PROGRAM OUTLINE

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

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 measureable and that they reflect the skills spelled out in the competency as those required of a competent journeyperson. 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.
Introduction

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.

<table>
<thead>
<tr>
<th>Section</th>
<th>Training Providers</th>
<th>Employers/ Sponsors</th>
<th>Apprentices</th>
<th>Challengers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Credentialing Model</td>
<td>Communicate program length and structure, and all pathways to completion</td>
<td>Understand the length and structure of the program</td>
<td>Understand the length and structure of the program, and pathway to completion</td>
<td>Understand challenger pathway to Certificate of Qualification</td>
</tr>
<tr>
<td>OAC</td>
<td>Communicate the competencies that industry has defined as representing the scope of the occupation</td>
<td>Understand the competencies that an apprentice is expected to demonstrate in order to achieve certification</td>
<td>View the competencies they will achieve as a result of program completion</td>
<td>Understand the competencies they must demonstrate in order to challenge the program</td>
</tr>
<tr>
<td>Training Topics and Suggested Time Allocation</td>
<td>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</td>
<td>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</td>
<td>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</td>
<td>Understand the relative weightings of various competencies of the occupation on which assessment is based</td>
</tr>
<tr>
<td>Program Content</td>
<td>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</td>
<td>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</td>
<td>Provides detailed information on program content and performance expectations for demonstrating competency</td>
<td>Allows individual to check program content areas against their own knowledge and performance expectations against their own skill levels</td>
</tr>
<tr>
<td>Section</td>
<td>Training Providers</td>
<td>Employers/ Sponsors</td>
<td>Apprentices</td>
<td>Challengers</td>
</tr>
<tr>
<td>--------------------------</td>
<td>------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Training Provider Standards</td>
<td>Defines the facility requirements, tools and equipment, reference materials (if any) and instructor requirements for the program</td>
<td>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</td>
<td>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</td>
<td>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</td>
</tr>
</tbody>
</table>
Section 2

PROGRAM OVERVIEW

Automotive Collision Repair Technician
Program Overview

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

RECOMMENDATION FOR CERTIFICATION

APPRENTICESHIP - DIRECT ENTRY

Automotive Collision Repair Technician

Level 3
Technical Training: 180 hours (6 weeks*)
Work-Based Training: 6,750 hours total
Interprovincial Red Seal Exam

Level 2
Technical Training: 150 hours (5 weeks*)
Work-Based Training: Accumulate hours
ITA Standardized Written Exam

Level 1
Technical Training: 150 hours (5 weeks*)
Work-Based Training: Accumulate hours
ITA Standardized Written Exam

Automotive Collision Repair Technician Foundation Program
Technical Training: 30 weeks*

Automotive Collision Repair Technician (Metal & Paint) (Automotive Collision Repair Technician)
Technical Training: 625 hours

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

Motor Vehicle Body Repairer (Metal & Paint) (Automotive Collision Repair Technician)
Technical Training: None
WBT: 3,360 hours

*Suggested duration based on 30-hour week
Program Overview

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.

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

**SHEET METAL REPAIR**

<table>
<thead>
<tr>
<th>E1</th>
<th>E2</th>
<th>E3</th>
<th>E4</th>
<th>E5</th>
<th>E6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Describe the characteristics of sheet metal</td>
<td>Describe the types of basic sheet metal damage</td>
<td>Identify sheet metal repair tools and equipment</td>
<td>Describe minor sheet metal damage repair</td>
<td>Describe productive organizational skills</td>
<td>Describe complex damage analysis procedures</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>E7</th>
<th>E8</th>
<th>E9</th>
<th>E10</th>
<th>E11</th>
<th>E12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Describe roughing procedures for repairing sheet metal</td>
<td>Describe plastic filling procedures for damage to complex sheet metal areas</td>
<td>Demonstrate sheet metal repair procedures</td>
<td>Describe panel replacement and repair techniques</td>
<td>Describe the characteristics of aluminum</td>
<td>Describe basic sheet aluminum repairs</td>
</tr>
</tbody>
</table>

**PLASTICS AND COMPOSITES**

<table>
<thead>
<tr>
<th>F1</th>
<th>F2</th>
<th>F3</th>
<th>F4</th>
<th>F5</th>
<th>F6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Describe plastic repair tools and equipment</td>
<td>Describe plastic repair techniques</td>
<td>Demonstrate plastic repair techniques</td>
<td>Describe fiberglass and SMC repair equipment</td>
<td>Describe repair procedures for fiberglass and SMC</td>
<td>Perform fiberglass and SMC repairs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>F7</th>
<th>F8</th>
<th>F9</th>
<th>F10</th>
<th>F11</th>
<th>F12</th>
</tr>
</thead>
<tbody>
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<td>Describe plastic filling procedures for damage to complex sheet metal areas</td>
<td>Demonstrate sheet metal repair procedures</td>
<td>Describe panel replacement and repair techniques</td>
<td>Describe the characteristics of aluminum</td>
<td>Describe basic sheet aluminum repairs</td>
</tr>
</tbody>
</table>

**SURFACE PREPARATION**

<table>
<thead>
<tr>
<th>G1</th>
<th>G2</th>
<th>G3</th>
<th>G4</th>
<th>G5</th>
<th>G6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Describe spray gun use</td>
<td>Identify air supply and purification equipment</td>
<td>Identify various spray booths</td>
<td>Demonstrate preparation for application of undercoats/primer</td>
<td>Demonstrate the application of undercoats/primer</td>
<td>Identify corrosion protection techniques</td>
</tr>
</tbody>
</table>

**AUTO BODY CONSTRUCTION AND COMPONENTS**

<table>
<thead>
<tr>
<th>H1</th>
<th>H2</th>
<th>H3</th>
<th>H4</th>
<th>H5</th>
<th>H6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify auto body construction types</td>
<td>Describe panel alignment methods</td>
<td>Describe body component servicing procedures</td>
<td>Describe automotive tempered glass</td>
<td>Describe automotive laminated glass</td>
<td>Service non-structural glass</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>H7</th>
<th>H8</th>
<th>H9</th>
<th>H10</th>
<th>H11</th>
<th>H12</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Describe plastic filling procedures for damage to complex sheet metal areas</td>
<td>Demonstrate sheet metal repair procedures</td>
<td>Describe panel replacement and repair techniques</td>
<td>Describe the characteristics of aluminum</td>
<td>Describe basic sheet aluminum repairs</td>
</tr>
</tbody>
</table>

**MECHANICAL COMPONENTS**

<table>
<thead>
<tr>
<th>I1</th>
<th>I2</th>
<th>I3</th>
<th>I4</th>
<th>I5</th>
<th>I6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify seat belt assemblies</td>
<td>Identify airbag system components</td>
<td>Discuss cooling system service</td>
<td>Describe air conditioning service</td>
<td>Identify vehicle systems</td>
<td>Identify electrical/electronic on-board procedures</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I7</th>
<th>I8</th>
<th>I9</th>
<th>I10</th>
<th>I11</th>
<th>I12</th>
</tr>
</thead>
<tbody>
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<td>Describe plastic filling procedures for damage to complex sheet metal areas</td>
<td>Demonstrate sheet metal repair procedures</td>
<td>Describe panel replacement and repair techniques</td>
<td>Describe the characteristics of aluminum</td>
<td>Describe basic sheet aluminum repairs</td>
</tr>
</tbody>
</table>
## Program Overview

### Structural Repair

<table>
<thead>
<tr>
<th>J1</th>
<th>Identify the various structural designs</th>
<th>J2</th>
<th>Identify collision theory concepts</th>
<th>J3</th>
<th>Identify damage assessment techniques</th>
<th>J4</th>
<th>Identify measuring theory and gauging equipment</th>
<th>J5</th>
<th>Identify various measuring systems</th>
<th>J6</th>
<th>Identify unibody anchoring techniques</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>J1</td>
<td>3</td>
<td>J2</td>
<td>3</td>
<td>J3</td>
<td>3</td>
<td>J4</td>
<td>3</td>
<td>J5</td>
<td>3</td>
<td>J6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>J7</th>
<th>Identify conventional frame anchoring techniques</th>
<th>J8</th>
<th>Describe straightening techniques</th>
<th>J9</th>
<th>Describe pulling techniques</th>
<th>J10</th>
<th>Describe structural panel replacement procedures</th>
<th>J11</th>
<th>Prepare a structural damage analysis sheet</th>
<th>J12</th>
<th>Demonstrate structural repair procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>J7</td>
<td>3</td>
<td>J8</td>
<td>3</td>
<td>J9</td>
<td>3</td>
<td>J10</td>
<td>3</td>
<td>J11</td>
<td>3</td>
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<table>
<thead>
<tr>
<th>J13</th>
<th>Demonstrate closed box panel structural sectioning techniques</th>
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</thead>
<tbody>
<tr>
<td>3</td>
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</table>

### Suspension and Steering

<table>
<thead>
<tr>
<th>K1</th>
<th>Identify MacPherson Strut suspension system</th>
<th>K2</th>
<th>Identify short and long arm suspension systems</th>
<th>K3</th>
<th>Identify the various types of rear suspension systems</th>
<th>K4</th>
<th>Identify R&amp;I procedures for suspension systems</th>
<th>K5</th>
<th>Describe rack and pinion steering systems</th>
<th>K6</th>
<th>Describe parallelogram steering systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>K1</td>
<td>3</td>
<td>K2</td>
<td>3</td>
<td>K3</td>
<td>3</td>
<td>K4</td>
<td>3</td>
<td>K5</td>
<td>3</td>
<td>K6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>K7</th>
<th>Identify wheel alignment angles</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td></td>
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</tbody>
</table>

### Insurance Estimating

<table>
<thead>
<tr>
<th>L1</th>
<th>Interpret estimating information</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>L2</th>
<th>Interpret business relations</th>
</tr>
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<tbody>
<tr>
<td>3</td>
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### Refinishing

<table>
<thead>
<tr>
<th>M1</th>
<th>Identify preparation of various substrates and topcoats</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>M1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>M2</th>
<th>Describe mixing and application of primers</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>M2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>M3</th>
<th>Describe refinishing corrosion protection methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>M3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>M4</th>
<th>Describe the refinishing process</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>M4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>M5</th>
<th>Identify the detailing process</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>M5</td>
</tr>
</tbody>
</table>
Training Topics and Suggested Time Allocation: Level 1

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

<table>
<thead>
<tr>
<th>Line</th>
<th>Topic</th>
<th>% of Time</th>
<th>Theory</th>
<th>Practical</th>
<th>Total</th>
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<tbody>
<tr>
<td>Line A</td>
<td>OCCUPATIONAL SKILLS AND SAFETY</td>
<td>4%</td>
<td>100%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>A1</td>
<td>Describe safe work practices</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A2</td>
<td>Describe shop safety procedures</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A3</td>
<td>Describe waste product handling</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A4</td>
<td>Describe Work Hazard Material Information System (WHMIS)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A5</td>
<td>Describe Personal Protective Equipment (PPE)</td>
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## Program Overview

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## Training Topics and Suggested Time Allocation: Level 2

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

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|        | **Total Percentage for Automotive Collision Repair Technician Level 2**      | 100%      |        |           |       |
### Program Overview

#### Training Topics and Suggested Time Allocation: Level 3

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

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<td>Identify conventional frame anchoring techniques</td>
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<td>Describe straightening techniques</td>
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<td>Identify short and long arm suspension systems</td>
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**Total Percentage for Automotive Collision Repair Technician Level 3**

100%
Section 3
PROGRAM CONTENT

Automotive Collision Repair Technician
Level 1

Automotive Collision Repair Technician
LINE (GAC): A OCCUPATIONAL SKILLS AND SAFETY

Competency: A1 Describe safe work practices

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

- Discuss personal safety measures.
- Identify shop emergency equipment.
- Describe safety precautions regarding fires.
- Describe hybrid and electric vehicle safety precautions.

LEARNING TASKS

1. Identify hazards.
   - Shop environment
   - Chemical
   - Air-borne

2. Discuss personal safety precautions and procedures.
   - Personal apparel
     - Clothing
     - Hair and beards
     - Jewellery
   - Housekeeping
   - Ventilation systems
   - Clear headedness
     - Contributing factors
   - Horseplay
   - Respect for others safety
   - Constant awareness of surroundings
   - Lifting

3. Locate shop emergency equipment and means of exit.
   - Emergency shutoffs
   - Spill kits
   - Fire control systems
   - Eye wash facilities
   - Emergency exits
   - First aid facilities
   - Emergency contact / phone numbers
   - Outside meeting place
   - Disaster meeting place
LEARNING TASKS
4. Describe the conditions and classifications of fires.

CONTENT
- Conditions to support fire
  - Air
  - Fuel
  - Heat
- Classes of fires
  - A – combustibles
  - B – liquids
  - C – electrical
  - D – metal
- Symbols and colours

5. Describe fire safety precautions when working near, handling or storing flammables.

- Fuels
  - Diesel
  - Gasoline
  - Propane
  - Natural gas
  - Solvents
- Lubricants
- Oily rags
- Combustible metals
- Aerosols

6. Describe the considerations and procedures to extinguishing a fire.

- 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.
   - Shop equipment
   - Proper housekeeping
   - Use of grinding tools
   - Movement of vehicles in the shop area
   - Battery disconnect

2. Describe lifting equipment safety.
   - 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

3. Follow safety procedures for alternate-fuel vehicles.
   - 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

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<td>o Controlled Products</td>
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<td>• Labels</td>
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<td>• Protection of workers</td>
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<tr>
<td>o Workers</td>
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<td>o Employers</td>
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<td>o Regulators</td>
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<tr>
<td>• Safety Data Sheets (SDS) and location</td>
<td>3. Describe the key elements of WHMIS.</td>
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<tr>
<td>• Labelling of containers of hazardous materials</td>
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<tr>
<td>• Worker education programs</td>
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<tr>
<td>• Personal Protection Equipment (PPE)</td>
<td>4. Describe the responsibilities of employees under WHMIS.</td>
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<td>• SDS</td>
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<td>• Labels</td>
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<tr>
<td>• Provide training</td>
<td>5. Describe the responsibilities of employers under WHMIS.</td>
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<td>• SDS</td>
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<tr>
<td>• Labels</td>
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<tr>
<td>• Work Education Programs in the workplace</td>
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</tbody>
</table>
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
Objectives
To be competent in this area, the individual must be able to:
• Inspect, use and maintain Personal Protection Equipment (PPE).

LEARNING TASKS
1. Identify the types of Personal Protective Equipment (PPE).
   • Hearing
   • Eyes
   • Skin
   • Breathing protection
   • Hands
   • Foot

2. Describe the use of Personal Protective Equipment (PPE).
   • Ear protection
   • Eye protection
   • Skin protection
   • Breathing protection
   • Hand protection
   • Foot protection

3. Describe the inspection and maintenance of Personal Protection Equipment (PPE).
   • Ear protection
   • Eye protection
   • Skin protection
   • Breathing protection
   • Hand protection
   • Foot protection

4. Describe how to correctly store Personal Protection Equipment (PPE).
   • Ear protection
   • Eye protection
   • Breathing protection
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
1. Describe rights and responsibilities
   • Employers
   • Employees
   • Contractors
   • Inspectors

2. Describe reporting of accidents.
   • Chain of command
   • Documentation

3. Describe the main elements of WorkSafeBC
   • Definitions
   • Application
   • Rights and responsibilities
   • Health and safety programs
   • Investigation and reports
   • Workplace inspections
   • Right to refuse work
   • General conditions
   • Building and equipment safety
   • Emergency preparedness
   • Preventing violence
   • Working alone
   • Ergonomics
   • Illumination
   • Indoor air quality
   • Smoking and lunchrooms

4. Describe the workplace hazards identified by WorkSafeBC
   • Chemical and biological substances
   • Substance specific requirements
   • Noise, vibration, radiation and temperature
   • Personal protective clothing and equipment
   • Confined spaces
   • Tools, machinery and equipment
   • Ladders, scaffolds and temporary work platforms
   • Electrical safety
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.
   • 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
   • Maintenance
   • 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
  o Frayed cords
  o Cracked casings
  o Leaking Lines
  o 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
   • Types
     o Bolts
     o Nuts
     o Washers
     o Clips
     o Rivets
     o Moulding clips
     o Adhesives
     o Screws
   • Functions
   • Costs

2. Describe removal and installation procedures
   • Fastener identification
   • Identifying reusable fasteners
   • Removal procedures
   • Replacement procedures
     o Torque specifications
   • Removal and replacement of retainers
   • Final operation/fit and finish

3. Remove and re-install reusable trim
   • 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.

   - 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

2. Use Original Equipment Manufacturers (OEM) specifications and repair procedures.

   - 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.
   • Cracking cylinders
   • Attaching regulators
   • Hoses, fittings and arrestors
   • Regulator diaphragm care
   • Leak checks
   • Relationship between
     o Tip size and material thickness
     o Tip size and gas pressure
   • Lighting procedures
   • Flames
     o Carburizing
     o Neutral
     o Oxidizing
   • Shutdown procedures

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
     o Carburizing
     o Neutral
     o 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
  - Oxyacetylene equipment
  - Steel panel

Criteria  The learner will be evaluated on
  - Safety
  - Procedure
  - Technique
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
  o 110 volts
  o 220 volts
  o Cooling fan
  o Duty cycle

• Service parts
  o Wire spool
  o Liner
  o Trigger connections
  o Main hose assembly
  o Gas diffuser
  o Contact tip
  o Nozzle
  o Ground clamp
  o Cables

• Wire sizes
• Shielding Gas
  o C-25 (75% argon/25% carbon dioxide)
  o 100% carbon dioxide
  o 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: D2 Describe MIG welding process

Objectives
To be competent in this area, the individual must be able to:
• Describe the set up procedure used for MIG (GMAW) welding.
• Describe shot arc, spray arc, and stitch spray arc MIG (GMAW) welding methods.

LEARNING TASKS
1. Describe the set up procedure used for MIG (GMAW) welding.
   • Manufacturer suggested settings (chart)
   • Drive roller pressure
   • Wire speed (current)
   • Wire stick out
   • Voltage (heat) selection
   • Shielding gas flow rate
   • Grounding methods
     o DC reverse polarity
     o DC straight polarity

2. Describe the short arc transfer method.
   • Purpose
   • Uses
   • Voltage
   • Current
   • Ground clamp

3. Describe the spray arc transfer method.
   • Purpose
   • Uses
   • Voltage
   • Current

4. Describe the stitch spray arc transfer method.
   • Pulse
   • Purpose
   • Uses
   • Voltage
   • Current
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.

<table>
<thead>
<tr>
<th>LEARNING TASKS</th>
<th>CONTENT</th>
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</thead>
</table>
| 1. Perform a butt weld on 22 gauge steel. | • Gun angle and speed  
• Penetration  
• Build-up  
• Consistent width bead |
| 2. Perform a lap weld on 22 gauge steel. | • Gun angle and speed  
• Penetration  
• Build-up  
• Consistent width bead |
| 3. Perform various size plug welds on 22 and 20 gauge steel. | • 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: D4 Describe plasma arc cutting

Objectives

To be competent in this area, the individual must be able to:
• Describe plasma arc cutting and operating procedures.
• Perform a cut on 22 and 20 gauge steel.

LEARNING TASKS

1. Describe plasma arc cutting.
   • Operating procedures
   • Gases and tips
   • Identify material
   • Maintenance
   • Storage
   • Potential hazards
   • Cutting area

2. Perform a cut on 22 and 20 gauge steel.
   • Gun angle and speed
   • Penetration
   • Equipment set-up
   • Personal Protection Equipment (PPE)

Achievement Criteria

Performance The learner will perform a cut on 22 or 20 gauge steel.
Conditions The learner will be given
• Cutting equipment
• Steel panel
Criteria The learner will be evaluated on
• Safety
• Procedure
• Technique
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
  o Reach arms
  o Pressurization handle
  o Transformer
  o Timer
• Purpose
• Use
  o Pressure
  o Time
  o Voltage
  o 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.

   CONTENT
   - Tensile strength
   - Yield strength
   - Spring-back
   - Composition
   - Work hardening
   - Annealing
   - Affects of heat

2. Describe the characteristics of high-strength steel.

   CONTENT
   - Tensile strength
   - Yield strength
   - Spring-back
   - Composition
   - Characteristics
   - Work hardening
   - Annealing
   - Affects of heat

3. Describe the characteristics of advanced and ultra-high strength steels.

   CONTENT
   - 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.
   - Hammers
   - Dollies
   - Pry bars
   - Spoons

2. Describe the use of sheet metal repair equipment.
   - Stud welder
   - Spot welder electrode
   - Hydraulic body jack
   - Pulling equipment
Objectives

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

- Perform sheet metal repair.

1. Describe damage analysis.
   - Cosmetic (minor) vs. structural (major)
   - Need for complete damage analysis
     - Visual
     - Touch

2. Describe repair methods.
   - Cold repair
   - Heat repair
   - Pushing/pulling
   - Roughing
   - Patching
   - Visualize desired outcome

3. Describe shrinking procedures.
   - Expansion and contraction
   - Restricted and unrestricted sheet metal
   - Oxyacetylene
   - Spitznagel™
   - Panel beater™
   - Cold shrinking

4. Describe body filling procedures.
   - 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
1. Describe hot-air welding techniques.
2. Describe airless welding techniques.
3. Describe adhesive repairs techniques.

CONTENT
• Identification of plastic
• Purpose and application
• Thermoplastic repair
• Maintain welding equipment
• Store welding equipment
• Recognize potential hazards
  o Air speed
  o Surface temperature
• Purpose and application
• Thermoplastic and thermo set repair
• Maintain welding equipment
• Store welding equipment
• Recognize potential hazards
  o Air speed
  o Surface temperature
• 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.

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<td>• Hot-air welding</td>
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<tr>
<td>• Airless welding</td>
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<tr>
<td>• Adhesive repairs</td>
</tr>
</tbody>
</table>

Achievement Criteria

Performance The learner will perform plastic repairs, including
- Welded
- Adhesive

Conditions The learner will be given
- Welding equipment
- Adhesive materials
- Plastic panel

Criteria The learner will be evaluated on
- Safety
- Procedure
- Technique
- Quality of repair
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.
   - Siphon feed
   - Gravity feed
   - Low Volume Low Pressure (L.V.L.P.)
   - High Volume Low Pressure (H.V.L.P.)
   - Pressure feed
   - Airbrush

2. Describe the parts of the spray gun.
   - Gun body
   - Trigger
   - Air valve
   - Spreader adjustment
   - Fluid adjustment
   - Fluid needle and tip
   - Air cap
   - Material container

3. Demonstrate troubleshooting techniques for correcting spray gun problems.
   - Identification of problem
   - Gun testing methods
   - Methods for correcting problem

4. Demonstrate the procedures for cleaning and maintaining the spray gun.
   - 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
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
LINE (GAC): G SURFACE PREPARATION
Competency: G3 Identify various spray booths

Objectives:
To be competent in this area, the individual must be able to:
- Identify types and operation of spray booths.
- Describe the various spray booth controls.

LEARNING TASKS
1. Identify the types of spray booths and how they operate.
   - Down draft
   - Semi-down draft
   - Cross flow
   - Heating requirements
   - Filter systems
   - Controls
   - Air supply
   - Maintenance

2. Describe the various spray booth controls.
   - Air flow direction
   - Air flow controls
   - Temperature controls
   - Curing/drying times
   - Filter types and changes
   - Pressure readings
     - Manometer
     - Magnehelic
   - Interlock switch
   - Plenum fan
   - Fire suppression systems
LINE (GAC): G SURFACE PREPARATION
Competency: G4 Demonstrate preparation for application of undercoats/primers

Objectives:
To be competent in this area, the individual must be able to:
- Describe substrates.
- Identify substrate condition.
- Identify pre-cleaning procedures.
- Describe paint removal techniques.
- Perform various sanding repair procedures.

LEARNING TASKS
1. Describe substrates.
   - Raw substrate
     - Steel
     - Aluminum
     - Plastics
   - Topcoat
     - Single stage
     - Base clear
     - Multi-coat

2. Identify substrate condition.
   - Paint issues
     - Cracking
     - Rust
     - Checking
     - Excessive mil thickness
     - Poor adhesion
     - Checking
     - Bridging
     - Runs and sags
     - Orange peel
   - Environmental damage

3. Identify cleaning steps prior to sanding.
   - Soap and water wash
   - Wax and grease remover
LEARNING TASKS

5. Describe paint removal techniques.
   - Steel substrate
     - Sanding removal
       - Hand
       - Machine
     - Chemical removal
     - Media blasting
   - Plastic substrate
     - Sanding removal
     - Chemical removal

6. Describe sanding materials.
   - Sanding discs
   - Wet/dry papers
   - Disc sizes
   - Grit types
   - Paper grit size
   - Abrasive pads
   - Open coat/closed coat

7. Describe sanding equipment.
   - Rotary
   - Dual action
   - Grinders
   - Sanding blocks/contour blocks
   - Sanding pads
   - Vacuum type system

8. Demonstrate sanding procedures.
   - Hand sanding
   - Power sanding
   - Feather-edging techniques
   - Block sanding
   - Guide coats
LINE (GAC): G SURFACE PREPARATION
Competency: G5 Demonstrate the application of undercoats/primers

Objectives:
To be competent in this area, the individual must be able to:
- Apply undercoats/primers.

**LEARNING TASKS**

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<td>- Scale</td>
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<td><strong>3. Apply undercoats/primers.</strong></td>
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<tr>
<td>- Equipment selection</td>
</tr>
<tr>
<td>- Spraying environment</td>
</tr>
<tr>
<td>- Number of coats</td>
</tr>
<tr>
<td>- Minimum dry times</td>
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<tr>
<td>- Minimum flash times</td>
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<tr>
<td>- Air pressure</td>
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<td><strong>4. Clean up</strong></td>
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<tr>
<td>- Disassembly</td>
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<tr>
<td>- Cleaning</td>
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<tr>
<td>- Gun washing</td>
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<tr>
<td>o Hand</td>
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<tr>
<td>o Machine</td>
</tr>
</tbody>
</table>
LINE (GAC): G SURFACE PREPARATION
Competency: G6 Identify corrosion protection techniques

Objectives:

To be competent in this area, the individual must be able to:
• Apply corrosion protection.

LEARNING TASKS

1. Describe corrosion prevention materials.
   • Zinc coating
   • Self-etching
   • Epoxy primer
   • Anti-corrosion compounds
   • Joint and seam sealers
   • Weld through primer
   • Undercoating
   • Wax coating

2. Describe the areas of the vehicle requiring corrosion protection after repair.
   • Joints and seams
   • Inside closed sections
   • Exterior panels (inside and outside)
   • Hot spots

3. Apply corrosion protection.
   • Material and equipment selection
   • Application techniques
   • Quality control
LINE (GAC): H AUTO BODY CONSTRUCTION AND COMPONENTS

Competency: H1 Identify auto body construction types

Objectives:

To be competent in this area, the individual must be able to:
- Identify types of body/frame construction.
- Describe body components.

LEARNING TASKS

1. Identify types of body/frame construction.
   - Conventional
   - Unibody
   - Space

2. Describe body components.
   - Structural panels
   - Exterior fixed panels
   - Exterior removable panels
   - Trim
   - Door hardware
   - Glass components
   - Bumpers
## 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
LINE (GAC): H AUTO BODY CONSTRUCTION AND COMPONENTS

Competency: H3 Describe body component servicing procedures

Objectives:

To be competent in this area, the individual must be able to:
- Describe body components

LEARNING TASKS

1. Describe the components of a door assembly and their various functions.
   - Door locking hardware
   - Door glass components
   - Hinges and methods of attachment
   - Door trim items
   - Review of door alignment steps
   - Servicing operations

2. Describe the components of a bumper assembly.
   - Bumper cover
   - Reinforcement bar
   - Filler panels
   - Impact absorbers
   - Sensors
   - Camera
   - Brackets or braces
   - Alignment steps

3. Describe sheet metal components.
   - Front end
     - Fenders
     - Hood panel
     - Headlight mounting panel
   - Rear end
     - Trunk
     - Hatch
     - Box
     - Tailgate
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
  o    Safety
  o    Clear
  o    Tinted
  o    Shaded
  o    Heated
•    Application
•    NAGS
•    Mountings
  o    Mechanical
  o    Gasket
  o    Adhesive
To be competent in this area, the individual must be able to:

- Describe laminated, structural glass.

**LEARNING TASKS**

1. Describe automotive laminated, structural glass.

   - Characteristics
     - Safety
     - Clear
     - Tinted
     - Shaded
     - Heated

   - H.U.D. (heads-up display)
   - Rain/moisture sensor
   - Acoustic inner layer
   - Anti-lacerative
   - Application
   - NAGS (National Auto Glass Specifications)
   - Repairable

2. Describe the removal and installation of laminated, structural glass.

   - Select removal method
     - Vehicle construction
       - Exposed pinchweld
       - Encapsulated
     - Replace vs. reinstall
     - Wire cutout
     - Cold knife cutout
     - Reciprocating tool

   - Remove bonded glass and material
     - Mark fastener locations and positions
     - Clean up
     - Storage
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
1. Describe removal and replacement procedures for non-bonded glass.
   CONTENT
   • Fasteners
     o Bolts
     o Fasteners (clips)
     o Rivets
     o Everseal
   • Gaskets
     o Bonded
   • Sealants
   • 2-part epoxy
   • Removal procedures
   • Installation procedures
   • Run channel
   • Sash channel
   • Clean up and disposal

2. Remove and replace non-bonded glass.
   CONTENT
   • 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
     o Spool/machine fed
     o Spool gun fed
   • Wire speed (current)
   • Pulse
   • Voltage (heat) selection
   • Shielding gas
     o Flow rate
     o Type (100% Argon)
   • Liner selection
   • Temperature sticks
   • Conditioning of metal

2. Describe set-up procedures for MIG brazing.

   CONTENT
   • Drive roller pressure
   • Wire feed
     o Spool/machine fed
     o Spool gun fed
   • Wire speed (current)
   • Voltage (heat) selection
   • Shielding gas
     o Flow rate
     o 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.
   - Gun angle and speed
   - Build-up
   - Consistent width bead
   - Penetration

2. Perform a plug weld on sheet aluminum (2 and 3 sheet thickness).
   - 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
  o Production deadlines
  o Tools and materials required
• Timing of repair steps
  o 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
  o Estimating
  o Creation of a repair plan
• Need for a complete damage analysis
• Damage analysis techniques
• Technology and sources of information
• Documentation
  o Improper previous repairs
  o 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
  o Heating
  o Shrinking
  o 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.

   - Repair materials
   - Cleaning products
   - Abrasives and strippers
   - Panel composition
   - Topcoat identification
   - Substrate identification
   - Removal of panel components
   - Control of panel movement

2. Describe the procedure to repair the door shell.

   - Damaged door skin removal
   - Damage analysis
   - Panel composition
   - Heating
   - Cold repair
   - Pushing/pulling
   - Shrinking
   - Hammer dolling
   - Stress relieving

3. Describe preparing new door skin for installation.

   - 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.

   CONTENT
   - Need for a complete damage analysis

2. Describe roughing procedures.

   CONTENT
   - Hammering on dolly/off dolly
   - Pry tools
   - Stress relieving and annealing with heat

3. Describe shrinking procedures.

   CONTENT
   - Expansion and contraction
   - Restricted and unrestricted
   - Oxyacetylene shrinking
   - Shrinking/ cold shrinking

4. Describe body filling procedures.

   CONTENT
   - 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.

<table>
<thead>
<tr>
<th>LEARNING TASKS</th>
<th>CONTENT</th>
</tr>
</thead>
</table>
| 1. Identify tools and equipment required for FRP and SMC repairs. | • Materials  
|                                                  | • Hand tools  
|                                                  | • Power tools  |
**Program Content**  
**Level 2**

**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**  
**CONTENT**

1. Identify SMC and fiberglass damage.
   - Substrate identification
     - One-sided
     - Two-sided
     - Cosmetic
   - Cracks
   - Holes
   - Scratches
   - Panel replacement

2. Describe various SMC and fiberglass damage repair techniques.
   - Layout
   - Cleaning
   - Surface preparation
   - Reinforcing
   - Mixing and application of materials
   - Rough shaping
   - Finish sanding

3. Describe the methods for panel replacement.
   - 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.
   - Cleaning
   - Fracture mitigation
   - Moisture removal
   - Beveling

2. Perform a two-sided FRP repair.
   - 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
- Tools and materials
- A damaged FRP panel
Criteria The learner will be evaluated on
- Safety
- Procedure
- Technique
- Quality of repair
LINE (GAC): MECHANICAL COMPONENTS
Competency: Identify seat belt assemblies

Objectives:
To be competent in this area, the individual must be able to:
• Identify seat belt assemblies.

LEARNING TASKS
1. Describe the types of automotive seat belt assemblies and their components.
   • Active design
   • Passive design
   • Two-point lap
   • Three-point seatbelt
   • Continuous loop single retractor
   • Three-point dual retractor
   • Three-point passive
   • Motorized shoulder belt
   • Automatic tensioner
   • Seat integrated systems
   • Mounting hardware
   • Electrical connections

2. Identify the inspection procedures for seat belt assembly.
   • Manufacturers’ specifications
   • Examine seat belt restraint system
   • Tongue/buckle assembly
   • Retractor (tilt mechanism and inertia type)
   • Webbing
   • Anchoring points
   • Interior panel and upholstery removal
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
CONTENT
1. Describe airbag system components.
• Impact sensors
• Control module
• Energy reserve module
• Voltage converter
• Clock spring
• Wiring harness
• Airbag module
• Inflator assembly

2. Identify safety procedures when working around an airbag system.
• Disarm
• Electrical disconnect
• Impact sensors
• Deployed inflator module
• Un-deployed inflator module

3. Describe the procedure to remove and replace the airbag system components.
• System scan
• Manufacturer removal and replacement process
• Required tools
• Related components
• Self-diagnostic system
LINE (GAC):  I MECHANICAL COMPONENTS

Competency:  I3 Discuss cooling system service

Objectives:
To be competent in this area, the individual must be able to:
• Describe cooling systems.

LEARNING TASKS

1. Describe cooling system components.
   • Radiators
   • Thermostat
   • Hoses
   • Water pump
   • Fan assembly
   • Block heater/expansion plug
   • Intercoolers
   • Coolant
   • Heater core
   • Belts
   • Pulleys
   • Shrouds

2. Describe disassembly and re-assembly cooling systems.
   • Radiator installation
   • Coolant types and mixture
   • Filling procedures
   • Troubleshooting
     o Pressure testing
     o Dye recognition

3. Identify oil cooling systems.
   • Transmission oil coolers
   • Power steering coolers
   • Engine oil coolers
LINE (GAC):  I MECHANICAL COMPONENTS
Competency:  I4 Describe air conditioning service

Objectives:
To be competent in this area, the individual must be able to:
• Describe the components of an air conditioning system.
• Identify safe handling procedures.

LEARNING TASKS
1. Describe air conditioning system components.
   • Condenser
   • Receiver-drier
   • Expansion valve
   • Compressor
   • System Lines
   • Refrigerant
   • Belts
   • Evaporator

2. Identify safe handling procedures.
   • Regulations and required certification
   • Pressurized system
   • Welding in vicinity
   • Evacuating the system (recovery)
   • Sealing system
   • Recharging the system
   • Dye
LINE (GAC): I MECHANICAL COMPONENTS
Competency: I5 Identify vehicle systems

Objectives:
To be competent in this area, the individual must be able to:
• Describe vehicle systems.

LEARNING TASKS
1. Describe drive train components.
   • Engine
   • Transmission
   • Axle
   • CV joints
   • Differentials
   • Drive shaft

2. Describe exhaust system components.
   • Muffler
   • Exhaust manifold
   • Exhaust pipe
   • Tail pipe
   • Catalytic converter
   • Resonator
   • Hangers
   • Clamps
   • Sensors
   • Heat shields

3. Describe fuel system components.
   • Fuel pump
   • Fuel injectors
   • Fuel tank
   • Fuel lines
   • Throttle body
   • Sending units
   • Emergency shut-off switch
   • Filters
   • Air intake system
Program Content
Level 2

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**

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<td>1. Describe electrical circuits.</td>
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<td>• Voltage</td>
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<tr>
<td>Current flow</td>
<td>• Resistance</td>
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<tr>
<td>Voltage drop</td>
<td>• Current flow</td>
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<tr>
<td>Power consumption</td>
<td>• Voltage drop</td>
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<tr>
<td>Series circuit</td>
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<tr>
<td>Parallel circuit</td>
<td>• Series circuit</td>
</tr>
<tr>
<td>System schematics</td>
<td>• Parallel circuit</td>
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<th>LEARNING TASKS</th>
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<td>Gases present</td>
<td>2. Identify the safety precautions when working around batteries.</td>
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<tr>
<td>Disconnecting</td>
<td>• Gases present</td>
</tr>
<tr>
<td>Removal</td>
<td>• Disconnecting</td>
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<tr>
<td>Charging</td>
<td>• Removal</td>
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<td>Welding near a battery</td>
<td>• Charging</td>
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<tr>
<td>Computers / memory</td>
<td>• Welding near a battery</td>
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<tr>
<td>Jump starting</td>
<td>• Computers / memory</td>
</tr>
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</table>

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<thead>
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</thead>
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<td>3. Describe a minor electrical diagnosis on a simple circuit.</td>
</tr>
<tr>
<td>Voltage drop</td>
<td>• Fault codes</td>
</tr>
<tr>
<td>Wiring harness repair</td>
<td>• Voltage drop</td>
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<tr>
<td>Checking for poor grounds</td>
<td>• Wiring harness repair</td>
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<tr>
<td>o Corrosion</td>
<td>• Checking for poor grounds</td>
</tr>
<tr>
<td>o Damaged wires</td>
<td>• o Corrosion</td>
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<tr>
<td>Fuses/ relays</td>
<td>• o Damaged wires</td>
</tr>
</tbody>
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<thead>
<tr>
<th>CONTENT</th>
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<tr>
<td>Location</td>
<td>4. Describe electronic components.</td>
</tr>
<tr>
<td>Modules</td>
<td>• Location</td>
</tr>
<tr>
<td>Sensors</td>
<td>• Modules</td>
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<td>Cameras</td>
<td>• Sensors</td>
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<tr>
<td>System calibration</td>
<td>• Cameras</td>
</tr>
<tr>
<td>Static straps</td>
<td>• System calibration</td>
</tr>
</tbody>
</table>
LEARNING TASKS

5. Describe related electrical components.

6. Describe removal and installation of damaged electrical components.

7. Repair damaged wires and exterior coatings.

CONTENT

- Exterior lighting
- Interior lighting
- Power accessories
- Stereo
- Antenna
- Switches
- Gauges
- Sending units

- Identify damaged component
- Manufacturers’ removal procedure
- Disconnect components
- Storage and/or disposal of components
- Test and verify component operation

- Types of wiring and coverings
- Types of connectors
- Determine repairability of wires
- Volt meters and test lights
- Splice, cut and solder
- Reapply coverings
  - Electrical tape
  - Shrink tube

Achievement Criteria

Performance The learner will repair damaged wire.

Conditions The learner will be given
- Tools and materials
- A damaged wire

Criteria The learner will be evaluated on
- Safety
- Procedure
- Technique
- Quality of repair
  - Resistance of circuit
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.
   • Designs
     o Ladder
     o Perimeter
     o “X” frame
   • Components
     o Body mounts
     o Cross members
   • Construction
     o Hydroformed
     o Steel
     o Aluminum

2. Describe unibody designs.
   • Designs
     o Semi-unitized
     o Composite
     o Torque box
     o Space frame
   • Components
     o Cradle
     o Pillars
   • Construction
     o Steel
     o Aluminum
     o Ultra-high strength (UHSS)
     o Overall structural integrity

3. Identify vehicle crush zones.
   • Energy management system
   • Types
   • Repairability
## LINE (GAC): J  STRUCTURAL REPAIR

### Competency: J2  Identify collision theory concepts

### Objectives:
To be competent in this area, the individual must be able to:
- Describe physical principles of collision and vehicle damage.

### LEARNING TASKS

<table>
<thead>
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<th>CONTENT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Describe collision forces.</strong></td>
</tr>
<tr>
<td>- Mass</td>
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<tr>
<td>- Momentum</td>
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<tr>
<td>- Inertia</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>CONTENT</th>
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</thead>
<tbody>
<tr>
<td><strong>2. Describe impacts and the effects on the vehicle.</strong></td>
</tr>
<tr>
<td>- Unibody and conventional frame</td>
</tr>
<tr>
<td>- Types of impacts</td>
</tr>
<tr>
<td>- Front end</td>
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<tr>
<td>- Rear end</td>
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<tr>
<td>- Side</td>
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<tr>
<td>- Roll over</td>
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<tr>
<td>- Stationary or moving</td>
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<tr>
<td>- Direction of damage</td>
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<tr>
<td>- Internal</td>
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<tr>
<td>- Crush zones</td>
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<tr>
<td>- External</td>
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<tr>
<td>- Deflection</td>
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<tr>
<td>- Direction</td>
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<tr>
<td>- Three section principle</td>
</tr>
<tr>
<td>- Primary and secondary</td>
</tr>
<tr>
<td>- Point of impact</td>
</tr>
<tr>
<td>- Buckling</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>LEARNING TASKS</th>
<th>CONTENT</th>
</tr>
</thead>
</table>
| 1. Describe measuring planes. | • Datum plane  
• Center plane  
• Zero or base plane  
• Length, width and height  
• X, Y, Z |
| 2. Identify point-to-point measurement. | • Definition  
• Purpose  
• Type of equipment used  
• Examples of use |
| 3. Identify parallel-to-datum measurement. | • Definition  
• Purpose  
• Type of equipment used  
• Examples of use |
| 4. Identify parallel-to-center measurement. | • Definition  
• Purpose  
• Type of equipment used  
• Examples of use |
| 5. Describe damage types. | • Sideways  
• Sag  
• Mash  
• Diamond  
• Twist |
| 6. Describe the use of frame specifications. | • Manufacturers’ specifications  
• Product-specific |
LEARNING TASKS
7. Identify measuring gauges.

CONTENT
• Tape measure
• Tram
• Self-centering
• Digital
• Acoustic
• Arm system

8. Describe X-measurement techniques.

CONTENT
• Limitations
  o Diamond checking
  o Assymetrical
• Sway checking


CONTENT
• Tram gauge
  o Length, width, cross

Achievement Criteria
Performance The learner will perform tram gauge measurements.

Conditions The learner will be given:
• Tram gauge
• Tape measure
• Specifications
• Vehicle or equivalent

Criteria The learner will be evaluated on:
• Procedure
• Accuracy of measurements
LINE (GAC):  J  STRUCTURAL REPAIR
Competency:  J5  Identify various measuring systems

Objectives:
To be competent in this area, the individual must be able to:
• Describe measuring systems.

LEARNING TASKS
1. Describe mechanical universal measuring systems.
   • Purpose
   • Design
   • Advantages
   • Disadvantages
   • Method of length measurement
   • Limitations of measuring equipment
   • Maintenance
   • Storage

2. Describe computerized measuring systems.
   • Purpose
   • Design
     o Laser
     o Acoustic
     o Robotic (arm)
     o Camera
   • Advantages
   • Disadvantages
   • Limitations of measuring equipment
   • Maintenance
   • Storage
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.
   • Center section principle
   • Universal anchoring (P4)
   • Potential hazards
   • Weight support
   • Vertical defection
   • Weak rocker panels

2. Describe floor anchor systems.
   • Purpose
   • Design
   • Potential hazards

3. Describe bench (rack) anchor systems.
   • Purpose
   • Design
   • Potential hazards
   • Fixed/adjustable

4. Describe anchoring limitations.
   • 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.

<table>
<thead>
<tr>
<th>LEARNING TASKS</th>
<th>CONTENT</th>
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</thead>
<tbody>
<tr>
<td>1. Describe the center section hold principle.</td>
<td>• Need for proper anchoring</td>
</tr>
<tr>
<td>2. Describe blocking methods.</td>
<td>• Leverage principles</td>
</tr>
<tr>
<td></td>
<td>• Twist removal</td>
</tr>
<tr>
<td>3. Describe the use of plug hooks.</td>
<td>• Fast, efficient anchor</td>
</tr>
<tr>
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<td>• Need for blocking</td>
</tr>
<tr>
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<td>• Level positioning</td>
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<tr>
<td>4. Describe chain wrapping techniques.</td>
<td>• Purpose</td>
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<tr>
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<td>• Chain wrapping methods</td>
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<tr>
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<td>• Use with blocking</td>
</tr>
<tr>
<td>5. Describe weight support techniques.</td>
<td>• Loaded and unloaded suspension</td>
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<td>• Split between torque box and suspension</td>
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<tr>
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<td>areas</td>
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<td></td>
<td>• Even from side-to-side to prevent twisting</td>
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<tr>
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<td>• Use with blocking</td>
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</table>
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.
   • Shape; dimension
     o Spring back
   • State; strength
     o Work hardening
   • High strength steel
   • Aluminum

2. Describe preparation for straightening.
   • Removal for access
     o Outer panel
     o Mechanical components
     o Glass
     o Interior trim
   • Visual inspection
     o Door gaps
   • Pinch weld flanges
     o Fuel lines
     o Brake lines
     o Wiring

3. Describe pulling clamps.
   • Types
     o Single bolt
     o Self-tightening
     o Side-pull (offset) attachment
     o Pull plate
   • Care of hardware
     o Cleanliness
     o Over-tightening
   • Use
     o Pulling force
     o Access
     o Attachment point
4. Describe multiple-pulling.
   • Advantages
     o Reduction of pressure
     o Equalizing and dispersing energy
     o Control

5. Describe floor pullers.
   • Designs
     o Chain anchored
     o Monocoque
   • Advantages
     o Time
     o Mobility

6. Describe vector pulling.
   • Principles
     o Maintaining constant pull angle

7. Describe bench (rack) pullers.
   • Designs
   • Advantages
     o Self-contained units
     o Complex hits
     o Pulling options
     o 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.

<table>
<thead>
<tr>
<th>LEARNING TASKS</th>
<th>CONTENT</th>
</tr>
</thead>
</table>
| **1.** Describe the center-out pulling principle. | • Need to establish true center-section  
• Effects of center-section misalignment on end sections |
| **2.** Describe the safe use of pulling equipment. | • Inspect components
  - Safety straps
  - Chains
  - Clamps
  - Hooks
  - Fixtures
  - Anchor pots
• Care of pulling chains
• Chain ratings
• Hydraulic equipment |
| **3.** Describe stress-relieving techniques. | • Heat
• Vibration
• Proper control of panel movement |
| **4.** Describe diamond/twist repair procedures. | • Analysis
• Setup
• Pulling procedures |
| **5.** Describe mash repair procedures. | • Analysis
• Setup
• Pulling procedure |
| **6.** Describe sag repair procedures. | • Analysis
• Setup
• Pulling procedures |
| **7.** Describe sway repair procedures. | • Analysis
• Setup
• Pulling procedures |
## Program Content

### Level 3

**LEARNING TASKS**

<table>
<thead>
<tr>
<th>Learning Task</th>
<th>CONTENT</th>
</tr>
</thead>
</table>
| 8. Describe cross-member repair procedures. | • Analysis  
• Setup  
• Pulling procedures |
| 9. Describe pulling techniques for front hits. | • Analysis  
• Setup  
• Pulling procedures |
| 10. Describe pulling techniques for rear hits. | • Analysis  
• Setup  
• Pulling procedures |
| 11. Describe pulling techniques for side hits. | • Analysis  
• Setup  
• Pulling procedures |
| 12. Describe pulling techniques for roll-over damage. | • Analysis  
• Setup  
• Pulling procedures |
Program Content
Level 3

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

2. Describe structural sectioning.
   • Analysis
     o Manufacturers’ removal procedure and specifications
     o ICBC
     o 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
**Objective:**
To be competent in this area, the individual must be able to:
- Perform structural repair.

### LEARNING TASKS

<table>
<thead>
<tr>
<th>CONTENT</th>
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</thead>
<tbody>
<tr>
<td>1. Perform structural repair.</td>
</tr>
</tbody>
</table>

### Achievement Criteria

| Performance | The learner will perform a structural repair. |
| Conditions | The learner will be given |
| Specification | |
| 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
    o Measuring
    o 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
  o Lower control arm
  o Lower ball joint
  o Strut assembly
  o Spring
  o Steering knuckle
  o Upper bearing
• Alignment angles
  o Poor handling
  o 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
  o Control arms
  o Lower ball joint
  o Steering gear
  o Pitman arm
  o Idler arm
  o Spring
  o Steering knuckle
  o Upper bearing
  o Torsion bar

• Alignment angles
  o Poor handling
  o 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
  o Trailing arm
  o Strut type
• Rear wheel drive design
  o Independent
  o 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
1. Describe rack and pinion steering systems.
   • Pinion gear
   • Rack gear
   • Gear housing
   • Tie rods
     o 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.
   •  Pitman arm
   •  Idler arm
   •  Center link/drag link
   •  Inner tie rods
   •  Outer tie rods
   •  Adjusting sleeves
   •  Steering knuckle

2. Describe the relationship between the parallelogram steering system and the lower control arms.
   •  Misalignment angles
   •  Jounce rebound toe change
   •  Handling problems
   •  Methods of checking
Program Content
Level 3

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.
   • Caster
   • Camber
   • Steering axis inclination
   • Toe
   • Turning radius
   • Thrust angle

2. Describe handling and parts wear problems associated with each of the alignment angles.
   • Tire wear
   • Pulling problems
   • Drive line alignment
   • Steering wheel angle

3. Describe the reasons for checking tracking.
   • Alignment problems
     o Thrust angle
   • Drive line problems
   • Wheelbase
   • Tire wear

4. Describe the effects of a misaligned unibody structure on the steering and suspension systems.
   • Handling
   • Parts wear
   • Jounce rebound toe change
   • Steering wheel angle

5. Describe diagnosis of wheel alignment on a misaligned unibody structure.
   • Parts wear
   • Interpreting SAI readings
   • Caster
   • Camber
Program Content
Level 3

LINE (GAC): L INSURANCE ESTIMATING
Competency: L1 Interpret estimating information

Objectives:
To be competent in this area, the individual must be able to:
• Describe damage estimating.

LEARNING TASKS
1. Describe estimating terminology.
   • Remove & Replace
   • Remove & Install
   • Judgement time
   • Overhaul
   • Repair
   • Sublet
   • Supplement

2. Describe additional information contained in estimating systems.
   • Procedural (P) -pages
   • Vehicle systems information
   • Plastics identification
   • High strength steel locations
   • Computer module locations
   • ‘Quick-check’ under hood measurements
   • Airbag information

3. Describe the parts of a damage estimate.
   • Estimate formats
   • Vehicle information
   • Customer information
   • Main body of estimate
     • Required parts and material
     • Required labour
     • Required sublet
     • Other costs
       - hazardous waste disposal
       - freight fees
       - taxes
     • Photographs
     • Cost calculations
LEARNING TASKS
4. Describe parts and material ordering.

CONTENT
• Communication with suppliers
• Parts manuals
• Computers databases
• Work orders
• Interpret documentation
• Organization of parts
• Storage of parts
• Environmental levies

5. Describe shop roles and responsibilities.

CONTENT
• 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 | CONTENT
--- | ---
1. Describe substrate and topcoat preparation. | - 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.
   • Materials
     o Tape
     o Paper
     o Poly
     o Foam
     o Fine line
     o Liquid mask
   • Methods
     o Back masking
     o Reverse masking
     o Unmasking
   • Material disposal

2. Describe mixing and tinting a colour coat.
   • Mixing of toners
     o Formula content
   • Use of scales
   • Spray out cards
   • Comparison colour to vehicle
   • Colour plotting
   • Colour adjustment

3. Apply refinish materials.
   • 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.

<table>
<thead>
<tr>
<th>LEARNING TASKS</th>
<th>CONTENT</th>
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</thead>
</table>
| 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
Level 1 Grading Sheet: Subject Competency and Weightings

<table>
<thead>
<tr>
<th>LINE</th>
<th>SUBJECT COMPETENCIES</th>
<th>THEORY WEIGHTING</th>
<th>PRACTICAL WEIGHTING</th>
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<tbody>
<tr>
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<tr>
<td>B</td>
<td>Tools and Equipment</td>
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In-school theory / practical subject competency weighting

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Final In-school Mark

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Standard Level Exam Mark

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<tr>
<th>Standard Level Exam Mark</th>
<th>20%</th>
</tr>
</thead>
</table>

Final Mark

<table>
<thead>
<tr>
<th>Final Mark</th>
<th>FINAL%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Assessment Guidelines – Level 2

**Program:**

**In-School Training:**

**Motor Vehicle Body Repairer (Metal & Paint)**

**Automotive Collision Repair Technician**

**Level 2**

<table>
<thead>
<tr>
<th>LINE</th>
<th>Subject Competencies</th>
<th>Theory Weighting</th>
<th>Practical Weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>Welding</td>
<td>14%</td>
<td>23%</td>
</tr>
<tr>
<td>E</td>
<td>Sheet Metal Repair</td>
<td>60%</td>
<td>60%</td>
</tr>
<tr>
<td>F</td>
<td>Plastics and Composites</td>
<td>14%</td>
<td>12%</td>
</tr>
<tr>
<td>I</td>
<td>Mechanical Components</td>
<td>12%</td>
<td>5%</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

**In-school theory & practical subject competency weighting**

<table>
<thead>
<tr>
<th>Final In-school Mark</th>
<th>IN-SCHOOL %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Final In-school Mark**

80%

**Standard Level Exam Mark**

20%

**Final Mark**

FINAL%
## Assessment Guidelines – Level 3

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

<table>
<thead>
<tr>
<th>PROGRAM: IN-SCHOOL TRAINING:</th>
<th>MOTOR VEHICLE BODY REPAIRER (METAL AND PAINT) (AUTOMOTIVE COLLISION REPAIR TECHNICIAN) LEVEL 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LINE</strong></td>
<td><strong>SUBJECT COMPETENCIES</strong></td>
</tr>
<tr>
<td>J</td>
<td>Structural repair</td>
</tr>
<tr>
<td>K</td>
<td>Suspension and Steering</td>
</tr>
<tr>
<td>L</td>
<td>Insurance Estimating</td>
</tr>
<tr>
<td>M</td>
<td>Refinishing</td>
</tr>
<tr>
<td></td>
<td>Final Proprietary Exam</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

**In-school theory & practical subject competency weighting**

<table>
<thead>
<tr>
<th></th>
<th><strong>THEORY WEIGHTING</strong></th>
<th><strong>PRACTICAL WEIGHTING</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50%</td>
<td>50%</td>
</tr>
</tbody>
</table>

**Final In-school Mark**

Apprentices must achieve a minimum 70% as the final in-school mark in order to be eligible to write the Interprovincial Red Seal exam.

<table>
<thead>
<tr>
<th>IN-SCHOOL %</th>
</tr>
</thead>
</table>

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

<table>
<thead>
<tr>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 - Hydraulic port-a-power</td>
<td>16 - Sets hammer and dolly sets</td>
<td>1 - Vehicle with conventional frame design</td>
</tr>
<tr>
<td>8 - Sets of oxyacetylene welding units (welding booths and ventilation)</td>
<td>4 - Stud welders</td>
<td>1 - Vehicle with unibody design</td>
</tr>
<tr>
<td>4 - Plasma arc units</td>
<td>2 - Complete vehicles (body alignment)</td>
<td>2 - Sets of complete anchoring systems</td>
</tr>
<tr>
<td>16 - Hammer and dolly sets</td>
<td>8 - Sets of oxyacetylene welding units</td>
<td>1 - Frame rack</td>
</tr>
<tr>
<td>4 - Stud welders</td>
<td>8 - Sets of seatbelt assemblies</td>
<td>2 - Portable pulling systems</td>
</tr>
<tr>
<td>4 - Hydraulic jack units</td>
<td>1 - Airbag assembly</td>
<td>1 - Wheel alignment rack</td>
</tr>
<tr>
<td>2 - Sets of complete pulling equipment units</td>
<td>1 - Air conditioning assembly</td>
<td>4 - Digital tram gauges</td>
</tr>
<tr>
<td>4 - Hot air plastic welding units</td>
<td>4 - Analogue electrical multimeters</td>
<td>2 - Sets of centering gauges</td>
</tr>
<tr>
<td>4 - Airless plastic welding units</td>
<td>4 - Digital electrical multimeters</td>
<td>1 - Computerized laser measuring system</td>
</tr>
<tr>
<td>1 - Metal break</td>
<td>2 – Saturation rollers</td>
<td>2 - Mechanical measuring systems</td>
</tr>
<tr>
<td>8 - HVLP spray guns</td>
<td>1 - Pulse welder</td>
<td>1 - Set of dimension manuals</td>
</tr>
<tr>
<td>8 - Dual-action sanders</td>
<td>1 - STRSW</td>
<td>2 - Strut tower gauges</td>
</tr>
<tr>
<td>1 - Spray gun</td>
<td></td>
<td>1 – ICBC / BC private insurance compatible estimating system</td>
</tr>
<tr>
<td>8 - Fresh air respirators</td>
<td>8 - HVLP spray guns</td>
<td>8 - HVLP spray guns</td>
</tr>
<tr>
<td>8 - Straight line sanders</td>
<td>4 - Fresh air systems</td>
<td>4 - Spray booth</td>
</tr>
<tr>
<td>8 - Sets of general sanding blocks</td>
<td>4 - Sets of masking equipment and materials</td>
<td>4 - Sets of masking equipment and materials</td>
</tr>
<tr>
<td>1 - Complete primer undercoat system</td>
<td></td>
<td>1 - Complete topcoat system</td>
</tr>
<tr>
<td>2 - Complete vehicles</td>
<td></td>
<td>4 - Sets of polishing equipment and material</td>
</tr>
<tr>
<td>1 – Printer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>220V Dent pulling station (DentFix)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nitrogen plastic welder</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 - Sets of polishing equipment and material</td>
<td></td>
</tr>
</tbody>
</table>

Motor Vehicle Body Repairer (Metal & Paint) (Automotive Collision Repair Technician)
Shop Tools and Equipment – Miscellaneous

Miscellaneous – All Levels
- Sanding material

<table>
<thead>
<tr>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Sheet metal material</td>
<td>• Aluminum material</td>
<td>• Cleaning materials</td>
</tr>
<tr>
<td>• Body filler material</td>
<td>• Body filler material</td>
<td>• Sanding equipment</td>
</tr>
<tr>
<td>• Adhesive and fiberglass material</td>
<td>• Adhesive material</td>
<td>• Primer undercoats</td>
</tr>
<tr>
<td>• Masking equipment and material</td>
<td>• Fiberglass material</td>
<td></td>
</tr>
<tr>
<td>• Refinishing material</td>
<td>• Electrical components</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• SMC material</td>
<td></td>
</tr>
</tbody>
</table>

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
3rd Edition
ISBN-10: 13059943

Recommended Resources

www.i-car.ca
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.
Appendix A

Glossary
Appendices

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 measurable 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

<table>
<thead>
<tr>
<th>Competency</th>
<th>Practical Assessment Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>B4 Describe organizational skills</td>
<td>The learner will access and interpret OEM specifications and repair procedures.</td>
</tr>
<tr>
<td>C2 Perform oxyacetylene procedures</td>
<td>The learner will perform oxyacetylene set up, cutting, heating and shut down.</td>
</tr>
<tr>
<td>D3 Perform various MIG welds on sheet steel</td>
<td>The learner will perform a butt weld, a lap weld, and a plug weld.</td>
</tr>
<tr>
<td>D4 Describe plasma arc cutting</td>
<td>The learner will perform a cut on 22 or 20 gauge steel.</td>
</tr>
<tr>
<td>E4 Describe minor sheet metal damage repair</td>
<td>The learner will repair minor sheet metal damage.</td>
</tr>
</tbody>
</table>
| F3 Demonstrate plastic repair techniques | The learner will perform plastic repairs, including  
  - Welded  
  - Adhesive |
| 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

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

<table>
<thead>
<tr>
<th>Competency</th>
<th>Practical Assessment Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>J4 Identify measuring theory and gauging equipment</td>
<td>The learner will perform tram gauge measurements.</td>
</tr>
<tr>
<td>J11 Prepare a structural damage analysis sheet</td>
<td>The learner will document damage analysis.</td>
</tr>
<tr>
<td>J12 Demonstrate structural repair procedures</td>
<td>The learner will perform a structural repair.</td>
</tr>
<tr>
<td>J13 Demonstrate closed box panel structural sectioning techniques</td>
<td>The learner will section a closed box, such as</td>
</tr>
<tr>
<td></td>
<td>• Pillar</td>
</tr>
<tr>
<td></td>
<td>• Rocker</td>
</tr>
<tr>
<td></td>
<td>• Rail</td>
</tr>
<tr>
<td>M4 Describe the refinishing process</td>
<td>The learner will prepare and apply refinish materials.</td>
</tr>
</tbody>
</table>
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:**

- Lee Bouchard - ATSO Assessment Coordinator
- Paul Dhaliwal - Collision Technician, Flag Mitsubishi
- Digenus (Dennis) Roussanidis - Collision Technician, No.1 Collision
- Michael S. Webb - Collision Technician, Mike's Quality Collision

**Industry subject matter experts retained as Program Outline reviewers:**

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- Mark Deroche - Chief Instructor, Collision Department, BCIT
- Randy Dewar - Instructor, Auto Collision, Okanagan College
- Rory Morrison - Department Head, Auto Collision Department, VCC
- Nick Penner - Instructor, Auto Collision Department, UFV
- Dennis Shorter - Instructor, Auto Collision Department, VCC
- Lee Bouchard - ATSO Assessment Coordinator
- Paul Dhaliwal - Collision Technician, Flag Mitsubishi
- 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.