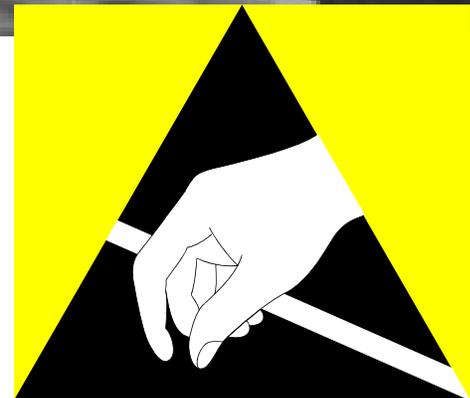
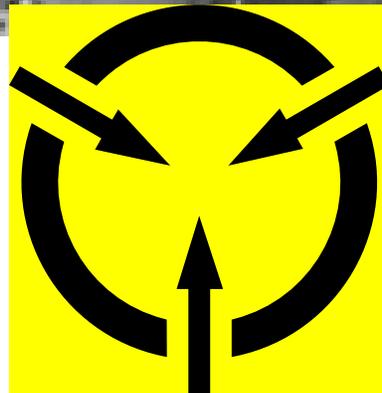


ESD: THE SHOCKING TRUTH!





WARNING: The material in this presentation is general in nature, and under no circumstances is it meant to replace published OEM or Maintenance Manual instructions

From “The Direct Approach, Technical Information & Tips for Citation Customers”

**Epic Handling and ESD Tips- 680
ATA 34-00**

Honeywell is very concerned that everyone understands how important it is to follow proper ESD (Electro Static Discharge) and handling procedures of Epic hardware.

**Use Caution with Honeywell KA 92 GPS Antennas
560XL, 550, 525, 525A, ATA: 34-40**

“... Our vendor has requested that we make owners/operators aware that these types of antennas are extremely sensitive to Electrostatic Discharge (ESD). Uncontrolled ESD can cause degraded operation of certain electronic components within the antennas.”

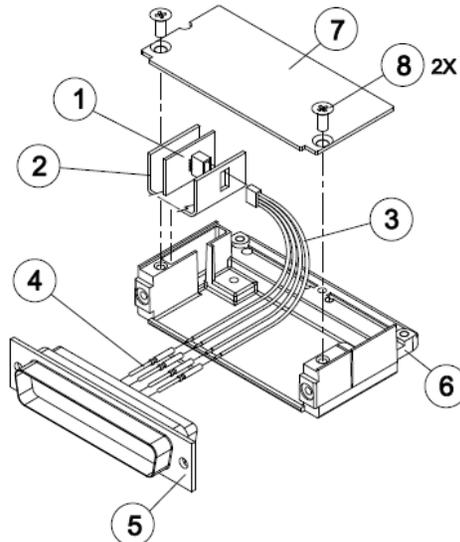


Figure 6-3. Configuration Module Installation

Table 6-2. Configuration Module Kit – 011-00979-00

Item	Description	Qty Needed	Garmin Part Number	
			011-00979-00 Kit	011-00979-03 Kit
1	Configuration Module PCB Board Assembly w/EEPROM & Temp Sensor	1	012-00605-00	011-02178-00
2	Spacer, Config Module	1	213-00043-00	N/A
3	Cable, 4-Conductor Harness	1	325-00122-00	
4	Pins, #22 AWG (HD)	5	336-00021-00	

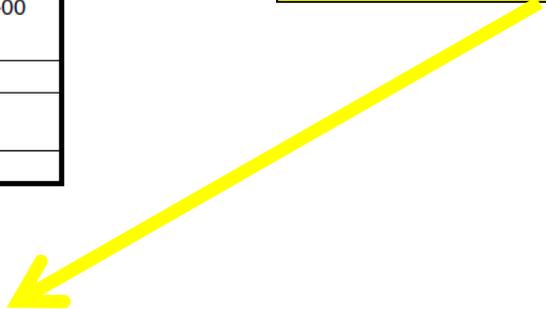
Removal:

NOTE

Use ESD protection when handling the configuration module.

1. Disconnect connector from LRU.
2. Remove 2 screws (8) from cover (7) and remove cover.
3. Unplug connector from configuration module (1).
4. Remove configuration module.

Typical ESD Warning in a Maintenance Manual (Garmin 1000 for Diamond DA-40)



LED ZEPPELIN

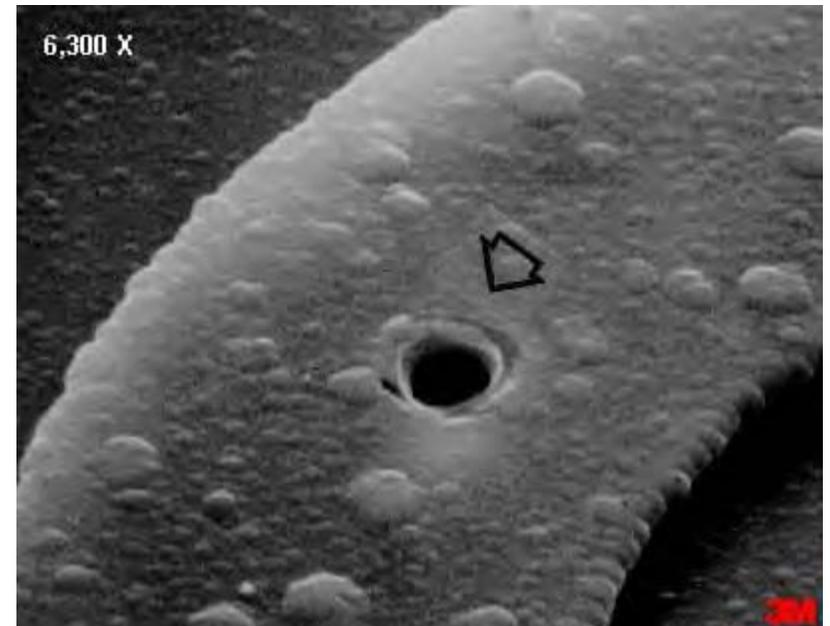
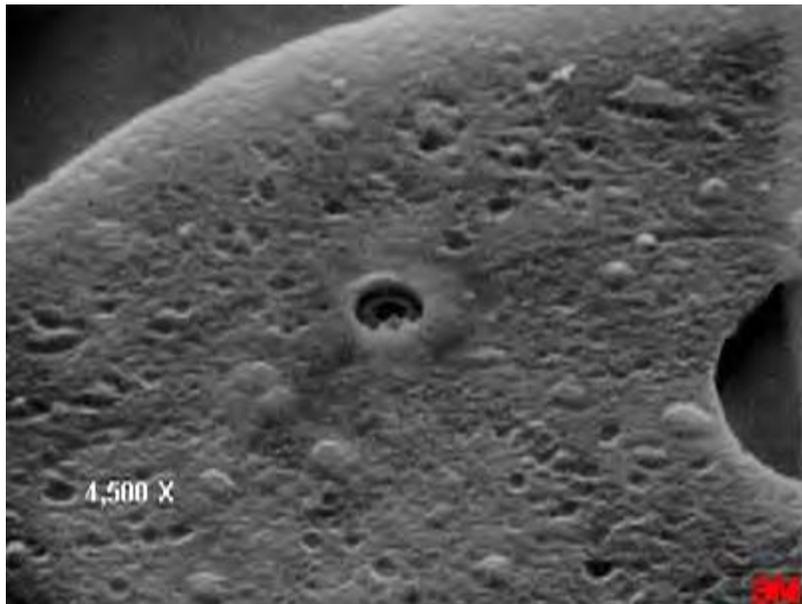
STEREO



I've got the forensic evidence of ESD Damage right here!



Typical ESD damage. These pictures were taken by scanning electron microscopes. Note the magnification



But Holmes,
can the issue of
ESD damage be
quantified and
deduced?

Watson, due to the high
cost of scanning
electron microscopes,
and the complicated
process to isolate it,
nearly all instances of
ESD damage are not
diagnosed as such; *it is
unquantified and
undetected except for
the failures it causes*



ESD is particularly hideous for the following reason:



Recall the scanning electron microscope pictures of ESD damage: ESD damaged Avionics Parts can only be diagnosed as such with specialized laboratory equipment which is not typically found in Depot or Repair Stations. The result is that the repair may involve replacing an IC chip or card, but the root cause (ESD Damage) is not positively identified.





**ESD DAMAGE
WILL MANIFEST
ITSELF IN ONE OF
THREE WAYS:**

***Outright failure of
the unit upon
installation***

***Premature Failure:
It should have
lasted 1000 hours
but failed after 50***

Intermittent failures



SO, WHAT CAN WE DO ABOUT IT?

Page | 1

Aviation Suppliers Association Best Practice Handling of ESD Sensitive Parts for Distributors



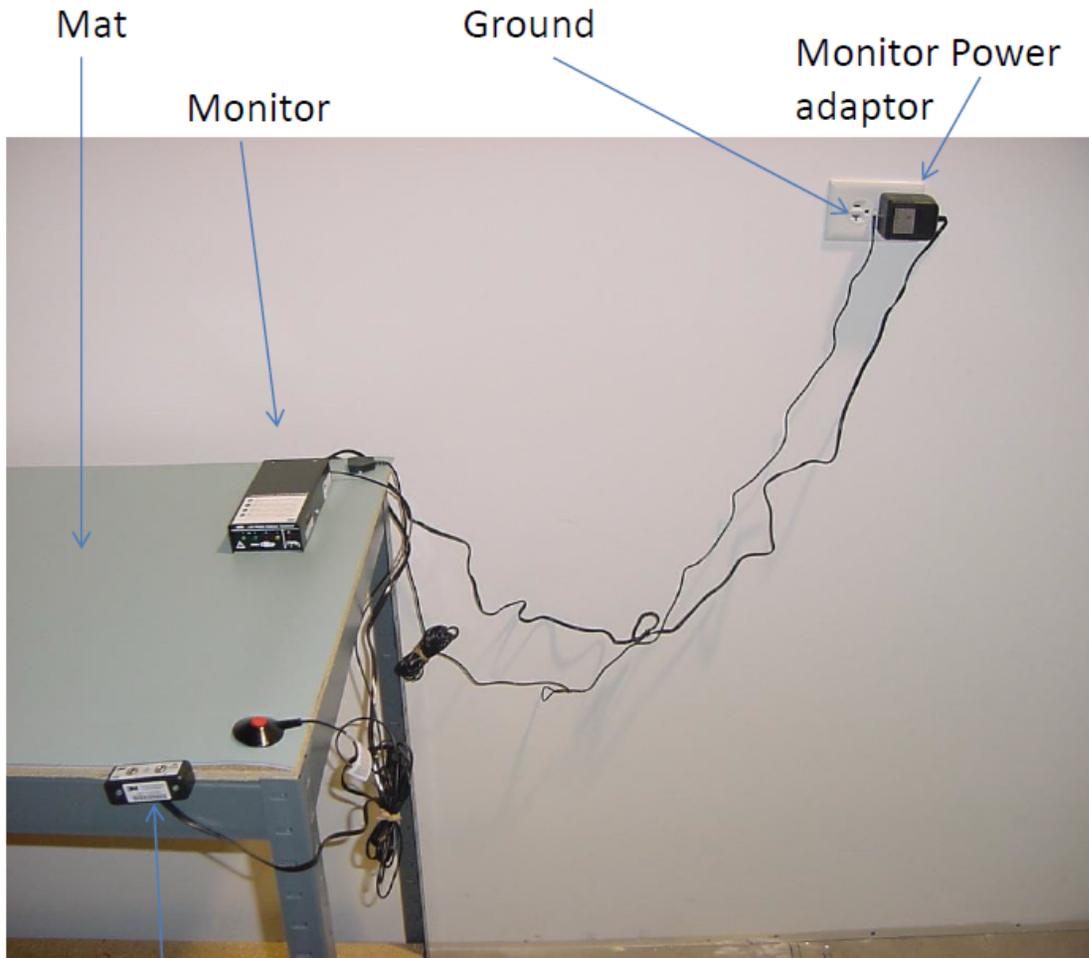
ASA Best Practice Handling of ESD Sensitive Parts for Distributors

Aviation Suppliers Association Best Practice
Handling of ESD Sensitive Parts for Distributors

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Selection of Equipment for an ESD Protected Area (EPA)



Dual Conductor wrist strap chord plugs-in here

See Short Video

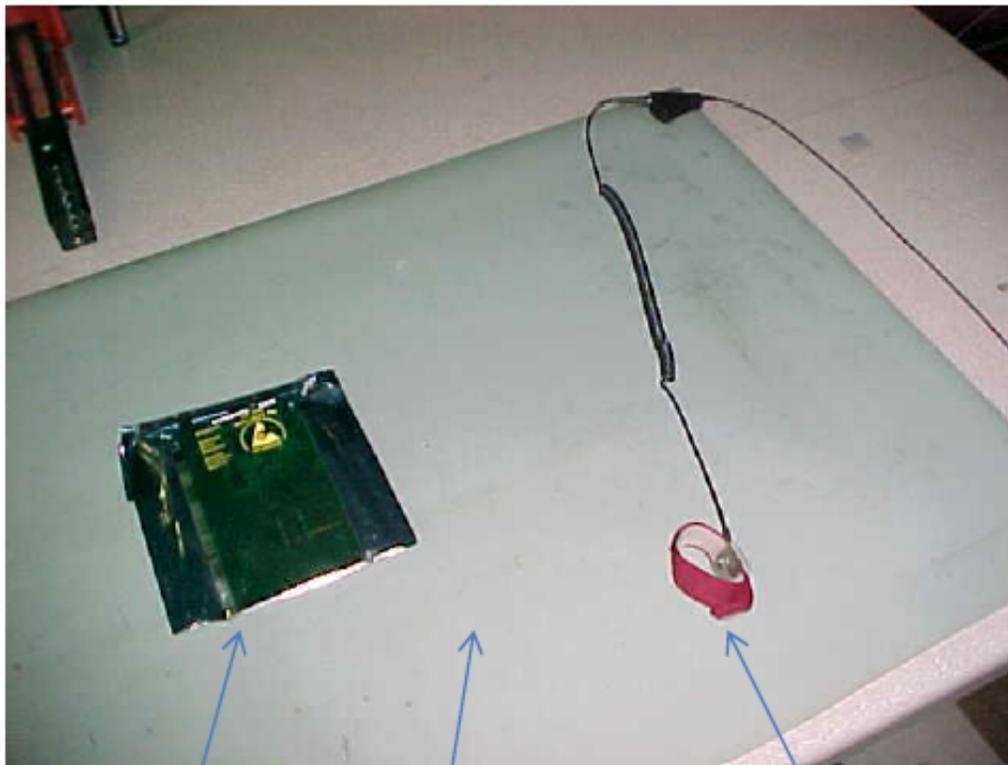


ESD protected area

“A. Continuous Monitoring Workstation (Figure 3). The advantage of this setup is that it **continuously monitors** the resistance of the operator and work surface ground connections **and displays a visual and/or audible alarm if a problem occurs** with the aforementioned. It typically consists of the Monitor, Dual Conductor Wrist Bands, Wrist Band Chords, grounding connection, and Table-top Conductive/Dissipative Work Surface Mat. “

Selection of Equipment for an ESD Protected Area (EPA)

Figure 1: Typical Simple EPA



Part to be inspected

ESD Mat

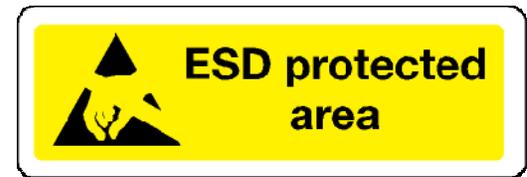
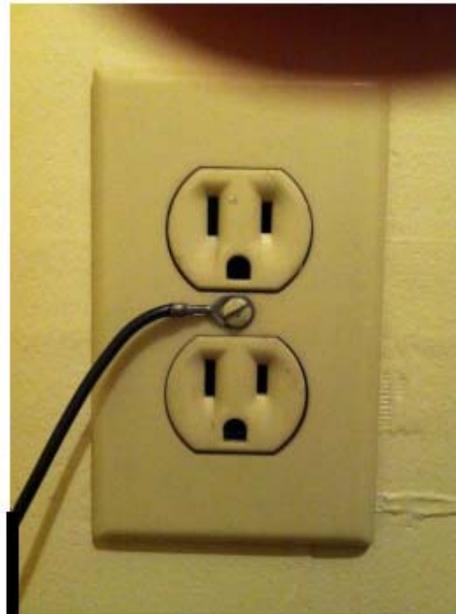
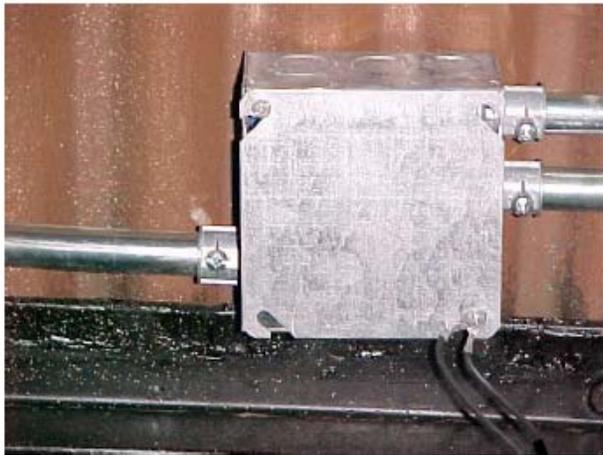
ESD Wrist Strap and chord

To Ground,
See figure 2



“B. Simple EPA (Figure 1). Consists of an ESD Wrist Strap and chord, Wrist Band Chords, grounding connection, and Table-top conductive/Dissipative Work Surface Mat. “

Selection of a Ground for an ESD Protected Area (EPA)



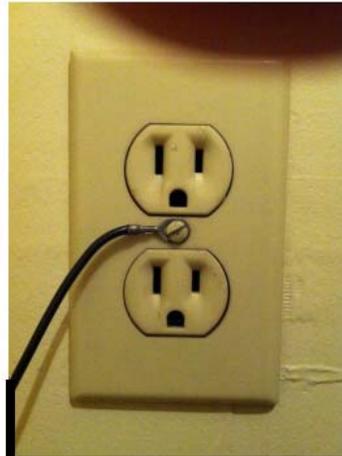
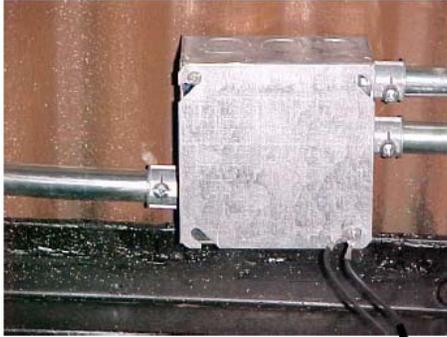
From Mat

“D. Selection of a ground for the EPA must be in accordance with the manufacturer’s instructions.”

***BTW: Royboy's counsel: Need some terminal solutions?
Go to your local automotive shop a buy a cheap Wire
Crimp Kit similar to the one shown***



Selection of a Ground for an ESD Protected Area (EPA)

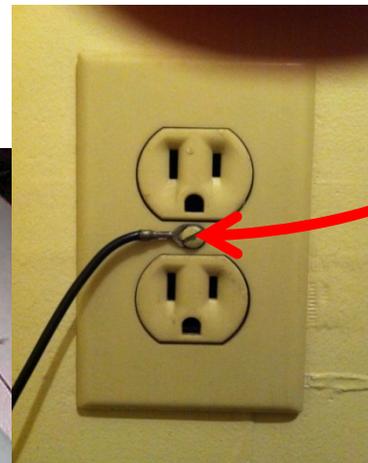
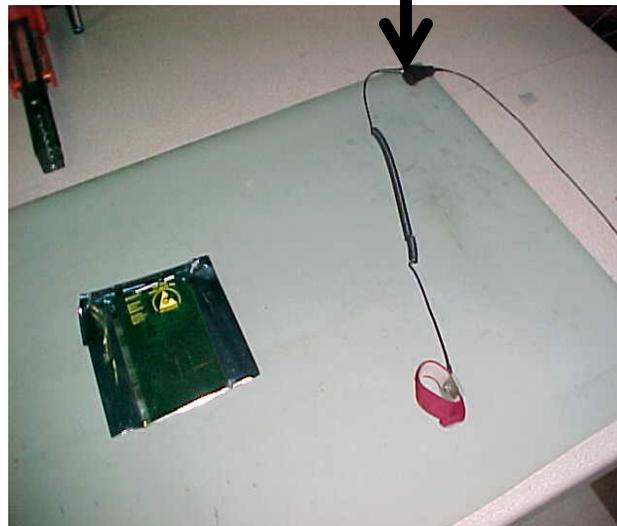


From Mat

“As a point of reference...the equipment grounding conductor of the grounding/bonding system should have a limit less than 1.0 ohm impedance. The measurement of ohm impedance of the grounding conductor can be verified using a standard electrical multimeter. “



Place on terminal



Place on screw

Common EPA Characteristics

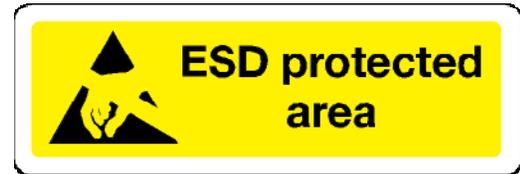


“A. Segregated area: A dedicated area should be set aside to set up the EPA to be used exclusively for this purpose. This will help ensure the equipment is maintained, kept clean, and the connections are not broken.

B. The EPA should include signage denoting its intended use. Examples include “ESD Protected Area”, “ESD Work Station”, or “ESD Inspection Area”.

C. Cleanliness: In order to eliminate sources of static, the EPA should remain free of any non-EPA related items such as, but not limited to, coffee cups, food wrappers, beverages, reading material, radios, and personal gear such as purses and backpacks. In addition, the EPA should be periodically cleaned as recommended by the ESD equipment manufacturer. “

Determining the Continued Integrity of the EPA

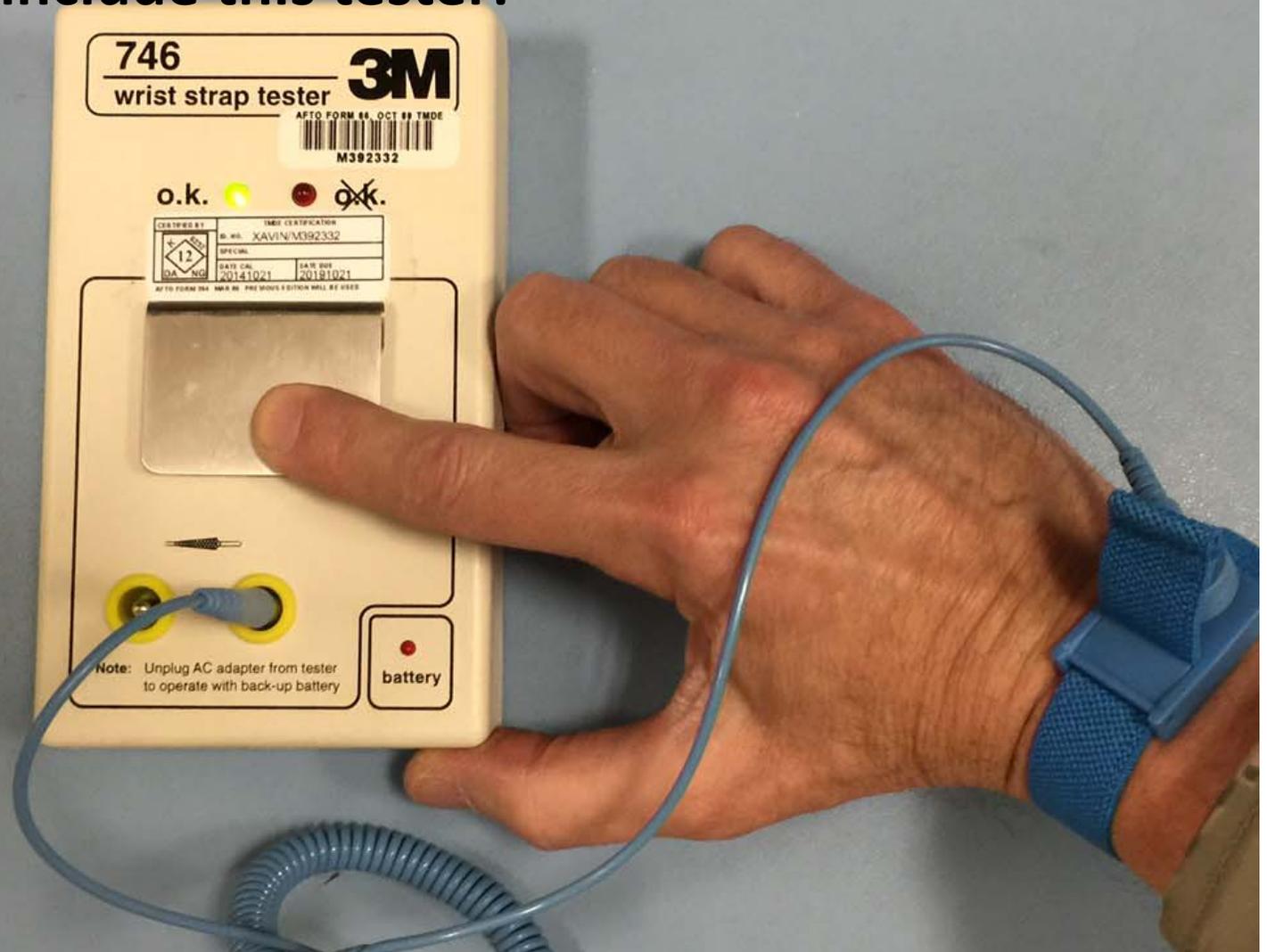


“The user should have a method to demonstrate the continued integrity of the EPA; that it is able to perform its intended purpose of electrically grounding the static charges on the employee before handling the ESD sensitive parts. Note that this is not calibration.”

Consider the following:

- Periodic verification of the measured result of the ground as previously discussed
- For a Simple EPA station, checking the integrity of the Human-Wristband-Cord combination

BTW: For the Simple EPA Setup, the wrist-strap/Chord combination seems to be the weak link in the ESD protection chain. A common method to check for its integrity might include this tester:

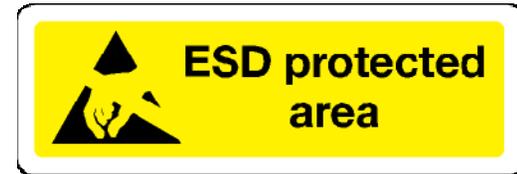


Causes of Wrist-strap-chord failures:

- Loss of elasticity-tightness
- Dirty
- Oxidation on connections
- Hair or dirt on the human

Determining the Continued Integrity of the EPA

DOCUMENTING RESULTS:

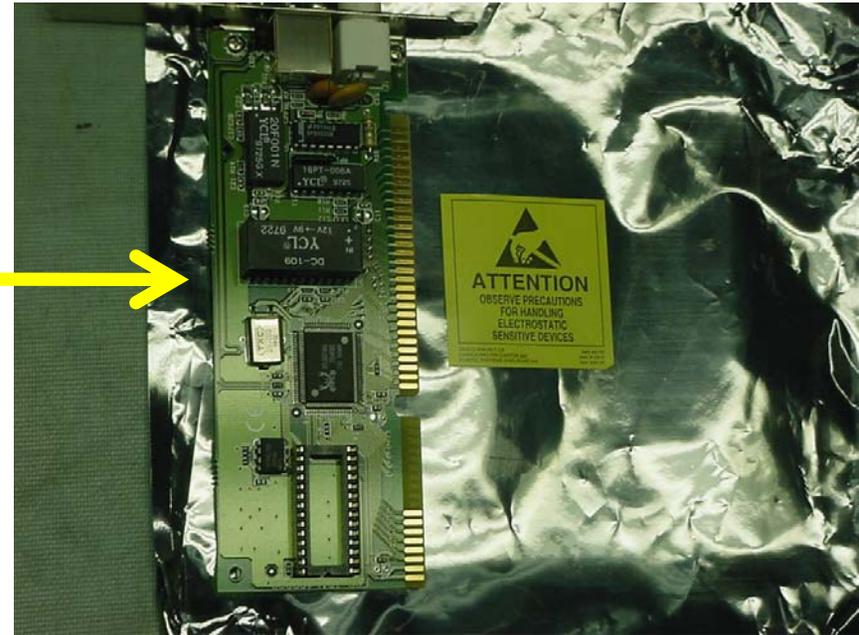


“The user may implement a method to record continued integrity test results. Some, but not all, facilities keep a log of this information. Typically, a log for recording test results would contain the date, employee identification (e.g. name, number, etc.), and results of the test. Typically, the first user of the day should make this record once daily before use. On days where the equipment is not used, the record is not required”

- Continuous Monitoring Workstation: The user should test the alarm by purposely either lifting off the wristband, or breaking any of the quick connections of the workstation.
- Simple EPA: Record the results of the (wristband-cord) Tester.

As Distributors, you will generally come in contact with 3 types of ESD sensitive parts:

Cards/Boards



Discreet components such as IC Chips

Component Assemblies (LRU's, Rotables)



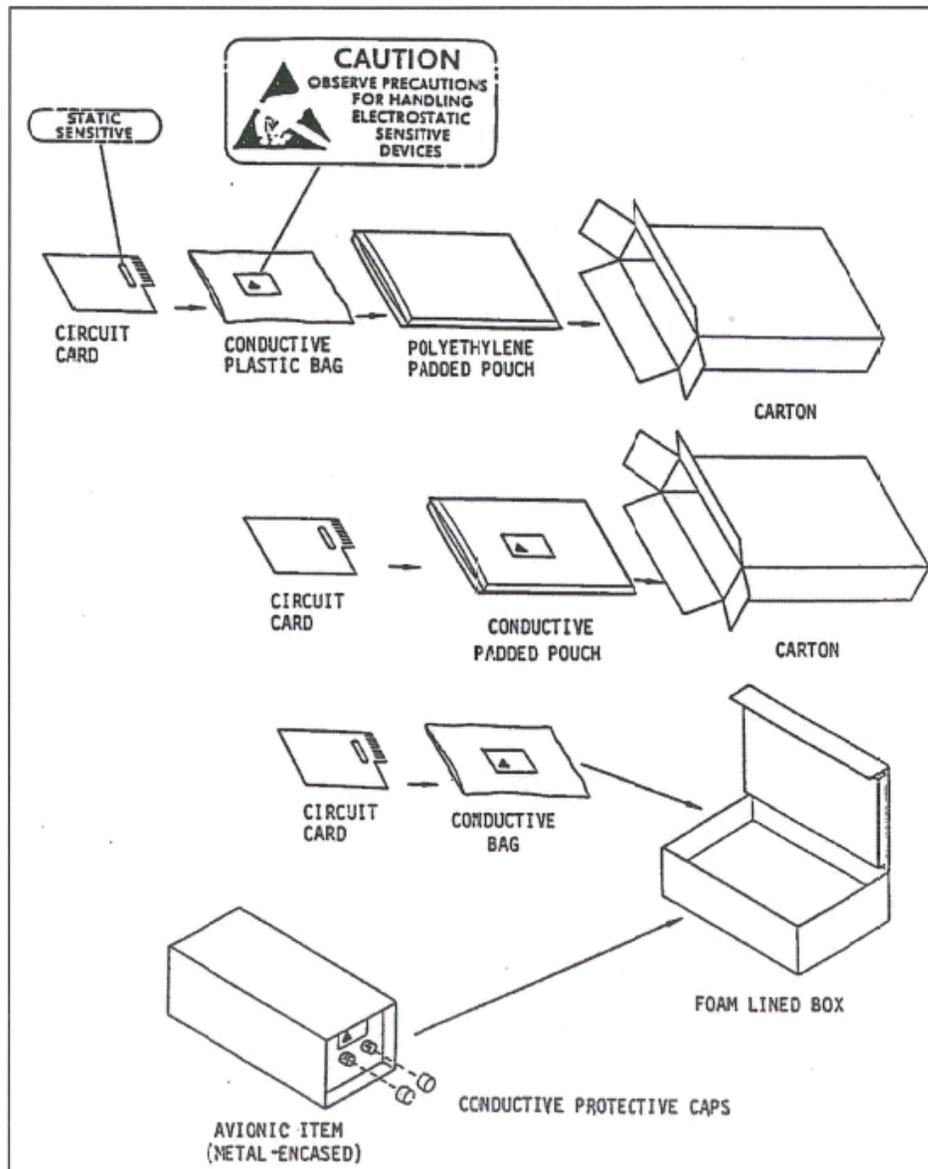
Packaging:

“When packaging ESD sensitive parts, consideration is given to one of three types of parts; Piece parts (such as IC Chips, Transistors), Circuit Boards, or LRU’s (Line Replaceable Units, commonly referred to as Rotables or appliances). ATA Specification 300 offers simple additional guidance.”

ESD Packaging: A common standard is ATA Specification 300

ATA Specification 300

Figure .1. Packaging of Electrostatic Discharge Sensitive Devices



PACKING SHEET

Page x of x Excerpt from ATA SPEC 106

Supplier Information

Master Carton Number	Hazmat	Packing Sheet
----------------------	--------	---------------

Sold To:	Ship To:	Forward To:
----------	----------	-------------

Miscellaneous							
Customer Order Number	Customer Item Number	Shipped Part Number	Part Serial Number	Description	Shipment Quantity	Unit of Measure	Unit Price Amount
	Mfr. Date	Harmonized Tariff Code	ESDS	Ordered Part Number	Shipment	Auth.	Country of Mfr.
	Mfr. Date	Harmonized Tariff Code	ESDS	Ordered Part Number	Shipment	Auth.	Country of Mfr.



A very good practice is to 'declare' the ESD part as much as possible so that others in the handling chain will know to apply the proper care



About LRU's:

LRU's in Storage or on the Shelf:
When ESD Caps are protecting the pins, you can safely handle the LRU

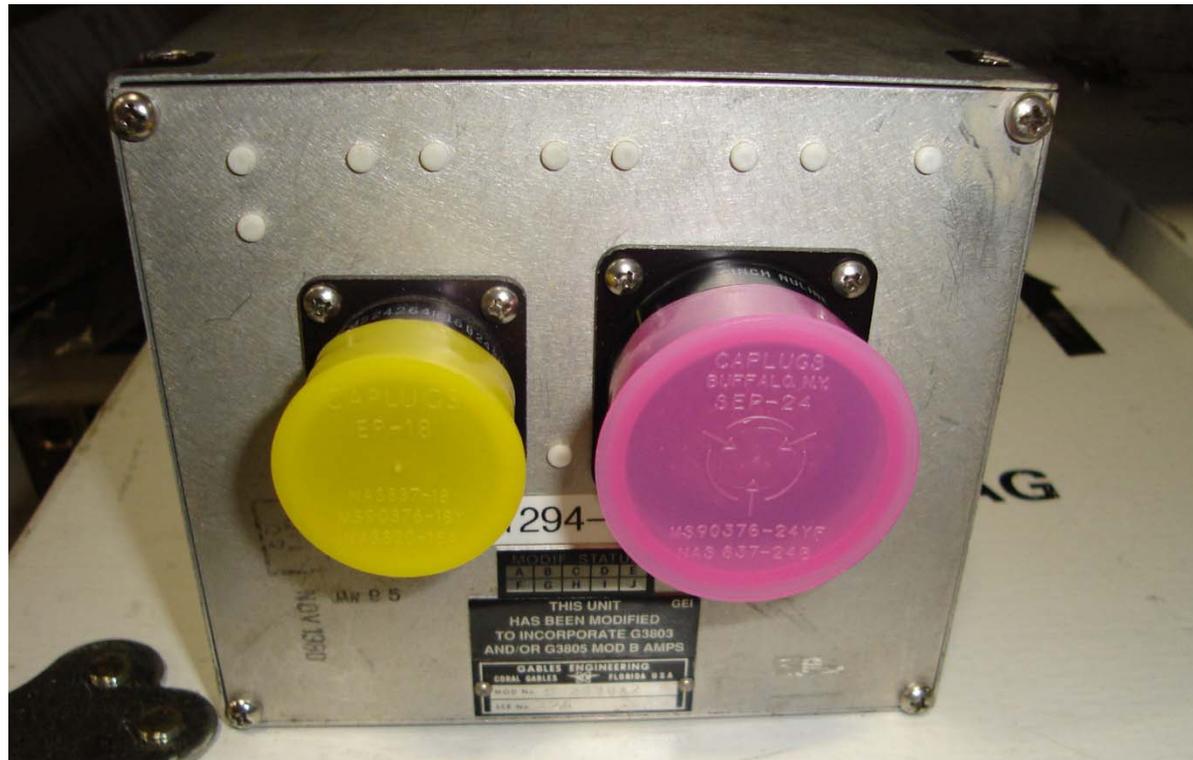
Typical ESD Caps



About LRU's:

LRU's are damaged by ESD charges in one of two ways

1) By installing the WRONG cap. The yellow cap is actually a very efficient generator of static charges



About LRU's:

LRU's are damaged by ESD charges in one of two ways:

2) When the protective caps are off, and the pins come in contact with static charges:

- ***During installation***
- ***During removal***
- ***In storage***
- ***In transport to and from the aircraft***



Training

“Training

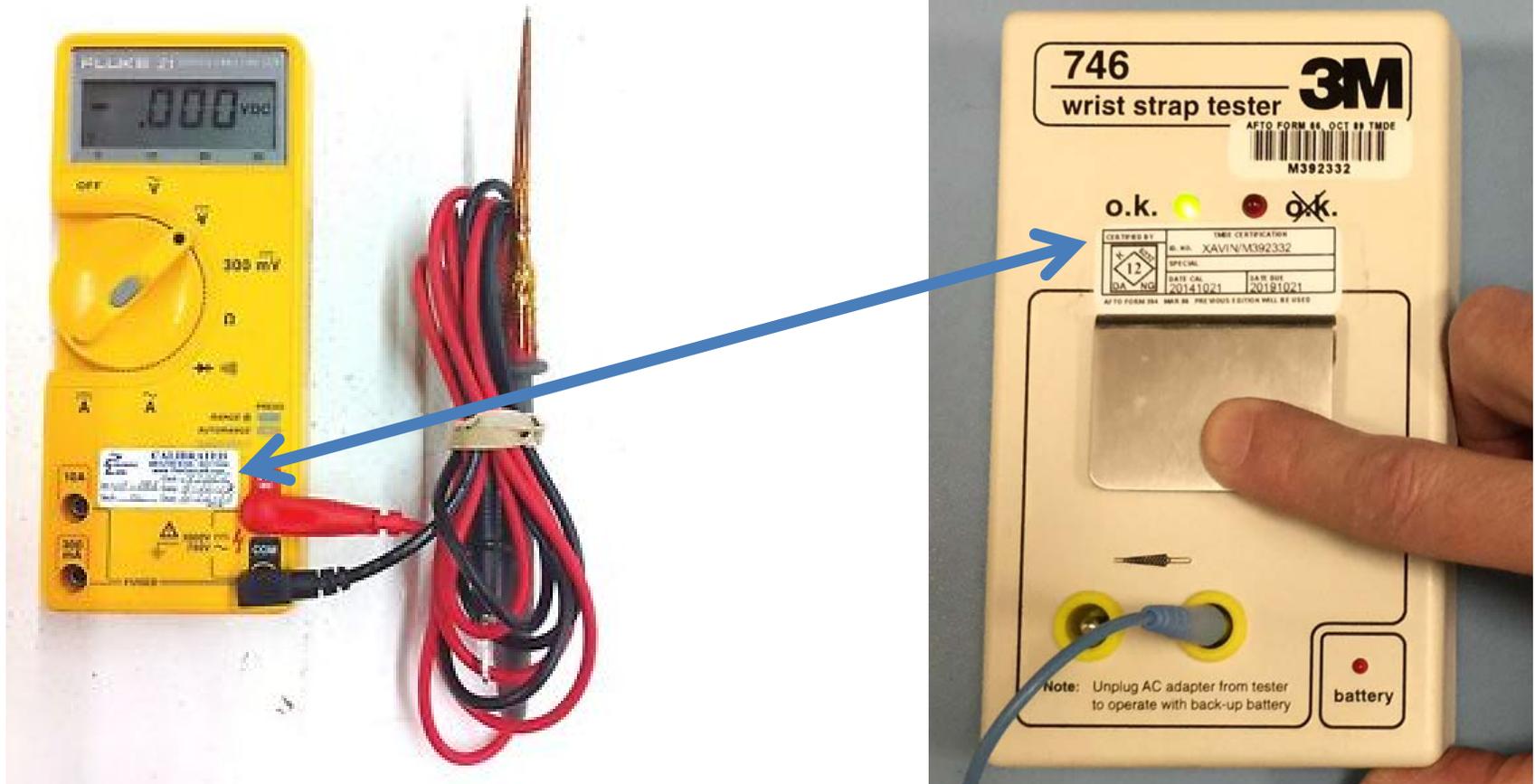
Persons who handle ESD sensitive parts should have the following topics documented in their training files:

- A. What is ESD?
- B. Sources of static charges
- C. Use and care of the EPA
- D. Packaging”

Calibration

“Calibration

Equipment such as, but not limited to, Wristband-Chord Testers typically require periodic calibration in accordance with the manufacturer’s instructions, and should be placed on the distributor’s calibration program and documented in its Quality System.”



Documentation

“Documentation

The Distributor should maintain files of the manufacturer’s instructions regarding the equipment contained in the EPA. This serves to verify for employees as well as auditors conformity with installation instructions. In addition, equipment documentation such as may exist with certain models of Continuous Monitoring Workstations which state that calibration is not required (except for factory settings), shall also be filed and presented for employees or auditors as needed.”



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*You're Good
To Go!*

