

TECHtalk

A TECHNICAL PRODUCT PUBLICATION

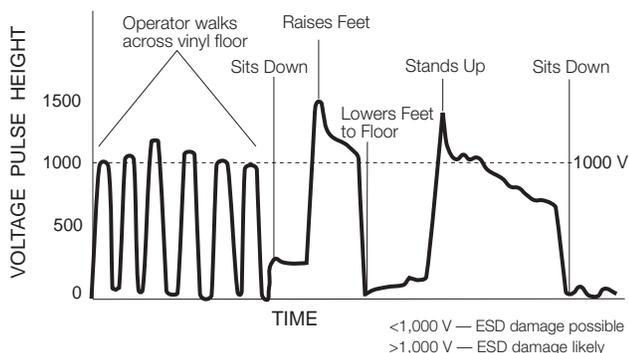
Preventing Electrostatic Discharge Damage

STATIC DAMAGE AWARENESS

Electrostatic discharge (ESD) is an electric charge transferred between bodies at different electrostatic potentials. It's often unseen—a dangerous charge seeking ground that destroys or damages billions of dollars worth of electronic components each year.

Some people feel that ESD damage is an electronics industry myth used to sell unneeded protection. This thinking is reinforced by the difficulty of determining, by hard numbers, the amount of ESD damage. Industrial experts place the annual ESD damage to electronic components at a conservative \$5 billion! Like 19th century doctors who scoffed at antiseptic surgical techniques until they saw bacteria under a microscope, most people are now convinced by extensive laboratory research that significant damage occurs from ESD to unprotected components.

Most electronic devices can be damaged by ESD of well under 1,000 volts—EPROM's can be damaged with only 100 volts! Components assembled onto circuit boards are especially vulnerable as the circuit traces funnel the ESD energy to susceptible components. 1,000 volts may seem like a large charge, but an ungrounded person can easily generate and discharge well over 1,000 volts without realizing it. The following graph shows typical voltages monitored on a person without a wrist strap.



You can't feel ESD below 3,000 volts, hear it below 5,000 volts, or see the spark below 10,000 volts. Damage is often undetectable, or may not show up immediately.

In low humidity, just walking with rubber-soled shoes across a vinyl floor can build up 12,000 volts.

PRODUCTION OF STATIC ELECTRICITY

Static is produced when two poorly-conductive materials meet, either through rubbing or through single contact followed by separation. As a result, each surface develops a different charge voltage level. Without a ground path to dissipate the charge, nonconductors—papers, plastics, foam coffee cups, clothing, and people—can carry thousands of volts.

While moist air allows charged bodies to slowly drain off an excess charge to ground, dry air inhibits that charge dissipation. Simply adding moisture to indoor air may stop painful charges arcing to your fingertips from light switches in carpeted rooms, but is not sufficient protection for sensitive electronic components. For that protection, a total system preventing all types of static discharge must be in place.

ACTIVITY	CHARGE VOLTAGE	
	15% HUMIDITY	80% HUMIDITY
Walking across carpet	35,000	1,500
Walking across vinyl floor	12,000	250
Working at bench	6,000	100
Opening a vinyl envelope	7,000	600
Picking up empty polyethylene bag	20,000	1,200
Sitting in chair padded with polyurethane foam	18,000	1,500

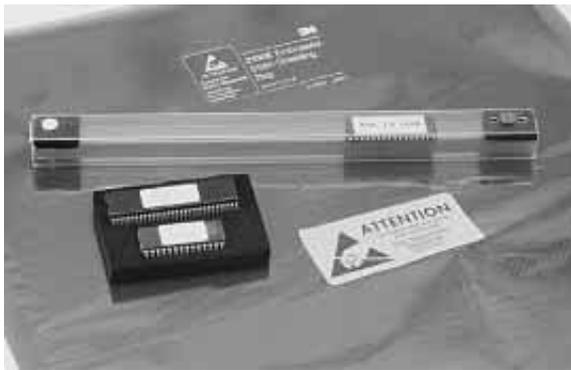
PROPER HANDLING OF ELECTRONIC COMPONENTS

ESD-susceptible components like circuit boards are normally chassis-grounded on standoffs in an enclosure—well protected from ESD. It's when they are removed from the enclosure that they must be protected against static discharge and physical damage. The only effective solution is a complete ESD protection system, including guidelines for packaging and shipping electronic components to minimize the possibility of further damage in shipment.



ESD PREVENTATIVE EQUIPMENT

- **Static Safeguarded Work Station**—Handle all static-sensitive components only at a work area equipped with a grounded static dissipative mat and grounded wrist straps. Test wrist straps daily to be certain the continuity is intact. When working in the field, portable static-dissipative mats and attached wrist straps should always be used. If components must be set down, place them only on the grounded mat.
- **Static Shielding Bag**—Whenever a static-sensitive component is removed from a grounded enclosure, place it in a static shielding bag. Damaged boards to be returned to the manufacturer should immediately be placed in a static shielding bag to prevent further damage in shipping. Place separate EPROM or IC's with prongs onto conductive foam or inside DIP tubes.



Fold the open end of the bag and seal with tape or a warning label declaring the contents static sensitive. If using clear DIP tubes or conductive foam for IC's, they must also be enclosed in a static shielding bag.

Pink polyethylene bags are **not** static-shielding. These bags protect contents only from static charging within the bag. They do not protect from static discharge caused by external electrostatic fields.

For complete ESD protection, we recommend the laminated blue/black conductive static shielding bags made by 3M. We stock the most popular sizes of these multilayer bags, and they can be reused as long as they are intact. Other static shielding bags, conductive foam, and DIP tubes can be purchased at most electronics supply stores.

- **Padded Box**—Sealed bags must be boxed and surrounded by padding to cushion contents during shipping to prevent physical damage.



Pink antistatic bubble wrap, foam sheets, foam peanuts, or other antistatic padding may be used to physically protect the component from damage due to rough handling during shipping.

The use of antistatic polystyrene material for cushioning is acceptable only when used in conjunction with a blue/black conductive static shielding bag. Simply wrapping a bare component in a sheet of antistatic foam, or placing it loose in a box of foam peanuts is a sure recipe for disaster.

At Rice Lake Weighing Systems, we require our suppliers to observe these ESD prevention guidelines when shipping us circuit boards, EPROM's, A/D converters and other static-sensitive components. We also follow these same guidelines when shipping static-sensitive parts to our customers.

NEW WARRANTY REPAIR POLICY — FEBRUARY 1, 1996

Because of the potential for ESD damage in packing and shipping, Rice Lake Weighing Systems will no longer accept for warranty repair or credit any circuit board or other static-sensitive component not packaged in accordance with these complete ESD prevention guidelines.

Pass Tech Talk along to share this technical information with your associates.

ROUTE TO:

-
-
-
-

RICE LAKE WEIGHING SYSTEMS
Industrial Solutions on a Global Scale™



Service Department
715-234-2003

Saturdays: 8:00 a.m. – 12 noon CT
Weekdays: 6:30 a.m. – 12 midnight CT