

Ref	NR/WI/SIG/00102
Issue	3
Date	August 2004

TI2I Track Circuit Risk Based Maintenance (formerly RT/E/WI/00102)

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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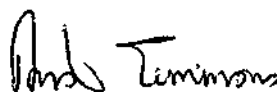
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Company Work Instructions

TI2I Track Circuit Risk Based Maintenance

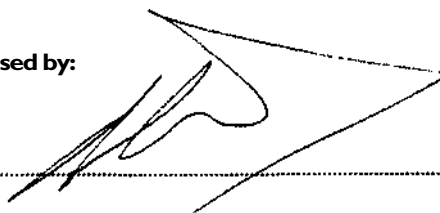
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Issue record

Issue	Date	Comments
1	Dec 2003	First issue
2	Feb 2004	Second issue – tune zones ratio change and formatting
3	Aug 2004	Inclusion of Record Card and correction of error in checklist for items 4.1.13 and 4.3.13

Implementation

This Work Instruction is mandatory where the implementation of Risk Based Maintenance for TI2I Track Circuits has been authorised in accordance with [RT/E/S/10662](#), 'Process for the Introduction of New or Revised Maintenance Regimes for Signalling Assets'.

[RT/E/C/10099](#), 'Risk Based Maintenance – Implementation', provides guidance on how to meet the implementation requirements of [RT/E/S/10662](#).

The services detailed in this specification shall be applied at the intervals detailed in [RT/E/S/10661](#), 'Signalling Maintenance: Task Intervals'

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1 Purpose

To detail the maintenance tasks for the TI2I Track Circuit risk based maintenance regime.

2 Scope

The tasks detailed within this work instruction are applicable to all TI2I track circuit configurations.

The maintenance tasks shall be applied where implementation of TI2I Track Circuit Risk Based Maintenance has been authorised in accordance with [RT/E/S/10662](#), 'Process for the Introduction of New or Revised Maintenance Regimes for Signalling Assets'.

3 Requirements

3.1 Safe System of Work

Before undertaking any work, a safe system of work shall be set up in accordance with the Rule Book.

3.2 Test Failures and Infrastructure Defects

Test failures / defects shall be rectified or reported to the appropriate manager as soon as reasonably practicable unless other specific instructions are provided with the task.

3.3 Tools

The following calibrated tools are required to perform the maintenance activities:

- Frequency Selective Meter (FSM) cat. No. 86/43505 or TI2I Test Meter (TTM) cat. no. 94/013001,
- A meter that can read AC and DC current and voltage,
- Torque wrench for impedance bond, tuning unit and rail connections,
- Universal Shunt Box catalogue no. 40/5450.

Additional tools may be required to undertake remedial work.

3.4 Checklists

To ensure all tasks are completed a checklist (see Appendix D) shall be completed during each maintenance visit.

3.5 Tuning Units

References to tuning units throughout this instruction apply equally to End Termination Units and Track Tuning Units where applicable.

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3.6 Cut Section Track Circuits

Each cut section must be treated as an individual track circuit and maintained accordingly.

3.7 Centre Fed Track Circuits

Each half of a centre fed track circuit operates as an independent track circuit and must be tested as such and a Checklist completed for each part.

Note that within 30 metres of the centre feed, any track anomaly will affect both track circuit sections.

3.8 Disconnection of Tuning Units [Potential Wrong Side Failure Risk]

When working on a series of TI2I track circuits, under no circumstances must the Tx and Rx tuning units of a track circuit be disconnected from the rails simultaneously. This could cause a track circuit to feed a sequential track circuit of the same frequency, resulting in the possibility of a wrong side failure of another track circuit.

3.9 Disconnection of Tx, Rx or Relay [Potential Equipment Failure]

The track relay must not be removed whilst its Rx is energised, i.e. the 24V D.C. supply to the Rx must be disconnected first by removing the fuse. Failure to observe this procedure could damage the Rx.

If an Rx or Tx is disconnected from its tuning unit, the terminals on that tuning unit to which the 2-core cable would be attached must be short-circuited, i.e. terminals 4 & 5 for a Tx, terminals 1 & 2 for an Rx or low power Tx. This is to permit the adjacent track circuits to operate reliably.

3.10 Intermediate Tuning Capacitor

Intermediate tuning capacitors are used to increase the gain at intermediate positions in the track circuit to overcome low ballast resistance. They **should not be** fitted without permission from Network Rail.

Where intermediate tuning capacitors are fitted the maintenance tasks detailed in section 4.2.9 shall be undertaken at intervals assessed as part of any implementation and appropriate to local requirements.

3.11 Full Test

On installation and after alterations, e.g. relaying, ballast cleaning or insulation changing has taken place, apparatus has been changed, leads or jumpers have been renewed / repaired or settings have been changed, a Full Test must be carried out in accordance with APPENDIX B of this specification.

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3.12 Track Circuit Record Cards

The Track Circuit Record Card (see Appendix E) shall be completed during each visit.
The card shall be kept in the relay end location case.

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4 Maintenance Activities

4.1 Transmitter End

If any remedial action is undertaken at the Transmitter End, a drop shunt must be completed at the receiver end.

Transmitter End		Service	
4.1.1	Visually inspect the transmitter for security and signs of water ingress. Investigate the cause and rectify as necessary.	A	B
4.1.2	Check security of terminals on the transmitter.		B
4.1.3	Visually inspect the internal wiring for signs of degradation. Indicators of this are discolouration, cracking or seepage. Report any signs of wire degradation to the manager.	A	B
4.1.4	Visually inspect the tail cables and cable connections from the location to the tuning unit and the tuning unit to the rails to ensure they are secure and not damaged or deteriorated such that it might lead to a failure prior to the next scheduled maintenance visit.	A	B
4.1.5	Visually inspect the cable protection arrangements and rectify as necessary. Pay particular attention to: • Damage to cables passing under the rails. • Ensuring the tail cables at the rail connections are clipped to the foot of the rail. • Ensuring that the tail cables are either protected by piping or clipped to the sleepers. • Ensuring the tail cables are tied together and lay perpendicular to the track with no coils to minimise the risk of stray inductance.	A	B
4.1.6	Visually inspect the tuning unit (and muffler if fitted) for damage, instability and water ingress.	A	B
4.1.7	Torque the rail connections to 10Nm.		B
4.1.8	Torque the tuning unit terminals T1 and T2 to 50Nm.		B
4.1.9	Clean and protect tuning unit terminals.		B
4.1.10	(Tuned zone only) On the adjacent tuning unit torque the rail connections to 10Nm.		B
4.1.11	(Tuned zone only) On the adjacent tuning unit torque terminals T1 and T2 to 50Nm.		B
4.1.12	(Tuned zone only) On the adjacent tuning unit clean and protect the tuning unit terminals.		B

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Transmitter End		Service							
4.1.13	(Tuned zone only) Using a frequency selective meter (FSM) or TI2I test meter (TTM) set the frequency to that of the track circuit under test and measure the rail-to-rail voltage of the tuning units forming the tuned zone. For consistency this test must always be carried out at the rails. Calculate the tuned zone ratio (Voltage reading across rails at adjacent tuning unit : Voltage reading across rails at inner tuning unit). Record the readings and ratio. The minimum ratios are: <table><tr><th>Frequency</th><th>Ratio</th></tr><tr><td>A, C, E and G</td><td>1:12 (1:10)*</td></tr><tr><td>B, D, F and H</td><td>1:18 (1:16)*</td></tr></table> *The values in brackets apply if the tuned zone contains redundant (bonded out) IRJs or non-clamped tuning units (manufactured or serviced prior to 1994) If the tuned zone ratio is less than that stated above, further investigation is required (See Section A.1). NOTE : Bonded out rail joints within the tuned zone should be removed or reported to the appropriate manager.	Frequency	Ratio	A, C, E and G	1:12 (1:10)*	B, D, F and H	1:18 (1:16)*	A	B
Frequency	Ratio								
A, C, E and G	1:12 (1:10)*								
B, D, F and H	1:18 (1:16)*								
4.1.14	Where necessary lubricate the padlocks on both the location case and tuning unit covers.	A	B						
4.1.15	Check the location case and tuning unit are correctly secured and locked before leaving the site.	A	B						

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