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May 1972

**Specification for Miniature Tractive Armature AC
Lamp Proving Relay Plug-in Type for Railway
Signalling Purposes**

British Railways Board



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Amendments

Amd. No.	Date	Text Affected
1	Jan 1974	Clause 18.1 (a)
2	May 1975	Clause 18.2
3	July 1976	Clause 6.11

NOTE

This specification supersedes all previous issues and is issued by:-

British Railways Board,
Director of S. & T. Engineering,
Materials Management Group,
Room 1103,
Rail House,
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Cheshire. CW2 6EA

from whom further copies may be obtained.

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B.R. SPECIFICATION FOR MINIATURE RELAYS
FOR RAILWAY SIGNALLING PURPOSES

AMENDMENT NO. 2

APPENDIX A1

Withdraw the existing Appendix A1 dated September, 1981 and substitute the attached.

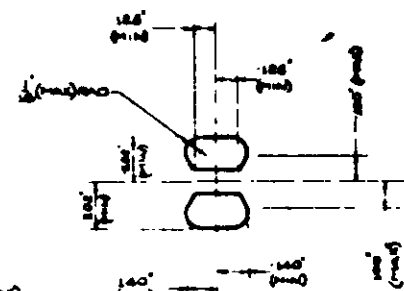
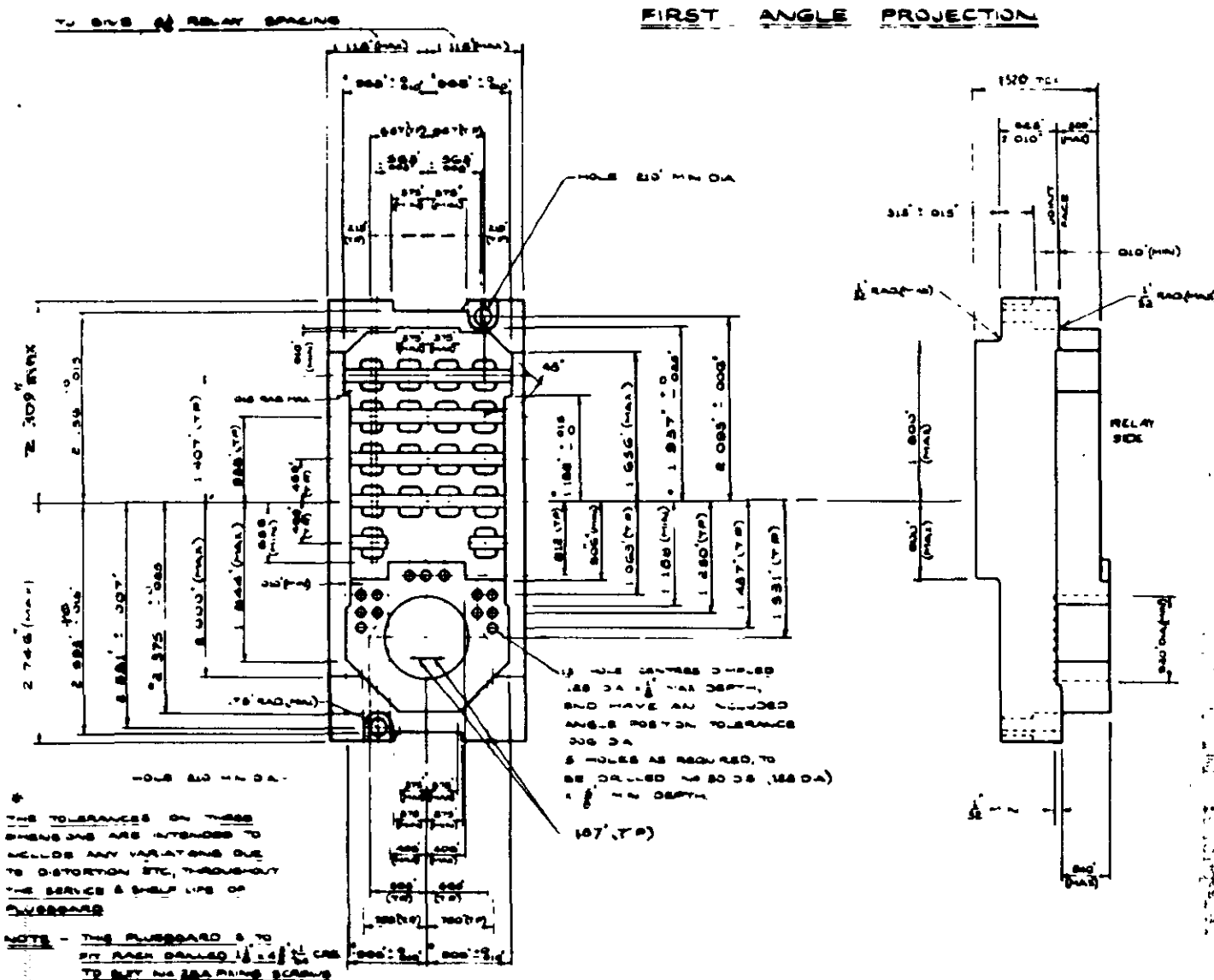
The maximum allowable overall (length) dimensions have been increased as follows:-

dimension 2.746" (Max.) was 2.708" (Max)

dimension 2.309" (Max.) was 2.271" (Max)

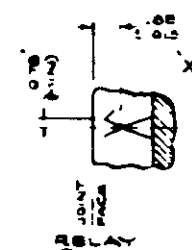
This Appendix applies to all the Specifications listed below:-

930A, 931A, 932A, 933A, 934A, 936A, 938A, 939A, 940A, 941A, 942, 943, 946, 949, 960, 961, 963, 966 and 968.



DIMENSIONS OF CONNECTOR SLOTS

THESE SLOTS MAY BE ANY SHAPE OR SIZE PROVIDED THE DIMENSIONS GIVEN ABOVE ARE NOT APPROACHED TO THE DEPTH OF THE JOINT FACE BETWEEN RELAY & PLUGBOARD



NOTE: INDIVIDUAL DESIGNS MUST BE SUCH THAT WHEN THE RELAY IS PLUGGED ON ANY PLUGBOARD THE END OF THE CABLE (1) IS NOT AT THE FOOT OF THE PLUGBOARD UNDER ANY CONDITIONS (TP) DENOTES TRUE POSITION IN ACCORDANCE WITH BS 308

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COMMON APPENDIX FOR MINATURE RELAY SPECIFICATIONS

PLUGBOARD DIMENSIONS

NOT TO SCALE

APPENDIX A.1
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B.R. SPECIFICATION 941A
(Superseding B.R. Specification 941)

FOR

MINIATURE TRACTIVE ARMATURE A.C. LAMP
PROVING RELAY, PLUG-IN TYPE, FOR
RAILWAY SIGNALLING PURPOSES

1. FOREWORD

- 1.1 The relay covered by this specification is intended for use in a railway signalling lamp proving circuit where the relay is connected in series with the primary of the lamp transformer.
- 1.2 These relays must not be used to break circuits in which the energy dissipated at the contact exceeds the limit given in Clause 12.1.

2. SCOPE

- 2.1 This specification relates to design requirements for a miniature tractive armature slow release line relay of the plug-in type for use in 110v signalling circuits, incorporating a rectifier feed unit, and suitable for use with S.L.34 or S.L.35 lamps to B.S. 469. It is intended to be used without an external resistor and with a lamp circuit having characteristics such that under extreme variations of filament current consumption and supply voltage the line currents will meet the operating values specified in Clause 18.2.
- 2.2 The design is based on the requirement that the relay shall remain in the operated position long enough to cover the contact transit time of the signal control relay.

3. DEFINITIONS

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

<u>Operate</u>	That condition of the relay when all front contacts are just made.
<u>Full Operate</u>	That condition of the relay when the armature has completed its maximum travel.
<u>Release</u>	That condition of the relay when all front contacts have opened.
<u>Full Release</u>	That condition which the relay assumes when de-energised.

3. DEFINITIONS (Cont'd)

<u>Front Contact</u>	A contact which is made when the relay is energised.
<u>Contact Element</u>	The contact piece which is attached to a contact spring.
<u>Contact Spring</u>	The spring strip to the end of which the contact element is secured.
<u>d.c.</u>	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) A relay, incorporating the rectifier feed unit.
 - (b) A plugboard into which a relay is plugged.
- 4.2 The relay shall be designed to have minimum bulk and weight consistent with the prime necessity for safety and reliability, and its construction shall be such as to minimise accidental damage sustained during transit or installation.
- 4.3 The relay shall include a rigid baseplate which shall form part of the plug-socket inter-connection between the relay and its plugboard.
- 4.4 The relay 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 relay. The material of the cover and construction of the relay shall be such that the application of a force of 30 lbs. at any point on the surface of the cover of the assembled relay shall not result in its deflection to an extent sufficient to interfere with the operation of the relay. 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 relay when assembled shall be dustproof.
- 4.7 Surface leakage distances shall not be less than 0.125" internal and 0.25" external. Parts enclosed when the relay 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 'B2' shall be provided to hold the relay securely in its plugboard without the possibility of the electrical connections becoming disconnected.

4. GENERAL (Cont'd)

- 4.10 The male portion of each inter-connection shall make a positive sliding contact with the female portion.
- 4.11 The permanent relay 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 size of wire to be accommodated will be of overall diameter not greater than 3.4 m.m. and a conductor diameter of 1.12 m.m. The connector shall be positively locked into the plugboard but shall be capable of being released and withdrawn to permit of easy disconnection.

5. DIMENSIONS

- 5.1 The dimensions of the relay and plugboard shall be in accordance with Appendices 'A1', 'A2' and 'B1'.
- 5.2 The retaining clip is to be in accordance with Appendix 'B2'. The handle of the relay shall be such that with the relay in position on its plugboard the total force exerted by the clip on the handle shall be not less than 20 lbs. and shall not exceed 50 lbs.
- 5.3 Relays with the same coding must be interchangeable.

6. MATERIALS

- 6.1 All materials used in the construction of the relay 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 relay and plugboard which would cause alteration in performance during storage life, except as provided for in Clause 16.1, 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 relay 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 - 40°C. to + 60°C when the relay is energised by 0.4 amps r.m.s. 50 Hz.
- 6.4 All insulating materials in contact with current carrying parts of the relay and plugboard shall comply with the following test:-
- Two $\frac{1}{4}$ " diameter electrodes shall be placed $\frac{1}{8}$ " 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 relay and plugboard which are capable of supporting growth of mould, or which are subject to deterioration by exposure to sunlight.

6. MATERIALS (Cont')

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

8. LIFE

- 8.1 The rated life of the relay shall be taken as 10^6 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 250 cycles daily.
- 8.2 The relay 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.