

# TECHNICAL INSTRUCTION

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NETWORK RAIL - SIGNAL ENGINEERING

## HVI Track Circuits in DC 3<sup>rd</sup> RAIL and Dual Electrified Areas SMS Test 35

Relevant Instructions NR/SP/SIG/ 11231 Signalling Maintenance Testing Handbook and NR/SP/SIG/11120 Signal Maintenance Specifications.

### Purpose

In 3<sup>rd</sup> Rail DC traction areas, and in dual electrified areas, HVI track circuit transformer/terminal boxes (known as 'bread bins') can experience a catastrophic arcing across the terminals when the traction supply is short circuited to the "Signalling" rail. As such traction short circuits are unpredictable (and can be caused by trains, rubbish falling across the rails or other reasons) it is undesirable to work inside the 'bread bin' with the traction current energised. The main reasons for opening the 'bread bin' are maintenance - Signal Maintenance Specification (SMS) Test 035 - and fault finding.

From implementation of this Technical Instruction, work shall not be attempted inside the 'bread bin' on 3<sup>rd</sup> rail DC and dual electrified areas unless the DC traction current is isolated for the entire length of the track circuit(s) concerned. Non-electrified and AC or DC overhead electrified areas are not affected by this Technical Instruction.

### Faulting and Maintenance in 3<sup>rd</sup> Rail DC and Dual Electrified Areas

Fault finding shall use test points other than inside the box. If the fault finding requires entry to the 'bread bin', the traction current shall be isolated first. SMS Test 035 shall be undertaken on the rails as described in Appendix A.

Note: Access to the track in some areas is very restricted. It is permissible for the local Area Signal Engineer to authorise installation of permanent test 'leads', wired from the rails to a special test box positioned in a place of safety. This box shall have the leads terminated in the box as far apart as physically possible. It is recommended such a test box is non-metallic. An ideal termination arrangement for each test lead would be one terminated at the top and the other at the bottom of a 6-way 2BA terminal block. (After installation, the loop resistance of the leads should be measured and the value recorded in the box so that allowances can be made when applying shunts at the test box.)

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## Appendix A

### Revised SMS Test 035 for Use in 3<sup>rd</sup> Rail and Dual Electrified Areas

CARRY OUT THE FOLLOWING TESTS AND RECORD THE RESULTS ON THE RECORD CARD

#### 1. Maintenance Test

##### 1.1 Drop Shunt Test (T1):

Using a shunt box, carry out a drop shunt test at the relay end ON THE RAILS.

| Electrified Lines | Non-electrified lines |
|-------------------|-----------------------|
| Min 1.0 $\Omega$  | Min 0.5 $\Omega$      |
| Max. 3.0 $\Omega$ | Max 2.5 $\Omega$      |

##### 1.2 Track Relay Voltage Test (T3):

Using a digital voltmeter set on dc manual range, *Measure* the voltage at the track relay plugboard contacts.

*(Note: there will be a fluctuation in the reading).*

| V1+ to V1-         | V2+ to V2-          |
|--------------------|---------------------|
| Min 20V<br>Max 50V | Min 30V<br>Max 100V |

##### 1.3 Relay End Track Transformer Voltage (T4):

*Measure* relay voltage at track relay end ON THE RAILS, using adapter integrator with digital voltmeter on auto range.

| Polarity Ratio<br>+ve : -ve       | Electrified<br>Lines V+ to V- | Non-electrified<br>Lines VA to VB |
|-----------------------------------|-------------------------------|-----------------------------------|
|                                   | Min 50V<br>Max 150V           | Min 20V<br>Max 120V               |
| <b>Min 5:1</b><br><b>Max 10:1</b> | Min 8V<br>Max 22V             | Min 2V<br>Max 12V                 |

##### 1.4 Relay End Load Test (T5):

Load test at relay end with 0.5 $\Omega$  shunt across the RAILS, using adaptor integrator.

| V+ to V- | VA to VB |
|----------|----------|
| Min 10V  | Min 6V   |