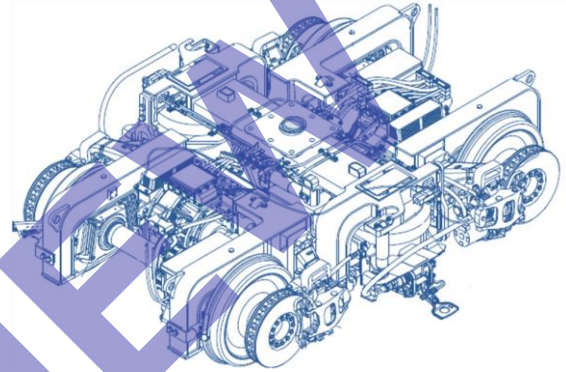
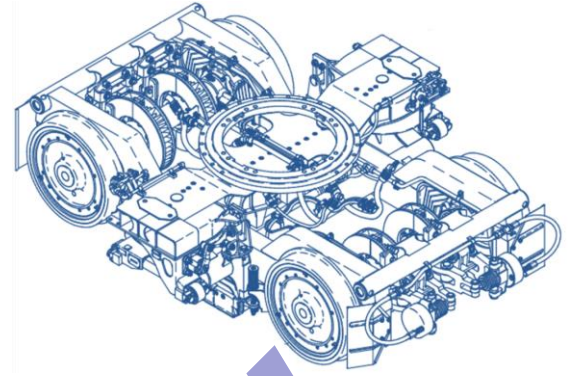


Inspection and Maintenance of Trucks and Axles

Course 202



PARTICIPANT GUIDE

 RAIL CAR TRAINING CONSORTIUM

Truck Systems

Inspection and Maintenance

Course 202

Participant Guide

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REVISION INDEX

Any additions, deletions, or revisions are to be listed below.

Date	Description of Change	Revision Author
11-Feb-2019	Updated information on ground brush maintenance.	CDT
27-Feb-2019	Updated information on speed sensor.	CDT

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Note: All images contained within this document were contributed by Rail Car Training Consortium members unless otherwise noted.

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PREVIEW

MODULE 1

General Inspection and Maintenance

Outline

- 1-1 Course Overview
- 1-2 Periodic Maintenance
- 1-3 Summary

Outcome and Objectives

This module is a general overview to inspection and maintenance tasks on major components of the rail vehicle's truck systems. Following the completion of this module, the participant should be able to:

- Explain agency periodic maintenance schedule for truck systems.
- Explain lockout/tagout.
- Describe required PPE practices.

Abbreviations

APTA	American Public Transportation Association
HRV	Heavy Rail Vehicle
LRV	Light Rail Vehicle
PPE	Personal Protective Equipment
RTS	Rail Transportation System
SMP	Standard Maintenance Procedure
SOP	Standard Operating Procedure

1-2 PERIODIC MAINTENANCE

Periodic maintenance is the performance of selected inspection and maintenance actions on truck systems and their subsystems. The maintenance schedules vary by rail transportation systems and are largely based on these factors: federal, state, and local regulations; OEM-recommended intervals; industry experience; operating environment/conditions; historical data; performance requirements; failure analysis; agency’s testing and experience; reliability centered maintenance programs.

Figure 1.1 is a sample of a maintenance schedule for the journal bearings of a rail car truck used in Santa Clara Valley Transportation Agency.

Part Description	Preventive Maintenance Task	Maintenance Intervals					Location R = Roof E = Exterior I = Interior U = Undercar	Preventive Maintenance Manual Section Reference
		A	B	C	D	E		
Journal Bearings	Inspect journal bearing for grease leakoff, check housing for discoloration, cracks or abnormal appearance. If grease leakoff occurs, troubleshoot, repair and re-lubricate		X				U/Trailer Truck	8.4.6.2
	Remove journal bearings, disassemble and repack with grease				X		U/Trailer Truck	8.4.6.2
A = 10,000 miles (two months) B = 30,000 miles (six months)		C = 60,000 miles (one year) D = 120,000 miles (two years)			E = 240,000 miles (four years)			

Figure 1.1 Maintenance Schedule –Courtesy VTA



Learning Application 1A

Compare this maintenance schedule shown in this table with the those recommended by your agency.

1-3 SUMMARY

This module reviewed general safety as well as defined periodic maintenance.

MODULE 2

Suspension, Frame, Bolster

Outline

- 2-1 Overview
- 2-2 Primary Suspension
- 2-3 Secondary Suspension
- 2-4 Frame
- 2-5 Bolster
- 2-6 Car Leveling
- 2-7 Summary

Outcome and Objectives

This module guides the participant through inspection and maintenance tasks on major components of the rail vehicle's suspension, frame, and bolster systems. Following the completion of this module, the participant should be able to complete the following inspection and maintenance tasks with an accuracy of 75% or greater on the following truck subsystems:

- Primary Suspension
- Secondary Suspension
- Frame
- Bolster
- Car Leveling

Key Terms

- Shimming

Abbreviations

APTA	American Public Transportation Association
HRV	Heavy Rail Vehicle
LRV	Light Rail Vehicle
OEM	Original Equipment Manufacturer
RTS	Rail Transportation System

2-1 OVERVIEW

MODULE 2: SUSPENSION, FRAME, BOLSTER

This module provides a framework for rail car technicians to approach inspection and maintenance of the truck's suspension, frame, and bolster systems. There's also a short section on car leveling procedures. Truck suspension systems are configured in various ways depending on design and manufacturer and this module describes some configurations across Consortium properties. While some of the inspection steps in this module are not specific to your agencies, the basic principles should apply. As far as possible, this course uses several examples of truck suspension systems.

As mentioned in the previous module, there are two types of trucks: powered trucks, sometimes known as motor trucks, and unpowered trucks, sometimes known as trailer trucks. Both types of trucks have similar suspension components. Some major components of the truck's suspension system is shown in Figure 2.1.

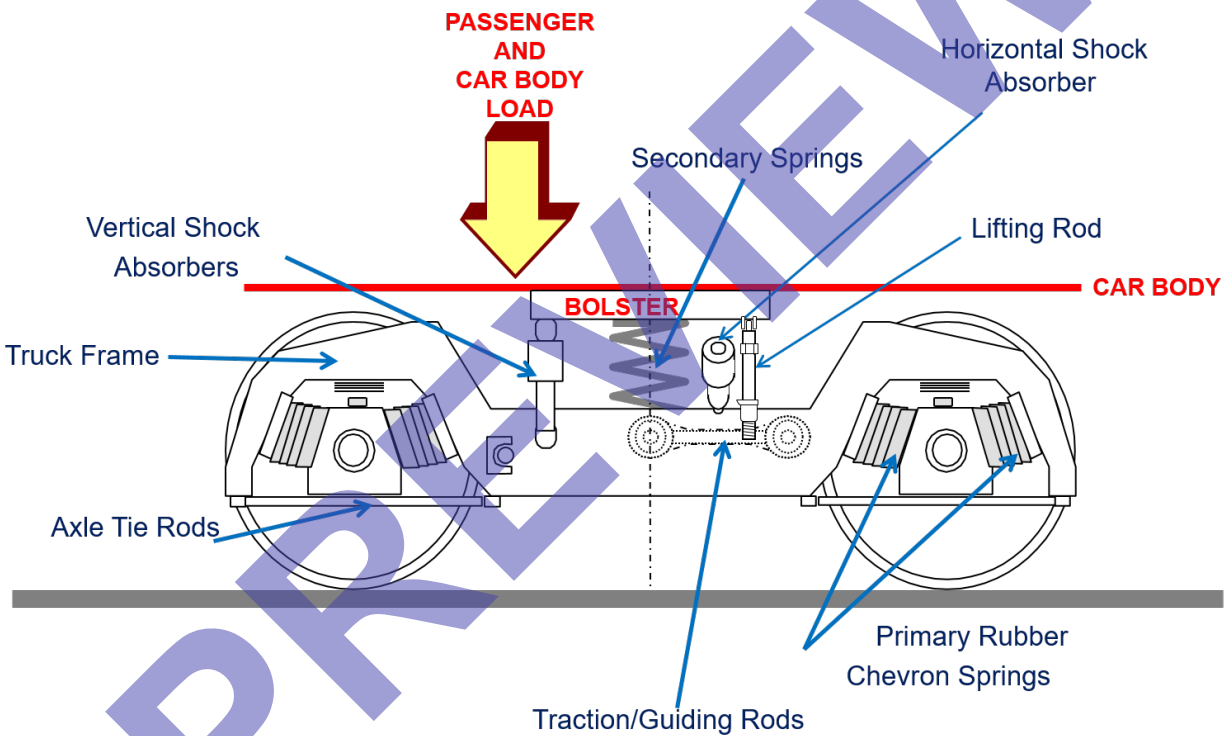


Figure 2.1 Suspension System Major Components

In all the inspection and maintenance procedures listed in this module, the participant should refer to the OEM's maintenance manuals for particulars such as torque values, voltage settings, pass/fail criteria, condemning limits, clearance measurements and specific procedure methodology. Component failures or deficiencies should be noted by the rail car technician and resolved within the recommended procedures of the OEM in conjunction with their agency.

Inspection

Chevron springs are the main components of the rail car's primary suspension.

Learning Application 2A

The link below is a video of a rail car technician performing a visual inspection of chevron springs on an LRV truck at the MBTA, Boston.

1. What are the four key points of inspection mentioned in this video?
2. Compare these key points with your agency's recommendations for visual inspection of chevron springs.
3. Below are excerpts from two agencies' manuals regarding visually inspecting chevron springs. Compare these inspection recommendations with those recommended by your agency.



a) Chevron spring inspections include visual checks for loose or missing adjustment plates, mounting screws, pedestal beam and bolts. Visually inspect for rubber deformation, separation and cracks, and for indications of contact with the frame. –Courtesy DART

b) Perform a general inspection of the chevron springs. Watch for any heat damage that may indicate a journal bearing failure. Inform the Supervisor if any springs are found which exhibit cracking or splitting, delaminating between the rubber and steel, or damaged steel components. –Courtesy WMATA

<https://vimeo.com/303831280>

Length: 2 minutes

Password provided by your instructor.

MODULE 2: SUSPENSION, FRAME, BOLSTER

Periodicity Miles (Interval)	Equipment	Task
60K (Annually)	Powered truck buffers (emergency springs)	<ol style="list-style-type: none"> 1. Inspect buffers for damage, accumulation of debris, and loose mounting hardware. 2. Check security of hardware securing buffer to adapter. Torque bolt per OEM specification. 3. Check security of hardware securing adapter to truck frame. Torque bolt per OEM specification. 4. Check security of end stops. Torque bolts per OEM specification.
	Unpowered truck buffers (emergency springs).	<ol style="list-style-type: none"> 1. Inspect buffers for damage, accumulation of debris, and loose mounting hardware. 2. Check security of hardware securing adapter to truck frame. Torque bolt per OEM specifications. 3. Check security of end stops. Torque bolts per OEM specifications.

Learning Application 2C



How do the periodicity and tasks in the above table compare to your agency's practice of inspecting and maintaining secondary suspension systems?

MODULE 3

Gearboxes and Gear Units

Outline

- 3-1 Overview
- 3-2 Sub-systems and Major Components
- 3-3 Summary

Outcome and Objectives

This module guides the participant through inspection and maintenance tasks on major components of the rail vehicle's gear systems. Following the completion of this module, the participant should be able to complete the following inspection and maintenance tasks with an accuracy of 75% or greater on the following (listed alphabetically):

- Bearings and races
- High-speed coupling
- Housing
- Lubrication
- Pinion assembly
- Seals
- Speed sensor

Abbreviations

APTA	American Public Transportation Association
FTA	Federal Transit Administration
HRV	Heavy Rail Vehicle
LRV	Light Rail Vehicle
PPE	Personal Protective Equipment
RTS	Rail Transportation System

3-1 OVERVIEW

This module outlines the inspection and maintenance tasks for the gearbox and gear units on the rail truck. The module is divided into four topic areas:

1. Gearbox
2. Speed Sensor
3. High Speed Coupling Assembly
4. Pinion Assembly

3-2 GEARBOX

The arrangement of gearbox or gear units vary by rail vehicle manufacturer and this module points out general inspection and maintenance approaches to the gearbox on the rail truck. The expectation is that participants will compare the recommended approaches here to those specific to their transportation agency.

Learning Application 3A

Click on the link below to watch video of a rail car technician performing inspection and maintenance of a **gearbox** on an LRV truck. The following questions can be used for discussion in class:

1. What are some visual checks of the gearbox housing that the technician performed?
2. What are some indications that the gearbox may be overfilled?
3. What does the technician check for when he removed the filling cap or inspection port?
4. What is the potential hazard that the technician mentions when he removed the cap for the gearbox oil?
5. What is the purpose of safety wiring as demonstrated in the video?



<https://vimeo.com/303830726>

Length: 10 minutes

Password:

MODULE 4

Wheels and Axles

Outline

- 4-1 Overview
- 4-2 Axles
- 4-3 Wheels and Tires
- 4-4 Ground Brush and Journal Housing
- 4-5 Summary

Outcome and Objectives

This module guides the participant through inspection and maintenance tasks on major components of the rail vehicle's wheelset assembly. Following the completion of this module, the participant should be able to complete the following inspection and maintenance tasks with an accuracy of 75% or greater on the following (listed alphabetically):

- Ground Brush and Housing
- Journal Bearings and Housing
- Leveling Devices
- Load Weight Sensor / transducer
- Shims
- Tires
- Traction/Radius Rod and brushings
- Tripping Device
- Up Stops and Down Stops/Pedestal Bar

Key Terms

- Toe
- Toe-in
- Toe-out

Abbreviations

APTA	American Public Transportation Association
HRV	Heavy Rail Vehicle
LRV	Light Rail Vehicle
RTS	Rail Transportation System

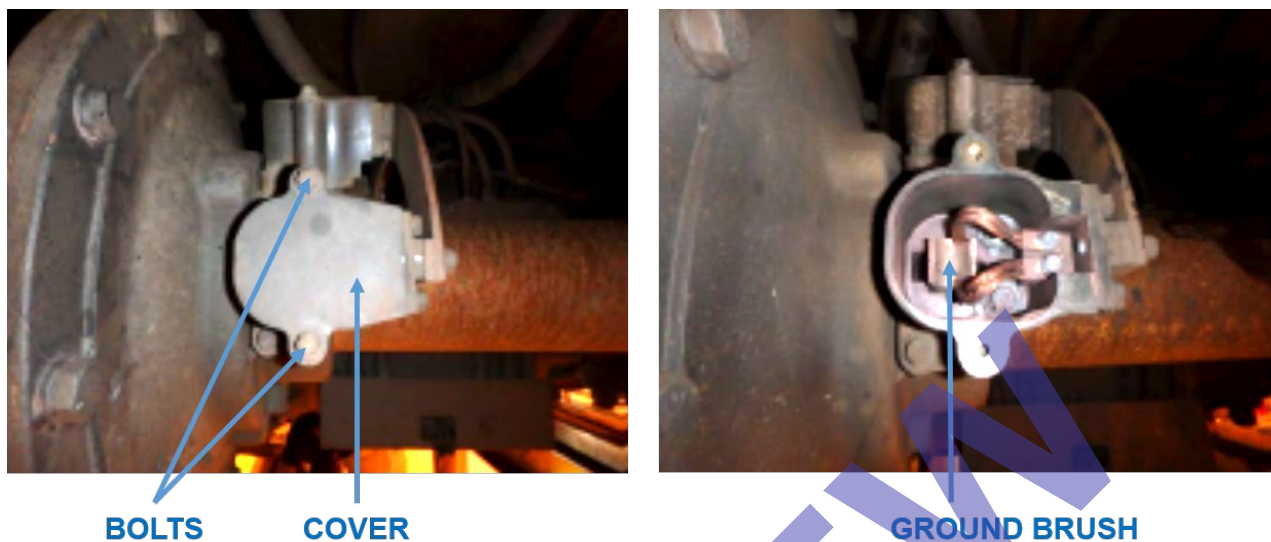


Figure 4.2 Ground Brush Unit Covered and Uncovered –Courtesy WMATA

Learning Application 4D

Click on the link below to watch video of a rail car technician performing inspection on the **ground brush assembly**. The following questions can be used for discussion in class:



1. What is the purpose of the brush spring?
2. For the brush itself, what does the technician check for?
3. How is ground brush wear measured?

<https://vimeo.com/303831361>

Length: 4 minutes

Password:



Warning: Safety Precautions!

- Remove ONE ground brush at a time. If there are faults with other grounds, the technician risks electrical shock.
- If all ground brushes are removed and power is applied to the vehicle, anyone coming into contact with the vehicle risks electrical shock.