

Requirements for Rail Vehicle Maintenance

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Synopsis

This document defines the requirements for the production of a **maintenance** Policy and Plan for rail vehicles operating on Railtrack controlled infrastructure.

Submitted by

Nick Howland
Standards Project Manager

Authorised by

Brian Alston
Acting Controller, Railway Group Standards

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 Railway Group Standard

 GM/RT2004

 Issue Two

 Date October 1999

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Part A

Issue record

This document will be updated when necessary by distribution of a complete replacement.

Amended or additional parts of revised pages will be marked by a vertical black line in the adjacent margin.

Issue	Date	Comments
One	September 1995	Original Document (Supersedes GM/TT0188)
Two	October 1999	Supersedes GM/RT2004 (Issue One), GM/RT2241, GM/RT2244, GM/RT2270, GM/TT0110, GM/TT0144, GM/TT0173 & GM/TT0403 & GK/EHH205. The changes are so numerous that they have not been marked by a vertical black line in the adjacent margin.

Responsibilities

Railway Group Standards are mandatory on all members of the Railway Group* and apply to all relevant activities that fall into the scope of each individual's Railway Safety Case. If any of those activities are performed by a contractor, the contractor's obligation in respect of Railway Group Standards is determined by the terms of the contract between the respective parties. Where a contractor is a duty holder of a Railway Safety Case then Railway Group Standards apply directly to the activities described in the Safety Case.

* The Railway Group comprises Railtrack and the duty holders of the Railway Safety Cases accepted by Railtrack.

Compliance

The provisions in this document are to be complied with from the 4th December 1999. It does not require retrospective action for existing certification.

Health and safety responsibilities

In issuing this document, Railtrack PLC makes no warranties, express or implied, that compliance with all or any documents published by the Safety & Standards Directorate is sufficient on its own to ensure safe systems of work or operation. Each user is reminded of its own responsibilities to ensure health and safety at work and its individual duties under health and safety legislation.

Supply

Controlled and uncontrolled copies of this document may be obtained from the Industry Safety Liaison Dept, Safety and Standards Directorate, Railtrack PLC, Railtrack House, DP01, Euston Square, London, NW1 2EE.

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Part B

1 Purpose

This Railway Group Standard defines the **Maintenance** requirements for Rail Vehicles to ensure continuous conformance with the Mandatory Requirements when they are operated on Railtrack controlled infrastructure.

2 Scope

The overall scope of Railway Group Standards is as specified in Appendix A of [GA/RT6001](#). Except as indicated below, this Railway Group Standard applies to all Rail Vehicles to be operated on Railtrack controlled infrastructure. It applies to all train safety systems including signalling and communication equipment fitted to the **vehicle**. It includes UK foreign registered international vehicles working in domestic traffic but does not apply to rail vehicles registered for and working in international traffic under RIV regulations.

3 Definitions

Conformance Certification Body

As defined in [GM/RT2000](#).

Certificate of Conformance

As defined in [GM/RT2000](#).

Examination

The process of checking the condition of a **vehicle** and its components against pre-defined criteria.

Maintenance

The process by which a rail **vehicle** is kept in a safe, serviceable, reliable and clean condition throughout its Service Life.

Maintenance Plan (in this Standard referred to as the Plan)

A document or documents detailing the standards of **Maintenance** for Rail Vehicles including the criteria for inspection and the periodicity of **Maintenance** of those components and systems that ensure continuous conformance with the Mandatory Requirements. It also defines the minimum staff competencies for carrying out the work and the minimum **maintenance** facilities required.

Mandatory Requirements

As defined in [GM/RT2000](#).

Maintenance Standard

A document, including specification, procedure, instruction, directive, rule or regulation that mandates requirements for the **maintenance** of Rail Vehicles in service on Railtrack controlled infrastructure.

Service Life

The time or distance over which a Rail **Vehicle** continues to meet Mandatory Requirements.

Speed Control Equipment

Vehicle based system related to the automatic control of **vehicle** speed or the automatic indication of permitted **vehicle** speed.

Train Operator

As defined in [GM/RT2000](#).

Vehicle Acceptance Body (VAB)

As defined in [GM/RT2000](#).

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4 Principles

4.1

Train Operators shall ensure that all Rail Vehicles presented for operation over Railtrack controlled infrastructure conform with the Mandatory Requirements.

4.2

To ensure that Rail Vehicles continue to conform with the Mandatory Requirements Train Operators shall have a Policy (see section 5) that defines the management system for the **Maintenance** of the Rail Vehicles they operate. For each **vehicle** type, the Policy shall be supported by a Plan containing:

- technical requirements;
- minimum **maintenance** facilities to implement technical requirements;
- minimum staff competencies to implement technical requirements.

4.3

The principles and objectives of the Policy shall be declared by the Train Operator in its Railway Safety Case that is subject to acceptance by Railtrack. The detail of the Policy may be contained in a separate document and may be referenced from the Railway Safety Case.

4.4

The process of ensuring the adequacy of the **maintenance** facilities and staff competencies shall be declared by the Train Operator in the Policy.

4.5

The confirmation that the Plan meets the requirements of this Standard is given by the issue of a Certificate of Conformance for **maintenance** by a Conformance Certification Body.

5 Maintenance Policy

5.1 General

The Train Operator shall have a controlled **Maintenance** Policy for the Rail Vehicles they operate whether the vehicles are:

- owned by the Train Operator; or
- leased or hired by the Train Operator; or
- supplied by a third party, such as other Train Operators

Where appropriate, the Train Operator shall obtain the support of the **Vehicle** Owner in the production of its policy.

Train Operators may arrange for the **Maintenance** of Rail Vehicles they operate to be carried out under their own direct control or under the direct control of another organisation (see section 5.2.1 and 5.2.2 of this document).

Where **Maintenance** is carried out by an organisation other than the Train Operator, the Train Operator shall ensure that its Policy is compatible with the management arrangements of the organisation carrying out the work. This does not absolve the Train Operator from having its own Policy.

5.2 Requirements for the Maintenance Policy

The Policy shall describe in general terms how the Train Operator manages the **Maintenance** of the Rail Vehicles it operates and the roles and responsibility of its own and any other organisations involved.

5.2.1 Requirements for all Policies:

- a) The defined roles and responsibilities of all the principal organisations concerned with the management of **Maintenance** of the Rail Vehicles.
- b) The competence of those responsible for setting the Policy.

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- c) Identification of the relevant responsibilities of those managers charged with executing the policy.
- d) The involvement of any third parties carrying out work associated with **Maintenance** activities covered by the Policy and how they are to be qualified and controlled.
- e) Reference to the classes of Rail Vehicles covered by the Policy.
- f) A statement of confirmation that compliance with the following will be achieved:
- [GM/RT2020](#), Policy for the Engineering of Wheelsets used on Railtrack Lines; and
 - [GM/RT2030](#), Axle Bearing **Maintenance** and Overhaul;
- g) Identification of a **Maintenance** Plan for each class of Rail Vehicles to be operated.
- h) A statement of intent that the Policy will be implemented on all Rail Vehicles embraced by the Policy.
- i) A statement of how the **maintenance** facilities are to be assessed and accredited.
- j) A statement of how Staff competencies requirements are to be assessed and accredited.
- k) The means by which the **Maintenance** of Rail Vehicles will be controlled to ensure that declared periodicity for attention is not exceeded.
- l) Details of the safety performance monitoring and reporting systems, (see [GM/RT2250](#) and [GK/RT0106](#)).
- m) The method of ensuring that the records of the **Maintenance** of Rail Vehicles are established, maintained and are retrievable. Records shall cover the following:
- requirements as defined in specific Railway Group Standards;
 - evidence that the defined **Maintenance** facilities Requirements and Staff competencies have been complied with;
 - evidence that the Plan has been complied with;
- n) The normal frequency at which the Policy shall be reviewed and specific circumstances which trigger a review such as when:
- there is a significant change to the **maintenance** facilities or staff competencies at the location where the work is carried out;
 - new types of rail vehicles are to be operated (including short term lease);
 - there is a change in the organisation carrying out the work;
 - there is a change of location where the work is to be carried out.
- o) The normal frequency of Plan review and specific circumstances which trigger a review such as:
- analysis from safety performance monitoring shows unacceptable risk;
 - occurrence of significant incidents affecting safety;
 - notification by other organisations of potential risk due to incidents with Rail Vehicles of the same type;
 - the planning of significant changes to Rail **Vehicle** designs, operational patterns, staff, or **maintenance** facilities covered by the plans;
 - instruction by Regulatory Bodies;

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- p) A system for ensuring that regular internal (and where appropriate external) audits are undertaken to check the implementation and continuing effectiveness of the:
- Policy;
 - Plan;

and that any appropriate corrective actions are taken.

- q) The process to ensure that any replacement parts used for the **Maintenance** of safety critical systems of Rail Vehicles under its control do not jeopardise the safety in operation of those Rail Vehicles.

5.2.2 Additional Requirements for Policies where Rail **Vehicle Maintenance is Not Under the Train Operator's Direct Control:**

- a) The process used to ensure that the Rail Vehicles are safe to operate each time they are offered for operation and the identification of those responsible for this.
- b) The process to ensure that all appropriate information relating to the operation of its Rail Vehicles, is made available to the Train Operator to assist them in developing and implementing their Policies and Plans.
- c) The process to ensure that if the **Vehicle** Owner or third party maintainer identifies an unacceptable risk requiring a change to the Policy or Plan the **Vehicle** Owner or third party maintainer immediately notifies the Train Operators using its Rail Vehicles on Railtrack controlled infrastructure.
- d) The process to ensure that the Rail Vehicles it operates are maintained by organisations qualified in accordance with [GM/RT2450](#) and that the personnel employed are competent to perform their allocated tasks. For safety critical tasks see [GO/RT3260](#).

6 Accreditation of **Maintenance** Facilities and Competency

The Train operator shall assess and document the minimum engineering **maintenance** facilities and staff competencies necessary to implement the requirements of the **Maintenance** Plan. Accreditation of **maintenance** facilities and competency may either be carried out internally or by a suitably qualified third party.

7 **Maintenance** Plan

7.1 Requirements for the Plan

The Plan is required to identify the components of the rail vehicles which present an element of risk in respect of continued compliance with the mandatory requirements. It is required to describe in detail the **Maintenance** of each class of Rail **Vehicle** to ensure that they will continue to conform to the Mandatory Requirements and be safe to operate on Railtrack controlled infrastructure. Such a document shall be controlled.

7.1.1

Where the **Maintenance** of a Rail **Vehicle** is carried out by the **vehicle** owner or a third party, the owner may produce a Plan in accordance with this Standard and obtain a Certificate of Conformance from a Conformance certification body.

7.1.2

Changes to any Plan which could affect the conformance to the Mandatory Requirements of the Rail Vehicles concerned shall be submitted to a Conformance certification body for certification, in accordance with the process for Engineering Acceptance of Rail Vehicles (see [GM/RT2000](#)).

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7.2

The Plan shall include the following:

- a) The **Maintenance** Standards for the Rail **Vehicle**.
- b) The schedule for all items covered under Clause 7.2 (a), defining the periodicity at which each item shall be actioned, noting that vehicles shall be maintained so that the prescribed tolerances for all components, assemblies and systems that influence swept envelopes are not exceeded throughout the life of the vehicles on Railtrack controlled infrastructure.
- c) The Inspection programme for regularly checking that the **vehicle** is safe to continue in service.
- d) Definition of the appropriate action to be taken to ensure that all safety critical systems and equipment on Rail Vehicles will continue to operate safely over the full range of environmental conditions, particularly in snow or freezing conditions.
- e) Technical Instructions that define the action that is required to be given to those specific Rail Vehicles that cannot be hauled safely when inoperative, without the adjustment, isolation, or removal or addition of some components or the imposition of a restrictive maximum speed to travel (eg vehicles such as shunting locomotives or rail mounted cranes).
- f) Minimum engineering **maintenance** facilities that are necessary for the mandated **maintenance**, including the requirements for items such as sidings, covered accommodation, pits, major equipment and special tools as relevant to the vehicles to be maintained.
- g) Minimum level of competencies required for the staff engaged in the execution of the specified **maintenance**.
- h) **Maintenance** Standards to specifically cover the mandatory limits set by Railway Group Standards including those defined in the Appendices listed in 7.3.

7.3

Additional Mandatory Requirements are defined in the following Appendices:

In Appendices A, B and C there are indications of the requirements (though not necessarily comprehensive) which should be addressed as appropriate.

Appendix A - requirements for brake system **Maintenance**;

Appendix B - requirements for speedometer testing;

Appendix C - requirements for trainborne signalling and telecommunications equipment;

Appendix D - Minimum List of Technical requirements.

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Appendix A

Mandatory Maintenance Requirements for Brake Systems

A.1

Every Rail **Vehicle** shall be subject to a scheme of **Maintenance** that is auditable and ensures that the components of Rail **Vehicle** braking systems are given **Maintenance** attention, at a periodicity appropriate for both the functional characteristics of the components and utilisation of the Rail **Vehicle**.

A.2

The **Maintenance** attention and periodicity shall be designed to ensure that the brake systems shall function correctly and safely, during the intervals between **Maintenance**, to achieve the specified performance.

A.3

At a periodicity appropriate for both the functional characteristics of the systems and utilisation of the Rail **Vehicle**, the brake systems shall be subject to functional brake tests to prove that they are operating correctly. This brake test may be static.

A.4

The functional brake test shall be designed to prove that the systems respond to all the graduated brake application demands, up to and including a full service and emergency application (enhanced emergency brake system where fitted).

A.5

Appropriate functional brake tests shall also be undertaken whenever components of the brake system are replaced and reconnected on the rail **vehicle**, following component repair, renewal or disconnection.

A.6

Appropriate and auditable records of the brake tests shall be made and retained.

A.7

If a fault in a rail **vehicle** brake system or component is revealed by either the **Maintenance** or tests, appropriate action shall be taken that will ensure the safety of the Rail **Vehicle** on Railtrack controlled infrastructure.

A.8

Where the rail **Vehicle** has a driving position(s), the functional brake test shall involve the use of each drivers brake controller and where there is no driving position there shall be an arrangement to enable brake demand signals to be relayed to the Rail **Vehicle** via the brake system couplings used for that purpose.

A.9

If it is necessary to provide energy (eg compressed air) for the brake system from an external source, the energy shall either be supplied to the Rail **Vehicle** via:

- the brake system couplings, normally used to transmit the energy between Rail Vehicles; or
- where the rail **vehicle** has equipment for generating the energy, it may be supplied direct to the rail **vehicle**, adjacent to that equipment; or
- the emergency main reservoir pipe connection adjacent to an autocoupler.

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Appendix B

Mandatory Speedometer and Speed Control Equipment Testing

B.1

Speedometer and Speed Control Equipment testing shall be undertaken in the following circumstances:

- a) when wheelsets have been replaced;*
- b) when wheels have been re-profiled;*
- c) when the speed indicating system, Speed Control Equipment or their components have been disturbed, adjusted, repaired or replaced;
- d) when there has been a report of a malfunction of the speed indicating equipment or Speed Control Equipment;
- e) when there has been a report questioning the accuracy of the speed indicating or Speed Control Equipment.

* This refers only to wheelsets that affect the speed indicating or Speed Control Equipment systems.

B.2 Speedometer Tests

The speedometer test must embrace the whole of the speed indicating system, as far as is practicable, and must cover:

- a) accuracy of readings at no more than 10 mile/h increments throughout the speed range, with a minimum of 5 equally spaced readings;
- b) intermittent or jerky operations;
- c) clarity and cleanliness of indicators and correct functioning of associated lighting;
- d) integrity of connections and components that cannot be included in the system test.

B.3 Speed Control Equipment Tests

Where Speed Control Equipment systems are fitted they shall be tested to ensure the same level of accuracy as that defined for speedometers.

B.4 Accuracy of Speedometer Tests

B.4.1

The indications given by the speedometer shall be recorded. The acceptable tolerance for speed indicating system accuracy is ± 2 miles/h (see paragraph B.4.2 below) when compared with a calibrated instrument during the static test. If found to be outside this tolerance, the speed indicating system must be corrected before the Rail **Vehicle** re-enters traffic.

B.4.2

Where the design characteristics of speed indicating equipment on rail vehicles does not allow this accuracy to be achieved, the Train Operator shall undertake a risk analysis to assess the maximum permissible tolerance that will not affect safety of operation of the rail vehicles concerned. The tolerance derived from the risk analysis can replace the tolerance defined in paragraph B.4.1.

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Appendix C

**Mandatory
Maintenance
Requirements for
Trainborne Signalling
and Communications
Equipment**

C.1

All signalling and communications equipment shall be managed to ensure that its integrity and performance remains compliant with its specification, approval and application criteria.

Those performance criteria which are not specifically defined in Railway Group Standards shall be included in the Plan.

C.2

The **Maintenance** requirements for each item of equipment shall be developed by a systematic process and shall be capable of demonstration that they are suitable and sufficient to control the risks which would arise from failure of the equipment.

C.3

The **Maintenance** requirements shall be documented and shall form part of the Plan for the Rail **Vehicle** in which the equipment is mounted. The procedures to ensure configuration control of both software and hardware shall be documented in the plan.

Auditable records shall be kept of all **Maintenance** activities including inspection and testing.

C.4

All failures of trainborne signalling and communications equipment shall be documented and shall be managed in accordance with [GK/RT0106](#) 'Management of Safety Related Failures of Signalling and Operational Telecommunications Systems'.

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Appendix D

Minimum List of Technical Requirements

D.1

The specified safe limits of wear and degradation where additional to the requirements defined in the suite of Railway Group Standards should be included in the Plan. The mandatory limits of wear and tolerances specified for all components, assemblies and systems influencing swept envelopes shall be considered in the determination of the **vehicle** envelopes.

Consideration shall be given to the following during the production of the **Maintenance** plans. The list is not exhaustive or necessarily representative of all types of Rail Vehicles:

a) Wheelset and constituent parts

- relative movement of wheels, axles, tyres and axle mounted equipment;
- cracks and fractures;
- dimensions affecting running safety:
 - minimum wheel diameter
 - tolerance between diameters of wheels on the same axle
 - tolerance between diameters of wheels on the same bogie or **vehicle**
 - minimum throat thickness
 - back to back dimensions
- flange and tread profile
- wheel tread surface damage
- wheel flat limits in interpretation of the maximum specified in the appropriate Standard

b) Bearings

- floats, clearances
- grease

c) Brake equipment

- disc integrity, condition and dimensions;
- pad and brake block integrity and dimensions;
- rigging (pins, bushes etc);
- integrity of operating devices, reservoirs, hoses, cocks, pipework, safety loops, etc;
- brake tests.

d) Buffers

- heights
- integrity and condition

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- greasing
- e) Drawgear
 - Dimensions
 - rubber condition
 - integrity and condition
 - operation
- f) Primary and secondary suspension
 - spring integrity, rules for changing
 - linkage wear, dimensional limits
 - suspension settlement
 - damper integrity
- g) Suspension tube bearings
 - condition, integrity and security of components and installation
 - bearing float
- h) Traction and auxiliary generators, alternators and other electrical machines
 - integrity and security
 - earthing condition and integrity
 - presence, condition and cleaning of all safety labelling
- i) Cleaning
 - ventilation ducts
 - bogies and underframe equipment
- j) Final drives/transmissions
 - Security to body or bogie frame
 - condition checks of safety critical items (e.g. Cardan shafts)
 - lubrication
- k) Internal combustion engines
 - security and condition of mountings
 - checks for leakage of flammable fluids
 - integrity of shaft couplings
 - engine safety systems (e.g. overspeed, crankcase explosion)
- l) Power systems (including associated protection systems)
 - integrity and security

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- earthing condition and integrity
 - presence, condition and cleaning of all safety labelling
- m) Pantographs
- integrity and security
 - dimensions and condition of pantograph head
 - overheight protection
 - earthing condition and integrity
 - presence, condition and cleaning of all safety labelling
- n) Shoe gear
- integrity and security
 - dimensions and condition of shoe gear
 - earthing condition and integrity
 - presence, condition and cleaning of all safety labelling
- o) Rail **vehicle** structures and underframes
- integrity and condition of all load bearing members or panels
 - integrity, operation and security of doors, openable and removable panels
 - integrity and security of all body mounted equipment
 - alignment
- p) Steam locomotive boilers, fittings and associated pipework
- q) Valve gear and motion for steam locomotives
- r) Trainborne safety systems (e.g. AWS, DSD, TPWS, TCA etc.)
- functional tests
- s) Hydraulic and pneumatic systems for Rail Vehicles
- condition and integrity of hoses, pipework, valves, etc.
 - tilt system
- t) Equipment for limiting interference with infrastructure systems (e.g. Interference Current Monitoring Unit (ICMU), earth fault detection equipment, etc.)
- tests
- u) Fire protection systems
- integrity and condition
 - currency of certification

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v) Lighting Systems

w) Visibility

- headlight and marker lights
 - adjustment
 - intensity
- **vehicle** front end and warning lines
 - cleaning policy

x) Emergency Facilities

- emergency lighting capacity
- detonators

y) Tilt systems and anti-tilt systems

D.2

The inspection and/or testing frequency of the following:

- Axles;
- Brake valves, equipment and system and protection devices (see also Appendix A);
- Air reservoirs (a label showing the last test date should be secured to the reservoir);
- Fire equipment;
- Door systems;
- Safety equipment (e.g. AWS, ATP, DRA, TCA, Radio);
- Windscreens, wipers and washers;
- Main transformers;
- Steam locomotive boilers, fittings and associated pipework;
- Security systems for out of gauge working components on on-track machines;
- Control systems, including safety inter-locks;
- Speedometers;
- Equipment for limiting interference with infrastructure systems (e.g. Interference Current Monitoring Unit (ICMU)).
- Headlights and marker lights
- Tilt systems and anti-tilt systems

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References

- GA/RT6001** Railway Group Standards Change Procedures
- GK/RT0106** Management of Safety Related Failures of Signalling and Operational Telecommunications
- GM/RT2000** Engineering Acceptance of Rail Vehicles
- GM/RT2020** Policy for the Engineering of Wheelsets used on Railtrack Lines
- GM/RT2030** Axle Bearing **Maintenance** and Overhaul
- GM/RT2250** Safety Performance Monitoring and Defect Reporting of Rail Vehicles and Plant and Machinery
- GM/RT2450** Qualification of Suppliers
- GO/RT3260** Competence Management for Safety-Critical Work