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Red Seal Occupational Standard

Transport Trailer Technician

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Transport Trailer Technician

Title: Transport Trailer Technician

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Foreword

The Canadian Council of Directors of Apprenticeship (CCDA) recognizes this Red Seal Occupational Standard (RSOS) as the Red Seal standard for the Transport Trailer Technician trade.

Background

The first National Conference on Apprenticeship in Trades and Industries, held in Ottawa in 1952, recommended that the federal government be requested to cooperate with provincial and territorial apprenticeship committees and officials in preparing analyses of a number of skilled occupations. Employment and Social Development Canada (ESDC) sponsors the Red Seal Program, which, under the guidance of the CCDA, develops a national occupational standard for each of the Red Seal trades.

Standards have the following objectives:

- to describe and group the tasks performed by skilled workers;
- to identify which tasks are performed in every province and territory;
- to develop instruments for use in the preparation of Interprovincial Red Seal Examinations and assessment tools for apprenticeship and certification authorities;
- to develop common tools for apprenticeship on-the-job and technical training in Canada;
- to facilitate the mobility of apprentices and skilled workers in Canada;
- to supply employers, employees, associations, industries, training institutions and governments with occupational standards.

Any questions, comments, or suggestions for changes, corrections, or revisions to this standard or any of its related products may be forwarded to:

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This standard was prepared by the Apprenticeship and Sectoral Initiatives Directorate of ESDC. The coordinating, facilitating and processing of this standard were undertaken by employees of the standards development team of the Trades and Apprenticeship Division and of Manitoba, the host jurisdiction for this trade.

Structure of the Occupational Standard

This standard contains the following sections:

Methodology: an overview of the process for development, review, validation and weighting of the standard

Description of the Transport Trailer Technician trade: an overview of the trade's duties, work environment, job requirements, similar occupations and career progression

Trends in the Transport Trailer Technician trade: some of the trends identified by industry as being the most important for workers in this trade

Essential Skills Summary: an overview of how each of the nine essential skills is applied in this trade

Roles and Opportunities for Skilled Trades in a Sustainable Future: an overarching description of how in the context of climate change, skilled trades play a large role in implementing solutions and adjusting to changes in the world. In addition to highlighting the importance of this awareness, the standard may also contain more details on activities, skills and knowledge elements that are specific to the trade

Industry Expected Performance: description of the expectations regarding the level of performance of the tasks, including information related to specific codes, regulations and standards that must be observed

Language Requirements: description of the language requirements for working and studying in this trade in Canada

Pie Chart of Red Seal Examination Weightings: a graph which depicts the national percentages of exam questions assigned to the major work activities

Task Matrix: a chart which outlines graphically the major work activities, tasks and sub-tasks of this standard

Harmonization of Apprenticeship Training: the aspects of apprenticeship training that participating provinces and territories have agreed upon to substantively align apprenticeship systems across Canada

Major Work Activity (MWA): the largest division within the standard that is comprised of a distinct set of trade activities

Task: distinct actions that describe the activities within a major work activity

Task Descriptor: a general description of the task

Sub-task: distinct actions that describe the activities within a task

Skills:

Performance Criteria: description of the activities that are done as the sub-task is performed

Evidence of Attainment: proof that the activities of the sub-task meet the expected performance of a tradesperson who has reached journeyperson level

Knowledge:

Learning Outcomes: describes what should be learned relating to a sub-task while participating in technical or in-school training

Learning Objectives: topics to be covered during technical or in-school training in order to meet the learning outcomes for the sub-task

Range of Variables: elements and examples (not all inclusive) that provide a more in-depth description of a term used in the performance criteria, evidence of attainment, learning outcomes, or learning objectives

Appendix A – Acronyms: a list of acronyms used in the standard with their full name

Appendix B – Tools and Equipment / Outils et équipement: a non-exhaustive list of tools and equipment used in this trade

Appendix C – Glossary / Glossaire: definitions or explanations of selected technical terms used in the standard

Methodology

Development of the Standard

A draft standard is developed by a broad group of trade representatives, including tradespeople, instructors and employers at a National Workshop led by a team of facilitators. This draft standard breaks down all the tasks performed in the occupation and describes the knowledge and abilities required for a tradesperson to demonstrate competence in the trade.

Harmonization of Apprenticeship Training

An analysis of all provinces' and territories' apprenticeship programs is performed and recommendations are made on harmonizing the name of the trade, the hours of training required and the number of levels of training. Provinces and territories consult with their respective industry stakeholders on these elements and revisions are discussed until consensus is reached. Following the development of the workshop draft of the RSOS, participants discuss and come to consensus on the sequence of training topics, as expressed in the new standard. Their sequencing recommendations are reviewed by stakeholders in participating provinces and territories and further discussions are convened to reach consensus and to identify any exceptions.

Online Survey

Stakeholders are asked to review and validate the activities described in the new standard via an online survey. These stakeholders are invited to participate in this consultation through apprenticeship authorities, as well as national stakeholder groups.

Draft Review

The RSOS development team forwards a copy of the standard to provincial and territorial authorities who consult with industry representatives to review it. Their recommendations are assessed and incorporated into the standard.

Validation and Weighting

Participating provinces and territories also consult with industry to validate and weight the document for the purpose of planning the makeup of the Red Seal Interprovincial Examination for the trade. They validate and weight the major work activities (MWA), tasks and sub-tasks, of the standard as follows:

MWA	Each jurisdiction assigns a percentage of questions to each MWA for an examination that would cover the entire trade.
TASKS	Each jurisdiction assigns a percentage of exam questions to each task within a MWA.
SUB-TASKS	Each jurisdiction indicates, with a YES or NO, whether or not each sub-task is performed by skilled workers within the occupation in its jurisdiction.

The results of this exercise are submitted to the RSOS development team who then analyzes the data and incorporates it into the document. The RSOS provides the individual jurisdictional validation results as well as the national averages of all responses. The national averages for MWA and task weighting guide the Interprovincial Red Seal Examination plan for the trade.

The validation of the RSOS is used to identify common core sub-tasks across Canada for the occupation. If at least 70% of the responding jurisdictions' industry performs a sub-task, it shall be considered common core. Interprovincial Red Seal Examination questions are limited to the common core sub-tasks identified through this validation process.

Definitions for Validation and Weighting

yes	sub-task performed by qualified workers in the occupation in that province or territory
no	sub-task not performed by qualified workers in the occupation in that province or territory
NV	standard Not Validated by that province or territory
ND	trade Not Designated in a province or territory
Not Common Core (NCC)	sub-task, task or MWA performed less than 70% of responding jurisdictions; these will not be tested by the Interprovincial Red Seal Examination for the trade
National Average %	average percentage of questions assigned to each MWA and task in Interprovincial Red Seal Examination for the trade

Provincial/Territorial Abbreviations

NL	Newfoundland and Labrador
NS	Nova Scotia
PE	Prince Edward Island
NB	New Brunswick
QC	Quebec
ON	Ontario
MB	Manitoba
SK	Saskatchewan
AB	Alberta
BC	British Columbia
NT	Northwest Territories
YT	Yukon Territory
NU	Nunavut

Description of the Transport Trailer Technician Trade

“Transport Trailer Technician” is this trade’s official Red Seal occupational title approved by the CCDA. This standard covers tasks performed by transport trailer technicians.

Transport trailer technicians inspect, diagnose, maintain, rebuild, assemble and repair transport trailers connected to or moved by a power unit. Trailers include flat decks, dry freight vans, refrigerated vans, tankers, converters, boosters, jeeps, pole trailers, steering dollies, dump trailers and any other commercial pull-type units. Transport trailer technicians inspect, service and repair parts and components of systems such as suspension and brake systems, chassis, mechanical and electrical components, flooring, hydraulic systems, axles, wheel assemblies and coupling devices. Technicians may specialize in refrigeration units, sheet metal work, frame repair or replacement.

Transport trailer technicians are employed at trailer manufacturers, sales and repair facilities, as well as at construction or industrial sites and fleet repair shops. They may work in a shop or out of a mobile service vehicle.

To meet government standards and regulations, transport trailer technicians may have to attain specialty certifications in order to perform work-related tasks. A propane license, refrigeration certificate, tanker inspection certificate, specialized pressure vessel welding license, welding certificates, wheel and tire certification, and government inspector certificate are examples of additional certification that may be required by certain jurisdictions.

Technicians must practice safe operating procedures and be conscious of the impact on people, equipment, work area and environment when performing their work. Due to the size and complexity of the equipment, safety is of prime importance. There is an inherent risk of injury when working with heavy equipment, power tools and welding equipment. There are also risks associated with working around loud noises, grease, oil, fuels, various exhaust fumes and high voltages. Hazardous cargo or residue contained within trailers can pose a risk to technicians. Technicians work on tankers which includes taking appropriate safety precautions when working in confined spaces.

The work requires considerable standing, climbing, crouching, kneeling and heavy lifting. Good vision, hearing and sense of smell, as well as the ability to think logically, allow transport trailer technicians to identify and isolate problems. Technicians must also be able to diagnose complex problems and interpret technical manuals and schematics. Building and fabrication skills are also an asset.

This standard recognizes similarities or overlaps with the work of truck and transport mechanics, refrigeration and air conditioning mechanics, welders, auto body and collision technicians, parts technicians and heavy duty equipment technicians.

With experience, transport trailer technicians act as mentors and trainers to apprentices in the trade. They may also advance to supervisory, service management and training positions.

Trends in the Transport Trailer Technician Trade

Technology

There is an increase in the use of telematics equipment for communication of system or component faults, monitoring status, modifying settings, and recording activities and location. A specific application for telematics technology is in refrigeration units, where settings can be monitored and changed from a distance. Other applications monitor trailer systems such as fuel systems, lighting, tire pressures and status of axles and wheel assemblies. Data obtained from telematics systems can better inform clients about trailer usage and maintenance.

Electric high-voltage refrigeration units are becoming more common in the marketplace. These units have a smaller physical footprint, reducing the load on the transport truck. Running these units on electricity is more cost-effective and produces fewer emissions than running on diesel fuel, particularly when units are parked and can be plugged into an electrical source. These high-voltage refrigeration units (up to 460 volts) require training and specialized equipment such as flash-protective gear, insulated tools and voltage meters.

New refrigerant technologies, such as nitrogen, are in place. These new refrigerants require different recovery techniques, new sealing and compressor technologies, and new material handling procedures.

Health and Safety

Conversions to new refrigerants bring new risks to technicians in terms of exposure to hazardous materials. They must adhere to Workplace Hazardous Materials Information System (WHMIS) and fire safety regulations to protect their health and surroundings.

Tools and Equipment

Beyond the regular tools of the trade, technicians are using more and more digital interfaces. Electronic devices such as smart phones, tablets and laptops are now essential tools.

Remote light and brake testers are available to connect to in-house maintenance systems, record component responses, maintain records for benchmarking and downloading equipment performance and meeting legislative requirements. Data transmission of diagnostic information is being recorded via Bluetooth and wireless technology.

The trade is seeing a lot more battery powered tools over pneumatic. There is also an increase in computer-based software for testing trailer anti-lock brake system (ABS) and roll stability diagnostics and clearing trouble codes.

Products/Materials

Transport trailer technicians must have current understanding of the design and structure of a trailer's overall body makeup in order to maintain and repair according to industry standards and specifications.

Trailer materials are changing, with an increasing use of composite materials in cross-members and trailer structures. Galvanized steel is now standard for supports and under-frame components.

Specialized components and systems are being used in various trailer applications; some of these components include disc brakes, powered landing gear, self-steering and load-sensing lift axle systems, and tire inflation systems.

Environmental

There are new systems that capture and dispose of expired refrigeration gases in environmentally friendly ways. A greater variety of engine oils and washing fluids in use require awareness of their handling and disposal requirements. There is an increase in training and certification in environmental awareness in the trade.

Legislative and Regulatory

Safe Food for Canadians Act as well as Sanitary Food Transportation Act impose many requirements for food-hauling trailers; these ensure that the containers are sanitary and food grade, have adequate temperature control and that records are kept.

Essential Skills Summary

Essential skills are needed for work, learning and life. They provide the foundation for learning all other skills and enable people to evolve with their jobs and adapt to workplace change.

Through extensive research, the Government of Canada and other national and international agencies have identified and validated nine essential skills. These skills are used in nearly every occupation and throughout daily life in different ways.

The application of these skills may be described throughout this document within the skills and knowledge which support each sub-task of the trade. The following are summaries of the requirements in each of the essential skills, taken from the essential skills profile. A link to the complete essential skills profile can be found at https://www.canada.ca/en/employment-social-development/programs/essential-skills/profiles.html.

Reading

Transport trailer technicians read instructions on work orders, application or installation instructions, manufacturers' service bulletins and manuals for troubleshooting and diagnostic information of products and materials. They read information sheets to learn about new products and materials.

Document Use

Transport trailer technicians reference drawings and interpret troubleshooting diagrams and charts to obtain information. They may complete check lists and documentation for inspection certificates.

Writing

Transport trailer technicians write notes on work orders, maintenance sheets and inspection forms. They may write to inform or request information from supervisors, colleagues or different departments. They may fill out maintenance, inspection reports and future recommendations for customers.

Oral Communication

Transport trailer technicians communicate with colleagues, manufacturers and supervisors to discuss and review job and safety requirements. They may speak with customers or drivers to determine their concerns with a trailer. They may advise customers of general trailer conditions and future repair requirements.

Numeracy

Transport trailer technicians measure width, length and distance of components to determine placement of components and ensure proper tension. They measure material to be cut. They calculate areas to be refitted with panels. They take measurements to ensure that axles are adjusted or that tire treads meet specifications.

Thinking

Transport trailer technicians use problem solving skills to diagnose the source of the trailer breakdowns and to estimate time required to complete a job. Decision-making skills are required for determining the type of equipment, parts, materials and procedures best suited for the job.

Transport trailer technicians require job task planning skills to determine task sequencing or prioritization of tasks. They organize their tools and the parts required at the beginning of each job. Transport trailer technicians find information by accessing WHMIS and other safety information. They consult repair manuals or inspection manuals for information about requirements and procedures.

Working with Others

Transport trailer technicians spend most of their time working independently but work with others depending on the job requirements.

Digital Technology

Transport trailer technicians may use mobile devices to complete tasks such as completing work orders. They may communicate by email with co-workers, supervisors, suppliers and manufacturers. They may use the internet to access online manuals, training courses, seminars and articles by suppliers or manufacturers.

Transport trailer technicians use diagnostic equipment that runs software applications and codes to determine operational data. Technicians use digital devices to connect to service information, diagnose faults, download software to program machines, and communicate with manufacturers' technical support channels in a repair facility or remotely to a customers' piece of equipment.

Continuous Learning

Transport trailer technicians are continuously learning to keep up with the changes in the industry. They may attend manufacturers' or suppliers' seminars.

Roles and Opportunities for Skilled Trades in a Sustainable Future

Climate change affects all of us. Trades play a large role in implementing solutions and adjusting to changes in the world.

Throughout this standard, there may be specific references to tasks, skills and knowledge that clearly show this trade's role in a more sustainable future. Each trade has different roles to play and contributions to make in their own way.

For example:

- Construction tradespeople need to consider the materials they are using, building methods, and improvements to mechanical and electrical installations. There are important changes to codes and standards to help meet the climate change goals and commitments set for 2030 and 2050. Retrofits and new construction of low-energy buildings provide enormous opportunities for workers in this sector. Concepts, such as energy efficiency and regarding buildings as systems are foundational.

- Automotive and mechanical trades are seeing a shift towards the electrification of vehicles and equipment. As a result, new skills and knowledge will be required for tradespeople working in this sector. There are mandates for sales of new light-duty zero-emission vehicles (ZEV) in Canada, with the goal of achieving 100% ZEV sales by 2035. Due to this mandate, the demand for these vehicles is growing quickly among consumers and fleets. With this escalating demand, the need for skilled workers to maintain and repair these vehicles is also increasing.

- In industrial and resource sectors, there is pressure to move towards increased electrification of industrial processes. Many industrial and commercial facilities are also being upgraded to improve energy efficiency in areas such as lighting systems, and new production processes and technologies. There are also opportunities in carbon capture, utilization and storage (CCUS), as well as the production and export of low-carbon hydrogen.

- Trades in the service sector may also need to be aware of responsible sourcing, as well as efficient use of products and materials. New ways of working better are always a part of the job.

There are fast-moving changes in guidelines, codes, regulations and specifications. Many are being implemented for the purpose of energy efficiency and climate change. Those that affect specific trades may be mentioned within the standard. Examples of these guidelines and legislation include:

- The National Energy Code of Canada for Buildings (NECB).

- The Canadian Net-Zero Emissions Accountability Act (CNZEAA).

- programs that encourage sustainable building design and construction such as Leadership in Energy and Environmental Design (LEED) and the Zero Carbon Building (ZCB) standards.

- the Montreal Protocol for phasing out R22 refrigerants.

- energy efficiency programs such as ENERGY STAR.

- principles of the United Nations Declaration for the Rights of Indigenous Peoples pertaining to energy sector development.

Apprentices and tradespeople need to increase their climate literacy and reinforce their own understanding of energy issues and environmental practices. It is important for them to understand why these changes are happening and their effect on trades' work. While individual tradespeople and apprentices may not be able to choose certain elements like; the architectural design of buildings, building material selection, regulatory requirements, use of electric vehicles and technologies, they must understand the impact of using these elements in their work. Impacts include using environmentally friendly products and following requirements related to the disposal and recycling of materials.

In apprenticeship, as well as in ongoing professional development, employers and instructors should encourage learning about these concepts, why they are important, how they are implemented, and the overarching targets they are aiming to achieve.

All in all, it's about doing the work better and building a better world.

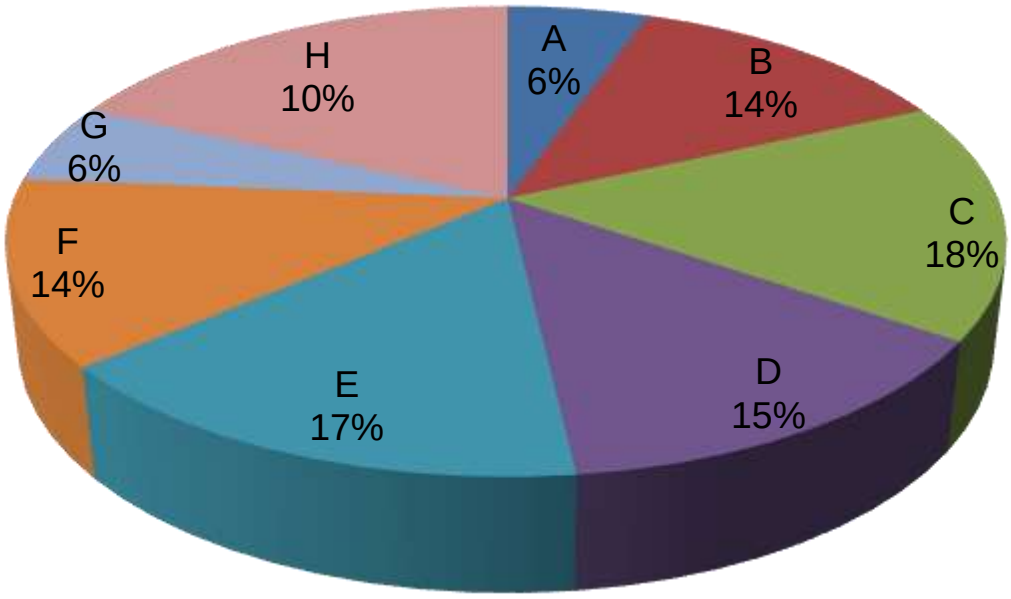
Industry Expected Performance

All tasks must be performed according to the applicable jurisdictional standards and regulations. All health and safety standards must be respected and observed. Work should be performed efficiently and to a high quality without material waste or environmental damage. All requirements of employers, manufacturers, clients and quality control policies must be met. At a journeyperson level of performance, all tasks must be done with minimal direction and supervision. As a journeyperson progresses in their career there is an expectation they continue to upgrade their skills and knowledge to maintain pace with industry and promote continuous learning in their trade through mentoring of apprentices.

Language Requirements

It is expected that journeypersons are able to understand and communicate in either English or French, which are Canada's official languages. English or French are the common languages of business as well as languages of instruction in apprenticeship programs.

Pie Chart
of Red Seal Examination Weightings



MWA A	Performs common occupational skills	6%
MWA B	Diagnoses and services suspension systems	14%
MWA C	Diagnoses and services brake systems	18%
MWA D	Diagnoses and services axles and wheel end assemblies	15%
MWA E	Diagnoses and services trailer chassis, bodies and coupling devices	17%
MWA F	Diagnoses and services electric and electronic systems	14%
MWA G	Diagnoses and services hydraulic systems	6%
MWA H	Diagnoses and services temperature control systems	10%

This pie chart represents a breakdown of the interprovincial Red Seal examination. Percentages are based on the collective input from workers from the trade from across Canada. The Task Matrix on the next pages indicates the breakdown of tasks and sub-tasks within each Major Work Activity and the breakdown of questions assigned to the Tasks. The Interprovincial examination for this trade has 100 questions.

Transport Trailer Technician

Task Matrix

A – Performs common occupational skills — 6%

Task A-1 **Performs safety-related functions** **27%**	**A-1.01 Maintains safe work environment**	**A-1.02 Uses personal protective equipment (PPE) and safety equipment**	
Task A-2 **Uses and maintains tools and equipment** **25%**	**A-2.01 Uses hand, electric and pneumatic tools**	**A-2.02 Uses measuring, testing and diagnostic equipment**	**A-2.03 Uses hoisting, lifting, staging and access equipment**
	A-2.04 Uses welding equipment	**A-2.05 Uses gas, plasma and arc air cutting equipment**	**A-2.06 Uses electronic devices and systems for diagnostics and programming**
Task A-3 **Performs routine work practices** **22%**	**A-3.01 Maintains fluids and lubricants**	**A-3.02 Lubricates parts and components**	**A-3.03 Cleans parts and components**
	A-3.04 Uses fasteners, sealants, adhesives and gaskets	**A-3.05 Maintains hoses, tubing and fittings**	
Task A-4 Organizes work **11%**	**A-4.01 Uses documentation**	**A-4.02 Plans daily tasks**	
Task A-5 **Uses communication and mentoring techniques** **15%**	**A-5.01 Uses communication techniques**	**A-5.02 Uses mentoring techniques**	

B – Diagnoses and services suspension systems — 14%

Task B-6 **Diagnoses suspension systems** **52%**	B-6.01 Diagnoses air suspension systems	B-6.02 Diagnoses spring suspension systems	B-6.03 Diagnoses rubber suspension systems
Task B-7 **Services suspension systems** **48%**	B-7.01 Maintains suspension systems	B-7.02 Repairs air suspension systems	B-7.03 Repairs spring suspension systems
	B-7.04 Repairs rubber suspension systems		

C – Diagnoses and services brake systems — 18%

Task C-8 **Diagnoses brake systems** **52%**	C-8.01 Diagnoses disc brake systems	C-8.02 Diagnoses drum brake systems	C-8.03 Diagnoses air brake systems
	C-8.04 Diagnoses hydraulic brake systems	C-8.05 Diagnoses electric brake systems	C-8.06 Diagnoses electronic braking control systems
Task C-9 **Services brake systems** **48%**	C-9.01 Maintains brake systems	C-9.02 Repairs disc brake systems	C-9.03 Repairs drum brake systems
	C-9.04 Repairs air brake systems	C-9.05 Repairs hydraulic brake systems	C-9.06 Repairs electric brake systems
	C-9.07 Repairs electronic braking control systems		

D – Diagnoses and services axles and wheel end assemblies 15%

Task D-10 **Diagnoses axles and wheel end assemblies** **52%**	**D-10.01 Diagnoses fixed, self-steering and lift axles**	**D-10.02 Diagnoses hubs and bearings**	**D-10.03 Diagnoses tires and rims**
Task D-11 **Services axles and wheel end assemblies** **48%**	**D-11.01 Maintains axles and wheel end assemblies**	**D-11.02 Repairs fixed axles, hubs and bearings**	**D-11.03 Repairs self-steering and lift axles**
	D-11.04 Replaces tires and rims	**D-11.05 Repairs tires**	

E – Diagnoses and services trailer chassis, bodies and coupling devices

17%

Task E-12 **Diagnoses trailer chassis and trailer bodies** **28%**	**E-12.01 Diagnoses trailer chassis**	**E-12.02 Diagnoses trailer bodies**	
Task E-13 **Services trailer chassis and trailer bodies** **28%**	**E-13.01 Maintains trailer chassis**	**E-13.02 Repairs trailer chassis**	**E-13.03 Maintains trailer bodies**
	E-13.04 Repairs trailer bodies		
Task E-14 **Diagnoses coupling devices and landing gear** **22%**	**E-14.01 Diagnoses coupling devices**	**E-14.02 Diagnoses landing gear**	
Task E-15 **Services coupling devices and landing gear** **22%**	**E-15.01 Maintains coupling devices**	**E-15.02 Repairs coupling devices**	**E-15.03 Maintains landing gear**
	E-15.04 Repairs landing gear		

F – Diagnoses and services electric and electronic systems

14%

Task F-16 **Diagnoses electric and electronic systems** **57%**	**F-16.01 Diagnoses lighting systems**	**F-16.02 Diagnoses wiring systems**	**F-16.03 Diagnoses trailer monitoring and control systems**
Task F-17 Services electric and electronic systems **43%**	**F-17.01 Maintains electric and electronic systems**	**F-17.02 Repairs lighting and wiring systems**	**F-17.03 Repairs trailer monitoring and control systems**

G – Diagnoses and services hydraulic systems — 6%

Task G-18 **Diagnoses hydraulic systems** **56%**	**G-18.01 Diagnoses self-contained hydraulic systems**	**G-18.02 Diagnoses auxiliary-powered hydraulic systems**
Task G-19 **Services hydraulic systems** **44%**	**G-19.01 Maintains hydraulic systems**	**G-19.02 Repairs hydraulic systems**

H – Diagnoses and services temperature control systems — 10%

Task H-20 **Diagnoses temperature control systems** **42%**	**H-20.01 Diagnoses fuel systems**	**H-20.02 Diagnoses charging and starting systems**	**H-20.03 Diagnoses high-voltage electric, hybrid and alternative drive systems**
	H-20.04 Diagnoses refrigeration and heating systems		
Task H-21 **Services temperature control systems** **58%**	**H-21.01 Maintains fuel systems**	**H-21.02 Repairs fuel systems**	**H-21.03 Maintains charging and starting systems**
	H-21.04 Repairs charging and starting systems	**H-21.05 Maintains high-voltage electric, hybrid and alternative drive systems**	**H-21.06 Repairs high-voltage electric, hybrid and alternative drive systems**
	H-21.07 Maintains refrigeration and heating systems	**H-21.08 Repairs refrigeration and heating systems (NCC)**	

Harmonization of Apprenticeship Training

Provincial and territorial apprenticeship authorities are each responsible for their respective apprenticeship programs. In the spirit of continual improvement, and to facilitate mobility among apprentices in Canada, participating authorities have agreed to work towards harmonizing certain aspects of their programs where possible. After consulting with their stakeholders in the trade, they have reached consensus on the following elements. Note that implementation of these elements may vary from jurisdiction to jurisdiction, depending on their own circumstances. For more information on the implementation in any province and territory, please contact that jurisdiction's apprenticeship authority.

1. Trade name

The official Red Seal name for this trade is Transport Trailer Technician.

2. Number of Levels of Apprenticeship

The number of levels of technical training recommended for this trade is two (2).

3. Total Training Hours during Apprenticeship Training

The total hours of training, including both on-the-job and in-school training for this trade is 3600.

4. Sequencing Topics and Related Subtasks

The topic titles in the table below are placed in a column for each apprenticeship level for technical training. Each topic is accompanied by the subtasks and their reference number. The topics in the grey shaded cells represent those that are covered "in context" with other training in the subsequent years.

Level 1	Level 2
Safety-Related Functions 1.01 Maintains safe work environment 1.02 Uses personal protective equipment (PPE) and safety equipment	
Tools and Equipment 2.01 Uses hand, electric and pneumatic tools 2.02 Uses measuring, testing and diagnostic equipment 2.03 Uses hoisting, lifting, staging and access equipment 2.04 Uses welding equipment 2.05 Uses gas, plasma and arc air cutting equipment 2.06 Uses electronic devices and systems for diagnostics and programming	**Tools and Equipment** 2.04 Uses welding equipment 2.05 Uses gas, plasma and arc air cutting equipment 2.06 Uses electronic devices and systems for diagnostics and programming
Routine Work Practices 3.01 Maintains fluids and lubricants 3.02 Lubricates parts and components 3.03 Cleans parts and components 3.04 Uses fasteners, sealants, adhesives and gaskets 3.05 Maintains hoses, tubing and fittings	

Level 1	Level 2
Organizes Work 4.01 Uses documentation 4.02 Plans daily tasks	**Organizes Work** 4.01 Uses documentation
Communication Techniques 5.01 Uses communication techniques	**Mentoring Techniques** 5.02 Uses mentoring techniques
Suspension Systems (Diagnoses) 6.01 Diagnoses air suspension systems 6.02 Diagnoses spring suspension systems 6.03 Diagnoses rubber suspension systems	**Suspension Systems (Diagnoses)** 6.01 Diagnoses air suspension systems 6.02 Diagnoses spring suspension systems 6.03 Diagnoses rubber suspension systems
Suspension Systems (Services) 7.01 Maintains suspension systems	**Suspension Systems (Services)** 7.02 Repairs air suspension systems 7.03 Repairs spring suspension systems 7.04 Repairs rubber suspension systems
Brake Systems (Diagnoses) 8.01 Diagnoses disc brake systems 8.02 Diagnoses drum brake systems 8.03 Diagnoses air brake systems 8.04 Diagnoses hydraulic brake systems	**Brake Systems (Diagnoses)** 8.01 Diagnoses disc brake systems 8.02 Diagnoses drum brake systems 8.03 Diagnoses air brake systems 8.04 Diagnoses hydraulic brake systems 8.05 Diagnoses electric brake systems 8.06 Diagnoses electronic braking control systems
Brake Systems (Services) 9.01 Maintains brake systems 9.02 Repairs disc brake systems 9.03 Repairs drum brake systems 9.04 Repairs air brake systems 9.05 Repairs hydraulic brake systems	**Brake Systems (Services)** 9.01 Maintains brake systems 9.02 Repairs disc brake systems 9.03 Repairs drum brake systems 9.04 Repairs air brake systems 9.05 Repairs hydraulic brake systems 9.06 Repairs electric brake systems 9.07 Repairs electronic braking control systems
Axles and Wheel End Assemblies (Diagnoses) 10.02 Diagnoses hubs and bearings 10.03 Diagnoses tires and rims	**Axles and Wheel End Assemblies (Diagnoses)** 10.01 Diagnoses fixed, self-steering and lift axles 10.03 Diagnoses tires and rims
Axles and Wheel End Assemblies (Services) 11.01 Maintains axles and wheel end assemblies 11.02 Repairs fixed axles, hubs and bearings 11.04 Replaces tires and rims 11.05 Repairs tires	**Axles and Wheel End Assemblies (Services)** 11.02 Repairs fixed axles, hubs and bearings 11.03 Repairs self-steering and lift axles
	Trailer Chassis and Trailer Bodies (Diagnoses) 12.01 Diagnoses trailer chassis 12.02 Diagnoses trailer bodies
Trailer Chassis and Trailer Bodies (Services) 13.01 Maintains trailer chassis 13.02 Repairs trailer chassis 13.03 Maintains trailer bodies 13.04 Repairs trailer bodies	**Trailer Chassis and Trailer Bodies (Services)** 13.02 Repairs trailer chassis 13.04 Repairs trailer bodies
	Coupling Devices and Landing Gear (Diagnoses) 14.01 Diagnoses coupling devices 14.02 Diagnoses landing gear

Level 1	Level 2
	Coupling Devices and Landing Gear (Services) 15.01 Maintains coupling devices 15.02 Repairs coupling devices 15.03 Maintains landing gear 15.04 Repairs landing gear
Electric and Electronic Systems (Diagnoses) 16.01 Diagnoses lighting systems 16.02 Diagnoses wiring systems	**Electric and Electronic Systems (Diagnoses)** 16.02 Diagnoses wiring systems 16.03 Diagnoses trailer monitoring and control systems
Electric and Electronic Systems (Services) 17.01 Maintains electric and electronic systems 17.02 Repairs lighting and wiring systems	**Electric and Electronic Systems (Services)** 17.02 Repairs lighting and wiring systems 17.03 Repairs trailer monitoring and control systems
Hydraulic Systems (Diagnoses) 18.01 Diagnoses self-contained hydraulic systems 18.02 Diagnoses auxiliary-powered hydraulic systems	
Hydraulic Systems (Services) 19.01 Maintains hydraulic systems 19.02 Repairs hydraulic systems	
	Temperature Control Systems (Diagnoses) 20.01 Diagnoses fuel systems 20.02 Diagnoses charging and starting systems 20.03 Diagnoses high-voltage electric, hybrid and alternative drive systems 20.04 Diagnoses refrigeration and heating systems
	Temperature Control Systems (Services) 21.01 Maintains fuel systems 21.02 Repairs fuel systems 21.03 Maintains charging and starting systems 21.04 Repairs charging and starting systems 21.05 Maintains high-voltage electric, hybrid and alternative drive systems 21.06 Repairs high-voltage electric, hybrid and alternative drive systems 21.07 Maintains refrigeration and heating systems 21.08 Repairs refrigeration and heating systems (NCC)

Major Work Activity A

Performs common occupational skills

Task A-1 Performs safety-related functions

Task Descriptor

Transport trailer technicians must adhere to safety procedures and regulations to ensure a safe work environment.

A-1.01 Maintains safe work environment

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
A-1.01.01P	identify potential ***hazards***	potential ***hazards*** are identified by performing visual inspection of vehicles and surrounding area
A-1.01.02P	perform ***housekeeping duties***	***housekeeping duties*** are performed according to company policies and procedures
A-1.01.03P	utilize ventilation equipment to extract and contain fumes, smoke and dust	ventilation equipment is utilized according to safe work procedures to extract and contain fumes, smoke and dust
A-1.01.04P	handle, store and dispose of ***hazardous materials***	***hazardous materials*** are handled, stored and disposed of according to company policies and procedures, and ***jurisdictional safety regulations***
A-1.01.05P	identify location of ***workplace safety equipment*** and emergency phone numbers	location of ***workplace safety equipment*** and emergency phone numbers are identified
A-1.01.06P	select and set up ***work area shielding***	***work area shielding*** is selected and set up according to task to protect others and surrounding work area

Range of Variables

hazards include: fluids and gases under high pressure in hydraulic, pneumatic and refrigeration systems; ceiling heights; overhead wires; uneven surfaces; live electrical circuits

housekeeping duties include: sweeping, discarding defective components, keeping area clear of obstacles

hazardous materials include: chemicals, refrigerants, high-pressure gases, fluids, fuels

jurisdictional safety regulations include: Occupational Health and Safety (OH&S), WHMIS

workplace safety equipment includes: safety stations, first aid kits, eyewash stations, fire extinguishers, spill kits, personal protective equipment (PPE)

work area shielding includes: shields, containment devices

	Knowledge	
	Learning Outcomes	**Learning Objectives**
A-1.01.01L	demonstrate knowledge of safe work practices	describe safe work practices to maintain a safe work environment
		describe procedures to handle, store and dispose of ***hazardous materials***
		identify ***workplace safety equipment***, and describe their characteristics and applications
A-1.01.02L	demonstrate knowledge of certification and regulatory requirements pertaining to safety	identify and describe ***jurisdictional safety regulations*** to maintain safe work environment
		identify ***components of*** Workplace Hazardous Materials Information System (***WHMIS***) and associated certifications
		identify and describe jurisdictional requirements for handling and disposing of ***hazardous materials***

Range of Variables

hazardous materials include: chemicals, refrigerants, high-pressure gases, fluids, fuels

workplace safety equipment includes: safety stations, first aid kits, eyewash stations, fire extinguishers, spill kits, personal protective equipment (PPE)

jurisdictional safety regulations include: Occupational Health and Safety (OH&S), WHMIS

components of WHMIS include: safety data sheets (SDS), labels, training, muster points

A-1.02 Uses personal protective equipment (PPE) and safety equipment

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
A-1.02.01P	select and use ***PPE*** and ***personal safety equipment***	***PPE*** and ***personal safety equipment*** are selected and used according to ***work conditions and requirements***, company policies and manufacturers' recommendations, and fit properly
A-1.02.02P	store and maintain ***PPE*** and ***personal safety equipment***	***PPE*** and ***personal safety equipment*** are stored and maintained according to company policies and manufacturers' recommendations
A-1.02.03P	repair or replace and report worn damaged or defective ***PPE*** and ***personal safety equipment***	worn, damaged or defective ***PPE*** and ***personal safety equipment*** are repaired or replaced according to company policies and ***jurisdictional safety regulations***, and designated safety representative is notified

Range of Variables

PPE includes: hard hats, gloves, respirators, safety glasses, hearing protection, safety boots, protective clothing, face shields

personal safety equipment includes: fall arrest, fall protection, guarding, shielding, jack/support stands, wheel chalks, lock out, tag out

work conditions and requirements include: wearing rubber gloves when handling hazardous or carcinogenic materials, wearing eye and hearing protection when hammering and grinding metals, wearing masks and breathing protection when working around hazardous airborne and liquid substances

jurisdictional safety regulations include: OH&S, WHMIS

	Knowledge	
	Learning Outcomes	**Learning Objectives**
A-1.02.01L	demonstrate knowledge of ***PPE***, their characteristics, applications and procedures for use	identify types of ***PPE***, and describe their characteristics, applications and procedures for use
		describe handling, storage and maintenance of ***PPE***
A-1.02.02L	demonstrate knowledge of ***personal safety equipment***, their characteristics, applications and procedures for use	identify types of ***personal safety equipment***, and describe their characteristics, applications and procedures for use

		describe handling, storage and maintenance of ***personal safety equipment***
A-1.02.03L	demonstrate knowledge of training, certification and regulatory requirements for ***PPE*** and ***personal safety equipment***	identify training and certification requirements for ***PPE*** and ***personal safety equipment***
		identify safety manuals, ***standards and regulations*** and ***jurisdictional safety regulations*** for ***PPE*** and ***personal safety equipment***

Range of Variables

PPE includes: hard hats, gloves, respirators, safety glasses, hearing protection, safety boots, protective clothing, face shields

personal safety equipment includes: fall arrest, fall protection, guarding, shielding, jack/support stands, wheel chalks, lock out, tag out

standards and regulations include: Canadian Standards Association (CSA), site-specific (company or client)

jurisdictional safety regulations include: OH&S, WHMIS

Task A-2 Uses and maintains tools and equipment

Task Descriptor

Transport trailer technicians must use and maintain tools and equipment to perform all tasks in their trade in a safe and efficient manner.

A-2.01 Uses hand, electric and pneumatic tools

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
A-2.01.01P	select and use hand, electric and pneumatic tools	hand, electric and pneumatic tools are selected and used according to task, company policies and procedures, and manufacturers' specifications and recommendations
A-2.01.02P	inspect hand, electric and pneumatic tools for wear, damage and defects	hand, electric and pneumatic tools are inspected for wear, damage and defects according to company policies and procedures, and manufacturers' specifications and recommendations
A-2.01.03P	clean and lubricate hand, electric and pneumatic tools	hand, electric and pneumatic tools are cleaned and lubricated according to company policies and procedures, and manufacturers' specifications and recommendations
A-2.01.04P	sharpen tools	tools are sharpened according to company policies and procedures, and type of material being used
A-2.01.05P	store hand, electric and pneumatic tools	hand, electric and pneumatic tools are stored according to company policies and procedures, and manufacturers' recommendations
A-2.01.06P	repair or replace worn, damaged and faulty hand, electric and pneumatic tools	worn, damaged and faulty hand, electric and pneumatic tools are repaired or replaced, and reported according to company policies and procedures

	Knowledge	
	Learning Outcomes	**Learning Objectives**
A-2.01.01L	demonstrate knowledge of hand, electric and pneumatic tools, their characteristics, applications, maintenance and procedures for use	identify types of hand, electric and pneumatic tools, and describe their characteristics, applications and procedures for use
		describe procedures to inspect hand, electric and pneumatic tools
		describe procedures to lubricate and clean hand, electric and pneumatic tools
		describe procedures to sharpen hand, electric and pneumatic tools
		describe procedures to record and report damaged and defective hand, electric and pneumatic tools
		identify hazards and describe safe work practices pertaining to hand, electric and pneumatic tools

A-2.02 Uses measuring, testing and diagnostic equipment

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
A-2.02.01P	select and use measuring, testing and diagnostic equipment	measuring, testing and diagnostic equipment are selected and used according to task, company policies and procedures, and manufacturers' specifications and recommendations
A-2.02.02P	inspect measuring, testing and diagnostic equipment for wear, damage or defects	measuring, testing and diagnostic equipment are inspected for wear, damage or defects according to company policies and procedures, and manufacturers' specifications and recommendations
A-2.02.03P	recalibrate measuring, testing and diagnostic equipment	measuring, testing and diagnostic equipment are recalibrated at required intervals according company policies and procedures, and manufacturers' specifications and recommendations

A-2.02.04P	clean and store measuring, testing and diagnostic equipment	measuring, testing and diagnostic equipment are cleaned and stored to prevent contamination and damage according to company policies and procedures, and manufacturers' recommendations
A-2.02.05P	change battery within electronic equipment	battery within electronic equipment is changed when required
A-2.02.06P	repair or replace worn, damaged and faulty measuring, testing and diagnostic equipment	worn, damaged and faulty measuring, testing and diagnostic equipment are repaired or replaced, and reported according to company policies and procedures

	Knowledge	
	Learning Outcomes	**Learning Objectives**
A-2.02.01L	demonstrate knowledge of measuring, testing and diagnostic equipment, their characteristics, applications, maintenance and procedures for use	identify types of measuring, testing and diagnostic equipment, and describe their characteristics, applications and procedures for use
		describe procedures to inspect measuring, testing and diagnostic equipment
		describe procedures to clean and store measuring, testing and diagnostic equipment
		describe procedures to recalibrate measuring, testing and diagnostic equipment
		describe procedures to record and report damaged and defective measuring, testing and diagnostic equipment
		identify hazards and describe safe work practices pertaining to measuring, testing and diagnostic equipment

A-2.03 Uses hoisting, lifting, staging and access equipment

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
A-2.03.01P	select and use hoisting, lifting, staging and access equipment	hoisting, lifting, staging and access equipment are selected and used according to task, company policies and procedures, and manufacturers' specifications and recommendations
A-2.03.02P	inspect hoisting, lifting, staging and access equipment for wear, damage, leaks and defects	hoisting, lifting, staging and access equipment are inspected for wear, damage, leaks and defects according to company policies and procedures, and manufacturers' specifications and recommendations
A-2.03.03P	repair, replace and report worn, damaged and faulty hoisting, lifting staging and access equipment	worn, damaged and faulty hoisting, lifting, staging and access equipment are repaired or replaced, and reported according to company policies and procedures
A-2.03.04P	store hoisting, lifting, staging and access equipment	hoisting, lifting, staging and access equipment are stored according to company policies and procedures, and manufacturers' recommendations
A-2.03.05P	position and connect hoisting and lifting equipment	hoisting and lifting equipment are positioned and connected according to company policies and procedures, and manufacturers' specifications and recommendations
A-2.03.06P	secure access equipment	access equipment is secured to prevent movement according to company policies and procedures, and manufacturers' specifications and recommendations
A-2.03.07P	operate hoisting, lifting, staging and access equipment	hoisting, lifting staging and access equipment are operated according to company policies and procedures, and manufacturers' recommendations
A-2.03.08P	identify potential ***hazards*** and implement measures to minimize risk	potential ***hazards*** are identified and measures are implemented to minimize risk

Range of Variables

hazards include: ceiling heights, overhead wires, uneven surfaces

	Knowledge	
	Learning Outcomes	**Learning Objectives**
A-2.03.01L	demonstrate knowledge of hoisting, lifting, staging and access equipment, their characteristics, applications and maintenance	identify types of hoisting, lifting, staging and access equipment, and describe their characteristics and applications
		describe procedures to inspect hoisting, lifting, staging and access equipment
		describe procedures to repair hoisting, lifting, staging and access equipment components
		describe procedures to store hoisting, lifting, staging and access equipment
		describe procedures to position and connect hoisting and lifting equipment
		describe procedures to record and report damaged and defective hoisting, lifting, staging and access equipment
A-2.03.02L	demonstrate knowledge of procedures to operate hoisting, lifting, staging and access equipment	identify ***factors*** to consider when selecting hoisting, lifting, staging and access equipment
		describe procedures to operate hoisting, lifting, staging and access equipment
		identify potential ***hazards*** and describe ***safe work practices*** pertaining to use of hoisting, lifting, staging and access equipment
		describe load limitations of hoisting, staging and lifting equipment
A-2.03.03L	demonstrate knowledge of training and certification requirements to operate hoisting, lifting, staging and access equipment	describe training and certification requirements to operate hoisting, lifting, staging and access equipment
A-2.03.04L	demonstrate knowledge of regulatory requirements to use hoisting, lifting, staging and access equipment	identify and interpret regulations to use hoisting, lifting, staging and access equipment

Range of Variables

factors include: load characteristics, environment, safety factors, anchor points, sling angles

hazards include: ceiling heights, overhead wires, uneven surfaces

safe work practices include: supervision of lifts, securing work area, communication

A-2.04 Uses welding equipment

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
A-2.04.01P	select and use welding equipment	welding equipment is selected and used according to task, company policies and procedures, and manufacturers' recommendations
A-2.04.02P	inspect welding equipment for wear, damage, defects and potential hazards	welding equipment is inspected for wear, damage, defects and potential hazards, and findings are reported to supervisor/manager according to company policies and procedures, and manufacturers' specifications and recommendations
A-2.04.03P	store and secure welding equipment	welding equipment is stored and secured according to company policies and procedures, manufacturers' recommendations and jurisdictional regulations
A-2.04.04P	maintain welding equipment	welding equipment is maintained by using ***methods*** according to company policies and procedures, and manufacturers' recommendations
A-2.04.05P	transport welding equipment	welding equipment is transported according to jurisdictional regulations and Transportation of Dangerous Goods (TDG) Act
A-2.04.06P	select and regulate compressed gases	compressed gases are selected and regulated according to material requirements
A-2.04.07P	set up welding equipment	welding equipment is set up by adjusting wire speed, heat and gas controls according to material being welded and job conditions
A-2.04.08P	prepare parent material to accept weld	parent material is prepared to accept weld
A-2.04.09P	assess flow and penetration during welding	flow and penetration are assessed during welding according to sensory inspection performed
A-2.04.10P	shut down welding equipment	welding equipment is shut down according to company policies and procedures, and manufacturers' recommendations

Range of Variables

methods include: cleaning welding tips, replacing electrode holders, securing ground clamps

	Knowledge	
	Learning Outcomes	**Learning Objectives**
A-2.04.01L	demonstrate knowledge of welding equipment, their characteristics, applications and maintenance	identify types of welding equipment, and describe their characteristics, applications and maintenance
		describe procedures to inspect welding equipment
		describe procedures to transport welding equipment
		describe procedures to store welding equipment
		identify ***welding materials***
A-2.04.02L	demonstrate knowledge of procedures to use welding equipment	describe procedures to use welding equipment
		identify ***hazards*** and describe safe work practices pertaining to welding equipment
A-2.04.03L	demonstrate knowledge of training and certification requirements to use welding equipment	identify training and certification requirements to use welding equipment
A-2.04.04L	demonstrate knowledge of regulatory requirements to transport and store welding equipment	identify and interpret standards and regulations to transport and store welding equipment

Range of Variables

welding materials include: covered and coiled wire electrodes, shielding gases
hazards include: electrocution, fire, arc flash, metal poisoning

A-2.05 Uses gas, plasma and arc air cutting equipment

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
A-2.05.01P	select and use gas, plasma and arc air equipment	gas, plasma and arc air equipment are selected and used according to task, company policies and procedures, and manufacturers' specifications and recommendations
A-2.05.02P	inspect gas, plasma and arc air equipment for wear, damage, defects and potential hazards	gas, plasma and arc air equipment are inspected for wear, damage, defects and potential hazards according to company policies and procedures, and manufacturers' specifications and recommendations
A-2.05.03P	store and secure gas, plasma and arc air equipment	gas, plasma and arc air equipment are stored and secured according to company policies and procedures, and manufacturers' recommendations
A-2.05.04P	maintain gas, plasma and arc air equipment	gas, plasma and arc air equipment are maintained using ***methods*** according to company policies and procedures, and manufacturers' specifications and recommendations
A-2.05.05P	transport gas, plasma and arc air equipment	gas, plasma and arc air equipment are transported according to jurisdictional regulations and TDG Act
A-2.05.06P	select and regulate compressed gases	compressed gases are selected and regulated according to material requirements and environmental conditions
A-2.05.07P	set up gas, plasma and arc air equipment	gas, plasma and arc air equipment are set up by adjusting controls according to material being cut and job conditions
A-2.05.08P	shut down gas, plasma and arc air equipment	gas, plasma and arc air equipment are shut down according to company policies and procedures, and manufacturers' recommendations

RANGE OF VARIABLE

methods include: replacing or cleaning cutting tips, cleaning torch bodies, securing hoses

	Knowledge	
	Learning Outcomes	**Learning Objectives**
A-2.05.01L	demonstrate knowledge of gas, plasma and arc air equipment, their characteristics, applications and maintenance	identify types of gas, plasma and arc air equipment, and describe their characteristics, applications and maintenance
		describe procedures to inspect gas, plasma and arc air equipment
		describe procedures to transport gas, plasma and arc air equipment
		describe procedures to store and secure gas, plasma and arc air equipment
A-2.05.02L	demonstrate knowledge of procedures to use gas, plasma and arc air equipment	describe procedures to use gas, plasma and arc air equipment
		identify hazards, and describe safe work practices pertaining to gas, plasma and arc air equipment

A-2.06 Uses electronic devices and systems for diagnostics and programming

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
A-2.06.01P	use ***software applications***	***software applications*** are used according to manufacturers' recommendations
A-2.06.02P	verify software version, download from manufacturer and upload to controllers	software version is verified, downloaded from manufacturer and uploaded to controllers
A-2.06.03P	select and use ***electronic devices***	***electronic devices*** are selected and used according to task and manufacturers' specifications
A-2.06.04P	download and document reports from equipment controller and forward to original equipment manufacturer (OEM) or customer	reports from equipment controller are downloaded and documented and forwarded to OEM or customer

A-2.06.05P	monitor ***parameters***	***parameters*** are monitored for operational status according to manufacturers' specifications
A-2.06.06P	interpret diagnostic results and reports	diagnostic results and reports are interpreted to determine failure and required repair

Range of Variables

software applications include: OEM diagnostic and operating software, internet-based technical support
electronic devices include: laptops, smart phones, tablets, data links, OEM communication devices
parameters include: speeds, temperatures, pressures, anti-lock brake system (ABS), roll stability, software versions

	Knowledge	
	Learning Outcomes	**Learning Objectives**
A-2.06.01L	demonstrate knowledge of using ***electronic devices*** for diagnostics and programming	describe ***software applications*** used in diagnostics and programming
		identify types of ***electronic devices*** used in diagnostics and programming, and describe their characteristics, applications and procedures for use
		describe manufacturers' programming and monitoring procedures
		describe elements of diagnostic results and reports
A-2.06.02L	demonstrate knowledge of training and certification available to use ***electronic devices*** for diagnostics and programming	describe training and certification available to use ***electronic devices*** for diagnostics and programming

Range of Variables

electronic devices include: laptops, smart phones, tablets, data links, OEM communication devices
software applications include: OEM diagnostic and operating software, internet-based technical support

Task A-3 Performs routine work practices

Task Descriptor

Transport trailer technicians perform the activities in this task across their trade when performing repairs and maintenance.

A-3.01 Maintains fluids and lubricants

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
A-3.01.01P	select and use tools and equipment	tools and equipment are selected and used according to task and manufacturers' specifications
A-3.01.02P	identify safe handling procedures for ***fluids*** and ***lubricants***	safe handling procedures for ***fluids*** and ***lubricants*** are identified according to WHMIS
A-3.01.03P	perform ***sensory inspections*** of ***fluids*** and ***lubricants***	***sensory inspections*** of ***fluids*** and ***lubricants*** are performed
A-3.01.04P	store and dispose of ***fluids*** and ***lubricants***	***fluids*** and ***lubricants*** are stored and disposed of according to jurisdictional regulations and manufacturers' recommendations
A-3.01.05P	service filtration systems	filtration systems are serviced according to manufacturers' recommended intervals
A-3.01.06P	verify ***fluid*** levels	***fluid*** levels are verified and topped up according to manufacturers' specifications
A-3.01.07P	identify and select types and grades of ***fluids*** and ***lubricants***	types and grades of ***fluids*** and ***lubricants*** are identified and selected according to application and environmental conditions

Range of Variables

fluids include: hub oil, hydraulic oil, coolants, methyl hydrate, fuel

lubricants include: synthetic, semisynthetic, non-synthetic

sensory inspections include: checking for odours, visible contaminants and texture

	Knowledge	
	Learning Outcomes	**Learning Objectives**
A-3.01.01L	demonstrate knowledge of ***fluids*** and ***lubricants***, their characteristics and applications	identify types and grades of ***fluids*** and ***lubricants***, and describe their characteristics and applications
		describe consequences of mixing different types of ***fluids*** and ***lubricants***
A-3.01.02L	demonstrate knowledge of procedures to maintain ***fluids*** and ***lubricants***	identify tools and equipment used to maintain ***fluids*** and ***lubricants***, and describe their applications and procedures for use
		describe procedures to maintain ***fluids*** and ***lubricants***
		describe procedures to dispose of and recycle oil, antifreeze, air conditioning refrigerant, contaminated fuels and filters
		identify hazards and describe safe work practices pertaining to ***fluids*** and ***lubricants***
A-3.01.03L	demonstrate knowledge of regulatory requirements to dispose of oil, antifreeze, air conditioning refrigerant, contaminated fuels and filters	identify and interpret standards and regulations to dispose of oil, antifreeze, air conditioning refrigerant, contaminated fuels and filters

Range of Variables

fluids include: hub oil, hydraulic oil, coolants, methyl hydrate, fuel
lubricants include: synthetic, semisynthetic, non-synthetic

A-3.02 Lubricates parts and components

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
A-3.02.01P	select and use ***lubricating equipment***	***lubricating equipment*** is selected and used according to task and manufacturers' specifications
A-3.02.02P	select ***lubricant***	***lubricant*** is selected according to application and environmental conditions
A-3.02.03P	inspect components prior to lubricating	components are inspected prior to lubricating

Range of Variables

lubricating equipment include: grease guns, pumps, suction guns
lubricants include: synthetic, semisynthetic, non-synthetic

	Knowledge	
	Learning Outcomes	**Learning Objectives**
A-3.02.01L	demonstrate knowledge of ***lubricants***, their characteristics and applications	identify types and grades of ***lubricants***, and describe their characteristics and applications
A-3.02.02L	demonstrate knowledge of procedures to lubricate parts and components	describe procedures to lubricate parts and components
		identify ***lubricating equipment*** used to lubricate parts and components, and describe their applications and procedures for use
		identify hazards and describe safe work practices pertaining to lubricating parts and components

Range of Variables

lubricants include: synthetic, semisynthetic, non-synthetic
lubricating equipment include: grease guns, pumps, suction guns

A-3.03 Cleans parts and components

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
A-3.03.01P	select and use ***cleaning tools***	***cleaning tools*** are selected and used according to task and manufacturers' recommendations
A-3.03.02P	select ***cleaning method***	***cleaning method*** is selected according to type and location of repair
A-3.03.03P	select ***cleaning solutions and solvents***	***cleaning solutions and solvents*** are selected according to task, manufacturers' recommendations and material being cleaned

A-3.03.04P	verify area surrounding part or component is clean and clear of debris	area surrounding part or component is clean and clear of debris before component removal
A-3.03.05P	verify part or component has been cleaned	part or component has been cleaned according to manufacturers' specifications and recommendations

Range of Variables

cleaning tools include: parts washers, scrapers, pressure washers, wire wheels, flushing equipment kits, wire brushes, die grinders, picks, files, emery cloths

cleaning methods include: scraping, wiping, washing, flushing

cleaning solutions and solvents include: brake cleaner, electrical contact cleaner, degreasers

	Knowledge	
	Learning Outcomes	**Learning Objectives**
A-3.03.01L	demonstrate knowledge of ***cleaning tools, solutions and solvents***, their characteristics and applications	identify types of ***cleaning tools*** used to clean parts and components, and describe their characteristics and applications
		identify types and material properties of ***cleaning solutions and solvents***, and describe their characteristics and applications
A-3.03.02L	demonstrate knowledge of procedures to clean parts and components	describe ***methods*** used for cleaning parts and components
		identify hazards and describe safe work practices pertaining to use of ***cleaning solutions and solvents***
A-3.03.03L	demonstrate knowledge of regulatory requirements to dispose of ***cleaning solutions and solvents***	identify and interpret standards and regulations to dispose of ***cleaning solutions and solvents***

Range of Variables

cleaning tools include: parts washers, scrapers, pressure washers, wire wheels, flushing equipment kits, wire brushes, die grinders, picks, files, emery cloths

cleaning solutions and solvents include: brake cleaner, electrical contact cleaner, degreasers

cleaning methods include: scraping, wiping, washing, flushing

A-3.04 Uses fasteners, sealants, adhesives and gaskets

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
A-3.04.01P	select and use installation and application ***tools and equipment***	installation and application ***tools and equipment*** are selected and used according to task and manufacturers' specifications
A-3.04.02P	select and use fasteners, sealants, adhesives and gaskets	fasteners, sealants, adhesives and gaskets are selected and used according to task, application and manufacturers' specifications
A-3.04.03P	remove and replace fasteners	fasteners are removed and replaced according to ***fastener condition***, use, location and manufacturers' specifications
A-3.04.04P	install fasteners	fasteners are installed according to manufacturers' specifications
A-3.04.05P	tighten fasteners	fasteners are tightened according to manufacturers' specifications
A-3.04.06P	repair threads	threads are repaired according to manufacturers' specifications
A-3.04.07P	apply sealants and adhesives	sealants and adhesives are applied according to type of material and environmental conditions
A-3.04.08P	remove and replace gaskets	gaskets are removed and replaced according to manufacturers' specifications
A-3.04.09P	install gaskets	gaskets are installed according to manufacturers' specifications

Range of Variables

tools and equipment include: rivet guns, glue guns, torque wrenches, crimpers, air hammers
fastener condition includes: corrosion, broken, damaged head, damaged and stretched threads

	Knowledge	
	Learning Outcomes	**Learning Objectives**
A-3.04.01L	demonstrate knowledge of fasteners, their characteristics and applications	identify types, grades and torque specifications of fasteners, and describe their characteristics and applications
A-3.04.02L	demonstrate knowledge of sealants, adhesives and gaskets, their characteristics and applications	identify types of sealants, adhesives and gaskets, and describe their characteristics and applications

A-3.04.03L	demonstrate knowledge of procedures to apply, remove and install fasteners, sealants, adhesives and gaskets	identify ***tools and equipment*** used with fasteners, sealants, adhesives and gaskets, and describe their applications and procedures for use
		describe procedures to remove and install fasteners and gaskets
		describe procedures to apply sealants, adhesives
		describe torque procedures for fasteners
		identify anaerobic and aerobic materials, and describe their characteristics and applications
		identify ventilation requirements when using sealants and adhesives
		identify hazards and describe safe work practices pertaining to use of fasteners, sealants, adhesives and gaskets
A-3.04.04L	demonstrate knowledge of regulatory requirements pertaining to sealants and adhesives	identify and interpret standards and regulations pertaining to handling, storing and disposing of sealants and adhesives

Range of Variables

tools and equipment include: rivet guns, glue guns, torque wrenches, crimpers, air hammers

A-3.05 Maintains hoses, tubing and fittings

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

Skills

	Performance Criteria	Evidence of Attainment
A-3.05.01P	select and use tools and equipment	tools and equipment are selected and used according to task and manufacturers' specifications
A-3.05.02P	drain fluid and relieve pressure from air and fluid systems before disconnecting hoses, tubing and fittings	fluid is drained and pressure is relieved from air and fluid systems before disconnecting hoses, tubing and fittings according to service conditions and manufacturers' recommendations
A-3.05.03P	identify and document ***faults***	***faults*** are identified and documented according to visual inspection of hoses, tubing and fittings

A-3.05.04P	route and secure hoses, tubing and fittings	hoses, tubing and fittings are routed and secured using clamps, springs, separators and ties to avoid rubbing pinch points or interference with other components
A-3.05.05P	install ferrules, nuts and inserts	ferrules, nuts and inserts are installed according to design and ***application***
A-3.05.06P	remove and install hoses, tubing and fittings	hoses, tubing and fittings are removed and installed according to manufacturers' recommendations and specifications
A-3.05.07P	create flares	flares are created using specialized flaring tools

Range of Variables

faults include: holes, cracks, breakage, worn, leaks
application includes: pressure, temperature, material travelling through line

	Knowledge	
	Learning Outcomes	**Learning Objectives**
A-3.05.01L	demonstrate knowledge of hoses, tubing and fittings, their characteristics and applications	identify ***types of hoses, tubing and fittings***, and describe their characteristics and applications
A-3.05.02L	demonstrate knowledge of procedures to remove and install hoses, tubing and fittings	identify tools and equipment used to remove and install hoses, tubing and fittings, and describe their applications and procedures for use
		describe types of ***faults*** identified by conducting visual inspections of hoses, tubing and fittings
		describe procedures to remove and install hoses, tubing and fittings
		describe compatibility of hoses, tubing and fittings
		identify hazards and describe safe work practices pertaining to use of hoses, tubing and fittings
A-3.05.03L	demonstrate knowledge of regulatory requirements pertaining to hoses, tubing and fittings	identify and interpret standards and regulations pertaining to hoses, tubing and fittings

Range of Variables

types of hoses, tubing and fittings include: plastic, rubber, neoprene, steel
faults include: holes, cracks, breakage, worn, leaks

Task A-4 Organizes work

Task Descriptor

Transport trailer technicians use a variety of documents to plan and record their work.

A-4.01 Uses documentation

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
A-4.01.01P	locate required ***information***	***manuals*** are referenced in order to locate required ***information***
A-4.01.02P	use ***electronic devices***	***electronic devices*** are used to locate required ***information***
A-4.01.03P	interpret and apply ***technical information*** to situation	***technical information*** is interpreted and applied to situation
A-4.01.04P	record ***service information***	***service information*** is recorded according to company policies and procedures, and manufacturers' requirements
A-4.01.05P	record ***work-related information***	***work-related information*** is recorded according to company policies and procedures, and manufacturers' requirements
A-4.01.06P	complete ***safety-related documents***	***safety-related documents*** are completed according to jurisdictional regulations, and company policies and procedures
A-4.01.07P	report completion of documentation to management	completion of documentation is reported to management according to company policies and procedures
A-4.01.08P	follow confidentiality guidelines	confidentiality guidelines are followed according to company policies and procedures

Range of Variables

information includes: warranties, service, parts

manuals include: operator, service, parts, safety

electronic devices include: laptops, smart phones, tablets, data links, OEM communication devices

technical information includes: schematics, drawings, specifications, theory of operation, test results

service information includes: warranty claims, service records, preventative maintenance records, failure analysis using photographs

work-related information includes: technician hours worked, machine hours, vehicle identification numbers (VIN), parts used, task descriptions

safety-related documents include: accident reports, injury reports, safety inspection reports, workplace hazard reports

	Knowledge	
	Learning Outcomes	**Learning Objectives**
A-4.01.01L	demonstrate knowledge of trade-related documentation and its use	identify ***trade-related information*** and describe their characteristics and applications
		identify information required for service records and maintenance logs
		identify ***safety-related documents*** and describe their characteristics and applications
A-4.01.02L	demonstrate knowledge of procedures to use and complete documentation	describe procedures to use and complete documentation
A-4.01.03L	demonstrate knowledge of confidentiality guidelines	identify elements of confidentiality guidelines, and describe their characteristics and applications
A-4.01.04L	demonstrate knowledge of regulatory requirements pertaining to use of documentation	identify and interpret regulations pertaining to use of documentation

Range of Variables

trade-related information include: manuals, technical information, work-related information, schematics, drawings

safety-related documents include: accident reports, injury reports, safety inspection reports, workplace hazard reports

A-4.02 Plans daily tasks

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
A-4.02.01P	determine priorities of tasks	priorities of tasks are determined according to ***factors***
A-4.02.02P	estimate repair times and finish dates	repair times and finish dates are estimated
A-4.02.03P	determine required materials and tools for diagnostics and repairs on service calls	required materials and tools for diagnostics and repairs on service calls are determined
A-4.02.04P	organize work and travel schedules	work and travel schedules are organized

Range of Variables

factors include: logical and efficient sequence, availability of parts

	Knowledge	
	Learning Outcomes	**Learning Objectives**
A-4.02.01L	demonstrate knowledge of planning tasks	describe sequence of work
		determine work and travel schedules
		describe importance of time management

Task A-5 Uses communication and mentoring techniques

Task Descriptor

Learning in the trades is done primarily in the workplace with tradespeople passing on their skills and knowledge to apprentices, as well as sharing knowledge among themselves. Apprenticeship is, and always has been about mentoring – learning workplace skills and passing them on. Because of the importance of this to the trade, this task covers the activities related to communication and mentoring skills in the workplace amongst peers and employers.

A-5.01 Uses communication techniques

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
A-5.01.01P	demonstrate communication practices with individuals or in a group	instructions and messages are interpreted by all parties involved in communication
A-5.01.02P	listen using ***active listening*** practices	***active listening*** practices are utilized
A-5.01.03P	speak clearly using correct industry terminology to ensure understanding	understanding of message is confirmed by both parties
A-5.01.04P	receive and respond to instructions	response to instructions indicates understanding
A-5.01.05P	receive and respond to feedback on work completed or performed	response to feedback indicates understanding and corrective measures are taken
A-5.01.06P	explain and provide feedback	explanation and feedback is provided and task is carried out as directed
A-5.01.07P	use questions to improve communication	questions enhance understanding, on-the-job training and goal setting
A-5.01.08P	participate in safety and information meetings	meetings are attended, information is relayed to workforce and is applied
A-5.01.09P	send and receive ***electronic messages***	***electronic messages*** are sent and received using professionalism, plain language and clear expressions according to company policy

Range of Variables

active listening includes: hearing, interpreting, reflecting, responding, paraphrasing
electronic messages include: email, text messages

	Knowledge	
	Learning Outcomes	**Learning Objectives**
A-5.01.01L	demonstrate knowledge of trade terminology	define terminology used in trade
A-5.01.02L	demonstrate knowledge of effective communication practices	describe importance of using effective verbal and non-verbal communication with ***people in the workplace***
		identify ***sources of information*** to effectively communicate
		identify communication and ***learning styles***
		describe effective listening and speaking skills
		describe how to receive and give instructions effectively
		identify ***personal responsibilities and attitudes*** that contribute to on-the-job success
		identify value of equity, diversity and inclusion in workplace
		identify communication that constitutes bullying, ***harassment*** and ***discrimination***
		identify communication styles appropriate to different systems and applications of ***electronic messages***

Range of Variables

people in the workplace include: other tradespeople, colleagues, apprentices, supervisors, clients, jurisdictional representatives, manufacturers

sources of information include: regulations, occupational health and safety requirements, jurisdictional requirements, prints, drawings, specifications, company and client documentation

learning styles include: seeing it, hearing it, trying it

personal responsibilities and attitudes include: asking questions, working safely, accepting constructive feedback, time management and punctuality, respect for authority, good stewardship of materials, tools and property, efficient work practice

harassment: as defined by the Canadian and jurisdictional Human Rights Commissions

discrimination: as defined by the Canadian Human Rights Act and jurisdictional human rights laws

electronic messages include: email, text messages

A-5.02 Uses mentoring techniques

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

Skills

	Performance Criteria	Evidence of Attainment
A-5.02.01P	identify and communicate learning objective and point of lesson	apprentice or learner can explain objective and point of lesson
A-5.02.02P	link lesson to other lessons and project	lesson order and unplanned learning opportunities are defined
A-5.02.03P	demonstrate performance of a skill to an apprentice or learner	***steps required to demonstrate a skill*** are performed
A-5.02.04P	set up conditions required for apprentice or learner to practice a skill	***practice conditions*** are set up so that skill can be practiced safely by apprentice or learner
A-5.02.05P	assess apprentice or learner's ability to perform tasks with increasing independence	performance of apprentice or learner improves with practice to a point where skill can be done with little supervision
A-5.02.06P	give supportive and corrective feedback	apprentice or learner adopts best practice after having been given supportive or corrective feedback
A-5.02.07P	support apprentices or learners in pursuing technical training opportunities	technical training is completed within timeframe prescribed by apprenticeship authority
A-5.02.08P	support anti-***harassment*** and anti-***discrimination*** practices in the workplace	workplace is ***harassment*** and ***discrimination***-free
A-5.02.09P	assess apprentice or learner suitability to trade during probationary period	apprentice or learner is given constructive feedback that helps them identify their own strengths and weaknesses and suitability for trade

Range of Variables

steps required to demonstrate a skill include: understanding the who, what, where, when, why, and how, explaining, showing, giving encouragement, following up to ensure skill is performed correctly

practice conditions means: guided, limited independence, full independence

harassment: as defined by the Canadian and jurisdictional Human Rights Commissions

discrimination: as defined by the Canadian Human Rights Act and jurisdictional human rights laws

Knowledge

	Learning Outcomes	Learning Objectives
A-5.02.01L	demonstrate knowledge of strategies for learning skills in workplace	describe importance of individual experience
		describe shared responsibilities for workplace learning

		determine one's own learning preferences and explain how these relate to learning new skills
		describe importance of different types of skills in workplace
		describe importance of ***essential skills*** in workplace
		identify different ***learning styles***
		identify different ***learning needs*** and strategies to meet them
		identify ***strategies to assist in learning a skill***
A-5.02.02L	demonstrate knowledge of strategies for ***teaching*** workplace ***skills***	identify different roles played by workplace mentor
		describe ***teaching skills***
		explain importance of identifying point of lesson
		identify how to choose a good time to present lesson
		explain importance of linking lessons
		identify context for learning skills
		describe considerations in setting up opportunities for skill practice
		explain importance of providing feedback
		identify techniques for giving effective feedback
		describe a skills assessment
		identify methods of assessing progress
		explain how to adjust lesson to different situations

Range of Variables

essential skills are: reading, document use, writing, oral communication, numeracy, thinking, working with others, digital technology, continuous learning

learning styles include: seeing it, hearing it, trying it

learning needs include: learning disabilities, learning preferences, language proficiency

strategies to assist in learning a skill include: understanding the basic principles of instruction, developing coaching skills, being mature and patient, providing feedback, being respectful

teaching skills include: identifying the point of the lesson, linking the lesson, demonstrating the skill, providing practice, giving feedback, assessing skills and progress

Major Work Activity B
Diagnoses and services suspension systems

Task B-6 Diagnoses suspension systems

Task Descriptor
Transport trailer technicians inspect and diagnose suspension systems according to manufacturers' specifications.

B-6.01 Diagnoses air suspension systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
B-6.01.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
B-6.01.02P	test operation of valves	operation of valves are tested by supplying air at system operating pressure according to manufacturers' specifications and procedures
B-6.01.03P	inspect operation of ***components***	operation of ***components*** is inspected
B-6.01.04P	identify ***problems*** of air supply and flow	***problems*** of air supply and flow are identified
B-6.01.05P	verify air pressure	air pressure is verified by using gauges
B-6.01.06P	perform ***sensory inspections*** on components to identify ***faults***	***sensory inspections*** are performed on components to identify ***faults***
B-6.01.07P	check for excessive movements of ***components***	***components*** are checked for excessive movements according to manufacturers' specifications and procedures
B-6.01.08P	interpret test results	test results are interpreted to determine ***next steps***

Range of Variables

tools and equipment include: pressure gauges, adapter fittings, hand tools, power tools, dial indicators, pry bars, jacks, jack/support stands, wheel chocks, light sources, torque wrenches, tape measures

components include: air valves, air springs, height control valves, fittings, air lines

problems include: faulty pressure protection valves; faulty emergency valves; cut, kinked or leaking supply lines

sensory inspections include: listening, looking and testing for air leaks; recognizing wear, damages and defects of components

faults include: leaks, cracks, tears, wear, kinks

components (checked for excessive movements) include: pivot bushings, shock absorbers, airbag mounts

next steps include: repairs, component replacement or adjustment, further diagnosis

	Knowledge	
	Learning Outcomes	**Learning Objectives**
B-6.01.01L	demonstrate knowledge of air suspension systems, their ***components***, characteristics, applications and operation	identify air suspension systems and their ***components***, and describe their characteristics, applications and operation
		explain air supply and operating pressures
B-6.01.02L	demonstrate knowledge of procedures to diagnose air suspension systems and their ***components***	identify ***tools and equipment*** used to diagnose air suspension systems and their ***components***, and describe their applications and procedures for use
		describe procedures to diagnose air suspension systems and their ***components***
		identify ***hazards*** and describe safe work practices while diagnosing air suspension systems and their ***components***
		identify inspections performed to diagnose air suspension systems ***components***
		identify possible ***faults*** and ***problems*** found while performing inspections

Range of Variables

components include: air valves, air springs, height control valves, fittings, air lines

components (checked for excessive movements) include: pivot bushings, shock absorbers, airbag mounts

tools and equipment include: pressure gauges, adapter fittings, hand tools, power tools, dial indicators, pry bars, jacks, jack/support stands, wheel chocks, light sources, torque wrenches, tape measures

hazards include: airbag rupture, frame shift, debris (rocks, mud, grass, chunks of rubber) projection relating to air loss

faults include: leaks, cracks, tears, wear, kinks

problems include: faulty pressure protection valves; faulty emergency valves; cut, kinked or leaking supply lines

B-6.02 Diagnoses spring suspension systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

Skills

	Performance Criteria	Evidence of Attainment
B-6.02.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
B-6.02.02P	perform visual inspections on ***components***	visual inspections on ***components*** are performed to identify ***faults***
B-6.02.03P	inspect U-bolts	U-bolts are inspected for defects or looseness visually or by using hammers
B-6.02.04P	inspect for excessive movements of ***components***	***components*** are inspected for excessive movements
B-6.02.05P	interpret diagnostic results	diagnostic results are interpreted to determine ***next steps***

Range of Variables

tools and equipment include: pneumatic tools, torque multipliers, torque wrenches, hand tools, power tools, pry bars, jacks, jack/support stands, wheel chocks, oxyacetylene torch, light sources

components include: leaves, spring saddles, bushings, U-bolts, shock absorbers, equalizers, hangers, radius rods, torque rods, centre bolts

faults include: worn, damaged, defective

next steps include: repairs, component replacement or adjustment, further diagnosis

Knowledge

	Learning Outcomes	Learning Objectives
B-6.02.01L	demonstrate knowledge of spring suspension systems, their ***components***, characteristics, applications and operation	identify spring suspension systems and their ***components***, and describe their characteristics, applications and operation
B-6.02.02L	demonstrate knowledge of procedures to diagnose spring suspension systems and their ***components***	identify ***tools and equipment*** used to diagnose spring suspension systems and their ***components***, and describe their applications and procedures for use
		describe procedures to diagnose spring suspension systems and their ***components***
		identify ***hazards*** and describe safe work practices while diagnosing spring suspension systems and their ***components***
		identify inspections performed to diagnose spring suspension system ***components***

		identify possible ***faults*** found while performing inspections
B-6.02.03L	demonstrate knowledge of training requirements to use oxyacetylene equipment	identify training requirements to use oxyacetylene equipment

Range of Variables

components include: leaves, spring saddles, bushings, U-bolts, shock absorbers, equalizers, hangers, radius rods, torque rods, centre bolts

tools and equipment include: pneumatic tools, torque multipliers, torque wrenches, hand tools, power tools, pry bars, jacks, jack/support stands, wheel chocks, oxyacetylene torch, light sources

hazards include: sprung or loaded suspension, falling debris, oxyacetylene flame, heavy lifting

faults include: worn, damaged, defective

B-6.03 Diagnoses rubber suspension systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
B-6.03.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
B-6.03.02P	perform visual inspections on ***components***	visual inspections on ***components*** are performed to identify ***faults***
B-6.03.03P	interpret diagnostic results	diagnostic results are interpreted to determine ***next steps***

Range of Variables

tools and equipment include: pneumatic tools, torque multipliers, torque wrenches, hand tools, power tools, pry bars, jacks, jack/support stands, wheel chocks, oxyacetylene torch, light sources

components include: radius rods, wishbones, trunnion bushings, load cushion, torque rods, shock absorbers

faults include: worn, damaged, defective

next steps include: repairs, component replacement or adjustment, further diagnosis

	Knowledge	
	Learning Outcomes	**Learning Objectives**
B-6.03.01L	demonstrate knowledge of rubber suspension systems, their ***components***, characteristics, applications and operation	identify rubber suspension systems and their ***components***, and describe their characteristics, applications and operation
B-6.03.02L	demonstrate knowledge of procedures to diagnose rubber suspension systems and their ***components***	identify ***tools and equipment*** used to diagnose rubber suspension systems and their ***components***, and describe their applications and procedures for use
		describe procedures to diagnose rubber suspension systems and their ***components***
		identify ***hazards*** and describe safe work practices while diagnosing rubber suspension systems and their ***components***
		identify inspections performed to diagnose spring suspension system ***components***
		identify possible ***faults*** found while performing inspections
B-6.03.03L	demonstrate knowledge of training requirements to use oxyacetylene equipment	identify training requirements to use oxyacetylene equipment

Range of Variables

components include: radius rods, wishbones, trunnion bushings, load cushion, torque rods, shock absorbers

tools and equipment include: pneumatic tools, torque multipliers, torque wrenches, hand tools, power tools, pry bars, jacks, jack/support stands, wheel chocks, oxyacetylene torch, light sources

hazards include: loaded suspension, falling debris, oxyacetylene flame, heavy lifting

faults include: worn, damaged, defective

Task B-7 Services suspension systems

Task Descriptor

Transport trailer technicians maintain suspension systems to prevent system failure. They also repair or replace suspension systems on the road and in the shop to enable the trailer to operate.

B-7.01 Maintains suspension systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

Skills

	Performance Criteria	Evidence of Attainment
B-7.01.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
B-7.01.02P	perform ***preventative maintenance checks***	***preventative maintenance checks*** are performed according to company policies and procedures, and manufacturers' maintenance procedures and schedules
B-7.01.03P	measure alignment	alignment is measured by using ***tools and equipment***
B-7.01.04P	adjust alignment of axles	alignment of axles is adjusted according to manufacturers' specifications
B-7.01.05P	adjust ride height	ride height is adjusted according to manufacturers' specifications

Range of Variables

tools and equipment include: lasers, pogo sticks, tape measures, alignment bars, alignment machines, plumb bobs

preventative maintenance checks include: checking height control valve operation, checking air lines securement, checking U-bolts, checking bushing wear and excessive movement, checking for broken or damaged components

Knowledge

	Learning Outcomes	Learning Objectives
B-7.01.01L	demonstrate knowledge of suspension systems, their components, characteristics, applications and operation	identify ***types of suspension systems*** and their components, and describe their characteristics, applications and operation
B-7.01.02L	demonstrate knowledge of procedures to maintain suspension systems and their components	identify ***tools and equipment*** used to maintain suspension systems and their components, and describe their applications and procedures for use

	describe procedures to maintain suspension systems and their components
	identify ***hazards*** and safe work practices while maintaining suspension systems and their components

Range of Variables

types of suspension systems include: air, spring, rubber

tools and equipment include: lasers, pogo sticks, tape measures, alignment bars, alignment machines, plumb bobs

hazards include: airbag rupture, frame shift, debris (rocks, mud, grass, chunks of rubber) projection relating to air loss, loaded suspension, oxyacetylene flame, heavy lifting

B-7.02 Repairs air suspension systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

Skills

	Performance Criteria	Evidence of Attainment
B-7.02.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
B-7.02.02P	stabilize vehicle	vehicle is stabilized by using ***methods*** to prevent collapse or movement
B-7.02.03P	remove ***components***	***components*** are removed according to manufacturers' specifications
B-7.02.04P	repair ***components***	***components*** are repaired according to manufacturers' specifications
B-7.02.05P	reinstall or replace ***components***	***components*** are reinstalled or replaced according to manufacturers' specifications
B-7.02.06P	adjust suspension beams for alignment of axles	suspension beams are adjusted according to manufacturers' specifications for alignment of axles
B-7.02.07P	torque fasteners and complete repair	fasteners are torqued according to manufacturers' specifications and repair is completed by verifying assembly of ***components***
B-7.02.08P	verify suspension system function	suspension system function is verified according to manufacturers' specifications

Range of Variables

tools and equipment include: welders, oxyacetylene torch, hand tools, pneumatic tools, jacks, jack/support stands, wheel chocks

methods include: decompressing air systems; using wheel chocks, jacks and jack/support stands

components include: air valves, air springs, height control valves, fittings, air lines, pivot bushings, shock absorbers, airbag mounts

	Knowledge	
	Learning Outcomes	**Learning Objectives**
B-7.02.01L	demonstrate knowledge of air suspension systems, their ***components***, characteristics, applications and operation	identify air suspension systems and their ***components***, and describe their characteristics, applications and operation
B-7.02.02L	demonstrate knowledge of procedures to repair air suspension systems and their ***components***	identify ***tools and equipment*** used to repair air suspension systems and their ***components***, and describe their applications and procedures for use
		describe procedures to remove, repair, replace, adjust, assemble and reinstall air suspension system ***components***
		identify ***hazards*** and safe work practices while performing repairs
		describe procedures to verify repair of air suspension systems and their ***components***

Range of Variables

components include: air valves, air springs, height control valves, fittings, air lines, pivot bushings, shock absorbers, airbag mounts

tools and equipment include: welders, oxyacetylene torch, hand tools, pneumatic tools, jacks, jack/support stands, wheel chocks

hazards include: airbag rupture, frame shift, debris (rocks, mud, grass, chunks of rubber) projection relating to air loss

B-7.03 Repairs spring suspension systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
B-7.03.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
B-7.03.02P	stabilize vehicle	vehicle is stabilized by using ***methods*** to prevent collapse or movement
B-7.03.03P	remove ***components***	***components*** are removed according to manufacturers' procedures
B-7.03.04P	repair ***components***	***components*** are repaired according to manufacturers' specifications
B-7.03.05P	reinstall or replace ***components***	***components*** are reinstalled or replaced according to manufacturers' specifications
B-7.03.06P	adjust components for alignment	components are adjusted for alignment according to manufacturers' specifications
B-7.03.07P	torque fasteners and complete repair	fasteners are torqued according to manufacturers' specifications and repair is completed by verifying assembly of ***components***
B-7.03.08P	verify suspension system function	suspension system function is verified according to manufacturers' specifications

Range of Variables

tools and equipment include: hand tools, torque wrenches, oxyacetylene torch, pneumatic tools, jacks, jack/support stands, wheel chocks

methods include: using wheel chocks, jacks and jack/support stands

components include: leaves, spring saddles, bushings, U-bolts, shock absorbers, equalizers, hangers, radius rods, torque rods, centre bolts

	Knowledge	
	Learning Outcomes	**Learning Objectives**
B-7.03.01L	demonstrate knowledge of spring suspension systems, their ***components***, characteristics, applications and operation	identify spring suspension systems and their ***components***, and describe their characteristics, applications and operation
B-7.03.02L	demonstrate knowledge of procedures to repair spring suspension systems and their ***components***	identify ***tools and equipment*** used to repair spring suspension systems and their ***components***, and describe their applications and procedures for use

	describe procedures to remove, repair, replace, adjust, assemble and reinstall spring suspension system ***components***
	identify ***hazards*** and safe work practices while performing repairs
	describe procedures to verify repair of spring suspension systems and their ***components***

Range of Variables

components include: leaves, spring saddles, bushings, U-bolts, shock absorbers, equalizers, hangers, radius rods, torque rods, centre bolts

tools and equipment include: hand tools, torque wrenches, oxyacetylene torch, pneumatic tools, jacks, jack/support stands, wheel chocks

hazards include: sprung or loaded suspension, falling debris, oxyacetylene flame, heavy lifting, sharp edges

B-7.04 Repairs rubber suspension systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

Skills

	Performance Criteria	Evidence of Attainment
B-7.04.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
B-7.04.02P	stabilize vehicle	vehicle is stabilized by using ***methods*** to prevent collapse or movement
B-7.04.03P	remove ***components***	***components*** are removed according to manufacturers' procedures
B-7.04.04P	repair ***components***	***components*** are repaired according to manufacturers' specifications
B-7.04.05P	reinstall or replace ***components***	***components*** are reinstalled or replaced according to manufacturers' specifications
B-7.04.06P	adjust components for alignment	components are adjusted for alignment according to manufacturers' specifications
B-7.04.07P	torque fasteners and complete repair	fasteners are torqued according to manufacturers' specifications and repair is completed by verifying assembly of ***components***
B-7.04.08P	verify suspension system function	suspension system function is verified according to manufacturers' specifications

Range of Variables

tools and equipment include: hand tools, torque wrenches, oxyacetylene torch, pneumatic tools, jacks, jack/support stands, wheel chocks

methods include: using wheel chocks, jacks and jack/support stands

components include: radius rods, wishbones, trunnion bushings, load cushion, torque rods, shock absorbers

	Knowledge	
	Learning Outcomes	**Learning Objectives**
B-7.04.01L	demonstrate knowledge of rubber suspension systems, their ***components***, characteristics, applications and operation	identify rubber suspension systems and their ***components***, and describe their characteristics, applications and operation
B-7.04.02L	demonstrate knowledge of procedures to repair rubber suspension systems and their ***components***	identify ***tools and equipment*** used to repair rubber suspension systems and their ***components***, and describe their applications and procedures for use
		describe procedures to remove, repair, replace, adjust, assemble and reinstall rubber suspension system ***components***
		identify ***hazards*** and safe work practices while performing repairs
		describe procedures to verify repair of rubber suspension systems and their ***components***

Range of Variables

components include: radius rods, wishbones, trunnion bushings, load cushion, torque rods, shock absorbers

tools and equipment include: hand tools, torque wrenches, oxyacetylene torch, pneumatic tools, jacks, jack/support stands, wheel chocks

hazards include: loaded suspension, falling debris, oxyacetylene flame, heavy lifting

Major Work Activity C
Diagnoses and services brake systems

Task C-8 Diagnoses brake systems

Task Descriptor

Transport trailer technicians diagnose brake systems as a critical task for the safe operation of the units. Accurate diagnostics are required for correct repair.

C-8.01 Diagnoses disc brake systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
C-8.01.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task
C-8.01.02P	remove ***components*** to access diagnostic area	***components*** are removed to access diagnostic area
C-8.01.03P	disassemble brake system	brake system is disassembled to access ***brake components***
C-8.01.04P	perform sensory inspections on ***brake components*** to identify ***faults***	sensory inspections on ***brake components*** are performed to identify ***faults***
C-8.01.05P	inspect brake chamber	brake chamber is inspected to ensure that there are no leaks, to identify damage and to locate broken springs
C-8.01.06P	perform ***functional check*** on disc brake	***functional check*** is performed on disc brake
C-8.01.07P	interpret diagnostic results	diagnostic results are interpreted to determine ***next steps***

Range of Variables

tools and equipment include: vernier calipers, dial indicators, disc/rotor micrometers, light sources, hand tools

components (removed for access) include: panels, wheels, tires

brake components include: brake pads, calipers, caliper pins, caliper pin boots, rubber hoses, caliper piston seal/boot

faults include: worn and cracked pads and rotors, worn slider pin bushings, seized slider pins, bent slider pins, leaking and chafing air lines and fittings

functional check includes: running clearance, adjuster function, caliper travel

next steps include: repairs, component replacement or adjustment, further diagnosis

	Knowledge	
	Learning Outcomes	**Learning Objectives**
C-8.01.01L	demonstrate knowledge of disc brake systems, their ***components***, characteristics, applications and operation	identify ***types of disc brake systems*** and their ***components***, and describe their characteristics, applications and operation
		describe allowable tolerances
		identify types of brake shoe materials and linings and describe their functions
		describe brake timing
C-8.01.02L	demonstrate knowledge of procedures to diagnose disc brake systems and their ***components***	identify ***tools and equipment*** used to diagnose disc brake systems and their ***components***, and describe their applications and procedures for use
		describe procedures to diagnose disc brake systems and their ***components***
		identify ***hazards*** and describe safe work practices while diagnosing disc brake systems and their ***components***
		identify inspections performed to diagnose disc brake systems and their ***components***
		identify possible ***faults*** found while performing inspections on ***components***
C-8.01.03L	demonstrate knowledge of procedures to disassemble and reassemble disc brake systems	describe procedures to disassemble and reassemble disc brake systems

Range of Variables

components (removed for access) include: panels, wheels, tires

brake components include: brake pads, calipers, caliper pins, caliper pin boots, rubber hoses, caliper piston seal/boot

types of disc brake systems include: hydraulic, air

tools and equipment include: vernier calipers, dial indicators, disc/rotor micrometers, light sources, hand tools

hazards include: brake dust, high air pressure, brake chambers (proper caging), brake fluid

faults include: worn and cracked pads and rotors, worn slider pin bushings, seized slider pins, bent slider pins, leaking and chafing air lines and fittings

C-8.02 Diagnoses drum brake systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
C-8.02.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task
C-8.02.02P	remove ***components*** to access diagnostic area	***components*** are removed to access diagnostic area
C-8.02.03P	disassemble brake system	brake system is disassembled to access brake shoes and ***brake components***
C-8.02.04P	perform sensory inspections on components	sensory inspections are performed to identify ***faults***
C-8.02.05P	inspect brake chamber	brake chamber is inspected to ensure that there are no leaks, to identify damage, to verify mounting and to locate broken springs
C-8.02.06P	perform applied stroke test	applied stroke test is performed to check component performance
C-8.02.07P	measure s-cam to bushing gap	s-cam is measured to bushing gap to verify that it is according to manufacturers' and North American standards
C-8.02.08P	interpret diagnostic results	diagnostic results are interpreted to determine ***next steps***
C-8.02.09P	measure stroke of push rod on brake	stroke of push rod on brake is measured using brake stroke gauge or tape measure to determine if travel is within North American standards

Range of Variables

tools and equipment include: drum gauges, shoe gauges, light sources

components (removed for access) include: dust shields, wheels, tires, drums, wheel ends (spoke-type hub)

brake components include: anchor pins and bushings, s-cam and s-cam bushings, s-cam rollers, slack adjusters, return springs, hold down springs, clevis pins, rubber hoses

faults include: excessive wear and cracks on shoes and drums, worn slack adjusters, broken or missing retainer hardware, leaking and chafing air lines and fittings, protruding shoes, seized or worn cams and bushings, wheel seal leaks

next steps include: repairs, component replacement or adjustment, further diagnosis

	Knowledge	
	Learning Outcomes	**Learning Objectives**
C-8.02.01L	demonstrate knowledge of drum brake systems, their ***components***, characteristics, applications and operation	identify ***types of drum brake systems*** and their ***components***, and describe their characteristics, applications and operation
		describe allowable tolerances
		identify types of brake shoe materials and linings and describe their functions
		describe brake timing
C-8.02.02L	demonstrate knowledge of procedures to diagnose drum brake systems and their ***components***	identify ***tools and equipment*** used to diagnose drum brake systems and their ***components***, and describe their applications and procedures for use
		describe procedures to diagnose drum brake systems and their ***components***
		identify ***hazards*** and describe safe work practices while diagnosing drum brake systems and their ***components***
		identify inspections performed to diagnose drum brake systems and their ***components***
		identify possible ***faults*** found while performing inspections on ***components***
C-8.02.03L	demonstrate knowledge of procedures to disassemble and reassemble drum brake systems	describe procedures to disassemble and reassemble drum brake systems
C-8.02.04L	demonstrate knowledge of regulatory requirements to diagnose drum brake systems and their ***components***	identify standards and regulations to diagnose drum brake systems and their ***components***

Range of Variables

brake components include: anchor pins and bushings, s-cam and s-cam bushings, s-cam rollers, slack adjusters, return springs, hold down springs, clevis pins, rubber hoses

components (removed for access) include: dust shields, wheels, tires, drums, wheel ends (spoke-type hub)

types of drum brake systems include: hydraulic, air

tools and equipment include: drum gauges, shoe gauges, light sources

hazards include: brake dust, high air pressure, brake chambers (proper caging)

faults include: excessive wear and cracks on shoes and drums, worn slack adjusters, broken or missing retainer hardware, leaking and chafing air lines and fittings, protruding shoes, seized or worn cams and bushings, wheel seal leaks

C-8.03 Diagnoses air brake systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

Skills

	Performance Criteria	Evidence of Attainment
C-8.03.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task
C-8.03.02P	perform sensory inspections on ***brake components***	sensory inspections on ***brake components*** are performed to identify ***faults***
C-8.03.03P	inspect brake chamber	brake chamber is inspected to ensure that there are no leaks, to identify damage, and to locate broken springs
C-8.03.04P	interpret diagnostic results	diagnostic results are interpreted to determine ***next steps***

Range of Variables

tools and equipment include: regulators, brake application tools, jack, jack/support stands, light sources

brake components include: wheel cylinders, brake shoe linings, return springs, hold down hardware, brake adjuster, caliper, pads, rotors, drums, brake lines, brake hoses

faults include: air leaks; chafed, kinked and cracked air lines and valves; loose valves and fittings; malfunctioning valves

next steps include: repairs, component replacement or adjustment, further diagnosis

Knowledge

	Learning Outcomes	Learning Objectives
C-8.03.01L	demonstrate knowledge of air brake systems, their ***components***, characteristics, applications and operation	identify air brake systems and their ***components***, and describe their characteristics, applications and operation
		describe allowable tolerances

		identify types of brake shoe materials and linings and describe their functions
		describe brake timing
C-8.03.02L	demonstrate knowledge of procedures to diagnose air brake systems and their ***components***	identify ***tools and equipment*** used to diagnose air brake systems and their ***components***, and describe their applications and procedures for use
		describe procedures to diagnose air brake systems and their ***components***
		identify ***hazards*** and describe safe work practices while diagnosing air brake systems and their ***components***
		identify inspections performed to diagnose air brake systems and their ***components***
		identify possible ***faults*** found while performing inspections on ***components***
		interpret schematics
C-8.03.03L	demonstrate knowledge of procedures to disassemble and reassemble air brake systems	describe procedures to disassemble and reassemble air brake systems

Range of Variables

brake components include: wheel cylinders, brake shoe linings, return springs, hold down hardware, brake adjuster, caliper, pads, rotors, drums, brake lines, brake hoses

tools and equipment include: regulators, brake application tools, jack, jack/support stands, light sources

hazards include: brake dust, high air pressure, brake chambers (proper caging)

faults include: air leaks; chafed, kinked and cracked air lines and valves; loose valves and fittings; malfunctioning valves

C-8.04 Diagnoses hydraulic brake systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

Skills

	Performance Criteria	Evidence of Attainment
C-8.04.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
C-8.04.02P	remove wheel and/or drum to access diagnostic area	wheel and/or drum is removed to access diagnostic area
C-8.04.03P	disassemble brake systems	brake systems are disassembled to access brake shoes and cylinders or brake pads and calipers

C-8.04.04P	perform sensory inspections on ***brake components***	sensory inspections on ***brake components*** are performed to identify ***faults***
C-8.04.05P	check brake fluid levels	brake fluid levels are checked
C-8.04.06P	check reverse lock-out feature on brake system	reverse lock-out feature is checked
C-8.04.07P	interpret diagnostic results	diagnostic results are interpreted to determine ***next steps***

Range of Variables

tools and equipment include: light sources, drum gauges

brake components include: wheel cylinders, brake shoe linings, return springs, hold down hardware, brake adjuster, caliper, pads, rotors, drums, brake lines, brake hoses

faults include: hydraulic fluid leaks, kinked and rusted lines, worn shoes and mounting hardware, seized adjusters, cracked hoses

next steps include: repairs, component replacement or adjustment, further diagnosis

	Knowledge	
	Learning Outcomes	**Learning Objectives**
C-8.04.01L	demonstrate knowledge of hydraulic brake systems, their ***components***, characteristics, applications and operation	identify ***types of hydraulic brake systems*** and their ***components***, and describe their characteristics, applications and operation
		describe allowable tolerances
		identify types of brake shoe materials and linings and describe their functions
		describe brake timing
C-8.04.02L	demonstrate knowledge of procedures to diagnose hydraulic brake systems and their ***components***	identify ***tools and equipment*** used to diagnose hydraulic brake systems and their ***components***, and describe their applications and procedures for use
		describe procedures to diagnose hydraulic brake systems and their ***components***
		identify ***hazards*** and describe safe work practices while diagnosing hydraulic brake systems and their ***components***
		identify inspections performed to diagnose hydraulic brake systems and their ***components***
		identify possible ***faults*** found while performing inspections on ***components***

		interpret schematics
C-8.04.03L	demonstrate knowledge of procedures to disassemble and reassemble hydraulic brake systems	describe procedures to disassemble and reassemble hydraulic brake systems

Range of Variables

brake components include: wheel cylinders, brake shoe linings, return springs, hold down hardware, brake adjuster, caliper, pads, rotors, drums, brake lines, brake hoses

types of hydraulic brake systems include: surge, electric-actuated

tools and equipment include: light sources, drum gauges

hazards include: brake dust, hydraulic fluid, high hydraulic pressure

faults include: hydraulic fluid leaks, kinked and rusted lines, worn shoes and mounting hardware, seized adjusters, cracked hoses

C-8.05 Diagnoses electric brake systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
C-8.05.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task
C-8.05.02P	remove ***components*** to access diagnostic area	***components*** are removed to access diagnostic area
C-8.05.03P	disassemble brake system	brake system is disassembled to access brake pads and magnets
C-8.05.04P	perform sensory inspections on components	sensory inspections on components are performed to identify ***faults***
C-8.05.05P	check power source for safety breakaway system and check that switch is functional	power source for safety breakaway system is checked and switch is checked for functionality
C-8.05.06P	interpret diagnostic results	diagnostic results are interpreted to determine ***next steps***

Range of Variables

tools and equipment include: screwdrivers, power sources, light sources, multimeters

components (removed for access) include: wheels, tires, drums

faults include: broken wires; wear on shoes, drums and magnet

next steps include: repairs, component replacement or adjustment, further diagnosis

	Knowledge	
	Learning Outcomes	**Learning Objectives**
C-8.05.01L	demonstrate knowledge of electric brake systems, their components, characteristics, applications and operation	identify types of electric brake systems and their components, and describe their characteristics, applications and operation
		describe allowable tolerances
		identify types of brake shoe materials and linings and describe their functions
		describe brake timing
		describe function of brake controller
C-8.05.02L	demonstrate knowledge of procedures to diagnose electric brake systems and their components	identify ***tools and equipment*** used to diagnose electric brake systems and their components, and describe their applications and procedures for use
		describe procedures to diagnose electric brake systems and their components
		identify ***hazards*** and describe safe work practices while diagnosing electric brake systems and their components
		identify inspections performed to diagnose electric brake systems and their components
		identify possible ***faults*** found while performing inspections on components
		interpret schematics
C-8.05.03L	demonstrate knowledge of procedures to disassemble and reassemble electric brake systems	describe procedures to disassemble and reassemble electric brake systems

Range of Variables

tools and equipment include: screwdrivers, power sources, light sources, multimeters

hazards include: brake dust, corrosion

faults include: broken wires; wear on shoes, drums and magnet

C-8.06 Diagnoses electronic braking control systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
C-8.06.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task
C-8.06.02P	remove ***components*** to access diagnostic area	***components*** are removed to access diagnostic area
C-8.06.03P	interpret computer diagnostic information after downloading and saving results	computer diagnostic information is interpreted after downloading and saving results
C-8.06.04P	check wiring and connections	wiring and connections are checked for continuity, wear and damage
C-8.06.05P	test wheel sensors	wheel sensors are tested using multimeter and verified against manufacturers' specifications
C-8.06.06P	inspect wheel sensor and exciter ring	wheel sensor and exciter ring are inspected for excessive gap and corrosion
C-8.06.07P	verify warning light operation (ABS light)	warning light operation (ABS light) is verified
C-8.06.08P	interpret diagnostic results	diagnostic results are interpreted to determine ***next steps***

Range of Variables

tools and equipment include: multimeters, wire brushes, computers, light sources, blink-code diagnostic tools

components (removed for access) include: wheels, tires, drums

next steps include: repairs, component replacement or adjustment, further diagnosis, verification

	Knowledge	
	Learning Outcomes	**Learning Objectives**
C-8.06.01L	demonstrate knowledge of electronic braking control systems, their components, characteristics, applications and operation	identify ***types of electronic braking control systems*** and their components, and describe their characteristics, applications and operation
		describe allowable tolerances
C-8.06.02L	demonstrate knowledge of procedures to diagnose electronic braking control systems and their components	identify ***tools and equipment*** used to diagnose electronic braking control systems and their components, and describe their applications and procedures for use

		describe procedures to diagnose electronic braking control systems and their components
		identify inspections performed to diagnose electronic braking control systems and their components
		identify possible ***faults*** found while performing inspections on components
		interpret schematics
C-8.06.03L	demonstrate knowledge of regulatory requirements to diagnose electronic braking control systems and their components	identify and interpret standards and regulations to diagnose electronic braking control systems and their components

Range of Variables

types of electronic braking control systems include: ABS, roll stability systems

tools and equipment include: multimeters, wire brushes, computers, light sources, blink-code diagnostic tools

faults include: sensors, ABS/electronic control unit (ECU), sensor leads, connectivity, tone wheel, wires

Task C-9 Services brake systems

Task Descriptor

Transport trailer technicians service brake systems as a critical task for the safe operation of units. Servicing includes both regular preventative maintenance as well as repairs to braking system faults and failures.

C-9.01 Maintains brake systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
C-9.01.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
C-9.01.02P	perform ***preventative maintenance checks***	***preventative maintenance checks*** are performed according to jurisdictional standards

C-9.01.03P	lubricate ***components***	***components*** are lubricated according to recommended maintenance schedule
C-9.01.04P	adjust brakes	brakes are adjusted according to specifications and jurisdictional regulations
C-9.01.05P	clean air system	air system is cleaned by flushing contaminants from system with air
C-9.01.06P	inspect electronic control systems	electronic control systems are inspected
C-9.01.07P	apply dielectric grease to electronic braking connections	dielectric grease is applied to electronic braking connections

Range of Variables

tools and equipment include: sockets, ratchets, hand tools, measuring tools, chassis grease, light sources

preventative maintenance checks include: applied stroke, wear, adjustment

components include: cams, slack adjusters, auto-greasers

	Knowledge	
	Learning Outcomes	**Learning Objectives**
C-9.01.01L	demonstrate knowledge of brake systems, their ***components***, characteristics, applications and operation	identify types of brake systems and their ***components***, and describe their characteristics, applications and operation
C-9.01.02L	demonstrate knowledge of procedures to maintain brake systems and their ***components***	identify ***tools and equipment*** used to maintain brake systems and their ***components***, and describe their applications and procedures for use
		describe procedures to maintain brake systems and their ***components***
		describe procedures to remove and install brake system ***components***
		identify safe work practices while maintaining brake systems and their ***components***
		describe system contamination
C-9.01.03L	demonstrate knowledge of training requirements to maintain brake systems	identify training requirements to maintain brake systems
C-9.01.04L	demonstrate knowledge of regulatory requirements to maintain brake systems	identify standards and regulations to maintain brake systems

Range of Variables

components include: cams, slack adjusters, auto-greasers

tools and equipment include: sockets, ratchets, hand tools, measuring tools, chassis grease, light sources

C-9.02 Repairs disc brake systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

Skills

	Performance Criteria	Evidence of Attainment
C-9.02.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
C-9.02.02P	replace worn, damaged and defective ***mechanical components***	worn, damaged and defective ***mechanical components*** are replaced according to manufacturers' specifications
C-9.02.03P	replace worn, damaged and defective ***air system components***	worn, damaged and defective ***air system components*** are replaced according to ***faults***
C-9.02.04P	complete repair	repair is completed by verifying operation of brakes

Range of Variables

tools and equipment include: caging bolts, rotor gauge, digital calipers, hand tools
mechanical components include: disc pads, calipers, rotors, fasteners
air system components include: brake chambers, air lines, valves, fasteners
faults include: air leaks, broken brake chamber springs, seized calipers, pad thickness, worn rotors

Knowledge

	Learning Outcomes	Learning Objectives
C-9.02.01L	demonstrate knowledge of disc brake systems, their ***mechanical*** and ***air system components***, characteristics, applications and operation	identify ***types of disc brake systems*** and their ***mechanical*** and ***air system components***, and describe their characteristics, applications and operation
C-9.02.02L	demonstrate knowledge of procedures to repair disc brake systems and their ***mechanical*** and ***air system components***	identify ***tools and equipment*** used to repair disc brake systems and their ***mechanical*** and ***air system components***, and describe their applications and procedures for use
		describe procedures to remove, repair, replace, adjust, assemble and reinstall disc brake system ***mechanical*** and ***air system components***
		identify ***hazards*** and safe work practices while performing repairs

		describe procedures to verify repair of disc brake systems and their ***mechanical*** and ***air system components***
C-9.02.03L	demonstrate knowledge of regulatory requirements to repair disc brake systems and their ***mechanical*** and ***air system components***	identify standards and regulations to repair disc brake systems and their ***mechanical*** and ***air system components***

Range of Variables

mechanical components include: disc pads, calipers, rotors, fasteners
air system components include: brake chambers, air lines, valves, fasteners
types of disc brake systems include: hydraulic, air
tools and equipment include: caging bolts, rotor gauge, digital calipers, hand tools
hazards include: brake dust, high air pressure, brake chambers (proper caging)

C-9.03 Repairs drum brake systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
C-9.03.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
C-9.03.02P	remove wheel end and hub assemblies	wheel end and hub assemblies are removed to access brake system
C-9.03.03P	replace or reinstall drum brake ***components***	drum brake ***components*** are replaced or reinstalled according to task
C-9.03.04P	shim and adjust ***components***	***components*** are shimmed and adjusted according to task
C-9.03.05P	complete repair	repair is completed by verifying operation of brakes

Range of Variables

tools and equipment include: anchor pin removal tool, spring removal/installation tool, drum lift, light sources, hand tools
components (to be replaced or reinstalled) include: brake drums, brake shoes, s-cams, cam bushings, s-cam tubes, slack adjusters, hardware
components (to be shimmed and adjusted) include: s-cams, slack adjusters

	Knowledge	
	Learning Outcomes	**Learning Objectives**
C-9.03.01L	demonstrate knowledge of drum brake systems, their ***components***, characteristics, applications and operation	identify ***types of drum brake systems*** and their ***components***, and describe their characteristics, applications and operation
C-9.03.02L	demonstrate knowledge of procedures to repair drum brake systems and their ***components***	identify ***tools and equipment*** used to repair drum brake systems and their ***components***, and describe their applications and procedures for use
		describe procedures to remove, repair, replace, adjust, assemble and reinstall drum brake system ***components***
		identify ***hazards*** and safe work practices while performing repairs
		describe procedures to verify repair of drum brake systems and their ***components***
C-9.03.03L	demonstrate knowledge of regulatory requirements to repair drum brake systems and their ***components***	identify standards and regulations to repair drum brake systems and their ***components***

Range of Variables

components (to be replaced or reinstalled) include: brake drums, brake shoes, s-cams, cam bushings, s-cam tubes, slack adjusters, hardware

components (to be shimmed and adjusted) include: s-cams, slack adjusters

types of drum brake systems include: hydraulic, air

tools and equipment include: anchor pin removal tool, spring removal/installation tool, drum lift, light sources, hand tools

hazards include: brake dust, high air pressure, brake chambers (proper caging), heavy lifting

C-9.04 Repairs air brake systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
C-9.04.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task
C-9.04.02P	replace air brake ***components***	air brake ***components*** are replaced according to ***faults***

C-9.04.03P	repair brake chambers	brake chambers are repaired by replacing ***components***
C-9.04.04P	complete repair	repair is completed by verifying operation of air system

Range of Variables

tools and equipment include: regulators, brake application tools, jacks, jack/support stands, light sources

components include: valves, sensors, lines, tanks, gladhands, brake chambers, tubing, hoses, clamps, fittings, diaphragms

faults include: chafed air lines, damaged tubing, leaking valves, leaking reservoir, corrosion, faulty valves, gladhand seals, emergency gladhand screen

	Knowledge	
	Learning Outcomes	**Learning Objectives**
C-9.04.01L	demonstrate knowledge of air brake systems, their ***components***, characteristics, applications and operation	identify air brake systems and their ***components***, and describe their characteristics, applications and operation
C-9.04.02L	demonstrate knowledge of procedures to repair drum brake systems and their ***components***	identify ***tools and equipment*** used to repair drum brake systems and their ***components***, and describe their applications and procedures for use
		describe procedures to remove, repair, replace, adjust, assemble and reinstall drum brake system ***components***
		identify safe work practices while performing repairs
		describe procedures to verify repair of air brake systems and their ***components***
C-9.04.03L	demonstrate knowledge of licensing requirements to repair drum brake systems and their ***components***	identify licensing requirements to repair drum brake systems and their ***components***
C-9.04.04L	demonstrate knowledge of regulatory requirements to repair drum brake systems and their ***components***	identify standards and regulations to repair drum brake systems and their ***components***

Range of Variables

components include: valves, sensors, lines, tanks, gladhands, brake chambers, tubing, hoses, clamps, fittings, diaphragms

tools and equipment include: regulators, brake application tools, jacks, jack/support stands, light sources

C-9.05 Repairs hydraulic brake systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
C-9.05.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task
C-9.05.02P	remove wheel end and hub assemblies	wheel end and hub assemblies are removed to access brake system
C-9.05.03P	replace or reinstall hydraulic brake ***components***	hydraulic brake ***components*** are replaced or reinstalled
C-9.05.04P	recondition ***components***	***components*** are reconditioned
C-9.05.05P	bleed system	system is bled to remove air from system
C-9.05.06P	complete repair	repair is completed by verifying operation of brakes and visually inspecting for leaks

Range of Variables

tools and equipment include: air gun, jack, jack/support stands, brake adjusting tool, hand tools

components include: sensors, wheel and master cylinders, brake bleeders, tubing, lines, fittings, brake fluid

	Knowledge	
	Learning Outcomes	**Learning Objectives**
C-9.05.01L	demonstrate knowledge of hydraulic brake systems, their ***components***, characteristics, applications and operation	identify ***types of hydraulic brake systems*** and their ***components***, and describe their characteristics, applications and operation
C-9.05.02L	demonstrate knowledge of procedures to repair hydraulic brake systems and their ***components***	identify ***tools and equipment*** used to repair hydraulic brake systems and their ***components***, and describe their applications and procedures for use
		describe procedures to remove, repair, replace, adjust, assemble and reinstall hydraulic brake system ***components***
		identify ***hazards*** and safe work practices while performing repairs

		describe procedures to verify repair of hydraulic brake systems and their ***components***
C-9.05.03L	demonstrate knowledge of regulatory requirements to repair hydraulic brake systems and their ***components***	identify standards and regulations to repair hydraulic brake systems and their ***components***

Range of Variables

components include: sensors, wheel and master cylinders, brake bleeders, tubing, lines, fittings, brake fluid

types of hydraulic brake systems include: surge, air-actuated

tools and equipment include: air gun, jack, jack/support stands, brake adjusting tool, hand tools

hazards include: brake dust, high-pressure fluid, environmental factors, corrosive materials

C-9.06 Repairs electric brake systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
C-9.06.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
C-9.06.02P	remove worn and damaged ***components***	worn and damaged ***components*** are removed
C-9.06.03P	replace or reinstall electric brake ***components***	electric brake ***components*** are replaced or reinstalled
C-9.06.04P	repack wheel bearings and adjust bearings	wheel bearings are repacked and bearings are adjusted according to manufacturers' free play specifications
C-9.06.05P	repair and replace damaged and corroded wiring	damaged and corroded wiring is repaired and replaced
C-9.06.06P	charge battery	battery is charged
C-9.06.07P	complete repair by verifying operation of electric brake system	repair is completed by verifying operation of electric brake system

Range of Variables

tools and equipment include: screwdrivers, power sources, light sources, multimeters, hand tools, wire strippers, wire crimpers

components include: battery, magnets, shoes, controllers

	Knowledge	
	Learning Outcomes	**Learning Objectives**
C-9.06.01L	demonstrate knowledge of electric brake systems, their ***components***, characteristics, applications and operation	identify types of electric brake systems and their ***components***, and describe their characteristics, applications and operation
C-9.06.02L	demonstrate knowledge of procedures to repair electric brake systems and their ***components***	identify ***tools and equipment*** used to repair electric brake systems and their ***components***, and describe their applications and procedures for use
		describe procedures to remove, repair, replace, adjust, assemble and reinstall electric brake system ***components***
		identify ***hazards*** and safe work practices while performing repairs
		describe procedures to verify repair of electric brake systems and their ***components***
C-9.06.03L	demonstrate knowledge of regulatory requirements to repair electric brake systems and their ***components***	identify standards and regulations to repair electric brake systems and their ***components***

Range of Variables

components include: battery, magnets, shoes, controllers

tools and equipment include: screwdrivers, power sources, light sources, multimeters, hand tools, wire strippers, wire crimpers

hazards include: brake dust, corrosion

C-9.07 Repairs electronic braking control systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
C-9.07.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
C-9.07.02P	confirm voltage supplied to system	voltage supplied to system is confirmed
C-9.07.03P	replace ***components***	***components*** are replaced
C-9.07.04P	adjust sensor gap	sensor gap is adjusted according to manufacturers' specifications

C-9.07.05P	clean tone ring	tone ring is cleaned to allow for generation of electrical impulses as required for function of electronic control system
C-9.07.06P	clear fault codes in ECU and complete repair	fault codes in ECU are cleared and repair is completed by verifying operation of electronic braking control system

Range of Variables

tools and equipment include: multimeters, wire brushes, computers, light sources, blink-code diagnostic tools, hand tools, wire strippers, wire crimpers

components include: sensors, cables, valves, connectors, ECU

	Knowledge	
	Learning Outcomes	**Learning Objectives**
C-9.07.01L	demonstrate knowledge of electronic braking control systems, their ***components***, characteristics, applications and operation	identify ***types of electronic braking control systems*** and their ***components***, and describe their characteristics, applications and operation
C-9.07.02L	demonstrate knowledge of procedures to repair electronic braking control systems and their ***components***	identify ***tools and equipment*** used to repair electronic braking control systems and their ***components***, and describe their applications and procedures for use
		describe procedures to remove, repair, replace, adjust, assemble and reinstall electronic braking control system ***components***
		identify safe work practices while performing repairs
		describe procedures to verify repair of electronic braking control systems and their ***components***
C-9.07.03L	demonstrate knowledge of training and certification requirements to repair electronic braking control systems and their ***components***	identify training and certification requirements to repair electronic braking control systems and their ***components***
C-9.07.04L	demonstrate knowledge of regulatory requirements to repair electronic braking control systems and their ***components***	identify and interpret standards and regulations to repair electronic braking control systems and their ***components***

Range of Variables

types of electronic braking control systems include: ABS, roll stability systems

components include: sensors, cables, valves, connectors, ECU

tools and equipment include: multimeters, wire brushes, computers, light sources, blink-code diagnostic tools, hand tools, wire strippers, wire crimpers

Major Work Activity D

Diagnoses and services axles and wheel end assemblies

Task D-10 Diagnoses axles and wheel end assemblies

Task Descriptor

Transport trailer technicians diagnose axles and wheel end assemblies when inspecting and performing preventative maintenance of the trailer.

D-10.01 Diagnoses fixed, self-steering and lift axles

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
D-10.01.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
D-10.01.02P	perform visual inspections on ***components***	visual inspections on ***components*** are performed to identify ***faults***
D-10.01.03P	inspect spindle	spindle is inspected for excessive wear and cracks
D-10.01.04P	interpret diagnostic results	diagnostic results are interpreted to determine ***next steps***

Range of Variables

tools and equipment include: dial indicators, micrometers, hand tools, jacks, jack/support stands, pneumatic tools

components include: trailing arm, blocks, shock brackets, saddles, spiders, brake chamber supports, brake chambers, brake shoes, brake drums, cam, cam bushings, hubs, bearings, air springs, switches, valves, bushings, slack adjusters, frame brackets, hangers

faults include: worn, damaged or defective components

next steps include: repairs, component replacement or adjustment, further diagnosis

	Knowledge	
	Learning Outcomes	**Learning Objectives**
D-10.01.01L	demonstrate knowledge of fixed, self-steering and lift axles, their ***components***, characteristics, applications and operation	identify types and models of fixed, self-steering and lift axles and their ***components***, and describe their characteristics, applications and operation
		explain bearing and spindle wear tolerances
		describe cup and cone bearings, and seals
		explain bearing preload and end play
D-10.01.02L	demonstrate knowledge of procedures to diagnose fixed, self-steering and lift axles and their ***components***	identify ***tools and equipment*** used to diagnose fixed, self-steering and lift axles and their ***components***, and describe their applications and procedures for use
		describe procedures to diagnose fixed, self-steering and lift axles and their ***components***
		identify ***hazards*** and describe safe work practices while diagnosing fixed, self-steering and lift axles and their ***components***
		identify inspections performed to diagnose fixed, self-steering and lift axles and their ***components***
		identify ***faults*** found while performing inspections on ***components***

Range of Variables

components include: trailing arm, blocks, shock brackets, saddles, spiders, brake chamber supports, brake chambers, brake shoes, brake drums, cam, cam bushings, hubs, bearings, air springs, switches, valves, bushings, slack adjusters, frame brackets, hangers

tools and equipment include: dial indicators, micrometers, hand tools, jacks, jack/support stands, pneumatic tools

hazards include: air spring rupture, frame shift, debris (rocks, mud, grass, chunks of rubber) projection relating to air loss, pinch points, sudden axle drop

faults include: worn, damaged or defective components

D-10.02 Diagnoses hubs and bearings

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
D-10.02.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
D-10.02.02P	measure bearing end play	bearing end play is measured using dial indicator
D-10.02.03P	perform visual inspections of cups and bearings	visual inspections of cups and bearings are performed to identify ***faults***
D-10.02.04P	perform visual inspection of ***spindle thread condition***	visual inspection of ***spindle thread conditions*** are performed
D-10.02.05P	identify ***hub problems***	***hub problems*** are identified
D-10.02.06P	interpret diagnostic results	diagnostic results are interpreted to determine ***next steps***

Range of Variables

tools and equipment include: dial indicators, hand tools, hub sockets, torque wrenches, seal installers

faults include: pitting, spalling, cracks, overheating, brinelling, arching

spindle thread conditions include: wear, damage

hub problems include: spinning race, failed wheel seal, cracked hubs, corrosion, damaged wheel studs, damaged tone ring, worn wheel pilot flange

next steps include: repairs, component replacement, further diagnosis

	Knowledge	
	Learning Outcomes	**Learning Objectives**
D-10.02.01L	demonstrate knowledge of hubs and bearings, their ***components***, characteristics, applications and operation	identify ***types of hubs*** and their ***components***, and describe their characteristics, applications and operation
		identify bearings and their ***components***, and describe their characteristics, applications and operation
		explain bearing and spindle wear tolerances
		describe cup and cone bearings, and seals
		explain bearing preload and end play

D-10.02.02L	demonstrate knowledge of procedures to diagnose hubs and bearings, and their ***components***	identify ***tools and equipment*** used to diagnose hubs and bearings and their ***components***, and describe their applications and procedures for use
		describe procedures to diagnose hubs and bearings and their ***components***
		identify ***hazards*** and describe safe work practices while diagnosing hubs and bearings, and their ***components***
		identify inspections performed to diagnose hubs and bearings, and their ***components***
		identify ***faults*** and ***hub problems*** found while performing inspections on ***components***

Range of Variables

components include: hub caps, studs, nuts, seals, races, rollers, cages, wedges, hub oil, grease
types of hubs include: spoke, stud-piloted, hub-piloted, pre-adjusted, unitized
tools and equipment include: dial indicators, hand tools, hub sockets, torque wrenches, seal installers
hazards include: frame shift, pinch points, grease, oil, brake dust, metal filings, sharp edges
faults include: pitting, spalling, cracks, overheating, brinelling, arching
hub problems include: spinning race, failed wheel seal, cracked hubs, corrosion, damaged wheel studs, damaged tone ring, worn wheel pilot flange

D-10.03 Diagnoses tires and rims

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
D-10.03.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
D-10.03.02P	perform visual inspections on tires and rims	visual inspections are performed on tires and rims to identify ***faults***
D-10.03.03P	measure tread depth	tread depth is measured using tread depth gauges
D-10.03.04P	measure air pressure	air pressure is measured using pressure gauges
D-10.03.05P	identify ***rim irregularities***	***rim irregularities*** are identified

D-10.03.06P	inspect lock ring of multi-piece rims	lock ring of multi-piece rims is inspected to identify irregularities
D-10.03.07P	interpret diagnostic results	diagnostic results are interpreted to determine ***next steps***

Range of Variables

tools and equipment include: tread gauges, pressure gauges, jacks, jack/support stands, pneumatic tools, hand tools, torque wrenches, tire bars, bead blaster, tire cage, air chuck, valve core tool, rubber mallet, bead axe

faults include: worn and mismatched tires, damaged treads and side walls, separation, weather cracking, retreads

rim irregularities include: dents, cracks, corrosion, wear

next steps include: repairs, component replacement, further diagnosis

	Knowledge	
	Learning Outcomes	**Learning Objectives**
D-10.03.01L	demonstrate knowledge of tires and rims, their ***components***, characteristics, applications and operation	identify types and sizes of tires and rims, and their ***components***, and describe their characteristics, applications and operation
D-10.03.02L	demonstrate knowledge of procedures to diagnose tires and rims, and their ***components***	identify ***tools and equipment*** used to diagnose tires and rims, and their ***components***, and describe their applications and procedures for use
		describe procedures to diagnose tires and rims, and their ***components***
		identify ***hazards*** and describe safe work practices while diagnosing tires and rims, and their ***components***
		identify inspections performed to diagnose tires and rims, and their ***components***
		identify possible ***faults*** and ***rim irregularities*** found while performing inspections
		describe tire wear limits and inflation pressures
		describe normal and irregular tire wear
		describe automatic inflation systems
		describe tire pressure monitoring systems (TPMS)

Range of Variables

components include: multi-piece rims, rims, valve stems, wheel nuts, wheel spacers, wedges, gaskets

tools and equipment include: tread gauges, pressure gauges, jacks, jack/support stands, pneumatic tools, hand tools, torque wrenches, tire bars, bead blaster, tire cage, air chuck, valve core tool, rubber mallet, bead axe

hazards include: sidewall blowouts, exposed belting, high pressure compressed air, valve core projectile

faults include: worn and mismatched tires, damaged treads and side walls, separation, weather cracking, retreads

rim irregularities include: dents, cracks, corrosion, wear

Task D-11 Services axles and wheel end assemblies

Task Descriptor

Transport trailer technicians maintain, repair and replace axles and wheel end assemblies to ensure proper and safe operation of trailers, in compliance with jurisdictional requirements.

D-11.01 Maintains axles and wheel end assemblies

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
D-11.01.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
D-11.01.02P	perform ***preventative maintenance checks***	***preventative maintenance checks*** are performed according to manufacturers' maintenance procedures and schedules
D-11.01.03P	adjust inflation pressures	inflation pressures are adjusted according to manufacturers' specifications using pressure gauges
D-11.01.04P	maintain lubricant levels	lubricant levels are maintained according to manufacturers' specifications
D-11.01.05P	torque wheel nuts	wheel nuts are torqued according to manufacturers' specifications and procedures
D-11.01.06P	adjust and measure end play	end play is adjusted and measured according to manufacturers' specifications

Range of Variables

tools and equipment include: dial indicators, hand tools, jacks, jack/support stands, pneumatic tools, seal installers, bearing packer, bearing race installer, torque wrenches

preventative maintenance checks include: checking fluid levels, inflation pressures and end play

	Knowledge	
	Learning Outcomes	**Learning Objectives**
D-11.01.01L	demonstrate knowledge of axles and wheel end assemblies, their ***components***, characteristics, applications and operation	identify types of axles and wheel end assemblies, and their ***components***, and describe their characteristics, applications and operation
D-11.01.02L	demonstrate knowledge of procedures to maintain axles and wheel end assemblies, and their ***components***	identify ***tools and equipment*** used to maintain axles and wheel end assemblies, and their ***components***, and describe their applications and procedures for use
		describe procedures to maintain axles and wheel end assemblies, and their ***components***
		describe inflation pressures and procedures
		identify ***hazards*** and safe work practices while maintaining axles and wheel end assemblies, and their ***components***
D-11.01.03L	demonstrate knowledge of training and certification requirements to maintain tires and rims, and their ***components***	identify training and certification requirements to maintain tires and rims, and their ***components***
D-11.01.04L	demonstrate knowledge of regulatory requirements to maintain tires and rims, and their ***components***	identify standards and regulations to maintain tires and rims, and their ***components***

Range of Variables

components include: trailing arm, blocks, shock brackets, saddles, spiders, brake chamber supports, brake chambers, brake shoes, brake drums, cam, cam bushings, hubs, bearings, air springs, switches, valves, bushings, slack adjusters, frame brackets, hangers

tools and equipment include: dial indicators, hand tools, jacks, jack/support stands, pneumatic tools, seal installers, bearing packer, bearing race installer, torque wrenches

hazards include: heating or welding wheel assemblies, lifting and handling of wheel assemblies, over-inflation of tires, under-inflation of tires, flat tires

D-11.02 Repairs fixed axles, hubs and bearings

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
D-11.02.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
D-11.02.02P	remove wheel end assembly to access axle	wheel end assembly is removed according to manufacturers' specifications and procedures to access axle
D-11.02.03P	inspect hubs, bearings and spindles	hubs, bearings and spindles are inspected to identify damage and wear
D-11.02.04P	replace cup and cone bearings or hub assembly	cup and cone bearings or hub assembly are replaced using ***tools and equipment***
D-11.02.05P	remove debris	debris is removed by cleaning hub and bearings
D-11.02.06P	replace or reinstall axles, hubs and bearings	axles, hubs and bearings are replaced or reinstalled according to manufacturers' specifications and procedures
D-11.02.07P	align axles to kingpin	axles are aligned to kingpin according to manufacturers' specifications
D-11.02.08P	complete repair	repair is completed by verifying operation of axles and hubs

Range of Variables

tools and equipment include: punches, hammers, sockets, seal pullers, drivers, jacks, jack/support stands, hand tools, pneumatic tools, torque wrenches, dial indicators, bearing race installers, parts washer

	Knowledge	
	Learning Outcomes	**Learning Objectives**
D-11.02.01L	demonstrate knowledge of hubs and fixed axles, their ***components***, characteristics, applications and operation	identify ***types of hubs*** and fixed axles, and their ***components***, and describe their characteristics, applications and operation
D-11.02.02L	demonstrate knowledge of procedures to repair hubs and fixed axles, and their ***components***	identify ***tools and equipment*** used to repair hubs and fixed axles, and their ***components***, and describe their applications and procedures for use
		describe procedures to remove, repair, replace, adjust, align and reinstall hub and fixed axle ***components***

	identify ***hazards*** and safe work practices while performing repairs
	describe procedures to verify repair of hubs and fixed axles, and their ***components***

Range of Variables

components (hubs) include: studs, nuts, seals, races, rollers, cages, wedges, hub oil, grease, hub fasteners, wheel bearings

types of hubs include: spoke, stud-piloted, hub-piloted

tools and equipment include: punches, hammers, sockets, seal pullers, drivers, jacks, jack/support stands, hand tools, pneumatic tools, torque wrenches, dial indicators, bearing race installers, parts washer

hazards include: frame shift, pinch points, grease, oil, brake dust, metal filings, sharp edges

D-11.03 Repairs self-steering and lift axles

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
D-11.03.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
D-11.03.02P	remove self-steering and lift axle ***components***	self-steering and lift axle ***components*** are removed according to manufacturers' specifications and procedures
D-11.03.03P	replace worn and damaged ***components***	worn and damaged ***components*** are replaced using ***tools and equipment***
D-11.03.04P	adjust and align self-steering and lift axles to kingpin	self-steering and lift axles are adjusted and aligned to kingpin according to manufacturers' specifications and procedures
D-11.03.05P	complete repair	repair is completed by verifying operation of self-steering and lift axles

Range of Variables

tools and equipment include: oxyacetylene torch, dial indicators, micrometers, hand tools, jacks, jack/support stands, pneumatic tools, torque wrenches

components include: kingpins, tie-rod ends, shock absorbers, slack adjusters, cams, cam tubes, bushings, brake chambers, steering bags, stabilizer shocks

	Knowledge	
	Learning Outcomes	**Learning Objectives**
D-11.03.01L	demonstrate knowledge of self-steering and lift axles, their ***components***, characteristics, applications and operation	identify types of self-steering and lift axles, and their ***components***, and describe their characteristics, applications and operation
D-11.03.02L	demonstrate knowledge of procedures to repair self-steering and lift axles, and their ***components***	identify ***tools and equipment*** used to repair self-steering and lift axles, and their ***components***, and describe their applications and procedures for use
		describe procedures to remove, repair, replace, adjust, align and reinstall self-steering and lift axle ***components***
		identify ***hazards*** and safe work practices while performing repairs
		describe procedures to verify repair of self-steering and lift axles, and their ***components***

Range of Variables

components include: kingpins, tie-rod ends, shock absorbers, slack adjusters, cams, cam tubes, bushings, brake chambers, steering bags, stabilizer shocks

tools and equipment include: oxyacetylene torch, dial indicators, micrometers, hand tools, jacks, jack/support stands, pneumatic tools, torque wrenches

hazards include: airbag rupture, frame shift, debris (rocks, mud, grass, chunks of rubber) projection relating to air loss, pinch points, sudden axle drop

D-11.04 Replaces tires and rims

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
D-11.04.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
D-11.04.02P	remove tires and rims from hub assembly	tires and rims are removed from hub assembly using ***tools and equipment***
D-11.04.03P	dismount and mount tires on rims	tires are dismounted and mounted on rims
D-11.04.04P	inflate tires in tire cage	tires in tire cage are inflated according to safe work procedures and manufacturers' specifications and procedures

D-11.04.05P	install tires and rim assemblies on hubs	tires and rim assemblies are installed on hubs according to manufacturers' specifications and procedures
D-11.04.06P	tighten and torque wheel nuts	wheel nuts are tightened and torqued according to manufacturers' specifications and procedures

Range of Variables

tools and equipment include: tread gauges, pressure gauges, jacks, jack/support stands, pneumatic tools, hand tools, torque wrenches, tire bars, bead blaster, tire cage, air chuck, valve core tool, rubber mallet, bead axe

	Knowledge	
	Learning Outcomes	**Learning Objectives**
D-11.04.01L	demonstrate knowledge of tires and rims, their ***components***, characteristics, applications and operation	identify types and sizes of tires and rims, and their ***components***, and describe their characteristics, applications and operation
		identify types of ***mounting components*** and describe their characteristics and applications
D-11.04.02L	demonstrate knowledge of procedures to replace tires and rims	identify ***tools and equipment*** used to replace tires and rims, and describe their applications and procedures for use
		describe procedures to replace tires and rims
		identify ***hazards*** and safe work practices while replacing tires and rims

Range of Variables

components include: multi-piece rims, rims, valve stems, wheel nuts, wheel spacers, wedges, gaskets

mounting components include: wheel nuts, wedges, studs

tools and equipment include: tread gauges, pressure gauges, jacks, jack/support stands, pneumatic tools, hand tools, torque wrenches, tire bars, bead blaster, tire cage, air chuck, valve core tool, rubber mallet, bead axe

hazards include: heating or welding wheel assemblies, lifting and handling of wheel assemblies, over-inflation of tires, under-inflation of tires, sidewall blowouts, exposed belting, high pressure compressed air, valve core projectile

D-11.05 Repairs tires

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
D-11.05.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
D-11.05.02P	remove tires and rims from hub assembly	tires and rims are removed from hub assembly using ***tools and equipment***
D-11.05.03P	dismount tires from rims	tires are dismounted from rims using ***tools and equipment***
D-11.05.04P	identify internal and external damages	internal and external damages are identified to recommend ***next steps***
D-11.05.05P	plug and patch tire	tire is plugged and patched according to size and location of damage
D-11.05.06P	mount tires	tires are mounted using ***tools and equipment***
D-11.05.07P	inflate tires to verify repair	tires are inflated to verify repair according to safe work procedures and manufacturers' specifications and procedures

Range of Variables

tools and equipment include: tire bars, tire machines, bead axes, bead blasters, air chucks, tire gauges, jacks, jack/support stands, tire cages, hand tools, pneumatic tools

next steps include: repair, visual inspection of cuts, cracks and inner and outer sidewall damage

	Knowledge	
	Learning Outcomes	**Learning Objectives**
D-11.05.01L	demonstrate knowledge of tires, their components, characteristics, applications and operation	identify types and sizes of tires, and their components, and describe their characteristics, applications and operation
		identify types of ***mounting components***, and describe their characteristics and applications
D-11.05.02L	demonstrate knowledge of procedures to repair tires	identify ***tools and equipment*** used to repair tires, and describe their applications and procedures for use
		identify types of tire damages that can be repaired
		describe procedures to dismount, mount and repair tires

	identify ***tire repair techniques***
	identify ***hazards*** and safe work practices while performing repairs
	describe procedures to verify repair of tires

Range of Variables

mounting components include: wheel nuts, wedges, studs

tools and equipment include: tire bars, tire machines, bead axes, bead blasters, air chucks, tire gauges, jacks, jack/support stands, tire cages, hand tools, pneumatic tools

tire repair techniques include: plugging and patching

hazards include: heating or welding wheel assemblies (pyrolysis), lifting and handling of wheel assemblies, over-inflation of tires, under-inflation of tires, sidewall blowouts, exposed belting, high pressure compressed air, valve core projectile

Major Work Activity E

Diagnoses and services trailer chassis, bodies and coupling devices

Task E-12 Diagnoses trailer chassis and trailer bodies

Task Descriptor

Transport trailer technicians diagnose trailer chassis and trailer bodies. Trailer chassis attach the trailer body to the suspension. Trailer bodies contain, secure and protect cargo. Structural problems affect how the weight of the load is distributed to the suspension systems, which in turn can create safety concerns.

E-12.01 Diagnoses trailer chassis

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
E-12.01.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
E-12.01.02P	perform visual inspections on frames and ***components***	visual inspections are performed on frames and ***components*** to identify ***defects***
E-12.01.03P	actuate locking systems on movable and fixed chassis	locking systems on movable and fixed chassis are actuated to verify their operation
E-12.01.04P	interpret diagnostic results	diagnostic results are interpreted to determine ***next steps***

Range of Variables

tools and equipment include: hand tools, pneumatic tools, jacks, jack/support stands, light sources, pry bars

components include: frame rails, cross members, gussets, mounts, king pins, pintle hitches, bumpers, bolster plates, fifth wheel

defects include: cracks, corrosion, damaged, worn or missing components

next steps include: repairs, component replacement, further diagnosis

	Knowledge	
	Learning Outcomes	**Learning Objectives**
E-12.01.01L	demonstrate knowledge of trailer chassis, their ***components***, characteristics, applications and operation	identify ***types of trailer chassis***, and their ***components***, and describe their characteristics, applications and operation
		identify ***types of frames*** and describe their characteristics, applications and operation
		identify ***types of slider locking mechanisms*** and describe their characteristics, applications and operation
E-12.01.02L	demonstrate knowledge of procedures to diagnose trailer chassis and their ***components***	identify ***tools and equipment*** used to diagnose trailer chassis and their ***components***, and describe their applications and procedures for use
		describe procedures to diagnose trailer chassis and their ***components***
		identify ***hazards*** and describe safe work practices while diagnosing trailer chassis and their ***components***
		identify inspections performed to diagnose trailer chassis and their ***components***
		identify possible ***defects*** found while performing inspections
E-12.01.03L	demonstrate knowledge of training and certification requirements to diagnose trailer chassis and their ***components***	identify training and certification requirements to diagnose trailer chassis and their ***components***
E-12.01.04L	demonstrate knowledge of regulatory requirements to diagnose trailer chassis and their ***components***	identify and interpret standards and regulations to diagnose trailer chassis and their ***components***

Range of Variables

components include: frame rails, cross members, gussets, mounts, king pins, pintle hitches, bumpers, bolster plates, fifth wheel

types of trailer chassis include: boosters, jeeps, converter dollies, highboy, lowboy, tankers, bulk, vans, platform heavy-haul

types of frames include: I-beam, ladder, unibody, channel

types of slider locking mechanisms include: air-release, manual-release

tools and equipment include: hand tools, pneumatic tools, jacks, jack/support stands, light sources, pry bars

hazards include: sharp edges, pinch points, hazardous materials, dirt, debris, grease, oil, high-pressure air lines, high-pressure hydraulic lines

defects include: cracks, corrosion, damaged, worn or missing components

E-12.02 Diagnoses trailer bodies

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
E-12.02.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
E-12.02.02P	perform visual inspections on trailer bodies	visual inspections on trailer bodies are performed to detect ***structural damage***
E-12.02.03P	inspect ***fasteners***	***fasteners*** are inspected for ***faults***
E-12.02.04P	inspect integrity of previous repairs and patches	integrity of previous repairs and patches are inspected
E-12.02.05P	check alignment of doors and gates	alignment of doors and gates are checked
E-12.02.06P	interpret diagnostic results	diagnostic results are interpreted to determine ***next steps***

Range of Variables

tools and equipment include: hand tools, pneumatic tools, jacks, jack/support stands, light sources, pry bars, smoke bombs, thermal cameras, hoisting equipment

structural damages include: bent or broken side rails; bent roof bows; corroded cross members; cracked or bent wall posts; corroded or punctured side panels; cracked mounting points; cracked or bent headers; cracked or bent bulkheads; corroded or punctured roof panel; cracked, bent or broken lift gates; worn out pins and bushings

fasteners include: rivets, welds, rail bolts

faults include: damage, corrosion, looseness, missing

next steps include: repairs, component replacement, further diagnosis

	Knowledge	
	Learning Outcomes	**Learning Objectives**
E-12.02.01L	demonstrate knowledge of trailer bodies, their ***components***, characteristics, applications and operation	identify ***types of trailer bodies***, and their ***components***, and describe their characteristics, applications and operation
		identify ***types of frames*** and describe their characteristics, applications and operation
		identify ***types of doors*** and describe their characteristics, applications and operation
E-12.02.02L	demonstrate knowledge of procedures to diagnose trailer bodies and their ***components***	identify ***tools and equipment*** used to diagnose trailer bodies and their ***components***, and describe their applications and procedures for use
		describe procedures to diagnose trailer bodies and their ***components***
		identify ***hazards*** and describe safe work practices while diagnosing trailer bodies and their ***components***
		identify inspections performed to diagnose trailer bodies and their ***components***
		identify possible ***structural damage*** found while performing inspections
E-12.02.03L	demonstrate knowledge of training and certification requirements to diagnose trailer bodies and their ***components***	identify training and certification requirements to diagnose trailer bodies and their ***components***
E-12.02.04L	demonstrate knowledge of regulatory requirements to diagnose trailer bodies and their ***components***	identify and interpret standards and regulations to diagnose trailer bodies and their ***components***

Range of Variables

components include: posts and panels, fibreglass reinforced panels (FRPs), aluminum and structural side panels, bulk heads, roof skin, flooring, door components, rollers

types of trailer bodies include: tankers, unibody, containers, vans, dump-style

types of frames include: I-beam, ladder, unibody, channel

types of doors include: hinged, roll-up, curtain side

tools and equipment include: hand tools, pneumatic tools, jacks, jack/support stands, light sources, pry bars, smoke bombs, thermal cameras, hoisting equipment

hazards include: pinch points, sharp edges, hazardous materials, flammable materials

structural damages include: bent or broken side rails; bent roof bows; corroded cross members; cracked or bent wall posts; corroded or punctured side panels; cracked mounting points; cracked or bent headers; cracked or bent bulkheads; corroded or punctured roof panel; cracked, bent or broken lift gates; worn out pins and bushings

Task E-13 Services trailer chassis and trailer bodies

Task Descriptor

Transport trailer technicians service trailer chassis and trailer bodies to ensure structural integrity and safety of equipment on the roads. Service includes repair, replacement, rebuild, adjustment and general maintenance.

E-13.01 Maintains trailer chassis

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
E-13.01.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
E-13.01.02P	perform ***preventative maintenance checks***	***preventative maintenance checks*** are performed according to manufacturers' maintenance procedures and schedules

Range of Variables

tools and equipment include: hand tools, pneumatic tools, jacks, jack/support stands, light sources, pry bars, hoisting equipment, oxyacetylene torch, welders, grinders

preventive maintenance checks include: cross-members, subframes, fifth wheels, bolster plates, header plates, king pins, pintle hitch, landing gear, frame rails, rollers

	Knowledge	
	Learning Outcomes	**Learning Objectives**
E-13.01.01L	demonstrate knowledge of trailer chassis, their components, characteristics, applications and operation	identify ***types of trailer chassis***, and their components, and describe their characteristics, applications and operation
		identify ***types of frames*** and describe their characteristics, applications and operation
		identify ***types of slider locking mechanisms*** and describe their characteristics, applications and operation
E-13.01.02L	demonstrate knowledge of procedures to maintain trailer chassis and their components	identify ***tools and equipment*** used to maintain trailer chassis and their components, and describe their applications and procedures for use

	describe procedures to maintain trailer chassis and their components
	identify ***hazards*** and safe work practices while maintaining trailer chassis and their components

Range of Variables

types of trailer chassis include: boosters, jeeps, converter dollies, highboy, lowboy, platform heavy haul, tankers, bulk, vans

types of frames include: I-beam, ladder, unibody, channel

types of slider locking mechanisms include: air-release, manual-release

tools and equipment include: hand tools, pneumatic tools, jacks, jack/support stands, light sources, pry bars, hoisting equipment, oxyacetylene torch, welders, grinders

hazards include: sharp edges, pinch points, hazardous materials, dirt, debris, grease, oil, high-pressure air lines, high-pressure hydraulic lines

E-13.02 Repairs trailer chassis

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
E-13.02.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
E-13.02.02P	repair or replace worn, damaged or defective ***components***	worn, damaged or defective ***components*** are repaired or replaced according to manufacturers' specifications
E-13.02.03P	complete repair	repair is completed according to manufacturers' specifications and procedures

Range of Variables

tools and equipment include: rivet guns, huck guns, hand tools, pneumatic tools, jacks, jack/support stands, light sources, pry bars, hoisting equipment, oxyacetylene torch, welders, grinders, torque wrenches

components include: subframes, slider rails, frame rails, cross members, gussets, mounts, king pins, pintle hitch, bumper, bolster plate, fifth wheels

	Knowledge	
	Learning Outcomes	**Learning Objectives**
E-13.02.01L	demonstrate knowledge of trailer chassis, their ***components***, characteristics, applications and operation	identify ***types of trailer chassis***, and their ***components***, and describe their characteristics, applications and operation
		identify ***types of frames*** and describe their characteristics, applications and operation
		identify ***types of slider locking mechanisms*** and describe their characteristics, applications and operation
E-13.02.02L	demonstrate knowledge of procedures to repair trailer chassis and their ***components***	identify ***tools and equipment*** used to repair trailer chassis and their ***components***, and describe their applications and procedures for use
		describe procedures to repair or replace trailer chassis and their ***components***
		identify ***hazards*** and safe work practices while performing repairs
		describe procedures to verify repair of trailer chassis and their ***components***

Range of Variables

tools and equipment include: rivet guns, huck guns, hand tools, pneumatic tools, jacks, jack/support stands, light sources, pry bars, hoisting equipment, oxyacetylene torch, welders, grinders, torque wrenches

components include: subframes, slider rails, frame rails, cross members, gussets, mounts, king pins, pintle hitch, bumper, bolster plate, fifth wheels

types of trailer chassis include: boosters, jeeps, converter dollies, highboy, lowboy, platform heavy haul, tankers, bulk, vans

types of frames include: I-beam, ladder, unibody, channel

types of slider locking mechanisms include: air-release, manual-release

hazards include: sharp edges, pinch points, hazardous materials, dirt, debris, grease, oil, high-pressure air lines, high-pressure hydraulic lines

E-13.03 Maintains trailer bodies

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
E-13.03.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
E-13.03.02P	perform ***preventative maintenance checks***	***preventative maintenance checks*** are performed according to customer checklist and, manufacturers' maintenance procedures and schedules

Range of Variables

tools and equipment include: hand tools, pneumatic tools, jacks, jack/support stands, light sources, pry bars, smoke bombs, thermal cameras, hoisting equipment, rivet guns, huck guns

preventive maintenance checks include: roof skin, roof bows, scuff liner, side panels, flooring, rivets, doors, door seals, venting, bulk head, kemlite, logistics tracking, hatches, valves, hydraulic lines

	Knowledge	
	Learning Outcomes	**Learning Objectives**
E-13.03.01L	demonstrate knowledge of trailer bodies, their ***components***, characteristics, applications and operation	identify ***types of trailer bodies***, and their ***components***, and describe their characteristics, applications and operation
		identify ***types of frames*** and describe their characteristics, applications and operation
		identify ***types of doors*** and describe their characteristics, applications and operation
E-13.03.02L	demonstrate knowledge of procedures to maintain trailer bodies and their ***components***	identify ***tools and equipment*** used to maintain trailer bodies and their ***components***, and describe their applications and procedures for use
		describe procedures to maintain trailer bodies and their ***components***
		identify ***hazards*** and safe work practices while maintaining trailer bodies and their ***components***

E-13.03.03L	demonstrate knowledge of training and certification requirements to maintain trailer bodies and their ***components***	identify training and certification requirements to maintain trailer bodies and their ***components***
E-13.03.04L	demonstrate knowledge of regulatory requirements to maintain trailer bodies and their ***components***	identify and interpret standards and regulations to maintain trailer bodies and their ***components***

Range of Variables

components include: posts and panels, FRP, aluminum and structural side panels, bulk heads, roof skin, flooring, door components, rollers

types of trailer bodies include: tankers, pressure vessels, unibody, containers, vans, dump-style

types of frames include: I-beam, ladder, unibody, channel

types of doors include: hinged, roll-up, curtain side

tools and equipment include: hand tools, pneumatic tools, jacks, jack/support stands, light sources, pry bars, smoke bombs, thermal cameras, hoisting equipment, rivet guns, huck guns

hazards include: pinch points, sharp edges, hazardous materials, flammable materials, falling from heights

E-13.04 Repairs trailer bodies

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
E-13.04.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
E-13.04.02P	repair or replace worn, damaged or defective ***components***	worn, damaged or defective ***components*** are repaired or replaced according to manufacturers' specifications and procedures
E-13.04.03P	repair, remove and replace doors	doors are repaired, removed and replaced according to manufacturers' specifications and procedures
E-13.04.04P	complete repair	repair is completed according to manufacturers' specifications and procedures

Range of Variables

tools and equipment include: hand tools, pneumatic tools, jacks, jack/support stands, light sources, pry bars, smoke bombs, thermal cameras, hoisting equipment, torque wrenches, rivet guns, huck guns, welders, grinders, oxyacetylene torch

components include: posts and panels, FRP, aluminum and structural side panels, bulk heads, roof skin, flooring, door components, rollers

	Knowledge	
	Learning Outcomes	**Learning Objectives**
E-13.04.01L	demonstrate knowledge of trailer bodies, their ***components***, characteristics, applications and operation	identify ***types of trailer bodies***, and their ***components***, and describe their characteristics, applications and operation
		identify ***types of frames*** and describe their characteristics, applications and operation
		identify ***types of doors*** and describe their characteristics, applications and operation
E-13.04.02L	demonstrate knowledge of procedures to repair trailer bodies and their ***components***	identify ***tools and equipment*** used to repair trailer bodies and their ***components***, and describe their applications and procedures for use
		describe procedures to repair, replace, adjust and align trailer bodies and their ***components***
		identify ***hazards*** and safe work practices while performing repairs
		describe procedures to verify repair of trailer bodies and their ***components***
E-13.04.03L	demonstrate knowledge of training and certification requirements to work on trailer bodies and their ***components***	identify training and certification requirements to work on trailer bodies and their ***components***
E-13.04.04L	demonstrate knowledge of regulatory requirements to work on trailer bodies and their ***components***	identify and interpret standards and regulations to work on trailer bodies and their ***components***

Range of Variables

components include: posts and panels, FRP, aluminum and structural side panels, bulk heads, roof skin, flooring, door components, rollers

types of trailer bodies include: tankers, pressure vessel, unibody, containers, vans, dump-style

types of frames include: I-beam, ladder, unibody, channel

types of doors include: hinged, roll-up, curtain side

tools and equipment include: hand tools, pneumatic tools, jacks, jack/support stands, light sources, pry bars, smoke bombs, thermal cameras, hoisting equipment, torque wrenches, rivet guns, huck guns, welders, grinders, oxyacetylene torch

hazards include: trailer content (flammable, corrosive, explosive, toxic), material being worked on, falling from heights, pinch points, sharp edges

Task E-14 Diagnoses coupling devices and landing gear

Task Descriptor

Transport trailer technicians must ensure that coupling devices secure the chassis to the power unit or to another chassis and that the landing gear supports the weight of the trailer when it is disconnected from the towing unit.

E-14.01 Diagnoses coupling devices

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
E-14.01.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
E-14.01.02P	perform sensory inspection of coupling devices	sensory inspection of coupling devices is performed to identify ***defects***
E-14.01.03P	verify out-of-adjustment or worn ***components***	out-of-adjustment or worn ***components*** are verified using ***tools and equipment***
E-14.01.04P	interpret diagnostic results	diagnostic results are interpreted to determine ***next steps***

Range of Variables

tools and equipment include: straightedges, kingpin gauges, fifth wheel adjustment tools, fifth wheel lock testers, pintle wear gauges

defects include: cracks on coupler or pick-up plates, worn coupling devices, seized components

components include: fifth wheels, slide tracks, safety chains, pintle hooks, couplers

next steps include: repairs, component replacement, further diagnosis

	Knowledge	
	Learning Outcomes	**Learning Objectives**
E-14.01.01L	demonstrate knowledge of coupling devices, their ***components***, characteristics, applications and operation	identify types of coupling devices, and their ***components***, and describe their characteristics, applications and operation
E-14.01.02L	demonstrate knowledge of procedures to diagnose coupling devices and their ***components***	identify ***tools and equipment*** used to diagnose coupling devices and their ***components***, and describe their applications and procedures for use
		describe procedures to diagnose coupling devices and their ***components***

		describe safe work practices while diagnosing coupling devices and their ***components***
		identify inspections performed to diagnose coupling devices and their ***components***
		identify possible ***defects*** found while performing inspections
E-14.01.03L	demonstrate knowledge of regulatory requirements to diagnose coupling devices and their ***components***	identify and interpret standards and regulations to diagnose coupling devices and their ***components***

Range of Variables

components include: fifth wheels, slide tracks, safety chains, pintle hooks, couplers

tools and equipment include: straightedges, kingpin gauges, fifth wheel adjustment tools, fifth wheel lock testers, pintle wear gauges

defects include: cracks on coupler or pick-up plates, worn coupling devices, seized components

E-14.02 Diagnoses landing gear

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
E-14.02.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task
E-14.02.02P	perform visual inspection of landing gear	visual inspection of landing gear is performed to identify ***damages or defects***
E-14.02.03P	operate landing gear to detect signs of excessive wear or ***failures***	landing gear is operated to detect signs of excessive wear or ***failures***
E-14.02.04P	interpret diagnostic results	diagnostic results are interpreted to determine ***next steps***

Range of Variables

tools and equipment include: tape measures, hand tools

damages or defects include: cracked mounting brackets, worn cross shafts, defective crank handles

failures include: worn bearings, worn gears, uneven leg lengths

next steps include: repairs, component replacement, further diagnosis

	Knowledge	
	Learning Outcomes	**Learning Objectives**
E-14.02.01L	demonstrate knowledge of landing gear, their ***components***, characteristics, applications and operation	identify types of landing gear and their ***components***, and describe their characteristics, applications and operation
		identify ***structures*** associated with landing gear
E-14.02.02L	demonstrate knowledge of procedures to diagnose landing gear and their ***components***	identify ***tools and equipment*** used to diagnose landing gear and their ***components***, and describe their applications and procedures for use
		describe procedures to diagnose landing gear and their ***components***
		describe safe work practices while diagnosing landing gear and their ***components***
		identify inspections performed to diagnose landing gear and their ***components***
		identify possible ***damages or defects*** found while performing inspections
		identify signs of ***failures*** detected when operating landing gear

Range of Variables

components include: crank handles, dolly leg pads, cross shafts, wing plates
structures include: wing plates, supporting structures, braces
tools and equipment include: tape measures, hand tools
damages or defects include: cracked mounting brackets, worn cross shafts, defective crank handles
failures include: worn bearings, worn gears, uneven leg lengths

Task E-15 Services coupling devices and landing gear

Task Descriptor

Transport trailer technicians service coupling devices and landing gear to ensure public safety and prevent equipment damage. Service includes repair, replacement, rebuild, adjustment and general maintenance.

E-15.01 Maintains coupling devices

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
E-15.01.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
E-15.01.02P	perform ***preventative maintenance checks***	***preventative maintenance checks*** are performed according to manufacturers' maintenance procedures and schedules
E-15.01.03P	verify proper function of ***locking mechanisms***	***locking mechanisms*** are functioning according to manufacturers' specifications
E-15.01.04P	clean, lubricate and adjust ***components***	***components*** are cleaned, lubricated and adjusted according to manufacturers' specifications and environmental conditions

Range of Variables

tools and equipment include: straightedges, kingpin gauges, fifth wheel adjustment tools

preventative maintenance checks include: measuring kingpin; checking for pintle hook play, fifth wheel play, and worn coupling devices

locking mechanisms include: safety catches, safety chains, air actuators

components include: fifth wheels, slide tracks, safety chains, pintle hooks, container locks

	Knowledge	
	Learning Outcomes	**Learning Objectives**
E-15.01.01L	demonstrate knowledge of coupling devices, their ***components***, characteristics, applications and operation	identify types of coupling devices, and their ***components***, and describe their characteristics, applications and operation
		identify types of ***locking mechanisms*** and describe their characteristics, applications and operation

E-15.01.02L	demonstrate knowledge of procedures to maintain coupling devices and their ***components***	identify ***tools and equipment*** used to maintain coupling devices and their ***components***, and describe their applications and procedures for use
		describe procedures to maintain coupling devices and their ***components***
		identify safe work practices while maintaining coupling devices and their ***components***
E-15.01.03L	demonstrate knowledge of training and certification requirements to maintain coupling devices and their ***components***	identify training and certification requirements to maintain coupling devices and their ***components***
E-15.01.04L	demonstrate knowledge of regulatory requirements to maintain coupling devices and their ***components***	identify and interpret standards and regulations to maintain coupling devices and their ***components***

Range of Variables

components include: fifth wheels, slide tracks, safety chains, pintle hooks, container locks
locking mechanisms include: safety catches, safety chains, air actuators
tools and equipment include: straightedges, kingpin gauges, fifth wheel adjustment tools

E-15.02 Repairs coupling devices

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
E-15.02.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
E-15.02.02P	adjust and rebuild fifth wheels	fifth wheels are adjusted and rebuilt according to manufacturers' specifications
E-15.02.03P	replace upper coupler and kingpin	upper coupler and kingpin are replaced according to regulatory requirements
E-15.02.04P	replace pintle hooks and safety chains	pintle hooks and safety chains are replaced according to regulatory requirements using fasteners
E-15.02.05P	repair locking components and corner castings on containers and chassis	locking components and corner castings on containers and chassis are repaired according to regular maintenance schedule
E-15.02.06P	complete repair	repair is completed by verifying operation and alignment of units

Range of Variables

tools and equipment include: hand tools, lock testers

	Knowledge	
	Learning Outcomes	**Learning Objectives**
E-15.02.01L	demonstrate knowledge of coupling devices, their ***components***, characteristics, applications and operation	identify types of coupling devices, and their ***components***, and describe their characteristics, applications and operation
		identify types of ***locking mechanisms*** and describe their characteristics, applications and operation
E-15.02.02L	demonstrate knowledge of procedures to repair coupling devices and their ***components***	identify ***tools and equipment*** used to repair coupling devices and their ***components***, and describe their applications and procedures for use
		describe procedures to repair, replace, adjust and rebuild coupling devices and their ***components***
		identify safe work practices while performing repairs
		describe procedures to verify repair of coupling devices and their ***components***

Range of Variables

components include: fifth wheels, slide tracks, safety chains, pintle hooks, container locks
locking mechanisms include: safety catches, safety chains, air actuators
tools and equipment include: hand tools, lock testers

E-15.03 Maintains landing gear

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
E-15.03.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
E-15.03.02P	perform ***preventative maintenance checks***	***preventative maintenance checks*** are performed according to customer checklist, and manufacturers' maintenance procedures and schedules

E-15.03.03P	lubricate gear box and inner leg and screw assembly	gear box and inner leg and screw assembly are lubricated according to maintenance schedule
E-15.03.04P	operate landing gear to distribute lubricants	landing gear is operated to distribute lubricants

Range of Variables

tools and equipment include: grease guns, tape measures, hand tools, welders, torches
preventative maintenance checks include: lubrication, operation, checking operation of dolly leg pad
components include: crank handles, dolly leg pads, cross shafts
structures include: wing plates, supporting structures, braces

	Knowledge	
	Learning Outcomes	**Learning Objectives**
E-15.03.01L	demonstrate knowledge of landing gear, their ***components***, characteristics, applications and operation	identify types of landing gear and their ***components***, and describe their characteristics, applications and operation
		identify ***structures*** associated with landing gear
E-15.03.02L	demonstrate knowledge of procedures to maintain landing gear and their ***components***	identify ***tools and equipment*** used to maintain landing gear and their ***components***, and describe their applications and procedures for use
		describe procedures to maintain landing gear and their ***components***
		identify safe work practices while maintaining landing gear and their ***components***

Range of Variables

components include: crank handles, dolly leg pads, cross shafts
structures include: wing plates, supporting structures, braces
tools and equipment include: grease guns, tape measures, hand tools, welders, torches

E-15.04 Repairs landing gear

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
E-15.04.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
E-15.04.02P	replace worn ***components***	worn ***components*** are replaced according to visual inspection and maintenance schedule
E-15.04.03P	recondition gear box on crankside leg	gear box on crankside leg is reconditioned according to manufacturers' specifications
E-15.04.04P	synchronize leg movement after replacing cross shafts	leg movement is synchronized after replacing cross shafts
E-15.04.05P	complete repair	repair is completed by verifying operation of landing gear

Range of Variables

tools and equipment include: grease guns, tape measures, hand tools, welders, torches
components include: cross shafts, dolly leg pads, dolly leg braces, crank handles

	Knowledge	
	Learning Outcomes	**Learning Objectives**
E-15.04.01L	demonstrate knowledge of landing gear, their ***components***, characteristics, applications and operation	identify types of landing gear and their ***components***, and describe their characteristics, applications and operation
		identify ***structures*** associated with landing gear
E-15.04.02L	demonstrate knowledge of procedures to repair landing gear and their ***components***	identify ***tools and equipment*** used to repair landing gear and their ***components***, and describe their applications and procedures for use
		describe procedures to repair, replace, and recondition landing gear and their ***components***
		identify safe work practices while performing repairs
		describe procedures to verify repair of landing gear and their ***components***

Range of Variables

components include: cross shafts, dolly leg pads, dolly leg braces, crank handles
structures include: wing plates, supporting structures, braces
tools and equipment include: grease guns, tape measures, hand tools, welders, torches

Major Work Activity F

Diagnoses and services electric and electronic systems

Task F-16 Diagnoses electric and electronic systems

Task Descriptor

Transport trailer technicians inspect electric and electronic systems to locate problems and recommend required repairs.

F-16.01 Diagnoses lighting systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
F-16.01.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
F-16.01.02P	perform tests using ***tools and equipment***	tests are performed using ***tools and equipment***
F-16.01.03P	perform visual inspection of lighting systems	visual inspection of lighting systems is performed to verify operation and jurisdictional regulations
F-16.01.04P	isolate and identify ***problems*** with lighting systems	***problems*** with lighting systems are isolated and identified using external source of power
F-16.01.05P	distinguish between lighting component fault and wiring problems	lighting component fault and wiring problems are identified
F-16.01.06P	interpret diagnostic results	diagnostic results are interpreted to determine ***next steps***

Range of Variables

tools and equipment include: multimeters, light testers, continuity testers, external power sources, power probes

problems include: flickering light, opaque lens, failed light emitting diodes (LED), missing or poor attachments, dimness, broken and corroded pins, poorly sealed junction boxes

next steps include: repairs, component replacement, further diagnosis

	Knowledge	
	Learning Outcomes	**Learning Objectives**
F-16.01.01L	demonstrate knowledge of lighting systems, their ***components***, characteristics, ***applications*** and operation	identify ***types of lighting systems*** and their ***components***, and describe their characteristics, ***applications*** and operation
		describe ***principles of electrical theory***
F-16.01.02L	demonstrate knowledge of procedures to diagnose lighting systems and their ***components***	identify ***tools and equipment*** used to diagnose lights and their ***components***, and describe their applications and procedures for use
		describe procedures to diagnose lights and their ***components***
		identify ***hazards*** and describe safe work practices while diagnosing lights and their ***components***
		identify inspections and tests performed to diagnose lights and their ***components***
		identify possible ***problems*** found while performing inspections and tests
F-16.01.03L	demonstrate knowledge of regulatory requirements to diagnose lighting systems and their ***components***	identify and interpret standards and regulations to diagnose lighting systems and their ***components***

Range of Variables

components include: connections, rubber mounts, mounting hardware, harnesses, plug-ins, reflectors

applications include: interior, marker, signal, brake, taillights, warning lights

types of lighting systems include: LEDs, incandescent

principles of electrical theory include: Ohm's Law (current draw, resistance, voltage), series circuits, parallel circuits, series/parallel circuits

tools and equipment include: multimeters, light testers, continuity testers, external power sources, power probes

hazards include: flammable, explosive and toxic cargos

problems include: flickering light, opaque lens, failed light emitting diodes (LED), missing or poor attachments, dimness, broken and corroded pins, poorly sealed junction boxes

F-16.02 Diagnoses wiring systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
F-16.02.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
F-16.02.02P	perform tests using ***tools and equipment***	tests are performed using ***tools and equipment***
F-16.02.03P	perform visual inspections of wiring and connections	visual inspections of wiring and connections are performed to identify ***problems***
F-16.02.04P	interpret diagnostic results	diagnostic results are interpreted to determine ***next steps***

Range of Variables

tools and equipment include: multimeters, light testers, continuity testers, power probes, remote power sources, thermal imaging devices

problems include: corroded pigtails, disconnected or broken wires, shorts, worn insulation, tripped breakers and failed fuses, damaged switches

next steps include: repairs, component replacement, further diagnosis

	Knowledge	
	Learning Outcomes	**Learning Objectives**
F-16.02.01L	demonstrate knowledge of wiring systems, their ***components***, characteristics, applications and operation	identify wiring systems, their ***components***, and their ***types of housings***, and describe their characteristics, applications and operation
		identify types and ***gauges of wires***, and describe their characteristics and applications
		explain colour coding of wires within harnesses
		identify types of harnesses required for wiring applications
		describe ***principles of electrical theory***
F-16.02.02L	demonstrate knowledge of procedures to diagnose wiring systems	identify ***tools and equipment*** used to diagnose wiring systems, and describe their applications and procedures for use
		describe procedures to diagnose wiring systems

	identify ***hazards*** and describe safe work practices while diagnosing wiring systems
	identify inspections and tests performed to diagnose wiring systems
	identify possible ***problems*** found while performing inspections and tests

Range of Variables

components include: circuit breakers, fuses, switches, conduits, wire connectors, harnesses

types of housings include: vapour-proof, explosion-proof, waterproof, conduit

gauges of wires include: 8, 10, 12, 14, 16

principles of electrical theory include: Ohm's Law (current draw, resistance, voltage), series circuits, parallel circuits, series/parallel circuits

tools and equipment include: multimeters, light testers, continuity testers, power probes, remote power sources, thermal imaging devices

hazards include: flammable, explosive and toxic cargos

problems include: corroded pigtails, disconnected or broken wires, shorts, worn insulation, tripped breakers and failed fuses, damaged switches

F-16.03 Diagnoses trailer monitoring and control systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
F-16.03.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
F-16.03.02P	identify ***symptoms of problems***	***symptoms of problems*** are identified by consulting with customer or operator
F-16.03.03P	operate equipment to reproduce symptoms	equipment is operated to reproduce symptoms
F-16.03.04P	perform visual inspection of trailer monitoring and control systems and their ***components***	visual inspection of trailer monitoring and control systems and their ***components*** to identify ***problems***
F-16.03.05P	perform ***tests and diagnostics***	***tests and diagnostics*** are performed
F-16.03.06P	interpret schematics	schematics are interpreted to locate and identify ***components***
F-16.03.07P	interpret results to determine ***required actions***	results are interpreted to determine ***required actions***

Range of Variables

tools and equipment include: multimeters, laptops, onboard diagnostic systems, OEM specialty tools

symptoms of problems include: service codes, alarms

components include: batteries, fuses, relays, actuators, alternators, switches, harnesses, diodes, connectors, sensors, wiring, controllers, grounds

problems include: corrosion, burnt components, broken wire connections, damaged harnesses, faulty sensors

tests and diagnostics include: circuit tests, component tests, service code diagnostics, communications systems

required actions include: cleaning connections, replacing components, soldering wires, further diagnosis, installing software

	Knowledge	
	Learning Outcomes	**Learning Objectives**
F-16.03.01L	demonstrate knowledge of trailer monitoring and control systems, their ***components***, characteristics, applications and operation	identify ***types of trailer monitoring and control systems***, and their ***components***, and describe their characteristics, applications and operation
		describe electronic subsystems and describe their characteristics, applications and operation
		describe ***principles of electrical and electronic theory***
		identify gauges of electrical wiring and types of connectors
		identify ***equipment accessories and options***
F-16.03.02L	demonstrate knowledge of procedures to diagnose trailer monitoring and control systems and their ***components***	identify ***tools and equipment*** used to diagnose trailer monitoring and control systems and their ***components***, and describe their applications and procedures for use
		describe procedures to diagnose trailer monitoring and control systems and their ***components***
		identify inspections, ***tests and diagnostics*** performed to diagnose trailer monitoring and control systems and their ***components***
		interpret results of ***tests and diagnostics***
		identify possible ***problems*** found while performing ***tests and diagnostics***
		identify ***diagnostic resources***
		interpret schematics and flow charts

Range of Variables

components include: batteries, fuses, relays, actuators, alternators, switches, harnesses, diodes, connectors, sensors, wiring, controllers, grounds

types of trailer monitoring and control systems include: temperatures, doors, ABS, roll over, tire pressures, global positioning system (GPS)

principles of electrical and electronic theory include: Ohm's Law (current draw, resistance, voltage), series circuits, parallel circuits, series/parallel circuits, diodes, transistors

equipment accessories and options include: data collection, GPS

tools and equipment include: multimeters, laptops, onboard diagnostic systems, OEM specialty tools

tests and diagnostics include: circuit tests, component tests, service code diagnostics, communications systems

problems include: corrosion, burnt components, broken wire connections, damaged harnesses, faulty sensors

diagnostic resources include: technical manual, manufacturer technical assistance, qualified trade experts

Task F-17 Services electric and electronic systems

Task Descriptor

Transport trailer technicians perform maintenance and repairs to electric and electronic systems related to the operation of the unit. All repairs must be done to meet company policies and procedures as well as jurisdictional regulatory requirements.

F-17.01 Maintains electric and electronic systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
F-17.01.01P	select and use tools and equipment	tools and equipment are selected and used according to task and manufacturers' specifications
F-17.01.02P	perform preventative maintenance checks	preventative maintenance checks are performed according to company policies and procedures, manufacturers' maintenance procedures and schedules, and jurisdictional regulations
F-17.01.03P	clean and adjust ***components***	***components*** are cleaned and adjusted to prevent failure
F-17.01.04P	ensure that wiring is secured to prevent damage and premature wear	wiring is secured to prevent damage and premature wear

F-17.01.05P	select anticorrosive products and apply to receptacles	anticorrosive products are selected and applied to receptacles according to company policies and procedures
F-17.01.06P	update software	software is updated according to manufacturers' specifications
F-17.01.07P	test and service batteries	batteries are tested and serviced according to manufacturers' specifications

Range of Variables

components include: connections, rubber mounts, mounting hardware, harnesses, plug-ins, reflectors, circuit breakers, fuses, switches, conduits, wire connectors, batteries, relays, actuators, alternators, diodes, sensors, wiring, controllers, grounds

	Knowledge	
	Learning Outcomes	**Learning Objectives**
F-17.01.01L	demonstrate knowledge of electric and electronic systems, their ***components***, characteristics, applications and operation	identify types of electric and electronic systems and their ***components***, and describe their characteristics, applications and operation
		identify ***types of lights*** and their components, and describe their characteristics, ***applications*** and operation
		identify ***types of connections*** and their components, and describe their characteristics, applications and operation
		identify ***types*** and ***gauges of wires*** and describe their characteristics and applications
		explain colour coding of wires within harnesses
		identify types and number of harnesses required for wiring applications
F-17.01.02L	demonstrate knowledge of battery safety, construction, design, diagnostics and service	identify construction and design of batteries
		describe operation of batteries
		describe procedures to test and service batteries
F-17.01.03L	demonstrate knowledge of procedures to maintain electric and electronic systems, and their ***components***	identify tools and equipment used to maintain electric and electronic systems, and their ***components***, and describe their applications and procedures for use

	describe ***procedures*** to maintain electric and electronic systems, and their ***components***
	identify ***hazards*** and safe work practices while maintaining electric and electronic systems, and their ***components***

Range of Variables

components include: connections, rubber mounts, mounting hardware, harnesses, plug-ins, reflectors, circuit breakers, fuses, switches, conduits, wire connectors, batteries, relays, actuators, alternators, diodes, sensors, wiring, controllers, grounds

types of lights include: LEDs, incandescent

applications include: marker, signal, brake, taillights, warning lights

types of connections include: vapour-proof, explosion-proof, waterproof

types of wires include: copper, communications wiring

gauges of wires include: 8, 10, 12, 14, 16

procedures include: discharging static charge, updating software

hazards include: flammable, explosive and toxic cargos

F-17.02 Repairs lighting and wiring systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
F-17.02.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
F-17.02.02P	remove and test ***components***	***components*** are removed and tested
F-17.02.03P	repair ***components***	***components*** are repaired according to manufacturers' specifications
F-17.02.04P	refasten loose or unsecured wiring and harnesses	loose or unsecured wiring and harnesses are refastened according to manufacturers' specifications
F-17.02.05P	replace or reinstall ***components***	***components*** are replaced or reinstalled according to according to manufacturers' specifications
F-17.02.06P	diagnose and replace batteries	batteries are diagnosed and replaced according to manufacturers' specifications
F-17.02.07P	complete repair	repair is completed by verifying operation of lighting and wiring systems

Range of Variables

tools and equipment include: multimeters, light testers, wire strippers and crimpers, soldering irons

components include: sockets, harnesses, receptacles, connections, bulbs, lenses, marker, signal, brake, taillights, warning lights, switches

	Knowledge	
	Learning Outcomes	**Learning Objectives**
F-17.02.01L	demonstrate knowledge of lighting and wiring systems, their ***components***, characteristics, applications and operation	identify types of lighting and wiring systems and their ***components***, and describe their characteristics, applications and operation
		identify ***types of lights*** and their components, and describe their characteristics, applications and operation
		identify ***types of connections*** and their components, and describe their characteristics, applications and operation
		identify ***types*** and ***gauges of wires*** and describe their characteristics and applications
		explain colour coding of wires within harnesses
		identify types and number of harnesses required for wiring applications
F-17.02.02L	demonstrate knowledge of procedures to repair lighting and wiring systems, and their ***components***	identify ***tools and equipment*** used to repair lighting and wiring systems, and their ***components***, and describe their applications and procedures for use
		describe procedures to remove, repair, replace, reinstall and refasten lighting and wiring system ***components***
		identify ***hazards*** and safe work practices while performing repairs
		describe procedures to verify repair of lighting and wiring systems, and their ***components***
		identify lighting and wiring ***repair materials***
		identify ***types of lights*** that can be repaired or replaced
F-17.02.03L	demonstrate knowledge of battery diagnostic procedures	identify tools used to diagnose batteries, and describe their applications and procedures for use
		interpret battery diagnostic results

F-17.02.04L	demonstrate knowledge of regulatory requirements to repair lighting and wiring systems	identify and interpret standards and regulations to repair lighting and wiring systems
		describe regulations governing locations and condition of lighting, reflectors and reflective tape

Range of Variables

components include: sockets, harnesses, receptacles, connections, bulbs, lenses, marker, signal, brake, taillights, warning lights, switches
types of lights include: LEDs, incandescent
types of connections include: vapour-proof, explosion-proof, waterproof
types of wires include: copper, communications wiring
gauges of wires include: 8, 10, 12, 14, 16
tools and equipment include: multimeters, light testers, wire strippers and crimpers, soldering irons
hazards include: flammable, explosive and toxic cargos
repair materials include: solder, wiring connectors, heat shrink tubing, electrical tape

F-17.03 Repairs trailer monitoring and control systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
F-17.03.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
F-17.03.02P	replace failed electrical and electronic ***components***	failed electrical and electronic ***components*** are replaced
F-17.03.03P	repair ***components***	***components*** are repaired according to manufacturers' specifications
F-17.03.04P	reinstall ***components***	***components*** are reinstalled according to manufacturers' specifications
F-17.03.05P	complete repair	repair is completed by verifying operation of trailer monitoring and control systems

Range of Variables

tools and equipment include: onboard diagnostics, electronic connection interface, OEM specialty tools
components include: batteries, fuses, relays, actuators, alternators, switches, harnesses, diodes, connectors, sensors, wiring, controllers, grounds

	Knowledge	
	Learning Outcomes	**Learning Objectives**
F-17.03.01L	demonstrate knowledge of trailer monitoring and control systems, their ***components***, characteristics, applications and operation	identify types of trailer monitoring and control systems, and their ***components***, and describe their characteristics, applications and operation
		describe ***electronic subsystems*** and describe their characteristics, applications and operation
		describe ***principles of electrical and electronic theory***
		identify gauges of electrical wiring and types of connectors
		identify ***equipment accessories and options***
F-17.03.02L	demonstrate knowledge of procedures to repair trailer monitoring and control systems and their ***components***	identify ***tools and equipment*** used to repair trailer monitoring and control systems and their ***components***, and describe their applications and procedures for use
		describe procedures to repair, replace and reinstall trailer monitoring and control system ***components***
		describe verification procedures for repair

Range of Variables

components include: batteries, fuses, relays, actuators, alternators, switches, harnesses, diodes, connectors, sensors, wiring, controllers, grounds

electronic subsystems include: input, control, output

principles of electrical and electronic theory include: Ohm's Law (current draw, resistance, voltage), series circuits, parallel circuits, series/parallel circuits, diodes, transistors

equipment accessories and options include: data collection, GPS

tools and equipment include: onboard diagnostics, electronic connection interface, OEM specialty tools

Major Work Activity G
Diagnoses and services hydraulic systems

Task G-18 Diagnoses hydraulic systems

Task Descriptor

Transport trailer technicians diagnose hydraulic systems as a critical task for the safe operation of the units' accessories. Accurate diagnostics are required for correct repair. Transport trailer technicians work with many types of hydraulic systems which include self-contained hydraulic systems, and auxiliary-powered hydraulic systems which are powered by the towing vehicle.

G-18.01 Diagnoses self-contained hydraulic systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
G-18.01.01P	select and use ***diagnostic tools and equipment***	***diagnostic tools and equipment*** are selected and used according to task and manufacturers' specifications
G-18.01.02P	inspect hydraulic systems	hydraulic systems are inspected using ***diagnostic tools and equipment***
G-18.01.03P	perform sensory inspections	sensory inspections are performed to identify ***conditions***
G-18.01.04P	identify faults with self-contained hydraulic system ***components***	faults with self-contained hydraulic system ***components*** are identified
G-18.01.05P	interpret diagnostic results	diagnostic results are interpreted to determine ***next steps***
G-18.01.06P	interpret hydraulic schematic	hydraulic schematic is interpreted and used to diagnose faults

Range of Variables

diagnostic tools and equipment include: flowmeters, pressure gauges, thermal imaging devices
conditions include: leaks, temperature, contaminated hydraulic fluid, lack of hydraulic fluid
components include: tanks, pumps, valves, sensors, actuators, hoses, controls
next steps include: repairs, component replacement, further diagnosis

	Knowledge	
	Learning Outcomes	**Learning Objectives**
G-18.01.01L	demonstrate knowledge of self-contained hydraulic systems, their ***components***, characteristics, applications and operation	identify ***types of self-contained hydraulic systems*** and their ***components***, and describe their characteristics, applications and operation
		identify ***power sources***
		identify types of hydraulic fluids and describe their properties
		describe hydraulic pressures, flows and volumes
		identify and interpret symbols on hydraulic schematics, and describe how they are applied to diagnosing self-contained hydraulic systems
G-18.01.02L	demonstrate knowledge of procedures to diagnose self-contained hydraulic systems and their ***components***	identify ***diagnostic tools and equipment*** used to diagnose self-contained hydraulic systems and their ***components***, and describe their applications and procedures for use
		describe procedures to diagnose self-contained hydraulic systems and their ***components***
		identify ***hazards*** and describe safe work practices while diagnosing self-contained hydraulic systems and their ***components***
		identify inspections performed to diagnose self-contained hydraulic systems and their ***components***
		identify possible ***conditions*** and faults found while performing inspections

Range of Variables

components include: tanks, pumps, valves, sensors, actuators, hoses, controls

types of self-contained hydraulic systems include: detachable float trailers, power lift gates, dock leveling systems, tilt deck

power sources include: air, electrical, engine-driven

diagnostic tools and equipment include: flowmeters, pressure gauges, thermal imaging devices

hazards include: hydraulic fluid injection, high temperature burn, fire

conditions include: leaks, temperature, contaminated hydraulic fluid, lack of hydraulic fluid

G-18.02 Diagnoses auxiliary-powered hydraulic systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
G-18.02.01P	select and use diagnostic tools and equipment	diagnostic tools and equipment are selected and used according to task and manufacturers' specifications
G-18.02.02P	inspect hydraulic system	hydraulic system is inspected using diagnostic tools and equipment
G-18.02.03P	perform sensory inspections	sensory inspections are performed to identify ***conditions***
G-18.02.04P	identify faults with auxiliary-powered hydraulic system ***components***	faults with auxiliary-powered hydraulic system ***components*** are identified
G-18.02.05P	interpret diagnostic results	diagnostic results are interpreted to determine ***next steps***
G-18.02.06P	interpret hydraulic schematic	hydraulic schematic is interpreted and used to diagnose faults

Range of Variables

conditions include: leaks, temperature, contaminated oil, lack of oil
components include: valves, sensors, actuators, hoses, controls
next steps include: repairs, component replacement, further diagnosis

	Knowledge	
	Learning Outcomes	**Learning Objectives**
G-18.02.01L	demonstrate knowledge of auxiliary-powered hydraulic systems, their ***components***, characteristics, applications and operation	identify ***types of auxiliary-powered hydraulic systems*** and their ***components***, and describe their characteristics, applications and operation
		identify types of hydraulic fluids and describe their properties
		describe hydraulic pressures, flows and volumes
		identify and interpret symbols on hydraulic schematics, and describe how they are applied to diagnosing auxiliary-powered systems
G-18.02.02L	demonstrate knowledge of procedures to diagnose auxiliary-powered hydraulic systems and their ***components***	identify diagnostic tools and equipment used to diagnose auxiliary-powered hydraulic systems and their ***components***, and describe their applications and procedures for use

	describe procedures to diagnose auxiliary-powered hydraulic systems and their ***components***
	identify ***hazards*** and describe safe work practices while diagnosing auxiliary-powered hydraulic systems and their ***components***
	identify inspections performed to diagnose auxiliary-powered hydraulic systems and their ***components***
	identify possible ***conditions*** and faults found while performing inspections

Range of Variables

components include: valves, sensors, actuators, hoses, controls
types of auxiliary-powered hydraulic systems include: dump trailers, walking floors, refuse trailers
hazards include: hydraulic fluid injection, high temperature burn, fire
conditions include: leaks, temperature, contaminated oil, lack of oil

Task G-19 Services hydraulic systems

Task Descriptor

Transport trailer technicians perform preventative maintenance on hydraulic systems to keep them operating at optimal conditions. Repairs to hydraulic systems are done to correct faulty operating conditions.

G-19.01 Maintains hydraulic systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
G-19.01.01P	select and use tools and equipment	tools and equipment are selected and used according to task and manufacturers' specifications
G-19.01.02P	perform ***preventative maintenance checks***	***preventative maintenance checks*** are performed according to company procedures, and manufacturers' maintenance procedures and schedules

G-19.01.03P	flush and service filtering systems and change hydraulic fluid	filtering systems are flushed and serviced and hydraulic fluid is changed according to manufacturers' requirements
G-19.01.04P	select hydraulic fluid	hydraulic fluid is selected according to ambient temperature, environmental conditions and system requirements
G-19.01.05P	perform visual inspection	visual inspection is performed during maintenance to identify faults
G-19.01.06P	lubricate system components	system components are lubricated according to manufacturers' specifications and recommendations
G-19.01.07P	operate and test systems to assess operation	systems are operated and tested to assess operation

Range of Variables

preventative maintenance checks include: hydraulic fluid levels, condition of hoses, pressure relief valve settings, visual inspections

	Knowledge	
	Learning Outcomes	**Learning Objectives**
G-19.01.01L	demonstrate knowledge of self-contained hydraulic systems, their ***components***, characteristics, applications and operation	identify ***types of self-contained hydraulic systems*** and their ***components***, and describe their characteristics, applications and operation
		identify ***power sources***
		identify types of hydraulic fluids and describe their properties
		describe hydraulic pressures, flows and volumes
G-19.01.02L	demonstrate knowledge of auxiliary-powered hydraulic systems, their ***components***, characteristics, applications and operation	identify ***types of auxiliary-powered hydraulic systems*** and their ***components***, and describe their characteristics, applications and operation
G-19.01.03L	demonstrate knowledge of procedures to maintain hydraulic systems and their components	identify tools and equipment used to maintain hydraulic systems and their components, and describe their applications and procedures for use
		describe procedures to maintain hydraulic systems and their components
		identify ***hazards*** and safe work practices while maintaining hydraulic systems and their components
G-19.01.04L	demonstrate knowledge of regulatory requirements to use and dispose of hydraulic fluids	identify and interpret standards and regulations to use and dispose of hydraulic fluids

Range of Variables

self-contained hydraulic system components include: tanks, pumps, valves, sensors, cylinders, hoses, controls

types of self-contained hydraulic systems include: detachable float trailers, power lift gates, dock leveling systems

power sources include: air, electrical, engine-driven

auxiliary-powered hydraulic system components include: valves, sensors, actuators, hoses, controls

types of auxiliary-powered hydraulic systems include: dump trailers, walking floors, refuse trailers

hazards include: hydraulic fluid injection, high temperature burn, fire

G-19.02 Repairs hydraulic systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
G-19.02.01P	select and use tools and equipment	tools and equipment are selected and used according to task and manufacturers' specifications
G-19.02.02P	remove and replace hydraulic components	hydraulic components are removed and replaced according to manufacturers' procedures
G-19.02.03P	recondition hydraulic components	hydraulic components are reconditioned according to manufacturers' specifications and procedures
G-19.02.04P	bleed system after replacing hydraulic components	system is bled after replacing hydraulic components according to manufacturers' specifications and procedures
G-19.02.05P	repair cracks in ***mounting and unit structure***	cracks are repaired in ***mounting and unit structure*** according to company policies and procedures
G-19.02.06P	adjust ***components***	***components*** are adjusted according to manufacturers' specifications and procedures
G-19.02.07P	complete repair	repair is completed by verifying operation of hydraulic system

Range of Variables

mounting and unit structure include: box frames, deck extension plates, lift rails

components (to be adjusted) include: pressure relief valves, flow control valves

	Knowledge	
	Learning Outcomes	**Learning Objectives**
G-19.02.01L	demonstrate knowledge of self-contained hydraulic systems, their ***components***, characteristics, applications and operation	identify ***types of self-contained hydraulic systems*** and their ***components***, and describe their characteristics, applications and operation
		identify ***power sources***
		identify types of hydraulic fluids and describe their properties
		describe hydraulic pressures, flows and volumes
		identify and interpret symbols on hydraulic schematics, and describe how they are applied to repairing hydraulic systems
G-19.02.02L	demonstrate knowledge of auxiliary-powered hydraulic systems, their ***components***, characteristics, applications and operation	identify ***types of auxiliary-powered hydraulic systems*** and their ***components***, and describe their characteristics, applications and operation
G-19.02.03L	demonstrate knowledge of procedures to repair hydraulic systems and their components	identify tools and equipment used to repair hydraulic systems and their components, and describe their applications and procedures for use
		describe procedures to remove, repair, replace, reinstall, recondition and adjust hydraulic systems and their components
		identify ***hazards*** and safe work practices while performing repairs
		describe procedures to verify repair of hydraulic systems and their components
G-19.02.04L	demonstrate knowledge of regulatory requirements to use and dispose of hydraulic fluids	identify and interpret standards and regulations to use and dispose of hydraulic fluids

Range of Variables

components (to be adjusted) include: pressure relief valves, flow control valves

types of self-contained hydraulic systems include: detachable float trailers, power lift gates, dock leveling systems

self-contained hydraulic system components include: tanks, pumps, valves, sensors, cylinders, hoses, controls

power sources include: air, electrical, engine-driven

auxiliary-powered hydraulic system components include: valves, sensors, actuators, hoses, controls

types of auxiliary-powered hydraulic systems include: dump trailers, walking floors, refuse trailers

hazards include: hydraulic fluid injection, high temperature burn, fire

Major Work Activity H

Diagnoses and services temperature control systems

Task H-20 Diagnoses temperature control systems

Task Descriptor

Temperature control systems include refrigeration and propane heating. These units regulate and monitor the temperature of trailer bodies, allowing for the transportation of perishables and temperature-sensitive cargos. Fuel systems, and starting and charging systems are part of the drive mechanism for the refrigeration and compressor units. Special licenses may be required to work on refrigeration and propane heating systems. Transport trailer technicians should have a good working knowledge of these systems for safety purposes. They are expected to be able to diagnose issues with these temperature control systems.

H-20.01 Diagnoses fuel systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	no	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
H-20.01.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
H-20.01.02P	perform visual inspection of fuel lines	visual inspection of fuel lines is performed to detect ***problems***
H-20.01.03P	inspect fuel system mounting hardware	fuel system mounting hardware is inspected for ***wear and damage***
H-20.01.04P	inspect fuel tank	fuel tank is inspected for ***conditions***
H-20.01.05P	check operation of fuel system ***components***	operation of fuel system ***components*** is checked
H-20.01.06P	interpret diagnostic results	diagnostic results are interpreted to determine ***next steps***

Range of Variables

tools and equipment include: pressure gauges, flow gauges
problems include: loose fittings, chafed or kinked lines, leaks, plugged filter and lines
wear and damage includes: loose or worn tank straps, cracked mounting brackets, broken fasteners
conditions include: tank expiry date, physical damage
components include: fuel pumps, gas regulators, fuel tanks, solenoids, pressure regulators
next steps include: repairs, component replacement, further diagnosis

	Knowledge	
	Learning Outcomes	**Learning Objectives**
H-20.01.01L	demonstrate knowledge of fuel systems and their ***components***, characteristics, applications and operation	identify ***types of fuel systems*** and their ***components***, and describe their characteristics, applications and operation
		identify fuel system ***fluid*** levels
H-20.01.02L	demonstrate knowledge of procedures to diagnose fuel systems and their ***components***	identify ***tools and equipment*** used to diagnose fuel systems and their ***components***, and describe their applications and procedures for use
		describe procedures to diagnose fuel systems and their ***components***
		identify ***hazards*** and describe safe work practices while diagnosing fuel systems and their ***components***
		identify possible ***problems***, ***wear and damage***, and ***conditions*** found while performing inspections
H-20.01.03L	demonstrate knowledge of training and certification requirements to diagnose fuel systems and their ***components***	describe training and certification requirements to diagnose fuel systems and their ***components***
H-20.01.04L	demonstrate knowledge of regulatory requirements to diagnose fuel systems and their ***components***	identify and interpret standards and regulations to diagnose fuel systems and their ***components***

Range of Variables

components include: fuel pumps, gas regulators, fuel tanks, solenoids, pressure regulators
types of fuel systems include: diesel, propane, natural gas
fluids include: antifreeze, motor oil, fuel
tools and equipment include: pressure gauges, flow gauges
hazards include: high pressure injection injury, burns, skin irritations, flash burns
problems include: loose fittings, chafed or kinked lines, leaks, plugged filter and lines
wear and damage includes: loose or worn tank straps, cracked mounting brackets, broken fasteners
conditions include: tank expiry date, physical damage

H-20.02 Diagnoses charging and starting systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	no	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
H-20.02.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
H-20.02.02P	inspect charging and starting systems	charging and starting systems are inspected to identify ***worn, damaged or defective components***
H-20.02.03P	test charging system for voltage and amperage output	charging system is tested for voltage and amperage output according to manufacturers' specifications
H-20.02.04P	test starting system for voltage and amperage draw	starting system is tested for voltage and amperage draw according to manufacturers' specifications
H-20.02.05P	test battery for cold cranking amperage (CCA) and operating condition (state of charge)	battery is tested for CCA and operating condition (state of charge) according to manufacturers' specifications
H-20.02.06P	interpret diagnostic results	diagnostic results are interpreted to determine ***next steps***

Range of Variables

tools and equipment include: multimeters, battery load testers, test lights

worn, damaged or defective components include: corroded electric connectors, broken or loose belts, leaking batteries

next steps include: repairs, component replacement, further diagnosis

	Knowledge	
	Learning Outcomes	**Learning Objectives**
H-20.02.01L	demonstrate knowledge of charging and starting systems, their components, characteristics, applications and operation	identify types of charging and starting systems and their components, and describe their characteristics, applications and operation
H-20.02.02L	demonstrate knowledge of procedures to diagnose charging and starting systems and their components	identify ***tools and equipment*** used to diagnose charging and starting systems, and their components, and describe their applications and procedures for use
		describe procedures to diagnose charging and starting systems, and their components

	identify ***hazards*** and describe safe work practices while diagnosing charging and starting systems, and their components
	identify possible ***worn, damaged or defective components*** found while performing inspections

Range of Variables

tools and equipment include: multimeters, battery load testers, test lights

hazards include: explosive gases, skin irritation, exposure to sulphuric acid, wearing conductive metals (rings, watches)

worn, damaged or defective components include: corroded electric connectors, broken or loose belts, leaking batteries

H-20.03 Diagnoses high-voltage electric, hybrid and alternative drive systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	no	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
H-20.03.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
H-20.03.02P	perform visual inspection of high-voltage electric, hybrid and alternative drive systems and their ***components***	visual inspection of high-voltage electric, hybrid and alternative drive systems and their ***components*** is performed to detect ***problems***
H-20.03.03P	consult with manufacturers' representative	manufacturers' representative is consulted with to determine next steps and repair procedures
H-20.03.04P	identify ***hazards*** involved in diagnosing high-voltage electric, hybrid and alternative drive systems	***hazards*** involved in diagnosing high-voltage electric, hybrid and alternative drive systems are identified

Range of Variables

tools and equipment include: 600-volt category 3 multimeters, specialized PPE (for high voltage), OEM diagnostic equipment

components include: lithium batteries, generators, invertors, displays and controls

problems include: poor wiring connections, damaged batteries, fault codes and readouts

hazards include: electrocution, fire, burns, flash burns

	Knowledge	
	Learning Outcomes	**Learning Objectives**
H-20.03.01L	demonstrate knowledge of high-voltage electric, hybrid and alternative drive systems, their ***components***, characteristics, applications and operation	identify high-voltage electric, hybrid and alternative drive systems, their ***components*** and describe their characteristics, applications and operation
H-20.03.02L	demonstrate knowledge of procedures to diagnose high-voltage electric, hybrid and alternative drive systems, and their ***components***	identify ***tools and equipment*** used to diagnose high-voltage electric, hybrid and alternative drive systems, and their ***components***, and describe their applications and procedures for use
		describe procedures to diagnose high-voltage electric, hybrid and alternative drive systems, and their ***components***
		identify ***hazards*** and describe safe work practices while diagnosing high-voltage electric, hybrid and alternative drive systems, and their ***components***
		identify possible ***problems*** found while performing inspections
H-20.03.03L	demonstrate knowledge of training and certification requirements to diagnose high-voltage electric, hybrid and alternative drive systems, and their ***components***	describe training and certification requirements to diagnose high-voltage electric, hybrid and alternative drive systems, and their ***components***
		describe manufacturer-specific training required to work on high-voltage electric, hybrid and alternative drive systems, and their ***components***

Range of Variables

components include: lithium batteries, generators, invertors, displays and controls

tools and equipment include: 600-volt category 3 multimeters, specialized PPE (for high voltage), OEM diagnostic equipment

hazards include: electrocution, fire, burns, flash burns

problems include: poor wiring connections, damaged batteries, fault codes and readouts

H-20.04 Diagnoses refrigeration and heating systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	no	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
H-20.04.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
H-20.04.02P	perform sensory inspection of refrigeration and heating systems	sensory inspection of refrigeration and heating systems is performed to detect ***problems*** according to jurisdictional regulations
H-20.04.03P	check pressure in system	pressure in system is checked using gauge set
H-20.04.04P	check temperature produced by system	temperature produced by system is checked using thermal imaging test or thermometer
H-20.04.05P	check error and performance codes on system display	error and performance codes on system display are checked according to manufacturers' fault code schedule
H-20.04.06P	check shore power function	shore power function is checked
H-20.04.07P	interpret diagnostic results	diagnostic results are interpreted to determine ***next steps***

Range of Variables

tools and equipment include: multimeters, gauge sets, thermometers, thermal imaging tools

problems include: incorrect pressures, plugged or restricted condensers and evaporators, out of fuel, leaks, malfunctioning sensors, incorrect voltage, loose mounting bolts

next steps include: repairs, component replacement, further diagnosis

	Knowledge	
	Learning Outcomes	**Learning Objectives**
H-20.04.01L	demonstrate knowledge of heating systems, their ***components***, characteristics, applications and operation	identify types of heating systems and their ***components***, and describe their characteristics, applications and operation
		identify heating unit mounting structures, fasteners and reinforcements
H-20.04.02L	demonstrate knowledge of refrigeration systems, their ***components***, characteristics, applications and operation	identify types of refrigeration systems and their ***components***, and describe their characteristics, applications and operation
		identify refrigeration unit mounting structures, fasteners and reinforcements

H-20.04.03L	demonstrate knowledge of procedures to diagnose refrigeration and heating systems, and their ***components***	identify ***tools and equipment*** used to diagnose refrigeration and heating systems, and their ***components***, and describe their applications and procedures for use
		describe procedures to diagnose refrigeration and heating systems, and their ***components***
		identify ***hazards*** and describe safe work practices while diagnosing refrigeration and heating systems, and their ***components***
		identify possible ***problems*** found while performing inspections
H-20.04.04L	demonstrate knowledge of training and certification requirements to diagnose refrigeration and heating systems, and their ***components***	describe training and certification requirements to diagnose refrigeration and heating systems, and their ***components***
H-20.04.05L	demonstrate knowledge of regulatory requirements to diagnose refrigeration and heating systems, and their ***components***	identify and interpret standards and regulations to diagnose refrigeration and heating systems, and their ***components***

Range of Variables

components (heating systems) include: batteries, wires, fuel tanks, electric heater

components (refrigeration systems) include: batteries, starters, alternators, compressors, fuel tanks, evaporators, condensers, expansion valves, filters, filter dryers

tools and equipment include: multimeters, gauge sets, thermometers, thermal imaging tools

hazards include: high pressure injection injury, carcinogenic and toxic refrigerant gases, burns, skin irritations, flash burns, shocks

problems include: incorrect pressures, plugged or restricted condensers and evaporators, out of fuel, leaks, malfunctioning sensors, incorrect voltage, loose mounting bolts

Task H-21 Services temperature control systems

Task Descriptor

Temperature control systems include refrigeration and propane heating. These units regulate and monitor the temperature of trailer bodies, allowing for the transportation of perishables and temperature-sensitive cargos. Fuel systems and starting and charging systems are part of the drive mechanism for the refrigeration and compressor units. Special licenses may be required to work on refrigeration and propane heating systems. Transport trailer technicians should have a good working knowledge of these systems for safety purposes. They are expected to be able to maintain and repair temperature control systems.

H-21.01 Maintains fuel systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
H-21.01.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
H-21.01.02P	perform ***preventative maintenance checks***	***preventative maintenance checks*** are performed according to manufacturers' maintenance procedures and schedules
H-21.01.03P	secure fuel lines	fuel lines are secured using ***fasteners*** to prevent chafing or kinking of lines
H-21.01.04P	replace fuel and air filters at regular intervals	fuel and air filters are replaced at regular intervals according to manufacturers' specifications
H-21.01.05P	drain water from tank and add stabilizer or conditioner	water is drained from tank and stabilizer or conditioner are added according to seasonal requirements

Range of Variables

tools and equipment include: hand tools, fuel line tools

preventative maintenance checks include: checking for water in tank, checking air and fuel filters for restrictions

fasteners include: insulated clamps, separators

	Knowledge	
	Learning Outcomes	**Learning Objectives**
H-21.01.01L	demonstrate knowledge of fuel systems and their ***components***, characteristics, applications and operation	identify ***types of fuel systems*** and their ***components***, and describe their characteristics, applications and operation
		identify fuel system ***fluid*** levels
H-21.01.02L	demonstrate knowledge of procedures to maintain fuel systems and their ***components***	identify ***tools and equipment*** used to maintain fuel systems and their ***components***, and describe their applications and procedures for use
		describe procedures to maintain fuel systems, and their ***components***
		identify and interpret manufacturers' specifications to maintain fuel systems and their ***components***
		identify ***hazards*** and safe work practices while maintaining fuel systems and their ***components***
H-21.01.03L	demonstrate knowledge of training and certification requirements to maintain fuel systems and their ***components***	identify training and certification requirements to maintain fuel systems and their ***components***

Range of Variables

components include: fuel pumps, gas regulators, fuel tanks, solenoids, pressure regulators
types of fuel systems include: diesel, propane, natural gas
fluids include: antifreeze, motor oil, fuel
tools and equipment include: hand tools, fuel line tools
hazards include: high pressure injection injury, burns, skin irritations, flash burns

H-21.02 Repairs fuel systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
H-21.02.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
H-21.02.02P	replace chafed or kinked fuel lines	chafed or kinked fuel lines are replaced according to manufacturers' specifications

H-21.02.03P	remove and reinstall fuel tanks and brackets	fuel tanks and brackets are removed and reinstalled according to manufacturers' specifications
H-21.02.04P	time injection pump and prime fuel system after repair or replacement of ***components***	injection pump is timed and fuel system is primed after repair or replacement of ***components***
H-21.02.05P	complete repair	repair is completed by verifying operation of fuel systems

Range of Variables

tools and equipment include: hand tools, battery service tools, load testers
components include: fuel pumps, gas regulators, fuel tanks, solenoids, pressure regulators

	Knowledge	
	Learning Outcomes	**Learning Objectives**
H-21.02.01L	demonstrate knowledge of fuel systems and their ***components***, characteristics, applications and operation	identify ***types of fuel systems*** and their ***components***, and describe their characteristics, applications and operation
		identify fuel system ***fluid*** levels
H-21.02.02L	demonstrate knowledge of procedures to repair fuel systems and their ***components***	identify ***tools and equipment*** used to repair fuel systems and their ***components***, and describe their applications and procedures for use
		describe procedures to remove, repair, replace, reinstall fuel systems and their ***components***
		identify ***hazards*** and safe work practices while performing repairs
		describe procedures to verify repair of fuel systems and their ***components***
H-21.02.03L	demonstrate knowledge of training and certification requirements to repair fuel systems and their ***components***	identify training and certification requirements to repair fuel systems and their ***components***
H-21.02.04L	demonstrate knowledge of regulatory requirements to repair fuel systems and their ***components***	identify and interpret standards and regulations to repair fuel systems and their ***components***

Range of Variables

components include: fuel pumps, gas regulators, fuel tanks, solenoids, pressure regulators
types of fuel systems include: diesel, propane, natural gas
fluids include: antifreeze, motor oil, fuel
tools and equipment include: hand tools, battery service tools, load testers
hazards include: high pressure injection injury, burns, skin irritations, flash burns

H-21.03 Maintains charging and starting systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

Skills

	Performance Criteria	Evidence of Attainment
H-21.03.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
H-21.03.02P	perform ***preventative maintenance activities***	***preventative maintenance activities*** are performed according to manufacturers' maintenance procedures and schedules
H-21.03.03P	adjust belt tension	belt tension is adjusted with belt tension gauge according to manufacturers' specifications
H-21.03.04P	clean electrical connections on starters, alternators and batteries	electrical connections on starters, alternators and batteries are cleaned using electrical contact cleaner and terminal brushes

Range of Variables

tools and equipment include: hand tools, battery service tools, load testers
preventative maintenance activities include: battery test, belt replacement

Knowledge

	Learning Outcomes	Learning Objectives
H-21.03.01L	demonstrate knowledge of charging and starting systems, their ***components***, characteristics, applications and operation	identify types of charging and starting systems and their ***components***, and describe their characteristics, applications and operation
H-21.03.02L	demonstrate knowledge of procedures to maintain charging and starting systems, and their ***components***	identify ***tools and equipment*** used to maintain charging and starting systems, and their ***components***, and describe their applications and procedures for use
		describe procedures to maintain charging and starting systems, and their ***components***
		identify ***hazards*** and safe work practices while maintaining charging and starting systems, and their ***components***

Range of Variables

components include: starters, alternators, pulleys, idler pulleys, belts, batteries, wiring harnesses

tools and equipment include: hand tools, battery service tools, load testers

hazards include: explosive gases, skin irritation, exposure to sulphuric acid, wearing conductive metals (rings, watches)

H-21.04 Repairs charging and starting systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	yes	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
H-21.04.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
H-21.04.02P	replace defective ***components***	defective ***components*** are replaced according to manufacturers' specifications
H-21.04.03P	adjust belt tension	belt tension is adjusted with belt tension gauge according to manufacturers' specifications
H-21.04.04P	complete repair	repair is completed by verifying operation of charging and starting systems

Range of Variables

tools and equipment include: hand tools, battery service tools, load testers

components include: starters, alternators, pulleys, idler pulleys, belts, batteries, wiring harnesses

	Knowledge	
	Learning Outcomes	**Learning Objectives**
H-21.04.01L	demonstrate knowledge of charging and starting systems, their ***components***, characteristics, applications and operation	identify types of charging and starting systems, and their ***components***, and describe their characteristics, applications and operation
H-21.04.02L	demonstrate knowledge of procedures to repair charging and starting systems, and their ***components***	identify ***tools and equipment*** used to repair charging and starting systems, and their ***components***, and describe their applications and procedures for use
		describe procedures to remove, repair, replace, adjust, reinstall charging and starting systems, and their ***components***

	identify ***hazards*** and safe work practices while performing repairs
	describe procedures to verify repair of charging and starting systems, and their ***components***

Range of Variables

components include: starters, alternators, pulleys, idler pulleys, belts, batteries, wiring harnesses

tools and equipment include: hand tools, battery service tools, load testers

hazards include: explosive gases, skin irritation, exposure to sulphuric acid, wearing conductive metals (rings, watches)

H-21.05 Maintains high-voltage electric, hybrid and alternative drive systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	no	yes	ND	yes	yes	NV	NV	ND

Skills

	Performance Criteria	Evidence of Attainment
H-21.05.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
H-21.05.02P	perform ***preventative maintenance checks***	***preventative maintenance checks*** are performed according to manufacturers' maintenance procedures and schedules
H-21.05.03P	change air and lubrication filters	air and lubrication filters are changed according to manufacturers' maintenance procedures and schedules
H-21.05.04P	consult with manufacturers' representative	manufacturers' representative is consulted with to determine maintenance procedures and schedules
H-21.05.05P	identify ***hazards*** involved in maintaining high-voltage electric, hybrid and alternative drive systems	***hazards*** involved in maintaining high-voltage electric, hybrid and alternative drive systems are identified

Range of Variables

tools and equipment include: 600-volt category 3 multimeter, specialized PPE (for high voltage), OEM maintenance equipment

preventative maintenance checks include: checking error and warning codes, checking voltage outputs, checking temperature output range, checking fluid levels

hazards include: electrocution, fire, burns, flash burns

	Knowledge	
	Learning Outcomes	**Learning Objectives**
H-21.05.01L	demonstrate knowledge of high-voltage electric, hybrid and alternative drive systems, their ***components***, characteristics, applications and operation	identify high-voltage electric, hybrid and alternative drive systems, their ***components*** and describe their characteristics, applications and operation
H-21.05.02L	demonstrate knowledge of procedures to maintain high-voltage electric, hybrid and alternative drive systems, and their ***components***	identify ***tools and equipment*** used to maintain high-voltage electric, hybrid and alternative drive systems, and their ***components***, and describe their applications and procedures for use
		describe procedures to maintain high-voltage electric, hybrid and alternative drive systems, and their ***components***
		identify ***hazards*** and describe safe work practices while maintaining high-voltage electric, hybrid and alternative drive systems, and their ***components***
H-21.05.03L	demonstrate knowledge of training and certification requirements to maintain high-voltage electric, hybrid and alternative drive systems, and their ***components***	describe training and certification requirements to maintain high-voltage electric, hybrid and alternative drive systems, and their ***components***
		describe manufacturer-specific training required for working on high-voltage electric, hybrid and alternative drive systems, and their ***components***

Range of Variables

components include: batteries, generators, invertors, displays and controls

tools and equipment include: 600-volt category 3 multimeter, specialized PPE (for high voltage), OEM maintenance equipment

hazards include: electrocution, fire, burns, flash burns

H-21.06 Repairs high-voltage electric, hybrid and alternative drive systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	no	yes	ND	yes	yes	NV	NV	ND

Skills

	Performance Criteria	Evidence of Attainment
H-21.06.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
H-21.06.02P	recover refrigerants and recharge system	refrigerants are recovered and system is recharged according to manufacturers' specifications and jurisdictional regulations
H-21.06.03P	replace ***faulty components***	***faulty components*** are replaced according to manufacturers' specifications
H-21.06.04P	adjust components	components are adjusted according to manufacturers' specifications
H-21.06.05P	complete repair	repair is completed by verifying operation of high-voltage electric, hybrid and alternative drive systems

Range of Variables

tools and equipment include: 600-volt category 3 multimeter, specialized PPE (for high voltage), OEM repair equipment

faulty components include: leaking hoses, broken fans, broken heat exchangers, plugged expansion valves, damaged harnesses, malfunctioning pressure and temperature sensors, broken wiring, malfunctioning electric motor/generator, dead batteries

Knowledge

	Learning Outcomes	Learning Objectives
H-21.06.01L	demonstrate knowledge of high-voltage electric, hybrid and alternative drive systems, their ***components***, characteristics, applications and operation	identify high-voltage electric, hybrid and alternative drive systems, their ***components*** and describe their characteristics, applications and operation
H-21.06.02L	demonstrate knowledge of procedures to repair high-voltage electric, hybrid and alternative drive systems, and their ***components***	identify ***tools and equipment*** used to repair high-voltage electric, hybrid and alternative drive systems, and their ***components***, and describe their applications and procedures for use
		describe procedures to repair high-voltage electric, hybrid and alternative drive systems, and their ***components***

		identify ***hazards*** and describe safe work practices while repairing high-voltage electric, hybrid and alternative drive systems, and their ***components***
		describe procedures to verify repair of high-voltage electric, hybrid and alternative drive systems, and their ***components***
H-21.06.03L	demonstrate knowledge of training and certification requirements to repair high-voltage electric, hybrid and alternative drive systems, and their ***components***	describe training and certification requirements to repair high-voltage electric, hybrid and alternative drive systems, and their ***components***
		describe manufacturer-specific training required for working on high-voltage electric, hybrid and alternative drive systems, and their ***components***

Range of Variables

components include: batteries, generators, invertors, displays and controls

tools and equipment include: 600-volt category 3 multimeter, specialized PPE (for high voltage), OEM repair equipment

hazards include: electrocution, fire, burns, flash burns

H-21.07 Maintains refrigeration and heating systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	ND	yes	no	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
H-21.07.01P	select and use tools and equipment	tools and equipment are selected and used according to task and manufacturers' specifications
H-21.07.02P	perform ***preventative maintenance checks***	***preventative maintenance checks*** are performed according to manufacturers' maintenance procedures and schedules
H-21.07.03P	operate and adjust refrigeration and heating system temperature controls	refrigeration and heating system temperature controls are operated and adjusted according to customer requirements

Range of Variables

preventative maintenance checks include: checking codes, inspecting belts, checking fluid and fuel levels, checking seals

	Knowledge	
	Learning Outcomes	**Learning Objectives**
H-21.07.01L	demonstrate knowledge of heating systems, their ***components***, characteristics, applications and operation	identify types of heating systems and their ***components***, and describe their characteristics, applications and operation
		identify heating unit mounting structures, fasteners and reinforcements
H-21.07.02L	demonstrate knowledge of refrigeration systems, their ***components***, characteristics, applications and operation	identify types of refrigeration systems and their ***components***, and describe their characteristics, applications and operation
		identify refrigeration unit mounting structures, fasteners and reinforcements
H-21.07.03L	demonstrate knowledge of procedures to maintain refrigeration and heating systems, and their ***components***	describe procedures to maintain refrigeration and heating systems, and their ***components***
		identify ***hazards*** and safe work practices while maintaining refrigeration and heating systems, and their ***components***
H-21.07.04L	demonstrate knowledge of training and certification requirements to maintain refrigeration and heating systems, and their ***components***	identify training and certification requirements to maintain refrigeration and heating systems, and their ***components***
H-21.07.05L	demonstrate knowledge of regulatory requirements to maintain refrigeration and heating systems, and their ***components***	identify and interpret standards and regulations to maintain refrigeration and heating systems, and their ***components***

Range of Variables

components (heating systems) include: batteries, wires, fuel tanks, electric heater

components (refrigeration systems) include: batteries, starters, alternators, compressors, fuel tanks, evaporators, condensers, expansion valves, filters, filter dryers

hazards include: high pressure injection injury, carcinogenic and toxic refrigerant gases, burns, skin irritations, flash burns, shocks

H-21.08 Repairs refrigeration and heating systems (Not Common Core)

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	no	yes	ND	yes	no	NV	NV	ND

	Skills	
	Performance Criteria	**Evidence of Attainment**
H-21.08.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
H-21.08.02P	recover refrigerants and recharge system	refrigerants are recovered and system is recharged according to manufacturers' specifications and jurisdictional regulations
H-21.08.03P	replace ***faulty components***	***faulty components*** are replaced according to manufacturers' specifications
H-21.08.04P	adjust components	components are adjusted according to manufacturers' specifications
H-21.08.05P	complete repair	repair is completed by verifying operation of refrigeration and heating systems

Range of Variables

tools and equipment include: refrigerant recovery and charge station, multimeters

faulty components include: leaking hoses, broken fans, broken heat exchangers, plugged expansion valves, damaged harnesses, malfunctioning pressure and temperature sensors, broken wiring

	Knowledge	
	Learning Outcomes	**Learning Objectives**
H-21.08.01L	demonstrate knowledge of heating systems, their ***components***, characteristics, applications and operation	identify types of heating systems and their ***components***, and describe their characteristics, applications and operation
		identify heating unit mounting structures, fasteners and reinforcements
H-21.08.02L	demonstrate knowledge of refrigeration systems, their ***components***, characteristics, applications and operation	identify types of refrigeration systems and their ***components***, and describe their characteristics, applications and operation
		identify refrigeration unit mounting structures, fasteners and reinforcements
H-21.08.03L	demonstrate knowledge of procedures to repair refrigeration and heating systems, and their ***components***	identify ***tools and equipment*** used to repair refrigeration and heating systems, and their ***components***, and describe their applications and procedures for use
		describe procedures to repair refrigeration and heating systems, and their ***components***

		identify ***hazards*** and safe work practices while performing repairs
		describe procedures to verify repair of refrigeration and heating systems, and their ***components***
H-21.08.04L	demonstrate knowledge of training and certification requirements to repair refrigeration and heating systems, and their ***components***	identify training and certification requirements to repair refrigeration and heating systems, and their ***components***
H-21.08.05L	demonstrate knowledge of regulatory requirements to repair refrigeration and heating systems, and their ***components***	identify and interpret standards and regulations to repair refrigeration and heating systems, and their ***components***

Range of Variables

components (heating systems) include: batteries, wires, fuel tanks, electric heater

components (refrigeration systems) include: batteries, starters, alternators, compressors, fuel tanks, evaporators, condensers, expansion valves, filters, filter dryers

tools and equipment include: refrigerant recovery and charge station, multimeters

hazards include: high pressure injection injury, carcinogenic and toxic refrigerant gases, burns, skin irritations, flash burns, shocks

Appendix A
Acronyms

ABS	anti-lock brake system
CCA	cold cranking amperage
CSA	Canadian Standards Association
ECU	electronic control unit
FRP	fibreglass reinforced panel
GMAW	gas metal arc welder
GTAW	gas tungsten arc welder
OEM	original equipment manufacturer
OH&S	Occupational Health and Safety
PPE	personal protective equipment
SDS	safety data sheet
TPMS	tire pressure monitoring system
TDG	Transportation of Dangerous Goods
VIN	vehicle identification numbers
WHMIS	Workplace Hazardous Materials Information System

Appendix B
Tools and Equipment / Outils et équipement

Personal Protective Equipment (PPE) and Safety Equipment/Équipement de protection individuelle (EPI) et de sécurité

eye protection	protection des yeux
eye wash station	douche oculaire
face shields	visières de protection
fall arrest and fall protection equipment	équipement anti-chute et de protection contre les chutes
fire blanket	couverture d'incendie
fire extinguishers	extincteurs
fire hoses	boyaux d'incendie
first aid station	poste de premiers soins
gloves	gants
hearing protection	dispositif de protection auditive
knee pads	genouillères
personal protective clothing	vêtements de protection personnelle
respirators	respirateur
safety boots	bottes de sécurité
safety cages	cages de sécurité
safety cones	cônes de sécurité
safety signs and tape	panneaux et ruban de sécurité
self-contained breathing apparatus	appareil respiratoire autonome
shields and guards	écrans et protecteurs
showers	douches
ventilation equipment	équipement de ventilation
welder's helmet	casque de soudeur
welding curtains	écran de soudeur

Hand Tools/Outils à main

bearing installer	installateur de roulement
bearing packer	graisseur de roulement
brake tools	outils pour les freins
bushing installer	outil de pose et de dépose de joints d'étanchéité
bushing remover	extracteur de douille
caulking gun	pistolet à calfeutrer
chisels	cisailles à tôles
clamps	pinces

crimping tool	outil à sertir
easy outs	extracteurs
files	limes
flaring tool	outil à évaser
grease gun	pistolet graisseur
hack saw	scie à métaux
hammer	marteau
light sources	sources lumineuses
magnet	aimant
picks	pics
pliers	pinces
pry bars	leviers
pullers	extracteurs
punches	poinçons
ratchets	clés à cliquets
rivet gun	riveteuse
scrapers	racloirs
screwdrivers	tournevis
seal driver	chasse-joints
shears	cisailles
side cutters	pinces coupantes de côté
snips	ciseaux
sockets	douilles
spreaders	écarteurs
stud remover	extracteur de goujons
suction gun	pistolet à aspirer
tap and die	taraud et matrice
thread chaser	peigne à fileter
tire bars	barres à pneus
torque multiplier	multiplicateur dynanométrique
torque wrench	clé dynamométrique
trouble light	lampe baladeuse
trowel	truelle
tube cutters	coupe-tubes
utility knife	couteau à lame rétractable
wire brush	brosse métallique
wire cutters	coupe-fils
wire strippers	pinces à dénuder
wrenches	clés

Electric, Pneumatic and Hydraulic Tools/Outils électriques, pneumatiques et hydrauliques

air/electric cutoff tools	outils de coupe à air/électrique
air/electric drill	perceuse pneumatique/électrique
air/electric grinders	meuleuses pneumatiques/électriques
air/electric hammer	marteau pneumatique/électrique
air/electric ratchet	cliquet à air/électrique
air/electric rivet gun	pistolet à rivets pneumatique/électrique
angle grinder	meuleuse d'angle
battery-powered tools	outils alimentés par batterie
blow gun	soufflette
crimpers	pinces à sertir
die grinders	rectifeuses
drills and bits	perceuses et mèches
electric saws	scies électriques
heat guns	pistolet thermique
hole saws	scies à trépan
nibblers	grignoteuses
parts washer	bac de dégraissage
portable compressor	compresseur portable
portable generator	générateur portable
portable hydraulic power tool	outil mécanique hydraulique portatif
pressure washer	laveuse a pression
sanders	ponceuses
soldering gun	pistolet de soudage
vacuum cleaner	aspirateur

Hoisting, Lifting, Staging and Access Tools and Equipment/ Outils et équipement de hissage, de levage, d'accès et dispositifs de support de l'équipement

blocking	échafaudage
brake drum dolly	diable pour tambour à frein
chain falls	palans à chaîne
come-alongs	treuils à main
equalizer beams	longerons de stabilisateur
fork lift	chariot élévateur à fourche
gantry	portique
hoists	palans
jack/support stands	chandelles de soutien
jacks	crics
ladders	échelles
mobile cranes	grues mobiles

overhead cranes	pont roulant
portable stairs	escabeaux
scaffolds	chandelles
scissor lift	plateforme élévatrice
shackles	manilles
slings	élingues
spreader bar	barre d’écartement
wheel chocks	cales de roue
wheel dolly	chariot à roues

Diagnostic and Measuring Tools/Outils de diagnostic et de mesure

5th wheel adjustment tool	outil d’ajustement de sellette d’attelage
600-volt category 3 multimeter	multimètre 600 volts de catégorie 3
air brake analyzer	analyseur de freins pneumatiques
battery load tester	contrôleur de charge des batteries
brake drum gauges	calibres de freins à tambour
brake stroke gauges	indicateur de course de frein
brake stroke tool	outil de course de frein
calculator	calculatrice
calipers	pied à coulisse
chalk line	cordeau traceur
circuit tester	contrôleur de circuits
dial indicator	comparateur à cadran
digital devices (laptops, cell phones, tablets)	ordinateur
feeler gauges	calibres d’épaisseur
flow meter	débitmètre
kingpin gauge	calibre à pivots d’attelage
level	niveau
light tester	contrôleur d’éclairage
micrometers	micromètre
multimeter	multimètre
original equipment manufacturer (OEM) tools	outils des fabricants d’équipements d’origine (FEO)
plumb bob	fil à plomb
portable diagnostic unit	appareil de diagnostic portatif
pressure gauge	manomètre
ruler	règle
shoe gauges	calibre pour segment de freins
spring scale	calibre à ressort
square	équerre
tape measure	ruban à mesurer

temperature gauge	jauge de température
tension scale	tensiomètre
thermal imaging camera	caméra d’imagerie thermique
torque wrench	clé dynanométrique
trailer alignment equipment	équipement d’alignement de remorque
vacuum gauge	indicateur de vide

Cutting and Welding Tools/Outils de découpage et de soudage

arc air gouging tool	outil de gougeage arc-air
arc air thermal lance	lance thermique à l’arc électrique
arc welder	soudeuse à l’arc
gas metal arc welder (GMAW)	soudeuse à l’arc sous gaz avec fil plein (GMAW)
gas tungsten arc welder (GTAW)	soudeuse à l’électrode de tungstène (GTAW)
mig welder	machine à souder mig
oxyacetylene torch	chalumeau oxyacétylénique
plasma cutter	coupeuse au plasma
portable welder	machine à souder portable
propane torch	chalumeau au propane

Stationary and Shop Tools/ Outils fixes et d’atelier

alignment machine	machine d’alignement
band saws	scies à ruban
bead seater	détalonneur
bench grinders	meuleuses d’établi
chop saw	scie à tronçonner
drill press	perceuse à colonne
hydraulic press	presse hydraulique
jigs	gabarits
lathe	tour
metal brake and brake shears	presse-plieuse cisaille
oil reclamation	récupération de l’huile
spring press	presse à ressort
table saws	scie circulaire à table
tire cage	cage de sécurité
tire machine	machine à changer les pneus
wheel balancer	équilibreur de roue

Appendix C
Glossary / Glossaire

access equipment	equipment used to facilitate or gain access to an area to be repaired	**équipement d'accès**	équipement utilisé pour faciliter l'accès ou permettre l'accès à un endroit où l'on doit effectuer une réparation
accessories	components for the vehicle which enhance the operation or extend longevity	**accessoires**	composants du véhicule qui en améliorent le fonctionnement ou en augmentent la durée de vie
air brake systems	braking system controlled or operated by directional flow of compressed air	**système de freins pneumatiques**	système commandé ou actionné par un débit directionnel d'air comprimé
air suspension system	type of suspension system using air springs	**suspension pneumatique**	type de suspension qui utilise des ressorts pneumatiques
antifreeze	a liquid coolant which allows for heat dissipation	**antigel**	liquide de refroidissement qui permet à la chaleur de se dissiper
antilock brake system (ABS)	electronically controlled brake control system to sense and react to wheel lockup	**système de freinage antiblocage (ABS)**	système à commande électronique qui détecte et réagit au blocage des roues
chassis	component that attaches the trailer body to the suspension. It includes frames, subframes and slider locking mechanisms. It distributes and carries the weight of the load to the suspension system.	**châssis**	partie reliant la carrosserie de la remorque et la suspension; le châssis comprend le cadre, le faux cadre, le mécanisme de verrouillage de l'élément coulissant; il distribue et reporte le poids de la charge sur la suspension
combination vehicles	two or more trailers attached by coupling devices	**ensemble routier**	deux ou plusieurs remorques attachées par des dispositifs d'attelage
coupling devices	device used to connect power units to one or more trailers together or to jeeps, converters and boosters. Devices can also connect chassis to containers.	**dispositifs d'attelage**	dispositif utilisé pour relier un véhicule motorisé à une ou plusieurs remorques ou à des diabolos, des diabolos convertisseurs et des engins de première intervention, ou encore pour relier un châssis à des conteneurs
diagnose	tasks involved in inspecting, testing and determining faults	**diagnostic**	les tâches liées à l'inspection, aux tests et à la détermination des défauts

electric brake system	braking system whose components are operated by a controlled voltage signal	**système de freinage électrique**	système de freinage dont les composants sont actionnés par un signal de tension contrôlé
electronic control unit (ECU)	module which monitors and controls functions of a trailer	**unité électronique de commande**	module qui contrôle et commande les fonctions d'une remorque
frame	base structure on which the rest of the trailer is built	**cadre**	structure de base sur laquelle est montée la remorque
gladhand	sealed coupling breakaway device that joins compressed air systems from one unit to another such as emergency or service systems	**tête d'accouplement**	dispositifs de sécurité d'attelage scellés qui relient les systèmes d'air comprimé à d'autres unités comme les circuits de secours ou d'entretien
heating and refrigeration systems	components which are used to keep a load's temperature constant through heating or cooling	**systèmes calorifiques et frigorifiques**	ensemble des composants servant à garder un chargement à une température constante, soit à la chaleur, soit au froid
high-voltage electric drive system	system that uses high AC voltages to drive electric components of a temperature control system	**système d'entraînement électrique à haute tension**	système qui utilise des tensions de CA élevées pour piloter les composants électriques d'un système de contrôle de la température
hybrid and alternative drive system	system that uses combinations of electric motors, batteries and alternative power to drive components of a temperature control system	**système d'entraînement hybride et alternatif**	système qui utilise des combinaisons de moteurs électriques, de batteries et de sources d'énergie alternatives pour entraîner les composants d'un système de contrôle de la température
hydraulic brake system	braking system controlled or operated by hydraulic fluid pressure	**système de freinage hydraulique**	système de freinage commandé ou actionné par la pression d'un liquide hydraulique
hydraulic system	system which uses fluid under pressure to transmit power through tubes or hoses to operate different components on a trailer	**système hydraulique**	système qui utilise un liquide sous pression pour transmettre l'énergie à travers un tuyau afin d'actionner divers composants de la remorque
landing gear	components which are used to support the weight of the trailer and load when disconnected from the towing unit	**dispositifs de levage et de soutien**	composants qui servent à supporter le poids de la remorque et de son chargement lorsqu'elle est détachée de l'unité tractrice
power unit	motorized towing unit	**véhicule motorisé**	unité tractrice propulsée par un moteur

rubber suspension system	type of suspension system using rubber cushions	**suspension à blocs de caoutchouc**	type de système de suspension utilisant des coussins en caoutchouc
sensory inspection	diagnosing or inspecting using sight, sound, smell or feel	**inspection sensorielle**	diagnostiquer les défectuosités ou faire une inspection en utilisant les sens de la vision, de l'ouïe, de l'odorat ou du toucher
service	activities which include repair, replacement, rebuild, reconditioning, adjustment and general maintenance of trailers and components	**maintenance**	activités comprenant la réparation, le remplacement, la remise en état, l'ajustement et le maintien en bon état des remorques et de leurs composants
slider	assembly to allow movement of a sub-frame	**élément coulissant**	assemblage qui permet le mouvement du faux cadre
slider locking mechanism	locking mechanism to secure the sub-frame to the chassis	**mécanisme de verrouillage de l'élément coulissant**	mécanisme qui fixe solidement le faux cadre au châssis
spread	distance between two axles	**écart**	distance entre deux essieux
spring suspension system	suspension system using spring packs	**suspension à ressorts**	suspension composée d'un bloc-ressorts
staging equipment	equipment that supports and stabilizes trailers to facilitate repair	**dispositifs de support de l'équipement**	dispositifs qui supportent et stabilisent l'équipement pour faciliter les réparations
sub-frame (bogie)	component to which the axles and suspension systems are attached	**faux cadre**	composant auquel sont reliés les essieux et les organes de la suspension
suspension	components which absorb road surface irregularities to smooth vehicle ride; it is designed to permit controlled wheel movement over irregular surfaces; basic types include spring, air and rubber	**suspension**	ensemble des composants qui absorbent les irrégularités de la route pour permettre au véhicule de rouler en douceur; la suspension est conçue pour permettre le mouvement contrôlé des roues sur des surfaces irrégulières; les principaux types de suspension sont les suspensions à ressorts, pneumatiques et à caoutchouc
towing unit	unit that tows the trailer; may be a power unit or a trailer	**unité tractrice**	élément qui sert à tirer la semi-remorque; l'unité tractrice peut être un véhicule motorisé ou une remorque

wheel end assembly	rotating parts at the end of the axles; includes hubs, bearings, seals, rims and tires	**ensemble d’extrémité de roue**	pièces tournantes à l’extrémité des essieux, y compris les moyeux, les roulements, les bagues, les jantes et les pneus