

Transport Trailer Technician Level 3

Transport Trailer Technician

Unit: A3 Orientation II: The Job of Journeywork

Level: Three

Duration: 14 hours

Theory: 14 hours

Practical: 0 hours

Overview:

Transport Trailer Technician technical training offers an entry-level orientation to the challenges of apprenticeship learning. The present unit introduces senior apprentices to the responsibilities of workplace *teaching* that they will assume as supervising journeypersons. Tradeworkers have a particularly rich tradition of refreshing and sharing their skills from one generation of practitioners 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 themselves become certified journeypersons. The journeyperson's obligation to assist trade learners 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, 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 dialogue with their instructor. The detailed descriptors under each unit objective reflect Manitoba and Canadian standards prescribed for journey-level supervisory capabilities, as well as key topics in current research on the importance of workplace teaching and learning in trades-apprenticeship systems. Thus, descriptors represent suggested focal points or guidelines for potentially-worthwhile exploration. Delivery of this content will vary with the discretion of individual instructors, and with the experiences senior apprentices bring forward for group/individual reflection on the skills-stewardship dimension of their own future practice as journeypersons.

Objectives and Content:	Percent of Unit Mark (%)
1. Describe the scope, substance, and significance of journey-level status.	10%
a. Historical background, including trainee experiences	
• Origin, definition, and examples of journey-level status	
• Obligations to employers, trade clients, and apprentices	
• Concept of skills stewardship, and its rationale	
• Customary responsibilities of journeyperson as workplace trainer/supervisor	
• Overview development of formal systems for regulating/recognizing journey-level competence in designated apprenticeable trades	
• Contributions of 'unticketed journeymen' and other informally-qualified Ironworkers to workplace trade-learning	
• Achievements/limitations of informal systems for workplace training	
• Trends (e.g., succession planning in the trades; recognition of credentials and prior learning; defined standards for on-the-job trades education and training)	

- b. Regulatory/legal dimensions of journey-level status in designated trades
 - Rights and obligations re: Canada's Interprovincial 'Red Seal' program (Red Seal rationale, scope, and products, including the National Occupational Analysis [NOA], and Interprovincial examinations)
 - Manitoba provincial requirements [e.g., *Apprenticeship and Certifications Act*; *General Regulation*; the *Transport Trailer Technician Trade Regulation*; relevant policies of the Apprenticeship and Certification Board of Manitoba]
 - Trade-specific requirements re: Practical Training supervision and documentation; importance of quality assurance and broad-scope coverage of prescribed task-content; ratios, etc.
- c. Other (as may be specified by instructor)

2. Compare/contrast role-options and responsibilities of the supervising journeyperson.

15%

- a. Recognizing the variability of supervision assignments, situations, and roles
- b. Source and specification of the supervision assignment
- c. Formal vs. informal roles (e.g., mandated by an employer's succession plan)
- d. Implicit vs. explicit standards and content: training goals are/are not codified; assessment measures are/are not used,
- e. Accountability for results: subject/not subject to third-party notification; completion of supervision assignment itself is/is not assessed by third party; journeyperson is/is not required to prepare performance evaluation that could affect apprentice's employability or wage-rate, etc.
- f. General vs. task- or job-specific supervision assignments: e.g., scope of expectations re: content of supervisory task(s)
- g. Long-term vs. short-run supervision assignments – e.g., considerable latitude/little latitude for apprentice to learn from mistakes
- h. 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 employer
- i. Typology of common supervisory role-options and what is implied by each:
 - Coach role: is 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, etc.
 - Peer role: typically involves individual upgrading or cross-training of one journeyperson by another; can include senior apprentice assisting less-experienced trade learner
 - Managerial role(s): can shade over into hire/fire issues as lead-hand or site-boss
 - Coordinator role: often a senior-level journeyperson appointed by an organization to assume responsibilities for monitoring progression of groups of apprentices
 - Other roles: may be improvised by journeyperson
- j. Possibilities, perils, and likelihood of role-overlap in 'real-life' trade practice
- k. Importance of clarifying all roles, expectations, and implications involved in accepting a supervision assignment
- l. Role of Apprenticeship Training Coordinator (ATC), Apprenticeship Manitoba
- m. Resources for developing skills and knowledge re: providing journey-level supervision
 - Books and journals (not always trade-specific)
 - Websites
 - Conversation with trade instructors, journeypersons, and peers
 - Workshops
- n. Other (as may be specified by instructor)

3. Describe/demonstrate common requirements re: providing journey-level supervision. 15%

- a. Review Unit A1 content re: challenges/opportunities opportunities of Apprenticeship learning adapted to journey-level supervision assignments and a journey-level standpoint
 - Application of adult education concepts to trades teaching/learning (e.g., responsibilities and expectations of adult learners)
 - Practical significance of 'styles' of adult learning and teaching
 - Helping apprentices to integrate technical training (in school) and practical training (on-the-job) learning experiences
 - Providing help and guidance re: new tasks and skills
 - Providing help and guidance re: fixing mistakes
 - Learning/teaching "the ropes" – socialization of learner within a community of trade practice (e.g., how to borrow a tool, interrupt a journeyperson, 'recruit' an advisor)
 - Coverage/documentation of prescribed tasks and subtasks (Transport Trailer Technician NOA), including responsibility re: logbook sign-off (where applicable)
 - Consultation with Apprenticeship Training Coordinator (ATC), Apprenticeship Manitoba
 - Communicating with apprentices and employers about supervision assignments and assignment specifications, including the limits of the trainers' own responsibilities and competence (e.g., substance-abuse intervention)
 - Benefits of maintaining a personal record of achievements, ideas, and needs as a workplace trainer
- b. Individual reflection and guided group discussion re: personal experiences of workplace learning as an apprentice
 - Identification of best and worst practices of supervising journeypersons
 - Assessment of personal experiences (if any) to date in supervising, coaching, or guiding other people to learn or improve their skills (e.g., entry-level apprentices, members of athletic team, younger family members, etc.), and how this might compare/contrast with the journey-level support of apprenticeship learning
 - Identification of workplace and other factors that can contribute to good and bad trades teaching/learning experiences
 - Development of personal standards re: responsibility to share one's knowledge and skill with others in the workplace (e.g., use/misuse of humour, rigour, discretion, craft-pride, etc.)
- c. Comparison/contrast of discussion results with current knowledge/resources re: workplace skills coaching methods as applicable to journey-level supervision assignments
 - Qualities of a good workplace coach
 - Components of workplace skills coaching
 - Processes and recommended practices re: workplace coaching
 - Troubleshooting problems re: supervision assignments
- d. Other (as may be specified by instructor)

4. Complete Modules 1 to 3, *Workplace Coaching Skills* (or equivalent). 30%

- a. Identifying purpose of the lesson
 - Explaining the point of the lesson
 - Role of the coach in specific coaching situation
 - Other (specified by instructor)
- b. Linking the lesson
 - Learner needs
 - Lesson sequence
 - Focus on learner
 - Selection/timing of coaching opportunities
- c. Demonstration of skill/task to be learned
 - Starting the coaching session

- Demonstration
- Hands-on trial
- Recap for learner

5. Complete Modules 4 to 6, *Workplace Coaching Skills* (or equivalent).

30%

- a. Practice of skill/task to be learned
 - Nature and importance of practice
 - Setting up for learner practice
 - Types of practice
 - Recycling and reinforcing skill/task learning
- b. Providing feedback to the learner
 - Value of feedback
 - Kinds of feedback
 - Guidelines and tips
- c. Assessment
 - Value of assessing learner progress
 - Assessing level of skill
 - Planning further steps toward skill/task mastery

Transport Trailer Technician

Unit: C5 Suspensions II

Level: Three

Duration: 63 hours

Theory: 23 hours

Practical: 40 hours

Overview:

This unit is designed to provide the apprentice with the 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 covers basic suspension principles, the main components of a typical suspension, and the suspension identification and inspection process. 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:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with lift axles and steerable/load-sensed axles.	6%
2. Describe design characteristics of lift axles and steerable/load-sensed axles.	6%
a. Axle alignment and position	
b. Types and sizes of axle and hub components such as:	
• Seals	
• Bearings	
• Dust shields	
• Studs	
• Nuts	
• Lugs	
• Caps (oil and grease)	
• Seal drivers	
• Wear rings	
c. Manufacturer's specifications	
3. Describe the characteristics and specifications of lift axles and steerable/load-sensed axles.	6%
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:
 - Clamps
 - Studs
 - Nuts
 - Spacers
 - Valve stem and cap
 - e. Manufacturer's specifications for tires:
 - Pre-certification requirements
 - Construction
 - Weight capacity
 - Performance designations
 - Recommended tire pressure
- 4. Describe removal and installation techniques for lift axles and steerable/load-sensed axles. 7%**
- a. Types and grades of oil and grease
 - b. Manufacturer's specifications (including OEM specifications)
 - c. Removal and installation techniques for axle system components such as:
 - Axles
 - Hubs
 - Seals
 - Bearings
 - Dust shields
 - Studs
 - Nuts
 - Lugs
 - Caps (oil and grease)_
 - Seal drivers
 - Wear rings
- 5. Perform checks and measurements on lift axles and steerable/load-sensed axles and related components. 18%**
- a. Axle System and related components
 - Axle alignment and position
 - b. Evaluate component conditions (connections, wear characteristics)
 - c. Manufacturer's specifications
 - d. Verification of service performed
- 6. Perform checks and measurements on wheel end and related components. 19%**
- a. Axle Systems and related components
 - Wheel end fastener failure analysis
 - b. Evaluate component conditions [connections, wear characteristics]
 - c. Manufacture's specifications [weldment]
 - d. Verification of service performed

7. **Perform axle system removal and installation techniques for wheel assemblies and tires.** 19%
- a. Manufacture's specifications
 - b. Wheel end fastener – installation procedure [Torque and clamp force]
8. **Perform checks, measurements, removal, and installation procedures for wheel assemblies and tires.** 19%
- 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: F4 Electricity and Wiring II: Lighting/Charging Circuitry/ABS

Level: Three

Duration: 56 hours

Theory: 21 hours

Practical: 35 hours

Overview:

This unit is designed to provide the apprentice with the relevant electrical systems knowledge (lighting, charging circuitry and ABS) for working with today's transport trailers. This unit, which builds on the course Electrical Theory and Circuitry, is intended to provide the apprentice with ample opportunity to build on electrical theory and circuitry concepts. The unit covers types of electrical test equipment, including isolation of electrical/electronic system faults. Diagnostic equipment and procedures are covered as is the isolation of electrical system faults.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Describe trailer electrical systems and types of electrical test equipment.	12%
a. Diagnostic test procedures	
b. Characteristics of components	
• Wiring colour codes and diagrams	
• Size and type of fasteners	
• Nose box location and related components	
• Socket size, type and location	
• Other related components	
c. Auxiliary electrical systems	
• ABS brake	
• Electronic loading system	
• Left axles	
• Power tail gates	
• Auxiliary lights	
• Backup alarms	
• Other auxiliary equipment	
d. Manufacturers' specifications	
2. Describe isolation of electrical / electronic system faults.	13%
a. Test point verification procedures	
b. Back-probing techniques for identifying faults	
c. Interpretation of diagnostic fault codes	

- 3. Demonstrate diagnostics on trailer electrical systems and types of electrical test equipment. 25%**
- a. Diagnostic test procedures
 - b. Characteristics of components
 - Wiring colour codes and diagrams
 - Size and type of fasteners
 - Nose box location and related components
 - Socket size, type and location
 - Auxiliary harness (power tailgate; auxiliary lighting)
 - Other related components
 - c. Auxiliary electrical systems
 - ABS brake
 - Electronic loading system
 - Lift axles
 - Power tail gates
 - Auxiliary lights
 - Backup alarms
 - Other auxiliary equipment
 - d. Manufacturers' specifications
- 4. Demonstrate use of diagnostic equipment and procedures. 25%**
- a. Operation of diagnostic testers
 - b. Wiring diagrams
 - Interpret wiring diagrams
 - Select wiring
 - Select and replace wiring harnesses
 - Support and secure wiring
 - c. Electrical defects
 - Short circuits
 - Grounds
 - Broken wires
 - Test light
 - Isolate electrical fault
 - Disconnect and reconnect wiring
 - Splice wires
 - Strip wire
 - d. Nose boxes
 - Identify cracked, corroded, bent and loose nose boxes
 - Select and replace fasteners and mounting brackets
 - Disassemble nose box
 - e. Fault analysis, including use of isolation techniques
 - Open fault
 - Ground Fault
 - Short Circuit
- 5. Demonstrate isolation of electrical / electronic system faults. 25%**
- a. Test point verification procedures
 - b. Back-probing techniques for identifying faults
 - c. Interpretation of diagnostic fault codes

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Unit: F5 Hydraulic Systems II

Level: Three

Duration: 35 hours

Theory: 8 hours

Practical: 27 hours

Overview:

This unit is designed to provide the apprentice with the knowledge required to perform inspection techniques and related procedures for hydraulic systems. Beginning with a descriptive overview of hydraulic systems and their components, this unit mainly focuses on determination of component failure and troubleshooting techniques.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Describe inspection techniques and procedures for hydraulic system.	40%
a. Determine causes of component failure / troubleshooting	
b. Hydraulic systems and components	
• Pumps	
• Hydraulic tank / reservoir	
• Cylinders	
• Hoses	
• Other main components	
c. Auxiliary equipment	
• Hoists	
• Fans	
• Control valves	
• Hydraulic motors	
• Other auxiliary equipment	
d. Manufacturers' specifications	
2. Demonstrate inspection techniques and procedures for hydraulic system.	60%
a. Determine causes of component failure / troubleshooting	
b. Hydraulic systems and components	
• Pumps	
• Hydraulic tank / reservoir	
• Cylinders	
• Hoses	
• Other main components	
c. Auxiliary equipment	
• Hoists	
• Fans	

- Control valves
 - Hydraulic motors
 - Other auxiliary equipment
- d. Manufacturers' specifications

Transport Trailer Technician

Unit: G1 Fundamentals of Heating

Level: Three

Duration: 35 hours

Theory: 18 hours

Practical: 17 hours

Overview:

This unit is designed to provide the apprentice with fundamental concepts of gases with respect to heating systems found on transport trailers. The unit then covers principles of operation and function of various types and components of the heating systems, and servicing requirements.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Describe the principles of gases associated with transport trailer heating systems.	2%
a. Boyle's Law	
b. Charle's Law	
c. Heat movement	
• Convection	
• Conduction	
• Radiation	
2. Describe construction and operating principles of catalytic heaters.	2%
3. Describe safety precaution considerations for transport trailers.	14%
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	
4. Describe principles of operation of a storage tank.	14%
a. Describe where a storage tank for liquefied petroleum gas (LPG) should be located and security precautions	
b. Describe the capacity and maximum filling level of an LPG tank	
c. Filling certificate	
5. Describe the function of regulators.	14%
a. Regulator adjustments	
b. Adjustment limitations	

- 6. Apply principles of refrigerants required to work with transport trailers. 14%**
- a. 134a
 - b. R22
 - c. 502
- 7. Apply safety precaution considerations for transport trailers. 10%**
- a. Lines and connections (as per code) when lighting, servicing and installing
 - b. Handling
 - c. Storage
 - d. Utilization
- 8. Describe principles of operation of a storage tank. 10%**
- a. Describe where a storage tank for liquefied petroleum gas (LPG) should be located and security precautions
 - b. Describe the capacity and maximum filling level of an LPG tank
 - c. Filling certificate
- 9. Demonstrate the function of regulators. 10%**
- a. Regulator adjustments
 - b. Adjustment limitations
- 10. Demonstrate servicing requirements as necessary. 10%**
- a. Perform regulator adjustments

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Unit: G2 Fundamentals of Refrigeration

Level: Three

Duration: 56 hours

Theory: 22 hours

Practical: 34 hours

Overview:

This unit is designed to provide the apprentice with fundamental concepts of refrigerants with respect to cooling systems found on transport trailers. The unit then covers principles of operation and function of refrigerant compressors and related components of the cooling systems, as well as the diagnostic and testing considerations (including efficiency checks).

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
<p>1. Describe the principles of refrigerants associated with transport trailer cooling systems.</p> <ul style="list-style-type: none"> a. Boyle's Law b. Charle's Law 	10%
<p>2. Describe construction and operating principles of refrigerant compressors.</p> <ul style="list-style-type: none"> a. Types of compressors used in the industry (mechanically driven): <ul style="list-style-type: none"> • Screw • Scroll • Reciprocating • Rotary vane b. Parts of a compressor <ul style="list-style-type: none"> • 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 	10%
<p>3. Describe cooling and lubrication provisions for the types of compressors.</p> <ul style="list-style-type: none"> a. Direction of rotation for lubrication <ul style="list-style-type: none"> • Importance • Valves 	10%

- 4. **Perform an efficiency check and recognize and record all malfunctions.** **35%**

- 5. **Demonstrate proper diagnosis and testing procedures for malfunctions.** **35%**
 - a. Reconditioning procedures and precautions
 - b. Adjustment limitations
 - c. Manufacturers' specifications

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Unit: A9 Pre-Inter-Provincial Review

Level: Three

Duration: 21 hours

Theory: 21 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:	<u>Percent of Unit Mark (%)</u>
<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"> • National Occupational Analysis (NOA); prescribed scope of the skills and knowledge which comprise the trade • NOA "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) c. Self-assessment, consultation and personal study plan <ul style="list-style-type: none"> • Self-assessment of individual strengths/weaknesses in trade related skills and knowledge 	n/a

- Approved textbooks
- Study groups

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| 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 electrical and hydraulic systems, and trailer- mounted accessories. | n/a |
| 9. | Review program content regarding heating and refrigeration units. | n/a |
