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National Rail Car Training Consortium

Course Catalog



Prepared For Rail Car Consortium Members

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Disclaimer: These courses are intended to educate employees of public transportation systems that have agreed to voluntarily participate in the Rail Car Training Consortium. It is intended only as informal guidance on the matters addressed, and should not be relied upon as the only method or manner for performing the tasks or work outlined in the materials. Anyone using this document or information provided in the associated training program should rely on his or her own independent judgment or, as appropriate, seek the advice of a competent professional in determining the exercise of care in any given circumstances. These materials are based on compendiums of knowledge from transit employees, manufacturers and outside consultants, each of whom may approach a repair, update, or maintenance in their own unique way. Always follow the safety and maintenance procedures from your own agency, union, relevant OEM(s) and/or regulatory organizations. In addition, the course materials include examples from member agencies, nomenclature, procedures, and configurations which can vary from one transit location to another. The document that you are now referencing may have been modified by the Consortium member. For the original versions, please go to TransitTraining.net or contact the Transportation Learning Center.

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Overview

Started in late 2015, the National Rail Car Training Consortium (Rail Car Consortium or Consortium) has moved forward with its mission to create standardized national training courseware for rail car technicians. The development team composed of over 40 rail car maintenance subject matter experts (SMEs) from 18 member agencies and unions from across the country along with instructional systems designers from the International Transportation Learning Center (ITLC), design curriculum and courseware for the rail and transit industry. By joining the Rail Car Training Consortium, agencies improve technician skills and prepare for new fleet implementation or upgrade internal capacity to refurbish existing fleet.

Since its inception, the Rail Car Consortium has developed a full suite of courseware to include: HVAC, Auxiliary Power Systems, Propulsion and Dynamic Braking, Doors, Friction Brakes, Current Collection & Distribution, Communication Systems, Automatic Train Control, Carbody, Trucks and Axles and Couplers. Additionally, the Rail Car Consortium has developed Overview to Rail Vehicle Subsystems, Troubleshooting and Diagnostics Principles and Rail Car Train-the-Trainer.

Rail Car Consortium course deliverables include:

- Participant Guides
- Instructor Guides
- PowerPoints with instructor notes
- Pre and Post Course Assessments
- Module Quizzes
- Instructional Videos
- Hands-on learning activities
- eLearning modules

For more information on the Rail Car Consortium, contact Kristen Ribaud at Kribaud@transportcenter.org.

Figure 1. Member Locations of the Rail Car Consortium (2025)

CATS Charlotte, NC	Metro Transit 9 ATU 1005 Minneapolis, MN	SD MTS San Diego, CA
GCRTA /ATU 268 Cleveland, OH	NFTA / ATU 1342 Buffalo, NY	Sound Transit Seattle, WA
MBTA / ATU 589 Boston, MA	Patco Lindenwold, NJ	TriMet / ATU 757 Portland, OR
MD MTA / ATU 1300 Baltimore, MD	SacRT / IBEW 1245 Sacramento, CA	WMATA /ATU 689 Washington, D.C

Figure 2. Course Sequence

 RAIL CAR CONSORTIUM COURSES					
Topic Areas	100 Level Overview		200 Level Inspection & Maintenance		300 Level Troubleshooting
Overview	100	Overview of Major Systems	Not Applicable		300 Troubleshooting Principles
Couplers	101	Intro and Overview to Couplers	201	Couplers Inspection and Maintenance	301 Troubleshooting Couplers
Trucks and Axles	102	Intro and Overview to Trucks and Axles	202	Trucks and Axles Inspection and Maintenance	302 Troubleshooting Trucks and Axles
Propulsion & Dynamic Braking	103	Intro and Overview to Propulsion & Dynamic Braking  eLearning Incl.	203	Propulsion & Dynamic Braking Inspection and Maintenance	303 Troubleshooting Propulsion & Dynamic Braking
APS & Batteries	104	Intro and Overview to APS & Batteries	204	APS & Batteries Inspection and Maintenance	304 Troubleshooting APS & Batteries
Friction Brakes	105	Intro and Overview to Friction Brakes	205	Friction Brakes Inspection and Maintenance	305 Troubleshooting Friction Brakes
HVAC	106	Intro and Overview to HVAC  eLearning Incl.	206	HVAC Inspection and Maintenance	306 Troubleshooting HVAC
Current Collection & Distribution	107	Intro and Overview to Current Collection and Distribution	207	Current Collection Inspection and Maintenance	307 Troubleshooting Current Collection & Distribution
Carbody	108	Intro and Overview to Carbody	208	Carbody Inspection and Maintenance	308 Troubleshooting Carbody
Doors	109	Intro and Overview to Doors	209	Doors Inspection and Maintenance	309 Troubleshooting Doors
Onboard Communication	110	Intro and Overview to Onboard Communication Systems	210	Onboard Communication Systems Inspection and Maintenance	310 Troubleshooting Onboard Communication Systems
Automatic Train Control	111	Intro and Overview to Automatic Train Control	211	Automatic Train Control Inspection and Maintenance	311 Troubleshooting Automatic Train Control
Special Topics					
Rerail	150	Intro and Overview to Rerailing  eLearning Incl.	Not Applicable		
Safety	151	General Safety for Transit Maintenance  eLearning	Not Applicable		
Wheel Truing	Not Applicable		251	Intro and Overview to Wheel Truing	Not Applicable
Networking	152	Intro and Overview to Networking	Not Applicable		
Wheel Press	Not Applicable		252	Intro and Overview to Wheel Press	Not Applicable
Wire Maintenance	153	Introduction to Wire Maintenance  eLearning	Not Applicable		

100 Level Courses

Course 100: Introduction and Overview to Rail Vehicle Systems, Operation and Maintenance

Course Description

This two-day course presents an overview of rail vehicle systems as well as general inspection and maintenance procedures. Participants engage in a series of activities that help them prepare to work on rail vehicles in a maintenance facility for passenger rail cars. Content is supplemented with examples to support participants' successful application of the course content to their work.

This course is organized into five modules. Within each module there may be several learning application activities and demonstrations. Before starting the course instruction, participants are expected to complete a **Pre-Course Assessment** to assess their knowledge of the subject. Similarly, after instruction of all the modules, participants will complete a **Post-Course Assessment** as well as a course evaluation.

Classroom Instruction: 15.7 hours	Hands-on Instruction: 45 minutes/participant <i>Hands-on instruction time provided is the amount of time to complete in the field activities. Instructors will have to calculate hands-on instruction time based on the number of participants in each class to determine total course instruction time.</i>
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Module 1: Introduction to the Rail Vehicle

Outcome: Explains parts, classes and environment of the rail vehicle.

 Duration of this Module: 151 minutes

 This Module has a Quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Identify classes of rail
- Identify parts of the rail vehicle
- Explain the rail vehicle dynamic envelope
- Explain the rail vehicle environment
- Identify the Direct Current (DC) disconnect

Module 2: Vehicle Worker Protection and Shop Safety

Outcome: Explains safety related protocols, procedures and hazards.

 Duration of this Module: 249 minutes

 This Module has a Quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Identify general rail car personal protective equipment (PPE)
- Identify shop and yard hazards and related safety.
- Identify emergency response resources.
- Explain the importance of a job safety briefing.
- Identify methods for and explain importance of housekeeping.

Module 3: Introduction to Resources

Outcome: Explains importance of and how to use resources a rail car technician will use within the scope of his/her job.

 Duration of this Module: 160 minutes

 This Module has a Quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Locate and describe the importance of technical manuals.
- Describe and explain the importance of bulletins, SOPs, and SDSs.
- Explain how to use manuals for parts, maintenance, etc.
- Locate and explain a work order as used in your agency.

Module 4: Introduction to Rail Vehicle Inspection and Maintenance

Outcome: Explain the importance and types of inspection and maintenance.

 Duration of this Module: 174 minutes

 This Module has a Quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Identify types of maintenance.
- Explain importance of inspection.

- Differentiate between types, strength, and identification of nuts, bolts, and screws.
- Identify DC disconnect and related shop power.
- Explain lockout/tagout.
- Explain purpose, use and safety considerations of tools used in rail vehicle maintenance.
- Describe communication within the shop.
- Identify safety procedures specific to shop procedures and environment.

Module 5: Introduction to Rail Vehicle Systems

Outcome: Explains rail vehicle systems

 Duration of this Module: 205 minutes

 This Module has a Quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Identify car body areas and parts of the rail vehicle.
- Identify rail vehicle electrical systems.
- Identify rail vehicle mechanical systems.
- Identify rail vehicle braking.
- Identify rail vehicle comfort systems.
- Suspension systems.
- Identify rail vehicle communication.

Course 101: Introduction and Overview to Rail Vehicle Couplers

Course Description

This course presents an overview to the principles of couplers for the new maintenance worker. The class focuses on different types of coupler systems and their major components. Participants engage in a series of activities that help them prepare to work on couplers in a maintenance facility for passenger rail cars. Content is supplemented with examples and hands-on learning activities to support participants' successful application of the course content to their work.

This course is organized into three modules. Within each module there may be several learning application activities and demonstrations. Before starting the module instruction, participants are expected to complete a **pre-course assessment** to assess their knowledge of the subject. Similarly, after instruction of all the modules, participants will complete a **post-course assessment** as well as a course evaluation.

***Note for instructors:** *This course is designed for instructors to teach Modules which are applicable to the specific type of coupler used at their agency. Instructors will all teach Modules 1, 4, 5 and will choose 2 or 3 based on the type of coupler used at their agency.*

Classroom Instruction: 10 hours (if teaching all modules)	Hands-on Instruction: 45 minutes/participant <i>Hands-on instruction time provided is the amount of time to complete in the field activities. Instructors will have to calculate hands-on instruction time based on the number of participants in each class to determine total course instruction time.</i>
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Module 1: Introduction and Overview to Couplers

Outcome: Explains the principles of operation of couplers and understands basic component definitions.

 Duration of this module: 45 minutes

 This module does not have a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Explain the principle of operation of Couplers
- Identify different types of Couplers
- Explain the general definition of Coupler components

Module 2: The Scharfenburg Coupler

Outcome: Explains and identifies components specific to the Scharfenburg Coupler

 Duration of this module: 187 minutes

 This module has a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Identify and explain the function of mechanical components to the Scharfenburg Coupler
- Identify and explain the function of electrical components to the Scharfenburg Coupler
- Identify and explain the function of pneumatic components to the Scharfenburg Coupler

Module 3: The Tomlinson Coupler

Outcome: Explains and identifies components specific to the Tomlinson Coupler

 Duration of this module: 170 minutes

 Hands-on Learning Activities

 This module has a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Identify and explain the function of mechanical components to the Tomlinson Coupler
- Identify and explain the function of electrical components to the Tomlinson Coupler
- Identify and explain the function of pneumatic components to the Tomlinson Coupler

Module 4: Operating a Coupler

Outcome: Explains how to automatically and manually coupler and uncouple a rail vehicle.

 Duration of this module: 136 minutes

 This module has a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Explain the procedure for automatically coupling a rail vehicle

- Explain the procedure for automatically uncoupling a rail vehicle
- Explain the procedure for manually uncoupling a rail vehicle

Module 5: Inspection and Maintenance Tools

Outcome: Explains and identifies tools used for inspection and maintenance of rail vehicle couplers

 Duration of this module: 104 minutes

 This module has a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- List and explain the function of tools used to inspect and maintain the coupler

Course 102: Introduction and Overview to Truck Systems

Course Description

This course provides participants with an overview of the principles of truck systems in preparation for participants to work on those systems in a rail car maintenance facility. The class focuses on truck systems and their major components. Participants engage in a series of activities that help them prepare to work on truck systems in a maintenance facility for passenger rail cars. Content is supplemented with examples to support participants' successful application of the course content to their work.

This course has five Modules. Within each Module, there may be several learning application activities and demonstrations.

Before beginning instruction, participants are expected to complete a **Pre-Course Assessment** to assess their knowledge of the subject. Similarly, after instruction of all the modules, participants will complete a **Post-Course Assessment** and a course evaluation.

Classroom Instruction: 7.5 hours	Hands-on Instruction: To be updated in next version <i>Hands-on instruction time provided is the amount of time to complete in the field activities. Instructors will have to calculate hands-on instruction time based on the number of participants in each class to determine total course instruction time.</i>
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Module 1: Principle of Operation of Trucks

Outcome: This Module introduces the principles of operation of truck systems.

 Duration of this Module: 57 minutes

 This Module includes video

 This Module has a Quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Describe the principle of operation of a rail car truck.
- Identified major components of a truck.

Module 2: Suspension

Outcome: This Module defines the primary and secondary suspension systems and their major components on a rail car truck.

 Duration of this Module: 101 minutes

 This Module has a Quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Explain the principles of operation of the suspension system on a rail car.
- List the major components of rail vehicle suspension.
- Explain the principles of operation of the bolster.

Module 3: Gearboxes

Outcome: This Module defines the gearbox and its major components on a rail car truck.

 Duration of this Module: 108 minutes

 This module has a Quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Explain the principles of operation of the gearbox system on a rail car truck.
- List the major components common to rail vehicle gearbox systems.

Module 4: Wheels and Axles

Outcome: Reviews the principles of operation of the truck's wheels and axles and their major components.

 Duration of this Module: 73 minutes

 This module has a Quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Explain the principles of operation of the rail vehicle wheelset assembly.
- List the major components common to rail vehicle wheelset assembly.

Module 5: Tools

Outcome: Reviews basic tools the technician will likely use when working on rail vehicle trucks.

🕒 Duration of this Module: 66 minutes

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Examine lists of specialized tools used in the inspection and maintenance of rail car trucks.

Course 103: Introduction and Overview to Propulsion and Dynamic Braking

Course Description

This course presents an overview of the principles of propulsion and dynamic braking and prepares the new maintenance technician to work on those systems. Course participants engage in a series of activities that help them prepare to work on propulsion and dynamic braking systems in a maintenance facility for passenger rail cars. Content is supplemented with examples to support participants' successful application of the course to their work.

This course has five modules. **Please note that Module 2 is specific to AC propulsion and Module 3 to DC propulsion.** The course instructor may choose to use one or both of these modules depending on their training needs.

Within each course module there may be several learning application activities and demonstrations. Before starting the module instruction, participants are expected to complete a **pre-course assessment** to assess their knowledge of the subject. Similarly, after instruction of all the modules, participants will complete a **post-course assessment** as well as a course evaluation.

Classroom Instruction: 9 hours	Hands-on Instruction: To be updated in next version <i>Hands-on instruction time provided is the amount of time to complete in the field activities. Instructors will have to calculate hands-on instruction time based on the number of participants in each class to determine total course instruction time.</i>
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Module 1: General Principles and Terminology

Outcome: Identifies the principles and terminologies associated with maintenance of rail car propulsion and dynamic braking systems.

 Duration of this module: 2 hours

 This module includes video

 This module has a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Explain basic theory of operation on a rail car's propulsion system.
- Explain basic theory of operation of rail car's dynamic braking system.
- Describe principles of motor theory.
- Compare AC and DC motors with respect to rail cars.
- Recall the theory of grounding circuits with respect to rail cars.

Module 2: Principles of Propulsion of AC Propulsion

Outcome: Identifies the major components of AC propulsion

 Duration of this module: 144 minutes

 This module has a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Explain the five functional areas of the AC propulsion system: Switching; Filtering; Dynamic Braking; Power Inversion; and Motors.
- Identify major components with each of the five functional areas of an AC propulsion system
- Describe principles of induction motor theory
- Identify the major components of the foundation subsystems of a hydraulic brake system: Electronic control, brake control, and braking devices

Module 3: Principles of Operation of DC Propulsion

Outcome: Identifies the major components of AC propulsion

 Duration of this module: 172 minutes

 This module has a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Explain the four functional areas of the DC propulsion system: Switching; Filtering; Traction Control and Dynamic Braking; and Motors.
- Identify major components within each of the four functional areas of a DC propulsion system.
- Explain the theory of operation of a DC motor.

Module 4: Principles of Operation of Dynamic Braking

Outcome: Identifies the principles and terminologies associated with maintenance of rail car propulsion and dynamic braking systems.

🕒 Duration of this module: 45 minutes

✍️ This module has a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Describe the theory of the motor as a generator.
- Explain regenerative braking.
- Explain resistive braking.
- Explain dynamic braking.
- Summarize other types of braking systems on a rail car to include: Friction braking; Hydraulic or pneumatic disk brakes; Track brakes; and Blended braking.

Module 5: Tools

Outcome: Identifies tools and materials used by technicians when working on propulsion and dynamic braking systems.

🕒 Duration of this module: 60 minutes

✍️ This module has a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Identify the following tools and supplies used when working around the propulsion and dynamic braking systems including: bench test equipment; portable test equipment; signal generator to test sensors; digital multimeter; re-pin connectors; acetylene torch; oscilloscopes; anti-static bags; torque wrenches; hand tools; crimping tool; soldering tools; heat shrink guns; and strap wrench.

Course 103: Propulsion eLearning Supplement

RV103: Propulsion eLearning Supplement

In this 20-minute eLearning module with interactive activities, learners will demonstrate knowledge in the following areas:

- General safety rules and guidelines
- Lockout/tagout
- Personal Protective Equipment (PPE)
- Electrical Shock Hazards
- AC Propulsion Systems
 - a. Switching
 - b. Filtering
 - c. Dynamic Braking
 - d. Power Inversion
 - e. Motors
- DC Propulsion Systems
 - a. Switching
 - b. Filtering
 - c. Traction Control
 - d. Dynamic Braking
 - e. Motors

This eLearning module can supplement the Rail Car Consortium's Instructor-led training materials on Propulsion or be used as refresher training.

Course 104: Introduction and Overview to APS and Battery Systems

Course Description

This one-day course presents an overview of the principles of APS and Battery Systems for the new maintenance worker. The class focuses on types of systems and their APS and Battery Systems major components. Participants engage in a series of activities that help them prepare to work on APS and battery systems in a maintenance facility for passenger rail cars. Content is supplemented with examples to support participants' successful application of the course content to their work.

This course is organized into four modules. Within each module there may be several learning application activities and demonstrations. Before starting the module instruction, participants are expected to complete a **pre-course assessment** to assess their knowledge of the subject. Similarly, after instruction of all the modules, participants will complete a **post-course assessment** as well as a course evaluation.

Classroom Instruction: 6 hours	Hands-on Instruction: To be updated in next version <i>Hands-on instruction time provided is the amount of time to complete in the field activities. Instructors will have to calculate hands-on instruction time based on the number of participants in each class to determine total course instruction time.</i>
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Module 1: Power Collection and Shop Power

Outcome: Explains the basics of power collection and its distribution to the APS & battery systems.

 Duration of this module: 90 minutes

 This module includes video

 This module has a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Identify input sources of power to a rail vehicle
- Describe the theory of ground circuits
- Diagram the flow of power from high voltage to low voltage in a rail vehicle

Module 2: Auxiliary Power Supply

Outcome: Explains conditioning of power in the rail vehicle's auxiliary power supply system in order to supply power for the vehicle's onboard electrical needs.

🕒 Duration of this module: 126 minutes

✍️ This module has a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Discuss the concept of power conditioning with respect to the rail vehicle's auxiliary power supply system
- Identify the three main capacities in the auxiliary power supply
- Identify major components and devices within each main area of the auxiliary power supply

Module 3: Batteries

Outcome: Describes battery systems on a rail vehicle.

🕒 Duration of this module: 65 minutes

📺 This module includes video

✍️ This module has a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- List major components of a NiCd battery
- Specify the relationship between batteries and low voltage power supply
- Discuss purpose of batteries in a rail vehicle
- Identify principles of battery operation
- Identify battery peripherals, battery management systems, chargers, etc.
- Identify battery calls, voltage

Module 4: Tools

Outcome: Describes some of the common hand and diagnostic tools used in the maintenance of auxiliary power supply and battery systems on a rail vehicle.

🕒 Duration of this module: 60 minutes

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Identify major components that comprise the foundation brake equipment of friction braking systems.
- Describe the functions of the foundation brake equipment.

Course 105: Introduction and Overview to Friction Brakes

Course Description

This course presents an overview of the principles of friction braking systems and their major components to prepare the new maintenance technician for work on those systems. Course participants engage in a series of activities that help them prepare to work on friction brakes in a maintenance facility for passenger rail cars. Content is supplemented with examples to support participants' successful application of the course content to their work.

This course is organized into six modules. **Please note that Module 2 is specific to pneumatic braking and Module 3 to hydraulic braking.** The course instructor may choose to use one or both of these modules depending on their training needs.

Within each module there may be several learning application activities and demonstrations. Before starting the module instruction, participants are expected to complete a **Pre-Course assessment** to assess their knowledge of the subject. Similarly, after instruction of all the modules, participants will complete a **Post-Course assessment**. Instructors and participants are encouraged to complete a course evaluation at the end.

Classroom Instruction: 10.2 hours	Hands-on Instruction: To be updated in next version <i>Hands-on instruction time provided is the amount of time to complete in the field activities. Instructors will have to calculate hands-on instruction time based on the number of participants in each class to determine total course instruction time.</i>
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Module 1: General Principles and Terminology

Outcome: Explains general principles and terminology related to friction brakes

 Duration of this Module: 56 minutes

 This Module has a quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Describe a rail vehicle's braking control system.
- Explain the purpose of friction braking.
- Categorize common classifications of friction braking systems.

Module 2: Pneumatic Braking Systems

Outcome: Explains principles and major components to Pneumatic Braking Systems

 Duration of this Module: 140 minutes

 This Module has a quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Explain the principles of operation of a pneumatic brake system
- Identify the major components of the foundation subsystems of a pneumatic brake system: Electronic control, brake control, air supply, and braking devices.

Module 3: Hydraulic Braking Systems

Outcome: Explains principles and major components to Hydraulic Braking Systems

 Duration of this Module: 175 minutes

 This Module has a quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Explain the principles of operation of a hydraulic brake system.
- Identify the major components of the foundation subsystems of a hydraulic brake system: Electronic control, brake control, and braking devices.

Module 4: Electromechanical Brakes

Outcome: Explains principles and major components to Electromechanical Brakes

 Duration of this Module: 78 minutes

 This Module has a quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Explain the principles of operation of a hydraulic brake system.
- Identify the major components of the foundation subsystems of a hydraulic brake system: Electronic control, brake control, and braking devices.

Module 5: Foundation Brake Equipment

Outcome: Explains functions and components of foundation brake equipment

 Duration of this Module: 56 minutes

 This Module has a quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Identify major components that comprise the foundation brake equipment of friction braking systems.
- Describe the functions of the foundation brake equipment.

Module 6: Tools and Materials

Outcome: Explains tools used for working on rail vehicle's friction brake systems

 Duration of this Module: 75 minutes

 This Module has a quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Identify tools and supplies specific to working on a rail vehicle's friction brake system.

Course 106: Introduction and Overview of HVAC Systems with eLearning Supplement

Course Description

This course presents an overview of the principles of HVAC systems for the new maintenance worker. The class focuses on types of HVAC systems and their major components. Participants engage in a series of activities that help them prepare to work on HVAC systems in a maintenance facility for passenger rail cars. Content is supplemented with examples to support participants' successful application of the course content to their work.

This course is organized into four modules. Within each module there may be several learning application activities and demonstrations. Before starting the module instruction, participants are expected to complete a **pre-course assessment** to assess their knowledge of the subject. Similarly, after instruction of all the modules, participants will complete a **post-course assessment** as well as a course evaluation.

Classroom Instruction: 9.4 hours	Hands-on Instruction: 90 minutes/participant <i>Hands-on instruction time provided is the amount of time to complete in the field activities. Instructors will have to calculate hands-on instruction time based on the number of participants in each class to determine total course instruction time.</i>
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Module 1: Overview of Rail Car HVAC and General Safety Procedures

Outcome: Demonstrates knowledge of the hazards and proper handling of refrigerant, Personal Protective Equipment generally used by HVAC technicians, and safety rules and procedures related to HVAC maintenance.

 Duration of this module: 185 minutes

 This module has a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Demonstrate knowledge of Clean Air Act of 1990, EPA 608 Certification, Refrigerant Hazards and Proper Handling Techniques

Module 2: Background Knowledge

Outcome: Demonstrates knowledge of basic theories of heat, as well the basic concepts regarding refrigeration and air conditioning. Understands the basic components of a typical heating system and HVAC piping and tubing.

 Duration of this module: 240 minutes

 This module has a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Demonstrate knowledge of the basic theories of heat
- Describe the basic concepts of refrigeration and air conditioning
- Describe the basic components and basic concepts of a typical heating system
- Demonstrate basic knowledge of HVAC piping and tubing

Module 3: Tools

Outcome: Explains the purpose and operations of tools used in HVAC maintenance

 Duration of this module: 140 minutes

 Hands-on Learning Activities

 This module has a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

The rail car technician should be able to explain the use of tools in HVAC inspection and maintenance including:

- Temperature measuring device
- Acid test kit
- Refrigerant recovery/recycle machine
- Two-stage vacuum pumps
- Pressure and vacuum micron gauge
- Manifold gauge set
- Refrigerant leak detectors
- Breakout box
- Air flow hood, anemometer or other velocity/volume-measuring device
- Scale
- Tubing, brazing and soldering tools
- Portable test unit

Course 106: HVAC eLearning Supplement

RV106: HVAC eLearning Supplement

In this 20-minute eLearning module with interactive activities, learners will demonstrate knowledge in the following areas:

- Demonstrate knowledge of the basic theories of heat
- Describe the basic concepts of refrigeration and air conditioning
- Describe the basic components and key components of the refrigeration cycle
- Read a pressure gauge to perform troubleshooting of the HVAC system

This eLearning module can supplement the Rail Car Consortium's Instructor-led training materials on HVAC or be used as refresher training.

Course 107: Introduction and Overview to Current Collection

Course Description

This one-day course presents an overview of the principles of current collection for the new maintenance worker. The class focuses on types of current collection systems and their major components. Participants engage in a series of activities that help them prepare to work on current collection systems in a maintenance facility for passenger rail cars. Content is supplemented with examples to support participants' successful application of the course content to their work.

This course consists of four modules. **Please note that Module 2 is specific to overhead catenary systems and Module 3 to third rails.** The course instructor may choose to use one or both of these modules depending on their training needs.

Within each Module, there may be several learning application activities and demonstrations. Before beginning instruction, participants are expected to complete a **Pre-Course Assessment** to assess their knowledge of the subject. Similarly, after instruction of all the modules, participants will complete a **Post-Course Assessment** as well as a course evaluation.

Classroom Instruction: 6.5 hours	Hands-on Instruction: 60 minutes/participant <i>Hands-on instruction time provided is the amount of time to complete in the field activities. Instructors will have to calculate hands-on instruction time based on the number of participants in each class to determine total course instruction time.</i>
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Module 1: Overhead Catenary

Outcome: Module 1 explains the basics of power collection from overhead catenary and distribution to the pantograph and associated equipment.

 Duration of this Module: 191 minutes

 This Module includes video

 This Module has a quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Describe the principle of operation of the overhead catenary with respect to the pantograph.
- Identify major components of the pantograph and associated equipment.

Module 2: Third Rail

Outcome: Module 2 explains the basics of power collection from the third rail and distribution to the pantograph and associated equipment.

🕒 Duration of this Module: 134 minutes

✍️ This Module has a quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Describe the principle of operation of the third rail.
- Identify major components of the third rail system.

Module 3: Tools

Outcome: Module 3 presents overview to some of the common hand and diagnostic tools for maintainers who are expected to work on current collection systems on rail vehicles.

🕒 Duration of this Module: 71 minutes

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Identify the following:
 - Hotstick
 - On/Off Rail Height Gauge
 - Spring Tension Gauge (Fish Scale)
 - Torque Wrench
 - Volt Meter (Megger)

Course 108: Introduction and Overview to Carbody

Course Description

This course presents an overview of a carbody for the new maintenance worker. The class focuses on interior, exterior and articulation (and their major components) of a carbody. Participants engage in a series of activities that help them prepare to work on carbody components in a maintenance facility for passenger rail cars. Content is supplemented with examples to support participants' successful application of the course content to their work.

This course consists of four modules. Within each Module, there may be several learning application activities and demonstrations. Before beginning instruction, participants are expected to complete a **Pre-Course Assessment** to assess their knowledge of the subject. Similarly, after instruction of all the modules, participants will complete a **Post-Course Assessment** as well as a course evaluation.

Classroom Instruction: 3.4 hours	Hands-on Instruction: To be updated in next version <i>Hands-on instruction time provided is the amount of time to complete in the field activities. Instructors will have to calculate hands-on instruction time based on the number of participants in each class to determine total course instruction time.</i>
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Module 1: Carbody Overview

Outcome: This Module reviews safety procedures, the modern passenger carbody history and gives learners a lesson of comprehension for carbody basics.

 Duration of this Module: 60 minutes

 This Module includes videos

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Describe the carbody structure.
- Identify various carbody configurations.
- List five (5) maintainable areas of the carbody.

Module 2: Carbody Interior

Outcome: Module 2 outlines the major areas of the carbody interior and its components.

 Duration of this Module: 59 minutes

 This Module includes video

 This Module has a quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- List the major components common to the carbody interior.
- Describe the functions of carbody interior components.

Module 3: Carbody Exterior

Outcome: Module 3 outlines the major areas of the carbody exterior and their components.

 Duration of this Module: 47 minutes

 This Module has a quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- List the major components common to the carbody exterior
- Describe functions of carbody exterior components

Module 4: Articulation

Outcome: Module 4 identifies the primary components of the articulation section of a rail vehicle.

 Duration of this Module: 31 minutes

 This Module includes video

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- List the major components common to the articulation section.
- Describe the functions of articulation.

Course 109: Introduction and Overview to Rail Vehicle Doors

Course Description

This course presents an overview of the principles of rail vehicle doors for the new maintenance worker. The class focuses on types and location of door assemblies and their major components. Participants will engage in a series of activities that help them prepare to work on rail vehicle doors in a maintenance facility for passenger rail cars. Content is supplemented with examples to support participants' successful application of the course content to their work.

This course is organized into three Modules. Within each Module there may be several learning application activities and demonstrations. Before starting the Module instruction, participants are expected to complete a **Pre-Course Assessment** to assess their knowledge of the subject. Similarly, after instruction of all the Modules, participants will complete a **Post-Course Assessment** as well as a course evaluation.

Classroom Instruction: 12.3 hours	Hands-on Instruction: To be updated in next version <i>Hands-on instruction time provided is the amount of time to complete in the field activities. Instructors will have to calculate hands-on instruction time based on the number of participants in each class to determine total course instruction time.</i>
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Module 1: General Safety Procedures for Door Operation and Maintenance

Outcome: Explains potential hazards, safety procedures and equipment for handling maintenance, inspection and troubleshooting procedures on rail vehicle doors.

 Duration of this Module: 230 minutes

 Hands-on Learning Activities

 This Module has a quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Identify electrical hazards.
- Demonstrate knowledge of mechanical safety hazards.
- Identify other workplace hazards.
- List personal protective equipment (PPE) specifically required when handling door inspection and maintenance.
- Demonstrate proper care and storage of PPE.
- Demonstrate the proper use of PPE.
- Explain safe practices.

Module 2: Introduction and Overview to Rail Vehicle Door Components

Outcome: Explains the components of rail vehicle door assemblies.

 Duration of this module: 330 minutes

 Hands-on Learning Activities

 This Module has a quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Explain the difference in location of doors.
- Explain key components of rail vehicle doors.
- Analyze the difference commands associated with doors.
- Demonstrate knowledge in no-motion system doors.
- Demonstrate the proper use of PPE.

Module 3: Rail Car Door Inspection and Maintenance Tools

Outcome: Explains common tools used when inspecting and maintaining rail vehicle doors.

 Duration of this module: 180 minutes

 Hands-on Learning Activities

 This module has a quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Demonstrate the ability to use a Portable Test Unit (PTU).
- Demonstrate the ability to use different types of gauges.
- Demonstrate the ability to use an obstruction detection tester.
- Identify other tools used by the rail car technician.

Course 110: Introduction and Overview to Rail Vehicle Communication Systems

Course Description

This one-day course presents an overview of the principles of communication systems for the new maintenance worker. The class focuses onboard communication systems and their major components. Participants engage in a series of activities that help them prepare to work on rail vehicle communication systems in a maintenance facility for passenger rail cars. Content is supplemented with examples to support participants' successful application of the course content to their work.

This course is organized into three modules. Within each module there may be several learning application activities and demonstrations. Before starting the module instruction, participants are expected to complete a **Pre-Course Assessment** to assess their knowledge of the subject. Similarly, after instruction of all the modules, participants will complete a **Post-Course Assessment** as well as a course evaluation.

Classroom Instruction: 6.5 hours	Hands-on Instruction: To be updated in next version <i>Hands-on instruction time provided is the amount of time to complete in the field activities. Instructors will have to calculate hands-on instruction time based on the number of participants in each class to determine total course instruction time.</i>
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Module 1: Principle of Operation of Communication Systems

Outcome: Explains the principles of operation and different types of rail vehicle communication systems.

 Duration of this Module: 67 minutes

 This Module does not have a Quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Explain the principle of operation of communication systems
- Explain different types of communication, which include:
 - Communication between operator and public;
 - Communication between operator and control center; and
 - Communication between vehicle and control center.

Module 2: Rail Vehicle Communication System Components

Outcome: Explains common components which make up the rail vehicle communication system.

 Duration of this module: 174 minutes

 This Module has a Quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Identify and explain communication system components.

Module 3: Communication System Tools

Outcome: Explains common tools used to inspect and maintain rail vehicle communication systems.

 Duration of this module: 152 minutes

 Hands-on Learning Activities

 This Module does not have a Quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Demonstrate the ability to identify, use and explain communication systems specific tools

Course 111: Introduction and Overview to Automatic Train Control (ATC)

Course Description

This 1-day course presents an overview of the principles of Automatic Train Control (ATC) for the new maintenance worker. The class focuses on types of ATC systems and their major components. Participants engage in a series of activities that help them prepare to work on ATC systems in a maintenance facility for passenger rail cars. Content is supplemented with examples to support participants' successful application of the course content to their work.

This course is organized into six modules. Within each module there may be several learning application activities and demonstrations. Before starting the module instruction, participants are expected to complete a **pre-course assessment** to assess their knowledge of the subject. Similarly, after instruction of all the modules, participants will complete a **post-course assessment** as well as a course evaluation.

Classroom Instruction: 9 hours	Hands-on Instruction: <i>Hands-on instruction time provided is the amount of time to complete in the field activities. Instructors will have to calculate hands-on instruction time based on the number of participants in each class to determine total course instruction time.</i>
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Module 1: Overview to Automatic Train Control

Outcome: Explains safety procedures, specific to Automatic Train Control

 Duration of this module: 50 minutes

 This module has a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Explain the basics of Automatic Train Control (ATC).
- Identify segments of track.
- Explain the train's location and position.

Module 2: Automatic Train Protection

Outcome: Explain the principle of operation of Automatic Train Protection

 Duration of this module: 102 minutes

 This module has a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Explain the principle of operation of Automatic Train Protection
- Describe the function of the ATP system

Module 3: Automatic Train Operation

Outcome: Explains the principle of operation of Automatic Train Operation

 Duration of this module: 50 minutes

 This module has a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Explain the principle of operation of Automatic Train Operation
- Describe the function of the ATO system

Module 4: Train to Wayside Communication

Outcome: Explains the principle of operation of Train to Wayside Communication

 Duration of this module: 66 minutes

 This module has a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Explain the principle of operation of Train to Wayside Communication
- Explain the function of Train to Wayside Communication
- Identify and explain:
 - TWC Antenna
 - TWC Code Control Box

Module 5: Automatic Train Control Supervision

Outcome: Explains the principle of operation of Automatic Train Control Supervision

🕒 Duration of this module: 48 minutes

✍️ This module has a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Explain the principle of operation of Automatic Train Control Supervision
- Describe the function of the ATCS system

Module 6: Common Components

Outcome: Identify and explain common Automatic Train Control components

🕒 Duration of this module: 91 minutes

✍️ This module has a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Demonstrate the ability to identify and explain common ATC components

Module 7: Tools

Outcome: Explain tools which are specifically used for inspection and maintenance of ATC components

🕒 Duration of this module: 92 minutes

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Demonstrate the ability to identify, explain and use:
 - PTU/PTE
 - Crew/Activation Key
 - Cab Signal Generator

Course 150: Introduction and Overview to Rerailing with eLearning Supplement

Course Description

This 1 ½ day course presents an overview of rerailing equipment and procedures for the new maintenance worker. The class focuses on major components of the rerail system. Participants engage in a series of activities that help them prepare to work on rerailing in a maintenance facility for passenger rail cars. Content is supplemented with examples to support participants' successful application of the course content to their work.

This course is organized into two modules. Within each module there may be several learning application activities and demonstrations. Before starting the module instruction, participants are expected to complete a **Pre-Course Assessment** to assess their knowledge of the subject. Similarly, after instruction of all the modules, participants will complete a **Post-Course Assessment** as well as a course evaluation.

Classroom Instruction: 11.7 hours	Hands-on Instruction: To be updated in next version <i>Hands-on instruction time provided is the amount of time to complete in the field activities. Instructors will have to calculate hands-on instruction time based on the number of participants in each class to determine total course instruction time.</i>
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Module 1: General Safety for Rerail Operation

Outcome: Explains safety hazards and rerail protocols to be followed during rerail operations

 Duration of this Module: 199 minutes (3.3 hours)

 Number of Slides: 41

 This Module has a Quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Explain safety hazards during rerail operations.
- Identify risk mitigation strategies for rerail safety hazards.
- Explain communication practices to be followed at a derailment scene.
- Identify Personal Protective Equipment (PPE).
- Identify and explain rerail departmental roles and responsibilities.

Module 2: Rerail System Equipment and Tools

Outcome: Explains equipment and tools used during the rerail process

 Duration of this Module: 202 minutes (3.4 hours)

 Number of Slides: 47

 This module has a Quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Identify and explain equipment used for rerail operation.
- Identify and explain tools used for rerail operation.

Module 3: Processes and Procedures for Rerail Operation

Outcome: Explains overview to processes and procedures for rerail operation.

 Duration of this Module: 225 minutes (3.75 hours)

 Number of Slides: 26

 This module has a Quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Explain rerail preventive maintenance procedures
- Explain arrival at scene procedures
- Explain how to set up rerail jacks
- Explain steps for performing a rerail operation
- Explain a rerail Push and Pull test
- Explain rerail cleanup procedures
- Explain rerail techniques using wreckers, cranes and tow trucks

Course 150: Introduction and Overview to Rerailing eLearning Supplement

Module Description

In this 15-minute self-led eLearning module with interactive activities, learners will demonstrate knowledge in the following areas:

- Setup rerail equipment and prepare the derailment scene
- Rerail a train

This eLearning module can supplement the Rail Car Consortium's Instructor-led training materials on rerailing or be used as refresher training.

Course 151: Introduction and Overview to Safety for Transit Maintenance Workers (eLearning Course)

Course Description

This 2.5 hour course provides an overview of workplace safety principles for rail vehicle technicians. Participants learn about hazard recognition, personal protective equipment (PPE), environmental and chemical risks, mechanical and electrical safety, lockout/tagout procedures, right-of-way safety, confined spaces, and blue signal protection.

The course consists of nine modules, which can be completed in any order. Each module includes an assessment, and a final post-course assessment is also included.

Module 1: Personal Protective Equipment (PPE)

Outcome: List appropriate personal protective equipment (PPE) for different work environments and general PPE maintenance.

 Duration of this Module: 43 minutes

 This Module has a Quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Identify common types of PPE used in maintenance.
- Explain the importance of job briefings in selecting appropriate PPE.
- Describe general maintenance guidelines for PPE commonly used in maintenance.
- Explain the responsibilities of employers and employees in ensuring PPE is used effectively.

Module 2: Environmental Safety

Outcome: List environmental factors contributing to heat and cold stress, and preventive measures.

 Duration of this Module: 10 minutes

 This Module has a Quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Understand how environmental factors, specifically hot and cold weather, contribute to heat and cold stress.

- Recognize the common types of heat and cold stress.
- Describe preventive measures to reduce the risk of heat and cold stress.

Module 3: Chemical Safety

Outcome: Describe common workplace chemical hazards, their potential health effects, and the role of Safety Data Sheets (SDS) in hazard identification.

 Duration of this Module: 24 minutes

 This Module has a Quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Identify common chemical hazards in the workplace, such as liquids and fumes.
- Describe the potential health effects of chemical exposure.
- Explain the role of Safety Data Sheets (SDS) in identifying hazards and implementing safety precautions.
- Explain the scope and purpose of the Hazardous Waste Operations and Emergency Response (HAZWOPER) standards.
- Describe the importance of proper chemical storage and handling procedures.
- Describe the essential components of chemical spill protection.

Module 4: Biohazard Safety

Outcome: Explain biological hazards, the infection chain, sharps and waste handling risks, and OSHA reporting procedures for needlestick and sharps injuries.

 Duration of this Module: 13 minutes

 This Module has a Quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Identify biological hazards in maintenance and how they are transmitted.
- Explain the chain of infection and its role in protecting against biological hazards.
- Recognize risks associated with improper handling of sharps, equipment, PPE, and waste.
- Understand how to record and update needlestick and sharps injuries to comply with OSHA requirements.

Module 5: Mechanical Safety

Outcome: Describe mechanical movement types, associated hazards, and injury prevention measures.

 Duration of this Module: 10 minutes

 This Module has a Quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Explain the different types of mechanical movements.
- Describe the potential hazards associated with rotating parts, reciprocating components, and other mechanical systems.
- Identify basic safety measures to prevent injuries from mechanical hazards.

Module 6: Electrical Safety

Outcome: Describe electrical hazards, risks, and accident prevention protocols.

 Duration of this Module: 12 minutes

 This Module has a Quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Identify common electrical hazards encountered in maintenance.
- Understand the potential risks associated with electrical hazards.
- Describe key safety protocols and procedures for preventing electrical accidents.

Module 7: Lockout Tagout (LOTO)

Outcome: Explain the importance of Lockout Tagout (LOTO) procedures and the necessary steps in the process.

 Duration of this Module: 7 minutes

 This Module has a Quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Explain the importance of Lockout Tagout (LOTO) procedures in ensuring safety.
- Identify the necessary steps in the LOTO process.
- Describe the proper use of LOTO equipment, such as combination locks.
- Recognize potential risks associated with failing to follow LOTO procedures.

Module 8: Roadway Worker Protection and Confined Space Safety

Outcome: Explain the importance of Roadway Worker Protection (RWP) for Right-of-Way safety, as well as the characteristics and safety procedures of a Permit-Required Confined Space.

 Duration of this Module: 20 minutes

 This Module has a Quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Explain the importance of Roadway Worker Protection (RWP) for Right-of-Way safety.
- Describe fundamental track safety principles.
- Explain the characteristics that define a Permit-Required Confined Space.
- List procedures for safely working in a Permit-Required Confined Space.

Module 9: Blue Signal Protection

Outcome: Explain the purpose of blue signals and their display requirements.

 Duration of this Module: 5 minutes

 This Module has a Quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Explain the purpose of blue signals.
- Describe the actions prohibited when blue signals are displayed.
- Identify where blue signals must be displayed.
- Identify the responsibilities of workers in maintaining blue signal protection.

Course 153: Introduction to Wire Maintenance (eLearning Course)

Course Description

This 45-minute eLearning course offers participants essential knowledge on basic wire repair principles and includes practical scenarios to help apply what they've learned to real-world situations.

The course consists of seven modules, that can be completed in any order. This course has a post course assessment.

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Define common terms
- Implement basic units of measurement
- Differentiate between material types
- Identify common wiring components
- Read and interpret a wire labeling system
- Classify common types of insulation and shielding
- Recognize best practices for wire routing, tracing, and termination
- Identify proper tools and usage

The modules in the Wire Maintenance eLearning course include:

1. Wiring Terminology
2. Introduction to Wiring
3. Wire Routing, Tracing, and Termination
4. Voltage and Measurement
5. Inspection of Wires
6. Introduction to Wiring Repairs
7. Wire Maintenance and Repair Tools

Course 154: Introduction to Wiring Schematics (eLearning Course)

Course Description

This 10-minute eLearning module offers participants foundational knowledge on what a wiring schematic is and the basic components to a wiring schematic

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Define wiring schematic
- Identify and explain the elements of a wiring schematic
- Demonstrate the ability to read a grid sheet
- Demonstrate the ability to trace power on a wiring schematic

200 Level Courses

Course 201: Inspection and Maintenance of Couplers

Course Description

This ½ -day course presents an overview of inspection and maintenance for coupler systems. The class focuses on types of coupler systems and inspection and maintaining their major components. Participants engage in a series of activities that help them prepare to work on couplers in a maintenance facility for passenger rail cars. Content is supplemented with examples to support participants' successful application of the course content to their work.

This course is organized into three modules. Within each module there may be several learning application activities and demonstrations. Before starting the module instruction, participants are expected to complete a **pre-course assessment** to assess their knowledge of the subject. Similarly, after instruction of all the modules, participants will complete a **post-course assessment** as well as a course evaluation.

Classroom Instruction: 4 hours	Hands-on Instruction: 45 minutes/participant <i>Hands-on instruction time provided is the amount of time to complete in the field activities. Instructors will have to calculate hands-on instruction time based on the number of participants in each class to determine total course instruction time.</i>
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Module 1: Preparing for Inspection

Outcome: Explains required PPE and hazards to be aware of when inspecting and maintaining couplers

 Duration of this module: 66 minutes

 This module has a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Explains safety hazards that exist when inspecting couplers
- Identify PPE required for inspection and maintenance of couplers

Module 2: Inspection and Maintenance of Coupler Components

Outcome: Explains the general procedures for inspection and maintenance of the coupler

 Duration of this module: 169 minutes

 This module does not have a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Demonstrate the ability to perform a pre-trip inspection
- Demonstrate the ability to inspect and maintain mechanical coupler components
- Demonstrate the ability to inspect and maintain electrical coupler components
- Demonstrate the ability to inspect and maintain pneumatic coupler components

Course 202: Inspection and Maintenance of Truck Systems

Course Description

This course provides participants with the essential steps for the inspection and maintenance of railcar trucks and their subsystems. The class focuses on suspension, frame, bolster, gearboxes, wheels, and axels and their components. Participants engage in a series of activities that help them prepare to work on truck systems in a maintenance facility for passenger rail cars.

This course has four modules that should be taught over two days, if you include break times for participants. Within each module, there may be learning application activities and demonstrations.

Before beginning instruction, participants are expected to complete a **pre-course assessment** to assess their knowledge of the subject. Similarly, after instruction of all the modules, participants will complete a **post-course assessment** as well as a course evaluation.

Classroom Instruction: 5.4 hours	Hands-on Instruction: 30 minutes/participant <i>Hands-on instruction time provided is the amount of time to complete in the field activities. Instructors will have to calculate hands-on instruction time based on the number of participants in each class to determine total course instruction time.</i>
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Module 1: General Inspection and Maintenance

Outcome: This module is a general overview to inspection and maintenance tasks on major components of the rail vehicle's truck systems.

🕒 Duration of this module: 30 minutes

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

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

Module 2: Suspension, Frame, Bolster

Outcome: This module guides the participant through inspection and maintenance tasks on major components of the rail vehicle's suspension, frame, and bolster systems.

🕒 Duration of this module: 115 minutes

📺 This module includes video

Learning Objectives

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

Module 3: Gearboxes and Gear Units

Outcome: This module guides the participant through inspection and maintenance tasks on major components of the rail vehicle's gear systems.

🕒 Duration of this module: 108 minutes

📺 This module includes video

Learning Objectives

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

Module 4: Wheels and Axles

Outcome: This module guides the participant through inspection and maintenance tasks on major components of the rail vehicle's wheelset assembly.

🕒 Duration of this module: 73 minutes

📺 This module includes video

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Explain the principles of operation of the rail vehicle wheelset assembly.
- List the major components common to rail vehicle wheelset assembly.

Course 203: Inspection and Maintenance of Propulsion and Dynamic Braking Systems

Course Description

This course presents an overview of the principles of propulsion and dynamic braking and prepares the new maintenance technician to work on those systems in a transportation rail car maintenance facility. Course participants engage in a series of activities that help them prepare to work on propulsion and dynamic braking systems in a maintenance facility for passenger rail cars. Content is supplemented with examples to support participants' successful application of the course to their work.

This course has three modules. **Please note that Module 2 is specific to AC propulsion and Module 3 to DC propulsion.** The course instructor may choose to use one or both of these modules depending on their training needs.

Within each course module there may be several learning application activities and demonstrations. Before starting the module instruction, participants are expected to complete a **pre-course assessment** to assess their knowledge of the subject. Similarly, after instruction of all the modules, participants will complete a **post-course assessment** as well as a course evaluation.

Classroom Instruction: 7.2 hours	Hands-on Instruction: 20 minutes/participant <i>Hands-on instruction time provided is the amount of time to complete in the field activities. Instructors will have to calculate hands-on instruction time based on the number of participants in each class to determine total course instruction time.</i>
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Module 1: General Principles and Terminology

Outcome: Explains the principles of maintenance for technicians working on a rail car's propulsion systems.

 Duration of this module: 80 minutes

 This module includes video

 This module has a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Explain agency's schedule of inspection and maintenance for rail car's propulsion and dynamic braking system.
- Identify line-replaceable units on propulsion systems
- Examine requirements of PM sheets
- Recognize diagnostics-based maintenance.

Module 2: Principles of Operation of AC Propulsion

Outcome: Identifies the steps involved in inspecting, maintaining, and testing components of an AC propulsion system on rail cars.

 Duration of this module: 80 minutes

 Hands-on Learning Activities

 This module includes videos

 This module has a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Inspect and maintain major components on an AC propulsion system on a rail car including: propulsion inverter, master controller, IGBT, blower, filter capacitors, brake choppers, and others.

Module 3: Principles of Operation of DC Propulsion

Outcome: Identifies the steps involved in inspecting, maintaining, and testing components of an DC propulsion system on rail cars.

 Duration of this module: 270 minutes

 Hands-on Learning Activities

 This module includes videos

 This module has a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Inspect and maintain major components on an DC propulsion system on a rail car including: choppers, cam control, master controller, PCU, resistance banks, HSCB and others.

Course 204: APS and Battery Systems Inspection and Maintenance

Course Description

This one-day course provides participants with the essential steps in inspecting and maintaining APS and battery systems on U.S. transit light and heavy rail cars. Participants engage in a series of activities that help them prepare to work on APS and battery systems in a maintenance facility for passenger rail cars. Content is supplemented with examples to support participants' successful application of the course content to their work.

This course is organized into three modules. Within each module there may be several learning application activities and demonstrations. Before starting the module instruction, participants are expected to complete a **pre-course assessment** to assess their knowledge of the subject. Similarly, after instruction of all the modules, participants will complete a **post-course assessment** as well as a course evaluation.

Classroom Instruction: 5.2 hours	Hands-on Instruction: 20 minutes/participant <i>Hands-on instruction time provided is the amount of time to complete in the field activities. Instructors will have to calculate hands-on instruction time based on the number of participants in each class to determine total course instruction time.</i>
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Module 1: General Safety Procedures

Outcome: Explains some of the principles of maintenance of rail car auxiliary power supply units and batteries.

🕒 Duration of this module: 70 minutes

✍️ This module does not have a quiz

Learning Objectives

Following the completion of this module, the rail car technician should be able to:

- Differentiate between scheduled and unscheduled maintenance
- Identify Line Replaceable Units
- Explain preventive maintenance practice
- Explain importance of keeping accurate maintenance records

Module 2: Power Collection and Shop Power

Outcome: Prepares the rail car technician to perform inspections and basic maintenance on auxiliary power supply systems.

 Duration of this module: 150 minutes

 This module includes video

 This module does not have a quiz

Learning Objectives

Following the completion of this module, the rail car technician should be able to:

- Perform maintenance of APS components such as: Capacitors, Electronic Controls, Ventilation, and IGBTs
- Perform function tests with portable test units.
- Remove and install line replaceable units

Module 3: Auxiliary Power Supply

Outcome: Prepares the rail car technician to perform inspections and basic maintenance on battery systems.

 Duration of this module: 90 minutes

 This module includes video

 This module does not have a quiz

Learning Objectives

Following the completion of this module, the rail car technician should be able to:

- Perform visual and electrical tests of battery cells
- Identify good vs bad cells in batteries
- Inspect and perform maintenance of NiCd Batteries.
- Perform maintenance battery breaker disconnect
- Inspect battery breaker disconnect

Course 205: Inspection and Maintenance of Friction Brakes

Course Description

This course provides participants with the essential steps for inspecting and maintaining friction brakes on transit rail cars. Course participants will engage in a series of activities that help them prepare to work on friction brakes in a maintenance facility for passenger rail cars. Content is supplemented with examples to support participants' successful application of the course content to their work.

This course has five Modules. **Please note that Module 2 is specific to pneumatic braking and Module 3 to hydraulic braking.** The course instructor may choose to use one or both of these Modules depending on their training needs.

This course is organized into five Modules. Within each Module there may be several learning application activities and demonstrations. Before starting the Module instruction, participants are expected to complete a **Pre-Course Assessment** to assess their knowledge of the subject. Similarly, after instruction of all the Modules, participants will complete a **Post-Course Assessment** as well as a course evaluation.

Classroom Instruction: 8.8 hours	Hands-on Instruction: 60 minutes/participant <i>Hands-on instruction time provided is the amount of time to complete in the field activities. Instructors will have to calculate hands-on instruction time based on the number of participants in each class to determine total course instruction time.</i>
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Module 1: General Inspection and Maintenance

Outcome: Explains general inspection and maintenance as related to friction braking systems

 Duration of this module: 48 minutes

 This module has a quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- List safety considerations specific to working with friction brakes.
- Describe a rail vehicle's braking control system.
- Explain the purpose of friction braking.
- Categorize common classifications of friction braking systems.

Module 2: Pneumatic Braking Systems

Outcome: Explains principle of operation and major components of the Pneumatic Braking System

 Duration of this Module: 128 minutes

 This module has hands-on activities

 This module has a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Explain the principles of operation of a pneumatic brake system
- Identify the major components of the foundation subsystems of a pneumatic brake system: Electronic control, brake control, air supply, and braking devices.

Module 3: Hydraulic Braking Systems

Outcome: Explains principle of operation and major components of the Hydraulic Braking System

 Duration of this Module: 124 minutes

 This Module has hands-on activities

 This Module has a quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Explain the principles of operation of a hydraulic brake system.
- Identify the major components of the foundation subsystems of a hydraulic brake system: Electronic control, brake control, and braking devices.

Module 4: Electromechanical Brakes

Outcome: Explains principle of operation and major components of Electromechanical Brakes

 Duration of this Module: 47 minutes

 This Module has hands-on activities

 This Module has a quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Explain the principles of operation of a hydraulic brake system.
- Identify the major components of the foundation subsystems of a hydraulic brake system: Electronic control, brake control, and braking devices.

Module 5: Foundation Brake Equipment

Outcome: Explains components and functions of Foundation Brake Equipment



Duration of this Module: 181 minutes



This Module has hands-on activities



This Module has a quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Identify major components that comprise the foundation brake equipment of friction braking systems.
- Describe the functions of the foundation brake equipment.

Course 206: Inspection and Maintenance of HVAC Systems

Course Description

This course presents essential steps for inspecting and maintaining HVAC systems for the new maintenance worker. Participants engage in a series of activities that help them prepare to work on HVAC systems in a maintenance facility for passenger rail cars. Content is supplemented with examples to support participants' successful application of the course content to their work.

This course is organized into four modules. Within each module there may be several learning application activities and demonstrations. Before starting the module instruction, participants are expected to complete a **pre-course assessment** to assess their knowledge of the subject. Similarly, after instruction of all the modules, participants will complete a **post-course assessment** as well as a course evaluation.

Classroom Instruction: 18 hours	Hands-on Instruction: To be updated in next version <i>Hands-on instruction time provided is the amount of time to complete in the field activities. Instructors will have to calculate hands-on instruction time based on the number of participants in each class to determine total course instruction time.</i>
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Module 1: Motors

Outcome: Demonstrates knowledge of AC and DC motors used in transit rail car HVAC systems, and ability to perform preventive maintenance and inspection tasks related to these motors.

 Duration of this module: 185 minutes

 This module has a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Demonstrate knowledge of AC and DC motors used in Transit Rail Car HVAC Systems
- Demonstrate ability to inspect and maintain:
 - AC Motor
 - DC Motor and Brushes
 - Motor Coupling
 - Motor Overload Device

Module 2: Refrigerant Handling

Outcome: Demonstrates ability to perform refrigerant handling tasks such as refrigerant leak detection, refrigerant recovery, recycling, reclaiming and disposal, and system evacuation and charging.

 Duration of this module: 290 minutes

 This module has a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Demonstrate ability to:
 - detect refrigerant leaks
 - use refrigerant recovery/recycle machine
 - recover refrigerant
 - properly dispose of refrigerant
 - draw system into a vacuum (evacuate)
 - properly charge a system with refrigerant

Module 3: Refrigeration Components

Outcome: Demonstrates more advanced knowledge and performs hands-on tasks related to the inspection and maintenance of the four major refrigeration components, as well as other special refrigeration components. Demonstrates ability to perform hands-on tasks related to piping, fittings and brazing

 Duration of this module: 405 minutes

 Hands-on Learning Activities

 This module has a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Demonstrate knowledge of Refrigerant-to-Air Evaporators
- Demonstrate ability to inspect and maintain
 - Evaporator Fins
 - Condensation Pan/Drain
 - Condenser Assembly and Fins
 - Evaporator and Condenser Fan Assembly
 - Compressor Assembly, Mountings and Service Valves
 - Protection Devices
 - Expansion Valve
 - Liquid Receiver Tank
 - Filter-drier
 - Air Filters
 - Sight Glass
 - Solenoid Valve

- Pippings and Fittings

Module 4: Heaters, HVAC and Electronic Controls

Outcome: Demonstrates the ability to inspect and maintain heaters, HVAC controls and electronic controls.

 Duration of this module: 210 minutes

 Hands-on Learning Activities

 This module has a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Demonstrate knowledge of basic elements of a control system
- Demonstrate ability for the inspection and maintenance of:
 - heaters
 - temperature sensors
 - Low Pressure Switch, High Pressure Switch, Flow Switch
 - Relays and Contactors
 - Control Boards
 - Overcurrent Protection
 - GFCI Protection
- Demonstrate ability to:
 - work between laptop and PLC programs
 - work with HVAC communications networks

Course 207: Inspection and Maintenance of Current Collection Systems

Course Description

This one-day course provides participants with the essential steps to inspecting and maintaining current collection systems on rail vehicles. The class focuses on overhead catenary and third rail current collection systems and their major components. Participants engage in a series of activities that help them prepare to work on current collection systems in a maintenance facility for passenger rail cars. Content is supplemented with examples to support participants' successful application of the course content to their work.

This course consists of three modules. **Please note that Module 2 is specific to overhead catenary systems and Module 3 to third rails.** The course instructor may choose to use one or both of these modules depending on their training needs. Before starting the module instruction, participants are expected to complete a **Pre-Course Assessment** to assess their knowledge of the subject. Similarly, after instruction of all the modules, participants will complete a **Post-Course Assessment** and a course evaluation.

Classroom Instruction: 5 hours	Hands-on Instruction: 60 minutes/participant <i>Hands-on instruction time provided is the amount of time to complete in the field activities. Instructors will have to calculate hands-on instruction time based on the number of participants in each class to determine total course instruction time.</i>
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Module 1: General Inspection and Maintenance

Outcome: Explains general inspection and maintenance procedures for current collection systems

⌚ Duration of this Module: 38 minutes

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Recognize safety hazards when working on current collector systems.
- Examine and compare maintenance schedules and checklists.
- Inspect and maintain the knife switch assembly.

Module 2: Overhead Catenary Systems

Outcome: Explains inspection and maintenance procedures for overhead catenary systems

🕒 Duration of this Module: 149 minutes

📺 This Module includes videos

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Inspect and maintain pantograph collector head; lowering device; raising mechanism; auto drop; surge/lightning arrestor; and
- Test, inspect, and maintain insulator; coupling rod

Module 3: Third Rail Systems

Outcome: Explains inspection and maintenance procedures for third rail systems

🕒 Duration of this Module: 110 minutes

📺 This Module includes video

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Test, inspect, and maintain the current collector assembly and related components.
- Perform other related maintenance tasks.

Course 208: Inspection and Maintenance of the Rail Carbody

Course Description

This one-day course presents general inspection and maintenance strategies and principles for working on the rail carbody. The class focuses on inspection and maintenance for interior, exterior and articulation (and their major components) of a rail carbody. Participants engage in a series of activities that help them practice and prepare to work on inspection and maintenance of rail carbodies. Content is supplemented with examples to support participants' successful application of the course content to their work.

This course consists of **four** modules. Within each Module, there may be several learning application activities and demonstrations. Before beginning instruction, participants are expected to complete a **Pre-Course Assessment** to assess their knowledge of the subject. Similarly, after instruction of all the modules, participants will complete a **Post-Course Assessment** as well as a course evaluation.

Classroom Instruction: 3.5 hours	Hands-on Instruction: 60 minutes/participant <i>Hands-on instruction time provided is the amount of time to complete in the field activities. Instructors will have to calculate hands-on instruction time based on the number of participants in each class to determine total course instruction time.</i>
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Module 1: General Inspection and Maintenance

Outcome: This Module presents a general overview for inspection and maintenance tasks on major components of the rail vehicle's carbody.

 Duration of this Module: 70 minutes

 This Module includes videos

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Explain agency maintenance schedules for the carbody.
- Describe required PPE practices.
- Apply standard safety precautions when working on the carbody.

Module 2: Carbody Interior

Outcome: Module 2 provides participants with a framework of the steps involved in inspection and maintaining the carbody interior.

 Duration of this Module: 62 minutes

 This Module includes video

 This Module has a quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Check that components of the operator cab are in good working order.
- Inspect condition of flooring, sides, and ceiling for needed repairs.
- Inspect condition of seating and other installations.
- Inspect condition of windows and windscreens.
- Check that interior lighting components are in good working order.

Module 3: Carbody Exterior

Outcome: Module 3 provides participants with a framework of the steps involved in inspecting and maintaining the carbody exterior.

 Duration of this Module: 50 minutes

 This Module includes video

 This Module has a quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Inspect components of the carbody roof.
- Inspect components of the ends of the carbody and its under-frame.
- Inspect condition and components of the sides of the carbody.
- Examine exterior lighting components are in good working order.

Module 4: Articulation

Outcome: Module 4 provides participants with a framework of the steps involved in inspecting and maintaining the articulation system on the rail carbody.

 Duration of this Module: 25 minutes

 This Module includes video

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Inspect articulation panels.
- Inspect articulation floor, rub plates, rubber bearing and bearing support.

- Inspect the bellows assembly.
- Inspect the slewing bearing

Course 209: Inspection and Maintenance of Rail Vehicle Doors

Course Description

This course presents an overview of general inspection and maintenance of rail vehicle door assembly components and prepares the new maintenance technician to work on those systems in a transportation rail car maintenance facility. Course participants engage in a series of activities that help them prepare to work on rail vehicle doors in a maintenance facility for passenger rail cars. Content is supplemented with examples to support participants' successful application of the course to their work.

This course is organized into three Modules. Within each Module there may be several learning application activities and demonstrations. Before starting the Module instruction, participants are expected to complete a **Pre-Course Assessment** to assess their knowledge of the subject. Similarly, after instruction of all the Modules, participants will complete a **Post-Course Assessment** as well as a course evaluation.

Classroom Instruction: 10.4 hours	Hands-on Instruction: 5 minutes/participant <i>Hands-on instruction time provided is the amount of time to complete in the field activities. Instructors will have to calculate hands-on instruction time based on the number of participants in each class to determine total course instruction time.</i>
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Module 1: General Inspection and Maintenance

Outcome: Explain the general inspection and maintenance procedures at your agency.

 Duration of this Module: 90 minutes

 This Module has a quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Explain the benefits of scheduled maintenance.
- Identify the components of a sensory inspection.
- Explain your agency's maintenance schedule.
- Describe the elements of a PM sheet.

Module 2: Door Controls

Outcome: Explains an overview to inspecting and maintaining Door Controls components on rail vehicle doors.

 Duration of this Module: 270 minutes

 Hands-on Learning Activities

 This Module has a quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Demonstrate the ability to explain the elements and perform a functional test.
- Demonstrate the ability to test obstruction detection devices.
- Demonstrate the ability to inspect and test passenger safety mechanisms.
- Demonstrate the ability to inspect a door control unit.

Module 3: Door Panel and Track

Outcome: Explains an overview to inspecting and maintaining Door Panel and Track components on rail vehicle doors.

 Duration of this Module: 265 minutes

 Hands-on Learning Activities

 This Module has a quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Demonstrate the ability to explain the elements and performs a functional test.
- Explain the concept of parallelism.
- Demonstrate the ability to inspect a roller hanger assembly.
- Demonstrate the ability to inspect a door guide.
- Demonstrate the ability to test cab doors.
- Demonstrate the ability to inspect heated thresholds.
- Demonstrate the ability to inspect door glass.
- Demonstrate the ability to inspect gaskets and seals.

Course 210: Inspection and Maintenance of Rail Vehicle Communication Systems

Course Description

This course presents an overview of the inspection and maintenance procedures for rail vehicle communication systems for the new maintenance worker. Participants engage in a series of activities that help them prepare to work on communication systems in a maintenance facility for passenger rail cars. Content is supplemented with examples to support participants' successful application of the course content to their work.

This course is organized into two modules. Within each module there may be several learning application activities and demonstrations. Before starting the module instruction, participants are expected to complete a **Pre-Course Assessment** to assess their knowledge of the subject. Similarly, after instruction of all the modules, participants will complete a **Post-Course Assessment** as well as a course evaluation.

Classroom Instruction: 5.6 hours	Hands-on Instruction: 20 minutes/participant <i>Hands-on instruction time provided is the amount of time to complete in the field activities. Instructors will have to calculate hands-on instruction time based on the number of participants in each class to determine total course instruction time.</i>
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Module 1: Getting Started on Inspection and Maintenance of Communication Systems

Outcome: Explains safety requirements inspection and maintenance schedules for rail vehicle communication systems.

 Duration of this Module: 59 minutes

 This Module does **not** have a Quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Explain the difference between scheduled and unscheduled maintenance.
- Identify PPE specific to inspection and maintenance of rail vehicle communication systems.
- Explain agency specific inspection schedules.

Module 2: Rail Vehicle Communication System Components

Outcome: Explains maintenance and inspection schedules for individual components of the communication system.

🕒 Duration of this Module: 275 minutes

✍️ This module does **not** have a Quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Demonstrate the ability to inspect and maintain communication system components to include:
 - Amplifiers
 - Automatic Announcement Control Panel
 - Automatic Vehicle Identification
 - Automatic Passenger Counting
 - Camera and Video System
 - Centralized Communication Control Unit
 - GPS
 - Microphone and Radio
 - Passenger Intercom Unit
 - Public Address System
 - Speakers
 - Train-to-Wayside Controls
 - WiFi

Course 211: Inspection and Maintenance of Automatic Train Control

Course Description

This 1-day course presents essential steps for inspecting and maintaining Automatic Train Control (ATC) systems. Participants engage in a series of activities that help them prepare to work on ATC systems in a maintenance facility for passenger rail cars. Content is supplemented with examples to support participants' successful application of the course content to their work.

This course is organized into six modules. Within each module there may be several learning application activities and demonstrations. Before starting the module instruction, participants are expected to complete a **pre-course assessment** to assess their knowledge of the subject. Similarly, after instruction of all the modules, participants will complete a **post-course assessment** as well as a course evaluation.

Classroom Instruction: 8.4 hours	Hands-on Instruction: 20 minutes/participant <i>Hands-on instruction time provided is the amount of time to complete in the field activities. Instructors will have to calculate hands-on instruction time based on the number of participants in each class to determine total course instruction time.</i>
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Module 1: General Inspection Procedures

Outcome: Explains general inspection procedures

 Duration of this module: 58 minutes

 This module has a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Explain the difference between scheduled and unscheduled maintenance
- Explain pre-inspection procedures
- Explain how inspection schedules work

Module 2: ATC System Testing

Outcome: Explains different Automatic Train Control system tests

 Duration of this module: 128 minutes

 This module has a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Demonstrate the ability to perform ATC system specific tests

Module 3: Exterior Components

Outcome: Explains inspection and maintenance procedures for exterior ATC components.

 Duration of this module: 106 minutes

 Hands-on Learning Activities

 This module has a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Demonstrate the ability to perform inspection and maintenance procedures on exterior components:
 - Antenna/Receiver coils
 - Speed Sensors
 - Train ID

Module 4: Interior Components

Outcome: Explains inspection and maintenance procedures for interior ATC components.

 Duration of this module: 209 minutes

 Hands-on Learning Activities

 This module has a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Demonstrate the ability to inspect and maintain interior components:
 - CPU Board
 - Relays/Vital Relays
 - Power Supply
 - Decelerometer
 - Aspect Display Unit
 - Bypass Switch

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- Master Controller
- Operator Acknowledgment Button
- P Signal Generator

Course 251: Introduction and Overview to Wheel Truing

Course Description

This 1-day course presents essential steps for inspecting and maintaining Automatic Train Control (ATC) systems. Participants engage in a series of activities that help them prepare to work on ATC systems in a maintenance facility for passenger rail cars. Content is supplemented with examples to support participants' successful application of the course content to their work.

This course is organized into six modules. Within each module there may be several learning application activities and demonstrations. Before starting the module instruction, participants are expected to complete a **pre-course assessment** to assess their knowledge of the subject. Similarly, after instruction of all the modules, participants will complete a **post-course assessment** as well as a course evaluation.

Classroom Instruction: 6.5 hours	Hands-on Instruction: <i>Hands-on instruction time provided is the amount of time to complete in the field activities. Instructors will have to calculate hands-on instruction time based on the number of participants in each class to determine total course instruction time.</i>
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Module 1: Overview of the Wheel

Outcome: Explains an overview to rail vehicle wheels and determining if wheels are salvageable or need to be condemned.

🕒 Duration of this Module: 162 minutes

📄 Number of Slides: 42

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Identify parts of the wheel
- Explain wheel profile
- Explain flange height, thickness, diameter
- Identify wheel defects
- Demonstrate how to take wheel measurements
- Explain speeds and feeds

Module 2: Wheel Truing Safety

Outcome: Explains safety hazards and precautions when working with the wheel truing machine.

🕒 Duration of this module: 56 minutes

📄 Number of Slides: 14

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Explain wheel truing safety hazards
- Explain wheel truing safety precautions
- Identify PPE to be worn during wheel truing operation

Module 3: Overview of the Wheel Truing Machine

Outcome: Explains wheel truing machine configuration and components.

🕒 Duration of this module: 42 minutes

📄 Number of Slides: 14

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Describe the mechanical configuration of the wheel truing machine
- Describe the control system on the wheel truing machine
- Describe the hydraulic system on the wheel truing machine
- Describe the auxiliary system on the wheel truing machine

Module 4: Wheel Truing Operational Procedures

Outcome: Explains wheel truing operational procedures.

🕒 Duration of this module: 82 minutes

📄 Number of Slides: 18

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Explain how to position the train on the wheel truing machine
- Explain wheel truing machine startup procedures
- Explain how to load wheelsets
- Explain how to engage the centers

- Explain wheelset hold down
- Explain manual cycle machining procedures
- Identify the type of emergency stop function used on the wheel truing machine
- Explain how to remove finished wheelsets
- Identify and explain post wheel cutting tasks

Module 5: Inspection, Maintenance, and Troubleshooting of the Wheel and Wheel Truing Machine

Outcome: Explains inspection, maintenance and troubleshooting procedures for the wheel and wheel truing machine.

🕒 Duration of this module: 60 minutes

📄 Number of Slides: 16

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Explain what to look for in a wheel truing sensory inspection
- Explain wheel truing daily, 50-hour, monthly and post operation inspection and maintenance tasks
- Explain basic wheel truing machine troubleshooting scenarios
- Explain basic wheel troubleshooting scenarios

300 Level Courses

Course 300: Principles of Troubleshooting and Diagnostics

Course Description

This 1-day course presents an overview of the principles of troubleshooting and diagnostics for the rail maintenance worker. The class focuses on principles of troubleshooting, electrical-electronic systems and monitoring and diagnostics. Participants engage in a series of activities that help them prepare to troubleshoot in a maintenance facility for passenger rail cars. Content is supplemented with examples to support participants' successful application of the course content to their work.

This course is organized into three modules. Within each module there may be several learning application activities and demonstrations. Before starting the module instruction, participants are expected to complete a **pre-course assessment** to assess their knowledge of the subject. Similarly, after instruction of all the modules, participants will complete a **post-course assessment** as well as a course evaluation.

Classroom Instruction: 7.5 hours	Hands-on Instruction: To be updated in next version <i>Hands-on instruction time provided is the amount of time to complete in the field activities. Instructors will have to calculate hands-on instruction time based on the number of participants in each class to determine total course instruction time.</i>
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Module 1: Principles of Troubleshooting

Outcome: Explains general troubleshooting importance, process, strategies and pitfalls

 Duration of this module: 145 minutes

 This module has a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Define and explain the importance of troubleshooting
- Describe a process for general troubleshooting
- Identify and describe troubleshooting strategies
- Identify and describe troubleshooting tips and pitfalls

Module 2: Troubleshooting Electrical-Electronic Systems

Outcome: Explains the difference between electrical and electronic systems and understands how to read schematics

 Duration of this module: 182 minutes

 This module has a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Demonstrate the ability to read a multiple-page schematic
- Describe the difference between electrical and electronic systems
- Given a component, determine if it uses an electrical or electronic system
- Demonstrate the ability to troubleshoot electrical components
- Demonstrate the ability to troubleshoot electric components

Module 3: Monitoring and Diagnostics

Outcome: Demonstrate how to use monitoring and diagnostics systems

 Duration of this module: 120 minutes

 This module has a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- List uses for Monitoring and Diagnostics Systems
- List different ways of accessing information and describe how they are related
- Demonstrate the ability to use the Train Display Panel to test and verify the functions of different subsystems (i.e. car body)
- Verify correct versions of software are being used
- Demonstrate ability to analyze system with laptop

Course 301: Troubleshooting Rail Vehicle Couplers

Course Description

This ½ -day course presents an overview to troubleshooting rail vehicle coupler systems. The class focuses on steps for troubleshooting major coupler components. Participants engage in a series of activities that help them prepare to troubleshoot couplers in a maintenance facility for passenger rail cars. Content is supplemented with examples to support participants' successful application of the course content to their work.

This course is organized into three modules. Within each module there may be several learning application activities and demonstrations. Before starting the module instruction, participants are expected to complete a **pre-course assessment** to assess their knowledge of the subject. Similarly, after instruction of all the modules, participants will complete a **post-course assessment** as well as a course evaluation.

Classroom Instruction: 2.2 hours	Hands-on Instruction: To be updated in next version <i>Hands-on instruction time provided is the amount of time to complete in the field activities. Instructors will have to calculate hands-on instruction time based on the number of participants in each class to determine total course instruction time.</i>
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Module 1: Troubleshooting the Coupler

Outcome: Explains common troubleshooting problems for the coupler

 Duration of this module: 134 minutes

 This module has a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Explain how to troubleshoot common problems when the coupler fails to couple
- Explain how to troubleshoot common problems when the coupler fails to uncouple
- Explain how to troubleshoot common problems with the mechanical coupler
- Explain how to troubleshoot common problems with the electrical coupler
- Explain how to troubleshoot common problems with the pneumatic coupler

Course 302: Troubleshooting Truck Systems

Course Description

Course 302 provides participants with an overview to troubleshooting railcar truck systems. This course examines probable causes of symptoms relating to the truck's suspension, frame, bolster, gearboxes, wheels, and axles.

Before beginning instruction, participants are expected to complete a **pre-course assessment** to assess their knowledge of the subject. Similarly, after instruction of all the modules, participants will complete a **post-course assessment** as well as a course evaluation. This course has one module with six sections and, with pre- and post-course activities.

Classroom Instruction: 2.1 hours	Hands-on Instruction: 60 minutes/participant <i>Hands-on instruction time provided is the amount of time to complete in the field activities. Instructors will have to calculate hands-on instruction time based on the number of participants in each class to determine total course instruction time.</i>
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Module 1: Troubleshooting Truck Systems

Outcome: This module examines probable causes of rough, jolting, and noisy rides as well as other symptoms reported by operators and passengers.

🕒 Duration of this module: 127 minutes

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Assess probable causes and resolutions of the following symptoms of the railcar truck:
 - Poor ride quality.
 - Air and oil leaks.
 - Ground brushes.
 - Carbody leaning and incorrect car height
- Identify steps to troubleshoot symptoms.

Course 303: Troubleshooting Propulsion and Dynamic Braking Systems

Course Description - AC Only

Course 303: *Troubleshooting Propulsion and Dynamic Braking Systems (AC)* provides participants with an overview of principles of maintenance of rail car propulsion and dynamic braking systems. Within this Module, there are eight sections, including an overview and a summary. Each section may have learning application activities and demonstrations.

Before beginning instruction, participants are expected to complete a **Pre-Course Assessment** to assess their knowledge of the subject. Similarly, after instruction of all the modules, participants will complete a **Post-Course Assessment** as well as a course evaluation.

Classroom Instruction: 5.1 hours	Hands-on Instruction: To be updated in next version <i>Hands-on instruction time provided is the amount of time to complete in the field activities. Instructors will have to calculate hands-on instruction time based on the number of participants in each class to determine total course instruction time.</i>
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Module 1: Troubleshooting Propulsion and Dynamic Braking Systems

Outcome: This Module provides troubleshooting techniques and possible solutions for technicians operating and maintaining braking systems with propulsion features.

🕒 Duration of this Module: 307 minutes

✍️ This Module has a quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Troubleshoot master controller
- Troubleshoot Propulsion Control logic
- Troubleshoot propulsion ventilation
- Troubleshoot braking resistors
- Troubleshoot traction motor

Course Description - DC Only

Course 303: *Troubleshooting Propulsion and Dynamic Braking Systems (DC)* provides participants with an overview of principles of maintenance of rail car propulsion and dynamic braking systems. Within this Module, there are eight sections, including an overview and a summary. Each section may have learning application activities and

demonstrations.

Before beginning instruction, participants are expected to complete a **Pre-Course Assessment** to assess their knowledge of the subject. Similarly, after instruction of all the modules, participants will complete a **Post-Course Assessment** as well as a course evaluation.

Classroom Instruction: 4.5 hours	Hands-on Instruction: To be updated in next version <i>Hands-on instruction time provided is the amount of time to complete in the field activities. Instructors will have to calculate hands-on instruction time based on the number of participants in each class to determine total course instruction time.</i>
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Module 1: Troubleshooting Propulsion and Dynamic Braking Systems

Outcome: This Module provides troubleshooting techniques and possible solutions for technicians operating and maintaining braking systems with propulsion features.

 Duration of this Module: 272 minutes

 This Module has a quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Troubleshoot master controller
- Troubleshoot Propulsion Control logic
- Troubleshoot propulsion ventilation
- Troubleshoot braking resistors
- Troubleshoot traction motor

Course 304: Troubleshooting and Repair of APS & Battery Systems

Course Description

Course 304: *Troubleshooting and Repair of Auxiliary Power Supply and Battery Systems* provides participants with an overview to troubleshooting auxiliary power supply systems on rail cars within the context of general troubleshooting and best practices. Content is supplemented with examples to support participants' successful application of the course content to their work.

With each Module, there may be several learning application activities and demonstrations. Before beginning instruction, participants are expected to complete a **Pre-Course Assessment** to assess their knowledge of the subject. Similarly, after instruction of all the modules, participants will complete a **Post-Course Assessment** as well as a course evaluation.

Classroom Instruction: 8.5 hours	Hands-on Instruction: 20 minutes/participant <i>Hands-on instruction time provided is the amount of time to complete in the field activities. Instructors will have to calculate hands-on instruction time based on the number of participants in each class to determine total course instruction time.</i>
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Module 1: Troubleshooting the APS System

Outcome: This Module explores the troubleshooting of commonly reported issues with the APS system and principles to follow when repairing APS systems.

 Duration of this Module: 366 minutes

 This Module includes videos

 This Module has a quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Explain the use of computer-aided diagnostics
- Remove and replace the APS ventilation fan
- Troubleshoot common reported problems including: ground faults, overvoltage, and lost phase
- Apply troubleshooting principles to faulty IGBTs
- Apply troubleshooting principles to other faulty APS components

Module 2: Troubleshooting Battery Systems

Outcome: Module 2 explores the troubleshooting of commonly reported issues with the battery system and principles to follow when repairing battery systems.

 Duration of this Module: 142 minutes

 This Module has a quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Apply troubleshooting principles to the battery charger and LVPS
- Identify probable cause of NiCd battery malfunction and repair NiCd batteries:
 - Replace NiCd batteries
 - Charge NiCd batteries
 - Troubleshoot shorted cells
 - Diagnose charging rates and non-charging rates

Course 305: Troubleshooting Friction Brakes

Course Description

This course provides participants with the essential steps to troubleshoot friction brakes on rail cars. Course participants will engage in a series of activities that help them prepare to work on friction brakes in a maintenance facility for rail cars. Content is supplemented with examples to support participants' successful application of the course content to their work.

This course has five Modules. **Please note that Module 1 is specific to pneumatic braking and Module 2 to hydraulic braking.** The course instructor may choose to use one or both of these modules depending on their training needs.

Within each Module there may be several learning application activities and demonstrations. Before starting the Module instruction, participants are expected to complete a **Pre-Course Assessment** to assess their knowledge of the subject. Similarly, after instruction of all the Modules, participants will complete a **Post-Course Assessment** as well as a course evaluation.

Classroom Instruction: 8.2 hours	Hands-on Instruction: 60 minutes/participant <i>Hands-on instruction time provided is the amount of time to complete in the field activities. Instructors will have to calculate hands-on instruction time based on the number of participants in each class to determine total course instruction time.</i>
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Module 1: Pneumatic Braking Systems

Outcome: Explains troubleshooting steps for pneumatic braking systems

 Duration of this module: 208 minutes

 This Module has a quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Troubleshoot the brake control unit.
- Troubleshoot valves and piping systems.
- Troubleshoot air compressors and main reservoir.

Module 2: Hydraulic Braking Systems

Outcome: Explains troubleshooting procedures for hydraulic braking systems

🕒 Duration of this Module: 171 minutes

✍️ This Module has a quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Demonstrate ability to diagnose transducer problems.
- Troubleshoot the Electro Hydraulic Unit.
- Troubleshoot motor assembly.
- Troubleshoot control valves.
- Troubleshoot accumulators.

Module 3: Electromagnetic Braking Systems

Outcome: Explains troubleshooting procedures for electromagnetic braking systems

🕒 Duration of this Module: 48 minutes

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Troubleshoot the rail vehicle's track brake.
- List common problems reported with track brakes.

Module 4: Foundation Braking Equipment

Outcome: Explains troubleshooting procedures for foundation braking equipment

🕒 Duration of this Module: 62 minutes

✍️ This Module has a quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Troubleshoot calipers.
- Troubleshoot disc brake units.
- Perform checks and tests of a rail vehicle's sanding system.
- Troubleshoot brake calipers.
- Explain anti-spinslide circuits.

Course 306: Troubleshooting of HVAC Systems

Course Description

Course 306: *Troubleshooting of HVAC Systems* provides an overview to troubleshooting HVAC systems on railcars within the context of general troubleshooting and best practices. There is only one Module for Course 306.

Within the Module, there are eight sections, including an overview and a summary. Each section may have learning application activities and demonstrations. Before beginning instruction, participants are expected to complete a **Pre-Course Assessment** to assess their knowledge of the subject. Similarly, after instruction of all the modules, participants will complete a **Post-Course Assessment** as well as a course evaluation.

Classroom Instruction: 3.4 hours	Hands-on Instruction: To be updated in next version <i>Hands-on instruction time provided is the amount of time to complete in the field activities. Instructors will have to calculate hands-on instruction time based on the number of participants in each class to determine total course instruction time.</i>
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Module 1: Troubleshooting of HVAC Systems

Outcome: This Module provides troubleshooting techniques and possible solutions for technicians who encounter issues with a rail HVAC system.

🕒 Duration of this Module: 205 minutes

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Review tools and test equipment used for troubleshooting HVAC equipment.
- Identify common failures and possible causes
- Given a rail HVAC problem and cause, describe possible solution and necessary repairs
- Given a real-world rail HVAC problem, apply troubleshooting principles to figure out the root cause and document the troubleshooting steps

Course 307: Troubleshooting Current Collection Systems

Course Description

This course provides participants with the essential steps for troubleshooting overhead catenary and third rail current collection systems. Course participants engage in a series of activities that help them prepare to work on current collection systems in a maintenance facility for passenger rail cars. Content is supplemented with examples to support participants' successful application of the course content to their work.

This course has two Modules. **Please note that Module 1 is specific to pantographs and Module 2 to third rail collectors.** The course instructor may choose to use one or both of these Modules depending on their training needs.

Within each Module, there are several learning application activities and demonstrations. Before starting the Module instruction, participants are expected to complete a **Pre-Course Assessment** to assess their knowledge of the subject. Similarly, after instruction of all the Modules, participants will complete a **Post-Course Assessment** as well as a course evaluation.

Classroom Instruction: 3.8 hours	Hands-on Instruction: 60 minutes/participant <i>Hands-on instruction time provided is the amount of time to complete in the field activities. Instructors will have to calculate hands-on instruction time based on the number of participants in each class to determine total course instruction time.</i>
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Module 1: Overhead Catenary Systems

Outcome: This Module provides troubleshooting techniques and possible solutions for technicians who encounter issues with the overhead catenary system.

🕒 Duration of this Module: 123 minutes

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Identify steps to troubleshoot pantograph collector head.
- Identify steps to troubleshoot electrical lowering device.
- Identify steps to troubleshoot manual lowering device.
- Identify steps to troubleshoot frame including insulated mounts and bearings.
- Identify steps to troubleshoot raising mechanism (springs).

Module 2: Third Rail Systems

Outcome: This Module provides troubleshooting techniques and possible solutions for technicians who encounter issues with third rail systems.

🕒 Duration of this Module: 107 minutes

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Troubleshoot the collector paddle assembly.
- Troubleshoot the loss of power to rail vehicle.

Course 308: Troubleshooting the Rail Carbody

Course Description

This one-day course presents general troubleshooting strategies and principles for working on the rail carbody. The class focuses on attempts at troubleshooting the major components of the rail carbody such as interior, exterior and articulation (and their major components). Participants engage in a series of activities that help them practice and prepare to work on inspection and maintenance of rail carbodies. Content is supplemented with examples to support participants' successful application of the course content to their work.

This course consists of **one** module. Within the Module, there may be several learning application activities and demonstrations. Before beginning instruction, participants are expected to complete a **Pre-Course Assessment** to assess their knowledge of the subject. Similarly, after instruction of all the modules, participants will complete a **Post-Course Assessment** as well as a course evaluation.

Classroom Instruction: 1.1 hours	Hands-on Instruction: 60 minutes/participant <i>Hands-on instruction time provided is the amount of time to complete in the field activities. Instructors will have to calculate hands-on instruction time based on the number of participants in each class to determine total course instruction time.</i>
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Module 1: Troubleshooting the Carbody

Outcome: This Module presents a general overview for inspection and maintenance tasks on major components of the rail vehicle's carbody, along with troubleshooting principles and techniques for future troubleshooting attempts.

 Duration of this Module: 66 minutes

 This Module includes videos

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Recall general steps for troubleshooting the carbody interior.
- Analyze and identify possible corrective actions for troubleshooting common carbody interior symptoms.
- Interpret and label flowchart to recall troubleshooting practices and strategies.

Course 309: Troubleshooting Rail Vehicle Doors

Course Description

This course provides participants with the essential steps to approach troubleshooting and replacement of door assembly components on U.S. rail vehicles. Participants will engage in a series of activities that help them prepare to work on rail vehicle doors in a maintenance facility for passenger rail cars. Content is supplemented with examples to support participants' successful application of the course content to their work.

This course is organized into three (3) Modules. Within each Module there may be several learning application activities and demonstrations. Before starting the Module instruction, participants are expected to complete a **Pre-Course Assessment** to assess their knowledge of the subject. Similarly, after instruction of all the Modules, participants will complete a **Post-Course Assessment** as well as a course evaluation.

Classroom Instruction: 13.2 hours	Hands-on Instruction: To be updated in next version <i>Hands-on instruction time provided is the amount of time to complete in the field activities. Instructors will have to calculate hands-on instruction time based on the number of participants in each class to determine total course instruction time.</i>
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Module 1: Troubleshooting Door Controls Components

Outcome: Explains commonly reported problems with the door controls components on the rail car.

 Duration of this Module: 310 minutes

 Hands-on Learning Activities

 This Module has a Quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Demonstrate the ability to troubleshoot:
 - Manual mechanical operation of door
 - Electrical and electronics of door operation
 - Passenger indication system
 - Relays/Solenoids
 - Door motors and drive mechanisms
 - Door Switches
 - Obstruction detection devices
 - Emergency release mechanism
 - Demonstrate the ability to download and make door adjustments using Portable Test Unit (PTU) software

Module 2: Troubleshooting the Door Panel and Track Components

Outcome: Explains commonly reported problems with the door panel and track components on the rail car.

 Duration of this Module: 225 minutes

 Hands-on Learning Activities

 This Module has a Quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

Demonstrate the ability to troubleshoot:

- Door Leaf and Panel
- Roller Hanger Assembly
- Door Interlock System
- Door Guide
- Cab Door Hinge and Mounting
- Window and Frame
- Gaskets and Seals

Module 3: Replacement of Door Components

Outcome: Explains the processes for replacing rail vehicle door components

 Duration of this Module: 255 minutes

 Hands-on Learning Activities

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

Demonstrate the ability to replace:

- Door Control Unit (DCU)
- Door Lights and Warning Chimes
- Relays and Solenoids
- Switches
- Obstruction Detection Devices
- Emergency Release Mechanisms
- Roller Hanger Assembly
- Door Guide
- Door Glass
- Gaskets and Seals
- Door Interlock System
- Cab Doors

Course 310: Troubleshooting Rail Vehicle Communication Systems

Course Description

This one-day course presents essential steps and approach to troubleshooting rail vehicle communication systems. Participants engage in a series of activities that help them prepare to work on communication systems in a maintenance facility for passenger rail cars. Content is supplemented with examples to support participants' successful application of the course content to their work.

This course is organized into three modules. Within each Module there may be several learning application activities and demonstrations. Before starting the Module instruction, participants are expected to complete a **Pre-Course Assessment** to assess their knowledge of the subject. Similarly, after instruction of all the modules, participants will complete a **Post-Course Assessment** as well as a course evaluation.

Classroom Instruction: 3.5 hours	Hands-on Instruction: 20 minutes/participant <i>Hands-on instruction time provided is the amount of time to complete in the field activities. Instructors will have to calculate hands-on instruction time based on the number of participants in each class to determine total course instruction time.</i>
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Module 1: Troubleshooting Rail Vehicle Communication System Components

Outcome: Explains common troubleshooting scenarios for communication system components

 Duration of this module: 212 minutes

 This Module does **not** have a Quiz

Learning Objectives

Following the completion of this Module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Demonstrate the ability to troubleshoot communication system components to include:
 - Centralized Communication Control Unit
 - Automatic Announcement Control Panel (AACP)
 - Microphone and Radio
 - Public Address System
 - Passenger Intercom Unit (PIU)
 - Speakers & Pre-Amp
 - Antennas
 - GPS

Course 311: Troubleshooting Automatic Train Control

Course Description

This course presents essential steps and procedures for troubleshooting the rail vehicle's Automatic Train Control (ATC) system. Participants engage in a series of activities that help them prepare to work on ATC systems in a maintenance facility for passenger rail cars. Content is supplemented with examples to support participants' successful application of the course content to their work.

This course is organized into six modules. Within each module there may be several learning application activities and demonstrations. Before starting the module instruction, participants are expected to complete a **pre-course assessment** to assess their knowledge of the subject. Similarly, after instruction of all the modules, participants will complete a **post-course assessment** as well as a course evaluation.

Classroom Instruction: 4.5 hours	Hands-on Instruction: 20 minutes/participant <i>Hands-on instruction time provided is the amount of time to complete in the field activities. Instructors will have to calculate hands-on instruction time based on the number of participants in each class to determine total course instruction time.</i>
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Module 1: Troubleshooting Exterior ATC Components

Outcome: Explains how to troubleshoot exterior ATC components

 Duration of this module: 95 minutes

 This module does *not* have a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Demonstrate the ability to explain and apply troubleshooting methods for:
 - Antenna/Receiver Coils
 - Speed Sensor
 - Train ID

Module 2: Troubleshooting Interior ATC Components

Outcome: Explains how to troubleshoot exterior ATC components

 Duration of this module: 176 minutes

 This module does *not* have a quiz

Learning Objectives

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Demonstrate the ability to explain and apply troubleshooting methods for interior ATC components.