

### Safe Working Practices:

#### SWP-11 Working with Electricity

Before doing any type of work you must carry out an assessment of the task to be undertaken. This will include the equipment to be worked on, the task itself, Personal Protective Equipment requirements, the work area and environment, plus the tools and equipment required to carry out the job safely. Consult your team leader if you are not satisfied the job can be carried out in a safe manner

#### GENERAL

1.0 This instruction applies to all electrical appliances, there are NO VOLTAGE LIMITS.

1.2 For the purposes of this document, the use of electrical falls into four main areas:-

- i) Battery powered machines.
- ii) Mains powered battery chargers.
- iii) Portable mains operated tools.
- iv) Mains powered equipment (general).

#### BATTERY POWERED MACHINES

2.0 When working on machines (particularly the traction circuits) the truck should be jacked and blocked in accordance with the Jacking and Blocking Safe Working Practice (SWP-02).

2.1 The danger of injury through shock when working on machines in our truck range (currently 80v maximum) is minimal. However the risk of injury through arcing is greater. Therefore care is required when working on truck electrical systems:-

- i) Regardless of the nature of work undertaken the battery should always be disconnected at the earliest opportunity, for trucks with battery isolation plugs I.E (Reach Trucks) the battery still requires to be unplugged as the isolation plug only takes away the positive connection to the truck.
- ii) Whilst it is acknowledged that some testing must be done live, all preparation for testing and all repair work will be done only when the battery has been isolated and unplugged.
- iii) Fault diagnosis should, where practicable, be carried out by continuity tests, not on live circuits.
- iv) Insulated tools should be used where ever possible, ie. insulated spanners and test leads.
- v) Where there is no alternative but to test "power circuits" live then the test leads should be of the type illustrated on page 4 5, Figure 1. These are the recommended type referred to in the Health and Safety Executive Guidance Note GS 38 and consequently meet the standard required in the Electricity at Work Regulations.
- vi) The recommended fused leads will not always be appropriate, the resistance offered by the fuse may affect readings taken at the lower end of the scale. As these readings are sought on circuits of low voltages and very low currents, then it is reasonable to use the unfused leads shown on page 5, Figure 2.
- vii) Similarly, when working on control boards the lack of space may dictate that the unfused/unshrouded leads are used. Again this should present no unacceptable risk as by definition the work is being carried out on control circuits of low voltage and low current.

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- 2.2 Where it is not possible to restore the machine to a safe working state before leaving it unattended, for even the shortest time span, the machine control fuses and at least the traction fuse should be removed and the battery disconnected at the battery terminal. It will not be acceptable to remove only the ignition key and pull the charger/battery plug. The Identification of Equipment Status (PA-11 QMS Procedure Manual) procedure applies.

#### **MAINS POWERED BATTERY CHARGERS**

- 3.0 TMHUK Service Technicians are not permitted to install chargers. It is the customers' responsibility to provide a suitable supply and connection. However, technicians may fit or replace 13A 3 pin plugs, the fact he is working on the plug necessitates isolation from the mains supply. The charger output lead should be disconnected from the battery before undertaking the task.
- 3.1 TMHUK Service Technicians are not allowed to service or repair any high frequency chargers.
- 3.2 Before commencing work ensure that you are aware of any conditions imposed upon us by the customer. e.g. Permit to Work.
- 3.3 If the customer employs a resident electrician consult him them about the switching off and isolation of the relevant supply.
- 3.4 The choice of work area is limited in respect of chargers, they are generally in a fixed location. However special consideration should be given to lighting, access and space:-
- i) There should be adequate light to reduce the risk as far as possible of the wrong identification of conductors, accidental contact with live components, and inadvertent short circuiting.
  - ii) Where the fixed lighting is inadequate the use of hand lamps or torches is permitted, but they must be adequate to enable injury attributable to poor lighting to be prevented.
  - iii) There should be good access to the charger, the surrounding area should be free of obstruction and allow people to pass without risk of contact. There should be no risk of secondary injury in the event of shock or arcing, e.g. a person receiving a shock and being thrown back may be run down by a passing fork lift truck.
  - iv) Live work on chargers should be kept to the absolute minimum. It is possible to carry out most diagnostic testing procedures using continuity.
  - v) Test meters must be verified before and immediately after use against a known source of similar value to the circuit under test.
  - vi) When working live the test leads described on page 4 5, Fig. 1 will be used.
  - vii) Wire cutters and spanners should must be of the insulated type. where ever possible.
  - viii) Open charger doors must be tied back secured open to prevent shock through accidental contact with live equipment on the door.
  - ix) The battery is a source of electrical energy and should therefore be disconnected whilst repairs or testing is being carried out.

#### **Switching Off and Isolation**

- 4.0 As much testing as is reasonably practicable and all repairs should be carried out under the "switched off and isolated" (locked off) condition, using the supplied Lock off Padlock.
- 4.1 Do not switch off any supply without consulting the customer before hand.

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- 4.2 It is acceptable to unplug any of our smaller chargers when plugged into a 13 amp ring main or similar. Care must be taken to prevent inadvertent plugging in, e.g. place the lead adjacent to or under the charger being worked on.
- 4.3 In all other instances and where live working is not absolutely necessary the charger must be switched off and isolated.
- 4.4 The essence of this requirement is to ensure that the equipment is made safe to work on and remains so until you reconnect it.
- 4.5 In most cases the switching off and isolating will be carried out in the same operation and by the same equipment.
- 4.6 The switch gear (fuse box) supplying the charger must be switched off and locked off by the means provided, if a resident electrician performs this function then your lock must also be in place.
- 4.7 If the switch gear supplies other equipment and it is unreasonable to disconnect the supply to all, then the relevant fuse should be removed and kept in your possession.
- 4.8 In all cases where you cannot secure the disconnection by fitting your own lock, you should attach the warning notice provided, to the switch off point. It should be attached in such a way as to make the purpose of the notice absolutely clear.

### **REMEMBER YOU SHOULD ONLY WORK "LIVE" IF THERE IS ABSOLUTELY NO ALTERNATIVE**

#### **Repair/Service of Chargers**

- 5.0 Technical support for the repair and servicing of chargers is provided in two ways:-
  - i) The TMHUK Work Instruction Manual under Service Schedule: Battery Chargers.
  - ii) The Charger manufacturers Instruction Manual.

#### **PORTABLE MAINS OPERATED TOOLS**

- 6.0 The company is no longer supplying 240v electrically operated hand (portable) tools for use by Field Service Technicians. It has for a number of years standardised on 110v equipment with suitable centre tapped (CTE) transformers. 18v Portable Battery operated equipment is also acceptable.
- 6.1 All portable tools and transformers regardless of voltage will only be used with a sensitive residual current device (RCD). The device should comply with BS4293 and should operate if the earth leakage current exceeds 0.03 amps.
- 6.2 The input lead to 240v/110v transformers should be as short as possible. Any extension leads necessary should be on the 110v side of the transformer.
- 6.3 **All** portable electrical appliances including extension leads carried by Field Service Technicians are tested annually in accordance with the Health and Safety Executives guidance note PM32.
- 6.4 In addition to the yearly checks the user has a duty to inspect on each occasion of use:-
  - i) That the plug, leads and tool have no defects.

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- ii) The plug should appear undamaged, be clean and dry.
- iii) The lead should be undamaged, the insulation intact and have no joins, unless made in accordance with guidance note PM32.
- iv) There should be no evidence of the cable grip failing at the plug or tool ends, ie. no exposed internal cable insulation.
- v) The tool should appear undamaged, the case should be intact and show no sign of cracks.
- vi) The on/off switch and the lock on facility (if fitted) should be tested for correct operation.

6.5 If any appliance is in any way defective it must not be used.

6.6 The same test criteria apply where appropriate to extension leads. Any cable coiled, or wound onto a drum must be suitably down rated or not used unless fully unwound.

6.7 Care must be taken to avoid damage to trailing leads and to prevent them becoming a hazard to others. Consideration should be given to routing extension leads overhead rather than laying out on the floor. Do not allow passing equipment to run over trailing leads.

6.8 Do not use portable electric tools and leads in adverse environments. It is not just water that is your enemy dust laden atmospheres can be explosive when a spark from an electrical appliance provides ignition.

#### **MAINS POWERED EQUIPMENT (GENERAL).**

7.0 All electrical equipment should be visually inspected on each occasion of use. Checks should be made for obvious signs of wear, damage or defect. Upon discovery of any apparent defect, the equipment must be isolated immediately and the defect reported. Under no circumstances should any attempt be made to rectify the "fault".

7.1 Electrical equipment will be subject to periodic inspection/testing in accordance with the IEE (Institute of Electrical Engineers) recommendations and the current Electricity at Work Regulations.

#### **APPROVED TEST LEADS**

8.0 The preferred probes should:

- i) Have finger barriers or be shaped so as to guard against inadvertent hand contact with the live conductors under test.
- ii) Be insulated so as to leave an exposed metal tip not exceeding 2mm measured across any surface of the tip. Where practicable it is strongly recommended that this be reduced to 1mm or less, or that spring loaded retractable screened probes be used.
- iii) Be adequately insulated (choice of insulating material may be influenced by the environment in which the leads are to be used).
- iv) Be coloured so that one lead can be readily distinguished from the other.
- v) Be flexible and sufficiently robust for the duty expected of them.
- vi) Be sheathed to protect against mechanical damage.
- vii) Be long enough for the purpose, while not overlong so as to be clumsy or unwieldy.
- viii) Not have accessible conductors other than the probe tips, nor should live conductors be accessible to a persons finger if a lead becomes detached from a probe, indicator or instrument when in use.

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All leads should be robust, flexible and well insulated.

Fig. 1  
Preferred leads

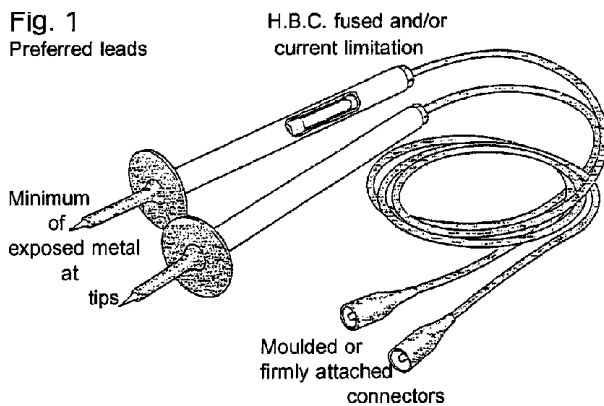
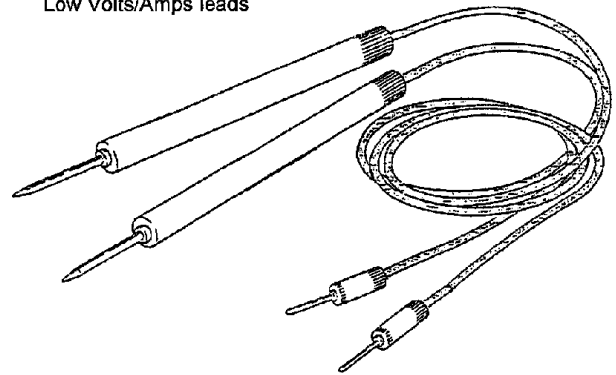


Fig. 2  
Low Volts/Amps leads



## CHILDREN AND YOUNG PERSONS

- 9.0 See Safety & Environmental Manual procedure "Employment of Young Persons" for precise definitions on children and young persons.
- 9.1 Under no circumstance should "Children" be allowed to work on battery operated or mains electrical equipment, live or locked off, there are no exceptions.
- 9.2 "Young Persons" must not, under any circumstance be allowed to work on live mains. They can be allowed to work on "locked off" mains equipment providing the locking off is conducted by a competent adult. That same adult must be in constant, close, personal supervision whilst the work is carried out. The supervising adult is responsible for the FIAT of work undertaken and once satisfied that it is safe to do so, reconnecting the supply.
- 9.3 "Young Persons" may be allowed to work on battery powered equipment only when constant, close, personal supervision is provided during the entire work process.
- 9.4 The use of mains and battery powered electrical tools and equipment must be in accordance with this document and the Safety & Environmental Manual procedure "Electricity at Work".
- 9.5 All such work conducted by Young Persons must be supervised by a competent adult. The degree of supervision required will be at the discretion of the supervising adult.