PERSONAL SAFETY AGAINST ELECTRICAL HAZARDS IN SUBSCRIBERS PREMISES.

1. INTRODUCTION.

1.1 Contact with the 240 volt commercial power supply generally used in Australia can have serious consequence. The hazard is increased particularly if contact is made simultaneously with an earthed object.

1.2 Even with tools or appliances in first class condition there are two extremely hazardous electrical conditions which can be encountered:-

(i) The absence of an adequate earth connection to the correct "earth" terminal of the normal 3 pin outlet sockets.

(ii) Concealed electrical wiring without protective conduit under floors or in plaster walls.

1.3 It is therefore imperative that electrical safety precautions be observed by all Engineering Division staff especially when working at subscribers premises.

2. WHY THESE HAZARDS EXIST.

2.1 Until recently, most power authority regulations did not require the earthing of all power socket outlets. This, plus the fact that outlets in private premises are seldom tested after installation, means that very little reliance can be placed on the existance of a good earth connection at outlets in subscribers premises. The absence of an adequate earth connection to an electrical appliance having exposed metal surfaces removes the only entirely safe protection from an accidental internal or external contact with a lethal voltage.

2.2 In addition, concealed electrical wiring, having only rubber or plastic protective sheathing, is permitted in some circumstances. This wiring may be hidden in cavity walls, under floors, or even embedded in plaster or cement rendered walls. It becomes a serious hazard if a metal tool or fitting should pierce the sheathing and contact the conductor. It is therefore necessary to be constantly on the alert to avoid contact with these power cables.

3. TESTING ELECTRICAL APPLIANCES AND OUTLETS.

3.1 All electrical appliances to be used in subscribers premises shall be tested using Test Set No. 28 in accordance with E.I. TELEPHONE, General, Z 0003. Where Test Set No. 28 is not available, an insulation test with a 500 volt megger between the earth conductor and the two other conductors must show a resistance of at least 1 megohm, and an earth continuity test with Test Set No. 29 or its equivalent must be conducted as per paragraph 5 of E.I. WORKSHOPS, Plant, X 0002. Appliances failing in any of the tests shall be forwarded for repair to the appropriate authority in the area concerned. No repairs shall be made locally by staff who are not qualified electricians.

3.2 At present, no readily portable device is available for effectively testing the earth on 3 pin outlets at subscribers premises. An earth resistance higher than 10 ohms will not always protect the user of an electrical appliance against certain types of fault condition. Testing with a voltmeter or test lamp will not detect such a low resistance, and positive results from such tests could give a false sense of security to the user. Apart from this, the connection of a lamp between the "active" and "earth" terminals of a socket may, if the "earth" terminals of other sockets are commoned but not adequately earthed, endanger users of appliances connected to these other sockets. In the absence of a safe earth test, all reasonable precautions must be taken, especially those mentioned in paragraph 4 of this instruction.

3.3 For large installations or on premises where power tools or appliances are used extensively, the Senior Technician shall test all relevant power outlets in accordance with E.I. TELEPHONE, General, Z 0006. This test shall be made prior to commencing work on an installation or at least annually for outlets used extensively by maintenance staff. Outlets which in any way fail to meet the requirements of the test shall not be used until the subscriber has had the necessary repairs effected.

4. PRECAUTIONS.

4.1 WHEN USING POWER TOOLS, an operator shall take one of the following precautions:-

(i) STAND ON INSULATING MATERIAL

(ii) WEAR RUBBER GLOVES

4.2 Dry timber or a rubber mat may be used as a suitable insulating material for use underfoot, but care should be taken to ensure that no portion of the body or clothing is in contact with any other object or surface which may not be insulated. Some rubber soled shoes may offer protection if dry, but in general, if they are not of special design, they should not be relied upon as the soles may contain small cracks or the shoes may be slightly damp.

4.3 Rubber gloves in good condition offer an excellent electrical safety factor where the hazard does not exceed 500 volts. Gloves may be obtained on personal issue (Serial 34 Item 2) to any officer who has frequent need for them, or on any particular job from the depot or tool store. All rubber gloves shall be frequently tested in accordance with the attached Appendix No. 2. Faulty gloves shall be condemned and destroyed in the prescribed manner.

4.4 WHEN USING HAND TOOLS such as a drill or a brace and bit in any location where wiring may be concealed in the walls or floors, where possible without causing undue inconvenience to the subscriber, THE POWER SHOULD BE DISCONNECTED at the main switch, and any distribution fuse or circuit breaker labelled "Electric Clock Not Via Main Switch" withdrawn or released. A notice, "Danger, Do Not Switch On, P.M.G. Workman", must be fixed to the main switch. The subscriber's co-operation should be sought before disconnecting the power, and electric clocks etc. should be restarted when the power is reconnected. In circumstances where it is impracticable for the power to be disconnected, the precautions laid down in paragraph 4.1 shall be observed.

4.5 Before plugging walls, preparatory to the running of cable or mounting of apparatus, a careful survey should be made of power outlets, etc. to determine, if possible, the route of power wiring, which should then be avoided in the installation of telephone wiring and equipment. Notwithstanding this, the precautions outlined in either paragraph 4.1 or 4.4 must be observed.

5. ADDITIONAL HAZARDS.

5.1 In addition to the concealed hazards already mentioned in this instruction, care must be taken to avoid danger from the following sources.

(i) Power busbars, electric tram or train wires or overhead electric crane wiring.

(ii) Power switching rooms and switchboards.

(iii) Live conduit.

(iv) Electric fittings located in confined spaces such as under floors or in attics.

(v) Internal connections of any equipment using commercial power supply.

(vi) Worn flex.

(vii) Walking on electric power cable and flex.

(viii) Carrying metal ladders or pipes in such a way that they may break a lamp and contact the element.

(ix) Broken power or light fittings.

6. ADDITIONAL PRECAUTIONS.

6.1 Dangerous situations can also be avoided by following simple precautions in addition to those mentioned in paragraph 4 of the instruction.

(i) Use insulated hand tools where possible.

(ii) Do not drill or punch through a wall within four feet of a meter box.

(iii) Take special care if it is impossible to avoid working in earthed locations such as under buildings, on uncovered concrete, on any wet surface, or in any area in which pipes, conduits, cables or metal roofs may be directly or indirectly connected to earth.

(iv) Power tools should normally be energised from a general purpose, 240 volts, 3 pin outlet.

(v) Determine from some person with authority that the power leads hanging from the ceiling of factories are 240 volt outlets.

(vi) Protect an extension lead from damage when it passes through a door or window.

(vii) Long extension leads, when in use, should not be allowed to remain coiled on a spool. Overheating may result and the cable could be damaged.

(viii) The supply to an electric power tool should be switched on before the tool is handled. This allows the fuse time to "blow" if a fault exists.

(ix) Lightly touch a power tool with the back of the hand before picking it up. A high voltage may be detected in a comparatively harmless manner by this test.

(x) Do not use an electric power tool if the casing or connecting flex is broken or damaged. Keep tools in carrying cases where they are provided.

(xi) Do not overload an electric drill.

(xii) When drilling through hollow walls, drill carefully through one side then inspect the cavity with a torch or insulated "snare" wire for concealed power cables before proceeding to drill to the other side.

(xiii) Portable hand lamps should have an unearthed guard to protect the globe.

(xiv) Staff should be discouraged from using aluminium or other metal ladders.

(xv) Broken power and light fittings should be either avoided or handled with the utmost care.

(xvi) Extreme care should be taken when carrying long lengths of metal, such as pipe or conduit, to avoid contact with electrical fittings.

APPENDIX.

RUBBER GLOVES.

(i) The gloves shall be examined to determine their condition by means of a visual examination. The important conditions to look for are:-

(a) Cracks, cuts or nicks that would tend to cause the rubber to tear. Such injuries within one inch of the open end of the gauntlet may be disregarded if of a minor nature.

(b) Rubber worn to such an extent that mechanical strength is affected.

(ii) The gloves, if above conditions are satisfactory, shall be subjected to an air test as follows:-

(a) Hold the glove at each side of the edge of the gauntlet.

(b) Revolve it about the edge of the gauntlet as an axis, thus rolling it towards the palm and confining air in the palm and fingers.

(c) Hold the rolled up gauntlet in one hand.

(d) Squeeze the palm of the glove with the other hand so as to put the confined air under pressure. If any puncture exists, the escape of air will indicate the fact and the hole in the glove will be made evident. (See Fig. 1)

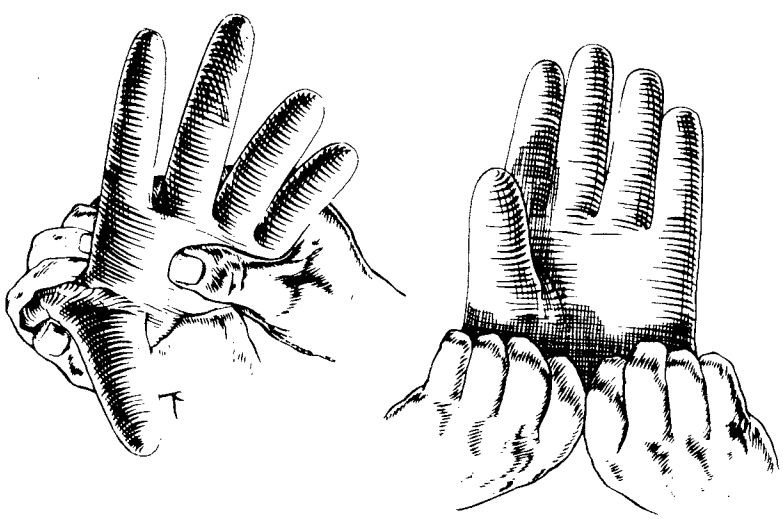

FIG. 1. TESTING RUBBER GLOVES.

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