

Motor Vehicle Body Repairer (Metal and Paint) Level 4

Motor Vehicle Body Repairer (Metal and Paint)

Unit: D1 Journeyperson Trainer

Level: Four

Duration: 7 hours

Theory: 7 hours

Practical: 0 hours

Overview:

Level 1 in-school technical training offers an entry-level orientation to the challenges of apprenticeship training as it relates to the development of core tasks and skill requirements, as well as social competencies. 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.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Compare/contrast role-options and responsibilities of the supervising journeyperson.	50%
a. Implicit vs. explicit standards and content: training goals are/are not codified; assessment measures are/are not used	
b. Accountability for results: e.g. journeyperson is/is not required to prepare performance evaluation that could affect apprentice's employability or wage-rate, etc.	
c. Long-term vs. short-term supervision assignments – e.g., considerable latitude/little latitude for apprentice to learn from mistakes	
d. 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	
e. Types of supervisory role options and what is implied by each:	
• 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, etc.	

- Peer role: typically involves individual upgrading or cross-training of one journeyperson by another; can include senior apprentice assisting less-experienced trade learner
- 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, such as combination or multiple roles of the above

2. Describe and demonstrate common requirements about providing journeyperson level supervision. 50%

- Apprenticeship learning adapted to journeyperson supervision assignments and a journeyperson 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 about new tasks and skills
 - Providing help and guidance about 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 journeyperson, and seek advice of experienced co-workers)
 - Coverage and documentation of prescribed tasks and subtasks where applicable.
 - Discuss the limits of the journeyperson 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 journeyperson trainer (e.g. resume, portfolio, training credentials, logbook, etc.)
- Individual reflection and guided group discussion about personal experiences of workplace learning as an apprentice
 - Identification of best and worst practices of journeyperson trainer
 - Identification of workplace and other factors that can contribute to good and bad trades teaching/learning experiences
 - Development of professional standards and work ethics about 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 journeyperson trainer
 - Components of workplace journeyperson training
 - Processes and recommended practices re: journeyperson training
 - Troubleshooting problems re: supervision assignments
- 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 journeyperson-level supervision task is approached in future
- Compare and contrast discussion results with current knowledge and resources about workplace training methods as they apply to journeyperson-level supervision assignments
- Other (as may be specified by instructor)

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Unit: D2 Tools and Equipment IV

Level: Four

Duration: 7 hours

Theory: 3 hours

Practical: 4 hours

Overview:

This unit is designed to provide the apprentice with the knowledge and skills for using and maintaining tools and equipment with a focus on their uses and applications for technical training units in Level Four.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Review tools and equipment, and describe their applications.	10%
a. Testing and diagnostic	
b. Shop	
c. Welding	
d. Measuring	
e. Straightening	
f. Glass removal tools	
2. Review and demonstrate care and maintenance procedures related to tools and equipment.	20%
a. Testing and diagnostic	
b. Shop	
c. Welding	
d. Measuring	
e. Straightening	
f. Glass removal tools	
3. Review the use of various types of tools and equipment.	20%
a. Testing and diagnostic	
b. Shop	
c. Welding	
d. Measuring	
e. Straightening	
f. Glass removal tools	
4. Demonstrate and perform work organization techniques and document usage.	50%

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Unit: D3 Steel and Aluminum Welding

Level: Four

Duration: 35 hours

Theory: 7 hours

Practical: 28 hours

Overview:

This unit is designed to provide the apprentice with the knowledge and skills about steel and aluminum welding. Topics include: describing electricity and welding, welding equipment and accessories, setting up and tuning welding machines, surface preparation for weld-through primers, welding techniques and procedures, stitch, skip and alternating plug welds and weld penetration and weld defects.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Review terminology associated welding.	5%
2. Review hazards and describe safe work practices pertaining to welding.	5%
3. Describe steel and aluminum welding, and their applications.	10%
4. Describe the operations, applications and use of welding equipment when welding automotive steels and aluminum. a. Current output b. Voltage output c. Metal Inert Gas (MIG) welding d. Reverse polarity e. Straight polarity f. Transfer process	15%
5. Describe MIG welding techniques for welding automotive steels and aluminum. a. Setup b. Welding position c. Proper joint fit-up d. Push technique e. Travel speed f. Welding gun angle g. Travel angle h. Work angle	15%

6. **Demonstrate and perform various types of welds and joints on steel and aluminum coupons.** 30%
- a. Joint
 - Lap
 - Butt with backing
 - Open butt
 - b. Welds
 - Plug
 - Tack
 - Stitch
 - c. Positions
 - Flat
 - Vertical
 - Horizontal
 - Overhead
7. **Demonstrate and perform destructive testing to determine weld quality on steel and aluminum coupons.** 20%
- a. Visual
 - Penetration
 - Defects
 - b. Destructive
 - Penetration
 - Defects

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Unit: D4 Straightening Aluminum

Level: Four

Duration: 7 hours

Theory: 4 hours

Practical: 3 hours

Overview:

This unit is designed to provide the apprentice with the knowledge and skills for straightening aluminum. Topics include: types of aluminum, their automotive applications and characteristics; types of damage to aluminum; procedures when straightening and repairing aluminum; procedures used to prepare aluminum when applying body fillers; and performing the procedures for straightening aluminum.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with straightening aluminum.	5%
2. Identify hazards and describe safe work practices when straightening aluminum.	5%
3. Identify and describe the types of aluminum, their automotive applications and characteristics.	10%
a. Vehicle construction	
b. Structural	
c. Non-structural	
d. Series	
4. Identify and describe types of damage to aluminum.	10%
a. Direct	
b. Indirect	
5. Identify considerations when straightening aluminum.	10%
a. Tool selection	
b. Repair sequence	
c. Protection of adjacent panels	
d. Panel preparation	
e. Corrosion protection	
f. Application of heat	
6. Describe and demonstrate repair procedures when straightening aluminum.	15%
a. Accessibility	
• Hammer and dolly	
• Heat shrinking	

- b. Limited accessibility
 - Prybar
 - Pick
 - Dent puller
 - Weld-on / Glue-on
 - Suction cups
 - c. Paintless dent repair (PDR)
 - d. Rough out
 - e. Align and adjust
7. **Describe and demonstrate methods used to straighten aluminum.** **15%**
- a. Preparation of substrate
 - b. Equipment setup
8. **Describe and demonstrate procedures used to prepare aluminum for application of body fillers.** **10%**
9. **Demonstrate and perform the following procedures to straighten aluminum.** **20%**
- a. Unlocking and reshaping
 - b. Dent removal
 - c. Shrinking and stress relieving

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Unit: D5 Mechanical Components II (Removes, Installs)

Level: Four

Duration: 28 hours

Theory: 7 hours

Practical: 21 hours

Overview:

This unit builds on Mechanical Components I and is designed to provide the apprentice with the knowledge and skills about mechanical components with a focus on key types of mechanical components related to motor vehicle body repair. Topics include: tools and equipment used to service mechanical components; procedures used to identify damaged or worn mechanical components; procedures used to remove and re-install mechanical components; and performing various procedures on mechanical components.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
<p>1. Define terminology associated with mechanical components.</p> <ul style="list-style-type: none"> a. Steering and suspension systems and components b. Braking systems and components 	10%
<p>2. Identify hazards and describe safe work practices when removing and installing mechanical components.</p> <ul style="list-style-type: none"> a. Personal b. Shop/facility c. Environment 	5%
<p>3. Identify types of mechanical components.</p> <ul style="list-style-type: none"> a. Steering and suspension systems and components b. Braking systems and components 	10%
<p>4. Identify and describe regulations and documentation relating to servicing mechanical components.</p> <ul style="list-style-type: none"> a. Original equipment manufacturer (OEM) recommendations <ul style="list-style-type: none"> • Steering and suspension systems and components • Braking systems and components 	10%
<p>5. Describe and demonstrate tools and equipment used to service mechanical components.</p> <ul style="list-style-type: none"> a. Steering and suspension systems and components b. Braking systems and components 	10%
<p>6. Describe the procedures to identify damaged or worn mechanical components.</p>	10%

- a. Steering and suspension systems and components
 - b. Braking systems and components
- 7. Describe and demonstrate the procedures used to remove and re-install mechanical components. 15%**
- a. Steering and suspension systems and components
 - b. Braking systems and components
- 8. Perform the following procedures on mechanical components. 30%**
- a. Remove a tire from a rim.
 - b. Install a tire on a rim
 - c. Balance wheel and tire assembly
 - d. Remove and re-install steering and suspension components
 - e. Remove and re-install braking components
 - f. Align steering and suspension

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Unit: D6 Structural Components III (Prepares)

Level: Four

Duration: 21 hours

Theory: 7 Hours

Practical: 14 Hours

Overview:

This unit builds on Structural Components II and is designed to provide the apprentice with the knowledge and skills related to structural components with a focus on: the causes of corrosion; application and materials for OEM corrosion protection; the types of corrosion protection materials; and procedures and equipment for preparing parts for corrosion protection.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Review terminology associated with structural components.	5%
2. Review hazards and describe safe work practices when removing and installing structural components. <ul style="list-style-type: none">a. Personalb. Shop/facilityc. Environment	5%
3. Review and describe the types of structural components and their locations.	10%
4. Review and locate energy management zones in conventional frames and unitized bodies. <ul style="list-style-type: none">a. Crumple/crush zoneb. Substrate materialsc. OEM specifications	10%
5. Identify and describe the causes of corrosion. <ul style="list-style-type: none">a. Corrosive hot spotsb. Collision repair hot spotsc. Galvanic corrosion and preventing galvanic corrosiond. Sacrificial corrosion	10%
6. Identify and describe the OEM corrosion protection warranties, and application and materials for OEM corrosion protection. <ul style="list-style-type: none">a. OEM corrosion protection warranties<ul style="list-style-type: none">• Function of coatings• Restoring corrosion protection• Failing to restore corrosion protection	20%

- Coating replacement recommendations
 - b. Application and Materials
 - Galvanizing
 - Metal treatment
 - Electrodeposition primer
 - Primer surfacer
 - Chip resistant coating
 - Topcoats
 - c. Variations in the OEM application process
- 7. Identify and describe types of corrosion protection materials. 20%**
- a. Metal/cleaner/conversion coating
 - b. Self-etching primers
 - c. Epoxy primers
 - d. Weld-through primers
 - e. Anti-corrosion compounds
- 8. Identify and describe the procedures and equipment for preparing parts for corrosion protection. 20%**
- a. Wax and grease remover application
 - b. Metal cleaner and conversion coating
 - c. OEM replacement parts
 - d. Shipping coatings
 - e. Salvage replacement parts
 - f. Spray guns
 - g. Spray wands
 - h. Wand systems

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Unit: D7 Structural Components IV (Removes, Repairs and Installs)

Level: Four

Duration: 28 hours

Theory: 4 Hours

Practical: 24 Hours

Overview:

This unit builds on Structural Components III and is designed to provide the apprentice with the knowledge and skills related to structural components with a focus on: the procedures for applying corrosion protection; the procedures for applying corrosion protection to structural parts and underbody; the types and application of seam sealers; application and equipment for chip resistant coatings; applying corrosion protection materials to interior and exterior panels, structural parts and vehicle underbody; and applying seam sealers and chip resistant coatings.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Review vehicle collision repair practices pertaining to structural component preparation and corrosion protection.	5%
2. Describe and demonstrate the procedures for applying corrosion protection.	10%
a. Exterior panels	
b. Panel back side	
c. Interior surfaces	
3. Describe and demonstrate procedures for applying corrosion protection to structural parts and underbody.	15%
a. Sectioning A joint with E-coated insert	
b. Foam fillers	
c. Protection to part exterior	
d. Mating flanges	
e. Stationary glass pinch weld areas	
4. Describe and demonstrate the types and application of seam sealers.	15%
a. Thin bodied	
b. Self-leveling	
c. Heavy bodied	
d. Solid seam sealers	
e. Sprayable seam sealers	
f. OEM application recommendations	
5. Describe and demonstrate the application and equipment for chip resistant coatings.	15%

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| 6. Apply corrosion protection materials to interior and exterior panels, structural parts, vehicle underbody. | 20% |
| 7. Apply seam sealers and chip resistant coatings. | 20% |

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Unit: D8 Electrical and Electronic Components II

Level: Four

Duration: 7 hours

Theory: 6 hours

Practical: 1 hour

Overview:

This unit builds on Electrical and Electronic Components I and is designed to provide the apprentice with the knowledge and skills about electrical and electronic components, with a focus on: the procedures to inspect, diagnose and repair electrical and electronic components damaged in a collision; and the procedures to remove and replace electrical and electronic components damaged in a collision.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Review terminology associated with electrical and electronic components.	5%
2. Review hazards and describe safe work practices when removing and installing electrical and electronic components. a. Personal b. Vehicle	5%
3. Review and describe the types of electrical and electronic components, and their function. a. Vehicle management systems b. Electrical generation and distribution systems c. Lighting systems d. Personal comfort systems	15%
4. Review and describe the tools and equipment used when repairing and installing electrical and electronic components.	15%
5. Demonstrate and perform procedures to inspect, diagnose and repair electrical and electronic components damaged in a collision. a. Operational check b. Damage analysis c. Isolate and protect d. System diagnosis e. Electrical circuit and component testing (continuity, resistance, voltage/amperage and grounds) <ul style="list-style-type: none">• Continuity• Resistance• Voltage/amperage• Grounds	30%

f. Lighting circuit

6. Demonstrate and perform procedures to remove and replace electrical and electronic components damaged in a collision. 30%

- a. OEM repair recommendations and wiring diagrams
- b. Tools and equipment
- c. System diagnosis
- d. Electrical circuit and component testing
 - Continuity
 - Resistance
 - Voltage/amperage
 - Hot side and ground side
- e. Lighting circuit

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Unit: D9 Unitized Body and Conventional Frame Repairs

Level: Four

Duration: 56 hours

Theory: 8 hours

Practical: 48 hours

Overview:

This unit is designed to provide the apprentice with the knowledge and skills about unitized body and conventional frame repairs. Topics include: the types and properties of unitized bodies and conventional frames, and repair considerations; set-up, anchoring, and measuring procedures for unitized body and conventional frame repairs; and performing structural alignment, sectioning, partial replacement, and full replacement procedures used in unitized body and conventional frame repairs.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with unitized body and conventional frame repairs.	10%
2. Describe hazards and describe safe work practices pertaining to unitized body and conventional frame repairs. a. Personal b. Shop/facility c. Vehicle	5%
3. Describe the types and properties of unitized bodies and conventional frames, and repair considerations. a. Unibody b. Space c. Conventional d. Steel e. Aluminum	20%
4. Describe unitized body and conventional frame repairs, and their applications and procedures. a. Identify the type of damage (Damage Analysis) b. Tools c. Equipment (including measuring equipment) d. Setup (including anchoring techniques and equipment) e. Determine the appropriate repair procedure (Repair Plan) f. Liability and responsibility for proper repair	20%
5. Demonstrate and perform set-up, anchoring and measuring procedures used in unitized body and conventional frame repairs.	20%

6. **Demonstrate and perform structural alignment, sectioning, partial replacement, and full replacement procedures used in unitized body and conventional frame repairs.** 25%
- a. Original equipment manufacturer (OEM) specifications (approved procedures)
 - b. Accepted industry procedures

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Unit: D10 Final Inspections

Level: Four

Duration: 7 hours

Theory: 3 hours

Practical: 4 hours

Overview:

This unit is designed to provide the apprentice with an overview of post-repair vehicle inspections. Topics include: performing visual inspections, operational checks, and vehicle road tests.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with post-repair vehicle inspections.	5%
2. Identify hazards and describe safe work practices when performing a post-repair vehicle inspection. a. Personal b. Vehicle	5%
3. Identify and describe vehicle components requiring operational checks. a. Structural and non-structural b. Mechanical c. Electrical and electronic d. Glass e. Supplemental restraint systems f. Accessories	10%
4. Identify and describe the procedures used to perform a visual inspection of the vehicle.	10%
5. Describe and demonstrate the procedures used to perform vehicle component operational checks. a. Structural and non-structural b. Mechanical c. Electrical and electronic d. Glass e. Supplemental restraint systems f. Accessories	15%
6. Perform a post-repair vehicle inspection using a check list.	20%
7. Perform a post-scan of a repaired vehicle using a scan tool.	20%

8. Identify and describe the purpose and procedures for conducting a vehicle road test. 15%

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Unit: D11 Pre-Interprovincial Review

Level: Four

Duration: 7 hours

Theory: 7 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 Interprovincial (Red Seal) certification and the features of the Interprovincial 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 Motor Vehicle Body Repairer (Metal and Paint).</p> <p>a. Scope and aims of Interprovincial (Red Seal) certification; value of certifications</p> <p>b. Obligations of candidates for Interprovincial certification</p> <ul style="list-style-type: none"> • Relevance of Interprovincial Examinations to current, accepted trade practices; industry-based provincial and national validation of test items • Supplemental Policy (retesting) • Confidentiality of examination content <p>c. Multiple-choice format (four-option) item format, Red Seal standards for acceptable test items</p> <p>d. Government materials relevant to the Interprovincial Examinations for apprentice Motor Vehicle Body Repairer (Metal and Paint) technicians</p> <ul style="list-style-type: none"> • Red Seal Occupational Standard (RSOS) – for Auto Body and Collision Technician; prescribed scope of the skills and knowledge which comprise the trade • RSOS “Pie-chart” and its relationship to content distribution of Interprovincial 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> <p>a. Personal preparedness</p> <ul style="list-style-type: none"> • Rest • Nutrition • Personal study regimen • Prior experience in test situations (e.g., Unit Tests) <p>c. Self-assessment, consultation and personal study plan</p>	n/a

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

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| 3. | Review program content regarding the major work activity of performs common occupational skills. | n/a |
| 4. | Review program content regarding the major work activity of repairs frame and structural components. | n/a |
| 5. | Review program content regarding the major work activity of repairs non-structural outer body panels and related components. | n/a |
| 6. | Review program content regarding the major work activity of repairs mechanical, electrical and alternative-fuel system components. | n/a |
| 7. | Review program content regarding the major work activity of repairs interior components and services restraint systems. | n/a |
| 8. | Review program content regarding the major work activity of performs refinishing procedures. | n/a |
| 9. | Review program content regarding the major work activity of performs detailing and cleaning. | n/a |
