

1.013 Man Regs	Electrical and Electronics work	Applicable to:	See also: 1.014 1.015 1.025 1.026
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Process(es) covered: The design and construction of items which will be connected to the mains supply where the use of electricity is peripheral (eg, lamps) or fundamental (eg, low-voltage power supplies for electronics).
Instruction in the repair and maintenance of high-voltage equipment.
The construction of electronics circuits from prepared modules or components.

Hazards

Electric shock Any equipment connected to the mains supply has the possibility of giving an electric shock to the user or constructor.
The repair of equipment using cathode-ray tubes will involve EHT power supplies with significant current output.

Explosion Many electronic components can disintegrate violently if overheated.

Risk Assessment

Electric shock Projects to design and make reading or standard lamps require mains wiring and present considerable risks unless the principles of safe construction are understood and followed.
Building a power unit for an electronics system may be part of the learning process and not avoidable. Again, it presents considerable risks unless the principles of safe construction are understood.

Explosion Repair and maintenance of high-voltage equipment also present considerable risks. Resistors, cells, electrolytic capacitors, thermistors and integrated circuits have all exploded in educational activities. The frequency is low and the risk of injury is not high although particles may enter the eye and give rise to alkaline contamination.

Control measures

In many cases, mains electricity can be avoided by using commercial low-voltage supplies (eg, battery eliminators) so that lamps and electronic equipment have a safe input of 6 or 12 V ac or dc. Where this is not appropriate, the design and construction must be carefully checked and tested using a commercial safety test set and the work carried out by a person trained to do portable appliance testing. (See CLEAPSS guide L242.)

Instruction in repair work should stress the importance of earth-free environments whenever tests on live equipment are to be made.

The risk of explosion is so low that even the wearing of eye protection seems difficult to justify. Most events are due to reversed connection or bad practice (eg, mixing cells of different types in one appliance or circuit). Electrolytic capacitors may also fail if the significance of the 'ripple current rating' is not understood or if they have been stored for too long.

Electrical and Electronics work (Continued)

Disposal	Dry batteries originating in technology workshops can be disposed of in ordinary waste (although those from laboratories cannot!). If a local recycling scheme exists, it should be used.
Storage	Electrolytic capacitors deteriorate in storage because the dielectric (insulation) between the plates breaks down. These components, if they have been stored for more than twelve months, should be re-formed before use. See CLEAPSS <i>Laboratory Handbook</i> Section 12.

FURTHER INFORMATION

Even with modular electronics teaching kits it is possible for students to make connections which will destroy one or more components. So long as the rate of damage is low, this can be accepted as part of the learning process.

IMMEDIATE REMEDIAL MEASURES

A particle could be in the eye	<p>Tell the casualty not to rub the eye, sit him/her down facing the light with the head leaning back. Stand behind the casualty to look for the particle in the eye. If it is over the iris or pupil, DO NOT ATTEMPT TO MOVE IT. Tell the casualty to hold a gauze pad over the eye and close the other one. Send for an ambulance to take the casualty to hospital.</p> <p>If the particle is visible over the white of the eye, the corner of a moistened handkerchief can be used to remove it. Otherwise send for a first aider.</p>
Other injury	<p>Apply pressure on or as close to the cut as possible, using fingers or a pad of cloth. Leave any embedded large bodies and press round them. Lower the casualty to the floor and raise the wound as high as possible. Protect yourself from contamination by blood.</p>
Electrolyte is in the eyes (from a battery or capacitor)	<p>Obtain medical attention. Irrigate immediately with water, holding eyelids apart and continue the irrigation until the casualty reaches hospital.</p>