

Work on Signalling Power Mains

ESM-09-01

Applicability

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SMS

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1.0	25 June 2021		First issue – supersedes SMP 42 (v1.2). Updated to align with ESD-09-01 and applicable to ARTC network wide.

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1 General

1.1 Purpose

This Standard sets out maintenance procedures for persons working on signalling power mains operating at voltages between nominal 110/120v AC and 1000v AC.

1.2 Scope

This standard covers the maintenance procedures for staff to be followed when working on signalling mains power.

It does not include requirements for working on low voltage 'authority' MEN mains supplies complying with AS/NZS 3000, which are subject to the national and state guidelines for work on electrical installations.

1.3 Document Owner

The General Manager - Technical Standards is the Document Owner. For any query, initial contact to be made at standards@artc.com.au.

1.4 Responsibilities

The Signal Maintenance staff are responsible to comply to this standard during maintenance works on signalling mains power supply.

1.5 Electrical Work

All work on signalling electrical systems shall be carried out by, or under the direct supervision of, persons trained and accredited to do so.

The term "electrical work" in the context of the signalling systems refers to any changes to wiring, including connection or disconnection of fuses or links on open terminal blocks, or the removal or installation of un-insulated wires and lugs on terminations, or jointing and termination of cables irrespective of working voltage.

The term "electrical work" does not include: the closing or opening of switches, or the removal or replacement of fuses or link pins in fully enclosed (SAK type) terminal blocks, or use of a meter to measure voltage, or the use of a current tong or current clamp.

Work that requires touching of wires or wiring but is unlikely to risk contact with potentials above the limits of 25VAC or 60VDC is not considered electrical work. If it is likely that contact with potentials above the limits of 25VAC or 60VDC can occur, then it is considered to be electrical work. Exposed terminals, or exposed conductors, with potentials above the limits of 25VAC or 60VDC are considered to represent a likely risk of contact.

2 Maintenance Procedures

Signalling power supply systems normally employ isolated power mains working at voltages between 110/120v AC nominal and 1000v AC.

Signalling personnel must be aware of the risks associated with these power mains.

Earth Leakage Detection with alarms is provided to assist maintenance staff but safe working practices must always be followed.

2.1 Isolation of Electrical Equipment

Before work is carried out on the signalling electrical system the power must be isolated, secured and proven to be de-energised.

2.1.1 Isolation of Mains

To isolate the mains:

- Open the supply-side circuit breaker or isolator.
- Secure the operating lever in the open position by affixing a tie through the holes provided for the purpose. The tie may be the same used to affix the label (see following).
- Identify the circuit breaker or isolator as having been deliberately isolated by attaching a label or danger tag showing the name of the person who affixed the tag, the date, and the reason for the isolation.
- Before work is commenced, test the circuit voltage at the actual work location to confirm that the power is off.

2.1.2 Isolation of Circuits

To isolate the circuit:

- Remove the fuse and common link or switch off the circuit breaker for the circuit.
- Protect the isolation by either
 - Fitting a distinctively coloured dummy fuse and link in the vacated spaces; or
 - Securely affixing insulating tape over the vacated spaces for the purpose, or
 - Securing the circuit breaker in the 'off' position or affixing insulating tape over the affected circuit breaker for the purpose.
- Identify the circuit as having been deliberately isolated by attaching a label or danger tag to the dummy fuse, or clearly labelling the securing tape. The label must show name of the person who affixed the tag, the date, and the reason for the isolation.
- Before commencing work, test the circuit voltage at the actual work location to confirm that the circuit is de-energised.

2.1.3 Work being done by the person doing the isolation

If the work to be carried out is being done by the person who does the isolation, then no further action is required.

2.1.4 Work being done by persons other than the person doing the isolation

If the work is to be carried out by persons other than the person who will be isolating and restoring the circuit, then before commencement of any work the signalling electrician or engineer in charge shall:

- Isolate, identify and test the circuit as described above
- Follow IBA process and complete the IBA form to capture the details of isolation.

While the work is ongoing the person performing the work shall:

- Keep the copy of IBA in a safe place at the work site.

On completion of the work:

- The person doing the work shall confirm to the signalling person in charge that work has been completed and it is safe to remove the isolation.
- The signalling person in charge shall complete the IBA form, remove the danger tag and securing device and restore the power.

3 Maintenance Activities

3.1 Testing of Earth Leakage Detectors

Earth Leakage Detectors (ELDs) shall be tested by operation of the push button provided on the device at intervals specified in the Technical Maintenance Plan and Service Schedules.

This test proves the operation of the ELD and confirms the integrity of the ELD Test Earth connection.

The test shall include a check that the ELD alarms and indications function correctly.

3.2 Response to Earth Faults

The use of Earth Leakage Detectors allows detection of any compromised insulation as soon as a potentially hazardous situation occurs.

For example, if a short circuit earth fault occurs on one leg of the 110/120V AC signalling power supply then the inherent protection provided by the IT system is compromised and contact with the other leg can result in a potentially harmful electric shock. If two faults occur on different sides of one signalling AC power supply, then it is possible for a "touch potential" that exceeds the accepted limit of 50VAC to exist between the case of one faulty item of equipment and earth.

As a result of the potential signalling safety hazard and the electrical safety hazard for personal that work on the signalling equipment it is necessary to rectify the causes of ELD alarms as a high priority.

If an ELD indicates an earth fault on an AC signalling supply, this indicates that a potentially hazardous situation exists. All exposed terminals and field equipment must be treated as potentially the source of a serious electric shock; the earth fault must be found and isolated or corrected as a matter of priority and no work may be performed on the supply.

3.3 Testing of Protective Earthing

All equipment is housed within a protective cover, any metal components of which are earthed.

The resistance from metal covers and enclosures to the earth busbar should not exceed 2 ohms.

3.4 Enclosure of Equipment

All equipment operating at voltages of 110/120v nominal and above must have the protective enclosures in position and correctly secured at all times.

Covers may be removed for testing purposes only, or when the equipment has been isolated to permit work to take place.

Should work be required within an enclosure where only partial isolation has occurred, then any live parts are to be temporarily enclosed before work commences. Any arrangements of this nature are to have the approval of the Signal Maintenance Engineer or nominated Signalling representative.

All covers are to be reinstated if the location is to be left unattended.