

Motor Vehicle Body Repairer (Metal and Paint) Level 4

Motor Vehicle Body Repairer (Metal and Paint)

Unit: C6 Welding and Cutting Aluminum

Level: Four

Duration: 22 hours

Theory: 4 hours

Practical: 18 hours

Overview:

This unit is designed to provide the motor vehicle body repair apprentice with an overview of welding and cutting aluminum. Topics will include: materials and equipment, converting a GMA welder for aluminum, procedures and variables of surface preparation, welding techniques and requirements for the Aluminum Welding Qualification Test (AWQT).

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Identify and describe materials and equipment for welding and cutting aluminum.	14%
a. Transfer methods	
b. Electrode wire	
c. Wire feed systems	
• Spool gun	
• Push-pull feeder	
• Wire feed rolls	
• Welding gun liner	
d. Shielding gas	
e. Welding gun	
• Contact tip/tube	
• Shielding gas nozzles	
2. Describe the procedures to convert a GMA welding for aluminum.	14%
3. Identify and describe the procedures and variables of surface preparation.	14%
a. Disc sander precautions	
b. Stainless steel brush	
c. Reverse polarity	
d. Nozzle-to-workplace distance	
e. Gun angle	
f. Travel speed amperage and voltage	
4. Identify and describe welding techniques.	24%
a. Tuning the welder	
b. Push techniques	
c. Cold start	

- d. Tailing in
 - e. Run-on and run-off tabs
 - f. Heat problems
 - g. Cold weld
 - h. Suck back
 - i. Weld cracks
 - j. v-groove welds
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- 5. **Describe the requirements for the AWQT butt joint with backing weld, AWQT fillet weld on lap joint and AWQT plug weld on lap joint.** **4%**

 - 6. **Performs procedures to convert a GMAW for aluminum.** **6%**

 - 7. **Perform various welding techniques.** **24%**

Motor Vehicle Body Repairer (Metal and Paint)

Unit: D6 Steering, Suspension and Braking Systems

Level: Four

Duration: 37 hours

Theory: 12 hours

Practical: 25 hours

Overview:

This unit is designed to provide the motor vehicle body repair apprentice with an overview of steering, suspension and braking systems. Topics will include: types of steering and suspension systems, braking systems, terminology, regulations and documentation, safety considerations, tools and equipment for servicing, damaged or worn steering and suspension systems, removing and re-installing for collision repair, servicing steering and suspension systems, procedures for servicing, alignment of steering and suspension systems, analyzing and replacing braking systems, and performing operational checks.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Identify types of steering and suspension systems and their components.	7%
2. Identify types of braking systems and their components.	4%
3. Define and explain terminology associated with steering, suspension and braking systems and components.	7%
4. Identify and describe regulations and documentation relating to servicing steering, suspension and braking systems.	4%
a. Original equipment manufacturer (OEM) recommendations	
5. Identify and describe safety considerations relating to servicing steering, suspension and braking systems and components.	7%
a. Personal	
b. Shop/facility	
c. Environment	
d. Liability	
6. Identify tools and equipment used to service steering, suspension and braking systems and components.	4%
7. Describe the procedures to identify damaged or worn steering and suspension system components.	7%
8. Describe the procedures used to remove and re-install steering, suspension and braking components in order to perform collision repairs.	7%

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| 9. | Describe the procedures used to service steering and suspension components. | 4% |
| 10. | Identify the alignment process and its importance in the repair of steering and suspension system components. | 8% |
| 11. | Describe the procedures used to analyze and replace braking system components. | 4% |
| 12. | Describe the procedures used to perform operational check of steering, suspension and braking system and components. | 7% |
| 13. | Inspect tires. | 2% |
| 14. | Remove tires from rims. | 2% |
| 15. | Replace tires. | 2% |
| 16. | Balance wheel and tire assemblies. | 2% |
| 17. | Clean, inspect and repack serviceable wheel bearing. | 2% |
| 18. | Locate different types of suspension systems. | 2% |
| 19. | Locate and identify steering linkage systems. | 2% |
| 20. | Locate various braking systems (drum & disc). | 2% |
| 21. | Locate Anti-lock Braking System (ABS) brake components. | 3% |
| 22. | Access ABS trouble codes. | 3% |
| 23. | Remove and re-install steering, suspension and braking components. | 3% |
| 24. | Replace steering components. | 3% |
| 25. | Perform power-steering pressure tests. | 2% |

Motor Vehicle Body Repairer (Metal and Paint)

Unit: E5 Post Repair Vehicle Inspection

Level: Four

Duration: 5 hours

Theory: 2 hours

Practical: 3 hours

Overview:

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

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Identify and describe the procedures used to perform a visual inspection of the vehicle.	7%
2. Identify vehicle components requiring operational checks.	28%
3. Describe the procedures used to perform vehicle component operational checks.	28%
4. Identify the purpose and procedures for conducting a vehicle road test.	7%
5. Complete a post-repair vehicle inspection check list.	30%

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Unit: E6 Body Integrity

Level: Four

Duration: 6 hours

Theory: 3 hours

Practical: 3 hours

Overview:

This unit offers senior apprentices a systematic review of skills and knowledge required for the vehicle safety inspection (body integrity qualification). It promotes a purposeful synthesis of on-the-job learning and the content of in-school technical training. The unit includes information about the significance of body integrity certification and the features of qualification exams. **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>
1. Review and master program content regarding required training certificates.	n/a
a. Vehicle safety inspection (body integrity qualification)	

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Unit: F8 Unitized Body Repair

Level: Four

Duration: 55 hours

Theory: 5 hours

Practical: 50 hours

Overview:

This unit is designed to provide the motor vehicle body repair apprentice with an overview of unitized body repairs. Topics will include: describing terminology and safety precautions, measuring equipment, types of damage, equipment, anchoring techniques, repairing techniques and procedures, and technician liability and responsibility.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define and explain terminology relating to repairing unitized bodies.	7%
2. Identify and describe safety precautions relating to and repairing unitized bodies. a. Personal b. Shop/facility c. Vehicle	4%
3. Identify measuring equipment and describe its applications and procedures for use.	13%
4. Identify the type of damage and determine the appropriate repair procedure.	10%
5. Identify equipment and describe its applications and procedures for use.	10%
6. Identify anchoring techniques and procedures used for unitized body repair.	11%
7. Describe the procedures used to repair unitized bodies. a. Original equipment manufacturer (OEM) specifications (approved procedures) b. Accepted industry procedures	11%
8. Explain technician liability and responsibility for proper repair.	4%
9. Set-up and use measuring equipment used in repairing unitized bodies.	6%
10. Set-up and use equipment used in repairing unitized bodies.	12%
11. Demonstrate anchoring techniques and procedures used for repairing unitized bodies.	12%

Motor Vehicle Body Repairer (Metal and Paint)

Unit: F9 Structural Corrosion Protection

Level: Four

Duration: 6 hours

Theory: 4 hours

Practical: 2 hours

Overview:

This unit is designed to provide the motor vehicle body repair apprentice with an overview of structural corrosion protection. Topics will include: causes of corrosion, OEM corrosion warranties, application and materials of OEM corrosion protection, preserving corrosion protection, types of corrosion materials, weld-through primers, anti-corrosion compounds, primer research, equipment and materials for preparing parts, applying corrosion protection, corrosion protection for structural parts and underbody, types and application of seam sealers and application and equipment for chip resistant coatings.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Identify and describe causes of corrosion.	4%
a. Corrosive hot spots	
b. Collision repair hot spots	
c. Galvanic corrosion and preventing galvanic corrosion	
d. Sacrificial corrosion	
2. Describe OEM corrosion protection warranties.	4%
a. Function of coatings	
b. Restoring corrosion protection	
c. Failing to restore corrosion protection	
3. Identify and describe the application and materials for OEM corrosion protection.	6%
a. Galvanizing	
b. Metal treatment	
c. Electrodeposition primer	
d. Primer surfacer	
e. Chip resistant coating	
f. Topcoats	
g. Variations in the OEM application process	
h. OEM corrosion coatings replacement recommendations	
4. Describe the procedures for preserving corrosion protection.	6%
5. Identify and describe types of corrosion protection materials.	6%
a. Metal/cleaner/conversion coating	

- b. Self-etching primers
 - c. Epoxy primers
6. **Identify and describe weld-through primers.** 4%
 7. **Identify and describe anti-corrosion compounds.** 4%
 8. **Describe primer research based on the materials and processes that were evaluated, product evaluation, weld-through primers and anti-corrosion compounds.** 7%
 9. **Identify and describe the procedures and equipment for preparing parts for corrosion protection.** 7%
 - 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
 10. **Identify and describe the procedures for applying corrosion protection.** 7%
 - a. Exterior panels
 - b. Panel back side
 - c. Interior surfaces
 11. **Identify and describe procedures for corrosion protection for structural parts and underbody.** 7%
 - 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
 12. **Identify and describe the types of and application of seam sealers.** 4%
 - a. Thin bodied
 - b. Self leveling
 - c. Heavy bodied
 - d. Solid seam sealers
 - e. Sprayable seam sealers
 - f. OEM application recommendations
 13. **Identify and describe the application and equipment for chip resistant coatings.** 4%
 14. **Demonstrate procedures for applying corrosion protection materials to interior and exterior panels.** 12%
 15. **Demonstrate procedures for corrosion protection for structural parts and underbody.** 12%
 16. **Demonstrate procedures for applying seam sealers and chip resistant coatings.** 6%

Motor Vehicle Body Repairer (Metal and Paint)

Unit: F10 Conventional Frame Repairs

Level: Four

Duration: 55 hours

Theory: 5 hours

Practical: 50 hours

Overview:

This unit is designed to provide the motor vehicle body repair apprentice with an overview of conventional frame repair. Topics will include: describing terminology and safety precautions in repairing and aligning, types of conventional frame construction, measuring equipment, types of damage and repair procedures, equipment, anchoring techniques, repairing and sectioning conventional frames and liability and responsibility.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define and explain terminology relating to repairing conventional frames.	3%
2. Identify and describe safety precautions relating to repairing and aligning conventional frames.	3%
a. Personal	
b. Shop/facility	
c. Vehicle	
3. Identify and describe types of conventional frame construction.	4%
4. Identify measuring equipment and describe its applications and procedures for use.	4%
5. Describe the procedures to identify the type of damage and determine the appropriate repair procedure.	7%
6. Identify equipment and describe its applications and procedures for use.	7%
7. Identify anchoring techniques and procedures used for conventional frame repair.	7%
8. Describe the procedures used to repair conventional frames.	14%
a. Original equipment manufacturer (OEM) specifications	
b. Accepted industry procedures	
9. Describe the procedures used to section a conventional frame.	14%
a. Original equipment manufacturer (OEM) specifications	
b. Accepted industry procedures	

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| 10. Explain liability and responsibility for proper repair. | 7% |
| 11. Set-up and use measuring equipment used for repairing conventional frames. | 6% |
| 12. Demonstrate the use of equipment. | 3% |
| 13. Demonstrate anchoring techniques and procedures used for conventional frame repair. | 3% |
| 14. Demonstrate repair of conventional frames. | 9% |
| 15. Demonstrate the procedures used to section conventional frames. | 9% |

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Unit: F11 Straightening Aluminum Panels

Level: Four

Duration: 6 hours

Theory: 4 hours

Practical: 2 hours

Overview:

This unit is designed to provide the motor vehicle body repair apprentice with an overview of straightening aluminum panels. Topics will include: the application of aluminum panels, physical properties, aluminum in vehicle design, heat and heating equipment, tools and workplace considerations, types of damage, materials and procedures for repair and corrosion protection.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
<p>1. Identify and describe the applications of aluminum in vehicle body.</p> <ul style="list-style-type: none"> a. Structural aluminum b. Extrusions and extrusion repair c. Cast aluminum repair d. Sheet aluminum repair 	9%
<p>2. Describe the physical properties of aluminum in vehicle body.</p> <ul style="list-style-type: none"> a. Weight savings b. Work hardening c. Elasticity of aluminum 	9%
<p>3. Identify and describe aluminum in vehicle design.</p> <ul style="list-style-type: none"> a. Aluminum frames b. Alloys c. Heat treatable vs. non-heat treatable d. Temper 	9%
<p>4. Identify the application of heat and heating equipment with aluminum in vehicle design.</p> <ul style="list-style-type: none"> a. Repair temperatures b. Annealing c. Heat times, heat indicators and heat transfer 	9%
<p>5. Describe the tools and workplace considerations for aluminum use in vehicle design.</p> <ul style="list-style-type: none"> a. Dedicated hand tools and abrasives b. Power tool considerations 	9%

- c. Separate areas
 - d. Ventilation
- 6. Identify and describe the types of damage in performing a damage analysis. 9%**
- a. Impact angles
 - b. Direct damage
 - c. Indirect damage
 - d. Primary damage
 - e. Secondary damage
- 7. Describe the materials and procedures for repairing during damage analysis. 9%**
- a. Repair vs. replace
 - b. Straightening
 - c. Repairable damage
 - d. Dye penetrant and locating cracks
- 8. Describe corrosion protection to repair areas. 7%**
- 9. Repair damaged aluminum panels. 30%**

Motor Vehicle Body Repairer (Metal and Paint)

Unit: G4 Electrical Program II

Level: Four

Duration: 8 hours

Theory: 8 hours

Practical: 0 hours

Overview:

This unit is designed to provide the motor vehicle body repair apprentice with an overview of trade electrical program II. Topics will include: describing procedures for electrical testing, describing electrical diagrams, properties of magnetism and electrical parts and describing electronic circuit parts.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Identify and describe the procedures for electrical testing.	50%
a. Electrical testing.	
b. Electrical circuits.	
c. Hot side and ground side testing.	
2. Identify and describe electrical diagrams.	30%
a. Review repair documents.	
3. Describe the properties of magnetism and identify electrical parts.	10%
a. Magnets and current flow.	
b. Solenoids.	
c. Relays.	
d. Electrical motors.	
e. Magnetic fields.	
4. Identify and describe electronic circuit parts.	10%
a. Semi-conductors and computer controlled parts.	

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Unit: A7 Pre-Certification Review

Level: Four

Duration: 6 hours

Theory: 6 hours

Practical: 0 hours

Overview:

This unit offers senior apprentices a systematic review of skills and knowledge required to pass the Interprovincial (IP) 'Red Seal' 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 Red Seal Interprovincial certification and the features of the Interprovincial exam. **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 Interprovincial (Red Seal) Examinations for the trade of Motor Vehicle Body Repairer.</p> <p>a. Scope and aims of Red Seal system; value of certifications</p> <p>b. Obligations of candidates for IP certification</p> <ul style="list-style-type: none"> • Relevance of IP Examinations to current, accepted trade practices; industry-based national validation of test items • Supplemental Policy (retesting) • Confidentiality of examination content <p>c. Multiple-choice format (four-option) item format, Red Seal/Apprenticeship Branch standards for acceptable test items</p> <p>d. Government materials relevant to the IP Examinations for apprentice Motor Vehicle Body Repairers</p> <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 IP Examination items • Manitoba Apprentice Portfolio, especially the NOA-based Practical Training Record Book and task/sub-task checklists as these relate to apprentice's coverage of the skills and knowledge of his/her trade 	n/a
<p>2. Identify resources, strategies and other considerations for maximizing successful completion of written exams.</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>b. 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 common occupational skills. | n/a |
| 4. Review program content regarding frame and structural components. | n/a |
| 5. Review program content regarding outer body panels. | n/a |
| 6. Review program content regarding glass. | n/a |
| 7. Review program content regarding mechanical and electrical components. | n/a |
| 8. Review program content regarding restraint system and interior components. | n/a |
| 9. Review program content regarding refinishing. | n/a |
| 10. Review program content regarding detailing. | n/a |

Motor Vehicle Body Repairer (Metal and Paint)

Unit: A8 Welding Test

Level: Four

Duration: 4 hours

Theory: 1 hour

Practical: 3 hours

Overview:

This unit offers senior apprentices a systematic review of skills and knowledge required for the automotive steel Gas Metal-Arc Welding (GMAW) / Metal Inert Gas (MIG) welding qualification. It promotes a purposeful synthesis of on-the-job learning and the content of in-school technical training. The unit includes information about the significance of welding certification and the features of qualification exams. **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>
1. Review and master program content regarding required training certificates.	n/a
a. Automotive steel GMAW MIG welding qualification	
