PROGRAM OUTLINE

Motor Vehicle Body Repairer
(Metal and Paint)
(Automotive Collision Repair Technician)
AUTOMOTIVE COLLISION REPAIR TECHNICIAN
PROGRAM OUTLINE

MAY 2012

BASED ON
NOA 2010

Developed by
Industry Training Authority
Province of British Columbia
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INTRODUCTION

Automotive Collision Repair Technician
Introduction

Foreword

This Program Outline is developed by the Automotive Training Standards Organization (ATSO) in accordance with the General Regulations made pursuant to the “Industry Training and Apprenticeship Act” of British Columbia. It reflects updated standards based on the 2010 Motor Vehicle Body Repairer (Metal and Paint) National Occupational Analysis (NOA). This Program Outline was prepared with the advice and assistance of an industry-centered advisory committee in cooperation with the Automotive Training Standards Organization. The Program Outline is intended as a guide for training providers, instructors, apprentices and their sponsors. This outline is separated into four main sections which include:

The Introduction - Contains a Foreword and the Acknowledgements section that lists all of the participants who were involved in the creation of this document, as well as a section called “How to Use this Document” which provides an oversight on how this document can be used.

The Program Overview - Contains a Credentialing Model that shows the path and requirements for the apprentice, a Program Assessment guide which indicates the types of assessments required for the program, an Occupational Analysis Chart that has the General Areas of Competency (GAC) and the individual competencies, and a Training Topics and Suggested Time Allocation which provides a suggested percentage of time for theory and practical components for each GAC in each level of technical training.

The Program Content - Represents individual levels broken down into General Areas of Competencies, which are further separated into competencies defined by L Objectives, Learning Tasks and Content.

The Training Provider Standards - A guide on Automotive Collision Repair facilities which outlines the requirements needed to provide training for this program. The Facility Requirements section provides minimal requirements for facilities seeking designation and upgrade. The Tools and Equipment section lists the minimal required tools to cover the competencies of this program. The Reference Material section is a collection of materials used for learning guides by the apprentice and instructors for the theory and the practical portion of the program. Finally, the Instructor Requirements section provides the level of knowledge and experience that each instructor must have to competently provide instruction in this program.

Practical instruction through demonstration and through student participation should be integrated within 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. It is the responsibility of employers to ensure safety training for the apprentices working on their work sites.

For more information please refer to the Motor Vehicle Body Repairer (Metal and Paint) (Automotive Collision Repair Technician) Program Profile document on the ITA website www.itabc.ca.

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

The 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 Mitsubushi
- 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:

- Chris Burns - Auto Collision Department, Okanagan College
- 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 Mitsubushi
- Digenus (Dennis) Roussanidis - Collision Technician, No.1 Collision
- Michael S. Webb - Collision Technician, Mike's Quality Collision

Facilitators:

- Lloyd Stamm - ATSO CEO
- Kevin Cudmore - ATSO Program Development Coordinator
- Taryn Wilson – ATSO Administrative Coordinator

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.
### 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>Industry Training 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>Suggested Schedule of Time Allotment</td>
<td>Shows proportionate representation of various GACs at each program level; should map to proportions of time spent on training, practical experience, and assessment</td>
<td>Understand the relative scope of various areas of the occupation, and areas in which the apprentice would require on-the-job experience</td>
<td>Understand the relative scope of various areas of the occupation, and areas in which on-the-job experience would be provided</td>
<td>Understand the relative weightings of various areas of the occupation on which assessment is based</td>
</tr>
<tr>
<td>Program Outline</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>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

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

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

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

Automotive Collision Repair Technician Foundation
Technical Training: 30 weeks*

C of C
Automotive Collision Repair Technician Foundation Program

C of Q
Motor Vehicle Body Repairer (Metal & Paint) (Automotive Collision Repair Technician)

C of A
Motor Vehicle Body Repairer (Metal & Paint) (Automotive Collision Repair Technician)

RECOMMENDATION FOR CERTIFICATION

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

C of Q
Automotive Service Technician (AST 4)

Technical Training: None
WBT: 3,360 hours

*Suggested duration based on 30-hour week

Motor Vehicle Body Repairer (Metal & Paint) (Automotive Collision Repair Technician)
Industry Training Authority
Challenge Pathway

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

C of Q = Certificate of Qualification

Completion Requirements
Interprovincial Red Seal Exam

Prerequisites
Approved challenge application, including:
Trade-Related Work Experience: 10,125 hours

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

None
# 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.

## OCCUPATIONAL SKILLS AND SAFETY

<table>
<thead>
<tr>
<th>A</th>
<th>Describe safe work practices</th>
<th>Describe shop safety procedures</th>
<th>Describe waste product handling</th>
<th>Describe Work Hazard Material Information System (WHMIS)</th>
<th>Describe Personal Protective Equipment (PPE)</th>
<th>Describe WCB Standards and Regulations</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
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</table>

## TOOLS AND EQUIPMENT

<table>
<thead>
<tr>
<th>B</th>
<th>Describe collision repair hand tools</th>
<th>Identify power tools</th>
<th>Identify various fasteners</th>
<th>Describe organizational skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>B2</td>
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<td>B3</td>
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<tr>
<td>B4</td>
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</tbody>
</table>

## OXYACETYLENE PROCEDURES

<table>
<thead>
<tr>
<th>C</th>
<th>Describe oxyacetylene safety</th>
<th>Perform oxyacetylene procedures</th>
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</thead>
<tbody>
<tr>
<td>C1</td>
<td></td>
<td></td>
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<tr>
<td>C2</td>
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</table>

## WELDING

<table>
<thead>
<tr>
<th>D</th>
<th>Describe MIG (Shielded Metal Arc Welding SMAW) safety</th>
<th>Describe MIG welding process</th>
<th>Perform various MIG welds on sheet steel</th>
<th>Describe plasma arc cutting</th>
<th>Describe resistance spot welders</th>
<th>Describe set-up procedures for MIG welding aluminum</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1</td>
<td></td>
<td>1</td>
<td>1</td>
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<td>D2</td>
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<td>D6</td>
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<td>2</td>
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</table>

Perform various aluminum MIG welds

D7

2
## Program Overview

<table>
<thead>
<tr>
<th>SHEET METAL REPAIR</th>
<th>E1</th>
<th>E2</th>
<th>E3</th>
<th>E4</th>
<th>E5</th>
<th>E6</th>
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</thead>
<tbody>
<tr>
<td>Describe the characteristics of sheet metal</td>
<td>1</td>
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<td>Describe the types of basic sheet metal damage</td>
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<tr>
<td>Identify sheet metal repair tools and equipment</td>
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<td></td>
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<td>Describe minor sheet metal damage repair</td>
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<tr>
<td>Describe productive organizational skills</td>
<td></td>
<td></td>
<td>2</td>
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<tr>
<td>Describe complex damage analysis procedures</td>
<td></td>
<td></td>
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</table>

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

### Structural Repair

<table>
<thead>
<tr>
<th>J</th>
<th>Identify the various structural designs</th>
<th>J1</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Identify collision theory concepts</td>
<td>J2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Identify damage assessment techniques</td>
<td>J3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Identify measuring theory and gauging equipment</td>
<td>J4</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Identify various measuring systems</td>
<td>J5</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Identify unibody anchoring techniques</td>
<td>J6</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Identify conventional frame anchoring techniques</td>
<td>J7</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Describe straightening techniques</td>
<td>J8</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Describe pulling techniques</td>
<td>J9</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Describe structural panel replacement procedures</td>
<td>J10</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Prepare a structural damage analysis sheet</td>
<td>J11</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Demonstrate structural repair procedures</td>
<td>J12</td>
<td>3</td>
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</table>

### Suspension and Steering

<table>
<thead>
<tr>
<th>K</th>
<th>Identify MacPherson Strut suspension system</th>
<th>K1</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Identify short and long arm suspension systems</td>
<td>K2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Identify the various types of rear suspension systems</td>
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<td>Describe rack and pinion steering systems</td>
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<td>Describe parallelogram steering systems</td>
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### Insurance Estimating

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### Refinishing

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<td>Identify the detailing process</td>
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## Training Topics and Suggested Time Allocation

**Motor Vehicle Body Repairer (Metal and Paint)**  
(Automotive Collision Repair Technician)  
Level 1

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<td>Describe waste product handling</td>
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<td>Describe Work Hazard Material Information System (WHMIS)</td>
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<td>Identify various fasteners</td>
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<td>Describe MIG welding process</td>
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<td>Perform various MIG welds on sheet steel</td>
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<td>Describe plasma arc cutting</td>
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<td>Describe resistance spot welders</td>
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### Program Overview

#### % of Time Allocated to:

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**Total Percentage for Automotive Collision Repair Technician Level 1**

100%
## Program Overview

**Motor Vehicle Body Repairer (Metal and Paint)**  
(Automotive Collision Repair Technician)  
Level 2

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<td>Describe complex damage analysis procedures</td>
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<td>Describe plastic filling procedures for damage to complex sheet metal areas</td>
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<td>E10</td>
<td>Describe panel replacement and repair techniques</td>
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<td>Describe repair procedures for fibreglass and SMC</td>
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**Total Percentage for Automotive Collision Repair Technician Level 2**  
100%
## Program Overview

### Motor Vehicle Body Repairer (Metal and Paint)  
**Automotive Collision Repair Technician**  
**Level 3**

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<td>✓</td>
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<td>Describe parallelogram steering systems</td>
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<td>Describe mixing and application of primers</td>
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<tr>
<td>M3</td>
<td>Describe refinishing corrosion protection methods</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
Program Content  
Level 1

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 vehicle safety precautions.

LEARNING TASKS

1. Discuss personal safety precautions and procedures.

- Personal apparel
  - Clothing
  - Hair and beards
  - Jewellery
- Personal protection
  - Head
  - Hands
  - Lungs
  - Eyes
  - Ears
  - Feet
- Housekeeping
- Ventilation systems
- Clear headedness
  - Contributing factors
- Horseplay
- Respect for others safety
- Constant awareness of surroundings
- Lifting

2. 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

3. Describe the conditions and classifications of fires.

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

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

6. Describe Hybrid safety precautions.

CONTENT

- Conditions to support fire
  - Air
  - Fuel
  - Heat
- Classes of fires
  - A – combustibles
  - B – liquids
  - C – electrical
  - D – metal
- Symbols and colours
- Fuels
  - Diesel
  - Gasoline
  - Propane
  - Natural gas
  - Solvents
- Lubricants
- Oily rags
- Combustible metals
- Aerosols
- Warning others and fire department
- Evacuation of others
- Fire contained and not spreading
- Method of exit
- Training
- P.A.S.S.
  - Point
  - Aim
  - Squeeze
  - Sweep
- 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
   - Floor jacks
   - Safety stands
   - Proper housekeeping
   - Use of grinding tools
   - Movement of vehicles in the shop area
   - Battery disconnect
   - Hoists

2. Describe lifting equipment safety.
   - Limitations of lifting equipment
   - Applications of lifting equipment
   - Safe lifting locations or points
   - Maintaining and 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
Program Content
Level 1

LINE (GAC): A
Competency: A3

OCCUPATIONAL SKILLS AND SAFETY
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

- Shop supplies
- Paint products
- Welding gases
- Waste products
- Waste removal fees
Program Content
Level 1

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 MSDS requirements.
- Describe the purpose of the Workplace Hazardous Materials Information System (WHMIS).
- Explain the contents of a WHMIS label.
- Describe the responsibilities of employees under WHMIS.
- Describe the responsibilities of employers under WHMIS.
- Describe information to be disclosed on a MSDS.
- Apply WHMIS regulations as they apply to hazardous materials used in the shop.

LEARNING TASKS

1. Describe MSDS requirements.

- Hazardous Product Act
- Controlled Products Regulations
- Ingredient Disclosure List
- Hazardous Materials Information Review Act
- Hazardous Materials Information Review Regulations


- Protection of Canadian workers
- Recognition of rights
  - Workers
  - Employers
  - Suppliers
  - Regulators

3. Describe the key elements of WHMIS.

- Material Safety Data Sheets (MSDS) and location
- Labelling of containers of hazardous materials
- Worker education programs

4. Describe the responsibilities of employees under WHMIS.

- MSDS
- Labels

5. Describe the responsibilities of employers under WHMIS.

- Provide training
- MSDS
- Labels
- Work Education Programs in the workplace
LEARNING TASKS

6. Describe information to be disclosed on a MSDS.

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

- 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

- Use storage and disposal of:
  - Solvents
  - Caustic cleaners
  - Cleaning solutions
  - Alcohol used for cleaning
  - Gasoline
  - Diesel fuel
  - Asbestos
  - Battery acid
  - Refrigerants
  - Brake fluid
  - Antifreeze
  - Lubricants
LINE (GAC): A  OCCUPATIONAL SKILLS AND SAFETY
Competency: A5  Describe Personal Protective Equipment (PPE)

Objectives

To be competent in this area, the individual must be able to:
- Identify Personal Protective Equipment (PPE).
- Inspect, use and maintain Personal Protection Equipment (PPE).
- Recognize workplace hazards.
- Describe occupational health and safety regulations.

LEARNING TASKS

1. Identify the types of Personal Protective Equipment.

   - Hearing
   - Eyes
   - Skin
   - Breathing protection
   - Hands
   - Foot

2. Describe the use of Personal Protective Equipment.

   - 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

5. Describe the required personal skills to reduce workplace hazards.

   - Organization
   - Communication
   - Knowledge
   - Experience
6. Describe workplace safety and health regulations.

- WCB regulations
- Provincial regulations
- Municipality regulations
- National regulations
- Fire regulations
LINE (GAC): A  OCCUPATIONAL SKILLS AND SAFETY
Competency: A6  Describe WCB Standards and Regulations

Objectives

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

- Describe the application of the parts of the Worker’s Compensation Act Outline in the Occupational Health and Safety Regulations.

LEARNING TASKS

1. Define terms used in the Workers’ Compensation Act.

   - Definitions, Section 1 of the Act

2. Describe the conditions under which compensation will be paid (Book 1).

   - Part 1, Division 2 of the Act

3. State the general duties of employers, employees and others (Book 1).

   - Part 2, Division 3, Sections 115-124 of the Act

4. State the Workers’ Compensation Act requirements for the reporting of accidents (Book 1).

   - Part 1, Division 5, Sections 53 and 54 of the Act

5. State the Core Requirements of the Occupational Health and Safety Regulation (Book 1).

   - 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
LEARNING TASKS

CONTENT
- Chemical and biological substances
- Substance specific requirements
- Noise, vibration, radiation and temperature
- Personal protective clothing and equipment
- Confined spaces
- Fall protection
- Tools, machinery and equipment
- Ladders, scaffolds and temporary work platforms
- Transportation of workers
- Electrical safety
LINE (GAC): B 
COMPETENCY: B1 
TOOLS AND EQUIPMENT

Describe collision repair hand tools

Objectives

To be competent in this area, the individual must be able to:
- Identify the use of general hand tools.
- Describe the use of hand tools.

LEARNING TASKS

1. Identify the use of general hand tools used in the trade.
   - 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 of use of hand tools
   - Torque specifications
   - Maintain hand tools
   - Store hand tools
   - Ability to recognize worn, broken and defective hand tools
Program Content
Level 1

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. Identify the use of power tools used in the trade.

   - Bench grinders
   - Drills
   - Sanders
   - Grinders
   - Miscellaneous electric tools
   - Miscellaneous air tools
   - Miscellaneous hydraulic tools
   - Operating procedures
   - Limitations of use
   - Ability to maintain and store power tools

2. Identify the potential hazards when using power tools.

   - Frayed cords
   - Cracked casings
   - Leaking Lines
   - Work environment
LINE (GAC): B  TOOLS AND EQUIPMENT
Competency: B3  Identify various fasteners

Objectives

To be competent in this area, the individual must be able to:
- Identify various fasteners used in the collision repair industry.
- Identify the procedures used to interior and exterior components.

LEARNING TASKS

1. Identify the types and uses of the various fasteners used to remove and install trim in the collision repair industry.
   - Bolts
   - Nuts
   - Washers
   - Clips
   - Pop rivets
   - Moulding clips
   - Adhesives
   - Screws
   - Costs of fasteners

2. Identify the procedures used to replace interior and exterior components.
   - Removal procedures
   - Replacement procedures
   - Fastener identification
   - Removal and replacement of retainers
   - Identifying reusable parts
   - Final operation/fit and finish
Program Content
Level 1

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.
- Identify a safe working environment.

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

2. Describe the use of manufacturers’ specification and repair procedures.
   - Sources of specifications and information
   - Access specification and information
   - Interpret manufacturers’ specifications and repair procedures
   - Interpret and apply information from hard copy and on-line technical manuals

3. Describe the process to prepare work area.
   - Repair procedures
   - Perform housekeeping
   - Select correct tools and equipment
   - Ability to lay out tools and equipment

4. Identify the skills required to provide a safe work environment.
   - Fire hazards
   - Hazardous settings
   - Personal injury hazards
   - Communicate potential hazards
   - Keep work area clean and free from clutter
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
Program Content
Level 1

LINE (GAC): C OXYACETYLENE PROCEDURES
Competency: C2 Perform oxyacetylene procedures

Objectives

To be competent in this area, the individual must be able to:
- Describe oxyacetylene procedures.
- Perform oxyacetylene procedures.

LEARNING TASKS

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

2. Perform oxyacetylene procedures.
   - Personal Protection Equipment (PPE)
   - Prepare tanks, regulators, hoses and torches
   - Tip selection
   - Setting working pressures for project
   - Torch lighting procedures
   - Flames
     - Carburizing
     - Neutral
     - Oxidizing
   - Heating procedure for expansion
   - Heating for shrinking
   - Heating with rosebud
   - Cutting with cutting tips
   - Shutdown
   - Storing equipment
Program Content
Level 1

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 /Shielded Metal Arc Welding (SMAW) welder.
- Describe the safety precautions involved with MIG (SMAW) welding.

LEARNING TASKS

1. Identify the components of a MIG Gas Metal Arc Welding (GMAW) welder.
   - Inverter power supply
     - 110 volts
     - 220 volts
     - DC reverse polarity
   - Service parts
     - Wire spool
     - Liner
     - Trigger connections
     - Main hose assembly
     - Gas diffuser
     - Contact tip
     - Nozzle
     - Ground clamp
     - Cables
   - Wire sizes
   - Shielding Gas
     - C-25 (75% argon/25% carbon dioxide)
     - 100% carbon dioxide
     - 100% argon (aluminum only)

2. Describe the safety precautions involved with MIG Shielded Metal Arc Welding (SMAW) welding.
   - Personal Protection Equipment (PPE)
     - Eye and face protection
     - Hearing protection
     - Clothing
     - Gloves
     - Footwear
     - Respirator
   - Ventilation
   - Grounded AC connections
   - Good connection for ground clamp
   - Flash shield placement
   - Battery Disconnect
   - Proximity to Control Modules
   - Manufacturers’ precautions
Program Content
Level 1

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 (SMAW) welding.
- Describe shot arc, spray arc, and stitch spray arc MIG (SMAW) welding methods.

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</table>
| 1. Describe the set up procedure used for MIG (SMAW) welding. | • Drive roller pressure  
• Wire speed  
• Voltage (heat) selection  
• Shielding gas flow rate  
• Grounding methods |
| 2. Describe the short arc transfer method. | • Purpose  
• Uses  
• Voltage  
• Current |
| 3. Describe the spray arc transfer method. | • Purpose  
• Uses  
• Voltage  
• Current |
| 4. Describe the stitch spray arc transfer method. | • Pulse  
• Purpose  
• Uses  
• Voltage  
• Current |
Program Content
Level 1

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

Objectives

To be competent in this area, the individual must be able to:
- Perform a butt and lap weld on 22 gauge steel.
- Perform a plug weld on 22 and 20 gauge steel.

LEARNING TASKS

1. Perform a butt weld on 22 gauge steel.
   - 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
Program Content
Level 1

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

Objectives
To be competent in this area, the individual must be able to:
- Describe resistance spot welders.

LEARNING TASKS
1. Describe resistance spot welders.

CONTENT
- Components
- Reach arms
- Pressurization handle
- Transformer
- Timer
- Purpose
- Use
- Voltage
- Current
- Maintenance
- Pressure
- Time
- 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.
   • Tensile strength
   • Yield strength
   • Spring-back
   • Chemical composition
   • Work hardening
   • Annealing
   • Affects of heat

2. Describe the characteristics of high-strength steel.
   • Tensile strength
   • Yield strength
   • Spring-back
   • Chemical composition
   • Characteristics
   • Work hardening
   • Annealing
   • Affects of heat

3. Describe the characteristics of advanced and ultra-high strength steels.
   • Advanced high strength steel examples
     o Brake hardenable
     o Yield strength
     o Tensile strength
     o Spring-back
     o Martensitic (MART)
     o Isotropic (IS)
     o Carbon Manganese
     o HSLA
     o Dual/Complex phase
   • Ultra high strength steel examples
     o Boron
     o Dual/Complex phase
     o 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
- 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 jack outfits
   - Pulling equipment
Program Content
Level 1

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

Objectives

To be competent in this area, the individual must be able to:
- Describe the various sheet metal repair procedures.
- Describe plastic filling and shaping repair procedures.
- Utilize shaping repair materials.

**LEARNING TASKS**

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Program Content
Level 1


- Repair materials
- Abrasives
- Sanding progression
- Rough shaping
  - Machine
  - Block
- Inspect panel visually and by touch to verify panel shape
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

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

2. Describe airless welding techniques.
   - Purpose and application
   - Thermoplastic and thermo set repair
   - Maintain welding equipment
   - Store welding equipment
   - Recognize potential hazards
     - Air speed
     - Surface temperature

3. Describe adhesive repairs techniques.
   - Types of repairs
   - Types of adhesives
   - Adhesion promoters
   - Surface preparation steps
   - Application and finishing
   - Manufacturers’ specifications
Program Content
Level 1

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 interior and exterior plastic repairs.

LEARNING TASKS
1. Demonstrate interior and exterior plastic repairs.

CONTENT
• Identification of plastic
• Hot-air welding
• Airless welding
• Adhesive repairs
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 the types and components of a spray gun.
- Perform spray gun troubleshooting techniques.
- Perform spray gun maintenance and cleaning.

LEARNING TASKS
1. Identify the 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**

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<td>Piston type</td>
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<td>Double phase</td>
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<tr>
<td>Rotary type</td>
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</table>

| Description of air and moisture filtration equipment. |
| Air pressure  |
| Volume  |
| Displacement  |
| Pressure loss  |
| Atmospheric versus compressed air  |

| Description of air and moisture filtration 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
   - Health risks
   - 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)
   - 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:
- Identify the various vehicle substrates and topcoats.
- Identify the condition of the substrate.
- Identify pre-cleaning procedures.
- Describe sanding equipment and sanding materials.
- Perform various sanding repair procedures.
- Demonstrate paint removal techniques.

**LEARNING TASKS**

<table>
<thead>
<tr>
<th>CONTENT</th>
<th>1. Describe vehicle substrates.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel</td>
<td>o Galvanized</td>
</tr>
<tr>
<td></td>
<td>o Mild</td>
</tr>
<tr>
<td></td>
<td>o High strength</td>
</tr>
<tr>
<td></td>
<td>o Ultra high strength</td>
</tr>
<tr>
<td>Aluminum</td>
<td></td>
</tr>
<tr>
<td>Plastics</td>
<td></td>
</tr>
<tr>
<td>Fibreglass</td>
<td></td>
</tr>
<tr>
<td>Sheet Moulded Compound (SMC)</td>
<td></td>
</tr>
<tr>
<td>Carbon fiber</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CONTENT</th>
<th>2. Identify vehicle topcoat.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single stage</td>
<td></td>
</tr>
<tr>
<td>Basecoat clear coat</td>
<td></td>
</tr>
<tr>
<td>Tri-coat</td>
<td></td>
</tr>
</tbody>
</table>
LEARNING TASKS

3. Describe substrate evaluation.

CONTENT
- Cracking
- Peeling
- Rusty
- Checking
- Solvent pop
- Excessive mil thickness
- Chalking
- Chemical fall out
- Rail dust
- Poor adhesion
- Flaking
- Checking
- Pin holes
- Bridging
- Runs and sags
- Orange peel

4. Identify cleaning steps prior to sanding.

CONTENT
- Soap and water wash
- Wax and grease remover
- Trim removal
- Masking materials
- Masking techniques
- Masking removal
- Polishing compounds

5. Describe sanding materials.

CONTENT
- Sanding discs
- Wet/dry papers
- Disc sizes
- Grit types
- Paper grit size
- Abrasive pads
- Open coat/closed coat
- Stripping materials
LEARNING TASKS

6. Describe sanding equipment.

- Rotary
- Orbital
- Dual action
- Random-orbital
- Straight Line
- Grinders
- Sanding blocks/contour blocks
- Sanding pads
- Vacuum type system

7. Demonstrate sanding procedures.

- Hand sanding
- Power sanding
- Feather-edging techniques
- Grinding
- Block sanding
- Guide coats
- Desired sanding outcomes

8. Demonstrate paint removal techniques.

- Steel substrate
  - Sanding removal
    - Hand
    - Machine
  - Chemical removal
  - Media blasting
- Plastic substrate
  - Sanding removal
  - Chemical removal
LINE (GAC): G
COMPETENCY: G5 Demonstrate the application of undercoats/primers

OBJECTIVES:
To be competent in this area, the individual must be able to:
- Describe the characteristics of the various undercoats.
- Describe primer mixing and application procedures.
- Demonstrate application methods of the various primers.

LEARNING TASKS
1. Describe the various undercoats and their specific applications when used over a repaired surface.
   - Self etch
     - Wash primers
     - Zinc chromate primer
     - Epoxy primer
     - Aerosol primer
   - Plastic primer/adhesion promoter
   - Primer surfacers
   - Etch primers/adhesion promoter
   - Sealers
   - Primer sealers

2. Describe the mixing and application steps for the various undercoats.
   - Safety precautions
   - Personal Protection Equipment (PPE)
   - Type of solvent
   - Amount of reduction
   - Mixing container
   - Mixing stick
   - Mixing hazards
   - Pot life
   - Air pressure
   - Type of spray gun required
   - Number of coats
   - Minimum dry times
   - Minimum flash times
   - Mixing computer knowledge
   - Application method
   - Temperature of spraying environment

3. Demonstrate the correct method used to apply a primer.
   - Epoxy primer
   - Primer surfacer
   - Sealer
   - Wash primer
Program Content
Level 1

LINE (GAC): G SURFACE PREPARATION
Competency: G6 Identify corrosion protection techniques

Objectives:

To be competent in this area, the individual must be able to:
- Describe anti-corrosion materials.
- Describe the areas of the vehicle that require corrosion protection.
- Demonstrate the application of anti-corrosion materials.

<table>
<thead>
<tr>
<th>LEARNING TASKS</th>
<th>CONTENT</th>
</tr>
</thead>
</table>
| 1. Describe the materials used for the prevention of corrosion. | - Zinc coating  
- Conversion coating  
- Epoxy primer  
- Primer surfacer  
- Anti-corrosion compounds  
- Joint and seam sealers  
- Weld through primer  
- Undercoating  
- Wax coatings |
| 2. Describe the areas of the vehicle requiring corrosion protection. | - Joints and seams  
- Inside closed sections  
- Exterior panels (inside and outside) |
| 3. Demonstrate application of corrosion protection products. | - Galvanizing compound when welding  
- Epoxy or self-etching primers  
- Light, medium, or heavy-bodied joint and seam sealers  
- Anti-corrosion compounds |
Program Content
Level 1

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 the various types of body/frame construction.
• Describe the components of a body structure.

LEARNING TASKS
1. Identify the various types of body/frame construction.
   • Conventional frame
   • Unitized body (early)
   • Unitized stub frame
   • Unibody

2. Describe the terminology for identifying the various components of the body structure.
   • Structural panels
   • Exterior fixed panels
   • Exterior removable panels
   • Exterior trim
   • Interior trim
   • Door hardware
   • Glass components
   • Front/rear clip
Program Content
Level 1

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:
- Describe panel alignment technique.
- Describe the importance of lubricating and sealing a moveable panel.
- Identify the methods used to test fit a panel.

LEARNING TASKS

1. Describe the reasons for proper panel alignment.
   - Operation
     - Moveable
     - Fixed
   - Fit/alignment
   - Safety
   - Seal
   - Parts wear
   - Customer satisfaction

2. Describe the methods of aligning panels.
   - Adjusting
   - Shimming
   - Bending
   - Jacking
   - Blocking
   - Alignment sequence

3. Describe the importance of proper lubrication and sealers on moveable panel operation.
   - Operation
   - Parts wear
   - Rust proofing

4. Identify the methods used to test fit a panel.
   - Method of fastening
   - Align with adjacent panels
   - Test fit panel
   - Use of correct fasteners
   - Identify misaligned panels
   - Verify part movement (moveable parts)
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 door assembly components and their functions.
- Describe the components of a bumper assembly.
- Describe the front end sheet metal components.
- Describe vehicle interior components.
- Describe the removal and installation procedures of interior components.

LEARNING TASKS
CONTENT
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 the front end sheet metal components.
   - Fenders
   - Hood panel
   - Headlight mounting panel
   - Methods of alignment
LEARNING TASKS

4. Describe the components found in the interior of a vehicle.

5. Describe the removal and installation of interior components.

CONTENT

- Seats
- Steering wheel
- Dash
- Console
- Headliner
- Door panels
- Visor
- Carpet
- Switches
- A, B, C pillar trim
- Stereo
- Sunroof
- Child seat anchors
- Luggage nets
- Spare tire
- Accessories
- Air bags
Program Content
Level 1

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
Program Content
Level 1

LINE (GAC): H AUTO BODY CONSTRUCTION AND COMPONENTS
Competency: H5 Describe automotive laminated glass

Objectives:

To be competent in this area, the individual must be able to:
• Describe laminated glass.

LEARNING TASKS
1. Describe automotive laminated glass.

CONTENT
• Characteristics
  o Safety
  o Clear
  o Tinted
  o Shaded
  o Heated
• H.U.D. (heads-up display)
• Rain/moisture sensor
• Acoustic inner layer
• Anti-lacerative
• Application
• NAGS (National Auto Glass Specifications)
• Repairable
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:
• Describe the removal and replacement procedure for fixed glass.
• Describe the removal and replacement procedure for moveable glass.

LEARNING TASKS
1. Describe removal and replacement procedures for non-adhesively bonded fixed glass.
   • Handling techniques
   • Types of removal procedures
   • Types of installation procedures
   • Leak inspection
   • Heated glass
   • Gasket
   • Lock strip
   • Run channel
   • Sash channel
   • Mechanically fastened
     o Butyl

2. Describe removal and replacement procedures for an adhesive mounted fixed glass.
   • Designs of glass mountings
   • Types of adhesives
     o Thiokol/Butyl
     o Urethane
   • Priming material specification
   • Pinch weld primers
   • Types of removal procedures
   • Types of installation procedures
   • Identify potential contamination
   • Cleaning procedure
   • Importance of urethane adhesive in structural strength of a vehicle
   • Leak inspection
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
   - Drive roller pressure
   - Wire feed
     - Spool/machine fed
     - Spool gun fed
   - Wire speed
   - Voltage (heat) selection
   - Shielding gas
     - Flow rate
     - Type (100% Argon)
   - Liner selection
   - Temperature sticks
   - Conditioning of metal

2. Describe set-up procedures for MIG brazing.

   CONTENT
   - Drive roller pressure
   - Wire feed
     - Spool/machine fed
     - Spool gun fed
   - Wire speed
   - Voltage (heat) selection
   - Shielding gas
     - Flow rate
     - Type (100% Argon)
   - Liner selection
   - Conditioning of metal
LINE (GAC): D  WELDING
Competency  D7  Perform various aluminum MIG welds

Objectives:
To be competent in this area, the individual must be able to:
- Perform a lap weld on sheet aluminum.
- Perform a plug weld on sheet aluminum.

LEARNING TASKS
1. Perform a lap weld on sheet aluminum.
   - 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
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.
- Describe manufacturers’ specifications and repair procedures.

LEARNING TASKS
1. Describe productive organizational skills.
   - 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

2. Describe the use of manufacturers’ specifications and repair procedures.
   - Sources of specifications and information
   - Ability to access specifications and information
   - Interpret manufacturers’ specifications and repair procedures
   - Interpret and apply information from hard-copy and on-line technical manuals
Program Content
Level 2

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
• Damage analysis techniques
• Need for a complete damage analysis
• Creation of a repair plan
• Avoiding an oversight
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
• Direct hammering
• Indirect hammering
• Edge alignment
• Body line alignment
• Sheet metal clamps and pulling devices
• Stud welder
• Last in/first out
• 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 plastic filling procedures.

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

CONTENT
- Identify fillers
  - All metal
  - Fibreglass (short hair, long hair)
  - Light weight
  - Polyester putty
  - Glazing putty
  - Applied
  - Spray
  - Spot putty
- Cleaning procedure
- Surface preparation
- Use of plastic filler
- Application
- Abrasive knowledge
- 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:
- Demonstrate sheet metal repair procedures.

LEARNING TASKS
1. Demonstrate sheet metal repair procedures.

CONTENT
- Personal Protection Equipment (PPE)
- Cleaning
- Analysis
- Roughing
- Shrinking
- Adjacent part fit-up
- Plastic Filling
- Sanding

NOTE: This Competency is designed to allow the apprentice to demonstrate his/her skills in the repair of various types of vehicle body damage. In-school circumstances may necessitate the selection of several types of repairs to various panels on the vehicle. It should be noted that while this Competency encompasses all levels of sheet metal damage, it is limited to body damage that does not require structural repairs to be performed to the vehicle.
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:
- Describe panel preparation.
- Describe panel reshaping.
- Describe panel alignment procedures.
- Describe plastic filler application and reshaping.
- Describe panel removal and installation procedures.

LEARNING TASKS
1. Describe damage analysis.
   - Identify extent of damage and repairability
     - Cost of replacement vs. repair
     - Part availability
     - Customer requests

2. Describe the procedure required to prepare a panel for repair.
   - Repair materials
   - Cleaning products
   - Abrasives and strippers
   - Panel composition
   - Topcoat identification
   - Substrate identification
   - Removal of panel components

3. Describe the procedure required to reshape a panel for repair.
   - Damage analysis
   - Panel composition
   - Heating
   - Cold repair
   - Pushing/pulling
   - Shrinking
   - Hammer dolling
   - Stress relieving
   - Required anchoring equipment
   - Control of panel movement
   - Accessibility
   - Adjacent part fit up

4. Describe the procedure required to align a panel.
   - Alignment sequence
   - Restore to manufacturers’ specified gaps, seams and contours
   - Loaded suspension
LEARNING TASKS

5. Describe the procedure required to apply and shape repair materials.

6. Describe panel removal and installation procedures.

CONTENT

- Types of repair materials
- Required repair materials
- Application procedure
- Abrasives
- Sanding techniques
- Removal procedure
- Identify panel composition
- Remove necessary component for access
- Test fitting
- Panel alignment
- Vehicle construction
- Drilling spot welds
- Factory seams versus sectioning
- Welding procedures
- Bonding procedures
- Fastening procedures and types
- Restoring corrosion protection
- Joint sealing
- Sound deadener application
- Inspect panel
  - Visually
  - Touch
- Verify panel alignment and operation
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
• Chemical composition
• 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 plastic filling procedures.

LEARNING TASKS

1. Describe damage analysis.
   • Need for a complete damage analysis

2. Describe roughing procedures.
   • Direct hammering
   • Indirect hammering
   • Pry tools
   • Stress relieving and annealing with heat

3. Describe shrinking procedures.
   • Effects of restricted expansion and unrestricted contraction on sheet aluminum
   • Oxyacetylene shrinking
   • MIG electrode shrinking
   • Cold shrinking
   • Panel beater™ shrinking
   • Stud gun

4. Describe plastic filling procedures.
   • Cleaning procedures
   • Surface preparation
   • Use of plastic 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 fiberglass and SMC repairs.

LEARNING TASKS
1. Identify tools and equipment required for fibreglass and SMC repairs.

CONTENT
• Personal Protection Equipment (PPE)
• Materials
• Hand tools
• Power tools
### Objectives:
To be competent in this area, the individual must be able to:
- Describe various SMC and fiberglass damage.
- Describe SMC and fiberglass repair methods.
- Describe SMC and fiberglass panel replacement procedures.

### LEARNING TASKS

<table>
<thead>
<tr>
<th>Learning Task</th>
<th>CONTENT</th>
</tr>
</thead>
</table>
| 1. Identify SMC and fiberglass damage. | • Substrate identification  
• Cracks  
• Holes  
• Scratches  
• Panel replacement |
| 2. Describe various SMC and fiberglass damage repair techniques. | • Personal Protection Equipment (PPE)  
• 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) |
Program Content
Level 2

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:
- Describe various fibreglass and SMC repair methods.
- Perform a repair to a fiberglass panel.
- Perform a repair to a SMC panel.
- Perform an SMC or fiberglass panel replacement.

LEARNING TASKS

1. Describe the methods of repairing the different types of damage.
- Personal Protection Equipment (PPE)
- Cracks
- Holes
- Scratches
- Types of adhesives
- Layout
- Surface preparation
- Reinforcing
- Mixing and application of materials
- Heat shrinking of adhesives
- Finishing

2. Perform a minor repair to a fiberglass panel.
- Personal Protection Equipment (PPE)
- Cracks
- Holes
- Scratches
- Types of adhesives
- Layout
- Surface preparation
- Reinforcing
- Mixing and application of materials
- Heat shrinking of adhesives
- Finishing

3. Describe the methods for fiberglass and SMC panel replacement.
- Complete panel
- Partial panel (sectioning)

4. Perform SMC and fiberglass panel replacement.
- Complete panel
- Partial panel (sectioning)
Program Content
Level 2

LINE (GAC): I MECHANICAL COMPONENTS
Competency: I1 Identify seat belt assemblies

Objectives:
To be competent in this area, the individual must be able to:
• Describe seat belt assemblies and their components.
• Identify seat belt inspection procedures.
• Describe upholstery and interior panel removal procedures.

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
   • Removal sequence
   • Examine seat belt restraint system
   • Manufacturers’ specifications

2. Identify the inspection procedures for seat belt assembly.
   • Tongue/buckle assembly
   • Retractor (tilt mechanism and inertia type)
   • Webbing
   • Anchoring points

3. Describe the procedures used to remove interior panels and upholstery.
   • Types of fasteners
   • Location of fasteners
   • Follow installation sequence
   • Install fasteners
   • Correct storage of components
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 the components and their function within an airbag system.
• Identify airbag safety measures.
• Describe removal and replacement procedures for airbag system components.

LEARNING TASKS
1. Describe the functions of the airbag system components.
   • Impact sensors
   • Control module
   • Energy reserve module
   • Voltage converter
   • Clock spring
   • Wiring harness
   • Airbag module
   • Inflator assembly

2. Identify the safety procedures to follow when working on a vehicle equipped with an airbag system.
   • Disarm
   • Electrical disconnect
   • Handling of impact sensors
   • Handling a deployed inflator module
   • Handling an un-deployed inflator module

3. Describe the procedure to remove and replace the airbag system components.
   • Disarm system per manufacturer
   • Required tools
   • Impact sensors
   • Control module
   • Energy reserve module
   • Voltage converter
   • Clock spring
   • Wiring harness
   • Airbag module
   • Inflator assembly
   • Follow manufacturer removal and replacement process
   • Recognize related components
   • Knowledge of 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 the functions of cooling system components.
- Discuss the cooling system assembly process and check for leaks.
- Identify automotive oil cooling systems.

LEARNING TASKS
1. Describe the cooling system components and their functions.
   - Radiators
   - Thermostat
   - Hoses
   - Water pump
   - Fan assembly
   - Block heater/expansion plug
   - Intercoolers
   - Coolant
   - Heater core
   - Belts
   - Pulleys
   - Shrouds

2. Discuss the steps to assemble the cooling system and check for leaks.
   - Radiator installation
   - Coolant types and mixture
   - Filling procedures
   - Pressure testing

3. Identify the various vehicle oil cooling systems and their functions.
   - Transmission 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 safety precautions required when repairing an air conditioning system.
- Describe Ozone Depleting Substances (ODS) regulations.

LEARNING TASKS

1. Describe the major components of an air conditioning system and their functions.
   - Condenser
   - Receiver-drier
   - Expansion valve
   - Compressor
   - System Lines
   - Refrigerant
   - Belts

2. Identify the precautions to follow when repairing a vehicle equipped with air conditioning.
   - Pressurized system
   - Welding in vicinity
   - Draining system (recovery)
   - Sealing system

3. Describe the Ozone Depleting Substance (ODS) regulations.
   - Approved person
   - Motor vehicle air conditioning
   - Definition of recovery
   - Servicing
   - Certification
   - Record keeping
   - Labelling
   - Code of Practices
   - J-1989 Standard
   - Equipment certification
   - Disposal
   - Enforcement
LINE (GAC): I MECHANICAL COMPONENTS
Competency: I5 Identify vehicle systems

Objectives:
To be competent in this area, the individual must be able to:
- Identify the components of a drive train.
- Identify the components of an exhaust system.
- Describe the components of a fuel system.
- Describe the components of a braking system.
- Identify the components of an accessory system.

LEARNING TASKS
1. Identify the components of a drive train and their functions.
   - Engine
   - Transmission
   - Axle
   - CV joints
   - Differentials
   - Drive shaft

2. Identify the components of an exhaust system and their functions.
   - Muffler
   - Exhaust manifold
   - Exhaust pipe
   - Tail pipe
   - Catalytic converter
   - Resonator
   - Hangers
   - Clamps
   - Sensors
   - Heat shields

3. Describe the components of a fuel system and their functions.
   - Fuel pump
   - Fuel injectors
   - Fuel tank
   - Fuel lines
   - Spark plugs
   - Throttle body
   - Sending units
   - Emergency shut-off switch
   - Filters
   - Air intake system
LEARNING TASKS
4. Describe the components of a braking system.

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

5. Identify the accessory component system and their functions.

CONTENT
- Wipers
- Cruise control
- Traction control
- Compressors
- Infotainment center
Program Content
Level 2

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:

- Describe the principle of electrical circuits.
- Identify the safety precautions taken when working around batteries.
- Describe minor electrical diagnosis to a simple circuit.
- Describe automotive electronic components.
- Identify safety precautions working around electronic components.
- Describe damaged wire and exterior coating repairs.
- Describe electrical component installation and replacement procedures.
- Identify related accessory electrical components.

LEARNING TASKS CONTENT
1. Describe the principle of electrical circuits.
   • Voltage
   • Resistance
   • Current flow
   • Power consumption
   • Ohm’s Law
   • Series circuit
   • Parallel circuit
   • Voltage drop
   • Conductors
   • Insulators

2. Identify the safety precautions when working around batteries.
   • Gases present
   • Disconnecting
   • Removal
   • Charging
   • Welding near a battery
   • Using a test light
   • Using a multi-meter
   • Computers

3. Describe the steps in performing a minor electrical diagnosis on a simple circuit.
   • Voltage
   • Resistance
   • Current flow
   • Ohm’s Law
   • Voltage drop
   • Wiring harness repair
LEARNING TASKS

CONTENT

4. Describe the electronic components in use on a modern automobile.
   - Electronic control modules
   - Component sensors and typical locations

5. Identify the safety precautions to be taken when working around electronic components on the automobile.
   - Electrical disconnect
   - Computer module removal and storage welding near modules or sensors
   - Jump-starting precautions
   - Cleaners and cleaning procedures
   - Static straps

6. Describe damaged wires and exterior coatings repair.
   - Types of wiring and coverings
   - Types of connectors
   - Volt meters and test lights
   - Corrosion protection
   - Splice, cut and solder
   - Determine repair ability of wires
   - Identify damaged wires
   - Reapply corrosion protection
   - Reapply coverings
   - Electrical tape/shrink wrap

7. Describe damaged electrical components removal.
   - Component operation
   - Manufacturers’ removal procedure
   - Identify damaged component
   - Disconnect components
   - Storage and/or disposal of components

8. Describe electrical components installation.
   - Corrosion preventative materials
   - Manufacturers’ specifications
   - Splice, solder and reconnect connectors
   - Ability to read electrical diagrams
   - Test and verify component operation
   - Apply corrosion preventative materials
LEARNING TASKS
9. Identify related electrical components and their functions.

CONTENT
- Exterior lighting
- Interior lighting
- ABS
- Power accessories
- Stereo
- Antenna
- Switches
- Gauges
- Sending units
- Relays
- Computer
- Charging system
- Recoding procedures
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 conventional frame designs.
- Describe unibody design concepts.
- Describe unitized-stub design.
- Identify vehicle crush zones on each style of frame.

### LEARNING TASKS

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| 1. Describe conventional frame designs. | - Body over frame styles  
  - Ladder  
  - Perimeter  
  - "X" frame  
  - Torque box  
  - Hydroformed  
  - Body brackets  
  - Cross members  
  - Symmetrical  
  - Mild steel  
  - Adjustable suspension  
  - Susceptibility to different damage conditions |
| 2. Describe unibody design concepts. | - Unibody  
  - Semi-unitized  
  - Space frame  
  - Composite  
  - Torque box  
  - Overall structural integrity  
  - Stress hull design  
  - Limited suspension adjustments  
  - Asymmetrical  
  - High strength steel |
| 3. Describe unitized-stub design. | - Symmetrical design  
  - Adjustable suspension  
  - Body to stub-frame alignment  
  - Mild steel |
| 4. Identify vehicle crush zones. | - Design concepts  
  - 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:
- Identify types of collision forces.
- Identify inertia forces and their effects.
- Describe the deflection forces due to structural design.
- Identify the deflection forces due to direction of travel.
- Identify misaligned vehicle sections.
- Describe present forces in a front-end, rear-end and side collision.

LEARNING TASKS
1. Identify the forces present in a collision.
   - Stationary
   - Moving
   - Internal
   - External

2. Identify inertia and its role in a collision.
   - Inertia forces in a collision
   - Lack of inertia forces during repair

3. Describe the effects of forces to the vehicle.
   - Weight of vehicle
   - Impacting a fixed object
   - Impacting a moving object
   - External forces
   - Internal forces
   - Direction of damage forces

4. Describe the deflection of collision forces.
   - Structural design
   - Direction of travel

5. Describe the deflection due to structural design.
   - Strength and configuration of frame, glass and floor area
   - Resistance to collapsing

6. Describe the deflection due to direction of travel.
   - Responsible for lateral deflections
   - Single vehicle vs. multi-vehicle collisions

7. Describe misalignment of vehicle sections.
   - Three section principle
   - Strength of sections
LEARNING TASKS

8. Describe the forces present in a front-end collision.

- Moment of impact
- Frame rail deflection
- Center and rear deflection
- Upward deflection
- Crush zones
- Drivetrain deflection design

9. Describe the forces present in a rear-end collision.

- Moment of impact
- Rail and floor collapsing
- Additional collapsing
- Roof deflection
- Crush zones

10. Describe the forces present in a side collision.

- Moment of impact
- Side collapsing
- Additional collapsing
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
• Parts removal
• Center floor pan area
• Cracked seam sealer
• Pulled spot welds
• Door gaps
• Panel alignment
• Visual panel fit
• Allowable tolerances
• Fastening points
• Drop-light placement
• Panel wetting
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 planes.
- Identify point-to-point, parallel-to-datum and parallel-to-center measurement.
- Describe frame collision damage types.
- Describe the use of universal frame specification books.
- Identify tram, center and datum gauges.
- Describe X-measurement and length conversion techniques.

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<td>3. Identify parallel-to-datum measurement.</td>
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<td>4. Identify parallel-to-center measurement.</td>
<td>Definition</td>
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<td>Diamond</td>
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<td>Twist</td>
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<td>6. Describe the use of universal frame specification books.</td>
<td>Manufacturers’ specifications</td>
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</table>
LEARNING TASKS
7. Identify various measuring gauges.
   - Tram gauge
   - Center gauge
   - Datum gauge
   - Digital gauges

8. Describe X-measurement techniques.
   - Limitations of measuring equipment
   - Diamond checking
   - Sway checking

9. Describe length conversion techniques.
   - Reasons for use
   - Geometry principles for conversion
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 mechanical universal measuring systems.
- Describe laser measuring systems.
- Describe a dedicated measuring system.
- Describe a computerized measuring system.

LEARNING TASKS

1. Describe a mechanical universal measuring system.
   - Purpose
   - Design
   - Advantages
   - Disadvantages
   - Method of length measurement
   - Limitations of measuring equipment
   - Maintenance
   - Storage

2. Describe a laser measuring system.
   - Purpose
   - Design
   - Advantages
   - Disadvantages
   - Limitations of measuring equipment
   - Maintenance
   - Storage

3. Describe a dedicated measuring system.
   - Purpose
   - Design
   - Advantages
   - Disadvantages
   - Limitations of measuring equipment
   - Maintenance
   - Storage

4. Describe computerized measuring systems.
   - Purpose
   - Design
   - 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 the need for a damage analysis.
- Describe the concept of unibody anchoring systems.
- Describe the vehicle center section principle.
- Identify floor, bench and rack anchoring systems.
- Identify vehicle weight support principles.
- Describe vehicle anchoring methods for vehicles with no lower panel pinchwelds.
- Describe plastic-skinned vehicle anchoring methods.

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<tr>
<th>LEARNING TASKS</th>
<th>CONTENT</th>
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</table>
| 1. Describe the need for a damage analysis. | • Extent of damage travel  
• Center section alignment for anchoring |
| 2. Describe unibody anchoring theory. | • Center section principle  
• Universal anchoring (P4)  
• Potential hazards |
| 3. Describe the center section principle. | • Square and level  
• Damage will affect both end sections |
| 4. Identify floor anchor systems. | • Purpose  
• Design  
• Potential hazards |
| 5. Identify bench anchor systems. | • Purpose  
• Design  
• Potential hazards  
• Fixed/adjustable |
| 6. Identify rack anchor systems. | • Purpose  
• Design  
• Potential hazards |
| 7. Identify weight support principles. | • Vertical deflection  
• Mechanics in/out  
• Weak rocker panels |
LEARNING TASKS
8. Describe anchoring methods for vehicles with no lower rocker panel pinch welds.

CONTENT
- Custom fit clamps
- Weld-on flanges
- Through-the-floor clamps
- Suspension mount clamps
- Jacking points


CONTENT
- Dangers of incorrect anchoring
- Custom clamps
Program Content
Level 3

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 center section holding and blocking principles.
- Describe the use of plug hooks.
- Describe chain wrapping techniques.
- Describe conventional frame weight support techniques.

LEARNING TASKS

1. Describe the center section hold principle.
   - Need for proper anchoring

2. Describe blocking methods.
   - Leverage principles
   - Twist removal

3. Describe the use of plug hooks.
   - Fast, efficient anchor
   - Need for blocking
   - Level positioning

4. Describe chain wrapping techniques.
   - Purpose
   - Chain wrapping methods
   - Use with blocking

5. Describe weight support techniques for conventional frames.
   - Split between torque box and suspension areas
   - Even from side-to-side to prevent twisting
   - Use with blocking
LINE (GAC): J  STRUCTURAL REPAIR
Competency: J8  Describe straightening techniques

Objectives:
To be competent in this area, the individual must be able to:
• Describe shape and state restoration.
• Describe pre-straightening prep procedures.
• Describe the use of pulling and anchoring clamps.
• Describe multiple-pulling concepts.
• Describe floor, bench and rack pullers.
• Describe vector pulling concepts.

LEARNING TASKS
1. Describe shape/state restoration.
   • Shape; dimension
   • State; strength
   • High strength steel
   • Aluminum
   • Fiber-reinforced composite

2. Describe vehicle prep procedures.
   • Outer panel removal
   • Mechanical removal for access
   • Door gaps
   • Visual inspection
   • Fuel Lines
   • Pinch weld flanges
   • Interior trim
   • Wiring
   • Glass
   • Electronic equipment

3. Describe the use of clamps.
   • Cleanliness
   • Care of hardware
   • Use of self-tightening clamps
   • Side-pull attachment adjustment

4. Describe multiple-pulling concepts.
   • Advantages
   • Low pressure

5. Describe floor pullers.
   • Designs
   • Advantages

6. Describe vector pulling.
   • Vector pulling concepts
   • Maintaining constant pull angle
7. Describe bench pullers.
   - Self-contained units

8. Describe rack pullers.
   - Designs
   - Unequal pressure pulling
   - Equal pressure pulling
Program Content
Level 3

LINE (GAC): J  STRUCTURAL REPAIR
Competency: J9  Describe pulling techniques

Objectives:
To be competent in this area, the individual must be able to:
- Describe the center-out pulling principle.
- Describe the safe use of pulling chains.
- Describe stress-relieving methods.
- Describe diamond, twist, mash, sag, and sway repair techniques.
- Describe cross-member repair procedures.
- Describe front hit, rear hit, and side hit pulling techniques.
- Describe roll-over pulling techniques.

<table>
<thead>
<tr>
<th>LEARNING TASKS</th>
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</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  |
### LEARNING TASKS

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<td>7. Describe sway repair procedures.</td>
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<td>8. Describe cross-member repair procedures.</td>
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<td>9. Describe pulling techniques for front hits.</td>
<td>• Pulling procedures</td>
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<td>10. Describe pulling techniques for rear hits.</td>
<td>• Analysis</td>
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<tr>
<td>11. Describe pulling techniques for side hits.</td>
<td>• Setup</td>
</tr>
<tr>
<td>12. Describe pulling techniques for roll-over damage.</td>
<td>• Pulling procedures</td>
</tr>
</tbody>
</table>
LINE (GAC): J
COMPETENCY: J10

Objective:
To be competent in this area, the individual must be able to:
- Describe panel replacement techniques.
- Describe structural sectioning techniques.
- Describe ‘A’ and ‘B’ pillar sectioning techniques.
- Describe floor pan and trunk floor sectioning techniques.
- Describe full-body sectioning techniques.
- Describe panel replacement specialty tools.

LEARNING TASKS
1. Describe complete structural panel replacement techniques.
   - Analysis
   - Vehicle construction
   - Manufacturers’ removal procedure and specifications
   - Identify areas of sectioning
   - Measuring techniques
   - Spot weld removal
   - Cutting
   - Pneumatic chiselling
   - Panel preparation
   - Panel alignment
   - Welding techniques
   - Cleaning
   - Surface preparation
   - Corrosion prevention

2. Describe structural sectioning techniques.
   - Analysis
   - Spot weld removal
   - Sectioning techniques
   - Panel preparation
   - Panel alignment
   - Welding techniques
   - Corrosion prevention

3. Describe ‘A’ and ‘B’ pillar sectioning techniques.
   - Analysis
   - Sectioning techniques
   - Panel preparation
   - Panel alignment
   - Welding techniques
   - Corrosion prevention
LEARNING TASKS

4. Describe floor pan and trunk floor sectioning techniques.

5. Describe full-body sectioning techniques.

6. Describe required specialty tools.

CONTENT

• Analysis
• Sectioning techniques
• Panel preparation
• Panel alignment
• Welding techniques
• Corrosion prevention

• Engine lifts
• Pullers
• Spring compressors
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:
• Prepare a damage analysis sheet.

LEARNING TASKS
1. Prepare a damage analysis sheet.

CONTENT
• Visual damage
• Buckles, cracks, or panel distortion
• Mechanical mounts
• Visible wheelbase or camber problems
• Dimensional analysis
• Formulate a repair plan
LINE (GAC): J  STRUCTURAL REPAIR
Competency: J12 Demonstrate structural repair procedures

Objective:
To be competent in this area, the individual must be able to:
- Demonstrate structural repair procedures.

LEARNING TASKS
1. Demonstrate structural repair procedures.

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

NOTE: In-school circumstances may necessitate the selection of various types of damage on both unibody and conventional frame vehicles.
**Program Content**  
**Level 3**

**LINE (GAC): J**  
**Competency: J13**  
**STRUCTURAL REPAIR**  
Demonstrate closed box panel structural sectioning techniques

**Objectives:**
To be competent in this area, the individual must be able to:
- Perform a panel sectioning of a closed box panel.

**LEARNING TASKS**  
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<td>Welding techniques</td>
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</table>
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:
- Identify the components and functions of a MacPherson strut suspension system.
- Describe suspension location and body structural positioning points.
- Describe the effects of body misalignment on suspension positioning.

LEARNING TASKS

1. Identify the components of a MacPherson strut suspension system and their various functions.

   - Lower control arm
   - Lower ball joint
   - Strut assembly
   - Spring
   - Steering knuckle
   - Upper bearing

2. Describe the relationship between suspension location and body structural point positioning.

   - Strut towers
   - Lower rails
   - Cross-member mounting area

3. Describe the effects of body misalignment on suspension positioning.

   - Incorrect alignment angles
   - Parts wear
   - Poor handling
   - Drive line misalignment
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 and their various functions.

LEARNING TASKS
1. Describe the components of a short and long arm suspension system and their various functions.

CONTENT
• Upper control arm
• Lower control arm
• Inner and outer tie-rod ends
• Steering knuckle
• Steering gear
• Upper and lower ball joint
• Pitman arm
• Idler arm
• Steering dampers
• Springs
  o Coil
  o Torsion
  o Airbag
• Torsion bar
• Shock absorber
• Ball joints
• Bearings
• Bushings
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:
• Identify types of rear suspension systems.

LEARNING TASKS
1. Identify the various types of rear suspension systems.

CONTENT
• Front wheel drive design
• Rear wheel drive design
• Independent
• Independent rear axle
• Trailing arm
• Strut type
• Live axle
LINE (GAC): K SUSPENSION AND STEERING
Competency: K4 Identify R&I (Removal & Installation) procedures for suspension systems

Objective:
To be competent in this area, the individual must be able to:
- Identify suspension system removal and installation procedures.

LEARNING TASKS
1. Identify R&I procedures for suspension systems.

CONTENT
- Visual inspection
- Manufacture removal and installation procedures
- Vehicle support
- Analysis of spring setup
  - Coil
  - Leaf
  - Mono
  - Multi
  - Airbag
  - Transverse leaf
  - Composite
- Brake system disconnect
- Constant velocity joints
- Assembly removal and installation
- Torquing fasteners
- Cleaning procedures
- Cleaning equipment
- Specialty tools
- Component storage
- Determine reusability of components
- Installation sequence
- Realignment requirements
- Brake system assembly and bleeding
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.
• Identify the relationship between the rack and pinion assembly and lower control arms.

LEARNING TASKS
1. Describe the design of a rack and pinion steering system.
   • Pinion gear
   • Rack gear
   • Gear housing
   • Tie rods
     o Inner/outer
   • Bellows
   • Mounting points

2. Identify the importance of proper relationship between the rack and pinion assembly and the lower control arms.
   • 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 a parallelogram steering system.
• Identify the relationship between the parallelogram steering and the lower control arms.

LEARNING TASKS
1. Describe the design of a parallelogram steering system.
   • Pitman arm
   • Idler arm
   • Center link/drag link
   • Inner tie rods
   • Outer tie rods
   • Adjusting sleeves
   • Steering knuckle

2. Identify the relationship between the parallelogram steering system and the lower control arms.
   • 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 the various suspension alignment angles.
• Describe handling and parts wear problems related to misaligned angles.
• Describe the importance of checking for vehicle tracking.
• Describe the effects of a misaligned unibody structure on the steering and suspension systems.
• Identify wheel alignment problems related to unibody structure misalignment.

LEARNING TASKS

1. Describe the alignment angles and their functions.
   - 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. Identify diagnosing wheel alignment problems on a misaligned unibody structure.
   - Difficulty in diagnosing parts problems
   - Difficulty in interpreting SAI readings
   - Caster
   - Camber
LINE (GAC): L INSURANCE ESTIMATING
Competency: L1 Interpret estimating information

Objectives:
To be competent in this area, the individual must be able to:
• Describe the flat rate system and times.
• Describe supplementary information found in estimation manual.
• Describe damage estimating preparation.
• Describe the procedure used to order parts and materials.
• Describe communication skills.

LEARNING TASKS
1. Describe the various flat rate times found in an estimating manual.
   • Remove & Replace
   • Remove & Install
   • Overhaul
   • Repair
   • Warranty

2. Interpret the supplementary information contained in an estimating manual.
   • Vehicle systems information
   • Plastics identification
   • High strength steel locations
   • Computer module locations
   • ‘Quick-check’ under hood measurements
   • Airbag information

3. Describe the preparation of a damage estimate.
   • Vehicle construction
   • Estimate formats
   • Industry terminology
   • Repair refinish procedures
   • Required parts and material
   • Required labour
   • Required sublet
   • Miscellaneous cost (hazardous waste disposal, freight fees and taxes)
   • Interpret manufacturers’ specific documentation
   • Perform calculations
   • Knowledge of computer and software systems and office equipment
   • Photograph vehicle as required
LEARNING TASKS

4. Describe the knowledge required to order parts and materials.

- Knowledge of parts and materials
- Communication with suppliers
- Parts manuals
- Computers databases
- Work orders
- Interpret documentation
- Organization of parts
- Storage of parts
- Environmental levies

5. Describe required communication skills.

- Conflict resolution techniques
- Technical information in layman’s terms
- Trades people
- Appraisers
- Customers
- Parts people
- Mentor apprentices
- Fax machine
- Two-way radios
- Computers and application software
Program Content
Level 3

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

Objectives:
To be competent in this area, the individual must be able to:
• Interpret how to maintain strong business working relationships.

LEARNING TASKS
1. Interpret business relations.

CONTENT
• Employer/Employee relations
• Staff morale
• Public relations and attitude towards customers
• 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:
- Identify the various types of surface substrates.
- Identify the various types of topcoats.
- Identify the condition of the substrate.
- Identify pre-repair cleaning procedures.
- Describe the use of sanding equipment and sanding materials.
- Describe surface cleaning procedures.
- Describe the sanded surface cleaning procedures.
- Describe the final cleaning and tacking process.

LEARNING TASKS

1. Identify the substrates encountered on today’s vehicles.
   - Steel – galvanized
   - Aluminum
   - Fiberglass
   - Plastics
   - Sheet moulded compound

2. Identify topcoat systems found on today’s vehicles.
   - Basecoat clear coat
   - Single stage enamel
   - Tri-coat
   - Single stage urethane

3. Identify the condition of the substrate.
   - Peeling
   - Cracking
   - Rusty
   - Checking
   - Solvent pop
   - Excess mil thickness
   - Chalking
   - Bleed through
   - Orange peel
   - Runs/sags
   - Bulls eyes
LEARNING TASKS

4. Identify cleaning steps prior to sanding.
   - Trim removal
   - Soap and water wash
   - Wax and grease remover
   - Masking materials
   - Masking techniques
   - Masking removal
   - Polishing compounds

5. Describe the various types of sanding materials used in the trade.
   - Wet/dry paper
   - Dry paper
   - Grit types
   - Paper grading
   - Abrasive pads
   - Open coat/closed coat
   - Stripping materials
   - Ability to protect surrounding area
   - Prepare blend areas
     - Polishing compound
   - Prepare refinish panel

6. Describe the types of sanding equipment used in the trade.
   - Rotary
   - Orbital
   - Random-orbital
   - Straight Line
   - Sanding blocks
   - Sanding pads

7. Demonstrate the types of sanding procedures used in the trade.
   - Hand sanding
   - Orbital sanding
   - Feather-edging techniques
   - Grinding
   - Block sanding
   - Guide coats
   - Desired sanding outcomes

8. Demonstrate paint removal techniques from a steel substrate.
   - Sanding removal
   - Chemical removal
   - Media blasting
<table>
<thead>
<tr>
<th>LEARNING TASKS</th>
<th>CONTENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>9. Demonstrate the correct use of metal conditioners.</td>
<td>• Steel substrates</td>
</tr>
<tr>
<td></td>
<td>• Aluminum substrates</td>
</tr>
<tr>
<td></td>
<td>• Conversion coatings</td>
</tr>
<tr>
<td>10. Demonstrate paint removal techniques from plastic substrate.</td>
<td>• Sanding removal</td>
</tr>
<tr>
<td></td>
<td>• Chemical removal</td>
</tr>
<tr>
<td>11. Describe surface cleaning.</td>
<td>• Contaminates</td>
</tr>
<tr>
<td></td>
<td>• Handling of cleaning materials</td>
</tr>
<tr>
<td></td>
<td>• Cleaning solvents</td>
</tr>
<tr>
<td></td>
<td>• Soaps</td>
</tr>
<tr>
<td></td>
<td>• Cleaning clay</td>
</tr>
<tr>
<td></td>
<td>• Pressure washer</td>
</tr>
<tr>
<td></td>
<td>• Brushes</td>
</tr>
<tr>
<td></td>
<td>• Cleaning procedures</td>
</tr>
<tr>
<td></td>
<td>• Disposal of cleaning materials</td>
</tr>
<tr>
<td></td>
<td>• Hazards of cleaning materials</td>
</tr>
<tr>
<td>12. Describe cleaning a sanded surface.</td>
<td>• Solvents</td>
</tr>
<tr>
<td></td>
<td>• Blowing and washing</td>
</tr>
<tr>
<td></td>
<td>• Protect surrounding areas</td>
</tr>
<tr>
<td>13. Describe the preparation steps taken to final wash and tack.</td>
<td>• Types of washing products</td>
</tr>
<tr>
<td></td>
<td>• Blowing</td>
</tr>
<tr>
<td></td>
<td>• Washing</td>
</tr>
<tr>
<td></td>
<td>• Tacking</td>
</tr>
<tr>
<td></td>
<td>• Anti-static products</td>
</tr>
<tr>
<td></td>
<td>• Spray booth set-up</td>
</tr>
</tbody>
</table>
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 various primers and their applications.
• Describe mixing and the application sequence of primers.

LEARNING TASKS

1. Describe the various undercoats and their specific applications.
   • Etch primers
     o Zinc chromate primer
     o Epoxy primer
     o Direct to metal primer surfacer
   • Plastic primer
   • Primer surfacers
   • Sealers
   • Primer sealers
   • Adhesion promoters
   • Flex agent

2. Describe the mixing and application steps for the various undercoats.
   • Personal Protection Equipment (PPE)
   • Safety precautions
   • Type of solvent
   • Amount of reduction
   • Mixing container
   • Mixing stick
   • Mixing hazards
   • Pot life
   • Air pressure
   • Type of spray gun required
   • Number of coats
   • Minimum dry times
   • Minimum flash times
   • Mixing computer knowledge
   • Application method
   • Temperature of spraying environment

3. Describe the correct method used to apply a primer.
   • Epoxy primer
   • Primer surfacer
   • Sealer
   • Wash primer
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 corrosion prevention materials.
• Describe vehicle areas that require corrosion protection.
• Demonstrate corrosion protection restoration procedures.

LEARNING TASKS

1. Describe the materials used for the prevention of corrosion.
   • Zinc coating
   • Conversion coating
   • Epoxy primer
   • Primer surfacer
   • Anti-corrosion compounds
   • Joint and seam sealers
   • Weld through primer
   • Undercoating
   • Wax coatings

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

3. Demonstrate the use of corrosion protection restoration techniques used when repairing a collision damaged area.
   • Galvanizing compound when welding
   • Epoxy or self-etching primers
   • Light, medium, or heavy bodied joint and seam sealers
   • Anti-corrosion compounds
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 the masking process.
   - Tape
   - Paper
   - Poly
   - Foam
   - Fine line
   - Liquid mask
   - Tubing
   - Back masking
   - Jamb masking
   - Other masking techniques
   - Unmasking techniques
   - Material disposal

2. Describe the steps for mixing and tinting a colour coat.
   - Proper mixing of toners
   - Formula content
   - Use of scales
   - Spray out cards
   - Draw down bar
   - Comparison colour to vehicle
   - Colour mapping
   - Colour adjustment
   - Colour change wet/dry
   - Mixing hazards
   - Material straining
   - Product maintenance
   - Spectrophotometer
LEARNING TASKS
3. Describe the process to apply refinishing materials to a surface.

CONTENT
- Cleaning content
- Application stroke
- Cross coating
- Drop coating
- Colour blending
- Clear blending
- Dry times
- Flash times
- Spray booth operation
- Spray gun operation
- Troubleshooting
- Set up portable drying equipment to speed up curing process
## LINE (GAC): M REFINISHING

Competency: M5 Identify the detailing process

### Objectives:
To be competent in this area, the individual must be able to:
- Describe the polishing process.
- Describe exterior vehicle cleaning.
- Describe interior vehicle cleaning.
- Describe overspray removal.
- Perform a final check.

### LEARNING TASKS

<table>
<thead>
<tr>
<th>Task</th>
<th>Content</th>
</tr>
</thead>
</table>
| 1. Describe the polishing process. | • Dirt nibs  
• Runs  
• Overspray  
• Sanding techniques  
• Sanding materials  
• Hand polishing  
• Electric polishing  
  - Speed  
  - Polisher motion  
• Pneumatic polishing  
• Equipment storage  
• Equipment maintenance  
• Personal Protection Equipment (PPE) |
| 2. Describe exterior vehicle washing/cleaning. | • Tire cleaners  
• Engine cleaners  
• Exterior soap  
• Window cleaners  
• Paint care procedures  
• Washing technique  
• Surface contaminants  
• Washing equipment |
3. Describe interior vehicle cleaning.
   - Cleaning products
   - Stain removal products
   - Stain removal and cleaning tools
   - Vacuum
   - Air blower
   - Shampooer
   - Conditioners
   - Deodorize interior

4. Describe overspray removal.
   - Types of overspray
   - Overspray removal techniques
Section 4

TRAINING PROVIDER STANDARDS
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.

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 – aluminum (welding booth and ventilation)

<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>1 - Vehicle with unitized – stub designs</td>
</tr>
<tr>
<td>16 - Hammer and dolly sets</td>
<td>8 - Sets of oxyacetylene welding units</td>
<td>2 - Sets of complete anchoring systems</td>
</tr>
<tr>
<td>4 - Stud welders</td>
<td>8 - Sets of seatbelt assemblies</td>
<td>1 - Frame rack</td>
</tr>
<tr>
<td>4 - Hydraulic jack units</td>
<td>1 - Airbag assembly</td>
<td>2 - Portable pulling systems</td>
</tr>
<tr>
<td>2 - Sets of complete pulling equipment units</td>
<td>1 - Air conditioning assembly</td>
<td>1 - Wheel alignment rack</td>
</tr>
<tr>
<td>4 - Hot air plastic welding units</td>
<td>4 - Analogue electrical multimeters</td>
<td>4 - Digital tram gauges</td>
</tr>
<tr>
<td>4 - Airless plastic welding units</td>
<td>4 - Digital electrical multimeters</td>
<td>2 - Sets of centering gauges</td>
</tr>
<tr>
<td>1 - Metal break</td>
<td>1 - complete primer undercoat system</td>
<td>1 - Computerized laser measuring system</td>
</tr>
<tr>
<td>8 - HVLP spray guns</td>
<td>2 - Complete vehicles</td>
<td>2 - Mechanical measuring systems</td>
</tr>
<tr>
<td>8 - Dual-action sanders</td>
<td>16 - Computer stations with CD ROM, modem software, etc.</td>
<td>1 - Set of dimension manuals</td>
</tr>
<tr>
<td>1 - Spray gun</td>
<td>1 - Printer</td>
<td>2 - Strut tower gauges</td>
</tr>
<tr>
<td>8 - Fresh air respirators</td>
<td>4 - HVLP spray guns</td>
<td>1 - ADP estimating system</td>
</tr>
<tr>
<td>8 - Straight line sanders</td>
<td>4 - Fresh air systems</td>
<td>8 - HVLP spray guns</td>
</tr>
<tr>
<td>8 - Sets of general sanding blocks</td>
<td>1 - Spray booth</td>
<td>4 - Sets of masking equipment and materials</td>
</tr>
<tr>
<td>1 - Complete primer undercoat system</td>
<td>4 - HVLP spray guns</td>
<td>1 - Complete topcoat system</td>
</tr>
<tr>
<td>2 - Complete vehicles</td>
<td>1 - Spray booth</td>
<td>4 - Sets of polishing equipment and material</td>
</tr>
<tr>
<td>16 - Computer stations with CD ROM, modem software, etc.</td>
<td>4 - Sets of masking equipment and materials</td>
<td>2 - Sets of vehicle cleaning systems</td>
</tr>
<tr>
<td>1 - Printer</td>
<td>16 - Computer stations with CD ROM modem, software, etc.</td>
<td></td>
</tr>
</tbody>
</table>
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>
<tr>
<td></td>
<td>- Cleaning materials</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Sanding equipment</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Primer undercoats</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
AUTO BODY REPAIR TECHNOLOGY – 5th EDITION
By James E. Duffy
ISBN 0-7668-6272-0

Recommended Resources
• None for this program.

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

Assessment Guidelines
Program: Motor Vehicle Body Repairer (Metal and Paint) (Automotive Collision Repair Technician)

Training providers delivering Motor Vehicle Body Repairer (Metal and Paint) (Automotive Collision Repair Technician) apprenticeship in-school technical training are required to enter the following information in ITA Direct Access for each apprentice:

- An in-school mark in the form of a percentage

The in-school percentage score for each level is the result of a combination of theory and practical assessments. This percentage score is then combined with the ITA Standard Level Examination to determine a final percentage score for the level.

Training Provider Component: In-School Technical Training

Calculation tables showing the subject competencies, level percentage weightings and level examination weightings are shown in the Grading Sheet: Subject Competencies and Weightings section of this document.

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

Level 1 and 2 in-school percentage scores are calculated by:

- totaling the level theory competency results as noted in the competencies and weightings tables and multiplying the total by 50% for Level 1 and 2 to produce a weighted theory percentage score;
- totaling the level practical competency results as noted in the competencies and weightings tables and multiplying the total by 50% for Level 1 and 2 to produce a weighted practical percentage score;
- adding the weighted theory and practical competency results together to determine the final in-school percentage score.

This final percentage score is entered into ITA Direct Access.

ITA Component: ITA Standardized Level Examinations - Level 1 and 2

Once the in-school training and standard level exam percentage scores are entered into ITA Direct Access, the system automatically calculates the final percentage score. The percentage score is calculated by blending the standardized exam percentage score and the in-school technical training percentage score to determine the final percentage score for the level.

In-school technical training (combined theory & practical) is weighted at 80% and the ITA standardized exam is weighted at 20%. These two scores are combined to determine the final level percentage score. This result is the final percentage score that is recorded in ITA Direct Access.

A percentage score of 70% or greater is required to pass the level when combining the final in-school percentage score and the final ITA standardized level exam percentage score.
In-school Component - Proprietary Examinations – Level 3

Until further notice, Training Providers delivering the Motor Vehicle Body Repairer (Metal and Paint) (Automotive Collision Repair Technician) program will continue using their institution’s proprietary examination in the calculation of the apprentices’ achievement for Level 3. The percentage weighting of this exam is 50% of the final in-school technical training percentage score.

Refer to the Grading Sheet Subject Competencies and Weightings Table to determine the calculation process for completing the Level 1, 2 and 3 percentage score. The final blended percentage score for Level 1, 2 and 3 is to be reported to ITA and must be 70% or greater to pass the level.

Interprovincial Red Seal

In order to achieve certification with the Red Seal Endorsement, Motor Vehicle Body Repairer (Metal and Paint) (Automotive Collision Repair Technician) apprentices are required to write the Motor Vehicle Body Repairer (Metal and Paint) (Automotive Collision Repair Technician) Interprovincial Red Seal exam after completing all levels of in-school technical training. Apprentices must have passed all levels of in-school technical training or be approved challengers to sit the exam. A score of 70% or greater is required for a pass.

Interprovincial Red Seal exams should be requested by training providers via the usual ITA procedure.

ITA will administer and invigilate Interprovincial Red Seal exams and score and record exam results in ITA Direct Access.
## Grading Sheet: Subject Competency and Weightings

<table>
<thead>
<tr>
<th>LINE</th>
<th>TRAINING TOPICS &amp; SUGGESTED TIME ALLOCATION</th>
<th>THEORY WEIGHTING</th>
<th>PRACTICAL WEIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Occupational Skills and Safety</td>
<td>4%</td>
<td>4%</td>
</tr>
<tr>
<td>B</td>
<td>Tools and Equipment</td>
<td>8%</td>
<td>5%</td>
</tr>
<tr>
<td>C</td>
<td>Oxy-Acetylene Welding</td>
<td>8%</td>
<td>6%</td>
</tr>
<tr>
<td>D</td>
<td>Mig Welding</td>
<td>20%</td>
<td>22%</td>
</tr>
<tr>
<td>E</td>
<td>Sheet Metal Repair</td>
<td>20%</td>
<td>24%</td>
</tr>
<tr>
<td>F</td>
<td>Plastics and Composites</td>
<td>12%</td>
<td>22%</td>
</tr>
<tr>
<td>G</td>
<td>Surface Preparation</td>
<td>16%</td>
<td>12%</td>
</tr>
<tr>
<td>H</td>
<td>Auto Body Construction and 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>

**MOTOR VEHICLE BODY REPAIRER (AUTOMOTIVE COLLISION REPAIR TECHNICIAN) in-school theory & practical subject competency weighting.**

50% 50%

**Calculated by the Training Provider:**

Multiply the total percentage scores in the theory column for each of the theory topics and multiply by 50%. Multiply the total percentage scores in the practical column for each of the theory topics and multiply by 50%. Add the two percentage scores to achieve a final percentage score for the level. This final percentage score is entered into ITA Direct Access.

**Calculated by ITA:**

- **In-school Percentage Score**
  
  ITA Direct Access calculates the percentage weighting once the in-school percentage score is entered. Combined theory and practical subject competency multiplied by 80%

- **Standard Level Exam Percentage Score**
  
  ITA Direct Access will calculate the percentage weighting once the standard level exam percentage scores have been entered. The exam score is multiplied by 20%

- **Final Percentage Score**
  
  The final percentage score for determining credit is calculated by ITA Direct Access.

**IN-SCHOOL %**
### PROGRAM: IN-SCHOOL TRAINING: MOTOR VEHICLE BODY REPAIRER (AUTOMOTIVE COLLISION REPAIR TECHNICIAN) LEVEL 2

**ITA DIRECT ACCESS CODE:** 0001ABSE02

<table>
<thead>
<tr>
<th>LINE</th>
<th>TRAINING TOPICS &amp; SUGGESTED TIME ALLOCATION</th>
<th>THEORY WEIGHTING</th>
<th>PRACTICAL WEIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>Mig 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>12%</td>
<td>10%</td>
</tr>
<tr>
<td>I</td>
<td>Mechanical Components</td>
<td>14%</td>
<td>7%</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

**MOTOR VEHICLE BODY REPAIRER (AUTOMOTIVE COLLISION REPAIR TECHNICIAN)** in-school theory & practical subject competency weighting

Calculated by the Training Provider:

Multiply the total percentage scores in the theory column for each of the theory topics and multiply by 50%. Multiply the total percentage scores in the practical column for each of the theory topics and multiply by 50%. Add the two percentage scores to achieve a final percentage score for the level. This final percentage score is entered into ITA Direct Access.

**IN-SCHOOL %**

Calculated by ITA: **In-school Percentage Score**

ITA Direct Access calculates the percentage weighting once the in-school percentage score is entered. Combined theory and practical subject competency multiplied by 80%

Calculated by ITA: **Standard Level Exam Percentage Score**

ITA Direct Access will calculate the percentage weighting once the standard level exam percentage scores have been entered. The exam score is multiplied by 20%

Calculated by ITA: **Final Percentage Score**

The final percentage score for determining credit is calculated by ITA Direct Access.

**FINAL%**
### Program: MOTOR VEHICLE BODY REPAIRER (AUTOMOTIVE COLLISION REPAIR TECHNICIAN)

#### In-School Training

<table>
<thead>
<tr>
<th>LINE</th>
<th>Training Topics &amp; Suggested Time Allocation</th>
<th>Theory Weighting</th>
<th>Practical Weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>J</td>
<td>Structural repair</td>
<td>27%</td>
<td>79%</td>
</tr>
<tr>
<td>K</td>
<td>Suspension and Steering</td>
<td>16%</td>
<td>13%</td>
</tr>
<tr>
<td>L</td>
<td>Insurance Estimating and Industry Liaison</td>
<td>3%</td>
<td>6%</td>
</tr>
<tr>
<td>M</td>
<td>Refinishing for Collision Repair Technicians</td>
<td>4%</td>
<td>2%</td>
</tr>
<tr>
<td></td>
<td>Final Proprietary Exam</td>
<td>50%</td>
<td></td>
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</tbody>
</table>

**Total**  
100% 100%

#### In-School %

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

ITA will enter the apprentices’ Motor Vehicle Body Repairer (Metal and Paint) Interprovincial examination mark in ITA Direct Access. A minimum mark of 70% on the examination is required for a pass.