
DC Track Circuit

Includes:	DC (all types).
Excludes:	All other track circuit types.
Related Test Specifications:	NR/L2/SIG/30014/D120/TS5-91.
Related Standards:	NR/PS/SIG/11755 (DC Track Circuits) Note: all relevant Technical Instructions and Notice Boards are to be checked for new instructions.
Related Design details:	Scheme plan, Bonding Plan, Loc area plan, REB/Location drawings.
Recording of Testing:	Completion of tests shall be by application of the check marks and recording of values on test copy diagrams, by recording of values on the appropriate record card, and by signing the appropriate test certificate.
Pre-requisites:	REB/ Location case and Cable tests complete prior to function testing.

General

This test specification is formed of the following sections, which correlate to the competency levels identified in NR/L2/SIG/30014/B410 for this type of equipment or testing.

1. Inspection and Bonding
2. Wire Count and Continuity
3. Set Up and Test
4. Extremities / Interference
5. Correspond

General definitions of terms are given in NR/L2/SIG/30014, however terms specific to this specification are defined in the last section of this specification.

DC Track Circuit

1. INSPECTION and BONDING

1.1. Carry out a Physical Dimensions Track Circuits Check to specification NR/L2/SIG/30014/D120/TS5-91.

1.2. *CHECK* for *CORRECT TYPE*:

1.2.1. Check equipment and bonding fitted is as specified in the wiring, track circuit and bonding diagrams.

New Work 'Preferred' design (medium voltage)

Track / Feed Type	Relay Type		Configuration		
	Resistance	Style	Track Relay only	Track Relay & Feed Relay	Track Relay with adjusting resistor
Standard AC Immune BR867	9Ω BR 966F2	Plug In PC 110	A.P.= A / L Max length 700m timber # ¹ 1200m concrete # ¹	A.P.= A / M Max length 500m timber 750m concrete # ¹	A.P.= B / N Max length 350m timber 500m concrete
	20Ω BR 939A	Plug In PC 105	A.P.= A / L Max length 700m timber 1200m concrete # ²	A.P.= A / M Max length 600m timber 900m concrete	A.P.= B / N Max length 350m timber 500m concrete
	60Ω BR 966F9	Plug In PC 104	A.P.= C / P Max length 250m timber 350m concrete	NOT VIABLE	NOT VIABLE
Standard AC immune with battery standby Charger to 086/001906 with 6 lead acid OR 9 NiCad cells.	20Ω BR 939	Plug In PC 105	A.P.= D / L Max length 700m timber 1200m concrete # ²	A.P.= D / M Max length 600m timber 900m concrete	A.P.= D / N Max length 350m timber 500m concrete

Existing 'Non-preferred' design (low voltage)

Track / Feed Type	Relay Type		Configuration			
	Resistance	Style	Track Relay only	Track Relay & Feed Relay	Track Relay with adjusting resistor	Feed Relay & Track Relay with adjusting resistor
Non Preferred Designs	2.25Ω BS1659	Shelf	A.P.= E / L See note # ⁴	NOT VIABLE	NOT VIABLE	NOT VIABLE
Group "A" Source voltage less than 2V. 2xCS2 Primary Cells in Parallel or Battery Charger with 1 NiCad Cell	4Ω BR 938	Plug In PC 101	NOT VIABLE	NOT VIABLE	NOT VIABLE	NOT VIABLE
	9Ω BS1659	Shelf	A.P.= G / L Max length 500m timber 800m concrete	A.P.= H / M Max length 400m timber 600m concrete	NOT VIABLE	NOT VIABLE
Non Preferred Designs	2.25Ω BS1659	Shelf	A.P.= E / L	NOT VIABLE	NOT VIABLE	NOT VIABLE
	4Ω BR 938	Plug In PC 101	A.P.= F / L Max length 400m timber # ³ 600m concrete # ³	A.P.= J / M Max length 200m timber # ³ 300m concrete # ³	A.P.= K / S Max length 300m timber # ³ 400m concrete # ³	NOT VIABLE
	9Ω BS1659	Shelf	A.P.= G / L Max length 800m timber 1200m concrete	A.P.= K / M Max length 700m timber 1000m concrete	A.P.= K / S Max length 450m timber 700m concrete	A.P.= K / R Max length 350m timber 500m concrete

DC Track Circuit

Notes: -

A.P. = Adjustment Procedure for electrical testing.

Feed End code letter 'A' to 'K' inclusive.

Relay code letter 'L' to 'S' inclusive.

#1 Limited to 680m on timber or concrete on A.C. electrified lines.

#2 Limited to 1000m on timber or concrete on A.C. electrified lines.

#3 Assumes the relay tail cables have a loop resistance up to 2Ω, if the loop resistance is below 1Ω then these figures may be increased by up to 50%.

#4 = Further examples of track circuits using this relay (including relay changes) shall not be installed - see RT/E/PS/11755

1.2.2. *Check* TR only feeds the TPR and the TPR is slow to pick.

1.2.3. *Check* any welded stainless steel (Eutectic) strips are as shown on the bonding plan.

1.3. *CHECK* for NO DAMAGE:

1.3.1. Visually *Check* Track Circuit Equipment and Bonding for damage.

1.3.2. *Check* for safe Insulation; bonding and track circuit cable sheaths and cores are not damaged and the cable is either new or not suffering from 'wet' or 'dry' insulation defects.

1.4. *CHECK* for CORRECT POSITION:

1.4.1. *Check* no prohibited practises or combinations with adjoining track circuits or other equipment, either on track or in equipment housings.

Point Heating

The combination of Low Voltage DC track circuits with any form of point heating is prohibited. If electric point heaters are fitted then these shall not be DC type and if AC then the track circuit design shall be AC immune.

Residual Interference Voltage

A DC track circuit shall not be used where the track condition is such that residual interference voltage presents an unacceptable hazard to train operations.

DC track circuits are unsuitable for use on track which uses concrete sleepers that are not insulated from the rails, or steel sleepers. Where new DC track circuits without feed end relays are to be introduced on insulated concrete sleepers, it is important that the general condition of those insulations be verified; failure to do so could result in an inability to commission due to excessive DC residual voltage interference.

Lightweight Vehicles and Others Susceptible to Poor Train Shunt

On non-electrified lines used by lightweight vehicles in Classes 14X to 16X or other modern rolling stock designated as susceptible, unless they are fitted with Track Circuit Assisters (TCAs), the only generally permitted types are:

- medium voltage AC immune,
- medium voltage AC immune/DC tolerant,
- diode.

DC and Dual Electrified Areas

DC track circuits shall not be installed on DC and dual electrified lines. However, the DC medium voltage AC immune/DC tolerant type may be used on AC electrified lines in the vicinity of dual electrified lines, even if the traction return systems cannot be isolated, subject to an immunisation evaluation exercise

A.C. Electrified Areas

Only AC immune designs shall be used in AC electrified areas. Track circuits on AC lines are subject to particular length restrictions. Traction return cross bonding shall be provided at all IRJs in the traction return rail. The traction return rails in adjacent terminal platforms shall also be bonded together at the buffer stop end. The traction return rail shall, wherever practicable, be positioned on the cess side to enable structure bonds to be kept short.