

# ELECTROSTATIC DISCHARGE PROTECTION

## What is ElectroStatic Discharge (ESD)?

Whenever static electricity on an object comes into contact with an earth ground object, discharge takes place, most often by a way of a spark. This is similar to a miniature lightning strike. Objects sensitive to such electrostatic discharge are **ElectroStatic Discharge Sensitive (ESDS)**.

Static electricity is generated by many different products and in many different ways. Handling plastic packaging, walking across a carpet, wearing clothing that retains static charges and working at a workbench that is not earth grounded are only a few ways static electricity is generated.

Your body can generate the largest static charge likely to come in contact with a **ESDS** component, so it is important that all necessary precautions are taken to prevent this contact from occurring.

## What is ESD Damage?

There are two types of damages or failures: upset and catastrophic.

Most **ESD** upset type damage will not normally show immediately. It may only show as a temporary loss of data but the next time everything passes the tests. Often the damage is so small that the damage to the component will not show up for some time, unlike damage caused by a short circuit which may cause a component to smoke, burn or explode. The component may not show any faults; however, at some point in time the component will fail, most likely at the most inconvenient time.

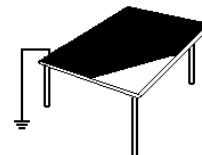
The second type of damage or failure, catastrophic, can be latent, allowing the radio equipment to pass inspection and tests only to fail later. The component may also be instantly damaged causing an immediate failure.

## How Do I Protect Against ESD Damage?

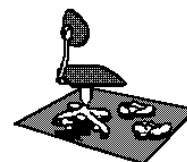
There are several ways to protect electronic equipment from **ESD** damage. All of the following should be followed, but even following only one will help.

## THE BASIC RULE: PREVENT CHARGES FROM FORMING

1. Earth ground the workbench. Use an antistatic material on the surface of the workbench and make sure it is grounded. Do not use insulated underlays on the bench. Make sure the ground connections are secured.



2. Use an antistatic floor covering material. Wear antistatic shoes or heel straps. Your chair also must be antistatic.



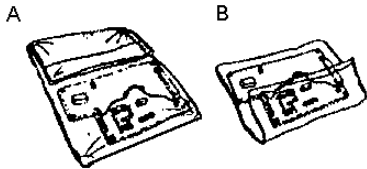
3. Wear a wrist or heel strap connected to earth ground. Keep clean and tight. If your skin is dry, use lotion under the wrist strap. Check wrist or heel strap daily for proper grounding.



4. Keep non-antistatic plastic packaging and other plastic objects away from work area.



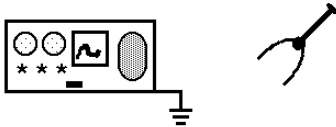
- Use only antistatic plastic or foam material to protect components and boards. Place component or board **inside** antistatic bag (A), **not on top of it** (B).



- Wear clothing that has been treated with a fabric softener during washing. This will not only reduce the risk of acquiring electrostatic charges but make your clothing more comfortable and stay cleaner longer.



- Use earth grounded test equipment, soldering irons, etc. and handtools without insulated handles.



- Clean your work bench, chair, shoes, etc. only with approved detergents and cleaning material only.



- Observe **ESD** precautions when the **ESDS** label is present on components or units and/or in the product manuals.



## RULE OF THUMB

- If covers of the radio are off, protection should be used if you are within 6 inches of a component.
- If you are handling parts, keep them in their protective bag or conductive foam container until both you and the component are safely discharged.

## REPACKAGING ESD SENSITIVE EQUIPMENT FOR SHIPMENT

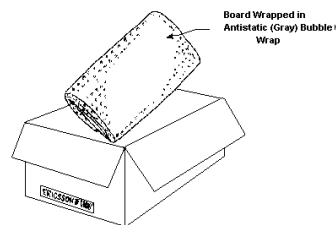
Exercise care when repackaging boards, assemblies, stations and other equipment containing electrostatic sensitive devices for shipment so they arrive at their destination undamaged.

Reuse the original carton if available. If you reuse a carton, be sure that it is in good rigid condition with no tears, punctures, rips, or corner damage with all flaps intact. **Remove all old labeling from the box.**

When using new cartons, select a carton large enough to allow for approximately two inches of anti-static packing material on all sides of the unit.

## BOARDS

- Observe ESD precautions noted earlier in this document. Avoid touching electrical components. Place component board inside an antistatic bag (black or smoky), close and tape the top and fold down.
- Wrap the board with approximately 4 layers of antistatic bubble wrap (pink). A sheet of bubble wrap approximately 2' x 3' should be adequate for most boards. Place in a box as near the same size as possible. If additional boards are to be shipped in the same carton, wrap each one individually. If an over size box is used, roll additional bubble wrap and pack around the board to fill the void. **DO NOT USE FOAM PEANUT PACKING MATERIAL!**

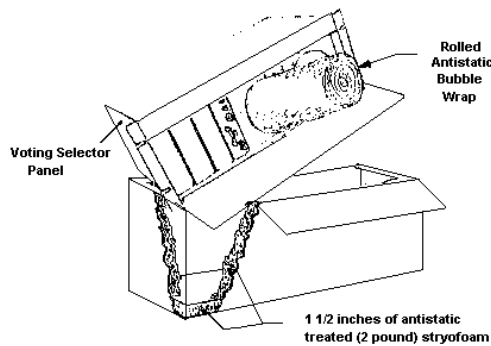


## ASSEMBLIES

Use the following procedures when shipping assemblies, (such as a voter) containing one or more component boards.

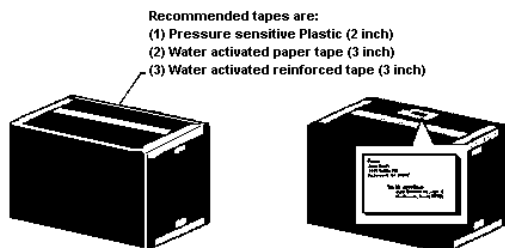
1. Open cabinet and place rolled bubble wrap against board assemblies.
2. Select a box approximately 3 inches larger in all dimensions and place a minimum of 1-1/2 inches of antistatic treated styrofoam on bottom of box. In addition, place treated styrofoam around all 4 sides and top of voter. The styrofoam must have a density of 2 lb.

**NOTE:** Smaller and lighter units may be shipped using 1/2 inch of styrofoam with a density of 1 lb.



## CLOSING THE CARTON

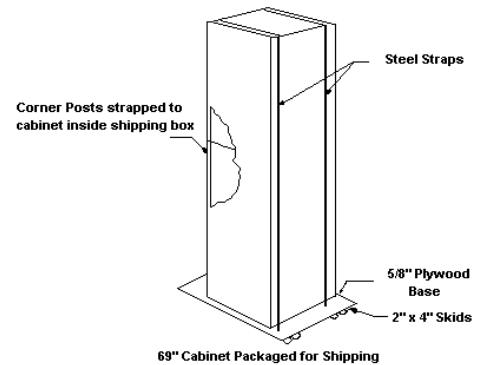
Close carton securely using strong tape 2 in. or more in width. Recommended tape includes pressure sensitive plastic, water activated paper tape (3 inch or more in width), or water activated reinforced tape. Only two center seam strips of reinforced tape are required versus 6 for regular tape. **DO NOT USE MASKING TAPE, CELLOPHANE TAPE, OR STRING!**



## STATIONS - 69/83 INCH CABINET

Select a suitable 350 double wall corrugated carton with corner posts and base. Carton should be large enough to allow 1 inch clearance for corner posts. Use original carton, if available.

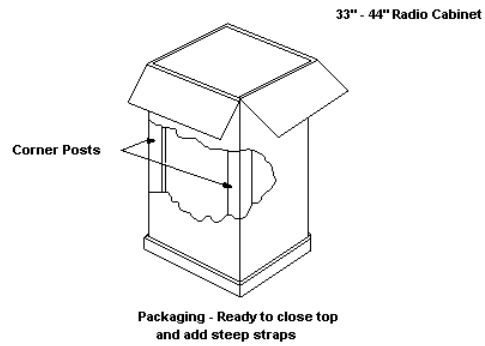
1. Cut a piece of 5/8 inch plywood to the dimensions of the station cabinet to provide a base for shipping.
2. Nail two 2 x 4s to the base, along opposite sides, to allow movement via forklift. **NOTE: PLACE STEEL BANDING BETWEEN 2 X 4s AND BASE BEFORE NAILING.**
3. Using four 1/2 x 2 or 2-1/2 inch lag bolts, (one in each corner) secure the station to the plywood base.
4. Put the corner post on each corner of cabinet and install carton over cabinet. Secure steel bands.



## STATIONS - 30 / 44 INCH CABINET

1. Select a suitable HSC (half slotted carton) 350 double wall with corner posts and base. Carton should be large enough to allow 1 inch clearance for corner posts. Use original carton, if available.
2. Place a 1 inch sheet of 1 lb density styrofoam on bottom of carton. Position cabinet on bottom and position corner posts on cabinet. Place carton top over cabinet and secure with steel banding.

## **LABELING**



To insure proper delivery:

- Use complete street address and zip code
- Place delivery label on top of carton only
- Do not place label on a seam or closure or on top of sealing tape
- Include complete return address

Stations - 30 / 44 inch Cabinet