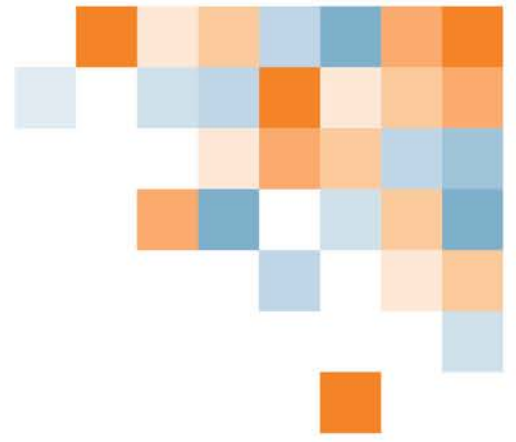


**ita**  
**YOUR TICKET.**



## PROGRAM OUTLINE

Motor Vehicle Body  
Repairer  
(Metal and Paint)  
(Automotive Collision Repair  
Technician)



The latest version of this document is available in PDF format on the ITA website  
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# **MOTOR VEHICLE BODY REPAIRER (METAL AND PAINT) (AUTOMOTIVE COLLISION REPAIR TECHNICIAN) PROGRAM OUTLINE**

**APPROVED BY INDUSTRY  
September 2017**

**BASED ON  
NOA 2014**

**Developed by  
Industry Training Authority  
Province of British Columbia**



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# **Section 1**

## **INTRODUCTION**

### **Automotive Collision Repair Technician**



## Foreword

This revised Program Outline is intended as a guide for instructors, apprentices, and employers of apprentices as well as for the use of industry organizations, regulatory bodies, and provincial and federal governments. It reflects updated standards based on the 2014 Red Seal National Occupational Analysis (NOA). It was developed by British Columbia industry and instructor subject matter experts.

Practical instruction by demonstration and student participation should be integrated with classroom sessions. Safe working practices, even though not always specified in each operation or topic, are an implied part of the program and should be stressed throughout the apprenticeship.

This Program Outline includes a list of recommended reference textbooks that are available to support the learning objectives and the minimum shop requirements needed to support instruction.

Competencies are to be evaluated through written exams and practical assessments. A passing grade is achieved by getting an overall mark of 70%. See the Assessment Guidelines in Section 4 for more details. The types of questions used on these exams must reflect the cognitive level indicated by the learning objectives and the learning tasks listed in the related competencies.

Achievement Criteria are included for those competencies that require a practical assessment. The intent of including Achievement Criteria in the Program Outline is to ensure consistency in training across the many training institutions in British Columbia. Their purpose is to reinforce the theory and to provide a mechanism for evaluation of the learner's ability to apply the theory to practice. It is important that these performances be observable and measurable and that they reflect the skills spelled out in the competency as those required of a competent journey person. The conditions under which these performances will be observed and measured must be clear to the learner as well as the criteria by which the learner will be evaluated. The learner must also be given the evaluation criteria.

The performance spelled out in the Achievement Criteria is a suggested performance and is not meant to stifle flexibility of delivery. Training providers are welcome to substitute other practical performances that measure similar skills and attainment of the competency. Multiple performances may also be used to replace individual performances where appropriate.

### **SAFETY ADVISORY**

Be advised that references to the WorkSafeBC safety regulations contained within these materials do not/may not reflect the most recent Occupational Health and Safety Regulation (the current Standards and Regulation in BC can be obtained on the following website: <http://www.worksafebc.com>. Please note that it is always the responsibility of any person using these materials to inform him/herself about the Occupational Health and Safety Regulation pertaining to his/her work.



## Acknowledgements

Industry and Instructor Subject Matter Experts retained to assist in the development of the Program Outline:

- Mark Deroche British Columbia Institute of Technology
- John Euloth Okanagan College
- Nick Penner University of the Fraser Valley
- Ranjot Sandhu Rapid Autobody

Industry and Instructor Subject Matter Experts retained to review the Program Outline:

- Don Anderson Automotive Collision Repair Technician
- Mark Deroche British Columbia Institute of Technology
- John Euloth Okanagan College
- Nick Penner University of the Fraser Valley
- Ranjot Sandhu Rapid Autobody
- Tate Westerman Vancouver Community College

The Industry Training Authority would like to acknowledge the dedication and hard work of all the industry and training provider representatives appointed to identify the training requirements of the Motor Vehicle Body Repairer (Metal & Paint) (Automotive Collision Repair Technician) trade.



## How to Use this Document

This Program Outline has been developed for the use of individuals from several different audiences. The table below describes how each section can be used by each intended audience.

Section	Training Providers	Employers/ Sponsors	Apprentices	Challengers
<b>Program Credentialing Model</b>	Communicate program length and structure, and all pathways to completion	Understand the length and structure of the program	Understand the length and structure of the program, and pathway to completion	Understand challenger pathway to Certificate of Qualification
<b>OAC</b>	Communicate the competencies that industry has defined as representing the scope of the occupation	Understand the competencies that an apprentice is expected to demonstrate in order to achieve certification	View the competencies they will achieve as a result of program completion	Understand the competencies they must demonstrate in order to challenge the program
<b>Training Topics and Suggested Time Allocation</b>	Shows proportionate representation of general areas of competency (GACs) at each program level, the suggested proportion of time spent on each GAC, and percentage of time spent on theory versus practical application	Understand the scope of competencies covered in the technical training, the suggested proportion of time spent on each GAC, and the percentage of that time spent on theory versus practical application	Understand the scope of competencies covered in the technical training, the suggested proportion of time spent on each GAC, and the percentage of that time spent on theory versus practical application	Understand the relative weightings of various competencies of the occupation on which assessment is based
<b>Program Content</b>	Defines the objectives, learning tasks, high level content that must be covered for each competency, as well as defining observable, measurable achievement criteria for objectives with a practical component	Identifies detailed program content and performance expectations for competencies with a practical component; may be used as a checklist prior to signing a recommendation for certification (RFC) for an apprentice	Provides detailed information on program content and performance expectations for demonstrating competency	Allows individual to check program content areas against their own knowledge and performance expectations against their own skill levels





Section	Training Providers	Employers/ Sponsors	Apprentices	Challengers
<b>Training Provider Standards</b>	Defines the facility requirements, tools and equipment, reference materials (if any) and instructor requirements for the program	Identifies the tools and equipment an apprentice is expected to have access to; which are supplied by the training provider and which the student is expected to own	Provides information on the training facility, tools and equipment provided by the school and the student, reference materials they may be expected to acquire, and minimum qualification levels of program instructors	Identifies the tools and equipment a tradesperson is expected to be competent in using or operating; which may be used or provided in a practical assessment



# **Section 2**

## **PROGRAM OVERVIEW**

### **Automotive Collision Repair Technician**

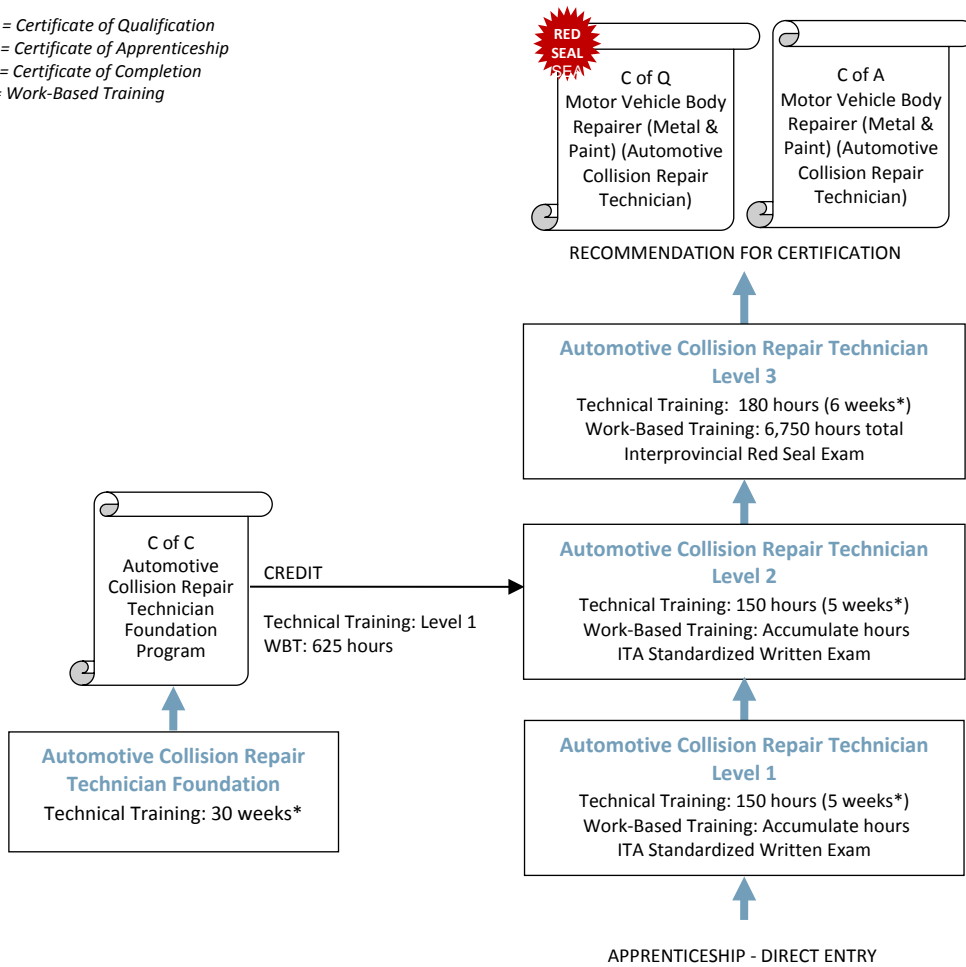


# Program Credentialing Model

## Apprenticeship Pathway

This graphic provides an overview of the Motor Vehicle Body Repairer (Metal & Paint) (Automotive Collision Repair Technician) apprenticeship pathway.

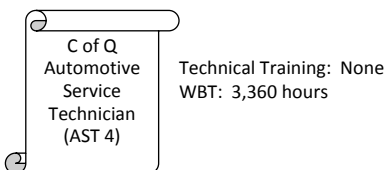
C of Q = Certificate of Qualification  
 C of A = Certificate of Apprenticeship  
 C of C = Certificate of Completion  
 WBT = Work-Based Training



\*Suggested duration based on 30-hour week

### CROSS-PROGRAM CREDITS

Individuals who hold the credentials listed below are entitled to receive partial credit toward the completion requirements of this program





## Occupational Analysis Chart

### AUTOMOTIVE COLLISION REPAIR TECHNICIAN

**Occupation Description:** "Automotive Collision Repair Technician" means a person who repairs, adjusts and replaces sheet metal and allied parts of automobiles, trucks and buses.

<b>OCCUPATIONAL SKILLS AND SAFETY</b> <b>A</b>	Describe safe work practices A1	Describe shop safety procedures A2	Describe waste product handling A3	Describe Work Hazard Material Information System (WHMIS) A4	Describe Personal Protective Equipment (PPE) A5	Describe WCB Standards and Regulations A6
	1	1	1	1	1	1
<b>TOOLS AND EQUIPMENT</b> <b>B</b>	Describe collision repair hand tools B1	Identify power tools B2	Identify various fasteners B3	Describe organizational skills B4		
	1	1	1	1		
<b>OXYACETYLENE PROCEDURES</b> <b>C</b>	Describe oxyacetylene safety C1	Perform oxyacetylene procedures C2				
	1	1				
<b>WELDING</b> <b>D</b>	Describe MIG (Shielded Metal Arc Welding SMAW) safety D1	Describe MIG welding process D2	Perform various MIG welds on sheet steel D3	Describe plasma arc cutting D4	Describe resistance spot welders D5	Describe set-up procedures for MIG welding aluminum D6
	1	1	1	1	1	2
	Perform various aluminum MIG welds D7					
	2					



<b>SHEET METAL REPAIR</b> <b>E</b>	Describe the characteristics of sheet metal E1 1	Describe the types of basic sheet metal damage E2 1	Identify sheet metal repair tools and equipment E3 1	Describe minor sheet metal damage repair E4 1	Describe productive organizational skills E5 2	Describe complex damage analysis procedures E6 2
	Describe roughing procedures for repairing sheet metal E7 2	Describe plastic filling procedures for damage to complex sheet metal areas E8 2	Demonstrate sheet metal repair procedures E9 2	Describe panel replacement and repair techniques E10 2	Describe the characteristics of aluminum E11 2	Describe basic sheet aluminum repairs E12 2
<b>PLASTICS AND COMPOSITES</b> <b>F</b>	Describe plastic repair tools and equipment F1 1	Describe plastic repair techniques F2 1	Demonstrate plastic repair techniques F3 1	Describe fiberglass and SMC repair equipment F4 2	Describe repair procedures for fiberglass and SMC F5 2	Perform fiberglass and SMC repairs F6 2
	Describe spray gun use G1 1	Identify air supply and purification equipment G2 1	Identify various spray booths G3 1	Demonstrate preparation for application of undercoats/primers G4 1	Demonstrate the application of undercoats/primers G5 1	Identify corrosion protection techniques G6 1
<b>SURFACE PREPARATION</b> <b>G</b>	Identify auto body construction types H1 1	Describe panel alignment methods H2 1	Describe body component servicing procedures H3 1	Describe automotive tempered glass H4 1	Describe automotive laminated glass H5 1	Service non-structural glass H6 1
	Identify seat belt assemblies I1 2	Identify airbag system components I2 2	Discuss cooling system service I3 2	Describe air conditioning service I4 2	Identify vehicle systems I5 2	Identify electrical/electronic on-board procedures I6 2
<b>AUTO BODY CONSTRUCTION AND COMPONENTS</b> <b>H</b>						
<b>MECHANICAL COMPONENTS</b> <b>I</b>						



## Program Overview

<b>STRUCTURAL REPAIR</b> <b>J</b>	Identify the various structural designs J1 3	Identify collision theory concepts J2 3	Identify damage assessment techniques J3 3	Identify measuring theory and gauging equipment J4 3	Identify various measuring systems J5 3	Identify unibody anchoring techniques J6 3		
	Identify conventional frame anchoring techniques J7 3	Describe straightening techniques J8 3	Describe pulling techniques J9 3	Describe structural panel replacement procedures J10 3	Prepare a structural damage analysis sheet J11 3	Demonstrate structural repair procedures J12 3		
	Demonstrate closed box panel structural sectioning techniques J13 3							
	<b>SUSPENSION AND STEERING</b> <b>K</b>	Identify MacPherson Strut suspension system K1 3	Identify short and long arm suspension systems K2 3	Identify the various types of rear suspension systems K3 3	Identify R&I procedures for suspension systems K4 3	Describe rack and pinion steering systems K5 3	Describe parallelogram steering systems K6 3	
		Identify wheel alignment angles K7 3						
		<b>INSURANCE ESTIMATING</b> <b>L</b>	Interpret estimating information L1 3	Interpret business relations L2 3				
		<b>REFINISHING</b> <b>M</b>	Identify preparation of various substrates and topcoats M1 3	Describe mixing and application of primers M2 3	Describe refinishing corrosion protection methods M3 3	Describe the refinishing process M4 3	Identify the detailing process M5 3	



## Training Topics and Suggested Time Allocation: Level 1

### MOTOR VEHICLE BODY REPAIRER (METAL AND PAINT) (AUTOMOTIVE COLLISION REPAIR TECHNICIAN) - LEVEL 1

		% of Time Allocated to:			
		% of Time	Theory	Practical	Total
<b>Line A</b>	<b>OCCUPATIONAL SKILLS AND SAFETY</b>	<b>4%</b>	<b>100%</b>	<b>0%</b>	<b>100%</b>
A1	Describe safe work practices		✓		
A2	Describe shop safety procedures		✓		
A3	Describe waste product handling		✓		
A4	Describe Work Hazard Material Information System (WHMIS)		✓		
A5	Describe Personal Protective Equipment (PPE)		✓		
A6	Describe WCB Standards and Regulations		✓		
<b>Line B</b>	<b>TOOLS AND EQUIPMENT</b>	<b>6%</b>	<b>70%</b>	<b>30%</b>	<b>100%</b>
B1	Describe collision repair hand tools		✓		
B2	Identify power tools		✓		
B3	Identify various fasteners		✓		
B4	Describe organizational skills		✓	✓	
<b>Line C</b>	<b>OXYACETYLENE PROCEDURES</b>	<b>8%</b>	<b>40%</b>	<b>60%</b>	<b>100%</b>
C1	Describe oxyacetylene safety		✓		
C2	Perform oxyacetylene procedures		✓	✓	
<b>Line D</b>	<b>WELDING</b>	<b>21%</b>	<b>30%</b>	<b>70%</b>	<b>100%</b>
D1	Describe MIG (Shielded Metal Arc Welding SMAW) safety		✓		
D2	Describe MIG welding process		✓		
D3	Perform various MIG welds on sheet steel		✓	✓	
D4	Describe plasma arc cutting		✓	✓	
D5	Describe resistance spot welders		✓		
<b>Line E</b>	<b>SHEET METAL REPAIR</b>	<b>23%</b>	<b>30%</b>	<b>70%</b>	<b>100%</b>
E1	Describe the characteristics of sheet metal		✓		
E2	Describe the types of basic sheet metal damage		✓		
E3	Identify sheet metal repair tools and equipment		✓		
E4	Describe minor sheet metal damage repair		✓	✓	
<b>Line F</b>	<b>PLASTICS AND COMPOSITES</b>	<b>16%</b>	<b>30%</b>	<b>70%</b>	<b>100%</b>
F1	Describe plastic repair tools and equipment		✓		
F2	Describe plastic repair techniques		✓		
F3	Demonstrate plastic repair techniques		✓	✓	



		% of Time Allocated to:			
		% of Time	Theory	Practical	Total
<b>Line G</b>	<b>SURFACE PREPARATION</b>	<b>12%</b>	<b>25%</b>	<b>75%</b>	<b>100%</b>
G1	Describe spray gun use		✓		
G2	Identify air supply and purification equipment		✓		
G3	Identify various spray booths		✓		
G4	Demonstrate preparation for application of undercoats/primers		✓		
G5	Demonstrate the application of undercoats/primers		✓		
G6	Identify corrosion protection techniques		✓		
<b>Line H</b>	<b>AUTO BODY CONSTRUCTION AND COMPONENTS</b>	<b>10%</b>	<b>30%</b>	<b>70%</b>	<b>100%</b>
H1	Identify auto body construction types		✓		
H2	Describe panel alignment methods		✓	✓	
H3	Describe body component servicing procedures		✓		
H4	Describe automotive tempered glass		✓		
H5	Describe automotive laminated glass		✓		
H6	Service non-structural glass			✓	
<b>Total Percentage for Automotive Collision Repair Technician Level 1</b>		<b>100%</b>			





## Training Topics and Suggested Time Allocation: Level 2

### MOTOR VEHICLE BODY REPAIRER (METAL AND PAINT) (AUTOMOTIVE COLLISION REPAIR TECHNICIAN) - LEVEL 2

		% of Time Allocated to:			
		% of Time	Theory	Practical	Total
<b>Line D</b>	<b>WELDING</b>	<b>12%</b>	<b>30%</b>	<b>70%</b>	<b>100%</b>
D6	Describe set-up procedures for MIG welding aluminum		✓		
D7	Perform various aluminum MIG welds			✓	
<b>Line E</b>	<b>SHEET METAL REPAIR</b>	<b>70%</b>	<b>30%</b>	<b>70%</b>	<b>100%</b>
E5	Describe productive organizational skills		✓		
E6	Describe complex damage analysis procedures		✓		
E7	Describe roughing procedures for repairing sheet metal		✓		
E8	Describe plastic filling procedures for damage to complex sheet metal areas		✓		
E9	Demonstrate sheet metal repair procedures			✓	
E10	Describe panel replacement and repair techniques		✓	✓	
E11	Describe the characteristics of aluminum		✓		
E12	Describe basic sheet aluminum repairs		✓		
<b>Line F</b>	<b>PLASTICS AND COMPOSITES</b>	<b>4%</b>	<b>20%</b>	<b>80%</b>	<b>100%</b>
F4	Describe fiberglass and SMC repair equipment		✓		
F5	Describe repair procedures for fiberglass and SMC		✓		
F6	Perform fiberglass and SMC repairs			✓	
<b>Line I</b>	<b>MECHANICAL COMPONENTS</b>	<b>14%</b>	<b>60%</b>	<b>40%</b>	<b>100%</b>
I1	Identify seat belt assemblies		✓		
I2	Identify airbag system components		✓		
I3	Discuss cooling system service		✓		
I4	Describe air conditioning service		✓		
I5	Identify vehicle systems		✓		
I6	Identify electrical/electronic on-board procedures		✓	✓	
<b>Total Percentage for Automotive Collision Repair Technician Level 2</b>		<b>100%</b>			



## Training Topics and Suggested Time Allocation: Level 3

### MOTOR VEHICLE BODY REPAIRER (METAL AND PAINT) (AUTOMOTIVE COLLISION REPAIR TECHNICIAN) - LEVEL 3

		% of Time Allocated to:			
		% of Time	Theory	Practical	Total
<b>Line J</b>	<b>STRUCTURAL REPAIR</b>	<b>60%</b>	<b>30%</b>	<b>70%</b>	<b>100%</b>
J1	Identify the various structural designs		✓		
J2	Identify collision theory concepts		✓		
J3	Identify damage assessment techniques		✓		
J4	Identify measuring theory and gauging equipment		✓	✓	
J5	Identify various measuring systems		✓		
J6	Identify unibody anchoring techniques		✓		
J7	Identify conventional frame anchoring techniques		✓		
J8	Describe straightening techniques		✓		
J9	Describe pulling techniques		✓		
J10	Describe structural panel replacement procedures		✓		
J11	Prepare a structural damage analysis sheet			✓	
J12	Demonstrate structural repair procedures			✓	
J13	Demonstrate closed box panel structural sectioning techniques		✓	✓	
<b>Line-K</b>	<b>SUSPENSION AND STEERING</b>	<b>15%</b>	<b>60%</b>	<b>40%</b>	<b>100%</b>
K1	Identify MacPherson Strut suspension system		✓		
K2	Identify short and long arm suspension systems		✓		
K3	Identify the various types of rear suspension systems		✓		
K4	Identify R&I procedures for suspension systems		✓		
K5	Describe rack and pinion steering systems		✓		
K6	Describe parallelogram steering systems		✓		
K7	Identify wheel alignment angles		✓		
<b>Line-L</b>	<b>INSURANCE ESTIMATING</b>	<b>5%</b>	<b>40%</b>	<b>60%</b>	<b>100%</b>
L1	Interpret estimating information		✓		
L2	Interpret business relations		✓		
<b>Line M</b>	<b>REFINISHING</b>	<b>20%</b>	<b>50%</b>	<b>50%</b>	<b>100%</b>
M1	Identify preparation of various substrates and topcoats		✓		
M2	Describe mixing and application of primers		✓		
M3	Describe refinishing corrosion protection methods		✓		
M4	Describe the refinishing process		✓	✓	
M5	Identify the detailing process		✓		
<b>Total Percentage for Automotive Collision Repair Technician Level 3</b>		<b>100%</b>			



# **Section 3**

## **PROGRAM CONTENT**

### **Automotive Collision Repair Technician**



# Level 1

## Automotive Collision Repair Technician



**LEARNING TASKS**

- 4. Describe the conditions and classifications of fires.
  
  
  
  
  
  
  
  
  
  
- 5. Describe fire safety precautions when working near, handling or storing flammables.
  
  
  
  
  
  
  
  
  
  
- 6. Describe the considerations and procedures to extinguishing a fire.

**CONTENT**

- Conditions to support fire
  - Air
  - Fuel
  - Heat
- Classes of fires
  - A – combustibles
  - B – liquids
  - C – electrical
  - D – metal
- Symbols and colours
  
  
  
- Fuels
  - Diesel
  - Gasoline
  - Propane
  - Natural gas
  - Solvents
- Lubricants
- Oily rags
- Combustible metals
- Aerosols
  
  
  
  
  
  
  
  
- Warning others and fire department
- Evacuation of others
- Fire contained and not spreading
- Method of exit
- Training
- P.A.S.S.
  - Point
  - Aim
  - Squeeze
  - Sweep



**LEARNING TASKS**

7. Describe hybrid and electric vehicle safety precautions.

**CONTENT**

- Identification
- Work area
  - Personal Protection Equipment (PPE)
  - Pylons
- Electrocution hazards
- Auto stop



- LINE (GAC): A OCCUPATIONAL SKILLS AND SAFETY**  
**Competency: A2 Describe shop safety procedures**

### Objectives

To be competent in this area, the individual must be able to:

- Describe safe work practices.
- Describe safe lifting equipment practices.
- Follow safety procedures for alternate fuel vehicles.

### LEARNING TASKS

1. Describe safe work practices.
2. Describe lifting equipment safety.
3. Follow safety procedures for alternate-fuel vehicles.

### CONTENT

- Shop equipment
- Proper housekeeping
- Use of grinding tools
- Movement of vehicles in the shop area
- Battery disconnect
  
- Types of equipment
  - Floor jacks
  - Safety stands
  - Hoists
- Limitations of lifting equipment
- Applications of lifting equipment
- Safe lifting locations or points
- Maintenance of lifting equipment
  
- Refer to manufacturers' safety procedures prior to working on alternate-fuel vehicles
- Deactivate battery packs on Hybrid vehicles to prevent damage to vehicle and injury to repairers
- Follow refinishing procedures for curing cycles for alternate-fuel vehicles
- Determine Personal Protection Equipment (PPE) required for task





**LINE (GAC):**      **A**    **OCCUPATIONAL SKILLS AND SAFETY**  
**Competency:**    **A3**    **Describe waste product handling**

**Objectives**

To be competent in this area, the individual must be able to:

- Describe storage and disposal of controlled products.

**LEARNING TASKS**

1. Describe the proper storage and disposal methods of controlled products.

**CONTENT**

- Municipal / regional regulations
- Shop supplies
- Paint products
- Vehicle fluids
- Welding gases
- Waste products
- Waste removal fees



**LINE (GAC):**        **A**    **OCCUPATIONAL SKILLS AND SAFETY**  
**Competency:**      **A4**   **Describe Work Hazard Material Information System (WHMIS)**

**Objectives**

To be competent in this area, the individual must be able to:

- Describe the Workplace Hazardous Materials Information System (WHMIS).
- Apply WHMIS regulations as they apply to hazardous materials used in the shop.

**LEARNING TASKS**

**CONTENT**

- |   |   |
|---|---|
| <p>1. Describe SDS requirements.</p>  | <ul style="list-style-type: none"> <li>• Regulations <ul style="list-style-type: none"> <li>○ Hazardous Product</li> <li>○ Controlled Products</li> <li>○ Ingredient Disclosure List</li> </ul> </li> <li>• Labels</li> </ul>                 |
| <p>2. Describe the purpose of the Workplace Hazardous Materials Information System (WHMIS).</p> | <ul style="list-style-type: none"> <li>• Protection of workers</li> <li>• Rights and responsibilities <ul style="list-style-type: none"> <li>○ Workers</li> <li>○ Employers</li> <li>○ Suppliers</li> <li>○ Regulators</li> </ul> </li> </ul> |
| <p>3. Describe the key elements of WHMIS.</p>   | <ul style="list-style-type: none"> <li>• Safety Data Sheets (SDS) and location</li> <li>• Labelling of containers of hazardous materials</li> <li>• Worker education programs</li> </ul>  |
| <p>4. Describe the responsibilities of employees under WHMIS.</p>                               | <ul style="list-style-type: none"> <li>• Personal Protection Equipment (PPE)</li> <li>• SDS</li> <li>• Labels</li> </ul>  |
| <p>5. Describe the responsibilities of employers under WHMIS.</p>                               | <ul style="list-style-type: none"> <li>• Provide training</li> <li>• SDS</li> <li>• Labels</li> <li>• Work Education Programs in the workplace</li> </ul>   |



### LEARNING TASKS

6. Describe information to be disclosed on an SDS.

7. Identify symbols found on WHMIS labels and their meaning.

8. Apply WHMIS regulations as they apply to hazardous materials used in the shop.

### CONTENT

- Hazardous ingredients
- Preparation information
- Product Information
- Physical data
- Fire or explosion
- Reactivity data
- Toxicological properties
- Preventive measures
- First-aid measures
  
- WHMIS Symbols 2015
  - Compressed gases
  - Flammable and combustible materials
  - Oxidizing materials (materials causing other toxic effects)
  - Poisonous and infectious materials
  - Materials causing immediate and serious toxic effect
  - Bio-hazardous infectious materials
  - Corrosive materials
  - Dangerously reactive materials
  - Environmentally hazardous materials
  - Serious health hazards
  
- Use, storage and disposal
  - Solvents
  - Paints
  - Isocyanates
  - Caustic cleaners
  - Cleaning solutions
  - Alcohol used for cleaning
  - Gasoline
  - Diesel fuel
  - Asbestos
  - Battery acid
  - Refrigerants
  - Brake fluid
  - Antifreeze
  - Lubricants



**LINE (GAC):**       **A**   **OCCUPATIONAL SKILLS AND SAFETY**  
**Competency:**     **A5**   **Describe Personal Protective Equipment (PPE)**

**Objectives**

To be competent in this area, the individual must be able to:

- Inspect, use and maintain Personal Protection Equipment (PPE).

**LEARNING TASKS**

**CONTENT**

- |   |   |
|---|---|
| <p>1. Identify the types of Personal Protective Equipment (PPE).</p>                      | <ul style="list-style-type: none"> <li>• Hearing</li> <li>• Eyes</li> <li>• Skin</li> <li>• Breathing protection</li> <li>• Hands</li> <li>• Foot</li> </ul>  |
| <p>2. Describe the use of Personal Protective Equipment (PPE).</p>                        | <ul style="list-style-type: none"> <li>• Ear protection</li> <li>• Eye protection</li> <li>• Skin protection</li> <li>• Breathing protection</li> <li>• Hand protection</li> <li>• Foot protection</li> </ul> |
| <p>3. Describe the inspection and maintenance of Personal Protection Equipment (PPE).</p> | <ul style="list-style-type: none"> <li>• Ear protection</li> <li>• Eye protection</li> <li>• Skin protection</li> <li>• Breathing protection</li> <li>• Hand protection</li> <li>• Foot protection</li> </ul> |
| <p>4. Describe how to correctly store Personal Protection Equipment (PPE).</p>            | <ul style="list-style-type: none"> <li>• Ear protection</li> <li>• Eye protection</li> <li>• Breathing protection</li> </ul>  |



**LINE (GAC):**     **A**   **OCCUPATIONAL SKILLS AND SAFETY**  
**Competency:**    **A6**   **Describe WCB Standards and Regulations**

**Objectives**

To be competent in this area, the individual must be able to:

- Describe the Workers Compensation Act

**LEARNING TASKS**

**CONTENT**

- |   |  |
|---|--|
| <p>1. Describe rights and responsibilities</p>                    | <ul style="list-style-type: none"> <li>• Employers</li> <li>• Employees</li> <li>• Contractors</li> <li>• Inspectors</li> </ul>  |
| <p>2. Describe reporting of accidents.</p>                        | <ul style="list-style-type: none"> <li>• Chain of command</li> <li>• Documentation</li> </ul>  |
| <p>3. Describe the main elements of WorkSafeBC</p>                | <ul style="list-style-type: none"> <li>• Definitions</li> <li>• Application</li> <li>• Rights and responsibilities</li> <li>• Health and safety programs</li> <li>• Investigation and reports</li> <li>• Workplace inspections</li> <li>• Right to refuse work</li> <li>• General conditions</li> <li>• Building and equipment safety</li> <li>• Emergency preparedness</li> <li>• Preventing violence</li> <li>• Working alone</li> <li>• Ergonomics</li> <li>• Illumination</li> <li>• Indoor air quality</li> <li>• Smoking and lunchrooms</li> </ul> |
| <p>4. Describe the workplace hazards identified by WorkSafeBC</p> | <ul style="list-style-type: none"> <li>• Chemical and biological substances</li> <li>• Substance specific requirements</li> <li>• Noise, vibration, radiation and temperature</li> <li>• Personal protective clothing and equipment</li> <li>• Confined spaces</li> <li>• Tools, machinery and equipment</li> <li>• Ladders, scaffolds and temporary work platforms</li> <li>• Electrical safety</li> </ul>  |



**LINE (GAC):**      **B**    **TOOLS AND EQUIPMENT**  
**Competency:**    **B1**   **Describe collision repair hand tools**

**Objectives**

To be competent in this area, the individual must be able to:

- Describe the use of collision repair hand tools.

**LEARNING TASKS**

1. Describe collision repair hand tools.

**CONTENT**

- Screwdrivers
- Wrenches
- Pliers
- Cutting tools
- Hammers
- Socket sets
- Bumping tools
- Straightening tools
- Material application tools
- Removal tools
- Installation tools

2. Describe the use of hand tools.

- Limitations
- Torque specifications
- Maintainance
- Storage
- Recognizing worn, broken and defective hand tools



**LINE (GAC):** B TOOLS AND EQUIPMENT  
**Competency:** B2 Identify power tools

### Objectives

To be competent in this area, the individual must be able to:

- Identify the use of power tools.
- Identify potential hazards when using power tools.

### LEARNING TASKS

1. Describe power tools.
  
  
  
  
  
  
  
  
2. Describe the use of power tools.

### CONTENT

- Electric / battery
- Pneumatic
- Hydraulic
  
  
  
  
- Hazards
  - Frayed cords
  - Cracked casings
  - Leaking Lines
  - Work environment
- Operating procedures
- Limitations
- Maintenance
- Storage



**LINE (GAC): B TOOLS AND EQUIPMENT**  
**Competency: B3 Identify various fasteners**

### Objectives

To be competent in this area, the individual must be able to:

- Describe various fasteners
- Describe removal and installation procedures

### LEARNING TASKS

1. Describe various fasteners
2. Describe removal and installation procedures
3. Remove and re-install reusable trim

### CONTENT

- Types
  - Bolts
  - Nuts
  - Washers
  - Clips
  - Rivets
  - Moulding clips
  - Adhesives
  - Screws
- Functions
- Costs
- Fastener identification
- Identifying reusable fasteners
- Removal procedures
- Replacement procedures
  - Torque specifications
- Removal and replacement of retainers
- Final operation/fit and finish
- Mouldings
- Name plates
- Emblems
- After-market trim and components





**LINE (GAC): B TOOLS AND EQUIPMENT**  
**Competency: B4 Describe organizational skills**

**Objectives**

To be competent in this area, the individual must be able to:

- Describe how to maintain productive repairs.
- Describe manufacturers' specification and repair information.
- Describe the process used to prepare a working area.

**LEARNING TASKS**

1. Describe the organizational skills required for productive repair work in a collision repair shop.
2. Use Original Equipment Manufacturers (OEM) specifications and repair procedures.

**CONTENT**

- Repair analysis
- Developing a repair plan
- Assessment of tools and materials required
- Timing of repair steps
- Avoidance of repetitive repair steps
- Production deadlines
- Store and inventory parts and materials
- Notify supervisor of missing, damaged and incorrect parts
- Work area preparation
  - Tool selection and layout
  - Housekeeping
- Access
  - Online
  - Hard Copy
  - Bulletins
- Interpretation
- Application

**Achievement Criteria**

**Performance** The learner will access and interpret OEM specifications and repair procedures.

**Conditions** The learner will be given

- Means to access specifications, e.g. computer lab
- Work task, e.g. remove headlight

**Criteria** The learner will be evaluated on

- Accuracy
- Efficiency



**LINE (GAC):** C OXYACETYLENE PROCEDURES  
**Competency:** C1 Describe oxyacetylene safety

### Objectives

To be competent in this area, the individual must be able to:

- Describe oxyacetylene safety.
- Describe oxyacetylene components.

### LEARNING TASKS

1. Describe oxyacetylene safety.

### CONTENT

- Safety
  - Leak test (soap and water)
  - Drop hazards
  - Surroundings
  - Flint strikers
  - Shields
  - Cool-down time
  - Fire suppression
  - Hazardous substrates
  - Ventilation
  - Flashback
  - Heating on concrete
- Personal Protection Equipment (PPE)
  - Eye protection
  - Gloves
  - Clothing
  - Respirator
- Gas characteristics
  - Oxygen
  - Acetylene



### LEARNING TASKS

2. Describe oxyacetylene components.

### CONTENT

- Cylinders
  - Oxygen
    - One piece cylinder
    - Safety devices High pressure
  - Acetylene
    - Two piece cylinder
    - Safety devices
    - Low pressure
    - Filler material (acetone)
- Regulators
  - Single stage
  - Two stage
  - Pressure adjustments
  - Cleanliness
- Hoses
  - Colours
  - Maintenance
  - Fittings
    - Grooved (acetylene)
    - Smooth (oxygen)
- Torches
  - Valves
  - Tips
    - Welding
    - Cutting
    - Heating
- Flashback arresters



**LINE (GAC): C OXYACETYLENE PROCEDURES**

**Competency: C2 Perform oxyacetylene procedures**

**Objectives**

To be competent in this area, the individual must be able to:

- Perform oxyacetylene procedures.

**LEARNING TASKS**

1. Describe oxyacetylene procedures.

**CONTENT**

- Cracking cylinders
- Attaching regulators
- Hoses, fittings and arrestors
- Regulator diaphragm care
- Leak checks
- Relationship between
  - Tip size and material thickness
  - Tip size and gas pressure
- Lighting procedures
- Flames
  - Carburizing
  - Neutral
  - Oxidizing
- Shutdown procedures
- Heating procedures for expansion
- Heating procedures for shrinking
- Cutting procedures
- Storage of oxyacetylene equipment

2. Perform oxyacetylene procedures.

- Personal Protection Equipment (PPE)
- Prepare tanks, regulators, hoses and torches
- Tip selection
- Setting working pressures for project
- Torch lighting procedures
- Flames
  - Carburizing
  - Neutral
  - Oxidizing
- Heating procedure for expansion
- Heating for shrinking
- Heating with rosebud
- Cutting with cutting tips
- Shutdown
- Storing equipment



### Achievement Criteria

Performance	The learner will perform oxyacetylene set up, cutting, heating and shut down.
Conditions	The learner will be given <ul style="list-style-type: none"><li>• Oxyacetylene equipment</li><li>• Steel panel</li></ul>
Criteria	The learner will be evaluated on <ul style="list-style-type: none"><li>• Safety</li><li>• Procedure</li><li>• Technique</li></ul>



**LINE (GAC): D WELDING**

**Competency: D1 Describe MIG (Shielded Metal Arc Welding SMAW) safety**

**Objectives**

To be competent in this area, the individual must be able to:

- Identify the components of a MIG / Gas Metal Arc Welding (GMAW) welder.
- Describe the safety precautions involved with MIG (GMAW) welding.

**LEARNING TASKS**

1. Identify the components of a MIG/GMAW welder.

**CONTENT**

- Power supply
  - 110 volts
  - 220 volts
  - Cooling fan
  - Duty cycle
- Service parts
  - Wire spool
  - Liner
  - Trigger connections
  - Main hose assembly
  - Gas diffuser
  - Contact tip
  - Nozzle
  - Ground clamp
  - Cables
- Wire sizes
- Shielding Gas
  - C-25 (75% argon/25% carbon dioxide)
  - 100% carbon dioxide
  - 100% argon (aluminum only)



2. Describe the safety precautions involved with MIG/GMAW welding.

- Welding-specific Personal Protection Equipment (PPE)
  - Face shields
  - Respirator
  - Ear protection
  - Lenses
  - Leather apron
  - Leather gloves
- Personal limitations
  - Pacemakers
  - Epilepsy
- Ventilation
- Grounded AC connections
- Flash shield placement
- Battery disconnect
- Proximity to electronic components
- Flammable fluids and coatings







**LINE (GAC):**        **D    WELDING**  
**Competency:**       **D3   Perform various MIG welds on sheet steel**

**Objectives**

To be competent in this area, the individual must be able to:

- Perform a butt and lap weld on 22 gauge steel.
- Perform a plug weld on 22 and 20 gauge steel.

**LEARNING TASKS**

1. Perform a butt weld on 22 gauge steel.
  
2. Perform a lap weld on 22 gauge steel.
  
3. Perform various size plug welds on 22 and 20 gauge steel.

**CONTENT**

- Gun angle and speed
- Penetration
- Build-up
- Consistent width bead
  
- Gun angle and speed
- Penetration
- Build-up
- Consistent width bead
  
- Gun angle and speed
- Penetration
- Build-up
- Complete closure of plug hole

**Achievement Criteria**

**Performance**    The learner will perform a butt weld, a lap weld, and a plug weld.

**Conditions**     The learner will be given

- Welding equipment
- Steel panel

**Criteria**        The learner will be evaluated on

- Safety
- Procedure
- Technique
- Destructive testing





**LINE (GAC):** D **WELDING**  
**Competency:** D5 **Describe resistance spot welders**

**Objectives**

To be competent in this area, the individual must be able to:

- Describe resistance spot welders.

**LEARNING TASKS**

1. Describe resistance spot welders.

**CONTENT**

- Components
  - Reach arms
  - Pressurization handle
  - Transformer
  - Timer
- Purpose
- Use
  - Pressure
  - Time
  - Voltage
  - Current
- Maintenance and calibration
- Manufacturers' specifications



**LINE (GAC):** E SHEET METAL REPAIR  
**Competency:** E1 Describe the characteristics of sheet metal

**Objectives**

To be competent in this area, the individual must be able to:

- Describe the characteristics of automotive steel.

**LEARNING TASKS**

1. Describe the characteristics of mild steel.
  
2. Describe the characteristics of high-strength steel.
  
3. Describe the characteristics of advanced and ultra-high strength steels.

**CONTENT**

- Tensile strength
- Yield strength
- Spring-back
- Composition
- Work hardening
- Annealing
- Affects of heat
  
- Tensile strength
- Yield strength
- Spring-back
- Composition
- Characteristics
- Work hardening
- Annealing
- Affects of heat
  
- Yield strength
- Tensile strength
- Spring-back
- Advanced high strength steel examples
  - Martensitic (MART)
  - Isotropic (IS)
  - Carbon Manganese
  - High strength, low alloy (HSLA)
  - Dual/Complex phase
- Ultra high strength steel examples
  - Boron
  - Dual/Complex phase
  - Transformation induced plasticity (TRIP)



**LINE (GAC):**        **E**    **SHEET METAL REPAIR**  
**Competency**        **E2**    **Describe the types of basic sheet metal damage**

**Objectives**

To be competent in this area, the individual must be able to:

- Identify the various types of sheet metal damage.

**LEARNING TASKS**

1. Identify the various types of sheet metal damage.

**CONTENT**

- Direct and indirect
- Displaced metal
- Hinge and roll buckle
- Stretched area
- Upset area
- Tears



**LINE (GAC):** E **SHEET METAL REPAIR**  
**Competency:** E3 **Identify sheet metal repair tools and equipment**

**Objectives**

To be competent in this area, the individual must be able to:

- Describe the use of sheet metal hand tools.
- Describe the use of sheet metal repair equipment.

**LEARNING TASKS**

1. Describe the use of sheet metal repair hand tools.
  
2. Describe the use of sheet metal repair equipment.

**CONTENT**

- Hammers
- Dollies
- Pry bars
- Spoons
  
- Stud welder
- Spot welder electrode
- Hydraulic body jack
- Pulling equipment



**LINE (GAC):** E SHEET METAL REPAIR  
**Competency:** E4 Describe minor sheet metal damage repair

### Objectives

To be competent in this area, the individual must be able to:

- Perform sheet metal repair.

### LEARNING TASKS

1. Describe damage analysis.
2. Describe repair methods.
3. Describe shrinking procedures.
4. Describe body filling procedures.

### CONTENT

- Cosmetic (minor) vs. structural (major)
- Need for complete damage analysis
  - Visual
  - Touch
- Cold repair
- Heat repair
- Pushing/pulling
- Roughing
- Patching
- Visualize desired outcome
- Expansion and contraction
- Restricted and unrestricted sheet metal
- Oxyacetylene
- Spitznagel™
- Panel beater™
- Cold shrinking
- Types of filler
- Surface preparation
  - Cleaning procedures
  - Coating removal
  - Featheredging
- Mixing procedures
- Application
  - Sanding progression
  - Type
  - Grit
- Blocking
  - Machine
  - Hand



- 5. Demonstrate repair procedures
  - Select
    - repair equipment
    - repair material
    - repair technique
  - Perform repair

**Achievement Criteria**

Performance The learner will repair minor sheet metal damage.

Conditions The learner will be given

- Repair equipment
- Repair materials
- Steel panel

Criteria The learner will be evaluated on

- Safety
- Procedure
- Technique
- Quality of repair





**LINE (GAC):** F **PLASTICS AND COMPOSITES**  
**Competency:** F1 **Describe plastic repair tools and equipment**

### Objectives

To be competent in this area, the individual must be able to:

- Describe the tools and equipment used for plastic repair.

### LEARNING TASKS

1. Describe the tools and equipment used for plastic repair.

### CONTENT

- Power tools
- Hand tools
- Materials
- Personal Protection Equipment (PPE)



**LINE (GAC):** F **PLASTICS AND COMPOSITES**  
**Competency:** F2 **Describe plastic repair techniques**

**Objectives:**

To be competent in this area, the individual must be able to:

- Describe hot-air and airless welding procedures.
- Describe adhesive plastic repair techniques.

**LEARNING TASKS**

**CONTENT**

1. Describe hot-air welding techniques.

- Identification of plastic
- Purpose and application
- Thermoplastic repair
- Maintain welding equipment
- Store welding equipment
- Recognize potential hazards
  - Air speed
  - Surface temperature

2. Describe airless welding techniques.

- Purpose and application
- Thermoplastic and thermo set repair
- Maintain welding equipment
- Store welding equipment
- Recognize potential hazards
  - Air speed
  - Surface temperature

3. Describe adhesive repairs techniques.

- Types of repairs
- Types of adhesives
- Adhesion promoters
- Surface preparation steps
- Application and finishing
- Manufacturers' specifications



**LINE (GAC):** F **PLASTICS AND COMPOSITES**  
**Competency:** F3 **Demonstrate plastic repair techniques**

**Objectives:**

To be competent in this area, the individual must be able to:

- Demonstrate plastic repairs.

**LEARNING TASKS**

1. Demonstrate plastic repairs.

**CONTENT**

- Identification of plastic
- Hot-air welding
- Airless welding
- Adhesive repairs

**Achievement Criteria**

Performance	The learner will perform plastic repairs, including <ul style="list-style-type: none"> <li>• Welded</li> <li>• Adhesive</li> </ul>
Conditions	The learner will be given <ul style="list-style-type: none"> <li>• Welding equipment</li> <li>• Adhesive materials</li> <li>• Plastic panel</li> </ul>
Criteria	The learner will be evaluated on <ul style="list-style-type: none"> <li>• Safety</li> <li>• Procedure</li> <li>• Technique</li> <li>• Quality of repair</li> </ul>



**LINE (GAC):** G SURFACE PREPARATION  
**Competency:** G1 Describe spray gun use

**Objectives:**

To be competent in this area, the individual must be able to:

- Identify types and components of a spray gun.
- Perform spray gun troubleshooting techniques.
- Perform spray gun maintenance and cleaning.

**LEARNING TASKS**

1. Identify types of spray guns used in the trade.

2. Describe the parts of the spray gun.

3. Demonstrate troubleshooting techniques for correcting spray gun problems.

4. Demonstrate the procedures for cleaning and maintaining the spray gun.

**CONTENT**

- Siphon feed
- Gravity feed
- Low Volume Low Pressure (L.V.L.P.)
- High Volume Low Pressure (H.V.L.P.)
- Pressure feed
- Airbrush
  
- Gun body
- Trigger
- Air valve
- Spreader adjustment
- Fluid adjustment
- Fluid needle and tip
- Air cap
- Material container
  
- Identification of problem
- Gun testing methods
- Methods for correcting problem
  
- Cleaning steps
- Maintenance procedures
- Storage



**LINE (GAC):**      **G**    **SURFACE PREPARATION**  
**Competency:**    **G2**   **Identify air supply and purification equipment**

**Objectives:**

To be competent in this area, the individual must be able to:

- Describe types and function of an air compressor.
- Describe air and moisture filtration equipment.

**LEARNING TASKS**

**CONTENT**

1. Describe the various types of air compressors.

- Piston type
- Single phase
- Double phase
- Screw type
- Diaphragm type
- Rotary type

2. Describe the features of an air compressor.

- Air pressure
- Volume
- Displacement
- Pressure loss
- Atmospheric versus compressed air

3. Describe air and moisture filtering equipment.

- Air transformer
- Air dryers
- Air filters
- Check air dryers and filters for contamination and moisture







### LEARNING TASKS

5. Describe paint removal techniques.

6. Describe sanding materials.

7. Describe sanding equipment.

8. Demonstrate sanding procedures.

### CONTENT

- Steel substrate
    - Sanding removal
      - Hand
      - Machine
    - Chemical removal
    - Media blasting
  - Plastic substrate
    - Sanding removal
    - Chemical removal
- 
- Sanding discs
  - Wet/dry papers
  - Disc sizes
  - Grit types
  - Paper grit size
  - Abrasive pads
  - Open coat/closed coat
- 
- Rotary
  - Dual action
  - Grinders
  - Sanding blocks/contour blocks
  - Sanding pads
  - Vacuum type system
- 
- Hand sanding
  - Power sanding
  - Feather-edging techniques
  - Block sanding
  - Guide coats











**LINE (GAC):** H **AUTO BODY CONSTRUCTION AND COMPONENTS**  
**Competency:** H2 **Describe panel alignment methods**

**Objectives:**

To be competent in this area, the individual must be able to:

- Perform a panel alignment.

**LEARNING TASKS**

**CONTENT**

1. Describe panel alignment.

- Operation
  - Moveable
  - Fixed
- Fit/alignment
- Safety
- Seal
- Parts wear
- OEM and after market parts

2. Perform panel alignment.

- Alignment sequence
- Method of fastening
- Adjusting
- Blocking
- Jacking
- Flushness/gap
- Lubrication
- Verify part movement (moveable parts)

**Achievement Criteria**

**Performance** The learner will perform a panel alignment.

**Conditions** The learner will be given

- Tools
- Replacement panel
- Vehicle or prop

**Criteria** The learner will be evaluated on

- Procedure
- Accuracy of alignment





### LEARNING TASKS

4. Describe interior vehicle components.

### CONTENT

- Components
  - Seats
  - Steering wheel
  - Dash
  - Console
  - Headliner
  - Door panels
  - Carpet
  - Switches
  - Trim
  - Spare tire
  - Accessories
  - Air bags
- Removal
- Installation



**LINE (GAC): H AUTO BODY CONSTRUCTION AND COMPONENTS**

**Competency: H4 Describe automotive tempered glass**

**Objectives:**

To be competent in this area, the individual must be able to:

- Describe tempered glass.

**LEARNING TASKS**

1. Describe automotive tempered glass.

**CONTENT**

- Characteristics
  - Safety
  - Clear
  - Tinted
  - Shaded
  - Heated
- Application
- NAGS
- Mountings
  - Mechanical
  - Gasket
  - Adhesive







**LINE (GAC):** H **AUTO BODY CONSTRUCTION AND COMPONENTS**  
**Competency:** H6 **Service non-structural glass**

**Objectives:**

To be competent in this area, the individual must be able to:

- Remove and replace non-bonded glass.

**LEARNING TASKS**

**CONTENT**

1. Describe removal and replacement procedures for non-bonded glass.

- Fasteners
  - Bolts
  - Fasteners (clips)
  - Rivets
  - Everseal

- Gaskets
  - Bonded

- Sealants
- 2-part epoxy
- Removal procedures
- Installation procedures
- Run channel
- Sash channel
- Clean up and disposal

2. Remove and replace non-bonded glass.

- Select removal method based on manufacturers' specifications
- Identify parts
- Disabling Supplemental Restraint Systems (SRS)
- Vehicle protection
- Clean up
- Removal and replacement of glass
- Fit, finish and operation

**Achievement Criteria**

**Performance** The learner will remove and replace non-bonded glass.

**Conditions** The learner will be given

- Tools
- Door
- Replacement glass

**Criteria** The learner will be evaluated on

- Safety
- Procedure
- Accuracy of alignment



# Level 2

## Automotive Collision Repair Technician



**LINE (GAC): D WELDING**

**Competency: D6 Describe set-up procedures for MIG welding aluminum**

**Objectives:**

To be competent in this area, the individual must be able to:

- Describe set-up procedures for MIG welding aluminum.
- Describe set-up procedures for MIG brazing.

**LEARNING TASKS**

1. Describe set-up procedures for MIG welding aluminum.

**CONTENT**

- Properties of aluminum
- Drive roller pressure
- Wire feed
  - Spool/machine fed
  - Spool gun fed
- Wire speed (current)
- Pulse
- Voltage (heat) selection
- Shielding gas
  - Flow rate
  - Type (100% Argon)
- Liner selection
- Temperature sticks
- Conditioning of metal

2. Describe set-up procedures for MIG brazing.

- Drive roller pressure
- Wire feed
  - Spool/machine fed
  - Spool gun fed
- Wire speed (current)
- Voltage (heat) selection
- Shielding gas
  - Flow rate
  - Type (100% Argon)
- Liner selection
- Conditioning of metal



**LINE (GAC):**        **D    WELDING**  
**Competency**        **D7   Perform various aluminum MIG welds**

**Objectives:**

To be competent in this area, the individual must be able to:

- Perform a lap weld on sheet aluminum.
- Perform a plug weld on sheet aluminum.

**LEARNING TASKS**

1. Perform a lap weld on sheet aluminum.
  
2. Perform a plug weld on sheet aluminum (2 and 3 sheet thickness).

**CONTENT**

- Gun angle and speed
- Build-up
- Consistent width bead
- Penetration
  
- Gun angle and speed
- Arc start away from plug hole
- Penetration
- Build-up
- Complete closure of plug hole
- Complete closure of plug hole on top and bottom sides of a through weld

**Achievement Criteria**

**Performance**    The learner will perform a lap weld and a plug weld.

**Conditions**    The learner will be given

- Welding equipment
- Aluminum panels

**Criteria**        The learner will be evaluated on

- Safety
- Procedure
- Technique
- Quality of weld



**LINE (GAC):** E SHEET METAL REPAIR  
**Competency:** E5 Describe productive organizational skills

**Objectives:**

To be competent in this area, the individual must be able to:

- Describe productive organizational skills.

**LEARNING TASKS**

1. Describe productive organizational skills.

**CONTENT**

- Repair analysis
- Repair plan
  - Production deadlines
  - Tools and materials required
- Timing of repair steps
  - Cycle times



**LINE (GAC):** E SHEET METAL REPAIR  
**Competency:** E6 Describe complex damage analysis procedures

**Objectives:**

To be competent in this area, the individual must be able to:

- Describe complex damage analysis procedures.

**LEARNING TASKS**

1. Describe complex damage analysis procedures.

**CONTENT**

- Purpose
  - Estimating
  - Creation of a repair plan
- Need for a complete damage analysis
- Damage analysis techniques
- Technology and sources of information
- Documentation
  - Improper previous repairs
  - Unrelated damage



**LINE (GAC):** E SHEET METAL REPAIR  
**Competency:** E7 Describe roughing procedures for repairing sheet metal

**Objectives:**

To be competent in this area, the individual must be able to:

- Describe roughing procedures for repairing complex sheet metal damage.

**LEARNING TASKS**

1. Describe the roughing procedures for repairing complex sheet metal damage on steel.

**CONTENT**

- Hammer on dolly / hammer off dolly
- Edge alignment
- Body line alignment
- Sheet metal clamps and pulling devices
- Stud welder
- Sequencing
- Stress relieving
  - Heating
  - Shrinking
  - Hammering



**LINE (GAC):** E **SHEET METAL REPAIR**  
**Competency:** E8 **Describe plastic filling procedures for damage to complex sheet metal areas**

**Objectives:**

To be competent in this area, the individual must be able to:

- Describe body filling procedures.

**LEARNING TASKS**

1. Describe filling procedures for repairing complex sheet metal damage on steel.

**CONTENT**

- Cleaning procedure
- Surface preparation
- Use of body filler
- Application
- Abrasives
- Contour blocking
- Fit of adjacent parts





**LINE (GAC):** E SHEET METAL REPAIR  
**Competency:** E9 Demonstrate sheet metal repair procedures

**Objective:**

To be competent in this area, the individual must be able to:

- Perform a complex sheet metal repair.

**LEARNING TASKS**

1. Perform a complex sheet metal repair.

**CONTENT**

- Cleaning
- Analysis
- Roughing
- Shrinking
- Adjacent part fit-up
- Body filler
- Sanding

**Achievement Criteria**

**Performance** The learner will perform a complex sheet metal repair.

**Conditions** The learner will be given

- Tools
- Damaged sheet metal panel

**Criteria** The learner will be evaluated on

- Safety
- Procedure
- Technique
- Quality of repair



**LINE (GAC): E SHEET METAL REPAIR**

**Competency: E10 Describe panel replacement and repair techniques**

**Objectives:**

To be competent in this area, the individual must be able to:

- Install a door skin.

**LEARNING TASKS**

1. Describe the procedure to prepare a door skin for replacement.
  
2. Describe the procedure to repair the door shell.
  
3. Describe preparing new door skin for installation.

**CONTENT**

- Repair materials
- Cleaning products
- Abrasives and strippers
- Panel composition
- Topcoat identification
- Substrate identification
- Removal of panel components
- Control of panel movement
  
- Damaged door skin removal
- Damage analysis
- Panel composition
- Heating
- Cold repair
- Pushing/pulling
- Shrinking
- Hammer dolling
- Stress relieving
  
- Removal procedure
- Remove necessary component for access
- Test fitting
- Panel alignment
- Drilling spot welds
- Factory seams versus sectioning
- Fastening procedures and types
- Inspect panel
  - Visually
  - Touch
- Verify panel alignment and operation



**LEARNING TASKS**

- 4. Install door skin.

**CONTENT**

- Welding procedures
- Bonding procedures
- Hammering technique
  - Rubber block
- Filling
- Joint sealing
- Sound deadener application
- Restoring corrosion protection

**Achievement Criteria**

Performance The learner will install a partial/simulated door skin (or equivalent).

Conditions The learner will be given

- Tools and materials
- Partial/simulated door skin (or equivalent)

Criteria The learner will be evaluated on

- Safety
- Procedure
- Technique
- Quality of repair



**LINE (GAC):** E SHEET METAL REPAIR  
**Competency:** E11 Describe the characteristics of aluminum

**Objectives:**

To be competent in this area, the individual must be able to

- Describe the characteristic of sheet aluminum.

**LEARNING TASKS**

1. Describe the characteristics of sheet aluminum.

**CONTENT**

- Alloys
- Series
- Characteristics
- Work hardening
- Annealing
- Effects of heat



**LINE (GAC):**        **E    SHEET METAL REPAIR**  
**Competency:**       **E12 Describe basic sheet aluminum repairs**

**Objectives:**

To be competent in this area, the individual must be able to:

- Describe aluminum damage analysis.
- Describe aluminum roughing, shrinking and body filling procedures.

**LEARNING TASKS**

1. Describe damage analysis.
  
2. Describe roughing procedures.
  
3. Describe shrinking procedures.
  
4. Describe body filling procedures.

**CONTENT**

- Need for a complete damage analysis
  
- Hammering on dolly/off dolly
- Pry tools
- Stress relieving and annealing with heat
  
- Expansion and contraction
- Restricted and unrestricted
- Oxyacetylene shrinking
- Shrinking/ cold shrinking
  
- Cleaning procedures
- Surface preparation
- Use of body filler
- Application
- Contour blocking



**LINE (GAC):** F **PLASTICS AND COMPOSITES**  
**Competency:** F4 **Describe fiberglass and SMC repair equipment**

**Objectives:**

To be competent in this area, the individual must be able to:

- Identify tools and equipment required for Fiber Reinforced Plastic (FRP) and Sheet Molded Compound (SMC) repairs.

**LEARNING TASKS**

1. Identify tools and equipment required for FRP and SMC repairs.

**CONTENT**

- Materials
- Hand tools
- Power tools



**LINE (GAC):** F **PLASTICS AND COMPOSITES**  
**Competency:** F5 Describe repair procedures for fiberglass and SMC

**Objectives:**

To be competent in this area, the individual must be able to:

- Describe repair procedures for fiberglass and SMC

**LEARNING TASKS**

1. Identify SMC and fiberglass damage.
2. Describe various SMC and fiberglass damage repair techniques.
3. Describe the methods for panel replacement.

**CONTENT**

- Substrate identification
  - One-sided
  - Two-sided
  - Cosmetic
- Cracks
- Holes
- Scratches
- Panel replacement
- Layout
- Cleaning
- Surface preparation
- Reinforcing
- Mixing and application of materials
- Rough shaping
- Finish sanding
- Complete panel
- Partial panel (sectioning)



**LINE (GAC):** F **PLASTICS AND COMPOSITES**  
**Competency:** F6 **Perform fiberglass and SMC repairs**

**Objectives:**

To be competent in this area, the individual must be able to:

- Perform a two-sided FRP repair.

**LEARNING TASKS**

1. Prepare damaged area for repair.
  
2. Perform a two-sided FRP repair.

**CONTENT**

- Cleaning
- Fracture mitigation
- Moisture removal
- Beveling
  
- Material and tool selection
- Sequencing steps
- Ventilation
- Reinforcing
- Heat

**Achievement Criteria**

Performance	The learner will perform a two-sided FRP repair.
Conditions	The learner will be given <ul style="list-style-type: none"> <li>• Tools and materials</li> <li>• A damaged FRP panel</li> </ul>
Criteria	The learner will be evaluated on <ul style="list-style-type: none"> <li>• Safety</li> <li>• Procedure</li> <li>• Technique</li> <li>• Quality of repair</li> </ul>







**LINE (GAC):** I **MECHANICAL COMPONENTS**  
**Competency:** I2 **Identify airbag system components**

**Objectives:**

To be competent in this area, the individual must be able to:

- Describe air bag system components and handling procedures.

**LEARNING TASKS**

1. Describe airbag system components.
2. Identify safety procedures when working around an airbag system.
3. Describe the procedure to remove and replace the airbag system components.

**CONTENT**

- Impact sensors
- Control module
- Energy reserve module
- Voltage converter
- Clock spring
- Wiring harness
- Airbag module
- Inflator assembly
- Disarm
- Electrical disconnect
- Impact sensors
- Deployed inflator module
- Un-deployed inflator module
- System scan
- Manufacturer removal and replacement process
- Required tools
- Related components
- Self-diagnostic system









### LEARNING TASKS

4. Describe braking system components.

### CONTENT

- Anti-lock brake (ABS)
  - Tone ring
  - Sensors
  - Wiring
- Wheel cylinder
- Pads
- Shoes
- Drums
- Rotors
- Calipers
- Master cylinder
- Proportioning valves
- Brake lines



**LINE (GAC):** I **MECHANICAL COMPONENTS**  
**Competency:** I6 **Identify electrical/electronic on-board procedures**

**Objections:**

To be competent in this area, the individual must be able to:

- Troubleshoot/repair electrical components

**LEARNING TASKS**

1. Describe electrical circuits.
  
2. Identify the safety precautions when working around batteries.
  
3. Describe a minor electrical diagnosis on a simple circuit.
  
4. Describe electronic components.

**CONTENT**

- Voltage
- Resistance
- Current flow
- Voltage drop
- Power consumption
- Series circuit
- Parallel circuit
- System schematics
  
- Gases present
- Disconnecting
- Removal
- Charging
- Welding near a battery
- Computers / memory
- Jump starting
  
- Fault codes
- Voltage drop
- Wiring harness repair
- Checking for poor grounds
  - Corrosion
  - Damaged wires
- Fuses/ relays
  
- Location
- Modules
- Sensors
- Cameras
- System calibration
- Static straps







# Level 3

## Automotive Collision Repair Technician



**LINE (GAC):** J **STRUCTURAL REPAIR**  
**Competency:** J1 **Identify the various structural designs**

**Objectives:**

To be competent in this area, the individual must be able to:

- Describe vehicle types (frame or unibody).

**LEARNING TASKS**

1. Describe conventional frame designs.

2. Describe unibody designs.

3. Identify vehicle crush zones.

**CONTENT**

- Designs
  - Ladder
  - Perimeter
  - “X” frame
- Components
  - Body mounts
  - Cross members
- Construction
  - Hydroformed
  - Steel
  - Aluminum
- Designs
  - Semi-unitized
  - Composite
  - Torque box
  - Space frame
- Components
  - Cradle
  - Pillars
- Construction
  - Steel
  - Aluminum
  - Ultra-high strength (UHSS)
  - Overall structural integrity
- Energy management system
- Types
- Repairability





**LINE (GAC):** J **STRUCTURAL REPAIR**  
**Competency:** J3 **Identify damage assessment techniques**

**Objectives:**

To be competent in this area, the individual must be able to:

- Identify visual inspection techniques.

**LEARNING TASKS**

1. Identify visual inspection techniques.

**CONTENT**

- Primary damage
- Secondary damage
- Mechanical damage
- Cracked seam sealer
- Cracked glass
- Pulled spot welds
- Panel alignment
- Fastening points
- Lighting



**LINE (GAC):** J    **STRUCTURAL REPAIR**  
**Competency:** J4    **Identify measuring theory and gauging equipment**

**Objectives:**

To be competent in this area, the individual must be able to:

- Describe measuring theory
- Describe measuring equipment

**LEARNING TASKS**

1. Describe measuring planes.
  
2. Identify point-to-point measurement.
  
3. Identify parallel-to-datum measurement.
  
4. Identify parallel-to-center measurement.
  
5. Describe damage types.
  
6. Describe the use of frame specifications.

**CONTENT**

- Datum plane
- Center plane
- Zero or base plane
- Length, width and height
- X, Y, Z
  
- Definition
- Purpose
- Type of equipment used
- Examples of use
  
- Definition
- Purpose
- Type of equipment used
- Examples of use
  
- Definition
- Purpose
- Type of equipment used
- Examples of use
  
- Sideways
- Sag
- Mash
- Diamond
- Twist
  
- Manufacturers' specifications
- Product-specific



**LEARNING TASKS**

- 7. Identify measuring gauges.
  
- 8. Describe X-measurement techniques.
  
- 9. Perform vehicle measurements.

**CONTENT**

- Tape measure
- Tram
- Self-centering
- Digital
- Acoustic
- Arm system
  
- Limitations
  - Diamond checking
  - Assymetrical
- Sway checking
  
- Tram gauge
  - Length, width, cross

**Achievement Criteria**

- |             |   |
|-------------|---|
| Performance | The learner will perform tram gauge measurements.   |
| Conditions  | The learner will be given <ul style="list-style-type: none"> <li>• Tram gauge</li> <li>• Tape measure</li> <li>• Specifications</li> <li>• Vehicle or equivalent</li> </ul> |
| Criteria    | The learner will be evaluated on <ul style="list-style-type: none"> <li>• Procedure</li> <li>• Accuracy of measurements</li> </ul>  |





**LINE (GAC):** J **STRUCTURAL REPAIR**  
**Competency:** J6 **Identify unibody anchoring techniques**

**Objectives:**

To be competent in this area, the individual must be able to:

- Describe unibody anchoring.

**LEARNING TASKS**

1. Describe unibody anchoring theory.
  
2. Describe floor anchor systems.
  
3. Describe bench (rack) anchor systems.
  
4. Describe anchoring limitations.

**CONTENT**

- Center section principle
- Universal anchoring (P4)
- Potential hazards
- Weight support
- Vertical deflection
- Weak rocker panels
  
- Purpose
- Design
- Potential hazards
  
- Purpose
- Design
- Potential hazards
- Fixed/adjustable
  
- Vehicles without lower rocker panel pinch welds
- Space frame
- Custom fit clamps
- Weld-on flanges
- Through-the-floor clamps
- Suspension mount clamps
- Jacking points





**LINE (GAC):** J **STRUCTURAL REPAIR**  
**Competency:** J7 **Identify conventional frame anchoring techniques**

**Objectives:**

To be competent in this area, the individual must be able to:

- Describe conventional frame anchoring.

**LEARNING TASKS**

**CONTENT**

- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>1. Describe the center section hold principle.</li> <li>2. Describe blocking methods.</li> <li>3. Describe the use of plug hooks.</li> <li>4. Describe chain wrapping techniques.</li> <li>5. Describe weight support techniques.</li> </ol> | <ul style="list-style-type: none"> <li>• Need for proper anchoring</li> <li>• Leverage principles</li> <li>• Twist removal</li> <li>• Fast, efficient anchor</li> <li>• Need for blocking</li> <li>• Level positioning</li> <li>• Purpose</li> <li>• Chain wrapping methods</li> <li>• Use with blocking</li> <li>• Loaded and unloaded suspension</li> <li>• Split between torque box and suspension areas</li> <li>• Even from side-to-side to prevent twisting</li> <li>• Use with blocking</li> </ul> |
|---|---|



**LINE (GAC):** J **STRUCTURAL REPAIR**  
**Competency:** J8 **Describe straightening techniques**

**Objectives:**

To be competent in this area, the individual must be able to:

- Describe straightening, equipment and techniques.

**LEARNING TASKS**

1. Describe straightening effects on damaged metal.
  
  
  
  
  
  
  
  
  
  
2. Describe preparation for straightening.
  
  
  
  
  
  
  
  
  
  
3. Describe pulling clamps.

**CONTENT**

- Shape; dimension
  - Spring back
- State; strength
  - Work hardening
- High strength steel
- Aluminum
  
- Removal for access
  - Outer panel
  - Mechanical components
  - Glass
  - Interior trim
- Visual inspection
  - Door gaps
- Pinch weld flanges
  - Fuel lines
  - Brake lines
  - Wiring
  
- Types
  - Single bolt
  - Self-tightening
  - Side-pull (offset) attachment
  - Pull plate
- Care of hardware
  - Cleanliness
  - Over-tightening
- Use
  - Pulling force
  - Access
  - Attachment point



4. Describe multiple-pulling.
  - Advantages
    - Reduction of pressure
    - Equalizing and dispersing energy
    - Control
  
5. Describe floor pullers.
  - Designs
    - Chain anchored
    - Monocoque
  - Advantages
    - Time
    - Mobility
  
6. Describe vector pulling.
  - Principles
    - Maintaining constant pull angle
  
7. Describe bench (rack) pullers.
  - Designs
  - Advantages
    - Self-contained units
    - Complex hits
    - Pulling options
    - Access



**LINE (GAC): J STRUCTURAL REPAIR**

**Competency: J9 Describe pulling techniques**

**Objectives:**

To be competent in this area, the individual must be able to:

- Describe pulling methods.

**LEARNING TASKS**

**CONTENT**

1. Describe the center-out pulling principle.
2. Describe the safe use of pulling equipment.
3. Describe stress-relieving techniques.
4. Describe diamond/twist repair procedures.
5. Describe mash repair procedures.
6. Describe sag repair procedures.
7. Describe sway repair procedures.

- Need to establish true center-section
- Effects of center-section misalignment on end sections
- Inspect components
  - Safety straps
  - Chains
  - Clamps
  - Hooks
  - Fixtures
  - Anchor pots
- Care of pulling chains
- Chain ratings
- Hydraulic equipment
- Heat
- Vibration
- Proper control of panel movement
- Analysis
- Setup
- Pulling procedures
- Analysis
- Setup
- Pulling procedure
- Analysis
- Setup
- Pulling procedures
- Analysis
- Setup
- Pulling procedures



**LEARNING TASKS**

**CONTENT**

- |   |   |
|---|---|
| 8. Describe cross-member repair procedures.           | <ul style="list-style-type: none"> <li>• Analysis</li> <li>• Setup</li> <li>• Pulling procedures</li> </ul> |
| 9. Describe pulling techniques for front hits.        | <ul style="list-style-type: none"> <li>• Analysis</li> <li>• Setup</li> <li>• Pulling procedures</li> </ul> |
| 10. Describe pulling techniques for rear hits.        | <ul style="list-style-type: none"> <li>• Analysis</li> <li>• Setup</li> <li>• Pulling procedures</li> </ul> |
| 11. Describe pulling techniques for side hits.        | <ul style="list-style-type: none"> <li>• Analysis</li> <li>• Setup</li> <li>• Pulling procedures</li> </ul> |
| 12. Describe pulling techniques for roll-over damage. | <ul style="list-style-type: none"> <li>• Analysis</li> <li>• Setup</li> <li>• Pulling procedures</li> </ul> |



**LINE (GAC): J STRUCTURAL REPAIR**

**Competency: J10 Describe structural panel replacement procedures**

**Objectives:**

To be competent in this area, the individual must be able to:

- Describe structural panel replacement and sectioning.

**LEARNING TASKS**

1. Describe structural panel replacement.

**CONTENT**

- Analysis
  - Vehicle construction
  - Identify areas of sectioning
  - Manufacturers' removal procedure and specifications
  - ICBC
  - I-Car
- Measuring
- Spot weld removal
- Cutting
  - Cut off tool
  - Chiseling
- Replacement panel preparation
  - Dress time
- Panel alignment
- Welding methods
- Cleaning
- Surface preparation
- Corrosion prevention

2. Describe structural sectioning.

- Analysis
  - Manufacturers' removal procedure and specifications
  - ICBC
  - I-Car
- Methods
- Spot weld removal
- Panel preparation
- Panel alignment
- Welding methods
- Corrosion prevention
- Floor pan and trunk floor



**LINE (GAC):** J **STRUCTURAL REPAIR**  
**Competency:** J11 **Prepare a structural damage analysis sheet**

**Objective:**

To be competent in this area, the individual must be able to:

- Document damage analysis.

**LEARNING TASKS**

1. Prepare a damage analysis report.

**CONTENT**

- Visual damage
- Buckles, cracks, or panel distortion
- Mechanical mounts
- Visible wheelbase
- Dimensional analysis
- Formulate a repair plan

**Achievement Criteria**

**Performance** The learner will document damage analysis.

- Conditions** The learner will be given
- Measuring equipment
  - Damaged vehicle
  - Access to specifications
  - Damage analysis report
  - Time limit

**Criteria** The learner will be evaluated on

- Accuracy of documentation



**LINE (GAC):** J **STRUCTURAL REPAIR**  
**Competency:** J12 **Demonstrate structural repair procedures**

**Objective:**

To be competent in this area, the individual must be able to:

- Perform structural repair.

**LEARNING TASKS**

1. Perform structural repair.

**CONTENT**

- Analysis
- Vehicle preparation and set-up
- Establishing a repair plan
- Measuring
- Straightening procedures
- Structural panel replacement

**Achievement Criteria**

**Performance** The learner will perform a structural repair.

**Conditions** The learner will be given

- Equipment
  - Pulling
  - Anchoring
  - Measuring
- Specifications
- Damaged vehicle or equivalent

**Criteria** The learner will be evaluated on

- Safety
- Procedure
- Accuracy of repair





**LINE (GAC): J STRUCTURAL REPAIR**

**Competency: J13 Demonstrate closed box panel structural sectioning techniques**

**Objectives:**

To be competent in this area, the individual must be able to:

- Perform sectioning of a closed box panel.

**LEARNING TASKS**

1. Perform sectioning of a closed box panel.

**CONTENT**

- Types of sectioning joints
- Panel preparation
- Welding methods
- Corrosion protection

**Achievement Criteria**

Performance The learner will section a closed box, such as

- Pillar
- Rocker
- Rail

Conditions The learner will be given

- Tools and equipment
  - Measuring
  - Welder
- Specifications
- A boxed section

Criteria The learner will be evaluated on

- Safety
- Procedure
- Accuracy of repair



**LINE (GAC):**      **K    SUSPENSION AND STEERING**  
**Competency:**    **K1   Identify MacPherson Strut suspension system**

**Objectives:**

To be competent in this area, the individual must be able to:

- Describe the MacPherson strut suspension system.

**LEARNING TASKS**

1. Describe the MacPherson strut suspension system

**CONTENT**

- Components
  - Lower control arm
  - Lower ball joint
  - Strut assembly
  - Spring
  - Steering knuckle
  - Upper bearing
- Alignment angles
  - Poor handling
  - Parts wear
- Limited adjustability



**LINE (GAC):**      **K    SUSPENSION AND STEERING**  
**Competency:**    **K2   Identify short and long arm suspension systems**

**Objective:**

To be competent in this area, the individual must be able to:

- Describe the components of a short and long arm suspension system.

**LEARNING TASKS**

1. Describe short and long arm suspension systems.

**CONTENT**

- Components
  - Control arms
  - Lower ball joint
  - Steering gear
  - Pitman arm
  - Idler arm
  - Spring
  - Steering knuckle
  - Upper bearing
  - Torsion bar
- Alignment angles
  - Poor handling
  - Parts wear



**LINE (GAC):**      **K    SUSPENSION AND STEERING**  
**Competency:**    **K3    Identify the various types of rear suspension systems**

**Objective:**

To be competent in this area, the individual must be able to:

- Describe rear suspension systems.

**LEARNING TASKS**

1. Describe rear suspension systems.

**CONTENT**

- Front wheel drive design
  - Trailing arm
  - Strut type
- Rear wheel drive design
  - Independent
  - Live axle



**LINE (GAC):**      **K    SUSPENSION AND STEERING**  
**Competency:**    **K4   Identify R&I procedures for suspension systems**

**Objective:**

To be competent in this area, the individual must be able to:

- Describe suspension system removal and installation procedures.

**LEARNING TASKS**

1. Describe R&I procedures for suspension systems.

**CONTENT**

- Visual inspection
- Manufacturers' removal and installation procedures
- Vehicle support
- Analysis of components
- Spring type
  - Transverse leaf
  - Composite
- Constant velocity joints
- Assembly removal and installation
- Torquing fasteners
- Procedures
  - Brake system disconnect
  - Cleaning
  - Installation sequence
  - Realignment requirements
  - Brake system assembly and bleeding
- Specialty tools
- Component storage
- Determine reusability of components



**LINE (GAC):**        **K    SUSPENSION AND STEERING**  
**Competency:**      **K5   Describe rack and pinion steering systems**

**Objectives:**

To be competent in this area, the individual must be able to:

- Describe rack and pinion steering systems.

**LEARNING TASKS**

**CONTENT**

1. Describe rack and pinion steering systems.

- Pinion gear
- Rack gear
- Gear housing
- Tie rods
  - Inner/outer
- Bellows
- Mounting points

2. Describe the relationship between the rack and pinion assembly and the lower control arms.

- Misalignment angles
- Jounce rebound toe change
- Handling problems
- Methods of checking



**LINE (GAC):**      **K    SUSPENSION AND STEERING**  
**Competency:**    **K6   Describe parallelogram steering systems**

**Objectives:**

To be competent in this area, the individual must be able to:

- Describe parallelogram steering systems.

**LEARNING TASKS**

1. Describe parallelogram steering systems.
  
2. Describe the relationship between the parallelogram steering system and the lower control arms.

**CONTENT**

- Pitman arm
- Idler arm
- Center link/drag link
- Inner tie rods
- Outer tie rods
- Adjusting sleeves
- Steering knuckle
  
- Misalignment angles
- Jounce rebound toe change
- Handling problems
- Methods of checking



**LINE (GAC): K SUSPENSION AND STEERING**

**Competency: K7 Identify wheel alignment angles**

**Objectives:**

To be competent in this area, the individual must be able to:

- Describe suspension alignment angles and its impact on handling and parts wear.

**LEARNING TASKS**

1. Describe alignment angles.
  
2. Describe handling and parts wear problems associated with each of the alignment angles.
  
3. Describe the reasons for checking tracking.
  
4. Describe the effects of a misaligned unibody structure on the steering and suspension systems.
  
5. Describe diagnosis of wheel alignment on a misaligned unibody structure.

**CONTENT**

- Caster
- Camber
- Steering axis inclination
- Toe
- Turning radius
- Thrust angle
  
- Tire wear
- Pulling problems
- Drive line alignment
- Steering wheel angle
  
- Alignment problems
  - Thrust angle
- Drive line problems
- Wheelbase
- Tire wear
  
- Handling
- Parts wear
- Jounce rebound toe change
- Steering wheel angle
  
- Parts wear
- Interpreting SAI readings
- Caster
- Camber







**LEARNING TASKS**

4. Describe parts and material ordering.

5. Describe shop roles and responsibilities.

**CONTENT**

- Communication with suppliers
- Parts manuals
- Computers databases
- Work orders
- Interpret documentation
- Organization of parts
- Storage of parts
- Environmental levies
  
- Appraisers
- Customers
- Technicians
- Parts people
- Clear communication
- Conflict resolution
- Professionalism



**LINE (GAC):** L **INSURANCE ESTIMATING**  
**Competency:** L2 **Interpret business relations**

**Objectives:**

To be competent in this area, the individual must be able to:

- Maintain strong business working relationships.

**LEARNING TASKS**

1. Interpret business relations.

**CONTENT**

- Employer/Employee relations
- Staff morale
- Customer service
- Relationship with the insurance industry



**LINE (GAC): M REFINISHING**

**Competency: M1 Identify preparation of various substrates and topcoats**

**Objectives:**

To be competent in this area, the individual must be able to:

- Describe substrate and topcoat preparation.

**LEARNING TASKS**

1. Describe substrate and topcoat preparation.

**CONTENT**

- Substrate types
- Substrate condition
- Surface cleaning
- Paint removal
- Sanding materials and equipment
- Sanding procedures
- Final wash and tack



**LINE (GAC): M REFINISHING**

**Competency: M2 Describe mixing and application of primers**

**Objectives:**

To be competent in this area, the individual must be able to:

- Describe mixing and application of undercoats / primers.

**LEARNING TASKS**

1. Describe mixing and application of undercoats / primers.

**CONTENT**

- Undercoat types
- Mixing
- Application
- Clean up



**LINE (GAC): M REFINISHING**

**Competency: M3 Describe refinishing corrosion protection methods**

**Objectives:**

To be competent in this area, the individual must be able to:

- Describe the application of corrosion protection.

**LEARNING TASKS**

1. Describe the application of corrosion protection.

**CONTENT**

- Material types
- Areas requiring corrosion protection after repair
- Application



**LINE (GAC):**        **M**    **REFINISHING**  
**Competency:**      **M4**   **Describe the refinishing process**

**Objectives:**

To be competent in this area, the individual must be able to:

- Describe the masking process.
- Describe colour coat mixing and tinting procedures.
- Describe the topcoat application process.

**LEARNING TASKS**

1. Describe masking.
  
  
  
  
  
  
  
  
  
  
  
2. Describe mixing and tinting a colour coat.
  
  
  
  
  
  
  
  
  
  
  
3. Apply refinish materials.

**CONTENT**

- Materials
  - Tape
  - Paper
  - Poly
  - Foam
  - Fine line
  - Liquid mask
- Methods
  - Back masking
  - Reverse masking
  - Unmasking
- Material disposal
  
- Mixing of toners
  - Formula content
- Use of scales
- Spray out cards
- Comparison colour to vehicle
- Colour plotting
- Colour adjustment
- Manufacturers' specifications
- Surface cleaning
- Drop coating
- Colour blending
- Dry times
- Flash times
- Spray booth operation
- Spray gun set up
- Troubleshooting
- Equipment clean up



**Achievement Criteria**

Performance The learner will prepare and apply refinish materials.

Conditions The learner will be given

- Tools and equipment
- Refinish materials
- Panel

Criteria The learner will be evaluated on

- Safety
- Procedure
- Technique
- Quality of finished product





**LINE (GAC):**        **M**    **REFINISHING**  
**Competency:**      **M5**   **Identify the detailing process**

**Objectives:**

To be competent in this area, the individual must be able to:

- Describe vehicle detailing.

**LEARNING TASKS**

**CONTENT**

1. Describe the detailing process.

- Paint defects
  - Dirt nibs
  - Runs
  - Overspray
  - Orange peel
- Sanding
  - Techniques
  - Materials
- Polishing
  - Speed
  - Polisher motion
  - Steps
- Equipment
  - Storage

2. Describe exterior vehicle cleaning.

- Cleaners
  - Tire
  - Engine
  - Soap
  - Window
- Paint care procedures
- Washing
  - Two bucket
  - Top to bottom
  - Equipment
- Environmental contaminants



3. Describe interior vehicle cleaning.
  - Cleaning products
    - pH scale
  - Stain removal products
  - Stain removal and cleaning tools
  - Vacuum
  - Air blower
  - Shampooer
  - Conditioners
  - Deodorize interior
  
4. Describe pre-delivery inspection.
  - Inspection checklist
  - Value added
    - Touch up stone chips
    - Surface defects



# Section 3

## ASSESSMENT GUIDELINES



## Assessment Guidelines – Level 1

### Level 1 Grading Sheet: Subject Competency and Weightings

PROGRAM: IN-SCHOOL TRAINING:		MOTOR VEHICLE BODY REPAIRER (METAL AND PAINT) (AUTOMOTIVE COLLISION REPAIR TECHNICIAN) LEVEL 1	
LINE	SUBJECT COMPETENCIES	THEORY WEIGHTING	PRACTICAL WEIGHTING
A	Occupational Skills and Safety	4%	4%
B	Tools and Equipment	8%	5%
C	Oxyacetylene Procedures	6%	6%
D	Welding	20%	22%
E	Sheet Metal Repair	20%	24%
F	Plastics and Composites	14%	22%
G	Surface Preparation	16%	12%
H	Auto Body Construction and Components	12%	5%
	<b>Total</b>	<b>100%</b>	<b>100%</b>
<b>In-school theory / practical subject competency weighting</b>		50%	50%
<b>Final In-school Mark</b>		<b>IN-SCHOOL %</b>	

<b>Final In-school Mark</b>	80%
<b>Standard Level Exam Mark</b>	20%
<b>Final Mark</b>	FINAL%



## Assessment Guidelines – Level 2

### Level 2 Grading Sheet: Subject Competency and Weightings

PROGRAM: IN-SCHOOL TRAINING:		MOTOR VEHICLE BODY REPAIRER (METAL AND PAINT) (AUTOMOTIVE COLLISION REPAIR TECHNICIAN) LEVEL 2	
LINE	SUBJECT COMPETENCIES	THEORY WEIGHTING	PRACTICAL WEIGHTING
D	Welding	14%	23%
E	Sheet Metal Repair	60%	60%
F	Plastics and Composites	14%	12%
I	Mechanical Components	12%	5%
	<b>Total</b>	<b>100%</b>	<b>100%</b>
<b>In-school theory &amp; practical subject competency weighting</b>		50%	50%
<b>Final In-school Mark</b>		IN-SCHOOL %	

<b>Final In-school Mark</b>	80%
<b>Standard Level Exam Mark</b>	20%
<b>Final Mark</b>	FINAL%



## Assessment Guidelines – Level 3

### Level 3 Grading Sheet: Subject Competency and Weightings

PROGRAM: IN-SCHOOL TRAINING:		MOTOR VEHICLE BODY REPAIRER (METAL AND PAINT) (AUTOMOTIVE COLLISION REPAIR TECHNICIAN) LEVEL 3	
LINE	SUBJECT COMPETENCIES	THEORY WEIGHTING	PRACTICAL WEIGHTING
J	Structural repair	25%	75%
K	Suspension and Steering	15%	12%
L	Insurance Estimating	5%	8%
M	Refinishing	5%	5%
	Final Proprietary Exam	50%	
	<b>Total</b>	<b>100%</b>	<b>100%</b>
<b>In-school theory &amp; practical subject competency weighting</b>		50%	50%
<b>Final In-school Mark</b> Apprentices must achieve a minimum 70% as the final in-school mark in order to be eligible to write the Interprovincial Red Seal exam.		IN-SCHOOL%	

**All apprentices who have completed all levels of the Motor Vehicle Body Repairer (Metal and Paint) (Automotive Collision Repair Technician) program with a FINAL level mark of 70% or greater will write the Interprovincial Red Seal examination as their final assessment.**

**ITA will enter the apprentices' Motor Vehicle Body Repairer (Metal and Paint) Interprovincial examination mark in ITA Direct Access.**

**A minimum mark of 70% on the examination is required for a pass.**



# **Section 4**

## **TRAINING PROVIDER STANDARDS**

### **Automotive Collision Repair Technician**



## Facility Requirements

### Classroom Area

- Comfortable seating and tables suitable for training, teaching, and lecturing.
- Compliance with all local and national fire codes and occupational safety requirements.
- Lighting controls to allow easy visibility of projection screen allowing students to take notes.
- Windows must have shades or blinds to adjust sunlight.
- Heating/air conditioning for comfort all year round.
- In-room temperature regulation and ventilation to ensure comfortable room temperature.
- Acoustics in the room must allow the instructor to be heard.
- White marking board with pens and eraser (optional: flipchart in similar size).
- Projection screen or projection area at front of classroom.
- Overhead projector and/or multi-media projector.

### Shop Area

- Ceiling shall be a minimum height of sixteen feet or height approved through the building engineer.
- Suitable demonstration area.
- Lighting appropriate for good vision in ambient light.
- Compliance with all local and national fire codes and occupational safety requirements.
- Must meet Municipal and Provincial bylaws in regards to waste water management and environmental laws.
- Ability to enclose a separate aluminum repair area (i.e. curtained)

### Lab Requirements

- Does not apply to this program.

### Student Facilities

- Does not apply to this program.

### Instructor's Office Space

- Does not apply to this program.





## Tools and Equipment

This Tools and Equipment list is based on a class size of 16 trainees; this list can be adjusted depending on the class size. The facilities and equipment must be in compliance with the appropriate zoning bylaw for instructional use.

### Shop Tools and Equipment – All Levels

- 8 - Power Supply Stations (AC and DC outputs)
- 8 - Sets of general hand tools/tool kits
- 8 - Sets of general power tools
- 8 - Sets of general air tools
- 8 - MIG welder units – capable of welding aluminum and steel (welding booth and ventilation)
- 2 – Heat guns
- 4 – Die grinders
- 1 – Electric wire stripper/ crimper
- Access to 8 up to date computer stations with all applicable software

Level 1	Level 2	Level 3
<ul style="list-style-type: none"> <li>• 4 - Hydraulic port-a-power</li> <li>• 8 - Sets of oxyacetylene welding units (welding booths and ventilation)</li> <li>• 4 - Plasma arc units</li> <li>• 16 - Hammer and dolly sets</li> <li>• 4 - Stud welders</li> <li>• 4 - Hydraulic jack units</li> <li>• 2 - Sets of complete pulling equipment units</li> <li>• 4 - Hot air plastic welding units</li> <li>• 4 - Airless plastic welding units</li> <li>• 1 - Metal break</li> <li>• 8 - HVLP spray guns</li> <li>• 8 - Dual-action sanders</li> <li>• 1 - Spray gun</li> <li>• 8 - Fresh air respirators</li> <li>• 8 - Straight line sanders</li> <li>• 8 - Sets of general sanding blocks</li> <li>• 1 - Complete primer undercoat system</li> <li>• 2 - Complete vehicles</li> <li>• 1 – Printer</li> <li>• 220V Dent pulling station (DentFix)</li> <li>• Nitrogen plastic welder</li> </ul>	<ul style="list-style-type: none"> <li>• 16 - Sets hammer and dolly sets</li> <li>• 4 - Stud welders</li> <li>• 2 - Complete vehicles (body alignment)</li> <li>• 8 - Sets of oxyacetylene welding units</li> <li>• 8 - Sets of seatbelt assemblies</li> <li>• 1 - Airbag assembly</li> <li>• 1 - Air conditioning assembly</li> <li>• 4 - Analogue electrical multimeters</li> <li>• 4 - Digital electrical multimeters</li> <li>• 2 – Saturation rollers</li> <li>• 1 – Pulse welder</li> <li>• 1 - STRSW</li> </ul>	<ul style="list-style-type: none"> <li>• 1 - Vehicle with conventional frame design</li> <li>• 1 - Vehicle with unibody design</li> <li>• 2 - Sets of complete anchoring systems</li> <li>• 1 - Frame rack</li> <li>• 2 - Portable pulling systems</li> <li>• 1 - Wheel alignment rack</li> <li>• 4 - Digital tram gauges</li> <li>• 2 - Sets of centering gauges</li> <li>• 1 - Computerized laser measuring system</li> <li>• 2 - Mechanical measuring systems</li> <li>• 1 - Set of dimension manuals</li> <li>• 2 - Strut tower gauges</li> <li>• 1 – ICBC / BC private insurance compatible estimating system</li> <li>• 8 - HVLP spray guns</li> <li>• 4 - Fresh air systems</li> <li>• 1 - Spray booth</li> <li>• 4 - Sets of masking equipment and materials</li> <li>• 1 - Complete topcoat system</li> <li>• 4 - Sets of polishing equipment and material</li> </ul>



		<ul style="list-style-type: none"> <li>• 2 - Sets of vehicle cleaning systems</li> </ul>
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**Shop Tools and Equipment – Miscellaneous**

**Miscellaneous – All Levels**

- Sanding material

<b>Level 1</b>	<b>Level 2</b>	<b>Level 3</b>
<ul style="list-style-type: none"> <li>• Sheet metal material</li> <li>• Body filler material</li> <li>• Adhesive and fiberglass material</li> <li>• Masking equipment and material</li> <li>• Refinishing material</li> </ul>	<ul style="list-style-type: none"> <li>• Aluminum material</li> <li>• Body filler material</li> <li>• Adhesive material</li> <li>• Fiberglass material</li> <li>• Electrical components</li> <li>• SMC material</li> </ul>	<ul style="list-style-type: none"> <li>• Cleaning materials</li> <li>• Sanding equipment</li> <li>• Primer undercoats</li> </ul>

**Student Equipment & Tools**

A list of required equipment and tools may be given to each apprentice at the beginning the technical training session.



## Reference Materials

### Required Reference Materials

Collision Repair and Refinishing: A foundation course for technicians  
Alfred Thomas and Michael Jund  
3<sup>rd</sup> Edition  
ISBN-10: 13059943

### Recommended Resources

[www.i-car.ca](http://www.i-car.ca)  
[www.tech-cor.com](http://www.tech-cor.com)

### Suggested Texts

- None for this program.



## Instructor Requirements

### Occupation Qualification

The instructor must possess:

- Automotive Collision Repair Technician - Certificate of Qualification with a Interprovincial Red Seal endorsement.
- Certificate of Qualification from another Canadian jurisdiction complete with Interprovincial Red Seal endorsement.

### Work Experience

- Must have a minimum of 5 years' experience as an Automotive Collision Repair Technician Journeyperson.
- Must have diverse Automotive Collision Repair industry experience including that which covers all the competencies in the program outline.
- Must have recent Automotive Collision Repair trade experience.

### Instructional Experience and Education

It is preferred that the instructor possesses one of the following:

- Instructors Certificate (minimum 30 hr course).
- Instructors must have or be registered in an Instructor's Diploma Program, to be completed within a five year period or hold a Bachelors or Masters Degree in Education.



# Appendices



# Appendix A

## Glossary



## Appendix A: Glossary

### **Abrasives**

Material used for cleaning or surface roughening such as sand, aluminium oxide or silicone carbide.

### **Active restraint system**

Is a system you need to physically enable such as seat belts, passenger side airbag.

### **Air bag matrix**

Manufacturers' specifications for components that need to be replaced or checked in the event of a deployment.

### **Air bags**

Refers to inflatable restraints located in steering wheels, dashes, seats, doors, pillars, roof rails, and headliners.

### **Detailing**

All activities performed for final preparation for delivery to the customer; detailing includes but is not limited to installation of trim and accessories, cleaning and polishing.

### **Frame and structural components**

Provides the vehicle with strength and structural integrity.

### **Glass**

A hard transparent substance that is laminated or tempered and sometimes tinted. Motor vehicle glass can be fixed as in windshields and rear windows or moveable as in side windows.

### **Glass hardware**

Glass hardware consists of moveable and adjustable parts and components that ensure the operation of moveable glass and consists of but is not limited to tracks, glass run channels, plastic guides, stops and regulators.

### **Interior components**

Interior components consist of trim, upholstery and panels within the vehicle.

### **Mechanical and electrical components**

Mechanical components consists of the moving parts that produce motion or a state of balance including suspension systems (steering and suspension), cooling systems, air conditioning systems, brake systems, the power train and the exhaust system. Electrical components are designed to perform a specific function (e.g. radio, defrost, cruise control) or to generate, store and distribute electricity (e.g. battery, charging system, relays).

### **Outer body panels**

Portions of a motor vehicle that are attached to the frame or structural components of the vehicle by welding, bonding or by mechanical attachments.

**Passive restraint systems**

Passive restraint systems include components such as dash, pads, head rest, collapsible steering columns and knee bolsters, motorized seat belts.

**Refinishing**

Provides a smooth and level surface upon which paint will adhere, by sanding, filling, cleaning and priming the surface prior to, and including, the application of a final colour coat.

**Restraint systems (also see definition for active and passive restraint systems)**

Restraint systems consist of passive or active safety components which provide occupants with injury protection in the event of a collision.

**Structural components**

Any primary-stress-bearing portion of the body structure that affects its over-the-road performance or crash-worthiness.

**Structural glass**

A specific type of glass with a special design and installation process that adds to the structural integrity of the vehicle.

**Unibody motor vehicle**

Vehicle design in which parts of the body structure serve as support for overall vehicle.





# Appendix B

## Practical Assessments



## Appendix B: Practical Assessments

Achievement Criteria are included for those competencies that require a practical assessment. The intent of including Achievement Criteria in the Program Outline is to ensure consistency in training across the many training institutions in British Columbia. Their purpose is to reinforce the theory and to provide a mechanism for evaluation of the learner's ability to apply the theory to practice. It is important that these performances be observable and measureable and that they reflect the skills spelled out in the competency. The conditions under which these performances will be observed and measured must be clear to the learner as well as the criteria by which the learner will be evaluated. The learner must also be given the evaluation criteria.

The performance spelled out in the Achievement Criteria is a suggested performance and is not meant to stifle flexibility of delivery. Training providers are welcome to substitute other practical performances that measure similar skills and attainment of the competency. Multiple performances may also be used to replace individual performances where appropriate.

The following is a summary of the practical assessments for each level. **For details, please refer to the Achievement Criteria following the particular competency in the Program Content section.**

### Level One

Competency	Practical Assessment Task
B4 Describe organizational skills	The learner will access and interpret OEM specifications and repair procedures.
C2 Perform oxyacetylene procedures	The learner will perform oxyacetylene set up, cutting, heating and shut down.
D3 Perform various MIG welds on sheet steel	The learner will perform a butt weld, a lap weld, and a plug weld.
D4 Describe plasma arc cutting	The learner will perform a cut on 22 or 20 gauge steel.
E4 Describe minor sheet metal damage repair	The learner will repair minor sheet metal damage.
F3 Demonstrate plastic repair techniques	The learner will perform plastic repairs, including <ul style="list-style-type: none"> <li>• Welded</li> <li>• Adhesive</li> </ul>
H2 Describe panel alignment methods	The learner will perform a panel alignment.
H6 Service non-structural glass	The learner will remove and replace non-bonded glass.

### Level Two

Competency	Practical Assessment Task
D7 Perform various aluminum MIG welds	The learner will perform a lap weld and a plug weld.
E9 Demonstrate sheet metal repair procedures	The learner will perform a complex sheet metal repair.
E10 Describe panel replacement and repair techniques	The learner will install a partial/simulated door skin (or equivalent).
F6 Perform fiberglass and SMC repairs	The learner will perform a two-sided FRP repair.
I6 Identify electrical/electronic on-board procedures	The learner will repair damaged wire.



**Level Three**

<b>Competency</b>	<b>Practical Assessment Task</b>
J4 Identify measuring theory and gauging equipment	The learner will perform tram gauge measurements.
J11 Prepare a structural damage analysis sheet	The learner will document damage analysis.
J12 Demonstrate structural repair procedures	The learner will perform a structural repair.
J13 Demonstrate closed box panel structural sectioning techniques	The learner will section a closed box, such as <ul style="list-style-type: none"> <li>• Pillar</li> <li>• Rocker</li> <li>• Rail</li> </ul>
M4 Describe the refinishing process	The learner will prepare and apply refinish materials.



# Appendix C

## Previous Contributors



## Appendix C: Previous Contributors

The 2012 Program Outline was prepared with the advice and direction of an industry steering committee convened initially by the Automotive Training Standards Organization (ATSO). Members include:

- Ian Johnston - Collision Technician
- Gary Heyster - Collision Technician, On-Line Collision
- Kevan Lamb - Collision Technician, Fix-it Auto
- Chris Suter - Collision Technician, Paramount Auto Body

### **Industry subject matter experts retained to assist in the development of the Program Outline content:**

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- Digenus (Dennis) Roussanidis - Collision Technician, No.1 Collision
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The Industry Training Authority would like to acknowledge the dedication and hard work of all the industry representatives appointed to identify the training requirements of the Automotive Collision Repair Technician occupation.