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Requirement Specification for a Barrier Operation Relay for L.C. Barriers (formerly RT/E/S/10065)

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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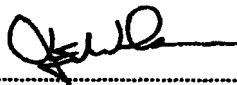


RAILTRACK LINE SPECIFICATION

REQUIREMENT SPECIFICATION FOR A BARRIER OPERATION RELAY (24V DC WORKING) FOR THE CONTROL OF LEVEL CROSSING BARRIERS

Approval and Authorisation

Endorsed by:



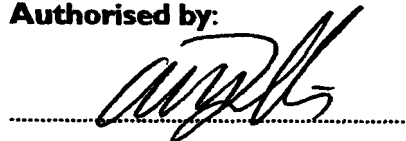
J. F. Wilson, Professional Head of Control Systems
Engineering

Accepted for Issue by:



C. Clifton, Head of Corporate Standards

Authorised by:



A. Doherty, Technical Services & Innovation Director

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RAILTRACK plc
Railtrack House
Euston Square
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NW1 2EE

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SUMMARY

This specification identifies the requirements for a Barrier Operation Relay (24V DC Working) for controlling level crossing barriers.

ISSUE/REVISION RECORD

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

Issue	Date	Comments
I	February 1999	New issue

IMPLEMENTATION

The requirements specified in this document shall be met by the Supplier of the Barrier Operation Relay (24V DC Working) and shall be enforced from April 1999 unless express written permission is obtained for any deviation from the Professional Head of Control Systems Engineering. The introduction of this specification does not mandate the replacement of relays which are in service and have been procured to a different specification.

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REQUIREMENT SPECIFICATION FOR A BARRIER OPERATION RELAY FOR L.C. BARRIERS

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**REQUIREMENT SPECIFICATION FOR A
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1. INTRODUCTION

1.1 Background

The Railtrack infrastructure includes level crossings with various types of protection which include the provision of barriers. The crossings are also generally equipped with other warning devices. The barriers close off either the whole of the road width or the nearside half of the road only.

The barriers are driven either directly or indirectly by a motor whose electrical input is fed over a contactor or equivalent device. This Barrier Operation Relay has a degree of safety criticality and must be highly reliable to minimise delays to both rail and road traffic.

This specification defines the requirements for a Barrier Operation Relay which will satisfy Railtrack's safety and business needs.

1.2 Overview of Requirements

The key requirements for the Barrier Operation Relay are:

- a) to provide a safe and reliable means of control for the barrier mechanisms;
- b) to provide electrical isolation between the controlling and controlled circuits, between the two poles of the controlled circuits and between all electrical circuits and the body of the unit;
- c) to incorporate a self-resetting means of protection which shall protect the motor from thermal damage;
- d) to be mechanically and electrically interchangeable with the equivalent electro-mechanical contactor to BR 906 [Ref. 12.2.4].

1.3 Other Specifications

1.3.1 Attention is drawn to the following specifications which may affect the design of a Barrier Operation Relay developed to meet the requirements of this specification:

- a) for the standard wiring: Ref. 12.2.3
- b) for the lifting barrier equipment: Ref. 12.2.6

**REQUIREMENT SPECIFICATION FOR A
BARRIER OPERATION RELAY FOR L.C. BARRIERS****Page 7 of 23****2. MANDATORY FUNCTIONAL REQUIREMENTS**

This section provides a statement of the essential Barrier Operation Relay features, functionality and levels of performance. Functional Safety Requirements are identified by an **(S)** at the end of the requirement statement.

2.1 Operation

- 2.1.1 When the barrier control logic determines that the barriers are required to be raised or lowered under power by the control circuit being completed, a B24 supply will be connected to Terminal 6. The negative pole of the control supply is normally permanently connected to Terminal 9 but may also be removed and applied at the same time by the same controlling logic.
- 2.1.2 A supply from the level crossing battery will be connected to Terminal 10 (B24) and Terminal 2 (N24). This shall provide the power to the switched output. The control input shall not be used to provide the switched output power.
- 2.1.3 The operated state of the device is that, with the controlling voltage applied as described in requirement 2.1.1, B24 and N24 supplies are output at Terminals 3 and 4 respectively. The Barrier Operation Relay shall operate correctly with a controlling voltage as low as 19.2V.
- 2.1.4 When the barrier control logic determines that the barriers have completed their travel the control circuit will be de-energised, removing the B24 supply from Terminal 6.
- 2.1.5 The normal or quiescent state of the device is that, with the controlling voltage removed from Terminal 6 (and optionally from Terminal 9), Terminals 3 and 4 are isolated from their respective poles of the power supply. The minimum voltage at which the Barrier Operation Relay shall revert from the operated state to the normal state is 3.6V **(S)**.

2.2 Performance

- 2.2.1 The Barrier Operation Relay shall be capable of driving any single barrier whose drive mechanism complies with the electrical requirements of RT/E/S/10061 [Ref. 12.2.6]. That specification states that the maximum steady motor current shall be not more than 16A and that the maximum stall current shall be not more than 30A. **(S)**
- 2.2.2 The device shall be capable of making, carrying continuously and breaking the currents quoted in requirement 2.2.1 throughout its service life.
- 2.2.3 The motor current drawn instantaneously on starting must be assumed to be limited only by the impedance of the power supply, wiring and terminations, i.e. the motor, when stationary, should be assumed to present

a short circuit at its input terminals. The minimum resistance of the motor circuit under these conditions is estimated as 0.1Ω .

- 2.2.4 Means shall be incorporated in the device to minimise the risk of thermal damage to the barrier mechanism motor. The protection shall become effective when the Barrier Operation Relay remains in the operated state and the time for which the device is operated and the load current are outside the envelope defined in requirement 2.2.5. **(S)**
- 2.2.5 A device with a characteristic, such that the requirements set out in the following table are met, would be deemed to satisfy the necessary requirements. Outside the current range quoted in the table the time/current characteristic of the device should not show any significant discontinuity.

Motor Current	Time to Trip
16A	Not less than 60 seconds and not more than 90 seconds
30A	Not less than 20 seconds and not more than 25 seconds
60A	Not less than 4 seconds and not more than 6 seconds

Table 1: Protection Characteristic

After operating, the protection shall automatically reset. The reset time shall be a minimum subject to the Supplier demonstrating that it provides adequate protection to the motor.

The characteristics of the protection should be related to the duty cycle of the motor and Suppliers may specify an alternative method of defining the performance requirements of the protection which satisfies the business and safety requirements. **(S)**

- 2.2.6 The delay between the application or removal of the controlling voltage and the outputs becoming energised or de-energised shall be insignificant in relation to the operating cycle of the crossing as described in [Ref. 12.1.1]. A delay of not more than 100 milliseconds would be deemed to be compliant with this requirement. **(S)**
- 2.2.7 There shall be effective isolation between each of the following parts of the device:
- the controlling circuit