

## CHAPTER 3

### HANDLING PRECAUTIONS

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### ELECTROSTATIC CHARGES

Electrostatic charges can be stored in many things; for example, manmade fibre clothing, moving machinery, objects with air blowing across them, plastic storage bins, sheets of paper in plastic envelopes, paper from copying machines, and on people (see Fig.1). Charges are caused by friction between two surfaces, at least one of which is non-conductive. The magnitude and polarity of the charges depend on the different affinities for electrons of the two materials rubbing together, the friction force and the humidity of surrounding air.

Electrostatic discharge is the transfer of an electrostatic charge between bodies at different potentials and occurs with direct contact or when induced by an electrostatic field. Although all pins of Philips ICs are protected against electrostatic discharge, we recommend the following ESD precautions are complied with when handling.

### WORKSTATION FOR HANDLING MOS ICs

Figure 2 shows a working area suitable for safely handling electrostatic-sensitive devices. It has a workbench, the surface of which is conductive and anti-static. The floor should also be covered with anti-static material.

The following precautions should be observed:

- Persons at a workbench should be earthed via a wrist strap and a resistor.
- All mains-powered equipment should be connected to the mains via an earth-leakage switch.
- Equipment cases should be grounded.
- Relative humidity should be maintained between 40% and 50%.
- An ionizer should be used to neutralize objects with immobile static charges in case other solutions fail.
- Keep static materials, such as plastic envelopes and plastic trays etc., away from the workbench. If there are any such static materials on the workbench, remove them before handling the semiconductor devices.
- Refer to the current version of the handbook EN 100015 (CECC 00015) "*Protection of Electrostatic Sensitive Devices*", which explains in more detail how to arrange an ESD protective area for handling ESD sensitive devices.

### RECEIPT AND STORAGE OF ICs

ICs are packed for despatch in anti-static/conductive containers, usually boxes, tubes or blister tape. Warning labels on both primary and secondary packing show that the contents are sensitive to electrostatic discharge.

The ICs should be kept in their original packing whilst in storage. If a bulk container is partially unpacked, the unpacking should be done at a protected workstation. Any ICs that are stored temporarily should be packed in conductive or anti-static packing or carriers.

### ASSEMBLING PC BOARDS

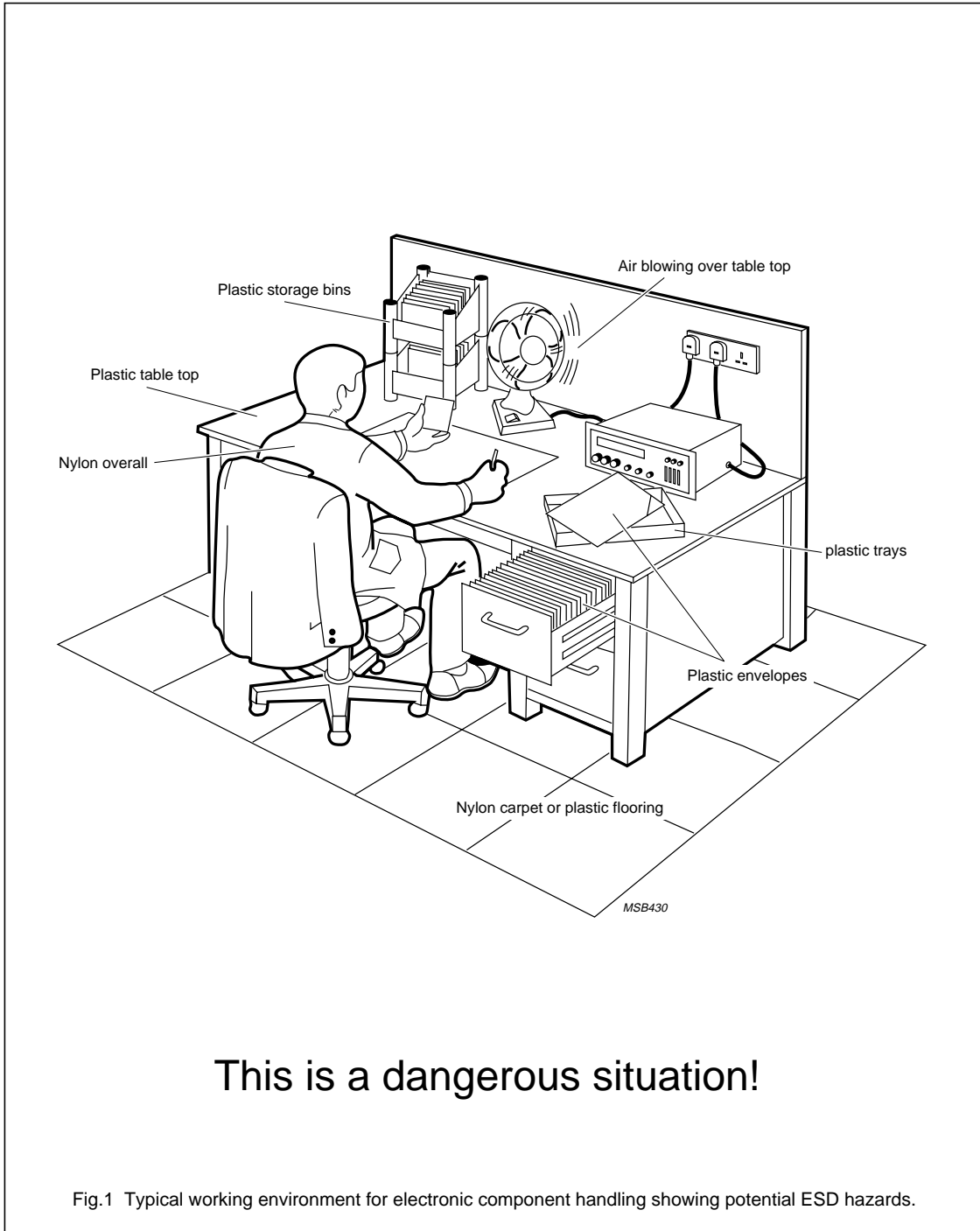
ICs must be removed from their protective packing with grounded component-pincers or short-circuit clips. Short-circuit clips must remain in place during mounting, soldering and cleansing/drying processes. Don't remove more ICs from the storage packing than are needed at any one time. Production/assembly documents should state that the product contains electrostatic sensitive devices and that special precautions need to be taken. During assembly, ensure that the ICs are the last of the components to be mounted and that this is done at a protected workstation.

All tools used during assembly, including soldering tools and solder baths, must be grounded. All hand-tools should be of conductive or anti-static material and, where possible, should not be insulated.

### TESTING PC BOARDS

Completed PC boards must be tested at a protected workstation. Place the soldered side of the circuit board on conductive or anti-static foam and remove the short-circuit clips. Remove the circuit board from the foam, holding the board only at the edges. Make sure the circuit board doesn't touch the conductive surface of the workbench. After testing, replace the PC board on the conductive foam to await packing.

Assembled circuit boards containing ICs should always be handled in the same way as unmounted ICs. They should also carry warning labels and be packed in conductive or antistatic packing.



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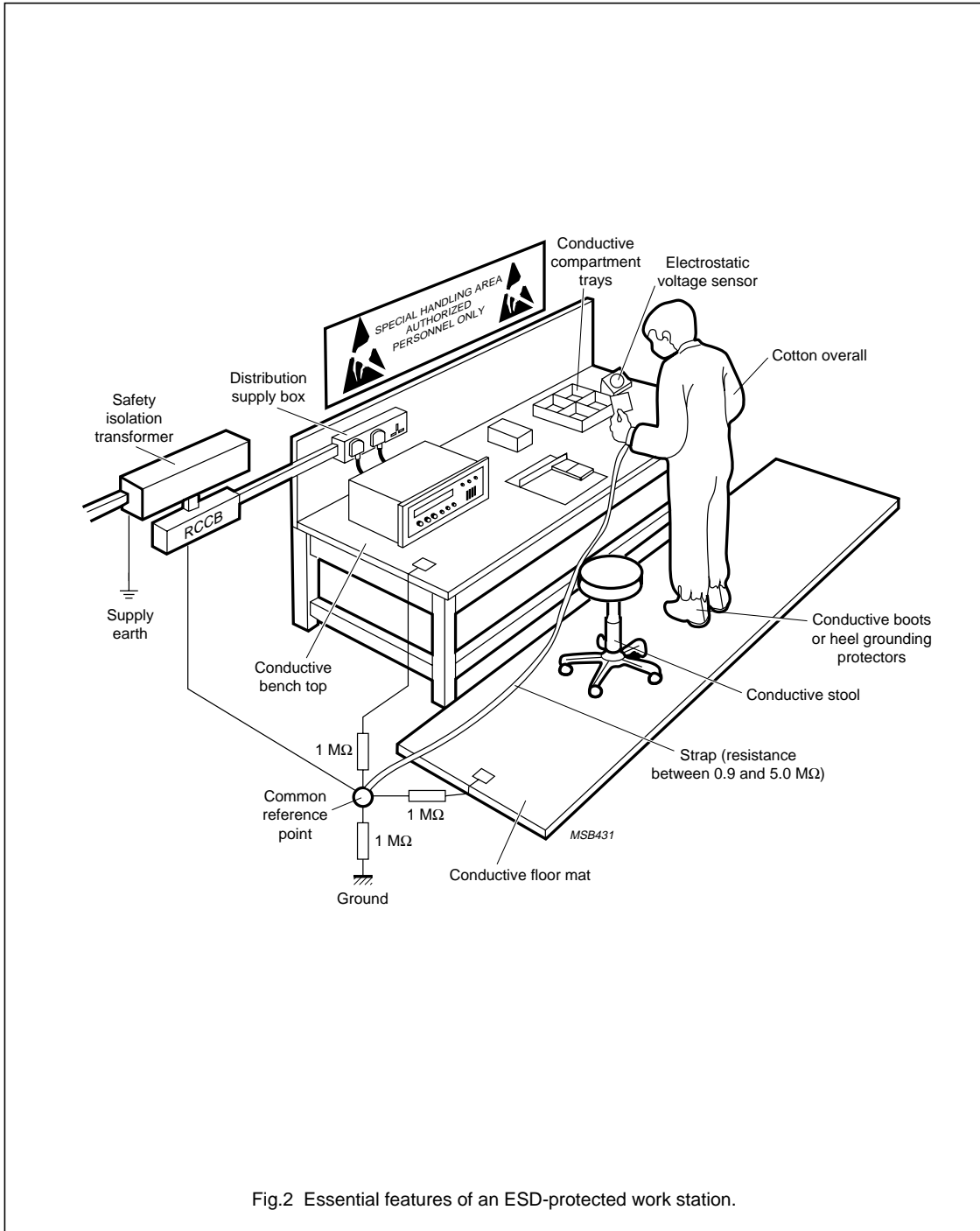


Fig.2 Essential features of an ESD-protected work station.