Precautions taken at US Sites against damage to ATLAS barrel modules by electrostatic discharge.

Adapted from document by M. Gibson for particular set ups in the USA.

Carl Haber 10-July-2002

General overview.

In this document we describe the electrostatic discharge (ESD) precautions that are undertaken in the USA as part of the production of ATLAS Barrel modules.

Basic principals for the protection against possible damage to ATLAS barrel modules by electrostatic discharge.

The aim is to produce a safe workable environment that effectively removes the possibility of damage to the electrical components of the ATLAS barrel module by ESD. We have taken great care to ensure that items that are not themselves static-sensitive but which may be used in the construction process have suitable intimate and proximity packaging and so can be allowed into the USA construction areas. Temperature and relative humidity are controlled and monitored to ensure suitable environmental conditions.

General technical information about the LBL clean-room.

1) The room is equipped with a static dissipitive floor.
   The external clothing worn by the operators when they are working with static sensitive components is anti-static. An approved supplier cleans lab coats once a week.
2) The operators either wears a wrist strap connected to ground or he/she is connected to the floor via their clean room anti-static shoes.
3) All the appropriate work stations are equipped with earth bonding points.
4) All chairs are upholstered with static dissipative fabric.
5) All the free use plastic bags are ether static dissipative or anti-static. All custom containers have ESD intimate and proximity packaging.
6) All the table surfaces are ether manufactured in static dissipative materials or are covered with static dissipative mats. Both are connected to earth via high resistance paths. All surfaces being regularly cleaned with an appropriate ESD cleaner.
7) The module storage boxes are constructed from aluminum. Commercially available plastic containers fabricated from anti-static materials or commercially available custom anti-static boxes.
8) The hybrid boxes that are used for transport and storage provide both intimate and proximity packaging are fabricated from anti-static materials.
9) At the time of writing we have no information about either the baseboard transport boxes and internal packaging or the module test boxes.

Hardware

10) The alignment system. (We note that the detector/baseboard assemblies are not static sensitive.)
   A) The small vacuum chucks are connected directly to ground.
   B) The assembly jigs are all aluminum and are handled by operators who are grounded through the static safe floor coating.

11) *The Adhesive Dispensing System*.
   A) The adhesive applicator being of metal construction is all connected to ground.

12) *The sub-assembly probe station*.
   A) The test station is connected to ground.
   B) When testing a 4-detector sub-assembly the module and its surrounding frame which is 100% metallic are both at negative potential defined by the source measure unit, which is not a floating supply.

13) *Hybrid mounting equipment.*
   A) The hybrid mounting station is placed on a table surface, which is static dissipative and grounded.

14) *The metrology hardware*.
   A) The metrology frame is placed on a 3 point carrier which is electrically connected to the SmartScope.
   B) The metal outer frame of the SmartScope is at ground potential.

15) *Wire bonding*.

A) Both the operator and all the relevant frames are connected to ground via high impedance paths.

16) *Electrical testing of the module*.
   A) All table tops are static dissipative and grounded
   B) All operators wear static safe overcoats, booties, and wrist-straps. The straps are grounded.
   C) All test fixtures are metal and grounded.
   D) All pigtails unconnected are covered with aluminum foil.

17) Storage.
   A) Storage cabinets house aluminum shelves which are\ all grounded.
   B) Storage cabinets are continuously flushed with dry air.
   C) Standard metal cabinets (which are floor mounted) are used for the storage of non-critical items, such as gloves, adhesive mixing pots, syringes for adhesive dispensing etc.