

Motor Vehicle Body Repairer (Metal and Paint) Level 2

Motor Vehicle Body Repairer (Metal and Paint)

Unit: B3 Trade Formulations – II

Level: Two

Duration: 12 hours

Theory: 12 hours

Practical: 0 hours

Overview:

This unit is designed to provide the motor vehicle body repair apprentice with an overview of trade formulations. Topics will include: procedures for calculating and mixing percentages, parts and open and closed mixing systems.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Describe the procedure for calculating and mixing by percentage.	10%
2. Describe the procedure for calculating and mixing by parts.	50%
3. Describe the procedure for open and closed mixing system calculations.	40%

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Unit: C3 Welding and Cutting (Steel)

Level: Two

Duration: 43 hours

Theory: 4 hours

Practical: 39 hours

Overview:

This unit is designed to provide the motor vehicle body repair apprentice with an overview of welding and cutting steel. Topics will 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. Identify the types of automotive sheet metal.	7%
a. Current output	
b. Voltage output	
c. Gas Metal-Arc Welding (GMAW) / Metal Inert Gas (MIG) welding	
d. Reverse polarity	
e. Straight polarity	
f. Transfer process	
2. Identify and describe GMA (MIG) welding equipment and accessories.	7%
3. Identify and describe the procedures for setting up and tuning a GMA (MIG) welding machine.	13%
a. Bird Nesting	
b. Fixing a Bird's Nest	
4. Describe the procedures for surface preparation for weld-through primers.	7%
5. Identify and describe welding techniques.	4%
a. Travel speed	
b. Welding gun angle	
c. Travel angle	
d. Work angle	
e. Pull technique	
f. Push technique stick out	
g. Welding position	
h. Proper joint fit-up	

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| 6. Describe heat management procedures for stitch weld, skip weld and alternating plug welds. | 14% |
| 7. Identify and describe the types and causes of poor and good weld penetration and weld defects. | 14% |
| 8. Identify and describe different welding techniques and procedures. | 4% |
| a. Plug | |
| b. On-vehicle plug | |
| c. Fillet | |
| d. On-vehicle fillet | |
| e. Butt joint with backing | |
| f. On-vehicle butt joint with backing | |
| g. Open butt joint | |
| h. On-vehicle open butt joint | |
| 9. Set-up and perform heating and cutting procedures using oxy-fuel equipment. | 3% |
| 10. Cut mild steel and ferrous and non-ferrous metals using oxy-fuel equipment. | 5% |
| 11. Use plasma arc equipment to cut metal. | 5% |
| 12. Disassemble and reassemble GMAW welding system. | 5% |
| 13. Fillet weld flat (GMAW): “t” joint and lap joint in steel and aluminum. | 4% |
| 14. Fillet weld horizontal (GMAW): “t” joint and lap joint in steel and aluminum. | 4% |
| 15. Butt weld flat (GMAW): square butt joint and single vee butt joint in steel and aluminum. | 4% |

Motor Vehicle Body Repairer (Metal and Paint)

Unit: C4 Metal Working in Body Adjustments

Level: Two

Duration: 44 hours

Theory: 4 hours

Practical: 39 hours

Overview:

This unit is designed to provide the motor vehicle body repair apprentice with an overview of metal working in body adjustments. Topics will include: roughing out sheet metal damage, indirect and direct damage to sheet metal aluminum, concepts of metallurgy, heat effects on sheet metal shrinking, expansion and contraction, tacking and welding sequencing, repairing accessible and inaccessible areas and misaligned body panels adjustments.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Describe the process for roughing out sheet metal damage.	13%
2. Describe the indirect and direct damage to sheet metal and aluminum.	7%
3. Review concepts of metallurgy.	4%
4. Describe the effects of heat on sheet metal, shrinking, expansion and contraction.	14%
5. Describe the sequence of tacking and welding sheet metal.	14%
6. Describe the tools and equipment used to repair accessible and inaccessible areas.	7%
7. Describe misaligned body panels and make adjustments.	7%
8. Illustrate proper fit, diagnoses and operation.	4%
9. Conduct a visual analysis of collision related damage on panels.	3%
10. Perform rough out of sheet metal.	6%
11. Perform unlocking procedures for indirect and direct damage to sheet metal and aluminum.	3%
12. Perform the use of controlled heat for shrinking, expansion and contraction on body panels.	6%

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| 13. Tack and weld sheet metal. | 4% |
| 14. Use tools and equipment to make repairs on accessible and inaccessible areas. | 3% |
| 15. Perform adjustments on misaligned body panels and use corrective adjustments and techniques to detect wind, noise, and dust and water leaks. | 3% |
| 16. Evaluate finished task use various techniques. | 2% |

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Unit: D3 Stationary Glass

Level: Two

Duration: 11 hours

Theory: 4 hours

Practical: 7 hours

Overview:

This unit is designed to provide the motor vehicle body repair apprentice with an overview of stationary glass. Topics will include: describing characteristics of stationary glass, structure/integrity of stationary glass, determining whether or not to repair or replace stationary glass, installation methods, the use of components, accessories, tools, and equipment in replacing stationary glass, removal and installation of stationary glass, and detecting leaks around stationary glass.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Identify the types of stationary glass and describe their characteristics.	4%
2. Describe stationary glass and its importance to the vehicle structure/integrity.	7%
3. Describe the procedures to determine if stationary glass can be repaired or if replacement is necessary.	4%
4. Identify the installation methods for stationary glass and describe the associated components. a. Mechanical b. Gasket mounted c. Adhesive bonded (OEM) installations	14%
5. Identify components and accessories associated with stationary glass.	7%
6. Identify tools and equipment used in stationary glass replacement and their procedures for use.	9%
7. Describe materials used for stationary glass replacement, their characteristics and procedures for use.	7%
8. Describe the procedures and precautions for removal and installation of stationary glass and its related components.	14%
9. Describe the procedures used to detect and repair leaks around stationary glass. a. Wind b. Water	4%

c. Dust

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| 10. Remove stationary glass. | 13% |
| 11. Perform installation methods for stationary glass. | 13% |
| 12. Performs checks to detect and repair leaks around stationary glass. | 4% |

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Unit: D4 Moveable Glass and Hardware

Level: Two

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 moveable and glass and hardware. Topics will include: describing characteristics of moveable glass and related hardware, fastening methods, inspection procedures, removal and installation of moveable glass, detecting, repairing, servicing, and adjusting moveable glass.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Identify the types of moveable glass and describe their characteristics.	7%
2. Describe moveable glass related hardware. a. Motors b. Regulators c. Channel/guides	7%
3. Identify the fastening methods for moveable glass and describe the associated components. a. Mechanical b. Pressure fitted c. Bonded	14%
4. Describe the procedures and considerations for inspecting moveable glass and its associated hardware.	7%
5. Describe the procedures used to remove and install moveable glass.	14%
6. Describe the procedures used to detect and repair leaks. a. Wind b. Water c. Dust d. Noise	7%
7. Describe the procedures used to service and adjust moveable glass.	14%
8. Remove and install moveable glass.	12%

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| 9. Service and adjust moveable glass. | 12% |
| 10. Perform checks for wind, noise, dust and water leaks. | 6% |

Motor Vehicle Body Repairer (Metal and Paint)

Unit: E1 Corrosion Protection

Level: Two

Duration: 5 hours

Theory: 4 hours

Practical: 1 hours

Overview:

This unit is designed to provide the motor vehicle body repair apprentice with an overview of corrosion protection. Topics will include: causes of corrosion, environmental and atmospheric conditions, inspection of corrosion related damage, types of corrosion, materials and tools used during repair procedures, Original Equipment Manufacturer (OEM) specifications, corrosion restoration to OEM and corrosion protection to electrical components.

Objectives and Content:	Percent of Unit Mark (%)
1. Identify the types and causes of corrosion. a. Oxidation b. Galvanic/sacrificial corrosion	7%
2. Identify environmental and atmospheric conditions that influence the rate of corrosion.	7%
3. Identify and describe the types of corrosion protection. a. OEM b. Undercoats and topcoats c. Anti-corrosion compounds	7%
4. Describe the procedures used to inspect for corrosion related damage.	7%
5. Identify corrosion protection materials used during repair procedures. a. primers b. sealers c. anti-corrosion compounds d. fastener	7%
6. Identify the methods and tools used to restore corrosion protection.	7%
7. Describe the procedures to restore corrosion protection to OEM specifications.	21%
8. Describe the procedures to restore corrosion protection to electrical components.	7%

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| 9. Use various types of corrosion protection. | 12% |
| 10. Inspect for corrosion related damage. | 3% |
| 11. Demonstrate the procedure used to restore corrosion protection to OEM specifications. | 12% |
| 12. Demonstrate the procedure used to restore corrosion protection to electrical components. | 3% |

Motor Vehicle Body Repairer (Metal and Paint)

Unit: E2 Fundamentals of Collision Repair

Level: Two

Duration: 8 hours

Theory: 4 hours

Practical: 4 hours

Overview:

This unit is designed to provide the motor vehicle body repair apprentice with an overview of the fundamentals of collision repair. Topics will include: types of vehicle construction, vehicle construction materials, manufacturing processes, control and reference points, collision energy management for properly repairing vehicles and vehicle centre section, rail, pillar, and panel designs, crush zones, front and rear rail designs, structural and non-structural parts, types of damage, repair recommendations and analysis, kink versus bend, metal structure, work hardening and parts, corrosion protection, visually and dimensionally correct and cosmetic restoring, sectioning guidelines, part inspection and structural part reparability.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
<p>1. Identify and describe types of vehicle construction.</p> <ul style="list-style-type: none"> a. Unibody vehicle b. Space frame vehicles c. Body-over-frame vehicles d. Ladder frames e. Perimeter frames 	7%
<p>2. Identify and describe types of vehicle construction materials.</p>	3%
<p>3. Identify and describe manufacturing processes.</p> <ul style="list-style-type: none"> a. Net build b. Coined surfaces c. Hydroforming d. Adhesively bonded panels 	4%
<p>4. Identify and describe control and reference points.</p> <ul style="list-style-type: none"> a. Quick checks using a tram gauge b. Production tolerances c. Repair tolerance 	3%
<p>5. Describe the procedures used for collision energy management for properly repairing vehicles and vehicle centre section.</p>	7%
<p>6. Identify and describe rail, pillar, and rocker panel designs, crush zones, front and rear rail designs, shape and design and A, B, C and D pillar designs.</p>	7%

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| 7. Identify and describe structural and non-structural parts and parts that add to vehicle integrity. | 7% |
| 8. Identify and describe types of damage. | 7% |
| <ul style="list-style-type: none"> a. Direct b. Indirect c. Mass inertia d. Previous improper repairs e. Claim-related damage f. Pre-existing damage | |
| 9. Describe the procedures used for repair recommendations and analyzing damaged parts. | 4% |
| 10. Identify and describe kink versus bend, metal structure, work hardening and parts that are not primary structural parts. | 7% |
| 11. Describe procedures for identifying extent of damage, location of damage and typical areas of repeated stress. | 7% |
| 12. Describe procedures for corrosion protection, and visually and dimensionally correct and cosmetic restoring. | 3% |
| 13. Identify and describe general sectioning guidelines, part inspection and structural part reparability. | 4% |
| 14. Perform basic measuring. | 7% |
| <ul style="list-style-type: none"> a. Tram gauge | |
| 15. Analyze visual and mechanical damage. | 16% |
| 16. Perform corrosion protection. | 7% |

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Unit: F3 Metal Working II (Aluminum)

Level: Two

Duration: 4 hours

Theory: 2 hours

Practical: 2 hours

Overview:

This unit is designed to provide the motor vehicle body repair apprentice with an overview of metal working II. Topics will include: describing characteristics of aluminum, types of damage to aluminum panels, performing metal work on aluminum panels, repair procedures, rough out and alignment of aluminum panels, and preparation of aluminum panels for refinishing.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Identify the series/characteristics of aluminum.	5%
2. Identify and describe types of damage to aluminum panels.	30%
a. Direct	
b. Indirect	
3. Identify considerations when performing metal work on aluminum panels.	30%
a. Tool selection	
b. Repair sequence	
c. Protection of adjacent panels	
d. Panel preparation	
e. Corrosion protection	
4. Identify the types of panels and their associated repair procedures.	30%
a. Accessible	
• Hammer and dolly	
• Shrinking	
b. Limited access	
• Pry-bar	
• Pick	
• Dent puller	
5. Describe the procedures used to rough out and align damaged aluminum panels.	2%
6. Describe the procedures used to prepare aluminum panels for refinishing.	3%

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Unit: F4 Non-Metal (Plastics and Composite) Repairs

Level: Two

Duration: 36 hours

Theory: 12 hours

Practical: 24 hours

Overview:

This unit is designed to provide the motor vehicle body repair apprentice with an overview of non-metal/plastics and composite repairs. Topics will include: describing the characteristics of non-metal /plastics and composite repairs, products and materials used in non-metal/ plastics and composite repair, International Organization for Standardization codes, procedures for non-metal/ plastics and composite repairs, operating (set-up and shut-down) procedures associated with plastic welding equipment, adhesive repair procedures and bonding procedures.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Identify non-metal plastics and composite substrates and describe their characteristics and applications.	10%
a. Plastics	
b. Fiberglass	
c. Composites	
2. Identify products and materials used in non-metal/plastics and composite repair.	10%
3. Identify International Organization for Standardization (ISO) codes.	4%
4. Describe the procedures used for non-metal/plastics and composite repairs.	21%
a. Plastics	
b. Fiberglass	
c. Composites	
5. Identify plastic welding equipment and the associated operating (set-up and shut-down) procedures.	4%
6. Identify the types of plastic welding and adhesive repair procedures.	14%
7. Identify bonding procedures.	7%
8. Perform plastic welding and adhesive repairs.	15%
9. Repair and fill fiberglass and composite panels.	9%

10. Perform bonding procedures.

6%

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Unit: G1 Electrical Fundamentals

Level: Two

Duration: 13 hours

Theory: 10 hours

Practical: 3 hours

Overview:

This unit is designed to provide the motor vehicle body repair apprentice with an overview of electrical fundamentals. Topics will include: basic electrical theory, trade related terminology, safety precautions, electrical and electronic components and component operation, electrical and electronic circuits, testing electrical and electronic components, electrical schematics/diagrams and interpreting electrical schematics/diagrams in repair.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Describe the basic electrical theory and correct repair procedures.	19%
2. Identify and define trade related terminology associated with electrical and electronic components.	7%
3. Identify and describe safety precautions relating to electrical and electronic components.	7%
4. Identify and describe basic electrical and electronic components and their operation.	4%
5. Identify instruments used to test electrical and electronic circuits and components and their procedures for use.	11%
6. Identify and describe basic electrical schematics/diagrams (OEM) and their use in the trade.	4%
7. Describe the procedures used to interpret electrical schematics/diagrams in the repair of electrical systems and electronic components. a. Original equipment manufacturer (OEM) recommendations	4%
8. Describe the procedures used to test electrical and electronic circuits and components.	14%
9. Interpret electrical schematics/diagrams.	3%
10. Demonstrate the use of test lights and Multi-meters.	12%
11. Use Ohm's law to calculate values in a parallel series circuit.	9%
12. Demonstrate procedures for splicing/repairing, soldering and use of shrink tube.	6%

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Unit: H5 Primers, Surfacers, Sealers (Prepping of Substrates)

Level: Two

Duration: 28 hours

Theory: 6 hours

Practical: 22 hours

Overview:

This unit is designed to provide the motor vehicle body repair apprentice with an overview of primers, surfacers, and sealers (prepping of substrates). Topics will include: describing types of primers, surfacers, and sealers (prepping substrates), safety considerations, equipment in applying primers, surfacers and sealers (prepping substrates), setting-up, adjusting, caring for, and maintaining equipment, preparing substrates, mixing procedures for primers, surfacers, and sealers (prepping substrates), application techniques, defects, ceases and prevention, and preparing for topcoats.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Identify types of primers, surfacers and sealers, and describe their characteristics and applications.	7%
2. Describe safety considerations and requirements relating to primers, surfacers and sealers. <ul style="list-style-type: none"> a. Personal b. Shop/facility c. Environment 	4%
3. Identify equipment used in applying primers, surfacers and sealers.	7%
4. Describe the procedures used to set-up, adjust, care for and maintain equipment used in applying primers, surfacers and sealers (refinishing materials).	10%
5. Describe the procedures used to prepare substrate prior to applying primers, surfacers and sealers.	10%
6. Describe the procedures for mixing primers, surfacers and sealers.	7%
7. Describe primer, surfacer and sealer application techniques and procedures.	7%
8. Identify and describe primer, surfacer and sealer defects, their causes and the procedures to prevent or correct them.	7%
9. Describe the procedures used to prepare primers, surfacers and sealers for topcoat.	7%

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| 10. Describe procedures for refinishing equipment, spray booths, make-up units, baking equipment and blowers for waterborne | 4% |
| 11. Set-up, adjust and maintain equipment used in applying undercoats. | 5% |
| 12. Demonstrate the procedures used to prepare substrate prior to applying undercoats. | 6% |
| 13. Demonstrate the procedures for mixing undercoats. | 3% |
| 14. Demonstrate undercoat application techniques and procedures. | 7% |
| 15. Demonstrate procedure to prevent and correct undercoat defects. | 3% |
| 16. Demonstrate how to prepare substrates for topcoat. | 6% |

Motor Vehicle Body Repairer (Metal and Paint)

Unit: H6 Refinishing II (Application of Topcoats)

Level: Two

Duration: 36 hours

Theory: 12 hours

Practical: 24 hours

Overview:

This unit is designed to provide the motor vehicle body repair apprentice with an overview of refinishing. Topics will include: surface final preparation, application of refinishing equipment, setting-up, operating, adjusting, caring for, and maintaining refinishing equipment and types of multi-stage and basecoat finishes.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Describe safety considerations relating to refinishing.	4%
a. Personal	
b. Shop/facility	
c. environment	
2. Describe the final surface preparation procedures for refinishing.	17%
3. Identify refinishing equipment and its applications.	27%
4. Describe the procedures used to set-up, operate, adjust, care for and maintain refinishing equipment.	10%
5. Identify types of single-stage finishes and describe their characteristics.	4%
6. Identify the types of multi-stage finishes (OEM processes for application of topcoats) and describe the characteristics.	4%
7. Identify the types of basecoat finishes.	4%
8. Prepare surface for refinishing and blending.	10%
9. Set-up, operate, adjust, and maintain refinishing equipment.	10%
10. Apply single-stage finishes.	2%
11. Apply multi-stage finishes.	5%
12. Apply basecoat/clearcoat finishes.	3%
