

PROGRAM OUTLINE

Recreation Vehicle Service
Technician



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RECREATION VEHICLE SERVICE TECHNICIAN PROGRAM OUTLINE

**APPROVED BY INDUSTRY
NOVEMBER 2018**

**BASED ON
NOA 2012**

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



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Section 1

INTRODUCTION

Recreation Vehicle Service Technician



Foreword

This Recreation Vehicle Service Technician Program Outline is intended as a guide for instructors, apprentices, and employers of apprentices as well as for the use of industry organizations, regulatory bodies, and provincial and federal governments. It reflects updated standards based on the 2012 Red Seal National Occupational Analysis (NOA) and was developed by British Columbia industry and instructor subject matter experts. This Program Outline will form the basis for further updating of the British Columbia Recreation Vehicle Service Technician Program by the Industry Training Authority (ITA).

Practical instruction by demonstration and student participation should be integrated with classroom sessions. Safe working practices, even though not always specified in each operation or topic, are an implied part of the program and should be stressed throughout the apprenticeship.

This Program Outline includes a list of recommended reference textbooks that are available to support the learning objectives and the minimum shop requirements needed to support instruction.

Competencies are to be evaluated through written exams and practical assessments. A passing grade is achieved by getting an overall mark of 70%. See the Assessment Guidelines for more details.

Achievement Criteria are included for those competencies that require a practical assessment. The intent of including Achievement Criteria in the Program Outline is to ensure consistency in training across the many training institutions in British Columbia. Their purpose is to reinforce the theory and to provide a mechanism for evaluation of the learner's ability to apply the theory to practice. It is important that these performances be observable and measurable and that they reflect the skills spelled out in the competency as those required of a competent journey person. The conditions under which these performances will be observed and measured must be clear to the learner as well as the criteria by which the learner will be evaluated. The learner must also be given the evaluation criteria.

The performance spelled out in the Achievement Criteria is a suggested performance and is not meant to stifle flexibility of delivery. Training providers are welcome to substitute other practical performances that measure similar skills and attainment of the competency. Multiple performances may also be used to replace individual performances where appropriate.

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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- Jordan Hill, Technician, Snowy Peaks RV, Fernie
- Jon Itterman, Instructor, Okanagan College
- Byron Scott, Owner Operator, Courtenay RV Specialists
- Bill Smith, Technician, Travelhome RV, Abbotsford

Subject Matter Experts retained as outline reviewers:

- Victor Flint, Instructor, Okanagan College, Owner Operator, Family First RV
- Jordan Hill, Technician, Snowy Peaks RV, Fernie
- Jon Itterman, Instructor, Okanagan College
- Byron Scott, Owner Operator, Courtenay RV Specialists
- Bill Smith, Technician, Travelhome RV, Abbotsford

The Industry Training Authority would like to acknowledge the dedication and hard work of all participants in identifying the training requirements of the Recreation Vehicle Service Technician (RVST) trade.



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	Employers/ Sponsors	Apprentices	Challengers
Program Credentialing Model	Communicate program length and structure, and all pathways to completion	Understand the length and structure of the program	Understand the length and structure of the program, and pathway to completion	Understand challenger pathway to Certificate of Qualification
OAC	Communicate the competencies that industry has defined as representing the scope of the occupation	Understand the competencies that an apprentice is expected to demonstrate in order to achieve certification	View the competencies they will achieve as a result of program completion	Understand the competencies they must demonstrate in order to challenge the program
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	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	Understand the relative weightings of various competencies of the occupation on which assessment is based
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	Identifies detailed program content and performance expectations for competencies with a practical component; may be used as a checklist prior to signing a recommendation for certification (RFC) for an apprentice	Provides detailed information on program content and performance expectations for demonstrating competency	Allows individual to check program content areas against their own knowledge and performance expectations against their own skill levels



Section	Training Providers	Employers/ Sponsors	Apprentices	Challengers
Training Provider Standards	Defines the facility requirements, tools and equipment, reference materials (if any) and instructor requirements for the program	Identifies the tools and equipment an apprentice is expected to have access to; which are supplied by the training provider and which the student is expected to own	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	Identifies the tools and equipment a tradesperson is expected to be competent in using or operating; which may be used or provided in a practical assessment
Appendix – Glossary of Acronyms			Defines program specific acronyms	



Section 2

PROGRAM OVERVIEW

Recreation Vehicle Service Technician

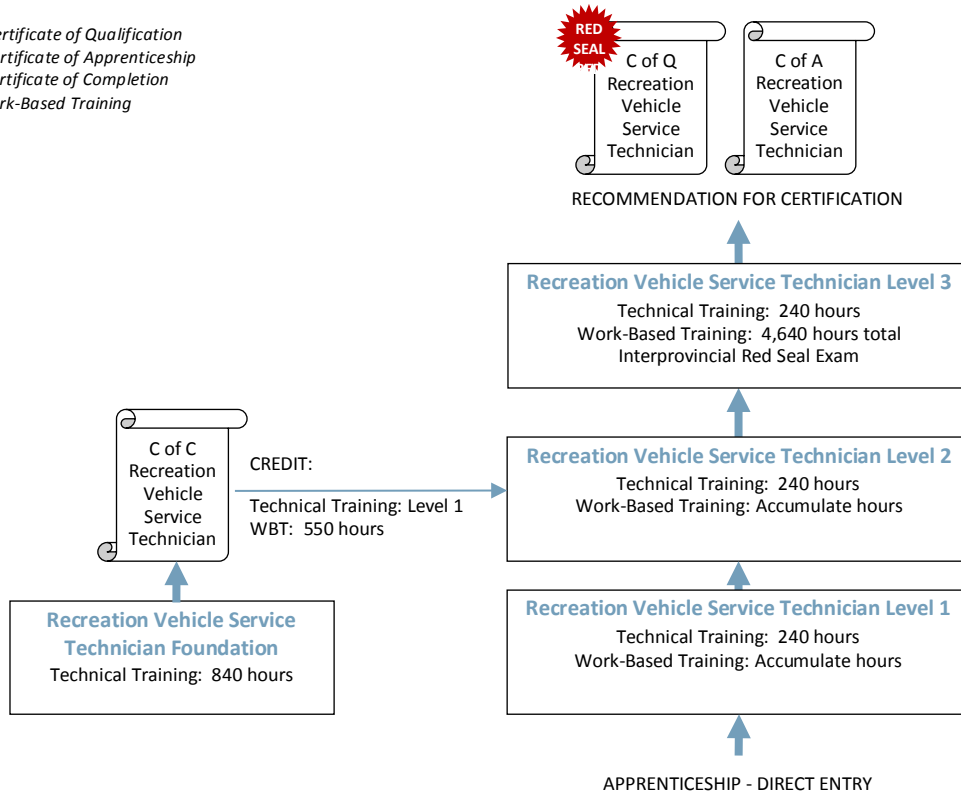


Program Credentialing Model

Apprenticeship Pathway

This graphic provides an overview of the Recreation Vehicle Service Technician apprenticeship pathway.

*C of Q = Certificate of Qualification
 C of A = Certificate of Apprenticeship
 C of C = Certificate of Completion
 WBT = Work-Based Training*



CROSS-PROGRAM CREDITS

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

None



Occupational Analysis Chart

RECREATION VEHICLE SERVICE TECHNICIAN

Occupation Description: Recreation vehicles (RV) are vehicles designed as temporary living quarters for recreational, camping, travel or seasonal use. RVs may be motorized (motorhomes) or towable (travel trailers, folding camping trailers, truck campers, and park models). RVs do not include off-road vehicles. RV service technicians work on systems and components of recreation vehicles, including electrical components, plumbing, propane gas components, appliances, exterior and interior components, structural frames and towing systems. They diagnose, repair, replace, install, adjust, test, maintain and modify these components and systems. They may also perform maintenance and repairs on trailer frames and running gear. They must be knowledgeable about each system’s function and the interaction among various systems. However, it is important to note that they do not work on the motor or drive train components of motorized RVs. RV service technicians are typically employed at RV dealerships, independent RV repair shops, RV manufacturers and may also be self-employed. They may work at indoor shops and outdoors at RV sites. Safety is important due to risks and hazards such as: working at heights, with electricity, with explosive and volatile materials, in the outdoor environment, and under vehicles.

PERFORM SAFETY-RELATED ACTIVITIES A	Use personal protective equipment (PPE) and safety equipment A1 1	Maintain safe work environment A2 1		
	USE TOOLS AND EQUIPMENT B	Use tools and equipment B1 1	Use lifting, moving and access equipment B2 1	
PERFORM COMMON WORK PRACTICES C	Use technical information C1 1 3	Perform pre-delivery inspections (PDI) C2 1	Use communication techniques C3 1 3	Perform estimation procedures C4 3
	SERVICE WATER SYSTEMS D	Service potable water systems D1 1	Service waste water systems D2 1	



SERVICE ELECTRICAL SYSTEMS F	Apply electrical theory F1 1	Service AC electrical systems F2 1 2 3	Service DC electrical systems F3 1 2 3	Service vehicle networking systems F4 1 3
	SERVICE LIQUID PETROLEUM (LP) GAS SYSTEMS H	Maintain LP gas systems H1 1 2	Install LP gas systems H2 2	Diagnose LP gas systems H3 2
SERVICE WATER HEATERS I		Maintain water heaters I1 1 2	Install water heaters I2 2	Diagnose water heaters I3 2
	SERVICE FURNACES J	Maintain furnaces J1 1 2	Install furnaces J2 2	Diagnose furnaces J3 2
SERVICE COOKTOPS AND OVENS K		Maintain cooktops and ovens K1 1 2	Install cooktops and ovens K2 2	Diagnose cooktops and ovens K3 2
	SERVICE REFRIGERATORS L	Maintain refrigerators L1 1 2	Install refrigerators L2 2	Diagnose refrigerators L3 2



Program Overview

SERVICE AIR CONDITIONERS (A/C), REFRIGERATION AND HEAT PUMPS M	Maintain A/C, refrigeration and heat pumps M1 1 3	Install A/C, refrigeration and heat pumps M2 2	Diagnose A/C, refrigeration and heat pumps M3 3	Repair A/C, refrigeration and heat pumps M4 3		
SERVICE EXTERIOR COMPONENTS O	Maintain exterior components O1 2	Install exterior components O2 2	Diagnose exterior components O3 2	Repair exterior components O4 2 3		
SERVICE INTERIOR COMPONENTS P	Maintain interior components P1 2	Install interior components P2 2	Diagnose interior components P3 2	Repair interior components P4 2	Service consumer products P5 3	
SERVICE CHASSIS AND MECHANICAL COMPONENTS Q	Maintain chassis and mechanical components Q1 1 3	Install chassis and mechanical components Q2 3	Diagnose chassis and mechanical components Q3 1 3	Repair chassis and mechanical components Q4 1 3	Service slideout systems Q5 3	Service levelling systems Q6 3
	Service folding camping trailers Q7 3					
SERVICE TOWING SYSTEMS R	Maintain towing systems R1 1	Install towing systems R2 1 3	Diagnose towing systems R3 1	Repair towing systems R4 1		



Training Topics and Suggested Time Allocation

RECREATION VEHICLE SERVICE TECHNICIAN – LEVEL 1

		% of Time Allocated to:			
		% of Time	Theory	Practical	Total
Line A	PERFORM SAFETY-RELATED ACTIVITES	8%	50%	50%	100%
A1	Use personal protective equipment (PPE) and safety equipment		✓	✓	
A2	Maintain safe work environment		✓	✓	
Line B	USE TOOLS AND EQUIPMENT	8%	20%	80%	100%
B1	Use tools and equipment		✓	✓	
B2	Use lifting, moving and access equipment		✓	✓	
Line C	PERFORM COMMON WORK PRACTICES	13%	50%	50%	100%
C1	Use technical information		✓	✓	
C2	Perform pre-delivery inspections (PDI)		✓	✓	
C3	Use communication techniques		✓	✓	
Line D	SERVICE WATER SYSTEMS	12%	50%	50%	100%
D1	Service potable water systems		✓	✓	
D2	Service waste water systems		✓	✓	
Line F	SERVICE ELECTRICAL SYSTEMS	25%	50%	50%	100%
F1	Apply electrical theory		✓		
F2	Service AC electrical systems		✓	✓	
F3	Service DC electrical systems		✓	✓	
F4	Service vehicle networking systems		✓	✓	
Line H	SERVICE LIQUID PETROLEUM (LP) GAS SYSTEMS	10%	50%	50%	100%
H1	Maintain LP gas systems		✓	✓	
Line I	SERVICE WATER HEATERS	3%	50%	50%	100%
I1	Maintain water heaters		✓	✓	
Line J	SERVICE FURNACES	3%	50%	50%	100%
J1	Maintain furnaces		✓	✓	
Line K	SERVICE COOKTOPS AND OVENS	2%	50%	50%	100%
K1	Maintain cooktops and ovens		✓	✓	
Line L	SERVICE REFRIGERATORS	3%	50%	50%	100%
L1	Maintain refrigerators		✓	✓	
Line M	SERVICE AIR CONDITIONERS (A/C), REFRIGERATION AND HEAT PUMPS	1%	75%	25%	100%
M1	Maintain A/C, refrigeration and heat pumps		✓	✓	



% of Time Allocated to:

		% of Time	Theory	Practical	Total
Line Q	SERVICE CHASSIS AND MECHANICAL COMPONENTS	6%	50%	50%	100%
Q1	Maintain chassis and mechanical components		✓	✓	
Q3	Diagnose chassis and mechanical components		✓	✓	
Q4	Repair chassis and mechanical components		✓	✓	
Line R	SERVICE TOWING SYSTEMS	6%	50%	50%	100%
R1	Maintain towing systems		✓		
R2	Install towing systems		✓	✓	
R3	Diagnose towing systems		✓	✓	
R4	Repair towing systems		✓		
Total Percentage for Recreation Vehicle Service Technician Level 1		100%			



Training Topics and Suggested Time Allocation

RECREATION VEHICLE SERVICE TECHNICIAN – LEVEL 2

		% of Time Allocated to:			
		% of Time	Theory	Practical	Total
Line F	SERVICE ELECTRICAL SYSTEMS	13%	50%	50%	100%
F2	Service AC electrical systems		✓	✓	
F3	Service DC electrical systems		✓	✓	
Line H	SERVICE LIQUID PETROLEUM (LP) GAS SYSTEMS	22%	75%	25%	100%
H1	Maintain LP gas systems		✓	✓	
H2	Install LP gas systems		✓	✓	
H3	Diagnose LP gas systems		✓	✓	
H4	Repair LP gas systems		✓	✓	
Line I	SERVICE WATER HEATERS	5%	50%	50%	100%
I1	Maintain water heaters		✓	✓	
I2	Install water heaters		✓	✓	
I3	Diagnose water heaters		✓	✓	
I4	Repair water heaters		✓	✓	
Line J	SERVICE FURNACES	5%	50%	50%	100%
J1	Maintain furnaces		✓	✓	
J2	Install furnaces		✓	✓	
J3	Diagnose furnaces		✓	✓	
J4	Repair furnaces		✓	✓	
Line K	SERVICE COOKTOPS AND OVENS	5%	50%	50%	100%
K1	Maintain cooktops and ovens		✓	✓	
K2	Install cooktops and ovens		✓	✓	
K3	Diagnose cooktops and ovens		✓	✓	
K4	Repair cooktops and ovens		✓	✓	
Line L	SERVICE REFRIGERATORS	5%	50%	50%	100%
L1	Maintain refrigerators		✓	✓	
L2	Install refrigerators		✓	✓	
L3	Diagnose refrigerators		✓	✓	
L4	Repair refrigerators		✓	✓	
Line M	SERVICE AIR CONDITIONERS (A/C), REFRIGERATION AND HEAT PUMPS	3%	50%	50%	100%
M2	Install A/C, refrigeration and heat pumps		✓	✓	
Line O	SERVICE EXTERIOR COMPONENTS	21%	50%	50%	100%
O1	Maintain exterior components		✓	✓	
O2	Install exterior components		✓	✓	



% of Time Allocated to:

		% of Time	Theory	Practical	Total
O3	Diagnose exterior components		✓	✓	
O4	Repair exterior components		✓	✓	
Line P	SERVICE INTERIOR COMPONENTS	21%	50%	50%	100%
P1	Maintain interior components		✓	✓	
P2	Install interior components		✓	✓	
P3	Diagnose interior components		✓	✓	
P4	Repair interior components		✓	✓	
Total Percentage for Recreation Vehicle Service technician Level 2		100%			



Training Topics and Suggested Time Allocation

RECREATION VEHICLE SERVICE TECHNICIAN – LEVEL 3

		% of Time Allocated to:			
		% of Time	Theory	Practical	Total
Line C	PERFORM COMMON WORK PRACTICES	19%	50%	50%	100%
C1	Use technical information		✓	✓	
C3	Use communication techniques		✓	✓	
C4	Perform estimation procedures		✓	✓	
Line F	SERVICE ELECTRICAL SYSTEMS	20%	50%	50%	100%
F2	Service AC electrical systems		✓	✓	
F3	Service DC electrical systems		✓	✓	
F4	Service vehicle networking systems		✓	✓	
Line M	SERVICE AIR CONDITIONERS (A/C), REFRIGERATION AND HEAT PUMPS	12%	50%	50%	100%
M1	Maintain A/C, refrigeration and heat pumps		✓	✓	
M3	Diagnose A/C, refrigeration and heat pumps		✓	✓	
M4	Repair A/C, refrigeration and heat pumps		✓	✓	
Line O	SERVICE EXTERIOR COMPONENTS	12%	50%	50%	100%
O4	Repair exterior components		✓	✓	
Line P	SERVICE INTERIOR COMPONENTS	3%	100%	0%	100%
P5	Service consumer products		✓		
Line Q	SERVICE CHASSIS AND MECHANICAL COMPONENTS	21%	50%	50%	100%
Q1	Maintain chassis and mechanical components		✓		
Q2	Install chassis and mechanical components		✓		
Q3	Diagnose chassis and mechanical components		✓		
Q4	Repair chassis and mechanical components		✓		
Q5	Service slideout systems		✓	✓	
Q6	Service levelling systems		✓	✓	
Q7	Service folding camping trailers		✓	✓	
Line R	SERVICE TOWING SYSTEMS	13%	100%	0%	100%
R2	Install towing systems		✓		
Total Percentage for Recreation Vehicle Service Technician Level 3		100%			



Section 3

PROGRAM CONTENT

Recreation Vehicle Service Technician



Level 1

Recreation Vehicle Service Technician



Line (GAC): **A PERFORM SAFETY-RELATED ACTIVITES**
Competency: **A1 Use personal protective equipment (PPE) and safety equipment**

Objectives

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

- Describe PPE and safety equipment.

LEARNING TASKS

1. Describe flammable and toxic materials

2. Describe fire safety

3. Describe ventilation system

CONTENT

- Types
 - Fuels
 - Diesel
 - Gasoline
 - Propane
 - Lubricants
 - Aerosols
 - Cleaners
 - Adhesives
 - Combustible materials
- Handling and storage
 - Spontaneous combustion
- Conditions to support fire
- Combustion triangle
- Classes of fires
 - A - combustibles
 - B - liquids
 - C - electrical
 - D – metals
- Symbols and colours
- Types of fire extinguishers
- Ventilation systems
 - Dust collection
 - Exhaust collection
 - Air exchange
- Situations when ventilation systems must be used
 - Work site conditions
 - Multiple people working
 - Outside/inside
 - Time of year



LEARNING TASKS

4. Describe PPE

CONTENT

- Personal apparel
 - Clothing
 - Hair and beards
 - Jewellery
- Personal protection
 - Head
 - Hands
 - Lungs
 - Eyes
 - Face
 - Ears
 - Feet
- Fall protection equipment



Line (GAC): B USE TOOLS AND EQUIPMENT

Competency: B1 Use tools and equipment

Objectives

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

- Use tools and equipment.

LEARNING TASKS

1. Use hand tools

2. Use hand-held power tools

3. Use shop equipment

CONTENT

- Safety
- Types
- Handling
- Maintenance
 - Sharpening
 - Lubricating
 - Adjusting
 - Storing
- Safety
- Types
- Handling
- Maintenance
 - Inspecting
 - Sharpening
 - Lubricating
 - Adjusting
 - Storing
- Safety
- Types
- Selection
- Maintenance
 - Inspecting
 - Routine
 - Lubricating
 - Adjusting
 - Storing



Achievement Criteria

Performance The learner will use tools to fabricate a U-tube manometer.

Conditions The learner will be given

- Marking rubric
- Tools
- Materials
- Specifications

Criteria The learner will be evaluated on

- Safety
- Time management
- Detail



Line (GAC): B USE TOOLS AND EQUIPMENT
Competency: B2 Use lifting, moving and access equipment

Objectives

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

- Describe lifting, moving and access equipment.

LEARNING TASKS

CONTENT

- | | |
|-------------------------------|---|
| 1. Describe lifting equipment | <ul style="list-style-type: none"> • Safety • Types <ul style="list-style-type: none"> ○ Jacks ○ Hoists • Operation • Maintenance |
| 2. Describe support systems | <ul style="list-style-type: none"> • Safety • Types <ul style="list-style-type: none"> ○ Stands • Operation • Maintenance |
| 3. Describe moving equipment | <ul style="list-style-type: none"> • Safety • Types <ul style="list-style-type: none"> ○ Powered movers <ul style="list-style-type: none"> ▪ Forklifts ○ Dollies • Operation • Maintenance |
| 4. Describe access equipment | <ul style="list-style-type: none"> • Safety • Types <ul style="list-style-type: none"> ○ Ladders ○ Scaffolding • Selection • Use • Maintenance |



Line (GAC): **C** **PERFORM COMMON WORK PRACTICES**
Competency: **C1** **Use technical information**

Objectives

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

- Describe shop business practices.
- Describe shop management systems.

LEARNING TASKS

1. Describe shop business practices

2. Describe shop management systems

CONTENT

- Time management
 - Flat rate
 - Hourly
 - Productivity
- Invoicing
- Parts ordering
- Service information
- Time keeping
- Diagnostic



Line (GAC): C PERFORM COMMON WORK PRACTICES
Competency: C2 Perform pre-delivery inspections (PDI)

Objectives

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

- Perform PDI.

LEARNING TASKS

1. Describe pre-delivery inspections

2. Perform PDI

CONTENT

- Pre-delivery inspection sheets
 - Test propane systems
 - Test appliances
 - Test electrical systems
 - Test plumbing systems
 - Check accessories
 - Chassis inspection
 - Interior/exterior inspection
 - Test all safety related systems

- Complete PDI sheet
- Deficiencies
 - Recording
 - Reporting
 - Pre-authorization for repair

Achievement Criteria

Performance	The learner will perform PDI.
Conditions	The learner will be given <ul style="list-style-type: none"> • PDI sheet • Tools and equipment
Criteria	The learner will be evaluated on <ul style="list-style-type: none"> • Safety • Time management • Detail



Line (GAC): C PERFORM COMMON WORK PRACTICES
Competency: C3 Use communication techniques

Objectives

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

- Use communication techniques.

LEARNING TASKS

1. Demonstrate two-way communication
2. Use active listening
3. Use digital communication technologies

CONTENT

- Verbal and written instructions
- Record keeping
 - Service/work orders
 - Technical reports
 - Parts requisition
- Attention
- Open-ended questions
- Clarification
- Hand-held devices



Line (GAC): **D SERVICE WATER SYSTEMS**
Competency: **D1 Service potable water systems**

Objectives

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

- Service potable water systems.

LEARNING TASKS

CONTENT

1. Describe potable water systems

- Codes
- Types
 - Demand
 - City
 - Manual
- Components
 - Lines
 - Polyvinyl chloride (PVC)
 - Polyethylene (Pex)
 - Polybutylene (PB)
 - High pressure vinyl hose
 - Check valves
 - Pumps
 - Filters
 - Tanks
 - Accumulator tanks
 - Fittings
 - Fixtures

2. Repair potable water systems

- Tank filler systems
- Tank drainage systems
- Water level monitor systems
- Diagnosis and repair of
 - Components
 - Tank filler systems
 - Tank drainage systems
- Testing
 - Verification of operation

3. Install potable water systems

- Installation procedures for
 - Components
 - Tank filler systems
 - Tank drainage systems
- Testing
 - Verification of operation



LEARNING TASKS

4. Maintain potable water systems

CONTENT

- Tanks
 - Cleaning
 - Sanitizing
 - Winterizing/summerizing
 - Antifreeze
 - Air
- Lines
 - Cleaning
 - Sanitizing
 - Winterizing/summerizing
 - Antifreeze
 - Air



Line (GAC): D SERVICE WATER SYSTEMS

Competency: D2 Service waste water systems

Objectives

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

- Describe servicing waste water systems.

LEARNING TASKS

1. Describe recreation vehicle (RV) waste water systems

2. Describe repairing waste water systems

3. Describe installing waste water systems

4. Describe maintaining waste water systems

CONTENT

- Canadian Standards Association (CSA) codes
- Types
 - Gray
 - Black
- Components
 - Tanks
 - Piping
 - Termination valves
 - Toilets
 - Sink/shower drains
 - Macerators
 - Tank flush valves
- Diagnosis and repair of
 - Components
- Testing
 - Verification of operation
- Installation procedures for
 - Components
- Testing
 - Verification of operation
- Tanks
 - Cleaning
 - Treatment
 - Flushing
 - Winterizing/summerizing
- Piping
 - Cleaning
 - Treatment
 - Flushing
 - Winterizing/summerizing
- Components
 - Cleaning
 - Lubrication
 - Winterizing/ summerizing



Line (GAC): **F** **SERVICE ELECTRICAL SYSTEMS**
Competency: **F1** **Apply electrical theory**

Objectives

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

- Apply electrical theory.

LEARNING TASKS

1. Describe basic electrical theory

2. Describe basic electrical circuits

3. Describe wire sizing and circuit protection devices

CONTENT

- Electron theory
- Sources of electrical energy
- Direct current (DC)
- Alternating current (AC)
- Properties of conductors, insulators and semi-conductors
- Current, voltage, resistance and electrical power
- Relationship between current, voltage, resistance and electrical power
- Electricity production
 - Friction
 - Pressure
 - Heat
 - Magnetic
 - Light
 - Chemical

- Closed
- Open
- Short
- Dead
- Live
- Load
- Source
- Series
- Parallel
- Series/parallel circuits
- Types of wire and cable
- Identifying wire sizes
 - American Wire Gauge (AWG)
 - Ampacity
- Voltage ratings
- Types of circuit protection and sizing
 - Ampacity
 - Voltage ratings



LEARNING TASKS

4. Describe wire connections

CONTENT

- Types
 - Solderless
 - Self-sealing
 - Soldered
 - Bonding lugs
- Characteristics of solder and fluxes
- Insulating methods
 - Tape
 - Heat shrink



Line (GAC): F **SERVICE ELECTRICAL SYSTEMS**
Competency: F2 **Service AC electrical systems**

Objectives

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

- Verify operation of AC electrical systems.

LEARNING TASKS

CONTENT

1. Describe AC electrical systems

- Describe electrical safety
- Codes
- Energy sources
 - Shore power
 - Generators
 - Frequency
 - Inverters
- 120VAC interior lights
- 120VAC plug and receptacles
- 120VAC circuits
- 120VAC converter
- Ground fault circuit interruptor (GFCI) system
- Hotskin test
- Polarity test

2. Verify operation of AC electrical systems

- Selecting tools
- Energy sources
 - Shore power
 - Generators
 - Inverters
- 120VAC interior lights
- 120VAC plug and receptacles
- 120VAC circuits
- 120VAC converter
- GFCI system
- Hotskin test
- Polarity test



Line (GAC): F **SERVICE ELECTRICAL SYSTEMS**
Competency: F3 **Service DC electrical systems**

Objectives

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

- Describe DC electrical systems.
- Service and install batteries.

LEARNING TASKS

1. Describe DC electrical systems

2. Describe batteries

CONTENT

- Describe electrical safety
- Codes
- Energy sources
 - Batteries
 - Solar
 - Converters
- 12VDC interior lights
- 12VDC plug and receptacles
- 12VDC circuits
- Polarity test
- Tools
- Types of batteries
 - Dry
 - Flooded
 - Absorbed glass matt (AGM)
 - Gel
 - Lithium
- Construction
- Ratings
- Disconnects
- Connections
 - Series
 - Parallel
 - Grounds
- Charge procedures
 - Water levels
- Test procedures



LEARNING TASKS

3. Install battery systems

4. Maintain battery systems

5. Troubleshoot battery systems

6. Verify operation of DC electrical systems

CONTENT

- Mounting
- Venting
- Connecting
- Disconnecting
- Verifying operation
- Procedures
 - Water level
 - Load test
 - Connections
- Tools
 - Hydrometer
 - Voltmeter
 - Ammeter
 - Load tester
- Tests
 - Voltage
 - Polarity
 - Connections
- Selecting tools
- Energy sources
 - Batteries
 - Solar
 - Converter
- 12VDC interior lights
- 12VDC plug and receptacles
- 12VDC circuits
- Polarity



Line (GAC): F **SERVICE ELECTRICAL SYSTEMS**
Competency: F4 **Service vehicle networking systems**

Objectives

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

- Operate vehicle networking systems.

LEARNING TASKS

1. Operate vehicle network systems

2. Operate multiplexing systems

CONTENT

- Network fundamentals
- Network configurations
 - Ring
 - Parallel
 - Bus
- Components
 - Touch screen
- Wiring and connectors
 - Single wire
 - Twisted pair
 - Fiber optic
- Network types
 - Controller Area Network (CAN)
 - Local Interconnect Network (LIN)
 - FlexRay
 - Media Oriented Systems Transport (MOST)
- Operation
- Faults
- Multiplexing fundamentals
 - Switch inputs
 - Control Modules
 - Body Control Module (BCM)
 - Outputs
 - Faults



Line (GAC): H **SERVICE LIQUID PETROLEUM (LP) GAS SYSTEMS**
Competency: H1 **Maintain LP gas systems**

Objectives

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

- Describe safety procedures for LPG.
- Describe LPG cylinder and tank inspection and filling.
- Fabricate with copper tubing.

LEARNING TASKS

1. Describe the properties of Liquid Petroleum Gas (LPG)

2. Describe safety procedures

3. Describe LPG cylinder and tank inspection and filling

CONTENT

- Types
 - Butane
 - Propane
- Chemical formulas
- Temperatures
- Pressure
- Contaminants
- Specific gravity
- Availability
- Energy value
- Limits of flammability
- Products of combustion
- LPGs as they appear to the five human senses

- Certifications
 - Transportation of dangerous goods
 - LPG re-fuelling
- PPE
- Site regulations
 - Ventilation
 - Distance from ignition
 - Storage

- Regulations
- Transport Canada (TC)
- Department of Transport (DOT)
- Cylinders
 - Types and components
 - Inspection
 - Purging
 - Filling



LEARNING TASKS

- 4. Fabricate with copper tube

CONTENT

- American Society of Mechanical Engineers (ASME)
- Tanks
 - Types and components
 - Inspection
 - Purging
 - Filling
- Cutting
- Flaring
- Bending

Achievement Criteria

Performance The learner will use hand tools to fabricate a 70% valve.

Conditions The learner will be given

- Marking rubric
- Tools
- Materials
- Specifications

Criteria The learner will be evaluated on

- Safety
- Time management
- Detail



Line (GAC): **I** **SERVICE WATER HEATERS**
Competency: **I1** **Maintain water heaters**

Objectives

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

- Operate water heaters.
- Maintain water heaters.

LEARNING TASKS

CONTENT

1. Describe water heaters

2. Verify operation of water heaters

3. Maintain water heaters

- Types
 - Tank
 - Tankless
 - On demand
 - Hydronic
- Operations
 - Propane
 - 120VAC
 - 12VDC

- Codes
- Safety
- Operation
- Winterizing/summerizing
- Sanitizing
- Flushing



Line (GAC): L **SERVICE REFRIGERATORS**
Competency: L1 **Maintain refrigerators**

Objectives

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

- Verify operation of refrigerators.

LEARNING TASKS

1. Describe refrigerators

2. Verify operation of refrigerators

CONTENT

- Types
 - Absorption
 - Compressor
- Operations
 - Propane
 - 12VDC
 - 120VAC
- Codes
- Safety
- Operation
 - Ventilation
- Winterizing/summerizing



Line (GAC): **M** **SERVICE AIR CONDITIONERS (A/C), REFRIGERATION AND HEAT PUMPS**

Competency: **M1** **Maintain A/C, refrigeration and heat pumps**

Objectives

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

- Verify operation of air conditioners, refrigeration and heat pumps.

LEARNING TASKS

CONTENT

1. Describe refrigeration, air conditioners and heat pumps

2. Verify operation of refrigeration, air conditioners and heat pumps

- Types
 - Refrigerators
 - Roof mount A/C and heat pumps
 - Basement A/C and heat pumps
 - Wall mount A/C
- Operations
 - 120VAC
- Codes
- Safety
- Operation



Line (GAC): **Q SERVICE CHASSIS AND MECHANICAL COMPONENTS**
Competency: **Q1 Maintain chassis and mechanical components**

Objectives

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

- Describe chassis and mechanical components.

LEARNING TASKS

1. Describe towable frames

2. Describe towable axles

3. Describe wheels

4. Describe tires

CONTENT

- Travel trailer
 - Levelling systems
 - Tongue jacks
 - Couplers
- Fifth wheel
 - Levelling systems
 - Stabilizing jacks
 - Landing gear
 - King pin
 - Goose neck
- Codes
- Towable axle systems
 - Spring and shackle
 - Under slung
 - Over slung
 - Single axle
 - Multi axle
 - Shocks
 - Torsion tube
- Spindles
- Weight ratings
- Scheduled maintenance intervals
- Codes
- Types
 - Steel
 - Aluminum
 - Magnesium
- Torque specifications
- Weight ratings
- Scheduled maintenance intervals
- Codes
- Construction



LEARNING TASKS

- 5. Describe towable braking systems

- 6. Describe electric braking systems

- 7. Describe the principles of hydraulic brakes

- 8. Describe hydraulic surge braking systems

- 9. Describe electric over hydraulic braking systems

CONTENT

- Load rating and sizing
- Inflation
- Scheduled maintenance intervals
- Types
 - Electric
 - Hydraulic
 - Electric over hydraulic
- Sequence of operation
- Scheduled maintenance intervals
- Backing plates
- Shoes
 - Friction
- Magnets
 - Testing
- Adjuster
- Drums
 - Measuring
- Breakaway systems
 - Battery
- Sequence of operation
- Hydraulic theory (Pascal's law)
- Types of friction
- Surge coupler
 - Reverse lock out
 - Weight ratings
- Master cylinder
- Backing plates
- Wheel cylinders
- Shoes
- Drums
 - Measuring
- Breakaway systems
- Brake lines
- Adjuster
- Operation
 - Controllers
 - Actuators (servos)
- Pads
- Discs
 - Measuring



LEARNING TASKS

10. Describe hubs and drums

CONTENT

- Calipers
- Breakaway systems
- Brake lines
- Wheel bearings and races
- Grease seals
- Bearing buddy system
- Tools for bearing, race and seal service
- Scheduled maintenance intervals



Line (GAC): Q **SERVICE CHASSIS AND MECHANICAL COMPONENTS**
Competency: Q3 **Diagnose chassis and mechanical components**

Objectives

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

- Diagnose towable chassis and mechanical components.

LEARNING TASKS

1. Diagnose frames
2. Diagnose axles
3. Diagnose wheels
4. Diagnose tires
5. Diagnose braking systems
6. Diagnose hubs and drums

CONTENT

- Inspection
- Troubleshooting
- Alignment
 - Camber
 - Caster
 - Toe in/out
- Troubleshooting
 - Axle and wheel alignment procedures
- Undercarriage inspection
 - Springs
 - Shackles
 - Hangers
 - Spring bolts
 - U-bolts
 - Bushings
 - Equalizers
 - Shocks
- Inspection
- Inspection
 - Wear patterns
- Inspection
- Troubleshooting
- Inspection
 - Hubs and drums
 - Wheel bearings and races
 - Seals
- Troubleshooting
- Criteria for replacement
- Re-assembly procedures



Line (GAC): Q **SERVICE CHASSIS AND MECHANICAL COMPONENTS**
Competency: Q4 **Repair chassis and mechanical components**

Objectives

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

- Repair chassis and mechanical components.

LEARNING TASKS

1. Replace frame components

2. Replace axles

3. Replace wheels

4. Replace tires

5. Service braking systems

6. Service hubs and drums

CONTENT

- Stabilizer jacks
- Landing gear
- Tongue jacks
- Order forms
- Measurements
- Remove & Replace
- Torque specifications
- Verify operation and alignment

- Type
- Rating
- Sizing
- Bolt pattern
- Offset
- Torque specifications

- Type
- Load rating
- Sizing
- Inflation
- Remove & Replace
- Bleeding
- Adjustment
- Wheel bearings and seals
- Repacking
 - Assembly procedures
- Replacing
 - Assembly procedures
 - Bearings
 - Race



Achievement Criteria

Performance The learner will repair chassis and mechanical components.

Conditions The learner will be given

- Tools and equipment
- Supplies
- Documentation

Criteria The learner will be evaluated on

- Safety
- Time management
- Detail



Line (GAC): R SERVICE TOWING SYSTEMS

Competency: R1 Maintain towing systems

Objectives

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

- Describe towing systems.
- Describe maintaining towing systems.

LEARNING TASKS

1. Describe tow vehicles

2. Describe receivers
3. Describe hitches

4. Describe sway control

5. Describe wiring systems

6. Describe maintenance of towing systems

CONTENT

- Codes
- Gross Vehicle Weight Rating (GVWR)
- Transmission coolers
- Classes
- Types
 - Weight carrying
 - Weight distributing
 - Fifth wheels
- Hitch balls
- Hitch pins
- Lubricants
- Active
- Passive
- Electronic
- Types of wiring systems
 - Towables
 - Slide in truck campers
- Types of wiring plugs
 - 4-pin
 - 6-pin
 - 7-pin
- Schematics
- Types of adapters
- Color codes
- Inspection
- Cleaning
- Lubrication



Line (GAC): R **SERVICE TOWING SYSTEMS**
Competency: R2 **Install towing systems**

Objectives

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

- Describe installing towing systems.
- Describe camper tie down systems.
- Describe truck camper jacks.
- Describe camper loading and unloading.

LEARNING TASKS

1. Describe installing receivers

2. Describe installing fifth wheel hitches and goose necks

3. Describe installing towable hitches

4. Describe installing sway control

CONTENT

- Selection
- Procedures
 - Instructions
 - Frame drilling
 - Torque specifications

- Selection
- Procedures
 - Instructions
 - Frame drilling
 - Torque specifications
- Pins
- Hitch balls
- Lubricants
- Verifying operation
- Selection
 - Weight carrying
 - Weight distributing
- Procedures
 - Instructions
 - Frame drilling
 - Torque specifications
- Pins
- Hitch balls
- Lubricants
- Verifying operation
- Selection
 - Active
 - Passive
 - Electronic



LEARNING TASKS

- 5. Describe installing wiring systems

- 6. Describe installing brake control systems

- 7. Describe camper tie down systems

- 8. Describe truck camper jacks

CONTENT

- Procedures
 - Instructions
 - Frame drilling
 - Torque specifications
- Verifying operation
- Selection
 - Plug and play
 - Full wiring
- Procedures
 - Instructions
- Verifying operation
- Selection
 - Controllers
 - Actuators
 - Wiring
- Procedures
 - Instructions
- Verifying operation
- Types
- Frame mount
- Bed mount
- Load capacities
- Codes
- Manufacturers' specifications
- Components
- Turnbuckles
- Load cinches
- Chains
- Straps
- Types
- Hydraulic
- Mechanical
- Electric
- Cable (yard) jacks
- Maintenance
 - Servicing
 - Safety
 - Inspection
 - Cleaning
 - Adjusting



LEARNING TASKS

CONTENT

9. Describe camper loading and unloading

- Lubricating
 - Fluid Level
 - Seals
 - Motor
 - Switches
 - Valves
 - Pumps
 - Verifying operation
 - Testing
 - Repairing
 - Replacement
 - Installing
 - Brackets
 - Mounting points
- Safety
- Wind
- Ground
- Ground pads
- Storage support

Achievement Criteria (OPTIONAL)

Performance The learner will build a towable light tester, including

- 7-pin
- 4-pin

Conditions The learner will be given

- 4-pin plugs
- 7-pin plugs
- Wires
- Schematics

Criteria The learner will be evaluated on

- Safety
- Time management
- Detail



Line (GAC): R SERVICE TOWING SYSTEMS

Competency: R3 Diagnose towing systems

Objectives

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

- Describe diagnosing towing systems.

LEARNING TASKS

CONTENT

- | | |
|---|--|
| <p>1. Describe inspection of receivers</p> | <ul style="list-style-type: none"> • Mounting • Condition <ul style="list-style-type: none"> ○ Wear ○ Corrosion |
| <p>2. Describe diagnosing fifth wheel hitches and goose necks</p> | <ul style="list-style-type: none"> • Mounting • Condition <ul style="list-style-type: none"> ○ Wear ○ Corrosion • Operation • Adjustments |
| <p>3. Describe diagnosing towable hitches</p> | <ul style="list-style-type: none"> • Mounting • Condition <ul style="list-style-type: none"> ○ Wear ○ Corrosion • Operation • Adjustments |
| <p>4. Describe diagnosing sway control</p> | <ul style="list-style-type: none"> • Mounting • Condition <ul style="list-style-type: none"> ○ Wear ○ Corrosion • Operation • Adjustments |
| <p>5. Describe diagnosing wiring systems</p> | <ul style="list-style-type: none"> • Mounting • Condition <ul style="list-style-type: none"> ○ Wear ○ Corrosion • Operation |
| <p>6. Describe diagnosing brake control systems</p> | <ul style="list-style-type: none"> • Mounting • Operation |



Line (GAC): R SERVICE TOWING SYSTEMS

Competency: R4 Repair towing systems

Objectives

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

- Describe repairing towing systems.

LEARNING TASKS

1. Describe repairing receivers
2. Describe repairing hitches
3. Describe repairing sway control
4. Describe repairing wiring systems

CONTENT

- Removal
- Replacement
- Removal of components
- Replacement of components
- Removal of components
- Cleaning
- Testing
- Replacement of components
- Verifying operation
- Removal of components
- Cleaning
- Testing
- Replacement of components
- Verifying operation



Level 2

Recreation Vehicle Service Technician



Line (GAC): **F SERVICE ELECTRICAL SYSTEMS**
Competency: **F2 Service AC electrical systems**

Objectives

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

- Describe servicing AC electrical systems.
- Fabricate test equipment.

LEARNING TASKS

1. Describe 120VAC wiring systems
2. Describe converters
3. Describe installing 120VAC wiring systems and converters
4. Describe diagnosing 120VAC wiring systems and

CONTENT

- Operation
- AC Codes
- Panels
- Breakers
- Wiring
- Loads
- GFCI
- Receptacles
- Switches
 - 2 way selector
- Schematics
- Shore power
- Types
 - Linear
 - Ferroresonant
 - Switch mode
- Ratings
 - Input
 - Output
- Applications
 - Deck mount
 - Built in
 - Slide ins
- Safety
- Selection
 - Wire size
 - Panel size
 - Breaker size
 - Procedures
- Verifying operation
- Safety



LEARNING TASKS

converters

5. Describe repairing 120VAC wiring systems and converters
6. Describe maintaining 120VAC wiring systems and converters
7. Describe wire connecting
8. Fabricate test equipment

CONTENT

- Troubleshooting procedures
 - Polarity
 - Continuity
- Mounting
- Connections
- Circuit loads
- Safety
- Identification of repair
- Repair procedures
- Verifying operation
- Safety
- Inspection
 - Wiring
 - Circuitry
 - Power cords
 - Cooling fans
- Contaminant removal
- Applications
- Procedures
 - Wire connecting
 - Stripping
 - Crimping tools
 - Wire nuts
- Forming and soldering splices
- Wiring
- Soldering
- Verifying operation

Achievement Criteria

Performance The learner will wire a 15-amp grounding plug to a GFCI mounted in an electrical box.

- Conditions** The learner will be given
- Supplies
 - Tools and equipment
 - Schematic

- Criteria** The learner will be evaluated on
- Safety
 - Time management
 - Detail



LEARNING TASKS

4. Describe repairing 12VDC wiring systems

5. Describe maintaining 12VDC wiring systems

CONTENT

- Circuit loads
- Safety
- Identification of repair
- Repair procedures
 - Soldering
 - Desoldering
- Verifying operation
- Safety
- Inspection
 - Wiring
 - Connections
 - Circuitry
- Batteries



Line (GAC): H **SERVICE LIQUID PETROLEUM (LP) GAS SYSTEMS**
Competency: H1 **Maintain LP gas systems**

Objectives

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

- Maintain LP gas systems.

LEARNING TASKS

1. Describe regulations
2. Describe propane system components
3. Describe diagnostic tools

CONTENT

- Codes
- Required technician certification
- Documentation
 - Checklist
 - Provincial re-certification
- Cylinders
- Tank
- Regulator
 - Orifice
 - Vents
- Hoses
- Manifolds
- Lines
- Couplers
- Quick connect fittings
- Connections
 - Threaded
 - Sealants
 - Crimped
 - Compression
 - Flared
- Manometer
 - U-tube
 - Bourdon tube
 - Electronic
- 70% valve
- Orifice size
- Leak detectors
 - Solution
 - Electronic



LEARNING TASKS

4. Maintain LP gas systems

CONTENT

- Inspection
- Adjustments
 - Working pressure
- Tests
 - Lock up test
 - Timed pressure drop test
- Verifying operation
- Recordkeeping

Achievement Criteria

Performance The learner will perform an LP gas system service.

Conditions The learner will be given

- Documentation
- Tools and equipment

Criteria The learner will be evaluated on

- Safety
- Time Management
- Detail



Line (GAC): **H SERVICE LP GAS SYSTEMS**
Competency: **H2 Install LP gas systems**

Objectives

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

- Describe the installation and design of LP gas systems.
- Perform black pipe cutting and threading.

LEARNING TASKS

1. Describe installation of LP gas systems

2. Describe designing an LP gas system

3. Perform black pipe cutting and threading

CONTENT

- Tools and procedures for black pipe
 - Cutting
 - Threading
 - Lubricants
 - Joining
 - Installation
 - Sealants

- Codes
- Pipe sizing
 - Number of appliances
 - Btu/h of appliances
 - Propane system codes
 - Length of propane piping/tubing

- Safety
- Procedures

Achievement Criteria

Performance The learner will perform black pipe cutting and threading.

Conditions The learner will be given

- Marking rubric
- Materials
- Tools

Criteria The learner will be evaluated on

- Safety
- Time management
- Detail



Line (GAC): H **SERVICE LP GAS SYSTEMS**
Competency: H3 **Diagnose LP gas systems**

Objectives

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

- Diagnose LP gas systems.

LEARNING TASKS

1. Diagnose LP gas systems

CONTENT

- Inspection
- Test procedures
 - Working pressure
 - Lock up
 - Leak test
- External factors effecting pressure



Line (GAC): H **SERVICE LP GAS SYSTEMS**
Competency: H4 **Repair LP gas systems**

Objectives

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

- Describe repairing LP gas systems.

LEARNING TASKS

1. Describe repairing LP gas systems

CONTENT

- Repair procedures
- Components
 - Removal
 - Inspection
 - Cleaning
 - Replacement
- Verifying operation



Line (GAC): I **SERVICE WATER HEATERS**
Competency: I1 **Maintain water heaters**

Objectives

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

- Maintain water heaters.

LEARNING TASKS

1. Describe water heaters

2. Maintain water heaters

CONTENT

- Codes
- Types
 - Tank
 - Tankless
 - On demand
 - Hydronic
- Components
 - Gas
 - Electrical
 - Water
 - Hardware
- Specialty tools
- Manufacturers' specifications
- Inspection
- Adjustments
- Cleaning
- Verifying operation



Line (GAC): I **SERVICE WATER HEATERS**
Competency: I2 **Install water heaters**

Objectives

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

- Describe the installation and removal of water heaters.

LEARNING TASKS

1. Describe the installation and removal of water heaters

CONTENT

- Codes
- Manufacturers' installation instructions
- Sealing
- Fastening
- Ventilation
- Verifying operation



Line (GAC): I **SERVICE WATER HEATERS**
Competency: I3 **Diagnose water heaters**

Objectives

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

- Describe diagnosing water heaters.

LEARNING TASKS

1. Describe diagnosing water heaters

CONTENT

- Manufacturers' documentation
- Inspection
 - Tank
 - Gas
 - Electrical
 - Water fittings
 - Hardware



Line (GAC): I **SERVICE WATER HEATERS**
Competency: I4 **Repair water heaters**

Objectives

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

- Describe repairing water heaters.

LEARNING TASKS

1. Describe repairing water heaters

CONTENT

- Repair procedures
- Manufacturers' documentation
- Components
 - Removal
 - Inspection
 - Cleaning
 - Replacement
- Verifying operation



Line (GAC): J SERVICE FURNACES

Competency: J1 Maintain furnaces

Objectives

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

- Maintain furnaces.

LEARNING TASKS

1. Describe furnaces

2. Maintain furnaces

CONTENT

- Codes
- Types
 - Forced combustion
 - Hydronic
 - Catalytic
- Components
 - Gas
 - Electrical
 - Hardware
- Specialty tools
- Manufacturers' specifications
- Inspection
- Adjustments
- Cleaning
- Verifying operation



Line (GAC): **J** **SERVICE FURNACES**
Competency: **J2** **Install furnaces**

Objectives

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

- Describe the installation and removal of furnaces.

LEARNING TASKS

1. Describe the installation and removal of furnaces

CONTENT

- Codes
 - Location
- Manufacturers' installation instructions
 - Sealing
 - Fastening
 - Ventilation
 - Ducting
- Verifying operation



Line (GAC): J **SERVICE FURNACES**
Competency: J3 **Diagnose furnaces**

Objectives

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

- Describe diagnosing furnaces.

LEARNING TASKS

1. Describe diagnosing furnaces

CONTENT

- Manufacturers' documentation
- Inspection
 - Heat exchanger
 - Gas
 - Electrical
 - Hardware
 - Venting
 - Ducting



Line (GAC): J **SERVICE FURNACES**
Competency: J4 **Repair furnaces**

Objectives

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

- Describe repairing furnaces.

LEARNING TASKS

1. Describe repairing furnaces

CONTENT

- Repair procedures
- Manufacturers' documentation
- Components
 - Removal
 - Inspection
 - Cleaning
 - Replacement
- Verifying operation



Line (GAC): K SERVICE COOKTOPS AND OVENS
Competency: K1 Maintain cooktops and ovens

Objectives

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

- Maintain cooktops and ovens.

LEARNING TASKS

1. Describe cooktops and ovens

2. Maintain cooktops and ovens

CONTENT

- Codes
- Types
 - Propane
 - Electric
- Components
 - Gas
 - Electrical
 - Hardware
- Manufacturers' specifications
- Inspection
- Adjustments
- Cleaning
- Verifying operation



Line (GAC): **K** **SERVICE COOKTOPS AND OVENS**
Competency: **K2** **Install cooktops and ovens**

Objectives

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

- Describe the installation and removal of cooktops and ovens .

LEARNING TASKS

1. Describe the installation and removal of cooktops and ovens

CONTENT

- Codes
 - Location
- Manufacturers' installation instructions
 - Fastening
 - Ventilation
- Verifying operation



Line (GAC): **K** **SERVICE COOKTOPS AND OVENS**
Competency: **K3** **Diagnose cooktops and ovens**

Objectives

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

- Describe diagnosing cooktops and ovens.

LEARNING TASKS

1. Describe diagnosing cooktops and ovens

CONTENT

- Manufacturers' documentation
- Inspection
 - Gas
 - Electrical
 - Hardware
 - Venting



Line (GAC): **K** **SERVICE COOKTOPS AND OVENS**
Competency: **K4** **Repair cooktops and ovens**

Objectives

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

- Describe repairing cooktops and ovens.

LEARNING TASKS

1. Describe repairing cooktops and ovens

CONTENT

- Repair procedures
- Manufacturers' documentation
- Components
 - Removal
 - Inspection
 - Cleaning
 - Replacement
- Verifying operation



Line (GAC): L SERVICE REFRIGERATORS
Competency: L1 Maintain refrigerators

Objectives

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

- Maintain refrigerators.

LEARNING TASKS

1. Describe refrigerators

CONTENT

- Codes
- Types
 - Absorption
 - Compressor
- Components
 - Cooling unit
 - Gas
 - Electrical
 - Cabinet
 - Door latches
 - Seals
 - Drain
- Manufacturers' specifications
- Inspection
- Adjustments
- Cleaning
- Verifying operation

2. Maintain refrigerators



Line (GAC): L **SERVICE REFRIGERATORS**
Competency: L2 **Install refrigerators**

Objectives

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

- Describe the installation and removal of refrigerators.

LEARNING TASKS

1. Describe the installation and removal of refrigerators

CONTENT

- Codes
- Manufacturers' installation instructions
 - Sealing
 - Fastening
 - Ventilation
- Verifying operation



Line (GAC): L **SERVICE REFRIGERATORS**
Competency: L3 **Diagnose refrigerators**

Objectives

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

- Describe diagnosing refrigerators.

LEARNING TASKS

1. Describe diagnosing refrigerators

CONTENT

- Manufacturers' documentation
- Inspection
 - Cooling unit
 - Gas
 - Electrical
 - Cabinet
 - Venting



Line (GAC): L **SERVICE REFRIGERATORS**
Competency: L4 **Repair refrigerators**

Objectives

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

- Describe repairing refrigerators.

LEARNING TASKS

1. Describe repairing refrigerators

CONTENT

- Repair procedures
- Manufacturers' documentation
- Components
 - Removal
 - Inspection
 - Cleaning
 - Replacement
- Verifying operation



Line (GAC): M SERVICE AIR CONDITIONERS (A/C), REFRIGERATION AND HEAT PUMPS

Competency: M2 Install A/C, refrigeration and heat pumps

Objectives

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

- Describe the installation and removal of refrigeration, air conditioners and heat pumps.

LEARNING TASKS

1. Describe the installation and removal of refrigeration, air conditioners and heat pumps

CONTENT

- Codes
- Manufacturers' installation instructions
 - Sealing
 - Fastening
 - Ventilation
 - Ducting
 - Electrical connections
- Verifying operation



Line (GAC): **O** **SERVICE EXTERIOR COMPONENTS**
Competency: **O1** **Maintain exterior components**

Objectives

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

- Describe exterior construction.
- Maintain exterior components.

LEARNING TASKS

1. Describe exterior construction

2. Describe siding

3. Describe roofing

4. Describe floor systems

5. Describe exterior components

CONTENT

- Stick and tin (loose hung)
- Laminated
 - Wood frame
 - Metal frame
- Hung wall
 - Interior panelling
 - Hollow walls
- Moulded fibreglass
- Aircraft
- Urethane
- Insulation
- Profiled aluminum
- Filon
- Formed aluminum
- Moulded fibreglass
- Laminated
- Trussed
 - Wood
 - Aluminum
- Coverings
 - Ethylene Propylene Diene Monomer (EPDM)
 - Thermoplastic polyolefin (TPO)
 - Aluminum
 - Fibreglass
- Laminated
- Trussed
 - Wood
 - Aluminum
- Urethane
- Windows



LEARNING TASKS

- 6. Maintain exterior components

CONTENT

- Baggage doors
- Entrance doors
- Ladders
- Roof racks
- Vents
 - Roof
 - Fridge
 - Stove
 - Furnace
 - Plumbing
 - Washer/dryer
- Skylights
- Awnings
- Add-a-rooms
- Grab handles
- Storage hatches
- Catches
- Fender skirts
- Rock guards
- Clearance/tail lights
- Mouldings
- Vinyl inserts
- Slide-outs
- Inspection
- Fasteners
- Cleaning
- Sealants
- Lubricants
- Slide seals
- Verifying operation



Line (GAC): **O** **SERVICE EXTERIOR COMPONENTS**
Competency: **O2** **Install exterior components**

Objectives

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

- Describe installing exterior components
- Build walls.

LEARNING TASKS

CONTENT

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Describe building and installing components of exterior construction
 2. Describe installing exterior components
 3. Build walls | <ul style="list-style-type: none"> • Safety • Walls • Siding • Roofing • Floor systems
 • Safety • Manufacturers' installation instructions <ul style="list-style-type: none"> ○ Fastening ○ Sealing • Verifying operation • Material selection • Blueprint reading |
|---|---|

Achievement Criteria

- | | |
|-------------|--|
| Performance | The learner will build walls: <ul style="list-style-type: none"> • Stick and tin wall • Laminated |
| Conditions | The learner will be given <ul style="list-style-type: none"> • Tools and equipment • Materials • Blueprints |
| Criteria | The learner will be evaluated on <ul style="list-style-type: none"> • Safety • Time management • Detail |



Line (GAC): **O** **SERVICE EXTERIOR COMPONENTS**
Competency: **O3** **Diagnose exterior components**

Objectives

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

- Describe diagnosing exterior components.

LEARNING TASKS

1. Describe diagnosing exterior components

CONTENT

- Inspection
 - Sealants
 - Fasteners
 - Condition
- Criteria for replacement
- Replacement procedures



LEARNING TASKS

3. Describe maintaining interior components

CONTENT

- Furniture
- Bed lifts
- Sink covers
- Shower surrounds
- Inspection
- Adjustments
- Lubricants
- Cleaning
- Aesthetic details



Line (GAC): P **SERVICE INTERIOR COMPONENTS**
Competency: P2 **Install interior components**

Objectives

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

- Describe installing interior construction and components.
- Build cabinets.

LEARNING TASKS

1. Describe building and installing components of interior construction
2. Describe installing interior components
3. Build cabinets

CONTENT

- Cabinets
- Countertops
- Manufacturers' installation instructions
 - Fastening
 - Filling
 - Sealing
- Aesthetic details
- Verifying operation
- Material selection
- Blueprint reading

Achievement Criteria

Performance	The learner will build a cabinet with top.
Conditions	The learner will be given <ul style="list-style-type: none"> • Marking rubric • Materials • Tools and equipment • Blueprints
Criteria	The learner will be evaluated on <ul style="list-style-type: none"> • Safety • Time management • Detail



Line (GAC): P **SERVICE INTERIOR COMPONENTS**
Competency: P3 **Diagnose interior components**

Objectives

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

- Describe diagnosing interior components.

LEARNING TASKS

1. Describe diagnosing interior components

CONTENT

- Inspection
 - Sealants
 - Fasteners
 - Condition
- Criteria for replacement
- Replacement procedures



Line (GAC): **P** **SERVICE INTERIOR COMPONENTS**
Competency: **P4** **Repair interior components**

Objectives

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

- Describe repairing interior construction.
- Describe repairing interior components.

LEARNING TASKS

1. Describe repairing interior construction

2. Describe repairing interior components

CONTENT

- Repair procedures
- Manufacturers' documentation
- Components
 - Removal
 - Inspection
 - Cleaning
 - Replacement
 - Reassembly
- Aesthetic details
- Verifying repair
- Repair procedures
- Manufacturers' documentation
- Components
 - Removal
 - Inspection
 - Cleaning
 - Replacement
 - Reassembly
- Aesthetic details
- Verifying operation



Level 3

Recreation Vehicle Service Technician



Line (GAC): C **PERFORM COMMON WORK PRACTICES**
Competency: C1 **Use technical information**

Objectives

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

- Describe documentation, documenting time and sources of technical information.

LEARNING TASKS

1. Describe documentation
2. Describe documenting time
3. Describe sources of technical information

CONTENT

- Types
 - Work orders
 - PDI
 - Purchase orders
 - Parts requisition orders
 - Warranty claim forms
 - Insurance forms
- Information required
 - VIN/serial numbers
 - Stock number
 - Customer signature
 - Contact information
 - Vehicle description
 - Licence number
 - Pictures
 - Condition
 - Date
- Flat rate
- Hourly
- Shop rates
- Time tracking
- Technical bulletins
- Recall notices
 - National Highway Traffic Safety Administration (NHTSA)
- Industry resources
- Manufacturers' resources
- Personal development



Line (GAC): C **PERFORM COMMON WORK PRACTICES**
Competency: C3 **Use communication techniques**

Objectives

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

- Describe internal and external communication techniques.

LEARNING TASKS

1. Describe two-way communication

2. Describe respectful communication

3. Describe customer courtesy and personal conduct

4. Describe customer needs and expectations

CONTENT

- Internal facing
 - Management
 - Service writer
 - Foreman
 - Journeyperson/mentor
 - Co-workers
- External facing
 - Customers
 - Vendors
 - Insurance adjustors
 - Inspectors
- Conflict resolution
 - External
 - Internal
- Harrassment
 - Bullying
 - Sexual
- Customer value
- Business etiquette
- Cleanliness
- Appearance
- Cleanliness
- Completion time
- Competent work



Line (GAC): C **PERFORM COMMON WORK PRACTICES**
Competency: C4 **Perform estimation procedures**

Objectives

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

- Describe estimation procedures.

LEARNING TASKS

1. Describe estimates

2. Describe estimating procedures

3. Describe communicating estimates

CONTENT

- Types
 - Customer
 - Insurance
 - Warranty
- Information required
- Approvals
- Consultations
 - Vendors
 - Sublet
- Inspection
- Technical information
 - Flat rate manuals
 - Parts manuals
 - Blueprints
 - Schematics
- Documenting
 - Condition
 - Pictures
 - Forms
- Time management
 - Shop scheduling
 - Parts availability
- Recording estimate
- Managing customer expectations
 - Explaining the scope of work

Achievement Criteria

Performance The learner will complete a repair estimate using an industry recognized Flat Rate manual.

Conditions The learner will be given

- A vehicle needing repair (or a description/photos of a vehicle needing repair)
- Access to a flat rate manual



Criteria

The learner will be evaluated on

- Calculator
- Safety
- Time management
- Detail



Line (GAC): F **SERVICE ELECTRICAL SYSTEMS**
Competency: F2 **Service AC electrical systems**

Objectives

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

- Service AC electrical systems.

LEARNING TASKS

1. Describe AC electrical systems

2. Describe generators

CONTENT

- Generators
- Inverters
- Transfer switches
- Energy management systems
- Codes
- Safety
- Types
 - Portable
 - Built in
- Operation
 - Engine
 - Alternator
- Cooling
 - Liquid
 - Air
- Fuel delivery systems
 - Gas
 - Propane
 - Diesel
- Electrical
 - AC
 - DC



LEARNING TASKS

6. Describe repairing generators

7. Describe inverters

8. Describe transfer switches

CONTENT

- Repair procedures
 - Remove and reinstall unit
- Manufacturers' documentation
- Components
 - Removal
 - Inspection
 - Cleaning
 - Replacement
- Verifying operation
- Codes
- Principles of operation
- Types
 - Pure sine wave
 - Modified sine wave
 - Inverter chargers
- Ratings
- Capacities
- Servicing
- Troubleshooting
- Installing
 - Manufacturers' installation instructions
- Codes
- Types
 - Manual
 - Automatic
- Ratings
- Capacities
- Operation
- Servicing
- Troubleshooting
- Installing
 - Manufacturers' installation instructions

Achievement Criteria

Performance The learner will perform routine maintenance and confirm proper generator function and output.

Conditions The learner will be given

- Tools and equipment



Criteria

The learner will be evaluated on

- Materials
- Marking rubric
- Safety
- Time management
- Detail



Line (GAC): F **SERVICE ELECTRICAL SYSTEMS**
Competency: F3 **Service DC electrical systems**

Objectives

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

- Describe photovoltaic systems.
- Describe monitoring panels.

LEARNING TASKS

1. Describe photovoltaic systems

CONTENT

- Panels
 - Cells
 - Modules
 - Arrays
- Solar electric principles
- Charge controllers
 - Simple one or two stage
 - Maximum power point tracking (MPPT)
 - Pulse width modulation (PWM)
- Wiring and connections
- Diodes
- Installation
 - Mounting hardware
- Servicing
 - Expansion
 - Verifying operation
 - Troubleshooting
 - Repairing

2. Describe monitoring panels

- Types
- Operation
- Wiring and connections
- Resistors
- Installation
 - Mounting
- Troubleshooting
- Servicing
 - Inspection
 - Cleaning
 - Removal
 - Replacement
 - Verifying operation



LEARNING TASKS

CONTENT

- Wireless system connections
 - Requirements
 - OneControl Application installed on phone/tablet
 - System Set Identifier (SSID) on WiFi hub
 - Password on WiFi hub
 - Navigation of the OneControl Application
- System configuration
 - System can be configured to operate many different functions
 - Navigation of the configurator file on the OCTP
 - Identifying icons
 - Group selection
 - Naming of the function
 - Configuring fuses



Line (GAC): M SERVICE AIR CONDITIONERS (A/C), REFRIGERATION AND HEAT PUMPS

Competency: M1 Maintain A/C, refrigeration and heat pumps

Objectives

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

- Describe components of air conditioners, refrigeration and heat pumps.
- Describe maintaining air conditioners, refrigeration and heat pumps.

LEARNING TASKS

1. Describe air conditioner components

2. Describe heat pump components

3. Describe compressor refrigerator components

4. Describe maintaining air conditioners, refrigeration, and heat pumps

CONTENT

- Evaporator
- Condenser
- Compressor
- Orifice/expansion valve
- Accumulator
- Controls

- Inside coil
- Outside coil
- Compressor
- Orifice/expansion valve
- Reversing valve
- Accumulator
- Controls

- Evaporator
- Condenser
- Compressor
- Orifice/expansion valve
- Accumulator
- Controls

- Access
- Inspection
- Clean components
- Wiring diagrams
- Verify air flow
 - Ducting
 - Separation
 - Comb fins
- Verifying operation



Achievement Criteria

Performance The learner will confirm A/C performance.

Conditions The learner will be given

- Tools and equipment
- Materials
- Marking rubric

Criteria The learner will be evaluated on

- Safety
- Time management
- Detail



Line (GAC): **M** **SERVICE AIR CONDITIONERS (A/C), REFRIGERATION AND, HEAT PUMPS**

Competency: **M3** **Diagnose A/C, refrigeration and heat pumps**

Objectives

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

- Describe diagnosing air conditioners, refrigeration, and heat pumps.

LEARNING TASKS

1. Describe diagnosing air conditioners, refrigeration, and heat pumps

CONTENT

- Safety
- Manufacturers' specifications
- Inspection
- Wiring diagrams
- Troubleshooting electrical system
 - Calculating electrical load ratings
 - Ohm's law
- Verifying Delta T



Line (GAC): **M SERVICE AIR CONDITIONERS (A/C), REFRIGERATION AND, HEAT PUMPS**

Competency: **M4 Repair A/C, refrigeration and heat pumps**

Objectives

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

- Describe repairing air conditioners, refrigeration and heat pumps.

LEARNING TASKS

1. Describe repairing air conditioners, refrigeration, and heat pumps

CONTENT

- Safety
- Repair procedures
- Manufacturers' documentation
- Components
 - Removal
 - Inspection
 - Cleaning
 - Replacement
- Verifying operation



Line (GAC): O SERVICE EXTERIOR COMPONENTS
Competency: O4 Repair exterior components

Objectives

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

- Describe servicing steps.
- Repair composite panels.
- Perform plastic welding.

LEARNING TASKS

1. Describe steps

2. Describe servicing steps

3. Describe repairing composite panels

CONTENT

- Types
 - Electric
 - Manual
- Components
 - Steps
 - Motors
 - Controllers
 - Actuators
 - Gear box
- Safety
- Manufacturers' operating manual
- Access
- Maintenance
- Troubleshooting
- Inspection
- Cleaning
- Adjustments
- Lubricating
- Repairing
 - Removal
 - Replacement
- Verifying operation
- Types of materials
 - Fibreglass
 - Fibre-reinforced Plastic (FRP)
- Types of damage
 - Cosmetic
 - Superficial
 - Radical
- Safety



LEARNING TASKS

4. Describe plastic welding

CONTENT

- Tools and equipment
- Repair methods
- Repair materials
- Repair procedures
- Decals and graphics
- Identifying plastics
 - ISO codes
 - Sanding test
 - Melt test
 - Float test
 - Repair manuals
- Plastic welding
 - Airless
 - Hot air
 - Joint fit up
 - Welding procedures

Achievement Criteria 1

- Performance The learner will perform repairs to composite panels.
- Conditions The learner will be given
- Tools and equipment
 - Materials
 - Marking rubric
- Criteria The learner will be evaluated on
- Safety
 - Time management
 - Detail

Achievement Criteria 2

- Performance The learner will perform plastic welding.
- Conditions The learner will be given
- Tools and equipment
 - Materials
 - Marking rubric
- Criteria The learner will be evaluated on
- Safety
 - Time management
 - Detail



Line (GAC): Q **SERVICE CHASSIS AND MECHANICAL COMPONENTS**
Competency: Q1 **Maintain chassis and mechanical components**

Objectives

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

- Describe maintaining hydraulic systems.
- Describe maintaining motorized chassis.

LEARNING TASKS

1. Describe hydraulic theory
2. Describe hydraulic systems
3. Describe hydraulic system components
4. Describe maintaining hydraulic systems

CONTENT

- Pascal's law
- Hydrodynamics
- Slideouts
- Levelling
- Lifting
- Pumps
- Tanks
- Lines
- Fittings
 - Types
- Actuators
 - Single acting
 - Double acting
- Valves
 - Pressure
 - Directional
- Filters
- Controls
 - Electrical
 - Manual
- Retractors
 - Springs
- Seals
- Fluid
- Safety
- Manufacturers' specifications
- Inspection
- Cleaning
- Fluid level
- Electrical connections
- Verifying operation



LEARNING TASKS

5. Describe motorized chassis

6. Describe Gross Vehicle Weight Rate (GVWR)

7. Describe suspension systems

8. Describe maintaining motorized chassis systems

CONTENT

- Construction
 - Class A
 - Class B
 - Class C

- Regulations
 - Federal
 - Provincial

- Load ratings
- Tow rating
- Hitch capacity

- Air bag
- Coil
- Leaf
- Torsion Bar
- Suspension aids
 - Overloads
 - Air bags

- Safety
- Inspection
- Manufacturers' specifications



Line (GAC): **Q SERVICE CHASSIS AND MECHANICAL COMPONENTS**
Competency: **Q2 Install chassis and mechanical components**

Objectives

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

- Describe installing mechanical components for chassis.

LEARNING TASKS

1. Describe installing mechanical components for chassis

CONTENT

- Safety
- Manufacturers' installation instructions
- Verifying operation



Line (GAC): Q **SERVICE CHASSIS AND MECHANICAL COMPONENTS**
Competency: Q3 **Diagnose chassis and mechanical components**

Objectives

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

- Describe diagnosing chassis and mechanical components.

LEARNING TASKS

1. Describe diagnosing chassis and mechanical components

CONTENT

- Safety
- Manufacturers' specifications
- Inspection
- Troubleshooting
- Verifying operation



Line (GAC): Q **SERVICE CHASSIS AND MECHANICAL COMPONENTS**
Competency: Q4 **Repair chassis and mechanical components**

Objectives

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

- Describe repairing chassis and mechanical components.

LEARNING TASKS

1. Describe repairing chassis and mechanical components

CONTENT

- Manufacturers' specifications
- Cleaning
- Adjustment
- Removal
- Replacement
- Verifying operation



Line (GAC): Q **SERVICE CHASSIS AND MECHANICAL COMPONENTS**
Competency: Q5 **Service slideout systems**

Objectives

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

- Describe servicing and repairing slideout systems.

LEARNING TASKS

1. Describe slideout systems

CONTENT

- Types
 - Flush floor
 - Raised floor
 - In-Wall
- Power source
 - Electric
 - Hydraulic
 - Manual
- Hydraulic components
 - Cylinders
 - Cables
 - Chains
 - Gears
 - Controls
- Electric components
 - Motors
 - Cables
 - Chains
 - Gears
 - Controls
 - In-Wall systems
- Room
 - Rollers
 - Guides
 - Seals
 - Weight ratings
 - Travel locks
- Manufacturers' specifications
- Safety
- Inspection
- Troubleshooting
- Cleaning
- Lubrication and conditioning

2. Describe servicing slideout systems



LEARNING TASKS

3. Describe repairing slideout systems

CONTENT

- Adjustments
- Verifying operation
- Safety
- Manufacturers' specifications
- Removal/replacement
 - Components
 - Room
- Cleaning
- Aesthetic details
- Verifying operation



Line (GAC): Q SERVICE CHASSIS AND MECHANICAL COMPONENTS
Competency: Q6 Service levelling systems

Objectives

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

- Describe servicing and repairing levelling systems.

LEARNING TASKS

1. Describe levelling systems

2. Describe servicing levelling systems

3. Describe repairing levelling systems

CONTENT

- Types
 - Electric
 - Hydraulic
- Hydraulic components
 - Cylinders
 - Springs
 - Controls
- Electric components
 - Motors
 - Gears
 - Controls
- Safety
- Manufacturers' operations manual
- Inspection
- Troubleshooting
- Cleaning
- Lubrication
- Adjustments
- Springs
- Verifying operation
- Safety
- Manufacturers' service manual
- Removal/replacement
 - Components
- Cleaning
- Aesthetic details
- Verifying operation



Line (GAC): **Q** **SERVICE CHASSIS AND MECHANICAL COMPONENTS**
Competency: **Q7** **Service folding camping trailers**

Objectives

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

- Describe folding camping trailers.
- Describe servicing lift systems and wall systems.

LEARNING TASKS

1. Describe folding camping trailers

2. Describe lift systems

3. Describe servicing lift systems and wall systems

CONTENT

- Types
 - Hard wall
 - Soft wall
- Components
 - Lift systems
 - Roof systems
 - Wall systems
 - Slideouts
 - Accessories
- Type
 - Manual
 - Electric
 - Hydraulic
- Components
 - Cable
 - Spring
 - Rams
- Safety
- Manufacturers' operating manual
- Access
- Maintenance
- Troubleshooting
- Inspection
- Cleaning
- Adjustments
- Lubricating
- Repairing
 - Removal
 - Replacement
- Verifying operation



Section 4

ASSESSMENT GUIDELINES



Assessment Guidelines – Level 1

Level 1 Grading Sheet: Subject Competency and Weightings

PROGRAM: IN-SCHOOL TRAINING:		RECREATION VEHICLE SERVICE TECHNICIAN LEVEL 1	
LINE	SUBJECT COMPETENCIES	THEORY WEIGHTING	PRACTICAL WEIGHTING
A	PERFORM SAFETY-RELATED ACTIVITES	8%	0%
B	USE TOOLS AND EQUIPMENT	8%	20%
C	PERFORM COMMON WORK PRACTICES	13%	30%
D	SERVICE WATER SYSTEMS	11%	0%
F	SERVICE ELECTRICAL SYSTEMS	25%	0%
H	SERVICE LIQUID PETROLEUM (LP) GAS SYSTEMS	10%	20%
I	SERVICE WATER HEATERS	3%	0%
J	SERVICE FURNACES	3%	0%
K	SERVICE COOKTOPS AND OVENS	2%	0%
L	SERVICE REFRIGERATORS	4%	0%
M	SERVICE AIR CONDITIONERS (A/C), REFRIGERATION AND HEAT PUMPS	1%	0%
Q	SERVICE CHASSIS AND MECHANICAL COMPONENTS	6%	15%
R	SERVICE TOWING SYSTEMS	6%	15%
	Total	100%	100%
In-school theory / practical subject competency weighting		50%	50%
Final in-school mark		IN-SCHOOL %	



Assessment Guidelines – Level 2

Level 2 Grading Sheet: Subject Competency and Weightings

PROGRAM: IN-SCHOOL TRAINING:		RECREATION VEHICLE SERVICE TECHNICIAN LEVEL 2	
LINE	SUBJECT COMPETENCIES	THEORY WEIGHTING	PRACTICAL WEIGHTING
F	SERVICE ELECTRICAL SYSTEMS	10%	25%
H	SERVICE LIQUID PETROLEUM (LP) GAS SYSTEMS	25%	25%
I	SERVICE WATER HEATERS	5%	0%
J	SERVICE FURNACES	5%	0%
K	SERVICE COOKTOPS AND OVENS	5%	0%
L	SERVICE REFRIGERATORS	5%	0%
M	SERVICE AIR CONDITIONERS (A/C), REFRIGERATION AND HEAT PUMPS	5%	0%
O	SERVICE EXTERIOR COMPONENTS	20%	25%
P	SERVICE INTERIOR COMPONENTS	20%	25%
	Total	100%	100%
In-school theory / practical subject competency weighting		50%	50%
Final in-school mark		IN-SCHOOL %	



Assessment Guidelines – Level 3

Level 3 Grading Sheet: Subject Competency and Weightings

PROGRAM: IN-SCHOOL TRAINING:		RECREATION VEHICLE SERVICE TECHNICIAN LEVEL 3	
LINE	SUBJECT COMPETENCIES	THEORY WEIGHTING	PRACTICAL WEIGHTING
C	PERFORM COMMON WORK PRACTICES	20%	32%
F	SERVICE ELECTRICAL SYSTEMS	20%	32%
M	SERVICE AIR CONDITIONERS (A/C), REFRIGERATION AND HEAT PUMPS	12%	18%
O	SERVICE EXTERIOR COMPONENTS	12%	18%
P	SERVICE INTERIOR COMPONENTS	4%	0%
Q	SERVICE CHASSIS AND MECHANICAL COMPONENTS	20%	0%
R	SERVICE TOWING SYSTEMS	12%	0%
	Total	100%	100%
In-school theory / practical subject competency weighting		50%	50%
Final in-school percentage score Apprentices must achieve a minimum 70% as the final in-school percentage score to be eligible to write the Interprovincial Red Seal exam.		IN-SCHOOL %	

All apprentices who complete Level 3 of the Recreation Vehicle Service Technician program with a FINAL level percentage score of 70% or greater will write the Interprovincial Red Seal examination as their final assessment.

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



Section 5

TRAINING PROVIDER STANDARDS



Facility Requirements

Classroom Area

- Comfortable seating and tables suitable for training, teaching, lecturing
- Compliance with all local and national fire code and occupational safety requirements
- Lighting controls to allow easy visibility of projection screen while also allowing students to take notes
- Windows must have shades or blinds to adjust sunlight
- Heating / Air conditioning for comfort all year round
- In-room temperature regulation to ensure comfortable room temperature
- In-room ventilation sufficient to control training room temperature
- Acoustics in the room must allow audibility of the instructor
- White marking board with pens and eraser (optional: flipchart in similar size)
- Projection screen or projection area at front of classroom
- Overhead projector and/or multi-media projector

Shop Area

- Ceiling shall be a minimum height of 16' or as varied by good engineering practices and code
- Length and width of shop must be adequate to accommodate RV with multiple slideouts
- Appropriate lifting devices (hoists) used in industry
- Suitable demonstration area
- Lighting appropriate for good vision in ambient light
- Compliance with all local and national fire code and occupational safety requirements
- Must meet Municipal and Provincial bylaws in regards to waste water management and environmental laws
- Adequate hoist/lifting devices to student ratio

Lab Requirements

N/A

Student Facilities

- Eating area as per WorkSafeBC regulations
- Washroom facilities as per WorkSafeBC regulations
- Personal storage lockers

Instructor's Office Space

N/A

Other

N/A



Tools and Equipment

Shop Equipment

Required

- Air compressor and components
- Band saw
- Battery charger
- Battery load tester
- Break
- Creepers
- Drill press
- Floor jacks
- Grinders, bench and angle
- Jack stands
- Parts cleaner
- Shop vacuum
- Sliding compound mitre saw
- Table saw

Recommended

- N/A

Shop (Facility) Tools

Standard Tools

- A/C tester
- Adjustable crescent wrenches, 8", 10"
- Air blow gun
- Air flow meters
- Air impact driver, 1/2"
- Air riveting guns
- Air shears
- Ammeter
- Aviation snip set, left, right, straight
- Battery carrying straps
- Battery pliers
- Battery post cleaner
- Battery terminal puller
- Battery terminal spreader/reamer
- Bearing and race installing tool
- Body clip removal tools
- Brake tools
- Chalk line
- Chisel set, wood and metal
- Circuit board tester
- Clutch head screw driver set (scrulox)
- Cordless screwdriver/drill
- Fibreglass repair tools
- Flashlight
- Framing square
- Hex key sets, allen wrench set, standard & metric
- Hole saw kit
- Hose clamp pliers
- Hydrometer
- Jigsaw
- Key hole saw
- Kregs cabinet jig
- Laminate trimmers and bits
- Levels, 2' and 4'
- Manometer
- Multimeter (DVOM and analogue)
- Paint equipment
- Pipe wrench, 10"
- Plastic welding
- Portable circular saw
- Portable sanders
- Pressure gauge
- Punch set
- Reciprocating saw
- Refractometer
- Rivet guns
- Routers and bits



- Rubber mallet
- Seal removing tool
- Set torx screwdriver set
- Single and double cut files, 10"
- Spin weld tool and equipment
- Standard socket sets, 1/4", 3/8", 1/2"
- Torque wrench, standard and metric, 1/2", 0-150 ft./lb.
- Tubing cutter flaring tool kit
- Tubing, 3/8" – 1" std. & 6mm – 19mm
- Vise-grips (Locking pliers)
- Wire brushes deep socket sets, standard and metric, 1/4", 3/8", 1/2"
- Wrenches (flare nut), 3/8" -7/8"

Specialty Tools

- N/A

Student Equipment (supplied by school)

Required

- 12V DC test light
- Ball-peen hammer
- Channel locks
- Circuit tester, polarity and GFCI
- Claw hammer, 16 oz.
- Combination square
- Combination wrench set
- Crimping tools
- Diagonal cutters
- Flat tip screw driver set
- Hack saw with replacement blades
- Needle-nose pliers
- Nut driver set, 3/16" to 1/2", metric
- Phillips screw driver set
- Putty knives
- Robertson screw driver set
- Scratch awl
- Slip joint pliers
- Tape measure, 1"-25'
- Utility knife
- Wire strippers
- Wonder bar

Recommended

N/A

Student Tools (supplied by student)

Required

None

Recommended

None



Reference Materials

Required Reference Materials

- Local materials developed by training providers
- Recreation Vehicle Industry Association (RVIA) textbooks
https://my.rvia.org/NC_Product?id=a1B41000003jdmQEAQ. (2012 or most recent)

Recommended Resources

- National Highway Traffic Safety Administration <https://www.nhtsa.gov/> (for recall notices)

Suggested Texts

N/A



Instructor Requirements

Occupation Qualification

The instructor must possess:

- BC Recreational Vehicle Service Technician Certificate of Qualification with Red Seal Endorsement
- Certificate of Qualification from another Canadian jurisdiction with Red Seal Endorsement

Work Experience

The instructor must possess:

- A minimum of 5 years experience working in the industry as a journeyperson
- Diverse industry experience, including that which would cover all competencies in this program

Instructional Experience and Education

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

- Instructor's Certificate
- Instructor's Diploma
- Bachelor's or Master's Degree in Education



Appendices



Appendix A Acronyms

A/C	Air conditioning
AC	Alternating current
AGM	Absorbed glass matt
ASME	American Society of Mechanical Engineers
AWG	American wire gauge
CAN	Controller Area Network (CAN)
CO	Carbon monoxide
CSA	Canadian Standards Association
DC	Direct current
DOT	Department of Transportation
EPDM	Ethylene Propylene Diene Monomer
FRP	Fibre reinforced plastic
GFCI	Ground fault circuit interrupter
GPS	Global positioning system
GVWR	Gross vehicle weight rating
ISO	International Organization for Standardization
LIN	Local Interconnect Network
LP	Liquid petroleum
LPG	Liquid petroleum gas
MOST	Media Oriented Systems Transport
MPPT	Maximum power point tracking
NHTSA	National Highway Traffic Safety Administration
OCTP	One Control Touch Panel
PDI	Pre-delivery inspection
Pex	Polyethylene
PPE	Personal protective equipment
PVC	Polyvinyl chloride
PWM	Pulse width modulation
RV	Recreation vehicle
SSID	System Set Identifier
TC	Transport Canada
TPO	Thermoplastic polyolefin
VAC	Volts of alternating current
VIN	Vehicle Identification number
VOM	Volt ohm meter
WHMIS	Workplace Hazardous Materials Information System



Appendix B Previous Contributors

The 2008 Program Outline was prepared with the advice and direction of industry subject matter experts:

- Al Cohoe
- Jim Ingram

The 2008 Program Outline was reviewed by the following:

- Lloyd Stamm Automotive Training Standards Organization
- Kevin Cudmore Automotive Training Standards Organization