

NTPC	LMI	LARA
TITLE	HANDLING OF ELECTROSTATIC SENSITIVE DEVICES	
REF. NO.	LMI 01-R0/LARA/OGN/OPS/C&I/003	

**LARA SUPER THERMAL POWER PROJECT
LOCAL MANAGEMENT INSTRUCTION**

LMI 01-R0/LARA/OGN/OPS/C&I/003

HANDLING OF ELECTROSTATIC SENSITIVE DEVICES



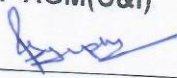
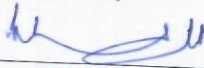
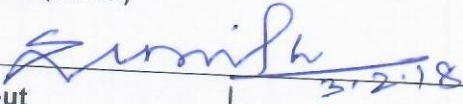
All locations are required to comply with this Directive

Approved for Implementation by
HOP(LARA)

Date :

Enquiries to : HOD(C&I)

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1	TITLE OF LMI	HANDLING OF ELECTROSTATIC SENSITIVE DEVICES
2	DOCUMENT CODE	LMI 01-R0/LARA/OGN/OPS/C&I/003
3	REVISION NO/DATE	
4	ORIGINAL/REF. DOCUMENT	COS-ISO- OG'N/OPS/C&I/003 Issue No. 1, Nov, 1996
5	PREPARED BY	Name: R K Gupta Designation: AGM(C&I) Signature: 
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9	APPROVED BY	Name: Sanjay Madan Designation: HOP Lara Signature: 
10	DATE OF ISSUE	8/2/18
11	CONTENTS LIST	Enclosed
12	DISTRIBUTION LIST	Enclosed

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HANDLING OF ELECTROSTATIC SENSITIVE DEVICES

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HANDLING OF ELECTROSTATIC SENSITIVE DEVICES

1.0 INTRODUCTION

Modern microelectronic circuits found in computers, telecommunication and protection equipment can be damaged by static electricity, unless suitable precautions are taken.

Properly designed circuits will normally be safe from any damage when housed in the equipment case supplied by the manufacturer, but may be subjected to damage when handled. This Operation Guidance Note(LMI) gives practical advice for personnel who may need to handle such circuits during operation and maintenance of such Circuit/Devices.

2.0 SUPERSEDED DOCUMENTS - Nil

3.0 SCOPE

The Guidance Note describes the precaution to be taken when handling components sensitive to electrostatic discharges.

4.0 MECHANISM OF FAILURE

Most people have experienced a small electric shock, caused by static electricity, when touching a metallic object, such as a filing cabinet, after walking across a carpet. The potential generated may be several thousand volts and had it been discharged into an unperfected electronic circuits, components within that circuit could be seriously damaged. The damage will, however, not always be immediately apparent, but may cause failure at a later date.

Semiconductor junctions within an integrated circuits are very small and as the usual working voltage will be low, the material layers from which they

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are made will be correspondingly very thin. In the future, as junction thickness decreases further to permit higher circuit packing density and faster operating speed, it is likely that devices may become more susceptible to damage by static charge.

The process of damage is quite simple in that the insulation for this level of voltage may be broken down or weakened by the high static potential. Such breakdown is normally non reversible. Damage has been recorded for static electricity of less than 100 volts and it is likely that new generations of equipment will be subject to damage by lower voltage, especially where MOS or CMOS are used.

5.0

MARKING OF ELECTROSTATIC SENSITIVE DEVICES

British Standard BS 5783: 1987 "Code of Practice for Handling of Electrostatic Sensitive Devices", defines a label, identical to that in IEC Publication 747-1, to indicate electrostatic sensitive devices.

The symbol is a yellow hand on a black triangular background and will be found both on packing material and on the case of the device itself. It may be necessary to remove the front cover of a piece of equipment, when in service, to see the symbol.

Manufacturer's literature supplied with the device should be also indicate that the device is sensitive to static charge.

6.0

SPECIAL HANDLING PROCEDURE FOR SITE WORK

If it becomes necessary to withdraw module containing an electrostatic sensitive device from the equipment case, the following precautions will reduce the possibility of damage.

- a. Before removing a module, ensure that you are at the same electrostatic potential as the module by touching the equipment case. Care should be taken if the equipment is energized and the use of a wrist strap as outline in (f) below is recommended.



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- b. Handle the module by its front plate, frame, or edges of the printed circuit board. Avoid touching the electronic components, printed circuit track and connectors.
- c. Do not pass the module to any person without first ensuring that you are both at the same electrostatic potential. Shaking hands achieves equipotential.
- d. Place the module on an antistatic surface, or on a conducting surface which is the same potential as yourself.
- e. Store or transport the module in a conductive bag. Conductive bags are widely available but in case of difficulties they can be obtained from the equipment manufacturer.
- f. If you are making measurements on the internal electronic circuitry of (for example) on amplifier in service, it is recommended that you are earthed to the case with a conductive wrist strap. Wrist straps should have a resistance to ground between 500 k ohms to 10 M ohms. If a wrist strap is not available, you should maintain regular contact with the case to prevent the built up of static electricity. Instrumentation which may be used for making measurements should be earthed to the case whenever possible.
- g. Voltage for continuity testing greater than 1.5 volts should be used with caution. Any tests should be made with a low voltage open circuit transient free tester with a short circuit current of less than 10 mA. Care should be taken with the use of multi range test meters. Simple audible (buzzer or bell) types of continuity tester should not be used when electrostatic sensitive devices are present.

Responsibility- AGM(C&I)

6.1 PRECAUTION TO BE TAKEN DURING UNPACKING

Most ESSDs (For example DDC cards) are supplied in Anti-static packing. Before opening this packing, person should touch a ground surface (DDC panel door or Electronic Lab's Anti-static workbench top), or wear grounded wrist



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strap to discharge his body charge. If it is being unpacked in the Lab, then packet itself should be put the Anti – static workbench. While unpacking, avoid touching components and edge connector of the module.

Responsibility- Lab In-charge(C&I)

7.0 SPECIAL HANDLING PROCEDURE FOR STORES /LABORATORY/ WORKSHOP WORK

It is recommended that a Special Handling Area should be established as defined in BS 5783:1987.

8.0 REFERENCES

BS 5783 : 1987 `` British standard Code of Practice for Handling of Electrostatic Sensitive Devices".

IEC Publication 747- 1 : 1983, ``Semiconductor Devices: Discrete Devices and Integrated Circuits", Part- 1: `` General".

9.0 IMPLEMENTATION OF LMI

Head of C&I shall be responsible for implementation and maintenance of records & to arrange internal audit once a year by team nominated by him. Exception reports, if any along with corrective actions and time schedule for implementation will be submitted to Head of O&M.

10.0 REVIEW

Head of C&I shall be responsible for review of this LMI at least once in two year & such revision will be based on feedback or due change in revision document which necessitates a revision.

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11.0 DO,s and DON'Ts

DO's

- Paper, non-conductive plastic, foams and films or cardboard to be kept away from the static controller conductive bench top. Placing devices loaded printed circuit board on top of any these materials effectively insulates them from ground and defeats the purpose of static controlled conductive surfaces.
- Food to be kept away from static controlled conductive work surfaces. If spilled on the bench top, these materials will contaminate the work area.
- Exercise caution during handling soldering guns around conductive work surface. Solder Spills and heat from the gun may melt and damage the conductive mat.
- Put on grounded wrist strap before touching any device. This drains off any static build-up charges from operator
- User must have pre requisite knowledge on the ESD cautions symbols
- Device or components to be removed from shielding bags only when grounded via wrist strap at grounded work station. This also applies when loading or removing device from the Printed circuit boards.

Don'ts

- Anyone not grounded, should not be allowed to touch devices, components or loaded printed circuit boards. To be grounded, they must be standing on a conductive floor mat with conductive heel straps attached to footwear or must wear a grounded wrist strap.
- No one should be allowed to touch the pins or leads unless grounded, since most ESD damage is done at these points.

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- No one should handle devices or components during transportation / shifting from work station to workstation unless protected by shielding bags. These items must never be directly handed by any one not grounded.
- Grounded static controlled conductive floor and bench top mats not to be waxed. These would allow buildup of an insulating layer and thus defeat the purpose of a conductive floor and thus defeating the purpose of a conductive work surface.
- Edge connectors of loaded printed circuit boards or empty printed circuit boards containing permanently mounted driver circuits not to be touched, when not grounded.
- Unloading components on a metal bench top allowing rapid discharge of charged devices should be avoided.
- Strictly avoid touch leads. Handle devices by their package even though grounded.

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12.0 ANNEXURE

1. ABBREVIATIONS

LMI : Local Management Instructions

CMOS: Complementary Metal Oxide Semi-Conductor

BS : British Standards

IEC : International Electro technical Commission

ESSD : Electrostatic Sensitive Device

DDC : Distributed Digital Control

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2 FORMAT OF THE WORK DONE

S.NO	AREA	CARD DETAILS	RECEIVED ON	CHECKED ON	REPAIRED BY	CONCERNED ENGINEER	REMARK

3 REVISION INDEX

SI. No.	REV.NO.	DATE	DETAILS	APPROVED BY

4 DISTRIBUTION LIST

Controlled copy

1. HOD(EEMG)
2. LARA INTRANET LMI WEB PAGE.