SKILLEDTRADES BC

PROGRAM OUTLINE

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

SKILLED TRADES BC

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MOTOR VEHICLE BODY REPAIRER (METAL AND PAINT) (AUTOMOTIVE COLLISION REPAIR TECHNICIAN) PROGRAM OUTLINE

APPROVED BY INDUSTRY
September 2017

BASED ON
NOA 2014

Developed by
SkilledTradesBC
Province of British Columbia

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Section 1

INTRODUCTION

Automotive Collision Repair Technician

Foreword

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

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

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

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

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

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

SAFETY ADVISORY

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

Acknowledgements

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

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

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

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

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

How to Use this Document

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

Section	Training Providers	Employers/ Sponsors	Apprentices	Challengers
Program Credentialing Model	Communicate program length and structure, and all pathways to completion	Understand the length and structure of the program	Understand the length and structure of the program, and pathway to completion	Understand challenger pathway to Certificate of Qualification
OAC	Communicate the competencies that industry has defined as representing the scope of the occupation	Understand the competencies that an apprentice is expected to demonstrate in order to achieve certification	View the competencies they will achieve as a result of program completion	Understand the competencies they must demonstrate in order to challenge the program
Training Topics and Suggested Time Allocation	Shows proportionate representation of general areas of competency (GACs) at each program level, the suggested proportion of time spent on each GAC, and percentage of time spent on theory versus practical application	Understand the scope of competencies covered in the technical training, the suggested proportion of time spent on each GAC, and the percentage of that time spent on theory versus practical application	Understand the scope of competencies covered in the technical training, the suggested proportion of time spent on each GAC, and the percentage of that time spent on theory versus practical application	Understand the relative weightings of various competencies of the occupation on which assessment is based
Program Content	Defines the objectives, learning tasks, high level content that must be covered for each competency, as well as defining observable, measureable achievement criteria for objectives with a practical component	Identifies detailed program content and performance expectations for competencies with a practical component; may be used as a checklist prior to signing a recommendation for certification (RFC) for an apprentice	Provides detailed information on program content and performance expectations for demonstrating competency	Allows individual to check program content areas against their own knowledge and performance expectations against their own skill levels
Training Provider Standards	Defines the facility requirements, tools and equipment, reference materials (if any) and instructor requirements for the program	Identifies the tools and equipment an apprentice is expected to have access to; which are supplied by the training provider and which the student is expected to own	Provides information on the training facility, tools and equipment provided by the school and the student, reference materials they may be expected to acquire, and minimum qualification levels of program instructors	Identifies the tools and equipment a tradesperson is expected to be competent in using or operating; which may be used or provided in a practical assessment

Section 2

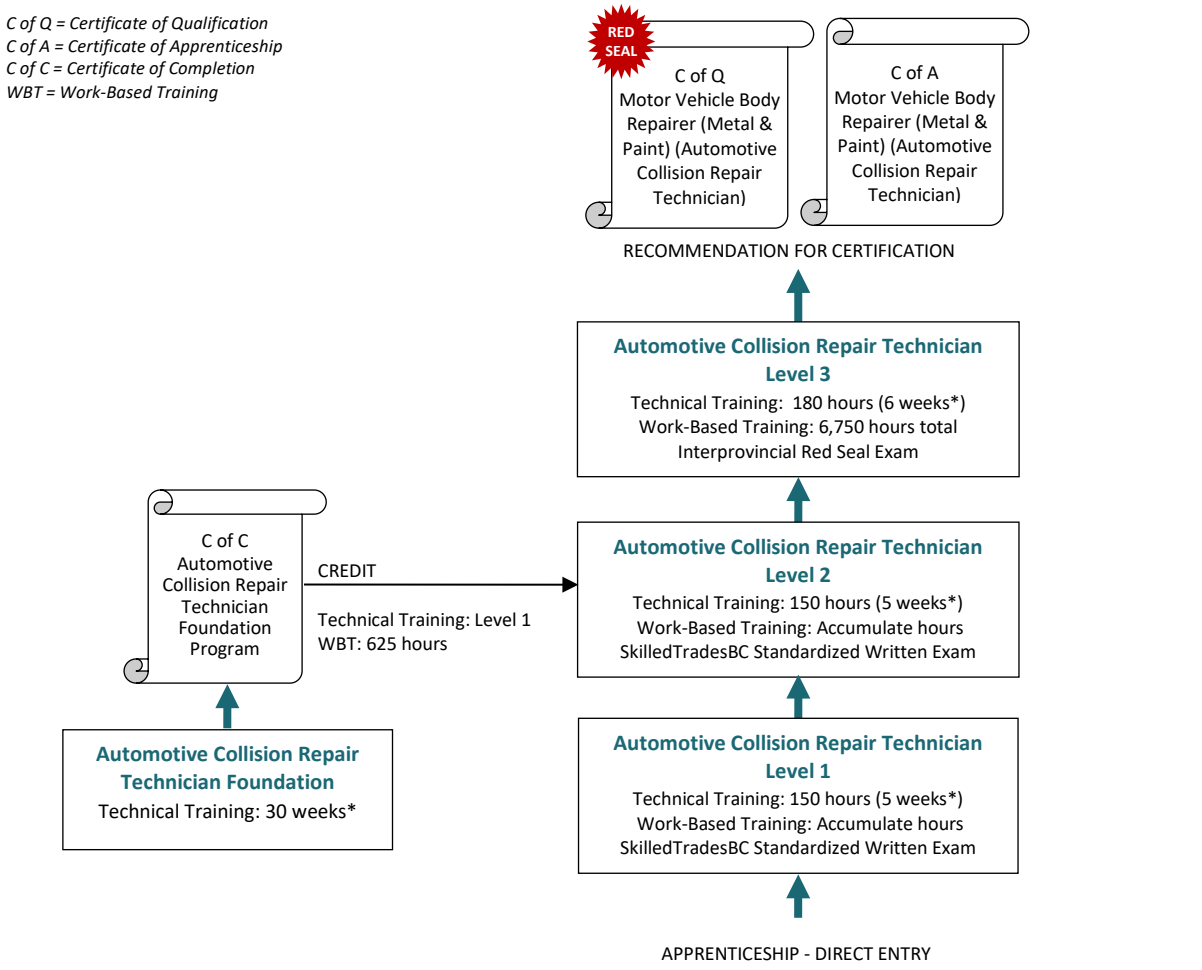
PROGRAM OVERVIEW

Automotive Collision Repair Technician

Program Credentialing Model

Apprenticeship Pathway

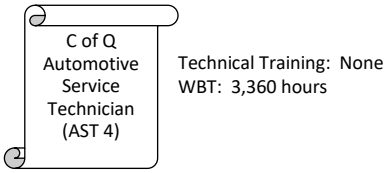
This graphic provides an overview of the Motor Vehicle Body Repairer (Metal & Paint) (Automotive Collision Repair Technician) apprenticeship pathway.



**Suggested duration based on 30-hour week*

CROSS-PROGRAM CREDITS

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



Occupational Analysis Chart

AUTOMOTIVE COLLISION REPAIR TECHNICIAN

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

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

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

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

Training Topics and Suggested Time Allocation: Level 1

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

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

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

Training Topics and Suggested Time Allocation: Level 2

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

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

Training Topics and Suggested Time Allocation: Level 3

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

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

Section 3

PROGRAM CONTENT

Automotive Collision Repair Technician

Level 1

Automotive Collision Repair Technician

LINE (GAC): A OCCUPATIONAL SKILLS AND SAFETY

Competency: A1 Describe safe work practices

Objectives

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

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

LEARNING TASKS	CONTENT
1. Identify hazards.	• Shop environment • Chemical • Air-borne

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

3. Locate shop emergency equipment and means of exit.	• Emergency shutoffs • Spill kits • Fire control systems • Eye wash facilities • Emergency exits • First aid facilities • Emergency contact / phone numbers • Outside meeting place • Disaster meeting place

LEARNING TASKS	CONTENT

4. Describe the conditions and classifications of fires.	• Conditions to support fire
	  ○ Air
	  ○ Fuel
	  ○ Heat
	• Classes of fires
	  ○ A – combustibles
	  ○ B – liquids
	  ○ C – electrical
	  ○ D – metal
	• Symbols and colours

5. Describe fire safety precautions when working near, handling or storing flammables.	• Fuels
	  ○ Diesel
	  ○ Gasoline
	  ○ Propane
	  ○ Natural gas
	  ○ Solvents
	• Lubricants
	• Oily rags
	• Combustible metals
	• Aerosols

6. Describe the considerations and procedures to extinguishing a fire.	• Warning others and fire department
	• Evacuation of others
	• Fire contained and not spreading
	• Method of exit
	• Training
	• P.A.S.S.
	  ○ Point
	  ○ Aim
	  ○ Squeeze
	  ○ Sweep

7. Describe hybrid and electric vehicle safety precautions.	• 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	CONTENT
1. Describe safe work practices.	• Shop equipment • Proper housekeeping • Use of grinding tools • Movement of vehicles in the shop area • Battery disconnect

2. Describe lifting equipment safety.	• Types of equipment
	  ○ Floor jacks
	  ○ Safety stands
	  ○ Hoists
	• Limitations of lifting equipment
	• Applications of lifting equipment
	• Safe lifting locations or points
	• Maintenance of lifting equipment

3. Follow safety procedures for alternate-fuel vehicles.	• Refer to manufacturers' safety procedures prior to working on alternate-fuel vehicles • Deactivate battery packs on Hybrid vehicles to prevent damage to vehicle and injury to repairers • Follow refinishing procedures for curing cycles for alternate-fuel vehicles • Determine Personal Protection Equipment (PPE) required for task

LINE (GAC): A OCCUPATIONAL SKILLS AND SAFETY

Competency: A3 Describe waste product handling

Objectives

To be competent in this area, the individual must be able to:
- Describe storage and disposal of controlled products.

LEARNING TASKS

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

CONTENT

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

LINE (GAC): A OCCUPATIONAL SKILLS AND SAFETY

Competency: A4 Describe Work Hazard Material Information System (WHMIS)

Objectives

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

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

LEARNING TASKS	CONTENT

1. Describe SDS requirements.	• Regulations
	  ○ Hazardous Product
	  ○ Controlled Products
	  ○ Ingredient Disclosure List
	• Labels

2. Describe the purpose of the Workplace Hazardous Materials Information System (WHMIS).	• Protection of workers
	• Rights and responsibilities
	  ○ Workers
	  ○ Employers
	  ○ Suppliers
	  ○ Regulators

3. Describe the key elements of WHMIS.	• Safety Data Sheets (SDS) and location • Labelling of containers of hazardous materials • Worker education programs
4. Describe the responsibilities of employees under WHMIS.	• Personal Protection Equipment (PPE) • SDS • Labels
5. Describe the responsibilities of employers under WHMIS.	• Provide training • SDS • Labels • Work Education Programs in the workplace

LEARNING TASKS	CONTENT
6. Describe information to be disclosed on an SDS.	• Hazardous ingredients • Preparation information • Product Information • Physical data • Fire or explosion • Reactivity data • Toxicological properties • Preventive measures • First-aid measures

7. Identify symbols found on WHMIS labels and their meaning.	• WHMIS Symbols 2015
	  ○ Compressed gases
	  ○ Flammable and combustible materials
	  ○ Oxidizing materials (materials causing other toxic effects)
	  ○ Poisonous and infectious materials
	  ○ Materials causing immediate and serious toxic effect
	  ○ Bio-hazardous infectious materials
	  ○ Corrosive materials
	  ○ Dangerously reactive materials
	  ○ Environmentally hazardous materials
	  ○ Serious health hazards

8. Apply WHMIS regulations as they apply to hazardous materials used in the shop.	• Use, storage and disposal
	  ○ Solvents
	  ○ Paints
	  ○ Isocyanates
	  ○ Caustic cleaners
	  ○ Cleaning solutions
	  ○ Alcohol used for cleaning
	  ○ Gasoline
	  ○ Diesel fuel
	  ○ Asbestos
	  ○ Battery acid
	  ○ Refrigerants
	  ○ Brake fluid
	  ○ Antifreeze
	  ○ Lubricants

LINE (GAC): A OCCUPATIONAL SKILLS AND SAFETY

Competency: A5 Describe Personal Protective Equipment (PPE)

Objectives

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

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

LEARNING TASKS	CONTENT
1. Identify the types of Personal Protective Equipment (PPE).	• Hearing • Eyes • Skin • Breathing protection • Hands • Foot
2. Describe the use of Personal Protective Equipment (PPE).	• Ear protection • Eye protection • Skin protection • Breathing protection • Hand protection • Foot protection
3. Describe the inspection and maintenance of Personal Protection Equipment (PPE).	• Ear protection • Eye protection • Skin protection • Breathing protection • Hand protection • Foot protection
4. Describe how to correctly store Personal Protection Equipment (PPE).	• Ear protection • Eye protection • Breathing protection

LINE (GAC): A OCCUPATIONAL SKILLS AND SAFETY

Competency: A6 Describe WCB Standards and Regulations

Objectives

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

- Describe the Workers Compensation Act

LEARNING TASKS	CONTENT
1. Describe rights and responsibilities	• Employers • Employees • Contractors • Inspectors
2. Describe reporting of accidents.	• Chain of command • Documentation
3. Describe the main elements of WorkSafeBC	• Definitions • Application • Rights and responsibilities • Health and safety programs • Investigation and reports • Workplace inspections • Right to refuse work • General conditions • Building and equipment safety • Emergency preparedness • Preventing violence • Working alone • Ergonomics • Illumination • Indoor air quality • Smoking and lunchrooms
4. Describe the workplace hazards identified by WorkSafeBC	• Chemical and biological substances • Substance specific requirements • Noise, vibration, radiation and temperature • Personal protective clothing and equipment • Confined spaces • Tools, machinery and equipment • Ladders, scaffolds and temporary work platforms • Electrical safety

LINE (GAC): B TOOLS AND EQUIPMENT

Competency: B1 Describe collision repair hand tools

Objectives

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

- Describe the use of collision repair hand tools.

LEARNING TASKS	CONTENT
1. Describe collision repair hand tools.	• Screwdrivers • Wrenches • Pliers • Cutting tools • Hammers • Socket sets • Bumping tools • Straightening tools • Material application tools • Removal tools • Installation tools
2. Describe the use of hand tools.	• Limitations • Torque specifications • Maintainance • Storage • Recognizing worn, broken and defective hand tools

LINE (GAC): B TOOLS AND EQUIPMENT

Competency: B2 Identify power tools

Objectives

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

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

LEARNING TASKS	CONTENT
1. Describe power tools.	• Electric / battery • Pneumatic • Hydraulic

2. Describe the use of power tools.	• Hazards
	  ○ Frayed cords
	  ○ Cracked casings
	  ○ Leaking Lines
	  ○ Work environment
	• Operating procedures
	• Limitations
	• Maintenance
	• Storage

LINE (GAC): B TOOLS AND EQUIPMENT

Competency: B3 Identify various fasteners

Objectives

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

- Describe various fasteners
- Describe removal and installation procedures

LEARNING TASKS	CONTENT

1. Describe various fasteners	• Types
	  ○ Bolts
	  ○ Nuts
	  ○ Washers
	  ○ Clips
	  ○ Rivets
	  ○ Moulding clips
	  ○ Adhesives
	  ○ Screws
	• Functions
	• Costs

2. Describe removal and installation procedures	• Fastener identification • Identifying reusable fasteners • Removal procedures • Replacement procedures ○ Torque specifications • Removal and replacement of retainers • Final operation/fit and finish
3. Remove and re-install reusable trim	• Mouldings • Name plates • Emblems • After-market trim and components

LINE (GAC): B TOOLS AND EQUIPMENT

Competency: B4 Describe organizational skills

Objectives

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

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

LEARNING TASKS	CONTENT

1. Describe the organizational skills required for productive repair work in a collision repair shop.	• Repair analysis
	• Developing a repair plan
	• Assessment of tools and materials required
	• Timing of repair steps
	• Avoidance of repetitive repair steps
	• Production deadlines
	• Store and inventory parts and materials
	• Notify supervisor of missing, damaged and incorrect parts
	• Work area preparation
	  ○ Tool selection and layout
	  ○ Housekeeping

2. Use Original Equipment Manufacturers (OEM) specifications and repair procedures.	• Access
	  ○ Online
	  ○ Hard Copy
	  ○ Bulletins
	• Interpretation
	• Application

Achievement Criteria

Performance	The learner will access and interpret OEM specifications and repair procedures.
Conditions	The learner will be given • Means to access specifications, e.g. computer lab • Work task, e.g. remove headlight
Criteria	The learner will be evaluated on • Accuracy • Efficiency

LINE (GAC): C OXYACETYLENE PROCEDURES

Competency: C1 Describe oxyacetylene safety

Objectives

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

- Describe oxyacetylene safety.
- Describe oxyacetylene components.

LEARNING TASKS

1. Describe oxyacetylene safety.

CONTENT

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

LEARNING TASKS

2. Describe oxyacetylene components.

CONTENT

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

LINE (GAC): C OXYACETYLENE PROCEDURES

Competency: C2 Perform oxyacetylene procedures

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

LEARNING TASKS	CONTENT

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

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

Achievement Criteria

Performance	The learner will perform oxyacetylene set up, cutting, heating and shut down.
Conditions	The learner will be given • Oxyacetylene equipment • Steel panel
Criteria	The learner will be evaluated on • Safety • Procedure • Technique

LINE (GAC): D WELDING

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

Objectives

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

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

LEARNING TASKS

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

CONTENT

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

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

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

LINE (GAC): D WELDING

Competency: D2 Describe MIG welding process

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

- Describe the set up procedure used for MIG (GMAW) welding.
- Describe shot arc, spray arc, and stitch spray arc MIG (GMAW) welding methods.

LEARNING TASKS	CONTENT

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

2. Describe the short arc transfer method.	• Purpose • Uses • Voltage • Current • Ground clamp
3. Describe the spray arc transfer method.	• Purpose • Uses • Voltage • Current
4. Describe the stitch spray arc transfer method.	• Pulse • Purpose • Uses • Voltage • Current

LINE (GAC): D WELDING

Competency: D3 Perform various MIG welds on sheet steel

Objectives

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

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

LEARNING TASKS	CONTENT
1. Perform a butt weld on 22 gauge steel.	• Gun angle and speed • Penetration • Build-up • Consistent width bead
2. Perform a lap weld on 22 gauge steel.	• Gun angle and speed • Penetration • Build-up • Consistent width bead
3. Perform various size plug welds on 22 and 20 gauge steel.	• Gun angle and speed • Penetration • Build-up • Complete closure of plug hole

Achievement Criteria

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

Conditions The learner will be given

- Welding equipment
- Steel panel

Criteria The learner will be evaluated on

- Safety
- Procedure
- Technique
- Destructive testing

LINE (GAC): D WELDING

Competency: D4 Describe plasma arc cutting

Objectives

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

LEARNING TASKS	CONTENT
1. Describe plasma arc cutting.	• Operating procedures • Gases and tips • Identify material • Maintenance • Storage • Potential hazards • Cutting area
2. Perform a cut on 22 and 20 gauge steel.	• Gun angle and speed • Penetration • Equipment set-up • Personal Protection Equipment (PPE)

Achievement Criteria

Performance The learner will perform a cut on 22 or 20 gauge steel.

Conditions The learner will be given
- Cutting equipment
- Steel panel

Criteria The learner will be evaluated on
- Safety
- Procedure
- Technique

LINE (GAC): D WELDING

Competency: D5 Describe resistance spot welders

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

- Describe resistance spot welders.

LEARNING TASKS

1. Describe resistance spot welders.

CONTENT

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

LINE (GAC): E SHEET METAL REPAIR

Competency: E1 Describe the characteristics of sheet metal

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

- Describe the characteristics of automotive steel.

LEARNING TASKS	CONTENT
1. Describe the characteristics of mild steel.	• Tensile strength • Yield strength • Spring-back • Composition • Work hardening • Annealing • Affects of heat
2. Describe the characteristics of high-strength steel.	• Tensile strength • Yield strength • Spring-back • Composition • Characteristics • Work hardening • Annealing • Affects of heat

3. Describe the characteristics of advanced and ultra-high strength steels.	• Yield strength
	• Tensile strength
	• Spring-back
	• Advanced high strength steel examples
	  ○ Martensitic (MART)
	  ○ Isotropic (IS)
	  ○ Carbon Manganese
	  ○ High strength, low alloy (HSLA)
	  ○ Dual/Complex phase
	• Ultra high strength steel examples
	  ○ Boron
	  ○ Dual/Complex phase
	  ○ Transformation induced plasticity (TRIP)

LINE (GAC): E SHEET METAL REPAIR

Competency E2 Describe the types of basic sheet metal damage

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

- Identify the various types of sheet metal damage.

LEARNING TASKS	CONTENT
1. Identify the various types of sheet metal damage.	• Direct and indirect • Displaced metal • Hinge and roll buckle • Stretched area • Upset area • Tears

LINE (GAC): E SHEET METAL REPAIR

Competency: E3 Identify sheet metal repair tools and equipment

Objectives

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

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

LEARNING TASKS	CONTENT
1. Describe the use of sheet metal repair hand tools.	• Hammers • Dollies • Pry bars • Spoons
2. Describe the use of sheet metal repair equipment.	• Stud welder • Spot welder electrode • Hydraulic body jack • Pulling equipment

LINE (GAC): E SHEET METAL REPAIR

Competency: E4 Describe minor sheet metal damage repair

Objectives

To be competent in this area, the individual must be able to:
- Perform sheet metal repair.

LEARNING TASKS	CONTENT

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

2. Describe repair methods.	• Cold repair • Heat repair • Pushing/pulling • Roughing • Patching • Visualize desired outcome
3. Describe shrinking procedures.	• Expansion and contraction • Restricted and unrestricted sheet metal • Oxyacetylene • Spitznagel™ • Panel beater™ • Cold shrinking

4. Describe body filling procedures.	• Types of filler
	• Surface preparation
	  ○ Cleaning procedures
	  ○ Coating removal
	  ○ Featheredging
	• Mixing procedures
	• Application
	  ○ Sanding progression
	  ○ Type
	  ○ Grit
	• Blocking
	  ○ Machine
	  ○ Hand

5. Demonstrate repair procedures

- Select
  - repair equipment
  - repair material
  - repair technique
- Perform repair

Achievement Criteria

Performance	The learner will repair minor sheet metal damage.
Conditions	The learner will be given • Repair equipment • Repair materials • Steel panel
Criteria	The learner will be evaluated on • Safety • Procedure • Technique • Quality of repair

LINE (GAC): F PLASTICS AND COMPOSITES

Competency: F1 Describe plastic repair tools and equipment

Objectives

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

- Describe the tools and equipment used for plastic repair.

LEARNING TASKS

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

CONTENT

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

LINE (GAC): F PLASTICS AND COMPOSITES

Competency: F2 Describe plastic repair techniques

Objectives:

To be competent in this area, the individual must be able to:
- Describe hot-air and airless welding procedures.
- Describe adhesive plastic repair techniques.

LEARNING TASKS	CONTENT

1. Describe hot-air welding techniques.	• Identification of plastic
	• Purpose and application
	• Thermoplastic repair
	• Maintain welding equipment
	• Store welding equipment
	• Recognize potential hazards
	  ○ Air speed
	  ○ Surface temperature

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

3. Describe adhesive repairs techniques.	• Types of repairs • Types of adhesives • Adhesion promoters • Surface preparation steps • Application and finishing • Manufacturers' specifications

LINE (GAC): F PLASTICS AND COMPOSITES

Competency: F3 Demonstrate plastic repair techniques

Objectives:

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

- Demonstrate plastic repairs.

LEARNING TASKS

1. Demonstrate plastic repairs.

CONTENT

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

Achievement Criteria

Performance — The learner will perform plastic repairs, including

- Welded
- Adhesive

Conditions — The learner will be given

- Welding equipment
- Adhesive materials
- Plastic panel

Criteria — The learner will be evaluated on

- Safety
- Procedure
- Technique
- Quality of repair

LINE (GAC): G SURFACE PREPARATION

Competency: G1 Describe spray gun use

Objectives:

To be competent in this area, the individual must be able to:
- Identify types and components of a spray gun.
- Perform spray gun troubleshooting techniques.
- Perform spray gun maintenance and cleaning.

LEARNING TASKS	CONTENT
1. Identify types of spray guns used in the trade.	• Siphon feed • Gravity feed • Low Volume Low Pressure (L.V.L.P.) • High Volume Low Pressure (H.V.L.P.) • Pressure feed • Airbrush
2. Describe the parts of the spray gun.	• Gun body • Trigger • Air valve • Spreader adjustment • Fluid adjustment • Fluid needle and tip • Air cap • Material container
3. Demonstrate troubleshooting techniques for correcting spray gun problems.	• Identification of problem • Gun testing methods • Methods for correcting problem
4. Demonstrate the procedures for cleaning and maintaining the spray gun.	• Cleaning steps • Maintenance procedures • Storage

LINE (GAC): G SURFACE PREPARATION

Competency: G2 Identify air supply and purification equipment

Objectives:

To be competent in this area, the individual must be able to:
- Describe types and function of an air compressor.
- Describe air and moisture filtration equipment.

LEARNING TASKS	CONTENT
1. Describe the various types of air compressors.	• Piston type • Single phase • Double phase • Screw type • Diaphragm type • Rotary type
2. Describe the features of an air compressor.	• Air pressure • Volume • Displacement • Pressure loss • Atmospheric versus compressed air
3. Describe air and moisture filtering equipment.	• Air transformer • Air dryers • Air filters • Check air dryers and filters for contamination and moisture

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

2. Describe the various spray booth controls.	• Air flow direction
	• Air flow controls
	• Temperature controls
	• Curing/drying times
	• Filter types and changes
	• Pressure readings
	  ○ Manometer
	  ○ Magnehelic
	• Interlock switch
	• Plenum fan
	• Fire suppression systems

LINE (GAC): G SURFACE PREPARATION

Competency: G4 Demonstrate preparation for application of undercoats/primers

Objectives:

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

- Describe substrates.
- Identify substrate condition.
- Identify pre-cleaning procedures.
- Describe paint removal techniques.
- Perform various sanding repair procedures.

LEARNING TASKS	CONTENT

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

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

3. Identify cleaning steps prior to sanding.	• Soap and water wash • Wax and grease remover

LEARNING TASKS	CONTENT

5. Describe paint removal techniques.	• Steel substrate
	  ○ Sanding removal
	  – Hand
	  – Machine
	  ○ Chemical removal
	  ○ Media blasting
	• Plastic substrate
	  ○ Sanding removal
	  ○ Chemical removal

6. Describe sanding materials.	• Sanding discs • Wet/dry papers • Disc sizes • Grit types • Paper grit size • Abrasive pads • Open coat/closed coat
7. Describe sanding equipment.	• Rotary • Dual action • Grinders • Sanding blocks/contour blocks • Sanding pads • Vacuum type system
8. Demonstrate sanding procedures.	• Hand sanding • Power sanding • Feather-edging techniques • Block sanding • Guide coats

LINE (GAC): G SURFACE PREPARATION

Competency: G5 Demonstrate the application of undercoats/primers

Objectives:

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

- Apply undercoats/primers.

LEARNING TASKS	CONTENT

1. Describe undercoats.	• Types
	  ○ Self-etching primer
	  ○ Epoxy primer
	  ○ Adhesion promoter
	  ○ Primer surfacers
	  ○ Sealer
	• Characteristics
	• Functions

2. Describe mixing.	• Technical data sheet
	  ○ Ratios
	  ○ Pot life
	  ○ Viscosity
	• Graduated container
	• Stick
	• Scale

3. Apply undercoats/primers.	• Equipment selection • Spraying environment • Number of coats • Minimum dry times • Minimum flash times • Air pressure

4. Clean up	• Disassembly
	• Cleaning
	• Gun washing
	  ○ Hand
	  ○ Machine

LINE (GAC): G SURFACE PREPARATION

Competency: G6 Identify corrosion protection techniques

Objectives:

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

LEARNING TASKS	CONTENT
1. Describe corrosion prevention materials.	• Zinc coating • Self-etching • Epoxy primer • Anti-corrosion compounds • Joint and seam sealers • Weld through primer • Undercoating • Wax coating
2. Describe the areas of the vehicle requiring corrosion protection after repair.	• Joints and seams • Inside closed sections • Exterior panels (inside and outside) • Hot spots
3. Apply corrosion protection.	• Material and equipment selection • Application techniques • Quality control

LINE (GAC): H AUTO BODY CONSTRUCTION AND COMPONENTS

Competency: H1 Identify auto body construction types

Objectives:

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

LEARNING TASKS	CONTENT
1. Identify types of body/frame construction.	• Conventional • Unibody • Space
2. Describe body components.	• Structural panels • Exterior fixed panels • Exterior removable panels • Trim • Door hardware • Glass components • Bumpers

LINE (GAC): H AUTO BODY CONSTRUCTION AND COMPONENTS

Competency: H2 Describe panel alignment methods

Objectives:

To be competent in this area, the individual must be able to:
- Perform a panel alignment.

LEARNING TASKS	CONTENT

1. Describe panel alignment.	• Operation
	  ○ Moveable
	  ○ Fixed
	• Fit/alignment
	• Safety
	• Seal
	• Parts wear
	• OEM and after market parts

2. Perform panel alignment.	• Alignment sequence • Method of fastening • Adjusting • Blocking • Jacking • Flushness/gap • Lubrication • Verify part movement (moveable parts)

Achievement Criteria

Performance The learner will perform a panel alignment.

Conditions The learner will be given
- Tools
- Replacement panel
- Vehicle or prop

Criteria The learner will be evaluated on
- Procedure
- Accuracy of alignment

LINE (GAC): H AUTO BODY CONSTRUCTION AND COMPONENTS

Competency: H3 Describe body component servicing procedures

Objectives:

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

- Describe body components

LEARNING TASKS	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 sheet metal components.	• Front end
	  ○ Fenders
	  ○ Hood panel
	  ○ Headlight mounting panel
	• Rear end
	  ○ Trunk
	  ○ Hatch
	  ○ Box
	  ○ Tail gate

LEARNING TASKS	CONTENT

4. Describe interior vehicle components.	• Components
	  ○ Seats
	  ○ Steering wheel
	  ○ Dash
	  ○ Console
	  ○ Headliner
	  ○ Door panels
	  ○ Carpet
	  ○ Switches
	  ○ Trim
	  ○ Spare tire
	  ○ Accessories
	  ○ Air bags
	• Removal
	• Installation

LINE (GAC): H AUTO BODY CONSTRUCTION AND COMPONENTS

Competency: H4 Describe automotive tempered glass

Objectives:

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

- Describe tempered glass.

LEARNING TASKS

1. Describe automotive tempered glass.

CONTENT

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

LINE (GAC): H AUTO BODY CONSTRUCTION AND COMPONENTS

Competency: H5 Describe automotive laminated glass

Objectives:

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

- Describe laminated, structural glass.

LEARNING TASKS	CONTENT

1. Describe automotive laminated, structural glass.	• Characteristics
	  ○ Safety
	  ○ Clear
	  ○ Tinted
	  ○ Shaded
	  ○ Heated
	• H.U.D. (heads-up display)
	• Rain/moisture sensor
	• Acoustic inner layer
	• Anti-lacerative
	• Application
	• NAGS (National Auto Glass Specifications)
	• Repairable

2. Describe the removal and installation of laminated, structural glass.	• Select removal method
	  ○ Vehicle construction
	  – Exposed pinchweld
	  – Encapsulated
	  ○ Replace vs. reinstall
	  ○ Wire cutout
	  ○ Cold knife cutout
	  ○ Reciprocating tool
	• Remove bonded glass and material
	  ○ Mark fastener locations and positions
	  ○ Clean up
	  ○ Storage

LINE (GAC): H AUTO BODY CONSTRUCTION AND COMPONENTS

Competency: H6 Service non-structural glass

Objectives:

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

- Remove and replace non-bonded glass.

LEARNING TASKS	CONTENT

1. Describe removal and replacement procedures for non-bonded glass.	• Fasteners
	  ○ Bolts
	  ○ Fasteners (clips)
	  ○ Rivets
	  ○ Everseal
	• Gaskets
	  ○ Bonded
	• Sealants
	• 2-part epoxy
	• Removal procedures
	• Installation procedures
	• Run channel
	• Sash channel
	• Clean up and disposal

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

Achievement Criteria

Performance	The learner will remove and replace non-bonded glass.
Conditions	The learner will be given • Tools • Door • Replacement glass
Criteria	The learner will be evaluated on • Safety • Procedure • Accuracy of alignment

Level 2

Automotive Collision Repair Technician

LINE (GAC): D WELDING

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

Objectives:

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

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

LEARNING TASKS	CONTENT

1. Describe set-up procedures for MIG welding aluminum.	• Properties of aluminum
	• Drive roller pressure
	• Wire feed
	  ○ Spool/machine fed
	  ○ Spool gun fed
	• Wire speed (current)
	• Pulse
	• Voltage (heat) selection
	• Shielding gas
	  ○ Flow rate
	  ○ Type (100% Argon)
	• Liner selection
	• Temperature sticks
	• Conditioning of metal

2. Describe set-up procedures for MIG brazing.	• Drive roller pressure
	• Wire feed
	  ○ Spool/machine fed
	  ○ Spool gun fed
	• Wire speed (current)
	• Voltage (heat) selection
	• Shielding gas
	  ○ Flow rate
	  ○ Type (100% Argon)
	• Liner selection
	• Conditioning of metal

LINE (GAC): D WELDING

Competency D7 Perform various aluminum MIG welds

Objectives:

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

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

LEARNING TASKS	CONTENT
1. Perform a lap weld on sheet aluminum.	• Gun angle and speed • Build-up • Consistent width bead • Penetration
2. Perform a plug weld on sheet aluminum (2 and 3 sheet thickness).	• Gun angle and speed • Arc start away from plug hole • Penetration • Build-up • Complete closure of plug hole • Complete closure of plug hole on top and bottom sides of a through weld

Achievement Criteria

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

Conditions The learner will be given

- Welding equipment
- Aluminum panels

Criteria The learner will be evaluated on

- Safety
- Procedure
- Technique
- Quality of weld

LINE (GAC): E SHEET METAL REPAIR

Competency: E5 Describe productive organizational skills

Objectives:

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

- Describe productive organizational skills.

LEARNING TASKS

1. Describe productive organizational skills.

CONTENT

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

LINE (GAC): E SHEET METAL REPAIR

Competency: E6 Describe complex damage analysis procedures

Objectives:

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

- Describe complex damage analysis procedures.

LEARNING TASKS

1. Describe complex damage analysis procedures.

CONTENT

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

LINE (GAC): E SHEET METAL REPAIR

Competency: E7 Describe roughing procedures for repairing sheet metal

Objectives:

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

- Describe roughing procedures for repairing complex sheet metal damage.

LEARNING TASKS

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

CONTENT

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

LINE (GAC): E SHEET METAL REPAIR

Competency: E8 Describe plastic filling procedures for damage to complex sheet metal areas

Objectives:

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

- Describe body filling procedures.

LEARNING TASKS

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

CONTENT

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

LINE (GAC): E SHEET METAL REPAIR

Competency: E9 Demonstrate sheet metal repair procedures

Objective:

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

- Perform a complex sheet metal repair.

LEARNING TASKS	CONTENT
1. Perform a complex sheet metal repair.	• Cleaning • Analysis • Roughing • Shrinking • Adjacent part fit-up • Body filler • Sanding

Achievement Criteria

Performance	The learner will perform a complex sheet metal repair.
Conditions	The learner will be given • Tools • Damaged sheet metal panel
Criteria	The learner will be evaluated on • Safety • Procedure • Technique • Quality of repair

LINE (GAC): E SHEET METAL REPAIR

Competency: E10 Describe panel replacement and repair techniques

Objectives:

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

- Install a door skin.

LEARNING TASKS	CONTENT
1. Describe the procedure to prepare a door skin for replacement.	• Repair materials • Cleaning products • Abrasives and strippers • Panel composition • Topcoat identification • Substrate identification • Removal of panel components • Control of panel movement
2. Describe the procedure to repair the door shell.	• Damaged door skin removal • Damage analysis • Panel composition • Heating • Cold repair • Pushing/pulling • Shrinking • Hammer dolling • Stress relieving

3. Describe preparing new door skin for installation.	• Removal procedure
	• Remove necessary component for access
	• Test fitting
	• Panel alignment
	• Drilling spot welds
	• Factory seams versus sectioning
	• Fastening procedures and types
	• Inspect panel
	  ○ Visually
	  ○ Touch
	• Verify panel alignment and operation

LEARNING TASKS	CONTENT
4. Install door skin.	• Welding procedures • Bonding procedures • Hammering technique ○ Rubber block • Filling • Joint sealing • Sound deadener application • Restoring corrosion protection

Achievement Criteria

Performance	The learner will install a partial/simulated door skin (or equivalent).
Conditions	The learner will be given • Tools and materials • Partial/simulated door skin (or equivalent)
Criteria	The learner will be evaluated on • Safety • Procedure • Technique • Quality of repair

LINE (GAC): E SHEET METAL REPAIR

Competency: E11 Describe the characteristics of aluminum

Objectives:

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

- Describe the characteristic of sheet aluminum.

LEARNING TASKS

1. Describe the characteristics of sheet aluminum.

CONTENT

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

LINE (GAC): E SHEET METAL REPAIR

Competency: E12 Describe basic sheet aluminum repairs

Objectives:

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

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

LEARNING TASKS	CONTENT
1. Describe damage analysis.	• Need for a complete damage analysis
2. Describe roughing procedures.	• Hammering on dolly/off dolly • Pry tools • Stress relieving and annealing with heat
3. Describe shrinking procedures.	• Expansion and contraction • Restricted and unrestricted • Oxyacetylene shrinking • Shrinking/ cold shrinking
4. Describe body filling procedures.	• Cleaning procedures • Surface preparation • Use of body filler • Application • Contour blocking

LINE (GAC): F PLASTICS AND COMPOSITES

Competency: F4 Describe fiberglass and SMC repair equipment

Objectives:

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

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

LEARNING TASKS	CONTENT
1. Identify tools and equipment required for FRP and SMC repairs.	• Materials • Hand tools • Power tools

LINE (GAC): F PLASTICS AND COMPOSITES

Competency: F5 Describe repair procedures for fiberglass and SMC

Objectives:

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

- Describe repair procedures for fiberglass and SMC

LEARNING TASKS	CONTENT

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

2. Describe various SMC and fiberglass damage repair techniques.	• Layout • Cleaning • Surface preparation • Reinforcing • Mixing and application of materials • Rough shaping • Finish sanding
3. Describe the methods for panel replacement.	• Complete panel • Partial panel (sectioning)

LINE (GAC): F PLASTICS AND COMPOSITES

Competency: F6 Perform fiberglass and SMC repairs

Objectives:

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

- Perform a two-sided FRP repair.

LEARNING TASKS	CONTENT
1. Prepare damaged area for repair.	• Cleaning • Fracture mitigation • Moisture removal • Beveling
2. Perform a two-sided FRP repair.	• Material and tool selection • Sequencing steps • Ventilation • Reinforcing • Heat

Achievement Criteria

Performance: The learner will perform a two-sided FRP repair.

Conditions: The learner will be given

- Tools and materials
- A damaged FRP panel

Criteria: The learner will be evaluated on

- Safety
- Procedure
- Technique
- Quality of repair

LINE (GAC): I MECHANICAL COMPONENTS

Competency: I1 Identify seat belt assemblies

Objectives:

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

- Identify seat belt assemblies.

LEARNING TASKS	CONTENT
1. Describe the types of automotive seat belt assemblies and their components.	• Active design • Passive design • Two-point lap • Three-point seatbelt • Continuous loop single retractor • Three-point dual retractor • Three-point passive • Motorized shoulder belt • Automatic tensioner • Seat integrated systems • Mounting hardware • Electrical connections
2. Identify the inspection procedures for seat belt assembly.	• Manufacturers' specifications • Examine seat belt restraint system • Tongue/buckle assembly • Retractor (tilt mechanism and inertia type) • Webbing • Anchoring points • Interior panel and upholstery removal

LINE (GAC): I MECHANICAL COMPONENTS

Competency: I2 Identify airbag system components

Objectives:

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

- Describe air bag system components and handling procedures.

LEARNING TASKS	CONTENT
1. Describe airbag system components.	• Impact sensors • Control module • Energy reserve module • Voltage converter • Clock spring • Wiring harness • Airbag module • Inflator assembly
2. Identify safety procedures when working around an airbag system.	• Disarm • Electrical disconnect • Impact sensors • Deployed inflator module • Un-deployed inflator module
3. Describe the procedure to remove and replace the airbag system components.	• System scan • Manufacturer removal and replacement process • Required tools • Related components • Self-diagnostic system

LINE (GAC): I MECHANICAL COMPONENTS

Competency: I3 Discuss cooling system service

Objectives:

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

- Describe cooling systems.

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

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

3. Identify oil cooling systems.	• Transmission oil coolers • Power steering coolers • Engine oil coolers

LINE (GAC): I MECHANICAL COMPONENTS

Competency: I4 Describe air conditioning service

Objectives:

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

- Describe the components of an air conditioning system.
- Identify safe handling procedures.

LEARNING TASKS	CONTENT
1. Describe air conditioning system components.	• Condenser • Receiver-drier • Expansion valve • Compressor • System Lines • Refrigerant • Belts • Evaporator
2. Identify safe handling procedures.	• Regulations and required certification • Pressurized system • Welding in vicinity • Evacuating the system (recovery) • Sealing system • Recharging the system • Dye

LINE (GAC): I MECHANICAL COMPONENTS

Competency: I5 Identify vehicle systems

Objectives:

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

- Describe vehicle systems.

LEARNING TASKS	CONTENT
1. Describe drive train components.	• Engine • Transmission • Axle • CV joints • Differentials • Drive shaft
2. Describe exhaust system components.	• Muffler • Exhaust manifold • Exhaust pipe • Tail pipe • Catalytic converter • Resonator • Hangers • Clamps • Sensors • Heat shields
3. Describe fuel system components.	• Fuel pump • Fuel injectors • Fuel tank • Fuel lines • Throttle body • Sending units • Emergency shut-off switch • Filters • Air intake system

LEARNING TASKS	CONTENT

4. Describe braking system components.	• Anti-lock brake (ABS)
	  ○ Tone ring
	  ○ Sensors
	  ○ Wiring
	• Wheel cylinder
	• Pads
	• Shoes
	• Drums
	• Rotors
	• Calipers
	• Master cylinder
	• Proportioning valves
	• Brake lines

LINE (GAC): I MECHANICAL COMPONENTS

Competency: I6 Identify electrical/electronic on-board procedures

Objections:

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

- Troubleshoot/repair electrical components

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

3. Describe a minor electrical diagnosis on a simple circuit.	• Fault codes
	• Voltage drop
	• Wiring harness repair
	• Checking for poor grounds
	  ○ Corrosion
	  ○ Damaged wires
	• Fuses/ relays

4. Describe electronic components.	• Location • Modules • Sensors • Cameras • System calibration • Static straps

LEARNING TASKS	CONTENT
5. Describe related electrical components.	• Exterior lighting • Interior lighting • Power accessories • Stereo • Antenna • Switches • Gauges • Sending units
6. Describe removal and installation of damaged electrical components.	• Identify damaged component • Manufacturers' removal procedure • Disconnect components • Storage and/or disposal of components • Test and verify component operation

7. Repair damaged wires and exterior coatings.	• Types of wiring and coverings
	• Types of connectors
	• Determine repairability of wires
	• Volt meters and test lights
	• Splice, cut and solder
	• Reapply coverings
	  ○ Electrical tape
	  ○ Shrink tube

Achievement Criteria

Performance	The learner will repair damaged wire.
Conditions	The learner will be given • Tools and materials • A damaged wire
Criteria	The learner will be evaluated on • Safety • Procedure • Technique • Quality of repair ○ Resistance of circuit

Level 3

Automotive Collision Repair Technician

LINE (GAC): J STRUCTURAL REPAIR

Competency: J1 Identify the various structural designs

Objectives:

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

- Describe vehicle types (frame or unibody).

LEARNING TASKS	CONTENT

1. Describe conventional frame designs.	• Designs
	  ○ Ladder
	  ○ Perimeter
	  ○ "X" frame
	• Components
	  ○ Body mounts
	  ○ Cross members
	• Construction
	  ○ Hydroformed
	  ○ Steel
	  ○ Aluminum

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

3. Identify vehicle crush zones.	• Energy management system • Types • Repairability

LINE (GAC): J STRUCTURAL REPAIR

Competency: J2 Identify collision theory concepts

Objectives:

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

- Describe physical principles of collision and vehicle damage.

LEARNING TASKS	CONTENT
1. Describe collision forces.	• Mass • Momentum • Inertia

2. Describe impacts and the effects on the vehicle.	• Unibody and conventional frame
	• Types of impacts
	  ○ Front end
	  ○ Rear end
	  ○ Side
	  ○ Roll over
	  ○ Stationary or moving
	• Direction of damage
	  ○ Internal
	• Crush zones
	• External
	• Deflection
	  ○ Direction
	• Three section principle
	• Primary and secondary
	  ○ Point of impact
	  ○ Buckling

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	CONTENT
1. Identify visual inspection techniques.	• Primary damage • Secondary damage • Mechanical damage • Cracked seam sealer • Cracked glass • Pulled spot welds • Panel alignment • Fastening points • Lighting

LINE (GAC): J STRUCTURAL REPAIR

Competency: J4 Identify measuring theory and gauging equipment

Objectives:

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

- Describe measuring theory
- Describe measuring equipment

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

LEARNING TASKS	CONTENT
7. Identify measuring gauges.	• Tape measure • Tram • Self-centering • Digital • Acoustic • Arm system

8. Describe X-measurement techniques.	• Limitations
	  ○ Diamond checking
	  ○ Assymetrical
	• Sway checking

9. Perform vehicle measurements.	• Tram gauge ○ Length, width, cross

Achievement Criteria

Performance	The learner will perform tram gauge measurements.
Conditions	The learner will be given • Tram gauge • Tape measure • Specifications • Vehicle or equivalent
Criteria	The learner will be evaluated on • Procedure • Accuracy of measurements

LINE (GAC): J STRUCTURAL REPAIR

Competency: J5 Identify various measuring systems

Objectives:

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

- Describe measuring systems.

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

2. Describe computerized measuring systems.	• Purpose
	• Design
	  ○ Laser
	  ○ Acoustic
	  ○ Robotic (arm)
	  ○ Camera
	• Advantages
	• Disadvantages
	• Limitations of measuring equipment
	• Maintenance
	• Storage

LINE (GAC): J STRUCTURAL REPAIR

Competency: J6 Identify unibody anchoring techniques

Objectives:

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

- Describe unibody anchoring.

LEARNING TASKS	CONTENT
1. Describe unibody anchoring theory.	• Center section principle • Universal anchoring (P4) • Potential hazards • Weight support • Vertical defection • Weak rocker panels
2. Describe floor anchor systems.	• Purpose • Design • Potential hazards
3. Describe bench (rack) anchor systems.	• Purpose • Design • Potential hazards • Fixed/adjustable
4. Describe anchoring limitations.	• Vehicles without lower rocker panel pinch welds • Space frame • Custom fit clamps • Weld-on flanges • Through-the-floor clamps • Suspension mount clamps • Jacking points

LINE (GAC): J STRUCTURAL REPAIR

Competency: J7 Identify conventional frame anchoring techniques

Objectives:

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

- Describe conventional frame anchoring.

LEARNING TASKS	CONTENT
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.	• Loaded and unloaded suspension • 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 straightening, equipment and techniques.

LEARNING TASKS	CONTENT

1. Describe straightening effects on damaged metal.	• Shape; dimension
	  ○ Spring back
	• State; strength
	  ○ Work hardening
	• High strength steel
	• Aluminum

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

3. Describe pulling clamps.	• Types
	  ○ Single bolt
	  ○ Self-tightening
	  ○ Side-pull (offset) attachment
	  ○ Pull plate
	• Care of hardware
	  ○ Cleanliness
	  ○ Over-tightening
	• Use
	  ○ Pulling force
	  ○ Access
	  ○ Attachment point

4. Describe multiple-pulling.	• Advantages
	  ○ Reduction of pressure
	  ○ Equalizing and dispersing energy
	  ○ Control

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

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

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

LINE (GAC): J STRUCTURAL REPAIR

Competency: J9 Describe pulling techniques

Objectives:

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

- Describe pulling methods.

LEARNING TASKS	CONTENT
1. Describe the center-out pulling principle.	• Need to establish true center-section • Effects of center-section misalignment on end sections

2. Describe the safe use of pulling equipment.	• Inspect components
	  ○ Safety straps
	  ○ Chains
	  ○ Clamps
	  ○ Hooks
	  ○ Fixtures
	  ○ Anchor pots
	• Care of pulling chains
	• Chain ratings
	• Hydraulic equipment

3. Describe stress-relieving techniques.	• Heat • Vibration • Proper control of panel movement
4. Describe diamond/twist repair procedures.	• Analysis • Setup • Pulling procedures
5. Describe mash repair procedures.	• Analysis • Setup • Pulling procedure
6. Describe sag repair procedures.	• Analysis • Setup • Pulling procedures
7. Describe sway repair procedures.	• Analysis • Setup • Pulling procedures

LEARNING TASKS	CONTENT
8. Describe cross-member repair procedures.	• Analysis • Setup • Pulling procedures
9. Describe pulling techniques for front hits.	• Analysis • Setup • Pulling procedures
10. Describe pulling techniques for rear hits.	• Analysis • Setup • Pulling procedures
11. Describe pulling techniques for side hits.	• Analysis • Setup • Pulling procedures
12. Describe pulling techniques for roll-over damage.	• Analysis • Setup • Pulling procedures

LINE (GAC): J STRUCTURAL REPAIR

Competency: J10 Describe structural panel replacement procedures

Objectives:

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

- Describe structural panel replacement and sectioning.

LEARNING TASKS	CONTENT

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

2. Describe structural sectioning.	• Analysis
	  ○ Manufacturers' removal procedure and specifications
	  ○ ICBC
	  ○ I-Car
	• Methods
	• Spot weld removal
	• Panel preparation
	• Panel alignment
	• Welding methods
	• Corrosion prevention
	• Floor pan and trunk floor

LINE (GAC): J STRUCTURAL REPAIR

Competency: J11 Prepare a structural damage analysis sheet

Objective:

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

- Document damage analysis.

LEARNING TASKS

1. Prepare a damage analysis report.

CONTENT

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

Achievement Criteria

Performance	The learner will document damage analysis.
Conditions	The learner will be given • Measuring equipment • Damaged vehicle • Access to specifications • Damage analysis report • Time limit
Criteria	The learner will be evaluated on • Accuracy of documentation

LINE (GAC): J STRUCTURAL REPAIR

Competency: J12 Demonstrate structural repair procedures

Objective:

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

- Perform structural repair.

LEARNING TASKS

1. Perform structural repair.

CONTENT

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

Achievement Criteria

Performance — The learner will perform a structural repair.

Conditions — The learner will be given

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

Criteria — The learner will be evaluated on

- Safety
- Procedure
- Accuracy of repair

LINE (GAC): J STRUCTURAL REPAIR

Competency: J13 Demonstrate closed box panel structural sectioning techniques

Objectives:

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

- Perform sectioning of a closed box panel.

LEARNING TASKS	CONTENT
1. Perform sectioning of a closed box panel.	• Types of sectioning joints • Panel preparation • Welding methods • Corrosion protection

Achievement Criteria

Performance — The learner will section a closed box, such as

- Pillar
- Rocker
- Rail

Conditions — The learner will be given

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

Criteria — The learner will be evaluated on

- Safety
- Procedure
- Accuracy of repair

LINE (GAC): K SUSPENSION AND STEERING

Competency: K1 Identify MacPherson Strut suspension system

Objectives:

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

- Describe the MacPherson strut suspension system.

LEARNING TASKS	CONTENT

1. Describe the MacPherson strut suspension system	• Components
	  ○ Lower control arm
	  ○ Lower ball joint
	  ○ Strut assembly
	  ○ Spring
	  ○ Steering knuckle
	  ○ Upper bearing
	• Alignment angles
	  ○ Poor handling
	  ○ Parts wear
	• Limited adjustability

LINE (GAC): K SUSPENSION AND STEERING

Competency: K2 Identify short and long arm suspension systems

Objective:

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

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

LEARNING TASKS

1. Describe short and long arm suspension systems.

CONTENT

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

LINE (GAC): K SUSPENSION AND STEERING

Competency: K3 Identify the various types of rear suspension systems

Objective:

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

- Describe rear suspension systems.

LEARNING TASKS

1. Describe rear suspension systems.

CONTENT

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

LINE (GAC): K SUSPENSION AND STEERING

Competency: K4 Identify R&I procedures for suspension systems

Objective:

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

- Describe suspension system removal and installation procedures.

LEARNING TASKS

1. Describe R&I procedures for suspension systems.

CONTENT

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

LINE (GAC): K SUSPENSION AND STEERING

Competency: K5 Describe rack and pinion steering systems

Objectives:

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

- Describe rack and pinion steering systems.

LEARNING TASKS	CONTENT
1. Describe rack and pinion steering systems.	• Pinion gear • Rack gear • Gear housing • Tie rods ○ Inner/outer • Bellows • Mounting points
2. Describe the relationship between the rack and pinion assembly and the lower control arms.	• Misalignment angles • Jounce rebound toe change • Handling problems • Methods of checking

LINE (GAC): K SUSPENSION AND STEERING

Competency: K6 Describe parallelogram steering systems

Objectives:

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

- Describe parallelogram steering systems.

LEARNING TASKS	CONTENT
1. Describe parallelogram steering systems.	• Pitman arm • Idler arm • Center link/drag link • Inner tie rods • Outer tie rods • Adjusting sleeves • Steering knuckle
2. Describe the relationship between the parallelogram steering system and the lower control arms.	• Misalignment angles • Jounce rebound toe change • Handling problems • Methods of checking

LINE (GAC): K SUSPENSION AND STEERING

Competency: K7 Identify wheel alignment angles

Objectives:

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

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

LEARNING TASKS	CONTENT
1. Describe alignment angles.	• Caster • Camber • Steering axis inclination • Toe • Turning radius • Thrust angle
2. Describe handling and parts wear problems associated with each of the alignment angles.	• Tire wear • Pulling problems • Drive line alignment • Steering wheel angle
3. Describe the reasons for checking tracking.	• Alignment problems ○ Thrust angle • Drive line problems • Wheelbase • Tire wear
4. Describe the effects of a misaligned unibody structure on the steering and suspension systems.	• Handling • Parts wear • Jounce rebound toe change • Steering wheel angle
5. Describe diagnosis of wheel alignment on a misaligned unibody structure.	• Parts wear • Interpreting SAI readings • Caster • Camber

LINE (GAC): L INSURANCE ESTIMATING

Competency: L1 Interpret estimating information

Objectives:

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

- Describe damage estimating.

LEARNING TASKS	CONTENT
1. Describe estimating terminology.	• Remove & Replace • Remove & Install • Judgement time • Overhaul • Repair • Sublet • Supplement
2. Describe additional information contained in estimating systems.	• Procedural (P) -pages • Vehicle systems information • Plastics identification • High strength steel locations • Computer module locations • 'Quick-check' under hood measurements • Airbag information

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

LEARNING TASKS	CONTENT
4. Describe parts and material ordering.	• Communication with suppliers • Parts manuals • Computers databases • Work orders • Interpret documentation • Organization of parts • Storage of parts • Environmental levies
5. Describe shop roles and responsibilities.	• Appraisers • Customers • Technicians • Parts people • Clear communication • Conflict resolution • Professionalism

LINE (GAC): L INSURANCE ESTIMATING

Competency: L2 Interpret business relations

Objectives:

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

- Maintain strong business working relationships.

LEARNING TASKS

1. Interpret business relations.

CONTENT

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

LINE (GAC): M REFINISHING

Competency: M1 Identify preparation of various substrates and topcoats

Objectives:

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

- Describe substrate and topcoat preparation.

LEARNING TASKS

1. Describe substrate and topcoat preparation.

CONTENT

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

LINE (GAC): M REFINISHING

Competency: M2 Describe mixing and application of primers

Objectives:

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

- Describe mixing and application of undercoats / primers.

LEARNING TASKS	CONTENT
1. Describe mixing and application of undercoats / primers.	• Undercoat types • Mixing • Application • Clean up

LINE (GAC): M REFINISHING

Competency: M3 Describe refinishing corrosion protection methods

Objectives:

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

- Describe the application of corrosion protection.

LEARNING TASKS	CONTENT
1. Describe the application of corrosion protection.	• Material types • Areas requiring corrosion protection after repair • Application

LINE (GAC): M REFINISHING

Competency: M4 Describe the refinishing process

Objectives:

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

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

LEARNING TASKS	CONTENT

1. Describe masking.	• Materials
	  ○ Tape
	  ○ Paper
	  ○ Poly
	  ○ Foam
	  ○ Fine line
	  ○ Liquid mask
	• Methods
	  ○ Back masking
	  ○ Reverse masking
	  ○ Unmasking
	• Material disposal

2. Describe mixing and tinting a colour coat.	• Mixing of toners ○ Formula content • Use of scales • Spray out cards • Comparison colour to vehicle • Colour plotting • Colour adjustment
3. Apply refinish materials.	• Manufacturers' specifications • Surface cleaning • Drop coating • Colour blending • Dry times • Flash times • Spray booth operation • Spray gun set up • Troubleshooting • Equipment clean up

Achievement Criteria

Performance	The learner will prepare and apply refinish materials.
Conditions	The learner will be given • Tools and equipment • Refinish materials • Panel
Criteria	The learner will be evaluated on • Safety • Procedure • Technique • Quality of finished product

LINE (GAC): M REFINISHING

Competency: M5 Identify the detailing process

Objectives:

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

- Describe vehicle detailing.

LEARNING TASKS	CONTENT

1. Describe the detailing process.	• Paint defects
	  ○ Dirt nibs
	  ○ Runs
	  ○ Overspray
	  ○ Orange peel
	• Sanding
	  ○ Techniques
	  ○ Materials
	• Polishing
	  ○ Speed
	  ○ Polisher motion
	  ○ Steps
	• Equipment
	  ○ Storage

2. Describe exterior vehicle cleaning.	• Cleaners
	  ○ Tire
	  ○ Engine
	  ○ Soap
	  ○ Window
	• Paint care procedures
	• Washing
	  ○ Two bucket
	  ○ Top to bottom
	  ○ Equipment
	• Environmental contaminants

3. Describe interior vehicle cleaning.	• Cleaning products ○ pH scale • Stain removal products • Stain removal and cleaning tools • Vacuum • Air blower • Shampooer • Conditioners • Deodorize interior

4. Describe pre-delivery inspection.	• Inspection checklist
	• Value added
	  ○ Touch up stone chips
	  ○ Surface defects

Section 3

ASSESSMENT GUIDELINES

Assessment Guidelines – Level 1

Level 1 Grading Sheet: Subject Competency and Weightings

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

Final In-school Mark	80%
Standard Level Exam Mark	20%
Final Mark	FINAL%

Assessment Guidelines – Level 2

Level 2 Grading Sheet: Subject Competency and Weightings

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

Final In-school Mark	80%
Standard Level Exam Mark	20%
Final Mark	FINAL%

Assessment Guidelines – Level 3

Level 3 Grading Sheet: Subject Competency and Weightings

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

SkilledTradesBC will enter the apprentices' Motor Vehicle Body Repairer (Metal and Paint) Interprovincial examination mark in SkilledTradesBC Portal.

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

Section 4

TRAINING PROVIDER STANDARDS

Automotive Collision Repair Technician

Facility Requirements

Classroom Area

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

Shop Area

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

Lab Requirements

- Does not apply to this program.

Student Facilities

- Does not apply to this program.

Instructor's Office Space

- Does not apply to this program.

Tools and Equipment

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

Shop Tools and Equipment – All Levels

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

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

Shop Tools and Equipment – Miscellaneous

Miscellaneous – All Levels

- Sanding material

Level 1	Level 2	Level 3
• Sheet metal material • Body filler material • Adhesive and fiberglass material • Masking equipment and material • Refinishing material	• Aluminum material • Body filler material • Adhesive material • Fiberglass material • Electrical components • SMC material	• Cleaning materials • Sanding equipment • Primer undercoats

Student Equipment & Tools

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

Reference Materials

Required Reference Materials

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

Recommended Resources

www.I-car.ca
www.tech-cor.com

Suggested Texts

- None for this program.

Instructor Requirements

Occupation Qualification

The instructor must possess:

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

Work Experience

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

Instructional Experience and Education

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

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

Appendices

Appendix A
Glossary

Appendix A: Glossary

Abrasives

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

Active restraint system

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

Air bag matrix

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

Air bags

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

Detailing

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

Frame and structural components

Provides the vehicle with strength and structural integrity.

Glass

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

Glass hardware

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

Interior components

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

Mechanical and electrical components

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

Outer body panels

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

Passive restraint systems

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

Refinishing

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

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

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

Structural components

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

Structural glass

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

Unibody motor vehicle

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

Appendix B

Practical Assessments

Appendix B: Practical Assessments

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

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

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

Level One

Competency	Practical Assessment Task
B4 Describe organizational skills	The learner will access and interpret OEM specifications and repair procedures.
C2 Perform oxyacetylene procedures	The learner will perform oxyacetylene set up, cutting, heating and shut down.
D3 Perform various MIG welds on sheet steel	The learner will perform a butt weld, a lap weld, and a plug weld.
D4 Describe plasma arc cutting	The learner will perform a cut on 22 or 20 gauge steel.
E4 Describe minor sheet metal damage repair	The learner will repair minor sheet metal damage.
F3 Demonstrate plastic repair techniques	The learner will perform plastic repairs, including • Welded • Adhesive
H2 Describe panel alignment methods	The learner will perform a panel alignment.
H6 Service non-structural glass	The learner will remove and replace non-bonded glass.

Level Two

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

Level Three

Competency	Practical Assessment Task

J4 Identify measuring theory and gauging equipment	The learner will perform tram gauge measurements.
J11 Prepare a structural damage analysis sheet	The learner will document damage analysis.
J12 Demonstrate structural repair procedures	The learner will perform a structural repair.
J13 Demonstrate closed box panel structural sectioning techniques	The learner will section a closed box, such as • Pillar • Rocker • Rail
M4 Describe the refinishing process	The learner will prepare and apply refinish materials.

Appendix C

Previous Contributors

Appendix C: Previous Contributors

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

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

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

- 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

SkilledTradesBC 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.