

Rev.	ECO	Description	Author	Approved	Date
A		Initial Release	B. Klatt	W. Mayer	01/08/91
B		General Review			02/10/06
C		General Editorial Update	B. Klatt	M. Bautz	07/16/14
D		Added Air Ionizer to Paragraph 4.0	B. Klatt	R. Goeke	10/27/14

**Massachusetts Institute of Technology
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**Electrostatic Discharge, Handling of Parts and
 Equipment (ESD)**

Dwg. No. 99-01003
 Revision D
 October 27, 2014

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Preface

Revision A was the Initial Release of 99-01003 written by Brian Klatt 12/18/90 and checked by W. F. Mayer on 01/08/91.

Revision B issued a General Review on 02/10/06.

Revision C issued a new format and general editorial update 07/16/14.

Revision D issued the addition of Air Ionizer to Paragraph 4.0 on 10/27/14.

1.0 Scope

This specification covers the handling requirements for static sensitive electronic parts and assemblies and the procedures to be followed from the receipt of electronic piece parts to the completion of component assembly. This procedure is also intended to aid in compliance to ANSI/ESD S20.20.

1.1 Objective

The objective of this procedure is the prevention of the electrostatic discharge (ESD) damage to sensitive parts and assemblies, by protecting hardware and personnel from excessive leakage current.

2.0 Transferring Parts and Assemblies

When flight parts and assemblies are moved from one controlled area to another, they will be transferred in static free containers.

3.0 Procedure

3.1 Receiving

Static sensitive electronic parts used in flight hardware must be delivered to MIT in ESD protective packaging, and identified on the external package as ESD sensitive. Receiving personnel will check the external packaging for damage caused by mishandling. The package is then opened and the internal contents will be checked for the following:

- a. Damage caused by mishandling
- b. Quantity agrees with quantity ordered on the purchase order or packing list
- c. Parts are packaged to prevent ESD damage

If the parts are not received in static free containers, they will be held by receiving for MRB action. Receiving personnel will not remove the parts from their protective packaging. If it is necessary to open the protective packaging for packing list verification, it will be done under controlled conditions described in section 4.0.

3.1.1 Incoming Inspections

Incoming visual inspection on ESD sensitive electronic parts will be done in a controlled area as described in section 4.0.

3.1.2 Incoming Electrical Testing

When incoming electrical testing is done on ESD sensitive electronic parts, it will be performed in a controlled area as described in section 4.0.

3.2 Bonded Storage

ESD sensitive parts will be kept in static free containers and stored in grounded metal cabinets.

3.3 Kitting

Kitting will be done in a controlled area as described in section 4.0.

3.4 Fabrication, Assembly, and Integration

Fabrication, assembly, and integration will take place in a controlled area as described in section 4.0. Shorting plugs will be installed on printed wiring board connectors when complete, unless test cables are plugged in.

3.5 Cleaning

Spot cleaning can be done in the assembly area but final cleaning will be done under an exhaust hood suitable for chemical use. The use of compressed air or dry nitrogen is prohibited unless an ionizing air gun is used.

3.6 Storage

Parts, sub-assemblies, assemblies, and components, when not in work, will be stored in static free containers or bags in a metal cabinet.

3.7 Electrical Test

Testing will be done in a controlled area as described in section 4.0.

3.8 Assembly and Component Electrical Test

Electrical test will be done to an approved procedure that has adequate provisions to ensure that no damage occur during testing.

4.0 Controlled Area

The controlled area is an area (fabrication, assembly, inspection, bonded stock, etc.) that has limited access and has a static free work area. The static free work area has conductive floor mats, conductive work surfaces, personnel wrist ground straps, wrist strap monitors, and is equipped with grounded tools and equipment. Ground connections shall be commonly connected to earth ground with a resistance sufficient to limit any leakage current to five (5) milliamperes. MKI controlled areas must meet the intent of applicable requirements of ANSI/ESD S20.20. Air ionizers should be used in high ESD or very low humidity environments to eliminate the buildup of potentially damaging static charges on electronic parts or equipment. This is sometimes necessary when ground straps cannot be used. Charge Coupled Devices (CCDs) are notoriously prone to ESD damage. Operators should always consider use of air ionizers.

5.0 Process Control

Process control is the responsibility of the person in charge of the area. Quality Assurance will monitor receiving, kitting, fabrication, assembly, inspection, and test areas to ensure compliance with these procedures.

6.0 Training

All personnel working with flight parts, hardware, or GSE must be trained per ANSI/ESD S20.20. This includes operators, inspectors, and test operators.