



**BR 949**  
**MAY 1972**

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## **Specification for**

MINIATURE D.C. NON-SAFETY TIME DELAY RELAY UNIT,  
PLUG-IN TYPE, FOR USE IN POINT CONTROL CIRCUITS.

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## Specification for

MINIATURE B.C. NON-SAFETY TIME DELAY RELAY UNIT,  
PLUG -IN TYPE, FOR TYPE, FOR USE IN POINT CONTROL CIRCUITS

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## Amendments

| Amd. No. | Date     | Text Affected |
|----------|----------|---------------|
| 1        | Nov. '72 | Clause 13.2   |
| 2        | July '73 | Clause 15.3   |
| 3        | July '76 | Clause 6.11   |
|          |          |               |
|          |          |               |

**British Railways Board**

This specification supersedes all previous issues. It is issued by:-

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BRITISH RAILWAYS BOARD

B.R. SPECIFICATION 949

FOR

MINIATURE D.C. NON-SAFETY TIME DELAY RELAY UNIT,  
PLUG-IN TYPE, FOR USE IN POINT CONTROL CIRCUITS.

1. FOREWARD

- 1.1 The relay unit covered by this specification is used in a point control circuit to disconnect the contactor coil, if the latter is not otherwise de-energised, within a predetermined time. The time delay provided is sufficient to allow the point machine to complete its normal operation.
- 1.2 The relay unit is intended for use in the operating circuit of a point contactor relay to B.R. Specification 943.
- 1.3 Six-pin codes are used for this unit and contact positions on the plugboard are so arranged that if a five-pin relay or unit is inadvertently plugged in no undesirable connections will result.

2. SCOPE

- 2.1 The specification relates to design requirements for a D.C. miniature non-safety type of relay unit incorporating a device which delays the operation of a relay for a predetermined time after the unit is energised.

3. DEFINITIONS

- 3.1 For the purpose of this specification the following definitions shall apply:-

Front Contact: A contact which is made after the pick-up time delay period has elapsed.

Back Contact: A contact which is made when the relay is de-energised.

Contact Element: The contact piece which is attached to the contact spring.

Contact Spring: The spring strip to the end of which the contact element is secured.

d.c. Current from a battery or smoothed rectified a.c. with a ripple content not exceeding 1.25% r.m.s.

#### 4. GENERAL

4.1 The complete assembly shall consist of two main parts, viz:-

- (a) The unit;
- (b) The plugboard into which the unit is plugged.

4.2 The unit shall be designed to have a minimum bulk and weight consistent with the prime necessity for efficient operation and reliability, and its construction shall be such as to minimise accidental damage sustained during transit or installation.

4.3 The unit shall include a rigid baseplate which shall form part of the plug-socket inter-connection between the unit and its plugboard.

4.4 The unit shall be enclosed in a cover which shall be so constructed that the relay shall be clearly visible for inspection. A retaining device shall be provided for the cover such that the cover cannot be removed without breaking a seal.

4.5 There shall be a minimum clearance of 0.125" between the cover and any moving part of the interior equipment. The material of the cover and construction of the unit shall be such that the application of a force of 30 lbs. at any point on the surface of the cover of the assembled unit shall not result in its deflection to an extent sufficient to interfere with the operation of any moving parts contained within the unit. The material shall be of such resilience that after removal of this force it shall restore to its normal condition. The cover shall be free from detrimental warping which may reduce this clearance, either from temperature or moisture changes or long-term ageing or release of locked up stresses.

4.6 The cover and baseplate of the unit, when assembled, shall be dustproof.

4.7 External surface leakage distances shall not be less than 0.25". Parts of the unit enclosed when the unit is attached to its plugboard may be regarded as internal.

4.8 There shall be a minimum of 0.015" clearance between any moving part and any other part which might interfere with its correct operation and the design must be such that this clearance is maintained throughout the rated life of the relay.

4.9 A retaining clip, as indicated in Appendix 'B.2' shall be provided to hold the unit securely in its plugboard without the possibility of the electrical connections becoming disconnected.

4.10 The male portion of each inter-connection shall make a positive sliding contact with the female portion.

4.11 The permanent rack wiring to the plugboard shall be terminated either by soldering or crimping to a connector which shall allow up to a maximum of two wires to be connected to each termination. The maximum

4.11 (Cont.)

size of wire to be accommodated will be of overall diameter not greater than 3.4mm, and a conductor diameter of 1.0mm, The connector shall be positively locked into the plugboard but shall be capable of being released and withdrawn to permit easy disconnection.

5. DIMENSIONS

5.1 The dimensions of the relay unit and plugboard shall be in accordance with Appendices 'A1', 'A2' and 'B1'.

5.2 The retaining clip is to be in accordance with Appendix 'B.2'. The handle of the unit shall be such that with the unit in position on its plugboard the total force exerted by the clip on the handle shall not be less than 20 lbs. and shall not exceed 50 lbs,

5.3 Units with the same coding must be interchangeable.

6. MATERIALS

6.1 All materials used in the construction of the relay unit and plugboard shall comply with the appropriate British Standard Specification unless otherwise stated.

6.2 No materials shall be used in the construction of the unit and the plugboard which would cause alteration in performance during storage life, or which are not capable of maintaining all their essential electrical and mechanical properties during rated service life.

6.3 All non-metallic materials used in the unit and plugboard shall be non-hygroscopic, self-extinguishing, free from detrimental warping, deformation, or embrittlement and, when transparent, permanently so, over the external temperature range -20°C. to + 55°C. when the unit is continuously operated at 20% above rated voltage.

6.4 All insulating materials in contact with current-carrying parts of the unit and plugboard shall comply with the following test:-

Two ¼" diameter electrodes shall be placed 1/8" apart on a sample of the material, which is at a temperature of not more than 20°C. The sample shall then be transferred to a test chamber having a temperature of 30°C. and a humidity of 85%. The insulation resistance measured at a voltage of 500v. D.C. between the electrodes shall not then fall below 1 megohm while the sample remains in the test chamber for a period of not less than 15 seconds.

6.5 No materials shall be used in the construction of the unit and plugboard which are capable of supporting growth of mould, or which are subject to deterioration by exposure to sunlight

6.6 All parts, both separately and in combination, shall either be resistant to corrosion or be so treated as to resist corrosion. Dissimilar metals used in contact with each other shall be so chosen or protected as to minimise the effect of electro-chemical action.

6.7 All materials used in the construction of the unit and plugboard or for the impregnation of coils, etc., shall be chemically and physically inert over the temperature range specified in clause 6.3

- 6.8 All soldered joints in conductors shall be made with soft solder. Non-corrosive flux shall be used in making all soldered joints and, after completion of the soldering operation, any excess flux shall be removed.
- 6.9 All screwed fastenings shall be securely locked to prevent movement in service. Mechanical means which do not abrade the surface and produce loose pieces of material shall be used to secure all pins, nuts, screws, etc., against working loose.
- 6.10 Screw threads in parts fabricated of materials which do not lend themselves to successful tapping shall be formed in metal bushes.

## 7. MOUNTING

- 7.1 The plugboard shall be so designed that when the conductor is inserted all live metallic parts are shrouded against accidental contact even when the unit is removed.
- 7.2 The spring tags on the relay unit shall be so constructed that in the event of the unit being plugged into a plugboard having maximum tolerances, they shall afterwards make effective contact if the unit is later plugged into a plugboard having minimum tolerances.
- 7.3 A registration device shall be provided to prevent an incorrectly coded six-pin unit being plugged into a particular plugboard. That portion of the registration device carried on the unit shall be incapable of alteration without breaking a seal, and shall be adequately protected against accidental breakage liable to permit the unit to be plugged into a wrong plugboard. The schedule of codes is shown as Appendix 'D'.
- 7\*4 The code pins on the unit must not extend beyond the joint face and may be up to 1/16" below this line.
- 7.5 The electrode potential of the material forming that part of the plugboard connector which makes contact with the spring tags of the unit shall lie between the values of -0.55v. and +0.10v. as measured against a saturated calomel electrode in sea water at 25°C.

## 8. LIFE

- 8.1 The rated life of the relay unit shall be taken as  $0.5 \times 10$  cycles under specified conditions of operation where one cycle consists of an operation followed by a release. The rate of operation shall be taken as 120 cycles daily.
- 8.2 The unit shall be considered as having a possible period of up to 3 years in reasonable storage conditions prior to being brought into use without verification or examination and without any adverse effect on its rated life. This requirement shall be reduced to 1 year where the unit incorporated electrolytic capacitors and/or selenium rectifiers.

## 9. ARMATURE SUPPORTS

Where a tractive armature relay is employed the under-noted provisos shall apply:-

- 9.1 The armature shall be positively located so as to prevent any displacement other than that required for the proper operation of the contacts.