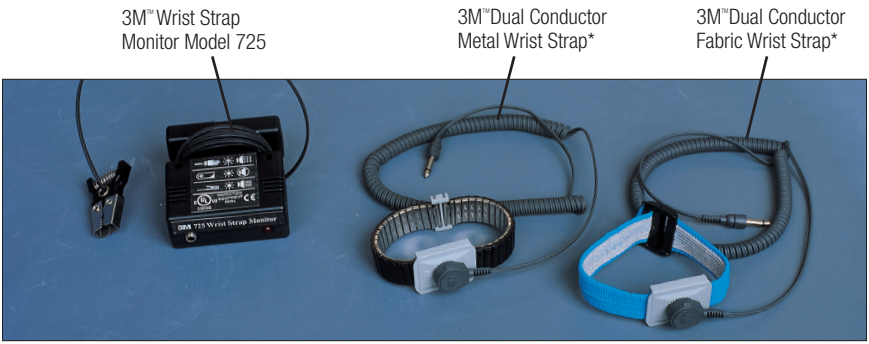

Figure 1 – 3M™ Wrist Strap Monitor Model 725 with 3M™ Dual Conductor Wrist Strap Assemblies.

SECTION 1
Theory of Operation
(Refer to Figure 1)

The 3M™ Wrist Strap Monitor Model 725 is designed to monitor the operation of the wrist strap grounding system of a single operator. The system features special wrist bands and ground cords that contain two independent conductors.*

The Wrist Strap Monitor Model 725 performs a resistance measurement by applying an electrical current of less than 1 μA. The path for the current is through one conductor of the wrist strap ground cord that contains a current-limiting resistor, through one side of the wrist band, through the skin of the wearer under the band, through the second side of the wrist band, through the second conductor of the wrist strap ground cord that contains a current limiting resistor, and finally back to the monitor. If the resistance of the wrist strap loop is less than 35 megohms**, the wrist strap ground cord, wrist band, and the interface of the wrist band to the arm of the wearer are considered to be functioning correctly. If the measured resistance is over 35 megohms**, a red lamp flashes along with a chirping audible alarm.

In addition, the Wrist Strap Monitor Model 725 monitors the ground clip connection to a predetermined electrical ground. This is accomplished by measuring the resistance from the monitor, through one conductor of the monitor's ground cord and metal clip, through the ground point conducting medium, through the other metal clip and conductor of the monitor's ground cord, and finally back to the Wrist Strap Monitor Model 725. If the resistance of this loop exceeds 10 megohms***, a red lamp will illuminate with a continuous audible alarm. This indicates that there is a problem with the monitor's ground cord or the ground point connection.

**3M™ Dual Conductor Cord & Wrist Band are required for use with the 3M™ Wrist Strap Monitor Model 725, ordered separately.*

*** Resistance values are ±15%*
**** Resistance values are +15%, -50%*

The 3M™ Wrist Strap Monitor Model 725 requires only a small amount of current to operate. When the red lamp and the audible alarm are activated simultaneously, the monitor requires approximately 5 μA of current. When the lamp and alarm are not activated (normal condition), the monitor requires approximately 50 μA of current.

As with any battery operated electronic device, the life of the battery will be determined by the frequency of use. However, for the Wrist Strap Monitor Model 725 you can expect a battery life of approximately one year in continuous operation under normal conditions.

Note: Use an alkaline battery for longer life.

NOTICE

The 3M™ Wrist Strap Monitor Model 725 does not have the capability of verifying that the ground point is a suitable ground. If you are not sure what a suitable ground is, contact a licensed electrician before installation.

The Wrist Strap Monitor Model 725 monitors the battery voltage and alerts the operator when it is necessary to change the battery. When the battery voltage falls below 6 volts the red lamp will illuminate with no audible alarm. At this time the Wrist Strap Monitor Model 725 is still operational, making reliable resistance measurements of the wrist strap assembly and the ground connection.

Voltage on Operator when Connected to the 3M Wrist Strap Monitor Model 725

There is a concern about the voltage that is applied to an operator while they are connected to a monitor. Some of today's electronic components are extremely sensitive to electrostatic discharge from a person (less than 10 volts). The following chart for the Wrist Strap Monitor Model 725 illustrates the level of voltage that will appear on the operator under various resistance conditions.

Voltage on Operator when connected to the Wrist Strap Monitor Model 725

Condition	Observed Voltage
No Skin Resistance	0.8V
200K Ohm Skin Resistance	0.9V
Likely Case Before Alarm	3.5V
Worst Case Before Alarm	6.8V
Absolute Worst Case	9.0V

Note: For more information about wrist strap monitoring see Additional Wrist Strap Monitoring Information (Section 12).

SECTION 2
Operating Your System

To operate the 3M™ Wrist Strap Monitor Model 725, attach the monitor's (6 ft.) ground cord with dual conductor ground clip to a suitable ground.

Attach a 3M™ Dual Conductor Ground Cord to a 3M™ Dual Conductor Wrist Band. Place the wrist band on your wrist and plug the cord into the jack on the front of the Wrist Strap Monitor Model 725. Plugging into the jack activates the monitor and causes it to emit a short beep and the red lamp to momentarily flash. If the red lamp flashes with an intermittent audible alarm or at any time during use, the resistance of the wrist strap assembly is greater than 35 megohms.** If the red lamp and the audible alarm remain on continuously, check the dual conductor ground clip connection.

The system is now ready for use.

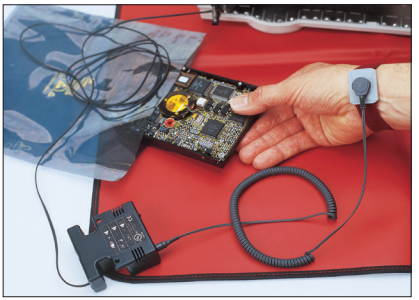

Figure 2

Note: Operators may complain that the alarm is sounding too often until they learn to adjust the wrist band to fit securely or apply an approved skin moisturizer on a frequent basis. Please remember that the monitor is informing you that the operator is exceeding the established static control requirement for resistance to ground when wearing a static protective wrist strap assembly. These alarms alert the operator when sensitive electronics are possibly being exposed to static electricity. Prior to incorporating the wrist strap monitor into your static control process, the operator could be unaware of these events.

NOTICE

If you decide not to use the dual conductor ground clip that is attached to the monitor's ground cord in the way described in this user instruction manual, observe the following precaution: Attach each of the two wires of the monitor's ground cord to separate ground bonding points. By attaching the wires to the same ground but at different physical locations, the monitor can check for loose or lost connections.

***Resistance values are ±15%*

SECTION 3
Installation When Attaching to a Static Control Work Surface

The 3M™ Wrist Strap Monitor Model 725 can be used to ground a work surface while providing a monitored grounding point for an operator. To ground a work surface, the Wrist Strap Monitor Model 725 contains a snap located on its bottom cover, that is connected internally to the monitor's ground cord. To use this feature there must be a 3M™ Female Snap Fastener Model 3034, 10 mm, snap fastener attached to the grounding layer of the work surface. Simply align the male snap on the monitor with the female snap on the work surface and press downward on the monitor. The work surface is now automatically grounded through a one megohm resistor by the Wrist Strap Monitor Model 725.

Figure 3

Note: Although the work surface is grounded by the 3M™ Wrist Strap Monitor Model 725, it is not monitoring the ground to the work surface.

3M™ Work Surface 8200 Series use the female 10 mm (3M Female Snap Fastener Model 3050) snap fastener for grounding. 3M™ Work Surfaces 1800, 8300 and 8800 Series use the female 10 mm (3M Female Snap Fastener Model 3034) snap fastener for grounding. In addition all 3M™ Portable Field Service Kits 8500 Series include the 10 mm (Female Snap Fastener Model 3034) snap fastener.

Use of an optional 3M™ Stand-By Jack 3057 at the work station extends the life of the monitor's input jack. The user disconnects the wrist strap ground cord from the wrist band and plugs into the Stand-By Jack 3057 which is mounted at the work station. Plugging into the Stand-By Jack 3057 prevents the Wrist Strap Monitor Model 725 from continuously alarming when disconnected from the wrist band.

The system is now ready for use.

SECTION 4
Installation Under Work Bench

The 3M™ Wrist Strap Monitor Model 725 can be mounted under a work bench by securing with two #8 screws (not supplied) through the mounting hole tabs located on the top cover.

Figure 4

When mounting the Wrist Strap Monitor Model 725 under a work bench for non mobile use, remove the parking clip (Section 6) from the Wrist Strap Monitor Model 725 using a small screwdriver. The Wrist Strap Monitor Model 725 is now ready to mount.

Note: Use of the monitor in this way precludes grounding a work surface through the snap connector on the bottom of the monitor. A static control work surface, if present, would require grounding separately through an additional ground cord.

Position the monitor so that it is convenient for the operator to plug their wrist strap ground cord into the jack on the front of the monitor. It is recommended that the front face of the monitor be flush or slightly recessed from the front edge of the work bench. Attach the monitor to the work bench with the screws. It may be necessary to pre-drill pilot holes for the screws.

Attach the dual conductor ground clip or each wire of the monitor's dual conductor ground cord to a suitable ground.

Use of an optional 3M™ Stand-By Jack 3057 at the work station extends the life of the monitor's input jack. The user disconnects the wrist strap ground cord from the wrist band and plugs into the Stand-By Jack 3057 which is mounted at the work station. Plugging into the Stand-By Jack 3057 prevents the Wrist Strap Monitor Model 725 from continuously alarming when disconnected from the wrist band.

The system is now ready for use.

SECTION 5
Installation Using 3M™ Belt Clip 723 (Optional)

An optional belt clip is available to further enhance the portability feature of the 3M™ Wrist Strap Monitor Model 725. This expands the use of the monitor when operators need to be highly mobile as in an electronic manufacturing environment. Simply attach the belt clip with female snap connector to the male snap connector on the monitor bottom cover. Slide the clip over your belt in a convenient place, so that the wrist strap ground cord will not interfere with normal body movements when attached to the monitor. Attach the dual conductor ground clip to a suitable ground at the work location. During mobility, attach the dual conductor ground clip to the parking clip on the Wrist Strap Monitor Model 725 (See Section 6).

SECTION 6
Parking Clip

A parking clip is supplied with the Wrist Strap Monitor Model 725 allowing mobile users to silence the ground clip disconnect alarm. Attaching the dual conductor ground clip to the parking clip prevents unnecessary disconnecting/connecting of the wrist strap ground cord from the input jack during mobility. An added benefit of this feature is that it extends the life of the dual conductor ground cord plug and the monitor's input jack. The parking clip is already attached to the mounting tab of the Wrist Strap Monitor Model 725. If the Wrist Strap Monitor Model 725 is to be mounted under a work bench for permanent use, remove the parking clip from the Wrist Strap Monitor Model 725 using a small screwdriver.

Figure 5

SECTION 7
Battery Replacement

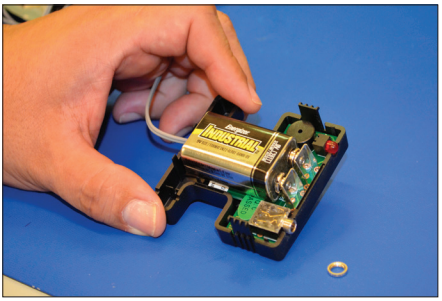

Figure 6

When only the red lamp illuminates on the 3M™ Wrist Strap Monitor Model 725, it is time to change the battery. Unplug the wrist strap ground cord from the Wrist Strap Monitor Model 725 jack before proceeding. Remove the top cover of the Wrist Strap Monitor Model 725 case by squeezing the two tabs (grooved area located on the bottom cover) inward while lifting the top cover. Remove the used battery carefully by using a pulling-twisting motion to unsnap the battery from the connectors on the printed circuit board.

Install a new 9 volt alkaline battery by supporting the snap connectors on the printed circuit board with your fingers, while using a pushing-twisting motion to fully seat the terminals of the battery into the snap connectors.

Note: Use an alkaline battery for longer life.

Pass the monitor's ground cord through one of the two exit wire slots in the bottom half of the case. Align the rear locking tab on the top cover, to the tab slot on the bottom cover while maintaining the ground cord in the desired wire slot. Rotate the top cover downward onto the two side locking tabs of the bottom cover and snap firmly into place.

SECTION 8
Verification Procedure for the 3M Wrist Strap Monitor Model 725

The Wrist Strap Monitor Model 725 cannot be recalibrated after the initial factory calibration. However, the following steps can be used to determine if the Wrist Strap Monitor Model 725 is operating within its specifications.

Equipment Needed

- Resistance Substitution Box (RSB), 1 Ohm to 45 Megohms ± 1%.
- One two-conductor cable with standard 3.5 mm (miniature) phone plug attached on one end and appropriate connectors on the other end to connect to RSB.
- Two single conductor wires with clip style on one end and appropriate connectors on the other end to connect to a RSB.

Note: Two conductor cables must have an isolation resistance of >1 Gigohm between conductors. Two separated wires may also be used to obtain higher isolation resistance.

Procedure

a) Install a new 9 volt battery into the 3M™ Wrist Strap Monitor Model 725.

b) Short the dual conductor ground clip by attaching to a conductive metal object such as a coin.

c) Plug the phone jack test cord into the wrist strap jack on the front of the monitor and attach the other end of the cord to the RSB.

Set the RSB as follows and observe the lamp and audible alarm:

- 29.8 Megohms – Red lamp OFF, audible alarm OFF.
- 40.2 Megohms – Red lamp ON (Flashing), audible alarm ON (Chirping).

d) Connect the two single conductor wires to the RSB. Attach the other ends of the wires with clips to the metal jaws of the Wrist Strap Monitor Model 725 dual conductor ground clip. Be sure to prevent the clips from contacting each other. Plug in the phone jack test cord into the wrist strap jack on the front of the monitor and short the opposite ends together.

Set the RSB as follows and observe the lamp and audible alarm:

- 5.0 Megohms – Red lamp OFF, audible alarm OFF.
- 11.5 Megohms – Red lamp ON (Continuous), audible alarm ON (Continuous tone).

SECTION 9
Specifications

3M™ Wrist Strap Monitor Model 725 Size	2.5 x 2.6 x 1.1 in. (6.4 x 6.6 x 2.8cm)	
Accuracy	+/-15%	
Test Voltage	9 VDC Open circuit	
Test Current	Less than 1 microamp	
Power Supply Requirements	9 Volt alkaline battery recommended (Not supplied)	
Environmental Operating Conditions	Temperature: Maximum : 110°F / 43°C Minimum : 50°F / 10°C	Humidity: Maximum relative humidity 75%

SECTION 10
Parts Included

1 ea. Wrist Strap Monitor Model 725 with 6 ft. dual conductor ground cord/clip and parking clip.
1 ea. User's Guide & Verification Procedure

SECTION 11
Required Accessories and Optional Available Parts

Model No.	Description	Size
2368	3M™ Dual Conductor Fabric Wrist Band	adjustable
2381	3M™ Dual Conductor Metal Wrist Strap*	small
2382	3M™ Dual Conductor Metal Wrist Strap*	medium
2383	3M™ Dual Conductor Metal Wrist Strap*	large
2384	3M™ Dual Conductor Metal Wrist Band	small
2385	3M™ Dual Conductor Metal Wrist Band	medium
2386	3M™ Dual Conductor Metal Wrist Band	large
2360	3M™ Dual Conductor Coil Cord	5 ft. (1.5m)
2370	3M™ Dual Conductor Coil Cord	10 ft. (3.0m)
2371	3M™ Dual Conductor Coil Cord	20 ft. (6.1m)
3057	3M™ Stand-By Jack	1.9 x 1.3 x 1.1 in. (4.8 x 3.3 x 2.8cm)
723	3M™ Belt Clip	

* *Includes Band & Cord*

Only accessories, optional parts and replacement parts supplied or specified by 3M Company shall be used with this product.

Use only a clean dry cloth to clean the 3M™ Wrist Strap Monitor Model 725.

For Repair & Service Center:
11705 Research Boulevard, Building 1, Austin, TX 78759
Phone: (800) 426-8688 press #2

SECTION 12
Additional Wrist Strap Monitoring Information

Suggested reading on wrist strap requirements and wrist strap monitoring:

- EIA 625 - Requirements for Handling Electrostatic-Discharge- Sensitive (ESDS) Devices.
- EN100015/1 - Protection of Electrostatic Sensitive Devices.
- 3M Tech. Response #123 - Pulsed Current vs. Constant Current in Work Station Monitors.
- 3M Static Digest Issue No.1, 1998 - Disc Drive Industry - Static Control Considerations.

Note: The 3M references are available by calling 3M Electronic Solutions Division Customer Service Department at 1-866-722-3736.

SECTION 13
Important Notice

All statements, technical information, and recommendations related to 3M's products are based on information believed to be reliable, but the accuracy or completeness is not guaranteed. Before using this product, you must evaluate it and determine if it is suitable for your intended application. You assume all risks and liability associated with such use. Any statements related to the product which are not contained in 3M's current publications, or any contrary statements contained on your purchase order shall have no force or effect unless expressly agreed upon, in writing, by an authorized officer of 3M.

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