Preventing Quality Problems

Reduction of Battery Voltage and Deterioration of Capacity

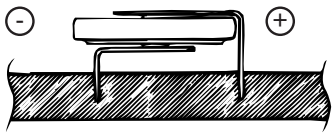
(1) Reduction of battery voltage and deterioration of capacity through contact with antistatic conductive materials

Incidents have been reported where terminal-mounted batteries for memory backup or coin-type lithium batteries have come into contact with antistatic conductive materials, thus forming external discharge circuits and leading to voltage drops or capacity deterioration.

In manufacturing plants using ICs, LSI and other semiconductor components, thoroughgoing antistatic measures are taken. Various protective materials are used to prevent static: most of them have special compounds of carbon, aluminum foil and other metals and are therefore conductive. These protective materials are used, for example, in the form of packaging bags, trays, mats, sheets, films, corrugated boards and resin cases.

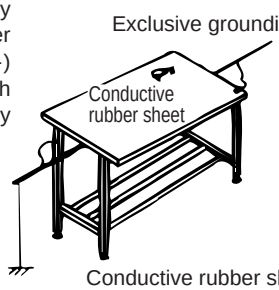
A protective material may have a resistance ranging from 10^3 to 10^6 Ω/cm, for instance. This means that if the (+) and (-) terminals of a battery come into contact with this material, a current ranging from several milliamperes to several microamperes will flow and the battery will discharge, causing voltage drop and capacity deterioration.

A terminal-mounted battery was inserted into a conductive mat. The battery charge was exhausted in several days.

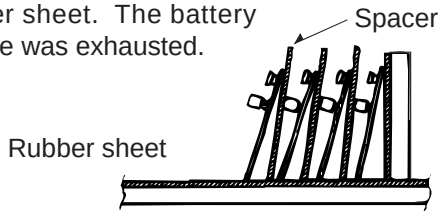


Conductive mat

A battery was placed directly on a rubber sheet spread over a worktable. The (+) and (-) terminals were in contact with the sheet and the battery charge was exhausted.

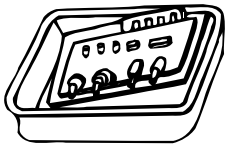


Battery-mounted PC boards were inadvertently brought into contact with spacers and a conductive rubber sheet. The battery charge was exhausted.



When batteries are to be used near protective materials, take every possible care to ensure that the (+) and (-) terminals of the batteries or PC boards, etc. on which batteries are mounted do not touch these protective materials directly.

A battery-mounted PC board was inadvertently brought into contact with a conductive resin case. The battery charge was exhausted.



Conductive resin case

Preventing Quality Problems

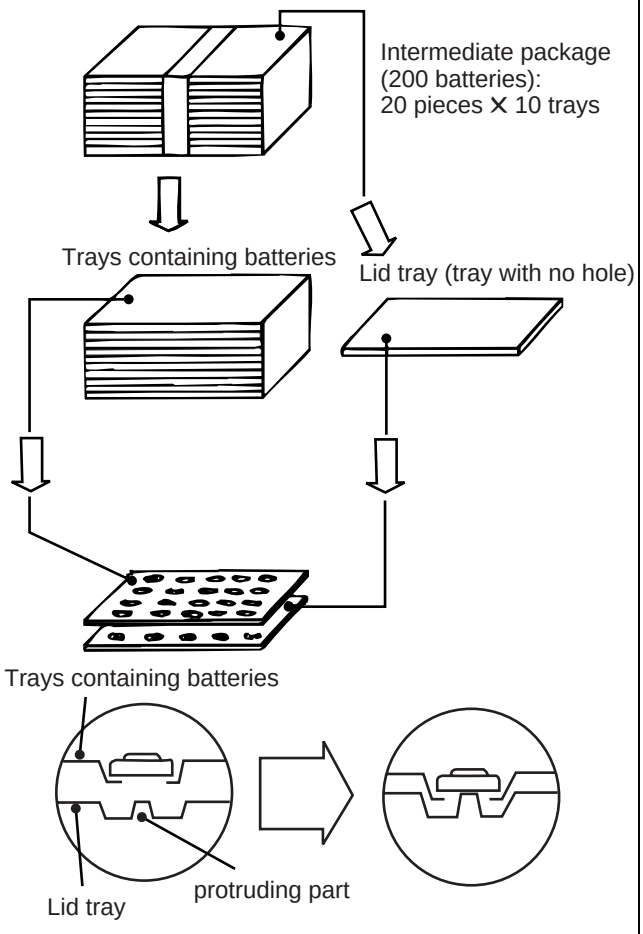
(2) Reduction of battery voltage and deterioration of capacity through contact between batteries

Incidents have been reported where terminal-mounted batteries for memory backup or coin-type lithium batteries have come into contact each other, thus forming discharge circuits (shorted state) and leading to voltage drops or capacity deterioration. Observe the following precautions.

1. Remove the batteries from the tray one at a time.
   If the tray is turned upside down, the batteries will come into contact with each other, forming discharge circuits.
2. Do not place batteries randomly in a parts box or other container.
   Discharge circuits will be formed by multiple batteries coming into contact, causing the batteries to discharge and drain.

○ Recommended procedures

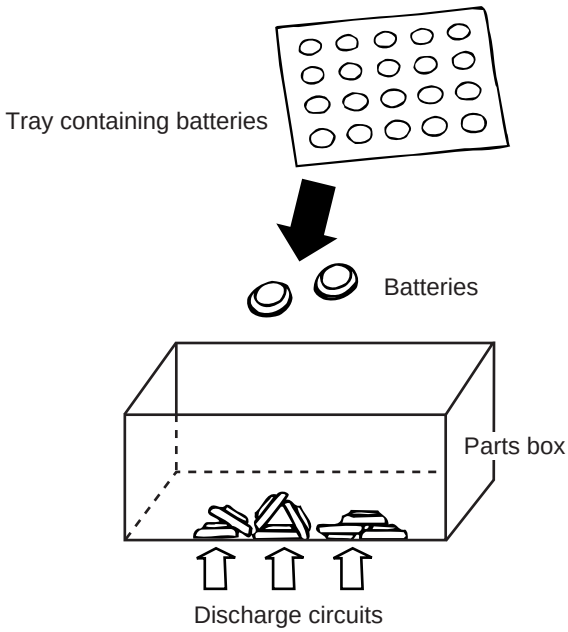
*Utilize the tray lid in taking out batteries

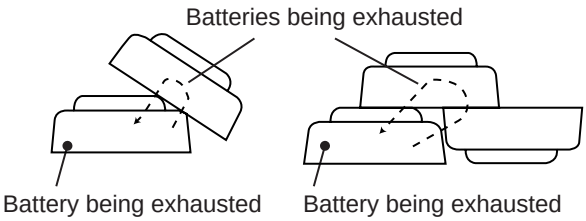


*Lay a tray lid flat and place a tray containing batteries on top of it: batteries are pushed up by protrusions of the lid tray so that they can be easily picked up with fingers.

× Prohibited procedures

*Do not throw batteries randomly into a parts box by turning over trays containing batteries.





*Contact of batteries with each other forms discharge circuits, thus the batteries are drained.

Preventing Quality Problems

Memory Erasure Problems

Coin-type lithium batteries are often used as the power supplies for memory backup in various equipment. However problems with the erasure of valuable data in the memory due to improper contact between the batteries and equipment can occur.

1. When batteries are to be used continuously for a prolonged period
   - Select tab terminal-mounted batteries, and solder the tabs to the battery connection terminals of the equipment. (See Fig. 1)
   - When batteries need to be replaced, use a battery holder (see Fig. 2) or battery with lead wire connectors (see Fig. 3).
2. When batteries need to be replaced in the short term, select batteries with no terminals or lead wire connectors.
   - Use of Y-shaped terminals (2-point contact) for both the (+) and (-) poles as the shape of the connection terminals in the equipment helps to achieve a more stable contact. (See Fig. 4)
     The contact pressure of the contacts should be no less than 2 to 10N (approx. 200 to 1000 gf). (See Fig. 5)
   - To prevent momentary contact failure of several milliseconds in the circuit, the use of a tantalum capacitor, etc. with a capacitance of several microfarads is effective. (See Fig. 6)
   - For the connection terminals of the equipment, use iron or stainless steel with nickel plating at the very least. Gold-plating is more suitable when the contact resistance must be reduced.

Note: Do not touch batteries with bare hands because perspiration (salt), body oil etc. will increase the surface resistance which may lead to defective contact.

Fig. 1: soldering

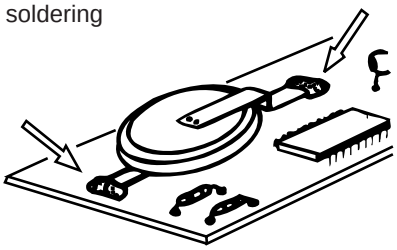


Fig. 2

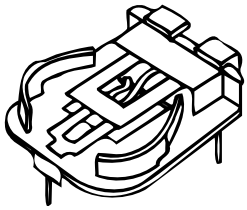


Fig. 3

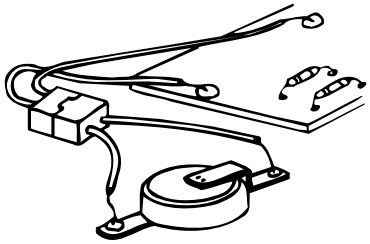


Fig. 4

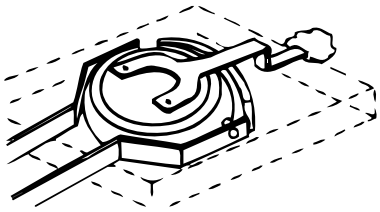


Fig. 5: load

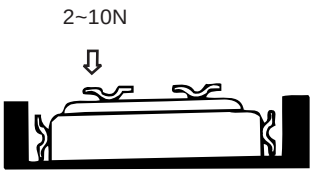


Fig. 6