

Transport Trailer Technician Level 3

Transport Trailer Technician

Unit: C1 Journeyperson Trainer

Level: Three

Duration: 14 hours

Theory: 14 hours

Practical: 0 hours

Overview:

This unit introduces senior apprentices to the responsibilities of workplace training that they will assume as supervising journeypersons. Most trades have a rich tradition of refreshing and sharing their trade skills from one generation of trade practitioner to the next. This unit orients senior apprentices to some of the practical and conceptual tools that can enable them to contribute to this trade heritage when they become certified journeypersons and, ultimately, journeyperson trainers.

The journeyperson's obligation to assist entry-level apprentices to develop skills and knowledge is complex and challenging. It involves safety considerations, employer expectations, provincial regulations, as well as the tradition of skills stewardship that links modern practice with the long history of workplace teaching and learning that defines the apprenticeable trades. The ability to offer timely and appropriate support to apprentices is itself an important area of trade learning. This unit presents material intended to help refine this ability through reflection and discussion by senior apprentices, and discussion with their in-school instructor and journeyperson trainer.

This content reflects Manitoba and Canadian standards prescribed for journeyperson-level supervisory capabilities, as well as key topics in current research on the importance of workplace training in apprenticeship systems. These detailed descriptors represent suggested focal points or guidelines for potentially worthwhile exploration, and are neither mandatory nor exhaustive.

Note: No percentage-weightings for test purposes are prescribed for this unit's objectives. Instead, a "Pass/Fail" grade will be recorded for the unit in its entirety.

Objectives and Content:	Percent of Unit Mark (%)
<p>1. Compare/contrast role-options and responsibilities of the supervising journeyperson.</p> <ul style="list-style-type: none">a. Implicit vs. explicit standards and content: training goals are/are not codified; assessment measures are/are not usedb. Accountability for results: e.g., journeyperson is/is not required to prepare performance evaluation that could affect apprentice's employability or wage-ratec. Long-term vs. short-term supervision assignments: e.g., considerable latitude/little latitude for apprentice to learn from mistakesd. Formally vs. informally structured: e.g., supervision assignment is part of a prescribed cycle of assignments involving coordination among multiple journeypersons; apprentice is trained according to an individual training plan negotiated with employere. Types of supervisory role options and what is implied by each<ul style="list-style-type: none">• Journeyperson Trainer (JT) role: often initiated by someone other than apprentice, and limited to a particular skill set, task or production requirement• Mentor role: often initiated by apprentice and relatively open-ended regarding content, duration, other• Peer role: typically involves individual upgrading or cross-training of one	n/a

journey person by another; can include a senior apprentice assisting a less-experienced trade learner

- Coordinator role: often a senior-level journey person appointed by an organization to assume responsibilities for monitoring progression of groups of apprentices
- Other roles: may be improvised by journey person, such as combination of multiple roles of the above

2. Describe and demonstrate common requirements for providing journey person level supervision. n/a

- a. Apprenticeship learning adapted to journey person supervision assignments and a journey person perspective
 - Application of adult education concepts to trades teaching and learning (e.g., responsibilities and expectations of senior-level apprentices)
 - Practical significance of “styles” of adult learning and teaching
 - Helping senior-level apprentices integrate in-school technical training and on-the-job practical training experiences
 - Providing help and guidance with new tasks and skills
 - Providing help and guidance with fixing mistakes
 - Learning and teaching “the ropes” – socialization of apprentice within a community of trade practice (e.g., how to borrow a tool, interrupt a journey person and seek advice of experienced co-workers, etc)
 - Coverage and documentation of prescribed tasks and subtasks where applicable.
 - Discuss the limits of the journey person trainers’ own responsibilities and competence (e.g., scope, willingness to train, etc)
 - Benefits of maintaining a personal record of achievements, ideas and needs as a journey person trainer (e.g., resume, portfolio, training credentials, logbook, etc)
- b. Individual reflection and guided group discussion about personal experiences of workplace learning as an apprentice
 - Identification of best and worst practices of journey person trainer
 - Identification of characteristics workplace and other factors that can contribute to good and bad trade teaching/learning experiences
 - Development of professional standards and work ethics concerning responsibility to share one’s knowledge and skill with others in the workplace (e.g., use/misuse of humour, rigour, discretion, craft-pride, etc)
 - Qualities of a good journey person trainer
 - Components of workplace journey person training
 - Processes and recommended practices re: journey person training
 - Troubleshooting problems re: supervision assignments
- c. Role of assessment in supervising, coaching or guiding other people to learn or improve their skills (e.g., formative and summative evaluation), and how this might contribute to how the journey person-level supervision task is approached in future
- d. Compare and contrast discussion results with current knowledge and resources about workplace training methods as they apply to journey person-level supervision assignments
- e. Other (as may be specified by instructor)

Transport Trailer Technician

Unit: C2 Suspension Systems II: Diagnoses/Services

Level: Three

Duration: 49 hours

Theory: 28 hours

Practical: 21 hours

Overview:

This unit is designed to provide the apprentice with additional knowledge about the principles of suspension and related components found in today's transport trailers. Beginning with an overview of related suspension terminology, this unit then covers hazards and describes safe work practices, truck and trailer air and air ride suspension components, diagnostic procedures on air ride suspension, lift axles, and steerable/load-sensed axles and associated removal and installation techniques.

New technologies provide lighter, stronger suspension systems such as composite spring suspensions. Multi-functional air bags are now available, acting as both a suspension system during normal operation and as a lifting device for loading and unloading. This provides easier access to loading docks. Some technologies — such as on-board scales — are being developed to improve safety.

Objectives and Content:

Percent of Unit Mark (%)

- | | |
|--|------------|
| 1. Define terminology associated with suspension systems. | 5% |
| a. Air ride suspension | |
| b. Lift axles | |
| c. Steerable/load-sensed axles | |
| • King pins | |
| • Steering linkage | |
| 2. Identify hazards and describe safe work practices when working with suspension systems and related components. | 5% |
| 3. Review truck and trailer air components. | 10% |
| a. Compressors | |
| b. Governors (dryers) | |
| c. Air valves | |
| 4. Describe air ride suspension components. | 10% |
| a. Air spring | |
| b. Height control valve | |
| c. Pressure protection valve | |

5. **Perform diagnostic procedures on air ride suspension, lift axles and steerable/load-sensed axles.** 35%
- a. Axle system and related components
 - Axle alignment and position
 - Checks and measurements
 - b. Evaluate component conditions
 - Connections
 - Wear characteristics
 - c. Manufacturers' specifications
 - d. Verification of service performed
6. **Perform removal and installation techniques for air ride suspension, lift axles and steerable/load-sensed axles.** 35%
- a. Types and grades of oil and grease
 - b. Manufacturers' specifications (including OEM specifications)
 - c. Removal and installation techniques for axle system components such as:
 - Air springs
 - Spring beam bushing
 - Walking beam
 - Air valves

Truck and Transport Mechanic

Unit: C3 Brake Systems II: Diagnoses/Services

Level: Three

Duration: 49 hours

Theory: 20 hours

Practical: 29 hours

Overview:

This unit is designed to provide the apprentice with terminology, hazard information and safe work practices associated with air flow aspects of air brake systems, as well as the principles of pneumatic brake systems found in today's transport trailer equipment, including pre- and post-121, ABS and EBS. The unit also covers diagnostic techniques and procedures when inspecting pneumatic brake systems from both theoretical and practical perspectives.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with air flow aspects of air brake systems.	5%
2. Identify hazards and describe safe work practices when working with air flow aspects of air brake systems.	5%
3. Identify and describe components used in pre-121 pneumatic brake systems.	10%
a. Terminology	
b. Characteristics/function	
c. Components	
• Pneumatic Valves: RE – 6, RE – 6NC, A1000 s/l	
• Converter – plumbing schematics	
d. Pre-121 pneumatic circuits	
4. Identify and describe components used in post-121 pneumatic brake systems.	10%
a. Terminology	
b. Characteristics/function	
c. Components	
• Designated circuits	
• Spring brake control valves	
• Service control valves	
d. Post-121 pneumatic circuits	
5. Identify and describe components used in anti-lock brake system (ABS) and pneumatic brake systems.	10%
a. Terminology	
b. Characteristics/function	

- c. Components
 - Designated circuits
 - Spring brake control valves
 - Service control valves
 - Meritor – “Easy-Stop” and “Enhanced”
 - Haldex – Gen1 and Gen2
 - Wabash – MBS 1/MBS 2
 - d. Specific ABS pneumatic circuits
- 6. Define terminology and components of electronic braking systems (EBS). 5%**
- a. Terminology
 - b. Characteristics/function
 - c. Components
 - d. Power line carrier (PLC)
 - e. Multiplexing
- 7. Demonstrate diagnostic techniques and procedures when inspecting pre-121 pneumatic brake systems. 5%**
- a. Types and operating conditions
 - b. Removal and installation techniques for related components
 - c. Brake adjustment techniques and procedures
 - d. Use of electronic testing equipment
- 8. Demonstrate diagnostic techniques and procedures when inspecting post-121 pneumatic brake systems. 20%**
- a. Types and operating conditions
 - b. Removal and installation techniques for related components
 - c. Brake adjustment techniques and procedures
 - d. Use of electronic testing equipment
- 9. Demonstrate diagnostic techniques and procedures when inspecting ABS and EBS pneumatic brake systems. 30%**
- a. Types and operating conditions
 - b. Removal and installation techniques for related components
 - c. Brake adjustment techniques and procedures
 - d. Use of electronic testing equipment

Transport Trailer Technician

Unit: C4 Axles and Wheel End Assemblies II: Diagnoses/Services

Level: Three

Duration: 7 hours

Theory: 7 hours

Practical: 0 hours

Overview:

This unit is designed to provide the apprentice with knowledge about the principles of axle systems and related components such as wheel end assemblies and tires found in today's transport trailers. Beginning with an overview of related axle system terminology, hazards and safe work practices, this unit also covers basic suspension principles, the main components of a typical suspension and the suspension identification and inspection process.

Automatic inflation systems have become more common, especially in fleets. Nitrogen inflated tires are increasing in popularity. Nitrogen maintains a constant inflation pressure regardless of ambient temperature. Additionally, more self-steering axles are being used on trailers.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Review terminology associated with axles and wheel end assemblies.	5%
2. Review hazards and describe safe work practices when working with axles and wheel end assemblies.	5%
3. Review diagnostic procedures associated with axles and wheel end assemblies. a. Wheel disc installation b. Wheel bearing end play	5%
4. Review characteristics and specifications of lift axles and steerable/load-sensed axles. a. Types of wheel end assemblies such as: • Stud pilot wheel mount (disc) • Hub pilot (disc) • Dayton/spoke wheel mount (rim) b. Types of tires • Radial • Bias ply c. Application of tires • Single • Dual • Super single d. Wheel assembly components such as:	25%

- Clamps
 - Studs
 - Nuts
 - Spacers
 - Valve stem and cap
- e. Manufacturers' specifications for tires
- Pre-certification requirements
 - Construction
 - Weight capacity
 - Performance designations
 - Recommended tire pressure

5. Review and perform axle system removal and installation techniques for wheel assemblies and tires. 40%

- a. Wheel end fastener – installation procedure
- Torque
 - Clamp force
- b. Manufacturers' specifications

6. Describe and perform checks, measurements, removal and installation procedures for wheel assemblies and tires. 20%

- a. Tire demounting techniques and procedures
- b. Inspection techniques and procedures for spacers and components
- c. Torque requirements and sequence
- d. Visual inspection of tire defects such as
- Tire wear
 - Separation
 - Recap separations
- e. Safe handling and inspection procedures (failure analysis)
- Zippered
 - Flat
 - Cuts

Transport Trailer Technician

Unit: C5 Trailer Chassis and Bodies II: Diagnoses/Services

Level: Three

Duration: 7 hours

Theory: 7 hours

Practical: 0 hours

Overview:

This unit is designed to provide the apprentice with knowledge about the trailer body when working with today's transport trailer equipment. The focus of this unit is the flat-deck structure. Beginning with an overview of the terminology, hazards and safe work practices associated with the types, structures and construction of trailer chassis and bodies, the unit also covers inspection techniques and operational/maintenance considerations and procedures.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Review terminology associated with trailer chassis and bodies.	5%
2. Review hazards and describe safe work practices when working with trailer chassis and bodies.	5%
3. Review the types/structures and construction of trailer chassis and bodies.	20%
a. Types	
• Flat bed	
• Van	
• Cattle pots	
• Dump trailer	
• Tankers	
b. Materials (structure, tensile strength)	
• Aluminum	
• Steel	
• Stainless steel	
• Fibreglass	
• Rubber	
c. Load control materials	
• Load bars	
• Cable winches (belt, steel)	
• Nylon straps	
• Chain cinches	
4. Review the considerations in the operation/use of trailer chassis and bodies.	15%
a. Use of load control materials and types of loads being transported	
b. Use of fastening devices	

- c. Jacking and leveling techniques and procedures
 - d. Additional safety considerations
 - Sizes and types of fastening devices
 - Load security positioning, fastening and replacement procedures
 - e. Manufacturers' operating specifications
- 5. Review diagnostic and inspection techniques and procedures. 15%**
- a. Welding techniques and procedures
 - b. Straightening equipment operation
 - c. Insulation removal techniques and procedures
 - d. Manufacturers' specifications
- 6. Describe diagnostic, inspection and repair procedures for trailer chassis and bodies. 20%**
- a. Repair techniques and procedures
 - Types of doors
 - Types of units
 - Types of materials
 - b. Straightening techniques and procedures
 - Types of doors
 - Types of units
 - Types of materials
 - c. Damage and/or wear characteristics and limits
 - Types of doors
 - Types of units
 - Types of materials
 - d. Other techniques
 - Riveting and caulking
 - Stretching procedures
 - Leveling procedures
 - Insulation removal
 - Flooring techniques (wood, steel, aluminum)
 - Welding and riveting requirements and compatible related structures
 - e. Manufacturers' specifications
- 7. Describe diagnostic procedures, removal and installation procedures for trailer chassis and bodies. 20%**
- a. Identification of location and extent of damage to interior/exterior of the trailer such as:
 - Structural damage (floors, main rails, panels, side posts)
 - Doors (seals, rollers, warn tracks, hardware)
 - Roofs/side walls (water leaks, corrosion)
 - Hardware (loose fasteners/rivets, kick panels, scuff liner, broken chains, locks, cables, winches)
 - b. Maintenance procedures
 - Welding requirements
 - Riveting requirements
 - Straightening equipment operation
 - c. Additional safety considerations

Transport Trailer Technician

Unit: C6 Coupling Units and Landing Gear: Diagnoses/Services

Level: Three

Duration: 21 hours

Theory: 7 hours

Practical: 14 hours

Overview:

This unit is designed to provide the apprentice with knowledge about coupling units and their related components found in today's transport trailers. Beginning with an overview of related terminology, hazards and safe work practices, and diagnostic procedures for coupling units and landing gear, the unit also covers design characteristics and operation, removal/installation procedures, techniques for checking/measuring units, landing gear and related components.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with coupling units, landing gear and related components.	5%
2. Identify hazards and describe safe work practices when working with coupling units, landing gear and related components.	5%
3. Identify and describe characteristics and operation of coupling units, landing gear and related components.	10%
a. Safety chains and cables	
• Sizes	
• Types	
• Capacities	
• Wear characteristics and limits	
b. Attachments for safety chains and cables	
• Eye	
• Clevis	
• Safety hook and latch	
• Cable clamps brackets	
• Safety cable/chain eye	
c. Draw bar function and attachments	
• Hinged brackets	
• Pins bushings	
• Bolts and mechanisms	
d. Pintle hook assembly	
e. Landing gear	
• Types	
• Makes and models	

- Ratios
 - Mounting patterns
- f. Brackets and braces
 - Types
 - Sizes
 - g. Support legs
 - Types
 - Models
 - h. Fifth wheel coupling assembly
 - i. Turntable assembly
- 4. Demonstrate diagnostic procedures for coupling units and related components. 20%**
- a. Types and sizes of fasteners, brackets and braces
 - b. Removal and installation techniques for coupling unit components such as:
 - Safety chains and cables
 - Attachments for safety chains and cables
 - Pintle hook assembly
 - Turntable
 - c. Checks and measurements
 - d. Torque specifications, procedures and sequence
 - e. Wear limits and tolerances
 - f. Evaluate component conditions such as checking for worn or damaged parts or excessive wear on draw bar eyes and bushing
 - g. Manufacturers' specifications
 - h. Verification of service performed
- 5. Demonstrate diagnostic procedures for landing gear. 20%**
- a. Types and sizes of fasteners, brackets and braces
 - b. Removal and installation techniques for landing gear components
 - Support legs
 - Manual support legs
 - Fasteners, brackets, braces, shaft pins, bushings, spacers
 - c. Checks and measurements
 - d. Alignment of landing gear to shaft
 - e. Appropriate mounting pattern
 - f. Height of landing gears
 - g. Evaluate component conditions (checking for cracked, stretched, bent, missing, loose or broken parts and/or components)
 - h. Manufacturers' specifications
 - i. Verification of service performed
- 6. Perform removal and installation techniques for coupling units and related components. 20%**
- a. Types and sizes of fasteners, cable clamps, brackets and lock components
 - b. Manufacturers' specifications
 - c. Removal and installation techniques for coupling units and their related components such as:
 - Safety chains and cables
 - Attachments for safety chains and cables
 - Draw bar function and attachments
 - Pintle hook assembly
 - Turntable

- 7. Perform removal and installation techniques for landing gear. 20%**
- a. Types and sizes of fasteners, brackets and braces
 - b. Manufacturers' specifications
 - c. Removal and installation techniques for landing gear components such as:
 - Support legs
 - Manual support legs
 - Fasteners, brackets, braces, shaft pins, bushings, spacers

Transport Trailer Technician

Unit: C7 Heating and Refrigeration Units: Diagnoses/Services

Level: Three

Duration: 35 hours

Theory: 15 hours

Practical: 20 hours

Overview:

This unit is designed to provide the apprentice with knowledge about heating and refrigeration units and their related components found in today's transport trailers. The unit provides an overview of related terminology, hazards and safe work practices, principles of gases associated with transport trailer heating systems and refrigeration systems, construction and operating principles of catalytic heaters, principles of operation of a storage tank, the function of regulators, principles of refrigerants required to work with transport trailers, construction and operating principles of refrigerant compressors as well as charging, starting, testing and operation of batteries.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with heating and refrigeration units.	5%
2. Identify hazards and describe safe work practices when working with heating and refrigeration units.	10%
a. Lines and connections (as per code) when lighting, servicing and installing	
b. Handling	
c. Storage	
d. Utilization	
e. Diesel self contained unit heated box	
3. Describe the principles of gases associated with transport trailer heating systems and refrigeration systems.	10%
a. Boyle's Law	
b. Charles's Law	
c. Heat movement	
• Convection	
• Conduction	
• Radiation	
4. Describe construction and operating principles of catalytic heaters.	10%
5. Describe principles of operation of a storage tank.	5%
a. Describe where a storage tank for liquefied petroleum gas (LPG) should be located and related security precautions	
b. Describe the capacity and maximum filling level of an LPG tank	

- c. Filling certificate
- 6. Describe the function of regulators. 5%**
- a. Regulator adjustments
 - b. Adjustment limitations
- 7. Apply principles of refrigerants required to work with transport trailers. 5%**
- a. 134a
 - b. R22
 - c. 502
 - d. Other
- 8. Identify and describe construction and operating principles of refrigerant compressors. 25%**
- a. Types of compressors used in the industry (mechanically driven)
 - Screw
 - Scroll
 - Reciprocating
 - Rotary vane
 - b. Parts of a compressor
 - Function of a compressor shaft seal
 - Other related parts and their function
 - c. Valve arrangements and action in compressors
 - d. Trace refrigerant flow through a compressor
 - e. Capacity and calculating capacity of a compressor (volumetric)
 - f. Calculate the displacement and capacities of a compressor (flow)
 - g. Function of the compressor in the system
 - h. Refrigeration/heating cycles and operational principles
 - i. Effect of change of state; effect of change of pressure
 - j. Cooling and lubrication provisions
 - Direction of rotation for lubrication (importance, valving)
- 9. Describe battery operation, charging and starting operation and testing. 25%**
- a. Battery type and construction
 - b. Alternator output
 - c. Starting system components and testing
 - d. Voltage drops

Transport Trailer Technician

Unit: C8 Welding III

Level: Three

Duration: 70 hours

Theory: 10 hours

Practical: 60 hours

Overview:

This unit is designed to provide the apprentice with knowledge about welding terminology, the use and operation of welding equipment and the hazards and safe work practices associated with it. The unit also covers various types of welds and joints.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with welding.	5%
a. Gas tungsten arc welder (GTAW)	
b. Welding equipment (GMAW)	
c. Aluminum Spool Gun Welding	
2. Identify hazards and describe safe work practices when working with welding tools and equipment.	5%
3. Describe the use and operation of welding equipment.	5%
a. Gas tungsten arc welder (GTAW)	
b. Welding equipment (GMAW)	
c. Aluminum Spool Gun Welding	
d. Other	
4. Demonstrate the use and operation of welding equipment.	40%
a. Gas tungsten arc welder (GTAW)	
b. Welding equipment (GMAW)	
c. Aluminum Spool Gun Welding	
d. Other	
5. Perform various types of welds and joints.	45%
a. Joint	
• Lap	
• Butt with backing	
• Open butt	
b. Welds	
• Plug	

- Tack
- Stitch
- c. Positions
 - Flat
 - Vertical
 - Horizontal
 - Overhead

Transport Trailer Technician

Unit: C9 Pre-Interprovincial Review

Level: Three

Duration: 28 hours

Theory: 28 hours

Practical: 0 hours

Overview:

This unit offers senior apprentices a systematic review of skills and knowledge required to pass the Inter-Provincial Examination. It promotes a purposeful personal synthesis between on-the-job learning and the content of in-school technical training. The unit includes information about the significance of Provincial certification and the features of the Provincial Examination.

Note: No percentage-weightings for test purposes are prescribed for this unit's objectives. Instead, a "Pass/Fail" grade will be recorded for the unit in its entirety.

Objectives and Content:	Percent of Unit Mark (%)
<p>1. Describe the significance, format and general content of Inter-Provincial (IP) Examinations for the trade of Transport Trailer Technician.</p> <ul style="list-style-type: none"> a. Scope and aims of Inter-Provincial certification; value of certifications b. Obligations of candidates for Inter-Provincial certification <ul style="list-style-type: none"> • Relevance of Inter-Provincial Examinations to current, accepted trade practices; industry-based provincial and national validation of test items • Supplemental Policy (retesting) • Confidentiality of examination content c. Multiple-choice format (four-option) item format, Red Seal standards for acceptable test items d. Government materials relevant to the Inter-Provincial Examinations for apprentice Transport Trailer Technicians <ul style="list-style-type: none"> • Red Seal Occupational Standard (RSOS); prescribed scope of the skills and knowledge which comprise the trade • RSOS "pie-chart" and its relationship to content distribution of Provincial Examination items • Apprenticeship Manitoba Technical Training package 	n/a
<p>2. Identify resources, strategies and other considerations for maximizing successful completion of written examinations.</p> <ul style="list-style-type: none"> a. Personal preparedness <ul style="list-style-type: none"> • Rest • Nutrition • Personal study regimen • Prior experience in test situations (e.g., Unit tests) b. Self-assessment, consultation and personal study plan 	n/a

- Self-assessment of individual strengths/weaknesses in trade related skills and knowledge
- Approved textbooks
- Study groups

- | | | |
|------------|---|------------|
| 3. | Review program content regarding occupational skills. | n/a |
| 4. | Review program content regarding suspension systems. | n/a |
| 5. | Review program content regarding brake systems. | n/a |
| 6. | Review program content regarding axles and wheel end assemblies. | n/a |
| 7. | Review program content regarding trailer chassis, bodies and coupling units. | n/a |
| 8. | Review program content regarding electric and electronic systems. | n/a |
| 9. | Review program content regarding hydraulic systems. | n/a |
| 10. | Review program content regarding temperature control systems. | n/a |
