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About This Standard

This Standard defines the signalling procedures to be applied when carrying out like for like renewals on signalling infrastructure / systems.

Document History

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List of Amendments –

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1 General

Whenever vital signalling equipment is renewed or replaced it shall be done in accordance with the applicable Network Rules and Procedures and the restored equipment shall be tested and certified correct before the apparatus is used for traffic operations.

The following procedures are to be followed for like for like renewal or replacement of relays, electrical equipment, and wiring to ensure that there is no alteration to the circuit (including no change of polarity or adjustment).

In the case of like for like replacement of a single wire, or with a strict wiring changeover process as for shelf relays, the work shall be tested and certified by the signalling maintainer performing the work, and that signalling maintainer is accountable for ensuring that it is correct and that no alteration has occurred.

Where there is any modification required to the principle of the circuits, approved circuit design drawings are to be obtained before any alteration is carried out.

2 Relay Change - Plug-In Relays (Refer also to SMP 24 “Placing signalling relays into service”)

Plug-in relays may be changed over as traffic conditions permit between trains.

The new relay is to be operationally tested in the plug-in relay rack test panel.

Magnetically latched relays must be driven down before they are placed in circuit.

The new relay's voltage, type, contact configuration, and indexing pins are to be checked. After change-over, the principal functions controlled by the relay shall be checked to operate.

If the relay had caused a failure, the change details shall be recorded on the Failure Recording sheet. Change details shall be recorded in the MIMS system.

3 Relay Change - Shelf Relay: Like For Like Change Procedure (Refer Also To SMP 24 “Placing Signalling Relays Into Service”)

This procedure applies to AC and DC shelf relays. This safety-critical procedure must be carried through by a signalling maintainer using the utmost care. Transfer to another person part way through is not permitted.

- Examine and bench test the new (overhauled) relay for correct operation. The relay must be sealed and the seal must not be broken.
- Check that the new relay is of the same type and contact configuration as the one to be replaced and as shown in the circuit book

Note: It is permissible to replace a double element AC line relay with a single element type and vice versa provided due care is taken to ensure that local and control coils are correctly bridged in parallel for double element relays.

- Check the wiring on the existing relay against the circuit book contact analysis sheet. Any discrepancy must be investigated by the Signal maintenance engineer.
- Check that the locknuts between studs and relay top on the new relay are tight.
- If a detachable top is fitted, change the relay after obtaining train running information and reaching an understanding with the signaller for safe working as traffic conditions permit.
- If the relay is direct wired proceed as follows:
 - Examine the existing relay to find which terminals are not in use.
 - On the new relay, fit nuts and washers to the corresponding spare terminals and tighten. Fit bottom washer only to the terminals to be used.
 - Check any bridging on the existing relay and fit the same bridges on the new relay before installation. Tighten down nuts.
 - Ensure that each and every wire on the existing relay is correctly labelled with its terminal number and circuit name, and that the wiring is securely tied with multiple ties into a firm loom corresponding to the relay terminal configuration.
 - Write down the relay contact configuration and the wire count on each terminal stud.
 - Contact the Signal Box for train running information, advise the signaller the relay is to be changed and reach an understanding for safe working as traffic conditions permit. Arrange protecting signals to be maintained at stop.
 - Remove the nuts, locknuts and washers from the existing relay and lift the wiring loom clear, ensuring that no wire touches any metal shelf/bracket or any other relay or relay stud and that the wiring is not disturbed.
 - Immediately remove the existing relay and replace it with the new one.
 - Lower the wiring loom onto the new relay and check that the terminal number on each wire label corresponds with the relay terminal to which the wire is fitted - fit washers and nuts.
 - Check against written down wire count and circuit book contact analysis sheet.
- In a controlled area, request the signaller to operate the controls which operate the relay.

For each controlled function request the signaller to advise the indication on the control console and/or indicator diagram and note that the status of the indication changes correctly when the relay is energised and de-energised.

Proceed verifying each controlled function in turn. Observe that the relay correctly energises and de-energises.

- In an automatic area, open and close appropriate fuses or negatives/commons to energise and de-energise the relay and observe its operation and note associated signal indications operate accordingly.
- If a track relay, ensure that the shunt value is within the permissible range of values for the type of track and that the local coil voltage and current and track coil voltage and current are correctly adjusted.
- Immediately complete and sign the relay change form and dispatch a copy to the signal maintenance engineer. The Signal Electrician in signing this form certifies that no incorrect connections have been made and that the circuits through the relay have not been altered in any way.

Note: If any doubt or delay arises during the process that could put at risk the safety of the signalling, the affected functions through the relay contacts shall be disconnected and booked out of use before changeover until certified by Circuit Strap and Function Tests after the change-over.

4 Equipment Change

The following procedure applies to electrical equipment changes.

The replacement equipment is firstly to be inspected and tested to be the correct type and not defective.

If contacts are to be changed they are to be changed one contact at a time by the signalling maintainer.

If a contact carrier or a circuit controller is to be changed and a number of wires have to be disconnected and reconnected, a procedure similar to that for changing Shelf Relays (Paragraph 3.0) is to be followed.

If electrical equipment is being changed with the same type and model then the signalling maintainer shall follow a procedure similar to that for changing Shelf Relays (Paragraph 3.0) to ensure that the wiring is correctly reconnected and that the equipment functions correctly in the circuit.

Adjustable equipment shall be tested in circuit for correct adjustment.

Refer also to Paragraph 6.0 for change of transformers.

5 Rewiring

Rewiring of working circuits may be carried out by a signalling maintainer one wire at a time to the procedures specified under SMP 12 Repair/Replacement of Signalling Wires.

If more than one wire of the existing circuits is to be disconnected prior to the reconnection of the replacement wires, then the work shall be planned so that a Signal Engineer, or other suitably accredited, competent person, is in attendance to carry out circuit tests, and restore the apparatus into use.

If single wire cables are to be replaced by multi-core cables then a Signal Engineer, or other suitably accredited, competent person, shall carry out the tests and restore the apparatus into use.

Tests shall include pre and post polarity tests where there is any possibility of reversal of power supply wiring or of wiring in polarity sensitive circuits eg; track circuits, paired detector circuits.

Rewiring like-for-like on other than a one-for-one changeover basis requires the prior approval of the Signal Maintenance Engineer. Planned rewiring on other than a direct like-for-like basis requires certification on a circuit diagram.

6 Transformer Change

When a transformer is changed there is a possibility that the polarity of the output voltage will be reversed due to differences in the internal wiring of the transformers.

When power supply transformers or track circuit transformers are changed, test the polarity before and after the change to ensure that it has not been reversed.

7 Equipment Replacement Which Is Not Like For Like

Where an item of vital signalling equipment is required to be replaced with an item which is not the same type and not equivalent in all respects then it should be treated as an alteration and be referred to the ARTC General Manager ISP or nominated Signalling representative, for instruction.

8 Modifications to Existing Circuits

These shall comply with the requirements in standard Specification SC 0041 00 SP.

9 Instructions When Working Near Or Interfering With Existing Signalling

Below are instructions that shall be followed when involved in interfering with existing circuits or when working near existing circuits.

9.1 Isolation from Working Circuits

Wires and equipment, de-commissioned from use, or not yet commissioned into use, shall not be connected at any point to working signalling circuits or power supplies and must be secured against and insulated from any possible metallic contact with working circuits.

9.2 Mixing of Old and New Circuits

If new wiring is to tap into old circuits none of the new wiring is to be connected into the existing working circuit before commissioning.

9.3 Loose Wires or Crimps

Loose wires with exposed conductors or with exposed crimps or lugs etc shall not be left unterminated near working circuits or equipment. They shall be clearly labelled and have their ends secured and insulated to prevent contact with one another or with any other equipment.

9.4 Connection or Disconnection from Vital Circuits

For New Works and Alterations, wires or equipment shall only be connected into or disconnected from vital signalling circuits when the affected signalling apparatus is disconnected and formally booked out of use.

9.5 Interference with Working Circuits, Security of Signalling Locations

All precautions shall be taken to ensure that working circuits cannot be mistakenly interfered with, accidentally damaged, or shorted out by tools, loose relay nuts, washers, bits of wire, etc.

All vital equipment and locations shall be fitted with locks and be locked when unattended.

Before closing up equipment or locations, persons shall check that everything is in order and properly connected and that nothing has been left loose, foul of standard clearances, or in a potentially unsafe condition.

Only persons who are properly instructed and authorised by a Signal Engineer are permitted to work without close supervision (by suitably qualified staff) in equipment locations and relay rooms.

Only persons who are suitably accredited, or closely supervised by a suitably accredited person, are permitted to interfere with existing signalling circuits or equipment.

9.6 Wiring Not In Use

In working locations any wiring or equipment which is not in use for signalling shall be distinctively evident as such and shall be clearly and adequately labelled accordingly. It shall be kept isolated from any power supply except as necessary under supervised use.

9.7 Tagging of Wiring at Termination Points

At the termination point where new wiring is to be connected to working circuits, or where old wiring is to be disconnected from working circuits, the wire shall be fitted with a tag clearly identifying the circuit and terminal to which it applies and the terminal to which it runs; the other end of any such wire it is to be similarly tagged.

9.8 Labelling of Stagework

Wiring to be commissioned or de-commissioned in stages shall be clearly labelled as to what stage it is to be commissioned or de-commissioned. On changeover, the stage labelling shall be removed, the correct labelling applied and the arrangements made obviously permanent.

9.9 Temporary Wiring

Temporary stagework wiring is to be of a distinctive colour with a different colour for each stage.

Temporary wiring for testing purposes is to be of a distinctive type and colour.

The distinguishing colours for temporary wiring should be documented and displayed in the location concerned.

The use of temporary wiring must be strictly controlled; it must be removed as soon as it has served its purpose and prior to through testing.

9.10 Spare Wires

Spare wires in equipment locations shall be properly terminated on spare terminals on termination racks; spare wires within trackside apparatus shall have the ends insulated, if there are no spare terminals available.

9.11 Equipment Not in Use

Equipment not in use and disconnected from the interlocking shall be securely open circuited and labelled accordingly.

It shall not be sufficient to only remove a fuse or open a link or remove a signal lamp etc ie, situations where someone could mistakenly insert a fuse or connect a link or insert a lamp etc and cause a potentially unsafe situation. The equipment shall be securely open circuited in two places where practical, and measures applied to prevent accidental or mistaken connection at both places.

9.12 Insulating the Wire and Equipment Not in Use

Where insulation of unconnected wiring or equipment out of use is required, a secure method shall be used.

Insulating tape or adhesive devices shall not be reused, new insulating tape etc., is required on each occasion. Approved closed and pre-insulated connectors properly crimped to wires shall be used where applicable.

Adhesive insulating tape should not be used directly on prepared conductor ends or on terminal lugs or pins etc, that are intended to be brought into use subsequently, as the adhesive may cause unreliable contact resistance.

The insulation method and application shall be checked to be effective.

9.13 Test Equipment

Approved test equipment only shall be connected to signalling circuits and equipment.

Test lamps shall not be used as they may provide a significant leakage path for circuit currents.

Test equipment shall be subject to calibration checks taken and recorded at appropriate intervals.

Electrical test instruments shall have insulated prods, etc.

9.14 Use of Spares or Reuse of Existing Equipment

Use of spares or reuse of redundant or existing equipment in New and Altered Works shall require the agreement of the Signal Engineer.

All spares, redundant or existing wires, cable cores, contacts or other items of equipment which are to be utilised in new circuits or in altered parts of existing circuits must first be inspected and tested to ensure that:

- they are spare without any connection at any point with other conductors, contacts, power supplies, or other equipment,
- their condition complies with the required standard,
- they are properly insulated without any leak or potential leak of current to or from earth or other circuits.

Special attention must be paid to ensure that terminals are not connected together by jumper bars or other strapping.

The results of the wire count, bell continuity test and insulation tests of the new circuit or altered parts of existing circuits, inclusive of the spare or reused items, shall be recorded and certified.

9.15 Interfacing of New and Existing Work

Where new or altered work is to interface with existing vital signalling, the Commissioning Engineer with the Signal Design Engineer shall together satisfy themselves of the accuracy of existing signalling plans and circuit diagrams to the as-built situation, in consultation with the Signal maintenance engineer. If there is reasonable cause to doubt that they are accurate then the existing arrangements, which are to be altered to connect with the new arrangements, shall be tested and certified.