DRAFT

Precautions taken at R.A.L. against damage to ATLAS barrel modules by electrostatic discharge.

M.Gibson

General overview.

In this document I describe the electrostatic discharge (ESD) precautions that are undertaken at RAL as part of the production of ATLAS Barrel modules.

Basic ethos 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. It is assumed that all sites supplying components to RAL or that are involved in post fabrication work are taking similar precautions. 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 RAL construction area.

As far as is reasonably practicable all electrostatic discharge sensitive devices (ESDs) will be stored and handled in accordance with British Standard **BS IEC 61340-5-1:1998** and **PD IEC 61340-5-2:1999**.

Temperature and relative humidity are logged continually to monitor the suitability of environmental conditions.

General technical information about the RAL clean-room.

- The room is equipped with a static dissipitive floor. The external clothing worn by the operators is anti-static. An approved supplier cleans lab coats once a week.
- 2) The operators either wears a wrist strap connected to a single line earth monitor box with audible alarm or he/she is connected to the floor via their clean room anti-static shoes.
- 3) All the stations are equipped with earth bonding points.
- 4) All the free use plastic bags are ether static dissipative or anti-static. All custom containers have ESD intimate and proximity packaging.
- 5) All the plastic A4 folders are static dissipative.
- 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 RAL module storage boxes are constructed from aluminium. 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 between Birmingham and RAL 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.

- A) The small vacuum chucks are connected directly to ground.
- B) The front of the granite table is fitted with a static dissipative mat, which is connected to ground via a high resistance lead.
- C) The trolleys on which the module assembly hardware is mounted are of galvanised metal construction with no paint and connected to the floor via trailing links.
- D) Each trolley has all exposed surfaces covered in static dissipative mats which are in turn connected to the trolley and hence to the floor.
- E) The pickup jigs, which are of metal construction, are stored on the top surface of the trolleys.
- 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 and the entire table surface is covered with static dissipative matting.
 - 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 connected to ground via a high resistance to form a static dissipative connection.
- 14) The metrology hardware.
 - A) The metrology frame is placed on a 3 point carrier which is electrically connected to the SmartScope via a high resistance cable to an earth bonding point.
 - 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) This electrical testing area is still under construction.
- 17) Storage.
 - A) Storage containers used for electrostatic discharge sensitive devices such as components or completed modules are mounted in ESD safe boxes may be ether of the following.
 - 1. Commercially available freezers with metal inner surfaces bonded to ground and internal support frames with electrically conducting surfaces.
 - 2. Commercially available plastic storage boxes with metal shelves that are bonded to ground via high resistive leads.

Both these options are supplied with Nitrogen. Because the freezers tops are at bench height they have additional static dissipative matting fitted

- to their lids.
- B) Standard metal cupboards (which are floor mounted) are used for the storage of non-critical items, such as gloves, adhesive mixing pots, syringes for adhesive dispensing etc.