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PRESS Inspection & Maintenance
Working Group

Modification Methodology for the Periodic Inspection and Maintenance of Passenger Cars

Abstract: This standard provides a methodology for the modification of the inspection/maintenance tasks and/or assigned frequencies contained within APTA PR-IM-S-013-99, Latest Revision, “Passenger Car Periodic Inspection and Maintenance.”

Keywords: inspection intervals, maintenance intervals, modification methodology, passenger cars, periodic inspection and maintenance of passenger cars

Summary: This safety standard describes the steps necessary to apply the modification methodology to the inspection/maintenance tasks and/or the assigned frequencies contained within APTA PR-IM-S-013-99, Latest Revision. It also provides definitions and acronyms that are either not found in other standards or have been modified for use with this standard.

Scope and purpose: This is a safety standard for the modification of the inspection/maintenance tasks and/or the assigned frequencies contained within APTA PR-IM-S-013-99, Latest Revision, “Passenger Car Periodic Inspection and Maintenance.” This safety standard is meant to provide organizations with the basic modification methodology necessary to change the scope and/or frequencies of the periodic inspection and maintenance tasks for passenger coaches. This safety standard is meant to identify those steps necessary to ensure that the tasks and frequencies assigned provide a high level of reliability for safety-critical systems and subsystems.

“This document represents a common viewpoint of those parties concerned with its provisions, namely transit operating/planning agencies, manufacturers, consultants, engineers and general interest groups. APTA standards are mandatory to the extent incorporated by an applicable statute or regulation. In some cases, federal and/or state regulations govern portions of a transit system’s operations. In cases where this is a conflict or contradiction between an applicable law or regulation and this document, consult with a legal advisor to determine which document takes precedence.”

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Participants

The American Public Transportation Association greatly appreciates the contributions of the **APTA PRESS Inspection and Maintenance Working Group**, which provided the primary effort in the drafting of this document.

At the time this standard was completed, the working group included the following members:

Jeff Thompson, SEPTA, *Chair*

Dave Elliott, LTK Engineering Services, *Vice Chair*

Enrique Arroyo-Rico, *ALSTOM Transport*

Danny Bailey, *Denton County Transp. Authority*

Stephen Bonina, *WSP USA*

Gordon Campbell, *Crosslinx Transit Solutions*

David Carter, *New Jersey Transit Corp.*

John Condrasky, *Wabtec Corp.*

Joshua Coran, *Talgo Inc.*

Richard Curtis, *Curtis Engrg. Consulting Svc, Inc.*

Ever Diaz, *Keolis Commuter Services*

Adam Eby, *Amtrak*

Paul Edwards, *Stacy and Witbeck*

Marc Gagné, *TDG Transit Design GRP Int'l Inc.*

Paul Jamieson, *SNC-Lavalin Rail & Transit Inc.*

Tony Jones, *retired*

Robert Lee, *Metra*

Paul Kovacs, *Lea+Elliott*

Lloyd Mack, *LTK Engineering Services*

Francesco Maldari, *MTA Long Island Rail Road*

Ted Mavronicolas, *Saft America*

Gerard McIntyre, *Knorr Brake Corp.*

Karl Mullinix, *Knorr Brake Corp.*

Joe Patterson, *Amsted Rail*

Mike Porter, *Community Transit*

Alan Rao, *Federal Transit Administration*

Gerhard Schmidt, *Siemens Mobility, Inc.*

Martin Schroeder, *Jacobs*

Richard Seaton, *TDG Transit Design GRP Int'l Inc.*

Patrick Sheeran, *LTK Engineering Services*

Nick Sorensen, *Utah Transit Authority*

Richard Spencer, *Knorr Brake Corp.*

Walt Stringer, *Walt Stringer and Associates*

Mark Sullivan, *STV Inc.*

Matthew Todt, *Amsted Rail*

Charles Turner, *STV Inc.*

Michael Wetherell, *McKissack & McKissack*

Dan Wilson, *Miami-Dade Transit*

Timothy Wineke, *Knorr Brake Corp.*

Cliff Woodbury, *LTK Engineering Services*

Gregory Yovich, *NICTD*

Steve Zuiderveen, *Federal Railroad Administration*

Project team

Nathan Leventon, *American Public Transportation Association*

Narayana Sundaram, *American Public Transportation Association*

Introduction

This introduction is not part of APTA PR-IM-S-014-99, Rev. 2, "Modification Methodology for the Periodic Inspection and Maintenance of Passenger Cars."

This introduction provides some background on the rationale used to develop this standard. It is meant to aid in the understanding and application of this standard.

This standard describes the modification methodology for the periodic maintenance and inspection of passenger cars. This standard applies to all:

1. Railroads that operate intercity or commuter passenger train service on the general railroad system of transportation; and
2. Railroads that provide commuter or other short-haul rail passenger train service in a metropolitan or suburban area, including public authorities operating passenger train service.

This standard does not apply to:

1. Rapid transit operations in an urban area that are not connected to the general railroad system of transportation;
2. Tourist, scenic, historic or excursion operations, whether on or off the general railroad system of transportation;
3. Operation of private cars, including business/office cars and circus trains; or
4. Railroads that operate only on track inside an installation that is not part of the general railroad system of transportation.

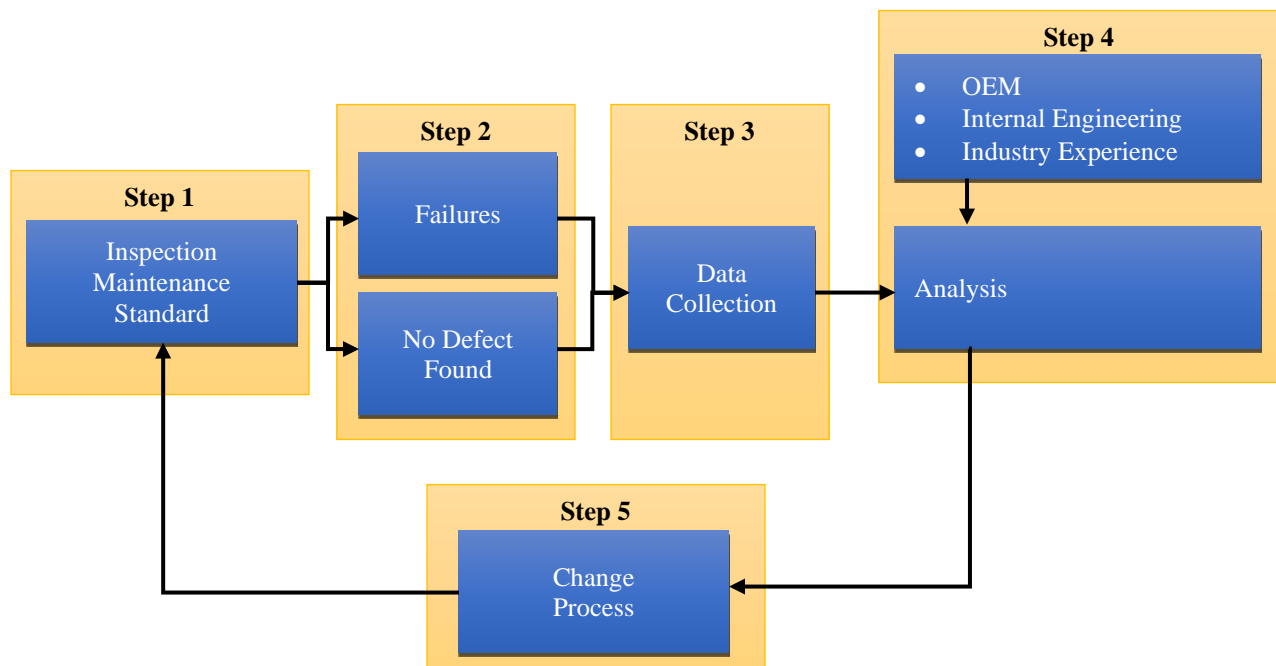
Modification Methodology for the Periodic Inspection and Maintenance of Passenger Cars

1. Modification methodology

The modification methodology involves five principal steps (refer to **Figure 1**):

1. Inspection/maintenance standard
2. Performance results
3. Data collection
4. Analysis
5. Change process

FIGURE 1
Modification Methodology



1.1 Inspection/maintenance standard

The inspection/maintenance standard requires inspection and maintenance tasks on systems or subsystems of passenger coaches in accordance with the assigned frequencies for the performance of those tasks as contained within APTA PR-IM-S-013-99, Latest Revision.

1.2 Performance results

Compile the findings of actions taken during the inspection/maintenance process. These findings may include but are not limited to the following:

- Failures uncovered during the inspection/maintenance process or outside the scheduled inspection
- A finding of “no defects”

1.3 Data collection

Collect inspection data obtained from sampling, surveys, inspections, and from manufacturers and operators, identified by each inspection system, component or item.

Below is the information collected and derived from both inspection and operating in order of importance in the maintenance program:

- Failures that could affect operating safety
- Failures that have operational consequences
- Failure modes of units removed as a result of failures
- The general condition of unfailed parts in units that have failed
- The general condition of serviceable units inspected as samples

1.4 Analysis

Systematically evaluate the system, subsystem or component based on a statistically valid sample and an analysis of information (including inspection data). The analysis shall compare the information with the inspection/maintenance standard (Section 1.1) and to any other American Public Transportation Association (APTA) or applicable federal, state, and local regulations on minimum levels of system, subsystem or component reliability and safety.

Information for the required evaluation may be gathered from numerous sources, including:

- Inspection data (Section 1.3)
- Original equipment manufacturer (OEM) instructions
- Internal engineering
- Industry operational experience

The results of the analysis will include a data display and report, with appropriate displays summarizing the period’s activities in sufficient depth to evaluate the effectiveness of the inspection and maintenance program. The report shall highlight systems, components and/or items that exceed the established performance standards and those that do not. The report shall also document and detail the repairs and modifications that were made to systems, components and items that were operating below an acceptable design level of reliability and safety.

As part of the analysis and reporting, a change recommendation may be made including the following:

- Increased or decreased inspection scope and interval
- Altering the inspection/maintenance program(s) methods, processes, or procedures
- Combinations of interval, scope, and program changes

1.5 Change process

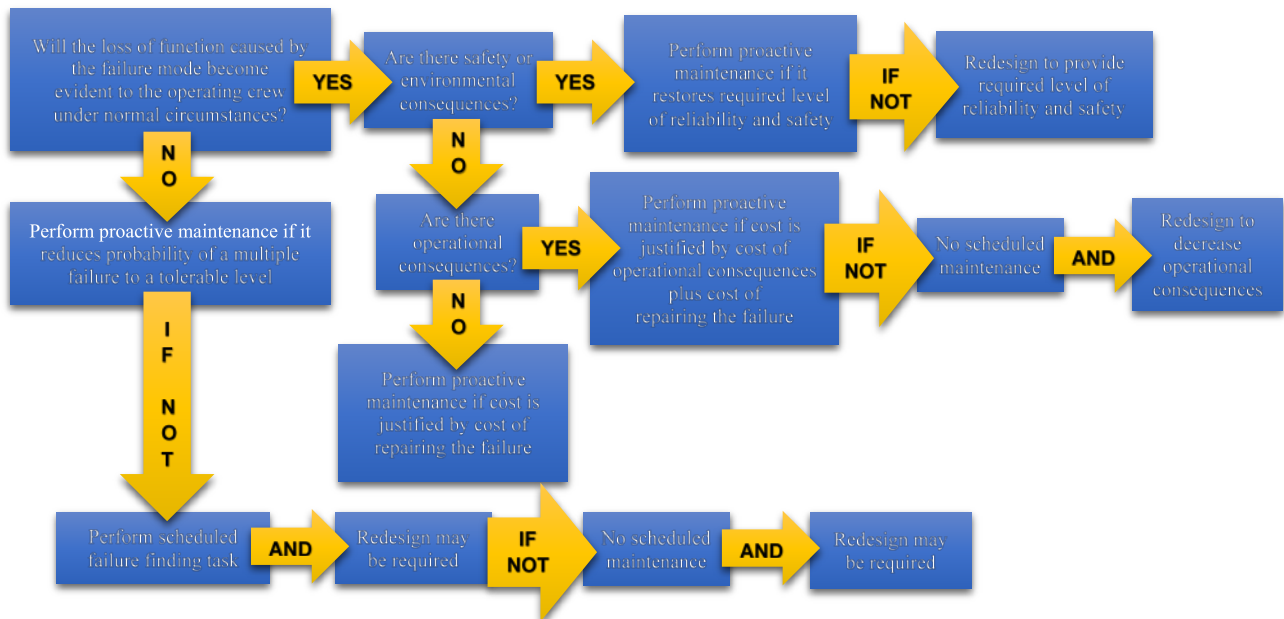
Adjust the inspection interval and/or the inspection program (such as the methods used to collect data, process change, or procedures related to reliability measurements and/or performance standards).

Start with the evaluation of recommendations from the analysis in Section 1.4. In the consideration of any recommendations for change, regulatory compliance must be ensured. In determining the impact of any recommended change, a risk analysis process must be utilized. The risk analysis process includes consideration of the following:

- Visibility of a functional failure (whether a failure is hidden or evident to the operating crew under normal circumstances)
- Visibility of reduced resistance to failure (evidence that a failure is imminent)
- Life or age-reliability characteristics of each item
- The category of evident failure consequences (i.e., safety and environmental consequences, operational consequences, or nonoperational consequences)

After consideration of the consequences (see **Figure 2** for a purely informative example), the risk assessment will evaluate how likely a failure is based upon the analysis in Section 1.4. The risk assessment will determine if the risk is tolerable based on corporate guidelines, as well as any other APTA or regulatory guidance on minimum levels of system, subsystem and component reliability and safety. The economic trade-off between the cost of scheduled maintenance and the benefits to be derived from it is also evaluated in the risk assessment.

FIGURE 2
Failure Consequences Flow Chart (Informative Only)



The safety impacts of this recommended change shall be evaluated pursuant to the requirements of the railroad system safety plan and 49 CFR Part 238.503, Inspection, Testing, and Maintenance Requirements.

Related APTA standards

APTA PR-IM-S-013-99, Latest Revision, “Passenger Car Periodic Inspection and Maintenance”

References

Besides applicable federal, state and local regulations; SMPs; and OEM instructions, this safety standard shall be used in conjunction with the following publication. If the following publication is superseded by an approved revision, then the revision shall apply.

49 CFR Part 238, Passenger Equipment Safety Standards, Subpart F—Inspection, Testing, and Maintenance Requirements for Tier II Passenger Equipment, Subsection 238.503, Inspection, Testing, and Maintenance Requirements, October 2000.

Definitions

data analysis: A systematic evaluation of an item based on a statistically valid sample and an analysis of collected information. The analysis should compare the data to a standard representing acceptable performance. The data analysis may be 1) a running average; 2) a tabulation of defects; 3) removal rates for past periods; and/or 4) graphs, charts or any other method depicting a norm.

data collection system: The system used to gather, store and catalog performance results for the purpose of analysis and regulatory compliance.

environmental consequences: Includes environmental damage or the breach of any known environmental standard or regulation.

nonoperational consequences: Consequences that involve the direct cost of repair.

operational consequences: Consequences that include reduced output, schedule delay, negative impacts on customer service and/or operating costs in addition to direct repair costs.

original equipment manufacturer (OEM) instructions: The technical documentation produced by the organization that built or manufactured a specific piece of passenger rail equipment describing maintenance procedures and frequencies for that piece of equipment.

periodic maintenance: The performance of selected inspection and maintenance actions on systems or subsystems. Regulatory agencies or the operating authority may set the frequency of these actions. The frequency may be expressed as a function of time (e.g., days, weeks, or months) or of utilization (e.g., mileage or cycles).

reliability: The ability of a component or system to perform a known task/function for a specified interval (time, cycles, etc.).

safety consequences: Injury or death or the breach of any known safety standard or regulation. The safety impacts of modifications to the inspection and maintenance standard shall be evaluated pursuant to the requirements of the railroad system safety plan and 49 CFR, Part 238.503, Inspection, Testing, and Maintenance Requirements.

standard maintenance procedure (SMP): The internal railroad document giving specific instruction on how to perform maintenance on a specific system or compound.

Abbreviations and acronyms

CFR	Code of Federal Regulations
NATSA	North American Transportation Services Association
OEM	original equipment manufacturer
PRESS	Passenger Rail Equipment Safety Standards
SMP	standard maintenance procedure

Summary of document changes

- Document formatted to the new APTA standard format.
- Sections have been moved and renumbered, as have their references within the document.
- Scope and summary moved to the front page and revised.
- Sections of definitions, abbreviations and acronyms moved to the rear of the document.
- Two new sections added: “Summary of document changes” and “Document history.”
- Some global changes to section headings and numberings resulted when sections dealing with references and acronyms were moved to the end of the document, along with other cosmetic changes, such as capitalization, punctuation, spelling, grammar and general flow of text.
- Slight wording changes to periodic maintenance definition to bring in line with standard PRESS definition for periodic maintenance.
- Removal of the word “instructions” from OEM under “Abbreviations and acronyms” section.
- Participants list updated.
- Figures redesigned.

Document history

Document Version	Working Group Vote	Public Comment/ Technical Oversight	CEO Approval	Policy & Planning Approval	Publish Date
First published	—	—	—	—	Oct. 27, 1999
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