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| Date  | October 1999           |

# Track Circuit Operating Device (formerly RT/E/S/21136)

**This temporary front sheet facilitates change to the new Network Rail Standards referencing nomenclature.**

**The Ref above will be formally allocated to this standard when it is next changed in the meantime the contents, date and issue number of this Network Rail Standard are UNCHANGED and with immediate effect it should be referred to as “(new ref) formerly (old ref)”.**

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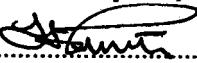


# RAILTRACK LINE SPECIFICATION

## TRACK CIRCUIT OPERATING DEVICE

### Approval and Authorisation

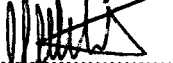
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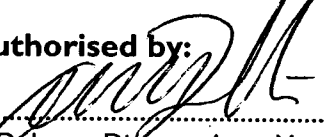
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## Summary

This specification states the performance requirements for track circuit operating devices.

## Issue/Revision Record

This specification will be updated when necessary by the distribution of a complete document. Amendments will be marked by vertical black line in the adjacent right hand margin.

| Issue | Issue Date   | Implementation Date | Comments          |
|-------|--------------|---------------------|-------------------|
| 1     | April 1999   | 5th June 1999       | New specification |
| 2     | October 1999 | 2nd October 1999    | Minor change      |

## Implementation

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**CONTENTS**

| <b>Section</b>                                            | <b>Description</b>                                 | <b>Page</b> |
|-----------------------------------------------------------|----------------------------------------------------|-------------|
| <b>I. INTRODUCTION</b>                                    |                                                    | <b>5</b>    |
| 1.1                                                       | Purpose                                            | 5           |
| 1.2                                                       | Scope                                              | 5           |
| 1.3                                                       | Abbreviations                                      | 5           |
| <b>2. DESCRIPTION OF TRACK CIRCUIT SYSTEMS</b>            |                                                    | <b>5</b>    |
| <b>3. DESCRIPTION OF ELECTRIFICATION TRACTION SYSTEMS</b> |                                                    | <b>6</b>    |
| 3.1                                                       | D.C. Traction System                               | 6           |
| 3.2                                                       | A.C. Traction System                               | 6           |
| 3.3                                                       | Description of Dual Electrified Traction System    | 7           |
| 3.4                                                       | Non-Electrified Lines                              | 7           |
| <b>4. GENERAL CLAUSES</b>                                 |                                                    | <b>7</b>    |
| 4.1                                                       | Safety, Legislation and Regulations etc.           | 7           |
| 4.2                                                       | Design, Manufacture and Workmanship                | 8           |
| 4.3                                                       | Spare Parts and Consumables                        | 8           |
| 4.4                                                       | Instruction Manual                                 | 8           |
| <b>5. COMPLIANCE WITH STANDARDS</b>                       |                                                    | <b>9</b>    |
| 5.1                                                       | European, International and British Standards etc. | 9           |
| <b>6. PERFORMANCE REQUIREMENTS</b>                        |                                                    | <b>9</b>    |
| 6.1                                                       | General                                            | 9           |
| 6.2                                                       | Environmental, Service and Installation Conditions | 9           |
| 6.3                                                       | Maintainability                                    | 10          |

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|                                                      |           |
|------------------------------------------------------|-----------|
| 6.4 Reliability and Availability                     | 10        |
| 6.5 Service Life                                     | 10        |
| 6.6 Finish and Resistance to Corrosion               | 10        |
| 6.7 Electrical Contact and T-COD Performance         | 11        |
| 6.8 Electrical Rating                                | 11        |
| 6.9 Electrification System Short Circuit Performance | 11        |
| 6.10 Operator Safety                                 | 11        |
| 6.11 Labelling                                       | 12        |
| 6.12 Attachment to Running Rails                     | 12        |
| <b>7. TYPE TESTING</b>                               | <b>13</b> |
| 7.1 Visual Inspection (initial)                      | 13        |
| 7.2 Rail to Rail Impedance Tests                     | 13        |
| 7.3 Pull-Off                                         | 14        |
| 7.4 Stand-On Test                                    | 14        |
| 7.5 Free Fall - Repeated                             | 14        |
| 7.6 Electrical Performance Tests.                    | 15        |
| 7.6.1 DC Traction Test                               | 15        |
| 7.6.2 AC Traction Test                               | 15        |
| 7.6.3 Track Circuit Current Test                     | 15        |
| 7.7 Mechanical Performance Test                      | 15        |
| 7.8 Vibration Test (Random)                          | 16        |
| 7.9 Vibration Test (Sinusoidal)                      | 16        |
| 7.10 Shock Test                                      | 17        |
| 7.11 Damp Heat Cyclic Test                           | 18        |
| 7.12 User Safety                                     | 19        |
| 7.13 Visual Inspection (final)                       | 19        |
| <b>8. DRAWINGS</b>                                   | <b>19</b> |

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## 9. REFERENCE DOCUMENTS

19

### 1. INTRODUCTION

#### 1.1 Purpose

This standard states the minimum requirements for the design, manufacture and testing of a portable track circuit operating device (T-COD) which is used to present a low impedance circuit between two running rails forming a track circuit in order to safely and reliably operate the track circuit to its occupied state. The occupied state of the track circuit is used as part of the protection arrangements for personnel working on railway lines under track possession.

#### 1.2 Scope

This specification applies to all T-CODs for use on track circuited electrified and non-electrified lines. T-CODs shall not be used where a checkrail is present alongside a running rail or a fourth rail is installed.

#### 1.3 Abbreviations

|       |                                 |
|-------|---------------------------------|
| T-COD | Track Circuit Operating Device. |
|-------|---------------------------------|

## 2. DESCRIPTION OF TRACK CIRCUIT SYSTEMS

The majority of running rails are used to form track circuits to provide a means of proving the absence of trains. The general arrangement is that a low power signal is transmitted from one end of the track circuit, along one rail, to a receiving device. The other rail forms the return path. When the track circuit is clear, the receiver is energised. When a train is between the transmitter and receiver, its axles provide a low impedance circuit between the two running rails, shunting the signal and causing the receiver to de-energise. This state is the occupied condition.

Many different types of track circuit equipment are in use to meet specific site requirements, in particular, only specially immunised systems can be used where a.c. or d.c. electric traction is provided.

The current forming the track circuit signal may be d.c. or a.c. up to 3 kHz and may be of complex waveform. Voltages range from a few hundred mV to impulses of 500 V. Some types of track circuit form tuned circuits in the rails and circulating track circuit currents can reach 30 A.

Track circuits are maintained so that they are guaranteed to detect a specified shunt resistance known as the drop shunt. Although there are detail differences between types, this value is generally not lower than  $0.3 \Omega$  for any point in any track circuit. An exception exists for a type of system used on non-electrified lines only, which has a short area within the length of the track circuit where  $0.25 \Omega$  is accepted.

### 3. DESCRIPTION OF ELECTRIFICATION TRACTION SYSTEMS

#### 3.1 Traction System

The d.c. electrification traction power supply system forms part of the railway infrastructure owned and operated by Railtrack. The system provides nominal 650/750 V d.c. supplies to trains via a third rail mounted outside the running rails, as shown in Appendix A. The return path for traction current is via either or both running rails, dependant upon the site requirements. The traction return system is not intentionally connected to an earth electrode.

It is possible for imbalance to occur in the return circuit such that the return currents in the rails are not evenly distributed. Under these conditions, a small potential difference will exist between the running rails which can result in relatively high d.c. currents through any connection, such as a T-COD, made between them.

At some sites, a fourth rail is provided. On Railtrack, this is connected to the return rail system.

#### 3.2 Traction System

The a.c. electrification traction power supply system forms part of the railway infrastructure owned and operated by Railtrack. The system provides nominal 25 kV, industrial frequency, supplies to trains via an overhead line contact system. The return path for traction current is via the running rails and either earth or a dedicated return conductor.

It is possible for imbalance to occur in the return circuit such that the return currents in the rails are not evenly distributed. Under these conditions, a small potential difference will exist between the running rails which can result in relatively high a.c. currents through any connection, such as a T-COD, made to them.

### **3.3 Description of Dual Electrified Traction System**

Some lines are dual equipped with both a.c. and d.c. traction systems using the running rails as a common return. The traction currents present in the running rails consequently originate from both a.c. and d.c. systems.

### **3.4 Non-Electrified Lines**

Where the lines are non-electrified, traction currents are not normally present in the running rails.

## **4. GENERAL CLAUSES**

### **4.1 Safety, Legislation and Regulations etc.**

At all times the T-COD shall be safe. Measures shall be taken to ensure the safety of persons concerned with its use, testing, repair and eventual disposal. All provisions for the safe and satisfactory operation, control and protection of the T-COD, shall be made available whether or not specifically mentioned, including guidance on wear limits of rail contact points.

The T-COD shall be adequately insulated, as required by the details shown in this specification.

The T-COD shall comply with the requirements of all relevant statutory acts, rules, regulations or orders.

The supplier shall provide recommendations for training in the safe operation and maintenance of the T-COD.