

PROGRAM OUTLINE

Transport Trailer Technician



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TRANSPORT TRAILER TECHNICIAN PROGRAM OUTLINE

**APPROVED BY INDUSTRY
SEPTEMBER 2013**

**BASED ON
NOA 2013**

**Developed by
Industry Training Authority
Province of British Columbia**



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Section 1

INTRODUCTION

Transport Trailer Technician



Foreword

Transport Trailer Technicians inspect, diagnose, maintain 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, mechanical and electrical components, flooring, hydraulic systems, axles, wheel assemblies and coupling units. Mechanics may specialize in sheet metal work, frame repair or replacement, and heating and refrigeration unit repairs.

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.

Due to the size and complexity of the equipment, safety is of prime importance. The student must be conscious of the impact on people, equipment, work area and environment when performing their work.

Some important attributes of the Transport Trailer Technician student are:

- Reliability
- Analytical skills
- Ability to read and understand service manuals
- Mathematical aptitude

They also demonstrate the ability to:

- Communicate effectively
- Work with little or no supervision
- Contribute to a team approach
- Plan and work sequentially
- Adapt to changing technology
- Problem solve

Key attributes for people entering this trade are mechanical aptitude, manual dexterity, hand-eye coordination, stamina and agility. Communication skills and patience are also important. Other assets are good vision, hearing and sense of smell to diagnose problems. This occupation may require a valid driver's license with air endorsement and/or a forklift operator's certificate.

SAFETY ADVISORY

Be advised that references to the WorkSafeBC safety regulations contained within these materials do not/may not reflect the most recent Occupational Health and Safety Regulation (the current Standards and Regulation in BC can be obtained on the following website: <http://www.worksafebc.com>). Please note that it is always the responsibility of any person using these materials to inform him/herself about the Occupational Health and Safety Regulation pertaining to his/her work.



Acknowledgements

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- D. Vallely, Coast Mountain Bus Company (Director)
- J. Saunders (Finning - Retired)
- J. Yardley, Canadian Forces (Mechanic)
- L. Babcock, Thompson Rivers University (Instructor)
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- L. Richardson, Resource Training Organization (Manager, Program Standards)
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- B. Holcik- Finning (Instructor)
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- B. Haugen- Vancouver Community College (Co-chair)
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Facilitators:

- G. Shorland (Facilitator and Director Program Standards)
- R. Robertson (CEO transCDA)

The Industry Training Authority would like to acknowledge the dedication and hard work of all the industry representatives appointed to identify the training requirements of the Transport Trailer Technician occupation.



How to Use this Document

This Program Outline has been developed for the use of individuals from several different audiences. The table below describes how each section can be used by each intended audience.

Section	Training Providers	Apprentices
Program Credentialing Model	Communicate program length and structure, and all pathways to completion	Understand the length and structure of the program, and pathway to completion
OAC	Communicate the competencies that industry has defined as representing the scope of the occupation	View the competencies they will achieve as a result of program completion
Training Topics and Suggested Time Allocation	Shows proportionate representation of general areas of competency (GACs) at each program level, the suggested proportion of time spent on each GAC, and percentage of time spent on theory versus practical application	Understand the scope of competencies covered in the technical training, the suggested proportion of time spent on each GAC, and the percentage of that time spent on theory versus practical application
Program Content	Defines the objectives, learning tasks, high level content that must be covered for each competency, as well as defining observable, measureable achievement criteria for objectives with a practical component	Provides detailed information on program content and performance expectations for demonstrating competency
Training Provider Standards	Defines the facility requirements, tools and equipment, reference materials (if any) and instructor requirements for the program	Provides information on the training facility, tools and equipment provided by the school and the student, reference materials they may be expected to acquire, and minimum qualification levels of program instructors



Section 2

PROGRAM OVERVIEW

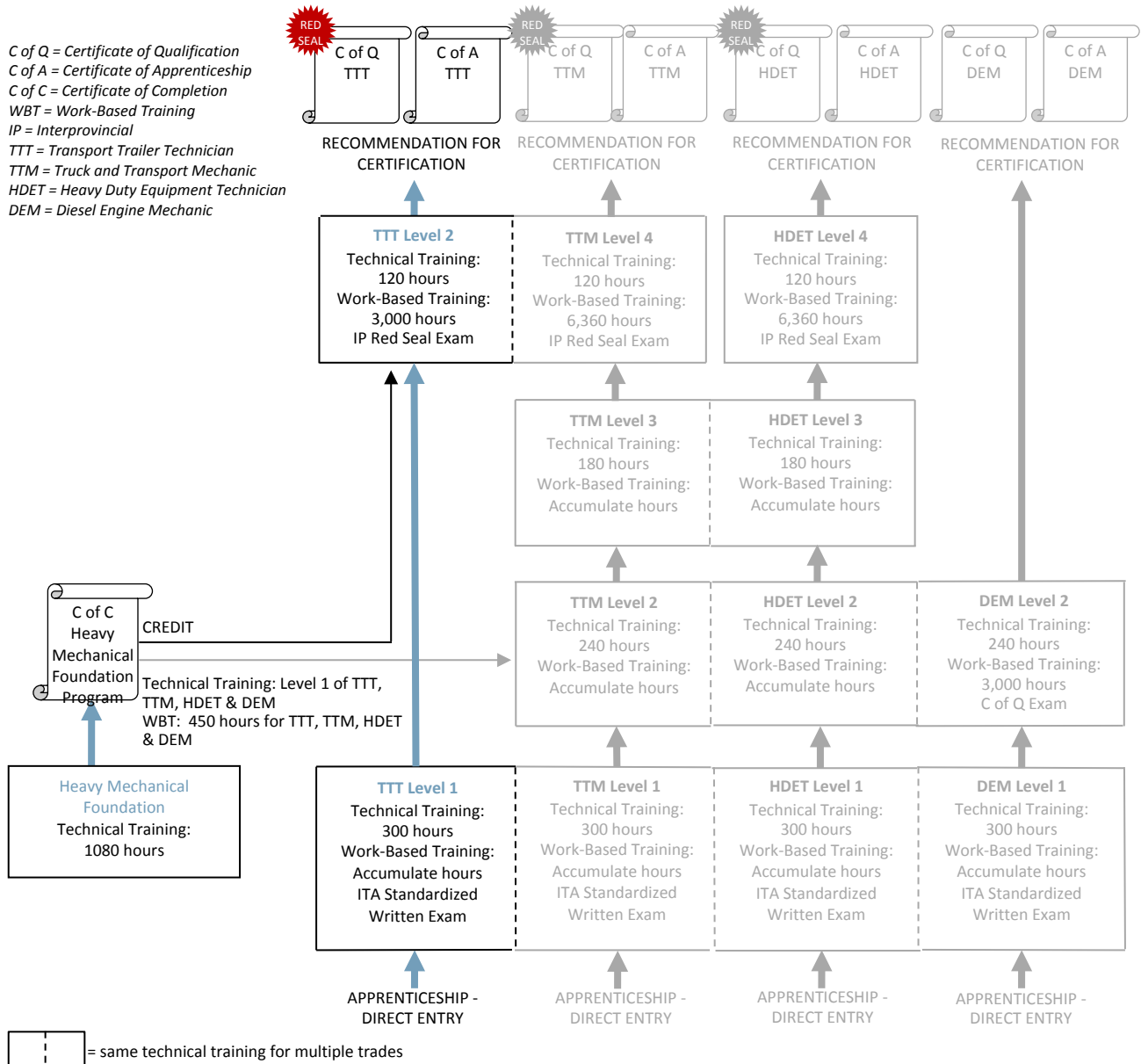
Transport Trailer Technician



Program Credentialing Model

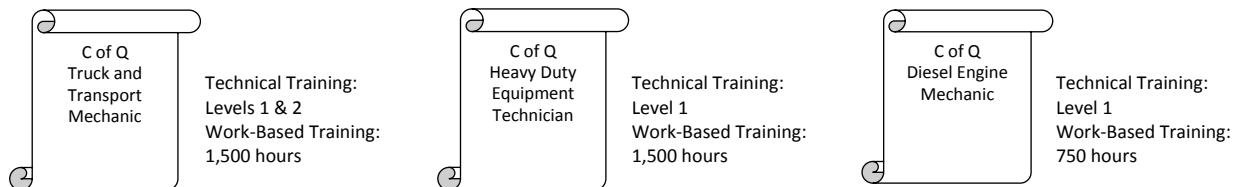
Apprenticeship Pathway

This graphic provides an overview of the Transport Trailer Technician apprenticeship pathway.



CROSS-PROGRAM CREDITS

Individuals who hold the credentials listed below are entitled to receive partial credit toward the completion requirements of this program

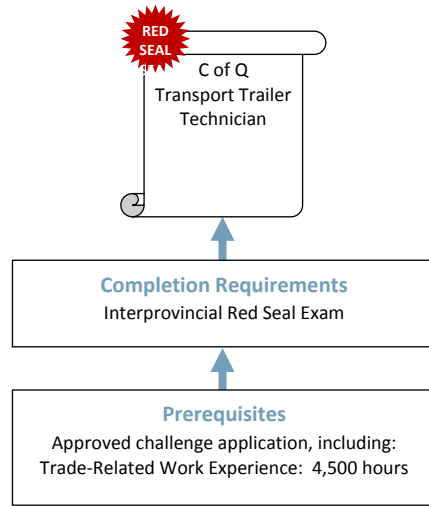




Challenge Pathway

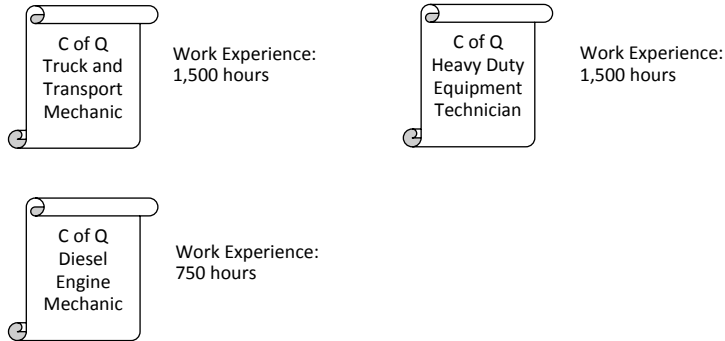
This graphic provides an overview of the Transport Trailer Technician challenge pathway.

C of Q = Certificate of Qualification



CREDIT FOR PRIOR LEARNING

Individuals who hold the credentials listed below are entitled to receive partial credit toward the completion requirements of this program





Occupational Analysis Chart

TRANSPORT TRAILER TECHNICIAN

Occupation Description: The Transport Trailer Technician program covers the scope of four occupations:

Transport Trailer Technician: Transport Trailer Technician means a person who maintains, rebuilds, overhauls, reconditions does diagnostic troubleshooting of motorized commercial truck, bus, and road transport equipment.

Occupational Skills A	Use Safe Work Practices A1 1	Use Hand Tools, Power Tools, and Shop Equipment A4 1	Use Fasteners and Fittings A5 1	Lift and Support Loads A6 1	Operate Equipment A7 1	Use Shop Resources and Record Keeping Practices A8 1
	Service Winch Wire Rope A9 1	Identify Lubricants A10 1	Service Bearings and Seals A11 1	Use Electronic Media A13 1	Use Cutting and Welding Equipment A14 1	Describe Diagnostic Procedures A16 1
Brakes B	Service and Repair Hydraulic Brakes B1 1	Service and Repair Hydraulic Power Brakes B2 1	Service and Repair Air Brakes B3 1	Diagnose and Repair Advanced Brake Systems B4 2		
	Describe Hydraulic Systems C1 1	Service Hydraulic Components C2 1	Diagnose and Repair Advanced Hydraulic Systems C3 2			



Program Overview

Electrical D	Describe Electricity D1	Use Electrical Testing Instruments D2	Service and Diagnose Batteries D3	Service Charging Systems D4	Service Starting Systems D6	Service Electrical Circuits D8
	1	1	1	1	1	1
	Service, Diagnose and Repair Hybrid Systems D12					
	2					
Frames, Steering and Suspension E	Service and Diagnose Tires, Wheels, and Hubs E1	Service Steering Systems E2	Diagnose and Repair Truck Hydraulic Assisted Steering Systems E3	Service, Diagnose and Repair Suspension Systems E4	Diagnose and Repair Frames E6	Align Vehicle E7
	1	1	2	1	1	2
Trailer F	Service Landing Gear and Trailer Accessories F1	Service and Repair Coupling Systems F2	Service, Diagnose and Repair Trailer Body Components F3	Service, Diagnose and Repair Heating and Refrigeration Systems F4		
	1	1	1	1		
Heating, Ventilation and Air Conditioning G	Describe Heating and Air Conditioning Fundamentals G1	Diagnose and Repair Heating and Air Conditioning Systems G2				
	1	1				
Structural Components and Accessories J	Identify Protective Structures J1	Service Cab Structures J2	Repair Advanced Cab and Body Structures J3			
	1	1	2			



Training Topics and Suggested Time Allocation

Transport Trailer Technician – Level 1

		% of Time Allocated to:			
		% of Time	Theory	Practical	Total
Line A	OCCUPATIONAL SKILLS	18%	55%	45%	100%
A1	Use Safe Work Practices		✓	✓	
A4	Use Hand Tools, Power Tools, and Shop Equipment		✓	✓	
A5	Use Fasteners and Fittings		✓	✓	
A6	Lift and Support Loads		✓	✓	
A7	Operate Equipment		✓	✓	
A8	Use Shop Resources and Record Keeping Practices		✓	✓	
A9	Service Winch Wire Rope		✓	✓	
A10	Identify Lubricants		✓	✓	
A11	Service Bearings and Seals		✓	✓	
A13	Use Electronic Media		✓	✓	
A14	Use Cutting and Welding Equipment		✓	✓	
A16	Describe Diagnostic Procedures		✓		
Line B	BRAKES	17%	30%	70%	100%
B1	Service and Repair Hydraulic Brakes		✓	✓	
B2	Service and Repair Hydraulic Power Brakes		✓	✓	
B3	Service and Repair Air Brakes		✓	✓	
Line C	HYDRAULICS	13%	40%	60%	100%
C1	Describe Hydraulic Systems		✓		
C2	Service Hydraulic Components		✓	✓	
Line D	ELECTRICAL	17%	55%	45%	100%
D1	Describe Electricity		✓		
D2	Use Electrical Testing Instruments		✓	✓	
D3	Service and Diagnose Batteries		✓	✓	
D4	Service Charging Systems		✓	✓	
D6	Service Starting Systems		✓	✓	
D8	Service Electrical Circuits		✓	✓	
Line E	FRAMES, STEERING AND SUSPENSION	14%	30%	70%	100%
E1	Service and Diagnose Tires, Wheels, and Hubs		✓	✓	
E2	Service Steering Systems		✓	✓	
E4	Service, Diagnose and Repair Suspension Systems		✓	✓	
E6	Diagnose and Repair Frames		✓	✓	



% of Time Allocated to:

		% of Time	Theory	Practical	Total
Line F	TRAILER	10%	35%	65%	100%
F1	Service Landing Gear and Trailer Accessories		✓	✓	
F2	Service and Repair Coupling Systems		✓	✓	
F3	Service, Diagnose and Repair Trailer Body Components		✓	✓	
F4	Service, Diagnose and Repair Heating and Refrigeration Systems		✓	✓	
Line G	HEATING, VENTILATION AND AIR CONDITIONING	8%	50%	50%	100%
G1	Describe Heating and Air Conditioning Fundamentals		✓		
G2	Diagnose and Repair Heating and Air Conditioning Systems		✓	✓	
Line J	STRUCTURAL COMPONENTS AND ACCESSORIES	3%	90%	10%	100%
J1	Identify Protective Structures		✓		
J2	Service Cab Structures		✓	✓	
Total Percentage for Transport Trailer Technician Level 1		100%			



Training Topics and Suggested Time Allocation

Transport Trailer Technician – Level 2

		% of Time Allocated to:			
		% of Time	Theory	Practical	Total
Line B	BRAKES	30%	50%	50%	100%
B4	Diagnose and Repair Advanced Brake Systems		✓	✓	
Line C	HYDRAULICS	30%	40%	60%	100%
C3	Diagnose and Repair Advanced Hydraulic Systems		✓	✓	
Line D	ELECTRICAL	5%	60%	40%	100%
D12	Service, Diagnose and Repair Hybrid Systems		✓	✓	
Line E	FRAMES, STEERING AND SUSPENSION	25%	40%	60%	100%
E3	Diagnose and Repair Truck Hydraulic Assisted Steering Systems		✓	✓	
E7	Align Vehicle		✓	✓	
Line J	STRUCTURAL COMPONENTS AND ACCESSORIES	10%	80%	20%	100%
J3	Repair Advanced Cab and Body Structures		✓	✓	
Total Percentage for Transport Trailer Technician Level 2		100%			



Section 3

PROGRAM CONTENT

Transport Trailer Technician



Level 1

Transport Trailer Technician



LEARNING TASKS

4. Describe the conditions necessary to support a fire
5. Describe the classes of fires according to the materials being burned
6. Apply preventative fire safety precautions when working near, handling or storing flammable liquids or gases, combustible materials and electrical apparatus
7. Describe the considerations and steps to be taken prior to fighting a fire
8. Describe the procedure for using a fire extinguisher
9. Describe fire suppression systems

CONTENT

- Emergency contact/phone numbers
- Outside meeting place
- Disaster meeting place
- Air
- Fuel
- Heat
- Class A
- Class B
- Class C
- Class D
- Symbols and colours
- Fuels
- Diesel
- Gasoline
- Propane
- Natural gas
- Ventilation
- Purging
- Lubricants
- Oily rags
- Combustible metals
- Aerosols
- Warning others and the Fire Department
- Evacuation of others
- Fire contained and not spreading
- Personal method of egress
- Training
- P.A.S.S.
 - Pull
 - Aim
 - Squeeze
 - Sweep
- Types
- Construction
- Operation
- Disarming



Line (GAC): **A** **OCCUPATIONAL SKILLS**
Competency: **A4** **Use Hand Tools, Power Tools, and Shop Equipment**

Objectives

To be competent in this area, the individual must be able to:

- Select, use and maintain tools and shop equipment.
- Select, use and maintain safety equipment.

LEARNING TASKS

1. Use protective equipment associated with the use of tools and shop equipment

2. Apply lock-out procedures to shop equipment

3. Select, use and maintain hand tools

CONTENT

- Personal Protective Equipment (PPE)
 - Head
 - Hands
 - Lungs
 - Eyes
 - Ears
 - Feet
 - Clothing
- Screening
- Guarding
- Ventilation
- Clean up
- WorkSafeBC lock-out procedures
- Electrical isolation
- Tags
- Locks
- Hand tool safety
 - Safety practices
 - Work with a safe attitude
 - Tool selection
 - Organize work area
 - Correct usage of hand tools
 - Maintain hand tools
 - Safe tool handling
 - Safe tool storage
- Hazards
- Wrenches
- Screwdrivers
- Cutting tools
- Hammers
- Chisels/punches
- Pry bars



LEARNING TASKS

4. Select, use and maintain measuring instruments

5. Select, use and maintain power tools

6. Select, use and maintain drill bits

7. Select, use and maintain shop equipment

CONTENT

- Pliers
- Clamping tools
- Abrasives
- Pullers
- Torque wrenches and multipliers

- Layout tools
- Precision measuring
- Imperial
- Metric
- Micrometer
- Veriner
- Dial indicator
- Feeler/thickness gauges
- Bore gauges

- Pneumatic
- Electric
- Hydraulic

- Types
- Sharpening
- Cutting speeds

- Presses
- Parts cleaning equipment
 - Hot tank
 - Cold solution
 - Hot agitator
 - Solvent tank
 - Pressure washer
 - Steam cleaner
 - Chemical cleaners
- Drill press
- Glass beader
- Sand blaster
- Grinders
- Compressor
- Cut-off saws



Line (GAC): **A** **OCCUPATIONAL SKILLS**

Competency: **A5** **Use Fasteners and Fittings**

Objectives

To be competent in this area, the individual must be able to:

- Select and use imperial and metric fasteners.
- Select and use pipe, tubing, hose and fittings.

LEARNING TASKS

1. Select and use imperial and metric fasteners

2. Cut and repair internal and external threads

3. Select use and repair tubing, pipe and fittings

CONTENT

- Thread systems
- Fastener types
 - Installation
- Washers
 - Types
 - Applications
- Locking devices
 - Types
 - Applications
- Taps
- Dies
- Thread repair
- Tubing
 - Types
 - Sizing
 - Applications
- Pipe
 - Types
 - Sizing
- Threads
 - Applications
- Fitting
 - Types
 - Sizing
 - Applications
- Assembly procedures
- Sealants
- Cutting, bending and flaring



LEARNING TASKS

4. Select and use hose and hose fittings

CONTENT

- Hose
 - Types
 - Sizing
 - Applications
- Assembly
- Hose fittings
 - Types



Line (GAC): A OCCUPATIONAL SKILLS

Competency: A6 Lift and Support Loads

Objectives

To be competent in this area, the individual must be able to:

- Apply the WorkSafeBC Safety Regulations to lifting and blocking applications.
- Select, use and maintain lifting and blocking equipment.
- Lift and move loads.

LEARNING TASKS

1. Apply the Occupational Health and Safety Regulations
2. Determine load weight
3. Select, use and maintain jacks
4. Select, use and maintain stands and blocking
5. Select, use and maintain wire ropes, chains and lifting straps
6. Use fibre rope knots, bends and hitches
7. Use visual and sound signals
8. Select, use and maintain hoisting equipment

CONTENT

- Refer to Regulations
 - Personal Protective Equipment (PPE)
 - Clothing
 - Housekeeping
 - Safe lifting and carrying
 - Safe handling with cranes
- Manufacturer’s specification
- Estimation
- Types
- Capacities
- Manufacturer’s procedures
- Types
- Capacities
- Bridging
- Types
- Capacities
- Inspection
- Rating tags
- Rigging and lifting attachments
- Types
- Uses
- Care and maintenance
- WorkSafeBC Safety Regulations
 - Hand
 - Sound
- Types
- Capacities
- Operation



LEARNING TASKS

9. Lift, hoist and move loads

CONTENT

- Determine safe working load
- Lifting and rigging procedures
- Regulations and specifications



Line (GAC): A OCCUPATIONAL SKILLS

Competency: A7 Operate Equipment

Objectives

To be competent in this area, the individual must be able to:

- Perform pre-start and walk around inspections.
- Start, move, secure and stop equipment.
- Obtain forklift operation training.

LEARNING TASKS

1. Describe pre-start and walk around inspections
2. Describe starting aids
3. Describe start up procedures
4. Describe emergency shut down procedures
5. Start, operate and shut down selected equipment
6. Lock-out heavy duty equipment prior to service
7. Operate a forklift

CONTENT

- Checklist
- Operator’s manuals
- Glow plug systems
- Intake preheater systems
- Starting fluids
- Block/circulating heaters
- Battery warmers
- Controls
- Cranking
- Monitoring
- Jump starting
- Cut-off
 - Fuel
 - Air
- Pre-start and walk around
- Use of starting aids
- Moving
- Securing and shutting down
- WorkSafeBC requirements
- Electrical isolation (Night switch)
- Tag
- Key in pocket
- Safe operation
- Forklift training (certification optional)
 - Occupational Health and Safety Regulations
 - Maintenance and records



Line (GAC): A **OCCUPATIONAL SKILLS**
Competency: A8 **Use Shop Resources and Record Keeping Practices**

Objectives

To be competent in this area, the individual must be able to:

- Communicate using forms and reports.
- Use computers and written media to locate service and maintenance information.

LEARNING TASKS

1. Use record keeping forms

2. Describe the requirements for report writing

3. Use manuals

CONTENT

- Business forms
 - Work order
 - Parts requisition
 - Purchase order
- Record keeping forms
 - Time sheets and daily time card
 - Equipment log
 - Maintenance log
 - Personal log
 - Maintenance schedule
 - Warranty
- Types of reports
 - Service
 - Structure
 - Inclusions or attachments
 - Shift end
 - Maintenance log
 - Accident
 - Safety
 - Digital media
- Technical
 - Service
 - Repair
- Parts
- Systems
- Operators
- Service bulletins/updates
- Digital media



Line (GAC): **A** **OCCUPATIONAL SKILLS**

Competency: **A9** **Service Winch Wire Rope**

Objectives

To be competent in this area, the individual must be able to:

- Describe wire rope and its applications.
- Inspect and service wire rope used on winches.

LEARNING TASKS

1. Describe wire rope

2. Inspect wire rope

3. Service wire rope

CONTENT

- Types
 - Regular lay
 - Lang lay
- Construction
- Application
- Safe working load
- Frequency
- Wear
- Damage
- Inspection
- Remove
- Repair/replace
- Lubrication
- Scheduled maintenance



Line (GAC): A OCCUPATIONAL SKILLS

Competency: A10 Identify Lubricants

Objectives

To be competent in this area, the individual must be able to:

- Identify and select lubricants.

LEARNING TASKS

1. Describe the theory of lubrication
2. Describe the properties of lubricants
3. Describe the use of lubricants

CONTENT

- Friction
- Purpose
- Viscosity
- Viscosity Index
- Additives
- Types
 - Oils
 - Greases
 - Dry lubricants
 - Synthetics
 - Brake fluids
 - Environmentally Friendly Liquids (EFL)
- Ratings
 - American Petroleum Institute (API)
 - Society of Automotive Engineers (SAE)
 - International Standardization Organization (ISO)
 - Military Standards
 - International Lubricant Standardization Approval Committee (ILSAC)
- Applications
- Oils
- Greases
- Dry lubricants
- Synthetics
- Brake fluids
 - Dot 3
 - Dot 4
 - Dot 5
- Manufacturer's specifications
- Minimum requirements
- Warranty issues



LEARNING TASKS

4. Handle lubricants

5. Perform fluid analysis

CONTENT

- Storage
- Disposal
- Personal protection

- Procedures
- Safety
- Reports
 - Contamination
 - Condition
 - Recommendations



Line (GAC): **A OCCUPATIONAL SKILLS**

Competency: **A13 Use Electronic Media**

Objectives

To be competent in this area, the individual must be able to:

- Use computers to create documents and conduct research.
- Use electronic imaging equipment.

LEARNING TASKS

1. Use computers

2. Use electronic media

CONTENT

- Hardware
- Keyboarding
- Software
- Operating system
 - Windows
 - Managing files
 - Printing
- Applications
 - Word processing
 - Internet access
 - E-mail
 - On-line resources
 - Data bases
- Digital camera
- Digital video



Line (GAC): **A OCCUPATIONAL SKILLS**
Competency: **A14 Use Cutting and Welding Equipment**

Objectives

To be competent in this area, the individual must be able to:

- Identify metals.
- Describe different welding procedures.
- Cut, weld and braze using oxy-acetylene.
- Perform shielded metal arc weld.
- Weld using wire feed processes.
- Solder tubing and sheet metal.

LEARNING TASKS

1. Identify regulations with respect to welding
2. Identify metals

3. Identify oxy-acetylene components

4. Use oxy-acetylene equipment

5. Cut mild steel with oxy-acetylene equipment

CONTENT

- WorkSafeBC Safety Regulations
- Metals and alloys
- Terminology
- Shapes
- Storage and handling
- Gases
- Valves and regulators
- Cylinders
- Hoses and fittings
- Cutting torches and tips
- Safety precautions
- Blow back
- Check valves
- Assembly procedures
- Operation procedures
- Lighting
- Pressures
- Adjusting
- Shut down procedures
- Leak testing
- Storage
- Set-up
- Freehand cuts
- Guided cuts
- Hole piercing



LEARNING TASKS

6. Weld mild steel with oxy-acetylene equipment

7. Braze lap joints with oxy-acetylene equipment

8. Solder tubing and sheet metal

9. Describe the shielded metal arc welding (SMAW) process

10. Identify shielded metal arc welding equipment

11. Identify mild steel electrodes for shielded metal arc welding

12. Weld mild steel with shielded metal arc

CONTENT

- Principles of fusion welding
- Filler metal
- Flux
- Welding tips
- Flame
- Technique
- Basic joints

- Brazing set-up
- Brazing techniques

- Process and procedures
- Solder types
 - 60/40
 - 40/60
 - Rosin core
 - Acid core

- Process
- Applications
- Safety requirements

- AC/DC machines
- Components
- Electrode holder
- Ground clamps
- Cables
- Connectors

- Types
- Operations
- Classifications
- Selection
- Storage and handling

- Procedures
- Weld ground placement
- Settings
- Positions
- Joints
- Types of welds



LEARNING TASKS

13. Weld mild steel using wire feed processes

14. Describe air-arc gouging

CONTENT

- Procedures
- Settings
- Safety
- Weld types and positions
- Wire type
- Purpose
- Procedure
- Safety



Line (GAC): **A OCCUPATIONAL SKILLS**
Competency: **A16 Describe Diagnostic Procedures**

Objectives

- To be competent in this area, the individual must be able to:
- Describe the importance of following a diagnostic procedure.
 - Describe diagnostic procedures used for troubleshooting.

LEARNING TASKS

1. Describe the importance of following a diagnostic process

2. Describe general diagnostic procedures

3. Describe the importance of following manufacturer’s diagnostic procedures where available

4. Describe the importance of failure analysis

CONTENT

- Cost of improper diagnosis
- Unhappy customers
- Lost business
- Time management
- Efficiency
- Damage to components

- Understand system
- Understand complaint
- Communicate with operator
- Operational test
- Visual inspection
- Form all possible conclusions
- Test conclusions
- System component isolation

- Time saving
- Warranty requirement
- Diagnostic efficiency

- Repeat failure
- Extend life
- Cost
- Customer satisfaction



Line (GAC): B BRAKES
Competency: B1 Service and Repair Hydraulic Brakes

Objectives

To be competent in this area, the individual must be able to:

- Service hydraulic brake systems.
- Diagnose hydraulic brake systems.
- Repair hydraulic brake systems.

LEARNING TASKS

1. Describe the principles of braking

2. Describe the foundation brake

3. Review hydraulic principles

CONTENT

- Friction
- Definition
- Coefficient
- Heat
- Absorbing
- Dissipating
- Effects of speed and weight
- Brake fade

- Types
 - Disk
 - Drum
 - Multidisc
 - Others
- Components
 - Calipers
 - Wheel cylinder
 - Lines
 - Shoes/pads
- Operation
 - Self energizing and non-self energizing
 - Servo/non-servo
- Pressure, force and area



LEARNING TASKS

4. Describe the hydraulics of a brake system

5. Select brake fluids

6. Describe parking brake systems

7. Diagnose hydraulic brake systems

CONTENT

- Types
 - Disk
 - Drum
 - Multidisc
 - Others
- Components
 - Master cylinder
 - Metering valve
 - Proportioning valve
 - Switches
- Operation
- Requirements
- Types
 - DOT 3
 - DOT 4
 - DOT 5
 - Others
- Characteristics
 - Hygroscopic
 - Boiling point
 - Viscosity
- Identification
- Types
 - Integral
 - Driveline
 - Hydraulic
 - Mechanical
- Components
- Operation
- Diagnostic procedures
 - Operational checks
 - Fluid condition/level
- Inspection



LEARNING TASKS

- 8. Repair hydraulic brake systems

- 9. Service parking brake systems

- 10. Perform preventive maintenance

CONTENT

- Components
 - Hydraulic
 - Mechanical
- Inspection
- Remove
- Repair/replace
- Install
- Flush/bleed

- Inspection
- Remove
- Repair/replace
- Install

- Inspection
- Operational tests
- Fluid level checks
- Adjustment
- Lubrication

Achievement Criteria

Performance B1 Service and Repair Hydraulic Brakes

Conditions The learner will require:

- Tools
- Test equipment
- Manufacturer's specifications
- A work place or training environment
- Equipment with hydraulic disk and drum brakes

Criteria The learner will be competent once the performance criteria is met:

- Followed safe work practices throughout entire task including lock out procedures
- Conducted in a logical manner
- Conducted according to manufacturer's specifications
- Conducted according to work place requirements

Throughout the term of the apprenticeship, the learner must conduct the above performance a multiple of times and in a variety of contexts



Line (GAC): B BRAKES
Competency: B2 Service and Repair Hydraulic Power Brakes

Objectives

To be competent in this area, the individual must be able to:

- Diagnose hydraulic assisted power brake systems.
- Repair hydraulic assisted power brake systems.
- Describe hydraulic anti-lock braking (ABS) systems.
- Diagnose and repair hydraulic anti-lock braking (ABS) systems.

LEARNING TASKS

1. Describe the power brake systems

2. Diagnose power brake systems

3. Repair power brake systems

4. Describe hydraulic anti-lock braking systems

CONTENT

- Types
 - Vacuum boosters
 - Hydro-boost
 - Hydro-max
 - Hydraulic
- Components
- Operation
- Diagnostic procedures
- Operational test
- Components
- Inspection
- Testing
- Inspection
- Remove
- Repair/replace
- Install
- Adjustments
- Verify system operation
- Types
 - Single channel
 - Two channel
 - Four channel
- Components
- Operation
- Precautions



LEARNING TASKS

5. Diagnose hydraulic anti-lock braking systems

6. Repair hydraulic anti-lock braking systems

CONTENT

- Manufacturer's diagnostic procedures
- Road test
- Diagnostic codes
- Components
- Inspection
- Testing

- Inspection
- Remove
- Repair/replace
- Install
- Adjustments
- Verify system operation
- Diagnostic codes

Achievement Criteria

Performance B2 Service and Repair Hydraulic Power Brakes

Conditions The learner will require:

- Tools
- Test equipment
- Manufacturer's specifications
- A work place or training environment
- Equipment with hydraulic disk and drum brakes

Criteria The learner will be competent once the performance criteria is met:

- Followed safe work practices throughout entire task including lock out procedures
- Conducted in a logical manner
- Conducted according to manufacturer's specifications
- Conducted according to work place requirements

Throughout the term of the apprenticeship, the learner must conduct the above performance a multiple of times and in a variety of contexts



Line (GAC): B BRAKES
Competency: B3 Service and Repair Air Brakes

Objectives

To be competent in this area, the individual must be able to:

- Describe the principles of braking.
- Describe the principles of pneumatics.
- Describe air brake schedules and components.
- Service air brake systems.
- Repair a wheel brake assembly.
- Describe and perform a pre-trip inspection.

LEARNING TASKS

1. Describe the principles of braking

2. Describe the principles of pneumatics

3. Describe a basic air brake system

CONTENT

- Friction
- Definition
- Coefficient
- Heat
- Absorbing
- Dissipating
- Effects of speed and weight
- Brake fade
- Water cooling
- Characteristics of air
- Relationship between force, pressure and area
- Effects of heat on air
- Time lag
- Pneumatic balance
- Sub systems
- Supply
- Delivery
- Foundation brakes
 - Drum
 - Disc
- Components
 - Compressor
 - Governor
 - Treadle
 - Relay
 - Brake chamber
- Operation



LEARNING TASKS

4. Describe the basics of air brake schedules
5. Repair foundation brake assembly
6. Service and inspect air brakes
7. Describe tractor trailer pre-trip brake inspection
8. Perform a tractor trailer pre-trip brake inspection

CONTENT

- 121
- S
- SX
- Operation and routine maintenance
- Inspection
- Disassembly
- Replacement
- Measurement
- Assembly
- Adjustment
- Tractor and trailer
- Components
 - Foundation brakes
 - Reservoirs
 - Lines
 - Disc/Drum
- Adjustment
- Scheduled maintenance
- As per motor vehicle standards
- As per motor vehicle standards

Achievement Criteria

Performance B3 Service and Repair Air Brakes

Conditions The learner will require:

- Tools
- Test equipment
- Manufacturer's specifications
- A work place or training environment
- Equipment with hydraulic disk and drum brakes

Criteria The learner will be competent once the performance criteria is met:

- Followed safe work practices throughout entire task including lock out procedures
- Conducted in a logical manner
- Conducted according to manufacturer's specifications
- Conducted according to work place requirements

Throughout the term of the apprenticeship, the learner must conduct the above performance a multiple of times and in a variety of contexts



LEARNING TASKS

4. Interpret basic hydraulic diagrams

CONTENT

- Types
 - Pictorial
 - Schematic
- Basic symbols



Line (GAC): **C HYDRAULICS**
Competency: **C2 Service Hydraulic Components**

Objectives

To be competent in this area, the individual must be able to:

- Describe selected hydraulic components.
- Select hydraulic fluids for applications.
- Select and assemble hydraulic hoses and fittings.
- Demonstrate safe work procedures for hydraulic systems service.
- Perform scheduled maintenance on hydraulic systems.

LEARNING TASKS

1. Describe hydraulic components

2. Select hydraulic fluids

3. Select hydraulic hoses and fittings

4. Assemble hydraulic hoses and fittings

CONTENT

- Seals
- Hoses/lines
- Fittings
- Filters

- Requirements
- Society of Automotive Engineers (SAE) viscosity ratings
- International Standardization Organization (ISO) viscosity ratings
- American Petroleum Institute (API) service ratings
- Manufacturer’s specifications
- Synthetic/Non-synthetic (mineral)
- Component/System compatibility

- Hose construction
- Working pressure
- Ratings
- Compatability
- Hose application
- Fitting types
 - National Pipe Thread (NPT)
 - Joint Industry Conference (JIC)
 - O-ring Boss (ORB)
 - O-ring Face (ORFS)
 - Split flange
 - Society of Automotive Engineers (SAE)
 - Reusable/Permanent

- Permanent
- Reusable



LEARNING TASKS

5. Demonstrate safe work procedures

6. Perform scheduled maintenance

CONTENT

- Safety blocking equipment and attachments
- Relieve pressure
- Reservoir venting
- Actuator neutralization
- Temperature hazards

- Visual inspection
- Leaks
- Hose rubs
- External damage
- Fluid level check
- Filter change, fluid change, fluid analysis
- Strainers
- Flushing system

Achievement Criteria

Performance C2 Service Hydraulic Components

Conditions The learner will require:

- Tools
- Test equipment
- Manufacturer's specifications
- A work place or training environment
- Equipment with mobile hydraulic systems

Criteria The learner will be competent once the performance criteria is met:

- Followed safe work practices throughout entire task including lock out procedures
- Conducted in a logical manner
- Conducted according to manufacturer's specifications
- Conducted according to work place requirements

Throughout the term of the apprenticeship, the learner must conduct the above performance a multiple of times and in a variety of contexts



Line (GAC): D ELECTRICAL
Competency: D1 Describe Electricity

Objectives

To be competent in this area, the individual must be able to:

- Define electrical terminology.
- Explain basic circuit concepts.
- Perform circuit calculations.
- Describe magnetic theory.
- Identify common electrical and electronic components.
- Interpret wiring diagrams and symbols.

LEARNING TASKS

1. Define electrical terminology
2. Explain basic circuit concepts and perform calculations

CONTENT

- Electrical quantities and their units and prefixes
- Voltage
- Current
- Resistance
- Power/Watts
- Circuit terminology
- Open circuit
- Closed circuit
- Short circuit
- Continuity
- Ground circuit
- Ground fault
- Series circuit
- Parallel circuit
- Series parallel circuit
- Sources of electricity
- Atomic theory
- Current flow
- Electrons
- Protons
- Neutron
- Conductors
- Insulators
- Semiconductors
- Basic circuit
- Source
- Load



LEARNING TASKS

3. Describe magnetic theory

4. Identify common electrical components

5. Describe the basic function of common electronic components

6. Interpret basic electrical wiring diagrams

CONTENT

- Complete path
- Electrical relationships
- Ohm's Law
- Watt's Law
- Series circuits
- Parallel circuits
- Series parallel circuits

- Properties of magnetic lines of force
- Terminology
- Relationship to electric current
- Electromagnetic induction
 - Types
 - Requirements
 - Factors affecting magnitude

- Lamps
- Switches
- Relays
- Solenoids
- Resistors
 - Fixed
 - Variable
- Capacitors
- Motors
- Alternators
- Fuses

- Diodes
- Transistors
 - Types
 - Wiring schematic and diagrams
 - Symbols
 - Conventions
 - Abbreviations



Line (GAC): D **ELECTRICAL**
Competency: D2 **Use Electrical Testing Instruments**

Objectives

To be competent in this area, the individual must be able to:

- Use electrical measuring devices.

LEARNING TASKS

1. Describe how to use electrical measuring devices.
2. Diagnose electrical circuits

CONTENT

- Analog vs. digital
- Voltmeters
- Ammeters
- Ohmmeters
- Multimeters (VOM)
- Amp clamp
- VAT's (Volt amp testers)
- Continuity testers
- Test lights
- Safety precautions
- Voltage drops
- Shorts
- Grounds
- Opens
- Resistance
- Amperage draw



LEARNING TASKS

- 4. Select batteries

- 5. Service batteries

- 6. Diagnose batteries

- 7. Use booster batteries

CONTENT

- Battery rating methods
 - Cold cranking amperes (CCA)
 - Cranking amperes (CA)
 - Reserve capacity
 - Amp hour
- Physical dimensions
- Safety precautions
- Inspection
- Cleaning
- Terminal servicing
- Charging
- Replacement
- Scheduled maintenance
- Storage and handling
- Specific gravity
- Open circuit voltage test
- Load test
- 3 minute fast charge test
- Battery impedance test
- Safety
- Voltage
 - 6/12/24
- Polarity

Achievement Criteria

Performance D3 Service and Diagnose Batteries

Conditions The learner will require:

- Tools
- Test equipment
- Manufacturer's specifications
- A work place or training environment
- Equipment with maintenance and maintenance free batteries

Criteria The learner will be competent once the performance criteria is met:

- Followed safe work practices throughout entire task including lock out procedures
- Conducted in a logical manner
- Conducted according to manufacturer's specifications
- Conducted according to work place requirements

Throughout the term of the apprenticeship, the learner must conduct the above performance a multiple of times and in a variety of contexts



Line (GAC): **D ELECTRICAL**
Competency: **D4 Service Charging Systems**

Objectives

To be competent in this area, the individual must be able to:

- Describe the purpose of charging circuits.
- Perform routine maintenance on charging circuits.

LEARNING TASKS

1. Describe charging circuits

2. Maintain charging circuits

CONTENT

- Purpose
- Operation
- Connections

- Inspection
- Visual
- Audible
- Output voltage/amperage test
- Belt condition and tension
- Alternator removal and replacement

Achievement Criteria

Performance D4 Service Charging Systems

- Conditions The learner will require:
- Tools
 - Test equipment
 - Manufacturer's specifications
 - A work place or training environment
 - Equipment with functional charging circuit

- Criteria The learner will be competent once the performance criteria is met:
- Followed safe work practices throughout entire task including lock out procedures
 - Conducted in a logical manner
 - Conducted according to manufacturer's specifications
 - Conducted according to work place requirements

Throughout the term of the apprenticeship, the learner must conduct the above performance a multiple of times and in a variety of contexts



Line (GAC): D **ELECTRICAL**
Competency: D6 **Service Starting Systems**

Objectives

To be competent in this area, the individual must be able to:

- Identify starting circuit components.
- Describe the design and operation of starting circuits.
- Perform maintenance on starting circuits.

LEARNING TASKS

1. Identify components of starting circuits

2. Describe the design and operation of starting circuits

3. Inspect starting circuits

CONTENT

- Battery
- Starter motor assembly
- Solenoids and relays
- Ignition switch
- Neutral safety switch/clutch pedal switch
- Cables and terminals

- System voltage
 - 12 volt
 - 24 volt
- Battery configuration
 - Series
 - Parallel
 - Series parallel
- Isolation switches
- Starter motor assembly
- Solenoids and relays
- Magnetic switch
- Thermal switch
- Ignition switch
- Neutral safety switch/clutch pedal switch
- Cables and terminals

- Inspection
 - Visual
 - Audible
- Routine maintenance
- Component removal and replacement

**Achievement Criteria**

Performance D6 Service Starting Systems

Conditions The learner will require:

- Tools
- Test equipment
- Manufacturer's specifications
- A work place or training environment
- Equipment with functional starter circuit

Criteria The learner will be competent once the performance criteria is met:

- Followed safe work practices throughout entire task including lock out procedures
- Conducted in a logical manner
- Conducted according to manufacturer's specifications
- Conducted according to work place requirements

Throughout the term of the apprenticeship, the learner must conduct the above performance a multiple of times and in a variety of context



Line (GAC): **D** **ELECTRICAL**
Competency: **D8** **Service Electrical Circuits**

Objectives

To be competent in this area, the individual must be able to:

- Service electrical circuits.
- Describe trailer wiring.

LEARNING TASKS

1. Replace electrical components

2. Select and install conductors and terminals/connectors

3. Describe sources of circuit faults

4. Describe trailer wiring circuits

CONTENT

- Lamps
- Starters
- Alternators
- Batteries
- Switches
- Motors
- Fuses

- Wire gauge
- Terminals/connectors
 - Crimped
 - Soldered
- Blown fuses
- Fusible link
- Circuit breaker
- Connection
- Wiring
- Connectors
- Junction box
- Wiring harness
- Circuit identification



Achievement Criteria

Performance D8 Service Electrical Circuits

Conditions The learner will require:

- Tools
- Test equipment
- Manufacturer's specifications
- A work place or training environment
- Equipment with electrical and electronic components

Criteria The learner will be competent once the performance criteria is met:

- Followed safe work practices throughout entire task including lock out procedures
- Conducted in a logical manner
- Conducted according to manufacturer's specifications
- Conducted according to work place requirements

Throughout the term of the apprenticeship, the learner must conduct the above performance a multiple of times and in a variety of contexts



LEARNING TASKS

5. Diagnose wheel hubs
6. Service wheel hubs
7. Describe traction devices

CONTENT

- Bearings
- Seals
- Lubrication
- Inspection
- Testing
- Inspection
- Replacement
- Repair
- Adjustment
 - Bearing end play
 - Rolling torque
- Lubrication
- Scheduled maintenance
- Types
 - Chains
 - Sanders
 - Calcium

Achievement Criteria

Performance E1 Service and Diagnose Tires, Wheels and Hubs

Conditions The learner will require:

- Tools
- Test equipment
- Manufacturer's specifications
- A work place or training environment
- Equipment with tires and wheel assemblies

Criteria The learner will be competent once the performance criteria is met:

- Followed safe work practices throughout entire task including lock out procedures
- Conducted in a logical manner
- Conducted according to manufacturer's specifications
- Conducted according to work place requirements

Throughout the term of the apprenticeship, the learner must conduct the above performance a multiple of times and in a variety of contexts



Line (GAC): E FRAMES, STEERING AND SUSPENSION
Competency: E2 Service Steering Systems

Objectives

To be competent in this area, the individual must be able to:

- Describe steering systems.
- Service steering systems.

LEARNING TASKS

1. Describe basic steering systems fundamentals

2. Service steering systems

CONTENT

- Types
 - Truck power assist
 - Track steering
 - Wheeled equipment steering
- Truck system components
 - Kingpins
 - Tie-rod ends
 - Drag link
 - Tie rod
 - Spindle
 - Steering arms
- Track system components
- Wheeled system components
- Inspection
- Remove/replace
- Install
- Lubrication
- Scheduled maintenance
- Adjustment
 - Drag link
 - Tie rod ends
 - Axle stops
 - Steering gear
 - Toe



Achievement Criteria

Performance E2 Service Steering Systems

Conditions The learner will require:

- Tools
- Test equipment
- Manufacturer's specifications
- A work place or training environment
- Equipment with various steering systems

Criteria The learner will be competent once the performance criteria is met:

- Followed safe work practices throughout entire task including lock out procedures
- Conducted in a logical manner
- Conducted according to manufacturer's specifications
- Conducted according to work place requirements

Throughout the term of the apprenticeship, the learner must conduct the above performance a multiple of times and in a variety of contexts



Line (GAC): E **FRAMES, STEERING AND SUSPENSION**
Competency: E4 **Service, Diagnose and Repair Suspension Systems**

Objectives

To be competent in this area, the individual must be able to:

- Describe suspension systems.
- Diagnose and repair suspension systems.

LEARNING TASKS

1. Describe wheeled equipment suspension systems
2. Diagnose wheeled equipment suspension systems
3. Repair wheeled equipment suspension systems
4. Diagnose and repair auto-lube systems
5. Describe truck and trailer steering axle suspension systems
6. Repair truck and trailer steering axle suspension systems

CONTENT

- Types
 - Hydro pneumatic
 - Rigid
- Components
- Operation
- Inspection
- Measuring
- Inspection
- Remove
- Repair/replace
- Install
- Adjustments
- Lubrication
- Scheduled maintenance
- Inspection
- Remove
- Repair/replace
- Install
- Adjustments
- Scheduled maintenance
- Types
 - Single
 - Tandem
- Components
 - Air bag
 - Shock absorbers
 - Spring construction
 - Hangers and attachments
- Operation
- Inspection
- Replacement



LEARNING TASKS

7. Describe truck and trailer rear axle suspension systems

8. Repair truck and trailer rear axle suspension systems

CONTENT

- Repair
- Adjustments
- Lubrication
- Arrangements
 - Single axle
 - Tandem axle
 - Tri axle
 - Lift axle
 - Tag axle
- Types
 - Walking beams
 - Leaf springs
 - Air bag
 - Rubber block
- Components
 - Torque rods
 - Transverse rods
 - Frame attachments
 - Springs
 - Pins and Bushings
- Operation
- Inspection
- Replacement
- Repair
- Lubrication
- Adjustments

Achievement Criteria

Performance E4 Service and Diagnose Suspension Systems

Conditions The learner will require:

- Tools
- Test equipment
- Manufacturer's specifications
- A work place or training environment
- Equipment with various suspension systems

Criteria The learner will be competent once the performance criteria is met:

- Followed safe work practices throughout entire task including lock out procedures
- Conducted in a logical manner
- Conducted according to manufacturer's specifications
- Conducted according to work place requirements

Throughout the term of the apprenticeship, the learner must conduct the above performance a multiple of times and in a variety of contexts



Line (GAC): E FRAMES, STEERING AND SUSPENSION

Competency: E6 Diagnose and Repair Frames

Objectives

To be competent in this area, the individual must be able to:

- Describe types of frames.
- Diagnose and repair frames.

LEARNING TASKS

1. Describe rail and frame types

2. Diagnose frames

CONTENT

- Types of rails
 - Materials
 - Mild steel
 - High tensile steel
 - Aluminum
 - Strength
 - Resisting bending moment (RBM)
 - Section modulus
 - Yield strength
- Types of Frames
 - Channel
 - Rigid
 - Articulated
 - I beam
- Components
 - Cross members
 - Brackets
 - Mounts
 - Hardware
 - Fasteners
 - Grade
 - Type
- Components
- Inspection
- Alignment
 - Measuring
 - Projection
 - Laser
 - String



LEARNING TASKS

3. Repair Frames

CONTENT

- Visual inspection
- Rail replacement
- Rail sectional replacement
 - Welding procedure
 - Brace support
- Repair
 - Crack
 - Bent
 - Twisted
- Adjustments
 - Alignment

Achievement Criteria

Performance E6 Diagnose and Repair Frames

Conditions The learner will require:

- Tools
- Test equipment
- Manufacturer's specifications
- A work place or training environment
- Equipment with various frame configurations

Criteria The learner will be competent once the performance criteria is met:

- Followed safe work practices throughout entire task including lock out procedures
- Conducted in a logical manner
- Conducted according to manufacturer's specifications
- Conducted according to work place requirements

Throughout the term of the apprenticeship, the learner must conduct the above performance a multiple of times and in a variety of contexts



Line (GAC): F TRAILER
Competency: F1 Service Landing Gear and Trailer Accessories

Objectives

To be competent in this area, the individual must be able to:

- Describe the construction and operation of accessories.
- Service limited accessories.

LEARNING TASKS

1. Describe the construction and operation of accessories

CONTENT

- Types
- Lift gates
 - Hydraulic
- Landing gear
 - Speeds
 - Gears
 - Cross rods
 - Support
- Ladders
- Dump box
 - Transfer box
 - High lift gate
 - Pony
 - End dump
 - Side dump
 - Clam dump
- Log bunks
 - Stakes
 - Extensions
 - Bunk
 - Bolster
 - Live
 - Fixed
- Draw bar
 - Pintle eye
 - Bushing
 - Compensator
- Load winch
 - Ratchet
 - Locks
- Components
- Operation



LEARNING TASKS

2. Service and repair lift gates, landing gears and winches

CONTENT

- Inspect
 - Operation
 - Hydraulics
 - Pivots
 - Lubrication
- Remove
- Repair/replace
- Install
- Lubrication
- Adjust
- Scheduled maintenance

Achievement Criteria

Performance F1 Service Landing Gear and Trailer Accessories

Conditions The learner will require:

- Tools
- Test Equipment
- Manufacturer's specifications
- A work place or training environment
- Equipment – trailer accessories, landing gear, logging bunk, lift gate

Criteria The learner will be competent once the performance criteria is met:

- Followed safe work practices throughout entire task including lock out procedures
- Conducted in a logical manner
- Conducted according to manufacturer's specifications
- Conducted according to work place requirements

Throughout the term of the apprenticeship, the learner must conduct the above performance a multiple of times and in a variety of contexts



Line (GAC): **F TRAILER**
Competency: **F2 Service and Repair Coupling Systems**

Objectives

To be competent in this area, the individual must be able to:

- Describe hitches and couplers.
- Service hitches and couplers.

LEARNING TASKS

1. Describe the tractor-trailer combinations

2. Describe fifth wheels

3. Service and repair fifth wheel assemblies

CONTENT

- Types
 - A train
 - B train
 - C train
- Purpose and design
- Types
 - Fixed
 - Sliding
 - Oscillating
- Components
 - Top plate
 - Base plate
 - Mounting brackets
 - Jaws and lock mechanisms
 - Jaw release mechanisms
 - Slide lock mechanisms
 - Safety devices
- Inspection
 - Jaws
 - Top plate
 - Slides
 - Locks
 - Pins
 - Bushings
- Replacement
- Adjustment
 - Jaws
- Lubrication
 - Slide
 - Jaws
 - Linkages
 - Top plate
- Scheduled maintenance



LEARNING TASKS

4. Describe bolster plates and king pins

5. Describe pintle hooks and eyes

6. Service and repair pintle hooks and eyes

CONTENT

- Bolster plates
- King pins
 - Size
 - Mounting
- Types
- Ratings
- Buffers
- Pneumatic
- Hydraulic
- Safety chains
- Compensators
- Inspection
 - Cracks
 - Wear
 - Evidence of welding
 - Bushings
- Replacement
- Lubrication
- Scheduled maintenance

Achievement Criteria

Performance F2 Service and Repair Coupling Systems

Conditions The learner will require:

- Tools
- Test equipment
- Manufacturer's specifications
- A work place or training environment
- Equipment - fifth wheel and pintle hitch assembly

Criteria The learner will be competent once the performance criteria is met:

- Followed safe work practices throughout entire task including lock out procedures
- Conducted in a logical manner
- Conducted according to manufacturer's specifications
- Conducted according to work place requirements

Throughout the term of the apprenticeship, the learner must conduct the above performance a multiple of times and in a variety of contexts



Line (GAC): F TRAILER

Competency: F3 Service, Diagnose and Repair Trailer Body Components

Objectives

To be competent in this area, the individual must be able to:

- Describe the purpose and operation of trailer body components.
- Install and remove trailer body components.
- Diagnose and repair or replace trailer body components.

LEARNING TASKS

1. Describe the purpose and operation of trailer body components

2. Remove and install trailer body components

3. Diagnose trailer body components

4. Repair trailer body components

CONTENT

- Components
 - Frames
 - Doors
 - Hinged
 - Roll up
 - Bumpers
 - Tanks
 - Valves
 - Manifold piping
 - Gauges
 - Transfer pump
 - Reflective tape

- Safety
- Operation
- Procedures
- Support systems

- Operation
- Manufacturer’s specifications
- Inspection and testing procedures
- Diagnosis
- Damage and wear identification

- Procedures
- Manufacturer’s specifications
- Testing
- Replacement
- Doors
 - Sidewall panels
 - Cross members



Achievement Criteria

Performance F3 Service, Diagnose and Repair Trailer Body Components

Conditions The learner will require:

- Tools
- Test equipment
- Manufacturer's specifications
- A work place or training environment
- Equipment with a variety of trailer bodies

Criteria The learner will be competent once the performance criteria is met:

- Followed safe work practices throughout entire task including lock out procedures
- Conducted in a logical manner
- Conducted according to manufacturer's specifications
- Conducted according to work place requirements

Throughout the term of the apprenticeship, the learner must conduct the above performance a multiple of times and in a variety of contexts



Line (GAC): F TRAILER

Competency: F4 Service, Diagnose and Repair Heating and Refrigeration Systems

Objectives

To be competent in this area, the individual must be able to:

- Identify heating and refrigeration components.
- Diagnose refrigeration units.
- Repair heating and refrigeration systems.

LEARNING TASKS

1. Describe types of heating and refrigeration

2. Service and repair heating and refrigeration systems

3. Describe hazards associated with refrigeration units

CONTENT

- Trailer mounted
 - Cooling unit
 - Heating unit
- Maintenance
- Inspections
 - Operational checks
 - Pressure checks
 - Temperature checks
- Lubricants
- Service intervals
- Belts
- Fall protection
- Refrigerant
- Environmental considerations
 - Ozone depletion
 - Global warming
 - Release of refrigerant



Achievement Criteria

Performance F4 Service Diagnose and Repair Heating and Refrigeration Systems

Conditions The learner will require:

- Tools
- Test equipment
- Manufacturer's specifications
- A work place or training environment
- Equipment with refrigeration units

Criteria The learner will be competent once the performance criteria is met:

- Followed safe work practices throughout entire task including lock out procedures
- Conducted in a logical manner
- Conducted according to manufacturer's specifications
- Conducted according to work place requirements

Throughout the term of the apprenticeship, the learner must conduct the above performance a multiple of times and in a variety of contexts



Line (GAC): G HEATING, VENTILATION AND AIR CONDITIONING

Competency: G1 Describe Heating and Air Conditioning Fundamentals

Objectives

To be competent in this area, the individual must be able to:

- Identify heating and air conditioning components.
- Describe the construction and operation of heating and air conditioning systems.
- Describe the impact of CFCs on the environment.
- Apply legislated procedures when dealing with systems containing CFCs.

LEARNING TASKS

1. Describe principles of heating and air conditioning systems
2. Identify components of heating and air conditioning systems
3. Describe the design and operation of heating and air conditioning systems

CONTENT

- Describe the law's of thermodynamics
- Heater
- Valves
- Controls
- Ducts
- Compressor
- Drive systems
- Evaporator
- Condenser
- Receiver-drier/accumulator
- Orifice tubes/expansion valves
- Refrigerant
 - Ozone depleting potential
- Lubricants
 - Mineral
 - Synthetic
- Controls
- Sensors
- Hoses, piping and connectors
- Seats and gaskets
- Heater
- Refrigeration cycle
- Compressor
- Evaporator
- Condenser
- Receiver-drier/accumulator
- Orifice tubes/expansion valves
- Refrigerant
- Lubricants



LEARNING TASKS

4. Describe the impact of CFCs on the environment
5. Identify legislation/agreements dealing with the use and handling of CFCs

CONTENT

- Controls
- Sensors
- Ozone depletion
- Global warming
- International
- Montreal Protocol On Substances that Deplete the Ozone Layer
- Kyoto Protocol to the United Nations Framework Convention on Climate Change
- Canadian Environmental Protection Act
- Provincial regulations
- Ozone Depleting Substances And Other Halocarbons Regulation
- Waste Management Act
- Training requirements
- Environmental awareness training course on ozone depleting substance control
- Certification
- CFC handling
- Conservation objectives



LINE (GAC): G HEATING, VENTILATION AND AIR CONDITIONING

Competency: G2 Diagnose and Repair Heating and Air Conditioning Systems

Objectives

To be competent in this area, the individual must be able to:

- Diagnose heating and air conditioning systems.
- Repair heating and air conditioning systems.
- Describe the impact of CFCs on the environment.
- Apply legislated procedures when dealing with systems containing CFCs.

LEARNING TASKS

1. Diagnose heating and air conditioning systems

CONTENT

- Diagnostic procedures
- Manufacturer's procedures
- Performance test
- Diagnostic codes
- Components
- Inspection
- Sensory Inspection
- Visual
- Audible
- Smell
- Touch
- Testing
- Vacuum
- Electrical
- Mechanical
- Pressure
- Leak detection methods
- Recovering, evacuation and recharging
- Pressure/leak testing
- Environmental considerations
- Removing and replacing components
- Verify system operations
- Ozone depletion
- Global warming

2. Repair heating and air conditioning systems

3. Describe the impact of CFCs on the environment



LEARNING TASKS

4. Identify legislation/agreements dealing with the use and handling of CFCs

CONTENT

- International
- Montreal Protocol On Substances that Deplete the Ozone Layer
- Kyoto Protocol to the United Nations Framework Convention on Climate Change
- Canadian Environmental Protection Act
- Provincial regulations
- Ozone Depleting Substances And Other Halocarbons Regulation
- Waste Management Act
- Training requirements
- Environmental awareness training course on ozone depleting substance control
- Certification
- Conservation objectives

Achievement Criteria

Performance G2 Diagnose and Repair Heating and Air Conditioning Systems

Conditions The learner will require:

- Tools
- Test equipment
- Manufacturer's specifications
- A work place or training environment
- Equipment with air conditioning units

Criteria The learner will be competent once the performance criteria is met:

- Followed safe work practices throughout entire task including lock out procedures
- Conducted in a logical manner
- Conducted according to manufacturer's specifications
- Conducted according to work place requirements

Throughout the term of the apprenticeship, the learner must conduct the above performance a multiple of times and in a variety of contexts



LINE (GAC): J STRUCTURAL COMPONENTS AND ACCESSORIES

Competency: J1 Identify protective structures

Objectives

To be competent in this area, the individual must be able to:

- Describe regulations related to protective structures.
- Perform service or inspection of protective structures.

LEARNING TASKS

1. Describe structural components

2. Describe inspection procedures

3. Identify operational regulations

CONTENT

- Roll over protective structure (ROPS)
- Falling objects protective structure (FOPS)
- Operator protective structure (OPS)

- Cracks
- Dents
- Fatigue

- Components
- Safety glass
- Screens
- Service/diagnose/repair



LINE (GAC): J STRUCTURAL COMPONENTS AND ACCESSORIES

Competency: J2 Service Cab Structures

Objectives

To be competent in this area, the individual must be able to:

- Identify cab, bodies and components.
- Service cab, bodies and components.

LEARNING TASKS

1. Identify cabs, bodies and components

2. Service cabs, bodies and components

CONTENT

- Types
- Components
 - Cab
 - Fixed
 - Air ride
 - Doors
 - Windows
 - Seats
 - Supplemental restraint system (air bag)
 - Sleepers
 - Ventilation systems
 - Mounting
- Operation
- Inspection
- Replacement
 - Components
- Adjustment
- Lubrication

**Achievement Criteria**

Performance J2 Service Cab Structures

Conditions The learner will require:

- Tools
- Test equipment
- Manufacturer's specifications
- A work place or training environment
- Equipment with cab structures

Criteria The learner will be competent once the performance criteria is met:

- Followed safe work practices throughout entire task including lock out procedures
- Conducted in a logical manner
- Conducted according to manufacturer's specifications
- Conducted according to work place requirements

Throughout the term of the apprenticeship, the learner must conduct the above performance a multiple of times and in a variety of contexts



Level 2

Transport Trailer Technician



LINE (GAC): B BRAKES

Competency: B4 Diagnose and Repair Advanced Brake Systems

To be competent in this area, the individual must be able to:

- Describe air brake schedules and their components.
- Diagnose and repair air brake schedules and their components.
- Diagnose and repair air over hydraulic systems and their components.

LEARNING TASKS

CONTENT

- | | |
|--|--|
| <p>1. Review a basic air brake system</p> | <ul style="list-style-type: none"> • Sub-systems • Supply • Delivery • Foundation brakes • Components • Operations |
| <p>2. Describe tractor/trailer and bus air brake schedules and their components</p> | <ul style="list-style-type: none"> • 121 • BT-75 • T-75 • L-75 • X • SX • Valve operation/function |
| <p>3. Diagnose tractor and bus air brakes (schedules) and their components</p> | <ul style="list-style-type: none"> • Inspection • Testing • Components <ul style="list-style-type: none"> ○ Vavles ○ Foundation brakes |
| <p>4. Repair tractor and bus air brake components</p> | <ul style="list-style-type: none"> • Inspection • Remove • Repair/replace • Install • Adlustment • Lubrication • Verify system operations |
| <p>5. Describe trailer brake systems and their components</p> | <ul style="list-style-type: none"> • Air • Electric • Electronic • Hydraulic/surge |



LEARNING TASKS

CONTENT

- | | |
|--|--|
| <p>6. Diagnose trailer brakes and their components</p> | <ul style="list-style-type: none"> • Inspection • Testing • Types <ul style="list-style-type: none"> ○ Air ○ Electric ○ Electronic ○ Hydraulic/surge |
| <p>7. Repair trailer brake components</p> | <ul style="list-style-type: none"> • Inspection • Remove • Repair/replace • Install • Adjustments • Lubrication • Verify system operation |
| <p>8. Describe air over hydraulic braking systems</p> | <ul style="list-style-type: none"> • Components • Operation |
| <p>9. Diagnose air over hydraulic braking systems and their components</p> | <ul style="list-style-type: none"> • Inspection • Testing |
| <p>10. Repair air over hydraulic braking components</p> | <ul style="list-style-type: none"> • Inspection • Remove • Repair/replace • Install • Adjustments • Lubrication • Verify system operation |
| <p>11. Describe air anti-lock, traction control braking and vehicle stability systems</p> | <ul style="list-style-type: none"> • Components • Operation |
| <p>12. Diagnose and repair air anti-lock, traction control braking and vehicle stability systems</p> | <ul style="list-style-type: none"> • Inspection • Remove • Repair/replace • Install • Adjustments • Lubrication • Verify system operation • Diagnostic codes |

**Achievement Criteria**

Performance B4 Diagnose and Repair Advanced Brake Systems

Conditions The learner will require:

- Tools
- Test equipment
- Manufacturer's specifications
- A work place or training environment
- Equipment with air brake systems

Criteria The learner will be competent once the performance criteria is met:

- Followed safe work practices throughout entire task including lock out procedures
- Conducted in a logical manner
- Conducted according to manufacturer's specifications
- Conducted according to work place requirements

Throughout the term of the apprenticeship, the learner must conduct the above performance a multiple of times and in a variety of contexts



LINE (GAC): C HYDRAULICS

Competency: C3 Diagnose and Repair Advanced Hydraulic Systems

Objectives

To be competent in this area, the individual must be able to:

- Diagnose hydraulic systems.
- Repair hydraulic systems and components.
- Repair electronic hydraulic systems.

LEARNING TASKS

1. Describe hydraulic systems and components

2. Diagnose hydraulic systems

3. Repair hydraulic systems and components

CONTENT

- Pumps
 - Vane
 - Gear
 - Piston
 - Pressure compensated
 - Load sensing (HD only)
- Actuators
 - Cylinders
 - Motors
- Valves
 - Pressure
 - Flow
 - Directional
- System types
 - Closed loop
 - Open loop
- Safety precautions
- Diagnostic procedures
- Test equipment
 - Pressure gauges
 - Flow meters
 - Temperature sensors
- Cycle times
- Diagnostic codes
- Manufacturer's procedures
- Safety precautions
- Components
 - Reservoirs
 - Pumps
 - Actuators
 - Control valves



LEARNING TASKS

4. Repair electronic hydraulic systems

CONTENT

- Accumulators
- Coolers
- Connecting lines
- Fluids
- Inspection
- Remove/install
- Repair/replace
- System flushing
- Safety precautions
- Sensors
- Actuators
- Wiring and connectors
- Electronic Control Module (ECM)
- Communication Protocols
- Remove/install
- Repair/replace
- Verify systems operation

Achievement Criteria

Performance C3 Service and Repair Advanced Hydraulic Systems

Conditions The learner will require:

- Tools
- Test equipment
- Manufacturer's specifications
- A work place or training environment
- Equipment with mobile hydraulic systems

Criteria The learner will be competent once the performance criteria is met:

- Followed safe work practices throughout entire task including lock out procedures
- Conducted in a logical manner
- Conducted according to manufacturer's specifications
- Conducted according to work place requirements

Throughout the term of the apprenticeship, the learner must conduct the above performance a multiple of times and in a variety of contexts

**Achievement Criteria**

Performance D12 Service, Diagnose and Repair Hybrid Systems

Conditions The learner will require:

- Tools
- Test equipment
- Manufacturer's specifications
- A work place or training environment
- Equipment with hybrid systems

Criteria The learner will be competent once the performance criteria is met:

- Followed safe work practices throughout entire task including lock out procedures
- Conducted in a logical manner
- Conducted according to manufacturer's specifications
- Conducted according to work place requirements

Throughout the term of the apprenticeship, the learner must conduct the above performance a multiple of times and in a variety of contexts



LEARNING TASKS

3. Repair power assisted steering components

CONTENT

- Removal
- Repair/install
- Adjustments
- Lubrication
- Verify operation

Achievement Criteria

Performance E3 Diagnose and Repair Hydraulic Assisted Steering Systems

Conditions The learner will require:

- Tools
- Test equipment
- Manufacturer's specifications
- A work place or training environment
- Equipment with hydraulic assisted steering

Criteria The learner will be competent once the performance criteria is met:

- Followed safe work practices throughout entire task including lock out procedures
- Conducted in a logical manner
- Conducted according to manufacturer's specifications
- Conducted according to work place requirements

Throughout the term of the apprenticeship, the learner must conduct the above performance a multiple of times and in a variety of contexts

**Achievement Criteria**

Performance E7 Align Vehicle

Conditions The learner will require:

- Tools
- Test equipment
- Manufacturer's specifications
- A work place or training environment
- Equipment with various frame configurations

Criteria The learner will be competent once the performance criteria is met:

- Followed safe work practices throughout entire task including lock out procedures
- Conducted in a logical manner
- Conducted according to manufacturer's specifications
- Conducted according to work place requirements

Throughout the term of the apprenticeship, the learner must conduct the above performance a multiple of times and in a variety of contexts



Section 4

TRAINING PROVIDER STANDARDS



Facility Requirements

Classroom Area

- Recommended 2.5 Sq. meters per student
- Projection screen, multimedia projector, whiteboard or similar
- Seating and tables suitable for lecturing
- Compliance with all safety codes

Shop Area

- Recommended 25 Sq. meters per student
- Meet all safety and fire, and environmental codes
- Good lighting
- Appropriate lifting cranes as required to move industry equipment
- Approved ventilation systems

Lab Requirements

- Recommended 10 Sq. meters per student
- Computer labs on-site

Student Facilities

- 1 locker per student
- Study areas
- Computer labs
- Food facility
- Hand wash facility
- Washroom facility

Instructor's Office Space

- Recommended 3.5 Sq. Meters

Other

- Storage space for classroom and shop props
- Parking space for heavy equipment and trucks
- Outside machine/truck wash bay



Tools and Equipment

Shop Equipment

Required Safety Equipment

- Ear protection
- Emergency backup lighting
- Eye wash station
- Face shield
- Fall arrest equipment
- Fall prevention equipment
- Fire extinguisher
- Fireproof blanket
- First aid station
- Gas mask
- Gloves
- Goggles
- Ladder
- Leather gloves
- Leggings
- Manlift
- Respirator
- Safety boots
- Safety cage
- Safety glasses
- Safety hat
- Splash suit

Student Tools (supplied by school)

Required

- 1/4, 3/8, and 1/2 inch drive socket sets
- Adjustable wrench
- Bar (pry, aligning, heel)
- Battery post and clamp cleaner, battery
- Terminal nut
- Battery terminal puller
- Brass drift
- Center punch
- Chisel
- Wire cutter, plier cutters, shears
- Digital multimeter



- Feeler gauge set
- File
- Hacksaw and blade
- Hammer: impact, rubber, sledge, air, slide, soft blow
- Hex key set, metric and imperial
- Jumper wire
- Magnetic pick-up tool (telescopic, flex)
- Metric and imperial steel rule
- Micrometer
- Pick (o-ring, seal)
- Pin punch
- Pipe wrench
- Pliers: insulated, snap ring, torque, punch
- Scraper
- Screwdriver
- Tape measure
- Test light
- Tool chest
- Universal joint
- Utility knife
- Wire brush
- Wire crimper and stripper
- Wrench set, combination (metric & imperial)
- Wrench set, flare nut (metric & imperial)

Recommended

- Air pressure gauge
- Belt tension gauge
- Boost gauge
- Borescope
- Depth micrometer
- Dial gauge
- Digital multimeter
- Electric pressure gauge
- Flowmeter
- Fuel pressure gauge
- Holding gauge
- Hydraulic pressure testing gauge/fittings
- Hydrometer
- Inside micrometer
- Level
- manifold gauge



- Mechanical pressure gauge
- Non-magnetic feeler gauge
- Oil temperature gauge
- Phototachometer
- Pressure gauge
- Pull-type scale
- Pyrometer
- Small hole gauge
- Spectroscope
- Spring scale
- Steel ruler
- Stethoscope
- Straight edge
- Tachometer
- Telescoping gauge
- Test light
- Thermometer
- Timing gauge
- Tire gauge
- Transmission gauge set
- Vacuum gauge

Student Equipment (supplied by school)

Required

- Air compressor
- Axle stand
- Battery charger
- Battery load/starting system tester
- Bearing heater
- Bleeding equipment
- Booster cable
- Bottle/axle jack
- Cable hoist
- Chain hoist
- Component heating or cooling equipment
- Computer, portable diagnostic computer
- Crack detecting equipment
- Cutting and welding torch set
- Cylinder cart and tank
- Diagnostic equipment
- Dolly
- Engine rotator



- Floor hoist
- Forklift
- Drill: bench, hand drivers, twist, air
- Fast charger
- Fuel recovery and storage system
- Grinder: bench, hand, valve
- Honing equipment
- Hydraulic floor jack
- Hydraulic hand jack
- Hydraulic transmission jack
- Leak detection equipment
- Nitrogen charging equipment
- Parts wash station
- Press: arbor, spring, hydraulic, bushing, shop, mechanical
- Pressure washer
- Printer
- Puller: bearing, gear, heavy duty, reamer
- Retrieval and storage equipment
- Scanning tool
- Shop crane
- Sling/cable/chain
- Spreader bar
- Support stand
- Tire guard
- Transmission jack
- Welding equipment
- Refrigerant recycling cart
- Safety equipment

Recommended

- Alignment tool
- Analyzer: gas, infrared, vibration meter
- Black light
- Coolant recycling unit
- Chemical agitator
- Mobile crane
- Oil recovery and storage tank



Safety Equipment for Student (supplied by student)

Required

- Coveralls
- Safety boots (CSA approved)
- Safety glasses (CSA approved)

Recommended

- High visibility coveralls
- Mechanics gloves



Reference Materials

Recommended Resources

- Industry Training Authority (ITA) www.itabc.ca
- WorkSafeBC www.worksafebc.com

Foundation

- Heavy Mechanical Group Foundation Learning Resources, Queens Printer
 - FOS Hydraulics (Deere) ISBN 0-86691-239-0
- or
- Vickers Mobile Hydraulics, ISBN 0-9634162-5-1
 - FOS Electronic and Electrical Systems (Deere), ISBN 0-86691-240-1
 - Heavy Duty Truck Systems 5th Edition (Norman/Scharff/Cosinchock), ISBN 0-7668-1340-1
 - Inside Air Brake Valves and Devices (Allan C. Wright)
 - Alberta Trades Training Modules, Queens Printer
 - FOS Air Conditioning (Deere) ISBN 086691-221-5
 - Driving Commercial Vehicles Manual MV2677 - Insurance Corporation of BC (ICBC) www.icbc.com

Level One

- Heavy Mechanical Group level 1 Learning Resources, Queens Printer
 - FOS Hydraulics (Deere) ISBN 0-86691-239-0
- or
- Vickers Mobile Hydraulics, ISBN 0-9634162-5-1
 - FOS Electronic and Electrical Systems (Deere), ISBN 0-86691-240-1
 - Heavy Duty Truck Systems 5th Edition (Norman/Scharff/Cosinchock), ISBN 0-7668-1340-1
 - Inside Air Brake Valves and Devices (Allan C. Wright)
 - Alberta Trades Training Modules, Queens Printer
 - FOS Air Conditioning (Deere) ISBN 086691-221-5
 - Driving Commercial Vehicles Manual MV2677 - Insurance Corporation of BC (ICBC) www.icbc.com

Level Two

- Heavy Duty Truck Systems 5th Edition (Norman/Scharff/Cosinchock), ISBN 0-7668-1340-1
 - Alberta trades Training Modules, Queens Printer
 - FOS Hydraulics (Deere) ISBN 0-86691-239-0
- or
- Vickers Mobile Hydraulics, ISBN 0-9634162-5-1

NOTE:

This list of Reference Materials is for training providers. Apprentices should contact their preferred training provider for a list of recommended or required texts for this program.



Instructor Requirements

Occupation Qualification

The instructor must possess:

- Heavy Duty Equipment Technician – Certificate of Qualification with Interprovincial Red Seal endorsement; or
- Transport Trailer Technician – Certificate of Qualification with Interprovincial Red Seal endorsement

Work Experience

A minimum of 10 years' experience working in the industry as a journeyman.

Instructional Experience and Education

It is preferred that the instructor also possesses one of the following:

- Grade 12 or equivalent
- Instructors Diploma



Appendices



Appendix A

Assessment Guidelines



Grading Sheet: Subject Competency and Weightings

PROGRAM: IN-SCHOOL TRAINING: ITA DIRECT ACCESS CODE:		TRANSPORT TRAILER TECHNICIAN LEVEL 1 000191	
LINE	SUBJECT COMPETENCIES	THEORY WEIGHTING	PRACTICAL WEIGHTING
A	Occupational Skills	10%	10%
B	Brakes	19%	19%
C	Hydraulics	15%	15%
D	Electrical	17%	17%
E	Frames, Steering and Suspension	19%	19%
F	Trailer	10%	10%
G	Heating, Ventilation and Air Conditioning	5%	5%
J	Structural Components and Accessories	5%	5%
	Total	100%	100%
In-school theory / practical subject competency weighting		50%	50%
Final in-school percentage score		IN-SCHOOL %	

In-school Percentage Score Combined theory and practical subject competency multiplied by	80%
Standard Level Exam Percentage Score The exam score is multiplied by	20%
Final Percentage Score	FINAL%



PROGRAM: IN-SCHOOL TRAINING: ITA DIRECT ACCESS CODE:		TRANSPORT TRAILER TECHNICIAN LEVEL 2 000191	
LINE	SUBJECT COMPETENCIES	THEORY WEIGHTING	PRACTICAL WEIGHTING
B	Brakes	30%	30%
C	Hydraulics	30%	30%
D	Electrical	5%	5%
E	Frames, Steering and Suspension	25%	25%
J	Structural Components and Accessories	10%	10%
	Total	100%	100%
In-school theory / practical subject competency weighting		50%	50%

<p>Final in-school percentage score</p> <p>Apprentices must achieve a minimum 70% as the final in-school percentage score to be eligible to write the Interprovincial Red Seal exam.</p>	<p>IN-SCHOOL %</p>
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All apprentices who complete Levels 1-2 of the Transport Trailer Technician program with a FINAL level percentage score of 70% or greater will write the Interprovincial Red Seal examination as their final assessment.

ITA will enter the apprentices' Transport Trailer Technician Interprovincial Red Seal examination percentage score in ITA Direct Access.

A minimum percentage score of 70% on the examination is required for a pass.