



# AUTOMOTIVE SERVICE TECHNICIAN 2017

Based on the CCDA Harmonization Recommendations and  
the Interprovincial Program Guide  
(pg. 11 for Program Structure)



The Joint Planning Committee (JPC) recognizes this Interprovincial Program Guide as the national curriculum for the occupation of Automotive Service Technician.

## Acknowledgements

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In 2012, a review, update and jurisdictional validation of this IPG were completed to ensure adequate coverage of the occupation as outlined in the 2011 National Occupational Analysis (NOA).

As this program guide will be amended periodically, comments or suggestions for improvement should be directed to:

Trades and Apprenticeship Division  
Labour Market Integration Directorate  
Human Resources and Skills Development Canada  
140 Promenade du Portage, Phase IV, 5<sup>th</sup> Floor  
Gatineau, Quebec K1A 0J9  
e-mail: redseal-sceaurouge@hrsdc-rhdcc.gc.ca

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## User Guide

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According to the Canadian Apprenticeship Forum, the IPG is: "a list of validated technical training outcomes, based upon those sub-tasks identified as common core in the NOA, and validated by industry in the provinces and territories as incorporating the essential tasks, knowledge and skills associated with a given trade."

Learning outcomes contained in the IPG represent the minimum common core content for the development of jurisdictional training standards and outlines. IPGs are developed based on the NOAs and extensive industry consultation. The IPG is intended to assist program development staff in the design of jurisdictional plans for training. Each jurisdiction has the flexibility to add additional content.

The IPG was deliberately constructed for ease of use and flexibility of structure in order to adapt to all delivery requirements. It details units of training, unit outcomes and objectives. It does not impose a delivery model or teaching format.

Jurisdictions and/or training providers will select and develop delivery materials and techniques that accommodate a variety of learning styles and delivery patterns. The IPG does not dictate study materials, textbooks or learning activities to be used in delivery.

The IPG document includes a recommended levelling structure to facilitate mobility for apprentices moving from one jurisdiction to another. Because of difference in jurisdictional regulations and program durations, levels are offered as suggestions only.

### Structure

The IPG is divided into units. The unit codes are used as a means of identification and are not intended to convey the order of delivery. Prerequisites have not been detailed. Each unit consists of *Learning Outcomes* and *Objectives and Content*.

The *Learning Outcomes* are the specific performances that must be evaluated. Wording of the learning outcomes, "Demonstrate knowledge of...", acknowledges the broad spectrum of ways in which knowledge can be shown. It is at the discretion of each jurisdiction to determine the manner in which learning outcomes are evaluated; theoretically, practically or a combination of both.

## User Guide (*continued*)

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The *Objectives and Content* for the unit details the information to be covered in order to achieve the performances specified in the *Learning Outcomes*. These objectives can be either theoretical or practical in nature, based on the requirements identified through the industry consultation process. The learning activities used to cover the objectives are at the discretion of the jurisdiction; however, practically worded objective statements have been used where industry indicated a need for the apprentices to receive exposure to performing the task or skill outlined while attending technical training. For example, this exposure could be done through instructor demonstration or individual or group performance of the skill or task. This practical training will help to reinforce the theoretical component of the technical training.

Detailed content for each objective has not been developed. Where detail is required for clarity, content has been provided. The content listed within the IPG document is **not** intended to represent an inclusive list; rather, it is included to illustrate the intended direction for the objective. Content may be added or extended in jurisdictional training plans as required.

Jurisdictions are free to deliver the IPG units one at a time or concurrently, provided that all *Learning Outcomes* are met. The IPG does not indicate the amount of time to be spent on a particular unit as the length of time required to deliver the *Learning Outcomes* successfully will depend upon the learning activities and teaching methods used.

## **IPG Glossary of Terms**

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These definitions are intended as a guide to how language is used in the IPGs.

<b>ADJUST</b>	To put in good working order; regulate; bring to a proper state or position.
<b>APPLICATION</b>	The use to which something is put and/or the circumstance in which you would use it.
<b>CHARACTERISTIC</b>	A feature that helps to identify, tell apart, or describe recognizably; a distinguishing mark or trait.
<b>COMPONENT</b>	A part that can be separated from or attached to a system; a segment or unit.
<b>DEFINE</b>	To state the meaning of (a word, phrase, etc.).
<b>DESCRIBE</b>	To give a verbal account of; tell about in detail.
<b>EXPLAIN</b>	To make plain or clear; illustrate; rationalize.
<b>IDENTIFY</b>	To point out or name objectives or types.
<b>INTERPRET</b>	To translate information from observation, charts, tables, graphs, and written material.
<b>MAINTAIN</b>	To keep in a condition of good repair or efficiency.
<b>METHOD</b>	A means or manner of doing something that has procedures attached to it.
<b>OPERATE</b>	How an object works; to control or direct the functioning of.
<b>PROCEDURE</b>	A prescribed series of steps taken to accomplish an end.
<b>PURPOSE</b>	The reason for which something exists or is done, made or used.

## **IPG Glossary of Terms** *(continued)*

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<b>TECHNIQUE</b>	Within a procedure, the manner in which technical skills are applied.
<b>TEST</b>	<p>v. To subject to a procedure that ascertains effectiveness, value, proper function, or other quality.</p> <p>n. A way of examining something to determine its characteristics or properties, or to determine whether or not it is working correctly.</p>
<b>TROUBLESHOOT</b>	To follow a systematic procedure to identify and locate a problem or malfunction and its cause.



## **Essential Skills Profiles**

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Essential Skills are the skills needed for work, learning and life. They provide the foundation for learning all the other skills that enable people to evolve within their jobs and adapt to workplace change.

Over the past several years, the Government of Canada has conducted research examining the skills people use at work. From this research, Essential Skills Profiles have been developed for various occupations.

For more information regarding Essential Skills and to access Essential Skills Profiles for specific occupations, visit HRSDC's Essential Skills website at:

<http://www.hrsdc.gc.ca/eng/workplaceskills/LES/profiles/profiles.shtml>

## Profile Chart

<b>OCCUPATIONAL SKILLS</b>			
<b>AST-100</b> Safety	<b>AST-105</b> Tools and Equipment	<b>AST-110</b> Hoisting and Lifting	<b>AST-115</b> Communication
<b>AST-120</b> Trade Related Documents	<b>AST-130</b> Oxy-Acetylene Welding and Cutting (OAW)	<b>AST-135</b> Gas Metal Arc Welding (MIG)	<b>AST-165</b> Vehicle Maintenance Inspection
<b>ENGINE AND ENGINE SUPPORT SYSTEMS</b>			
<b>AST-145</b> Accessory Drive Systems	<b>AST-200</b> Engine Principles	<b>AST-205</b> Cooling Systems	<b>AST-210</b> Engine Lubrication Systems
<b>AST-230</b> Fuel Delivery Systems	<b>AST-235</b> Ignition Systems	<b>AST-300</b> Engine Repair	<b>AST-305</b> Gasoline Fuel Systems
<b>AST-330</b> Emission Control Systems	<b>AST-335</b> Intake and Exhaust Systems	<b>AST-400</b> Diesel Fuel Injection Systems	
<b>VEHICLE MANAGEMENT SYSTEMS</b>			
<b>AST-310</b> Vehicle Management Systems			
<b>DRIVE LINE SYSTEMS</b>			
<b>AST-240</b> Drive Shafts and Axles	<b>AST-315</b> Manual Transmissions and Transaxles	<b>AST-320</b> Clutches and Flywheels	<b>AST-325</b> Transfer Cases
<b>AST-340</b> Differentials and Final Drive Assemblies	<b>AST-420</b> Automatic Transmissions and Transaxles		
<b>ELECTRICAL AND COMFORT CONTROL SYSTEMS</b>			
<b>AST-155</b> Electrical and Electronic Principles	<b>AST-215</b> Starting Systems	<b>AST-220</b> Charging Systems	<b>AST-225</b> Lighting and Wiper Systems
<b>AST-425</b> Electrical Options and Accessories	<b>AST-430</b> Instrumentation and Information Displays	<b>AST-435</b> Heating, Ventilation and Air Conditioning Systems	

**Profile Chart** *(continued)*

<b>STEERING AND SUSPENSION, BRAKING, CONTROL SYSTEMS, TIRES, HUBS AND WHEEL BEARINGS</b>			
<b>AST-125</b> Tires, Wheels and Hubs	<b>AST-140</b> Braking Systems I (Non-ABS)	<b>AST-160</b> Suspension Systems I	<b>AST-245</b> Steering Systems
<b>AST-410</b> Braking Systems II (ABS)	<b>AST-415</b> Suspension Systems II		
<b>BODY COMPONENTS, TRIM AND RESTRAINT SYSTEMS</b>			
<b>AST-150</b> Body Components and Trim	<b>AST-440</b> Restraint Systems		
<b>HYBRID AND ALTERNATE FUEL SYSTEMS</b>			
<b>AST-170</b> Hybrid and Alternate Fuel Systems I	<b>AST-445</b> Hybrid and Alternate Fuel Systems II		

## Program Structure – Nova Scotia Apprenticeship Program

The courses listed below are required technical training in the Automotive Service Technician Apprenticeship Program.

Nova Scotia Course	Nova Scotia Course Name	Nova Scotia Prerequisites	Interprovincial Program Guide (IPG) Content To Be Covered			
			IPG Units		Sugg. Hrs.	Page #
<b>Level 1 (6 Weeks)</b>						
	Integrated Milestone	NONE	MENT-1801	Workplace Mentoring 1 (NS Specifig19c)	4	17
ASTA-1831	Fundamental Skills	NONE	AST-100	Safety	13	18
			AST-105	Tools and Equipment	5	19
			AST-110	Hoisting and Lifting	5	21
			AST-115	Communication		22
			AST-120	Trade Related Documents	3	23
ASTA-1832	Chassis Systems 1	ASTA-1831	AST-125	Tires Wheels and Hubs	10	24
			AST-160	Suspension Systems I	20	26
			AST-240	Drive Shafts and Axles		41
MPOA-1800	Basic Welding	ASTA-1831	AST-130	Oxy-Acetylene Welding (OAW) and Cutting	17	28
			AST-135	Gas Metal Arc Welding	13	29
ASTA-1833	Non-ABS Brake Systems	ASTA-1831	AST-140	Braking System I (Non-ABS)	40	30
ASTA-1834	Electrical and Electronic Systems 1	ASTA-1831	AST-155	Electrical and Electronic Principles	40	32
ASTA-1835	Maintenance Inspection and Body Adjustment	ASTA-1831	AST-145	Accessory Drive Systems	10	35
			AST-150	Body Components and Trim	10	37
			AST-165	Vehicle Maintenance Inspection	10	39

## 2011 NOA Sub-Task to IPG Unit Comparison

NOA Sub-task		IPG Unit	
<b>Task 1 – Uses and maintains tools and equipment.</b>			
1.01	Maintains tools and equipment.	AST-105	Tools and Equipment
1.02	Uses hoisting and lifting equipment.	AST-110	Hoisting and Lifting
		AST-100	Safety
1.03	Uses personal protective equipment (PPE) and safety equipment.	AST-100	Safety
<b>Task 2 – Performs common trade activities.</b>			
2.01	Uses technical information.	AST-120	Trade Related Documents
2.02	Estimates preliminary job cost.	AST-120	Trade Related Documents
2.03	Maintains safe work environment.	AST-100	Safety
<b>Task 3 – Diagnoses engine systems.</b>			
3.01	Diagnoses cooling systems.	AST-205	Cooling Systems
3.02	Diagnoses lubricating systems.	AST-210	Engine Lubricating Systems
3.03	Diagnoses base engine.	AST-200	Engine Principles
<b>Task 4 – Repairs engine systems.</b>			
4.01	Repairs cooling systems.	AST-205	Cooling Systems
4.02	Repairs lubricating systems.	AST-210	Engine Lubricating Systems
4.03	Repairs base engine.	AST-300	Engine Repair
<b>Task 5 – Diagnoses engine support systems.</b>			
5.01	Diagnoses fuel delivery systems.	AST-230	Fuel Delivery Systems
		AST-305	Gasoline Fuel Systems
		AST-400	Diesel Fuel Injection Systems
5.02	Diagnoses ignition systems.	AST-235	Ignition Systems
5.03	Diagnoses intake/exhaust systems.	AST-335	Intake and Exhaust Systems
5.04	Diagnoses emission systems.	AST-330	Emission Control Systems
5.05	Diagnoses accessory drive systems and mounts.	AST-145	Accessory Drive Systems
		AST-315	Manual Transmissions and Transaxles
		AST-420	Automatic Transmissions and Transaxles
5.06	Diagnoses diesel engine support systems.	AST-230	Fuel Delivery Systems
		AST-400	Diesel Fuel Injection Systems
		AST-235	Ignition Systems
		AST-335	Intake and Exhaust Systems
<b>Task 6 – Repairs engine support systems.</b>			
6.01	Repairs gasoline delivery systems.	AST-230	Fuel Delivery Systems
		AST-305	Gasoline Fuel Systems
		AST-400	Diesel Fuel Injection Systems
6.02	Repairs ignition systems.	AST-235	Ignition Systems
6.03	Repairs intake/exhaust systems.	AST-335	Intake and Exhaust Systems
6.04	Repairs emission systems.	AST-330	Emission Control Systems
6.05		AST-145	Accessory Drive Systems

NOA Sub-task		IPG Unit	
	Repairs accessory drive systems and mounts.	AST-315	Manual Transmissions and Transaxles
		AST-420	Automatic Transmissions and Transaxles
6.06	Repairs diesel engine support systems.	AST-230	Fuel Delivery Systems
		AST-400	Diesel Fuel Injection Systems
		AST-235	Ignition Systems
		AST-335	Intake and Exhaust Systems
		AST-330	Emission Control Systems
<b>Task 7 – Diagnoses vehicle management systems.</b>			
7.01	Reads diagnostic trouble codes (DTCs).	AST-310	Vehicle Management Systems
7.02	Monitors parameters.	AST-310	Vehicle Management Systems
7.03	Interprets test results.	AST-310	Vehicle Management Systems
7.04	Tests system circuitry and components.	AST-310	Vehicle Management Systems
<b>Task 8 – Repairs vehicle management systems.</b>			
8.01	Updates component software.	AST-310	Vehicle Management Systems
8.02	Replaces components.	AST-310	Vehicle Management Systems
8.03	Verifies vehicle management system repair.	AST-310	Vehicle Management Systems
		AST-155	Electrical and Electronic Principles
<b>Task 9 – Diagnoses drive line systems.</b>			
9.01	Diagnoses drive shafts and axles.	AST-240	Drive Shafts and Axles
9.02	Diagnoses manual transmissions/trans-axles.	AST-315	Manual Transmissions and Transaxles
9.03	Diagnoses automatic transmissions/transaxles.	AST-420	Automatic Transmissions and Transaxles
9.04	Diagnoses clutches.	AST-320	Clutches and Flywheels
9.05	Diagnoses transfer cases.	AST-325	Transfer Cases
9.06	Diagnoses final drive assemblies.	AST-340	Differentials and Final Drive Assemblies
<b>Task 10 – Repairs drive line systems.</b>			
10.01	Repairs drive shafts and axles.	AST-240	Drive Shafts and Axles
10.02	Repairs manual transmissions/transaxles.	AST-315	Manual Transmissions and Transaxles
10.03	Repairs automatic transmissions/transaxles.	AST-420	Automatic Transmissions and Transaxles
10.04	Repairs clutches.	AST-320	Clutches and Flywheels
10.05	Repairs transfer cases.	AST-325	Transfer Cases
10.06	Repairs final drive assemblies.	AST-340	Differentials and Final Drive Assemblies
<b>Task 11 – Diagnoses electrical systems and components.</b>			
11.01	Diagnoses starting/charging systems and batteries.	AST-215	Starting Systems
		AST-220	Charging Systems
11.02	Diagnoses basic wiring and electrical systems.	AST-155	Electrical and Electronic Principles
		AST-425	Electrical Options and Accessories
11.03	Diagnoses lighting and wiper systems.	AST-225	Lighting and Wiper Systems
11.04	Diagnoses entertainment systems.	AST-425	Electrical Options and Accessories
11.05	Diagnoses electrical options.	AST-425	Electrical Options and Accessories
11.06		AST-155	Electrical and Electronic Principles

NOA Sub-task		IPG Unit	
	Diagnoses instrumentation and information displays.	AST-430	Instrumentation and Information Displays
11.07	Diagnoses electrical accessories.	AST-155	Electrical and Electronic Principles
		AST-425	Electrical Options and Accessories
<b>Task 12 – Repairs electrical systems and components.</b>			
12.01	Repairs starting/charging systems and batteries.	AST-215	Starting Systems
		AST-220	Charging Systems
12.02	Repairs basic wiring and electrical systems.	AST-155	Electrical and Electronic Principles
		AST-425	Electrical Options and Accessories
12.03	Repairs lighting and wiper systems.	AST-225	Lighting and Wiper Systems
12.04	Repairs entertainment systems.	AST-425	Electrical Options and Accessories
12.05	Repairs electrical options.	AST-425	Electrical Options and Accessories
12.06	Repairs electrical accessories.	AST-155	Electrical and Electronic Principles
		AST-425	Electrical Options and Accessories
12.07	Installs electrical accessories.	AST-155	Electrical and Electronic Principles
		AST-425	Electrical Options and Accessories
12.08	Repairs instrumentation and information displays.	AST-155	Electrical and Electronic Principles
		AST-430	Instrumentation and Information Displays
<b>Task 13 – Diagnoses heating, ventilation and cooling (HVAC) and comfort control systems.</b>			
13.01	Diagnoses air flow control systems.	AST-435	Heating, Ventilation and Air Conditioning Systems
13.02	Diagnoses refrigerant systems.	AST-435	Heating, Ventilation and Air Conditioning Systems
13.03	Diagnoses heating systems.	AST-435	Heating, Ventilation and Air Conditioning Systems
<b>Task 14 – Repairs heating, ventilation and cooling (HVAC) and comfort control systems.</b>			
14.01	Repairs air flow control systems.	AST-435	Heating, Ventilation and Air Conditioning Systems
14.02	Repairs refrigerant systems.	AST-435	Heating, Ventilation and Air Conditioning Systems
14.03	Repairs heating systems.	AST-435	Heating, Ventilation and Air Conditioning Systems
<b>Task 15 – Diagnoses steering and suspension, braking, control systems, tires, wheels, hubs and wheel bearings.</b>			
15.01	Diagnoses steering, suspension and control systems.	AST-245	Steering Systems
15.02	Diagnoses braking and control systems.	AST-140	Braking Systems I (Non ABS)
		AST-410	Braking Systems II (ABS)
15.03	Diagnoses tires, wheels, hubs, and wheel bearings.	AST-125	Tires, Wheels and Hubs
<b>Task 16 – Repairs steering and suspension, braking, control systems, tires, wheels, hubs and wheel bearings.</b>			

NOA Sub-task		IPG Unit	
16.01	Repairs steering, suspension and control systems.	AST-245	Steering Systems
16.02	Repairs braking and control systems.	AST-140	Braking Systems I (Non-ABS)
		AST-410	Braking Systems II (ABS)
16.03	Repairs tires, wheels, hubs and wheel bearings.	AST-125	Tires, Wheels and Hubs
<b>Task 17 – Diagnoses body components, trim and restraint systems.</b>			
17.01	Diagnoses restraint systems.	AST-440	Restraint Systems
17.02	Diagnoses wind noise, rattles and water leaks.	AST-150	Body Components and Trim
17.03	Diagnoses interior and exterior components and trim.	AST-150	Body Components and Trim
17.04	Diagnoses latches, locks and movable glass.	AST-150	Body Components and Trim
<b>Task 18 – Repairs body components, trim, restraint systems and installed accessories.</b>			
18.01	Repairs restraint systems.	AST-440	Restraint Systems
18.02	Repairs problems with wind noise, rattles and water leaks.	AST-150	Body Components and Trim
18.03	Repairs interior and exterior components and trim.	AST-150	Body Components and Trim
18.04	Repairs latches, locks and movable glass.	AST-150	Body Components and Trim
18.05	Install interior and exterior accessories.	AST-150	Body Components and Trim
<b>Task 19 – Diagnoses hybrid and alternate fuel systems.</b>			
19.01	Implements hybrid safety protocols.	AST-170	Hybrid and Alternate Fuel Systems I
19.02	Diagnoses hybrid systems.	AST-445	Hybrid and Alternate Fuel Systems II
19.03	Diagnoses alternate fuel systems.	AST-445	Hybrid and Alternate Fuel Systems II
<b>Task 20 – Repairs hybrid and alternate fuel systems.</b>			
20.01	Repairs hybrid systems.	AST-445	Hybrid and Alternate Fuel Systems II
20.02	Repairs alternate fuel systems.	AST-445	Hybrid and Alternate Fuel Systems II



# **LEVEL 1**

## **MENT-1801**

## **Workplace Mentoring I**

(Nova Scotia Unit of Instruction)

### **Learning Outcomes:**

- Identify and explain strategies for learning workplace skills.
- Demonstrate strategies to assist in learning skills in the workplace.

### **Objectives and Content:**

1. Describe the importance of your own experiences.
2. Identify the partners involved in apprenticeship.
3. Describe the shared responsibilities for workplace learning.
4. Determine your own learning preferences and explain how these relate to learning new skills.
5. Describe the importance of different types of skills in the workplace.
6. Describe the importance of essential skills in the trade.
7. Identify different ways of learning.
8. Identify your learning preferences.
9. Identify different learning needs and strategies to meet learning needs.
10. Identify techniques for effective communication.
11. Identify strategies to assist in learning a skill.

## AST-100            Safety

### Learning Outcomes:

- Demonstrate knowledge of safety equipment, their applications, maintenance and procedures for use.
- Demonstrate knowledge of safe work practices.
- Demonstrate knowledge of regulatory requirements pertaining to safety.

### Objectives and Content:

1. Identify types of personal protective equipment (PPE) and clothing and describe their applications and limitations.
2. Describe the procedures used to care for and maintain PPE.
3. Identify workplace hazards and describe safe work practices and equipment.
  - i) personal
  - ii) shop/facility
    - fire
    - explosion
    - gases
  - iii) environmental awareness
  - iv) vehicle
    - restraint systems
    - high voltage systems
    - high pressure fuel systems
    - hybrid and electrical vehicles
4. Identify and explain workplace safety and health regulations.
  - i) federal
    - Material Safety Data Sheets (MSDS)
    - Workplace Hazardous Material Information System (WHMIS)
  - ii) provincial/territorial
    - Occupational Health and Safety (OHS)
      - right of refusal
      - reportable incidents
    - inspections and safety certifications
  - iii) municipal

## AST-105            Tools and Equipment

### Learning Outcomes:

- Demonstrate knowledge of tools and equipment, their applications, maintenance and procedures for use.
- Demonstrate knowledge of hand and power tools, their applications, maintenance and procedures for use.
- Demonstrate knowledge of measuring and testing devices, their applications, maintenance and procedures for use.
- Demonstrate knowledge of shop equipment, their applications, maintenance and procedures for use.
- Demonstrate knowledge of welding, cutting and heating equipment and their applications.
- Demonstrate knowledge of fasteners, tubing, hoses and fittings, their applications and procedures for use.

### Objectives and Content:

1. Identify hazards and describe safe work practices pertaining to the use of tools and equipment.
2. Identify types of hand tools and describe their applications and procedures for use.
3. Describe the procedures used to store and maintain hand tools.
4. Identify types of power tools and describe their applications and procedures for use.
  - i) electric
  - ii) pneumatic
  - iii) hydraulic
5. Describe the procedures used to inspect, maintain and store power tools.
6. Identify types of measuring tools and describe their applications and procedures for use.
  - i) micrometers
  - ii) vernier calipers
  - iii) pressure gauges

7. Identify types of scan tools and digital voltage ohmmeters (DVOM) and describe their applications.
8. Describe the procedures used to inspect, maintain and store measuring tools.
9. Identify types of shop equipment and describe their applications and procedures for use.
10. Describe the procedures used to inspect, maintain and store shop equipment.
11. Identify types of welding, cutting and heating equipment and describe their applications.
  - i) oxy-acetylene heating and cutting
  - ii) gas metal arc welding (GMAW)
    - metal inert gas welding (MIG)
    - tungsten inert gas welding (TIG)
  - iii) shielded metal arc welding (SMAW)
12. Identify types of fasteners and describe their applications and procedures for use.
13. Identify types of tubing and hoses and describe their applications and procedures for use.
14. Identify types of fittings and describe their applications and procedures for use.

## **AST-110            Hoisting and Lifting**

### **Learning Outcomes:**

- Demonstrate knowledge of hoisting and lifting equipment, their applications and procedures for use.

### **Objectives and Content:**

1. Define terminology associated with hoisting and lifting.
2. Identify hazards and describe safe work practices pertaining to hoisting and lifting.
  - i) Occupational Health and Safety (OHS) regulations
  - ii) safe work practices
3. Interpret information pertaining to hoisting and lifting found on drawings and specifications.
4. Identify types of hoisting and lifting equipment and accessories and describe their applications and procedures for use.
5. Describe the procedures used when hoisting and lifting.
6. Describe the procedures used to inspect, maintain and store hoisting and lifting equipment.

## **AST-115            Communication**

### **Learning Outcomes:**

- Demonstrate knowledge of effective communication practices.

### **Objectives and Content:**

1. Identify audiences and describe techniques for effective verbal and non-verbal communication.
  - i) apprentices
  - ii) other tradespersons
  - iii) colleagues
  - iv) supervisors
  - v) clients
  
2. Describe the importance of effective communication.
  - i) customers
  - ii) co-workers
  - iii) related professionals
  - iv) journey person/apprentice
  
3. Describe effective information gathering and communication techniques.
  - i) questioning
  - ii) translating technical information
  - iii) using communication equipment
  
4. Identify types of communication devices and describe their purpose and operation.
  - i) portable and stationary radios
  - ii) cellular phones and mobility devices
  - iii) computers
  - iv) digital camera
  
5. Identify government and company policies and procedures, guidelines and standards.
  
6. Describe the importance of communicating job requirements.

## AST-120

## Trade Related Documents

### Learning Outcomes:

- Demonstrate knowledge of trade related documents and their use.
- Demonstrate knowledge of the procedures used to prepare and complete documentation.

### Objectives and Content:

1. Identify sources of related information.
2. Identify formats of related information.
  - i) print
  - ii) electronic
3. Locate and interpret identification codes found on the vehicle and vehicle components.
  - i) vehicle identification number (VIN)
4. Identify types of trade related documents and describe their applications.
  - i) work orders
  - ii) schematics and service information
  - iii) technical service bulletins (TSB)
  - iv) preventative maintenance schedules
  - v) estimates
  - vi) industry standard labour guides
  - vii) manufacturers' specifications
  - viii) codes and standards
  - ix) company policies
5. Describe the procedures used to prepare and complete trade related documents.
  - i) work orders
  - ii) estimates
  - iii) pre-delivery inspection
  - iv) preventative maintenance



## **AST-125            Tires, Wheels and Hubs**

### **Learning Outcomes:**

- Demonstrate knowledge of tires, wheels and hubs, their components and operation.
- Demonstrate knowledge of the procedures used to diagnose and repair tires, wheels and hubs.

### **Objectives and Content:**

1. Define terminology associated with tires, wheels and hubs.
2. Identify safety considerations, hazards and describe safe work practices pertaining to tires and wheels.
  - i) tire inflation
  - ii) tire sizing
3. Identify types of tools and equipment relating to tires, wheels and hubs and describe their applications and procedures for use.
4. Identify types of tires and describe their construction.
5. Interpret tire codes and sidewall markings.
6. Describe the importance of tire rotation and maintenance.
7. Identify types of wheels and describe their components and operation.
8. Identify types of hubs and bearing assemblies and describe their components and operation.
9. Identify types of tire pressure monitoring systems and describe their applications.
10. Identify types of lubricants and describe their applications and procedures for use.
11. Describe the relationship between the suspension system and wheel assemblies.

12. Identify types of specialized tools and equipment and describe their applications and procedures for use.
13. Describe the procedures used to diagnose tires, wheels and hubs.
  - i) verify complaint
  - ii) visually inspect
  - iii) retrieve diagnostic codes
  - iv) access service information
  - v) conduct tests and measurements
  - vi) isolate problem and root cause
14. Describe the procedures used to remove and reinstall tires and wheel assemblies.
  - i) index and balance
15. Describe the procedures used to remove and reinstall hubs and bearings.
16. Describe the procedures used to repair and/or replace tires and wheel assemblies.
  - i) perform repair
  - ii) verify repair
17. Describe the procedures used to adjust, repair and/or replace hubs and bearings.
  - i) perform repair
  - ii) verify repair

**Learning Outcomes:**

- Demonstrate knowledge of suspension systems, their components and operation.
- Demonstrate knowledge of the procedures used to diagnose and repair suspension systems.

**Objectives and Content:**

1. Define terminology associated with suspension systems.
2. Identify hazards and describe safe work practices pertaining to suspension systems.
  - i) springs
3. Interpret codes, standards and regulations pertaining to suspension systems.
  - i) manufacturers' specifications
4. Identify tools and equipment relating to suspension systems and describe their applications and procedures for use.
5. Identify types of suspension systems and describe their components and operation.
  - i) independent
  - ii) solid axle
6. Identify types of frames and body construction.
7. Identify types of springs and describe their purpose and operation.
  - i) coil
  - ii) leaf
  - iii) torsion bar
  - iv) air
8. Identify types of dampers and describe their components and operation.
  - i) struts
  - ii) shocks

9. Identify types of specialized tools and equipment and describe their applications and procedures for use.
10. Describe the procedures used to diagnose suspension systems.
  - i) verify complaint
  - ii) visually inspect
  - iii) access service information
  - iv) conduct tests and measurements
  - v) isolate problem and root cause
11. Describe the procedures used to remove and reinstall suspension system components.
12. Describe the procedures used to adjust, repair and/or replace suspension system components.
  - i) perform repair
  - ii) verify repair

**Learning Outcomes:**

- Demonstrate knowledge of oxy-acetylene welding and cutting equipment, their applications, maintenance and procedure for use.
- Demonstrate knowledge of weld defects, their causes and the procedures to prevent and correct them.

**Objectives and Content:**

1. Define and explain terminology associated with oxy-acetylene welding, cutting and heating.
2. Identify hazards and describe safe work practices pertaining to oxy-acetylene welding and cutting.
  - i) personal
  - ii) shop/facility
  - iii) equipment
3. Identify oxy-acetylene welding and cutting equipment and accessories and describe their applications.
4. Identify types of oxy-acetylene processes and describe their applications.
  - i) brazing/welding
  - ii) cutting
  - iii) heating
5. Describe the procedures used to set-up, adjust and shut-down oxy-acetylene welding and cutting equipment.
6. Describe the procedures used to inspect, store and maintain oxy-acetylene welding and cutting equipment.
7. Describe the procedures used to operate oxy-acetylene equipment.
8. Identify types of weld defects and describe their causes.
9. Describe the procedures used to prevent and correct weld defects.

## AST-135

## Gas Metal Arc Welding (GMAW [MIG])

### Learning Outcomes:

- Demonstrate knowledge of gas metal arc welding equipment, their applications, maintenance and procedure for use.
- Demonstrate knowledge of weld defects, their causes and the procedures to prevent and correct them.

### Objectives and Content:

1. Define and explain terminology associated with GMAW welding.
2. Identify safety precautions relating to GMAW use.
  - i) personal
  - ii) shop/facility
  - iii) equipment
3. Identify types of GMAW processes and describe their applications.
4. Identify GMAW welding equipment and accessories and describe their applications.
5. Describe the procedures used to set-up, adjust and shut-down GMAW equipment.
6. Describe the procedures used to operate GMAW equipment.
7. Describe the procedures used to inspect, maintain and store GMAW equipment.
8. Describe the procedures used to weld using GMAW equipment.
9. Identify types of weld defects and describe their causes.
10. Describe the procedures used to prevent and correct weld defects.

## AST-140

## Braking Systems I (Non-ABS)

### Learning Outcomes:

- Demonstrate knowledge of braking systems, their components and operation.
- Demonstrate knowledge of the procedures used to diagnose and repair braking systems.

### Objectives and Content:

1. Define terminology associated with braking systems.
2. Identify safety considerations pertaining to braking systems.
  - i) hydraulic pressure
  - ii) anti-lock brake system (ABS)
3. Explain hydraulic principles related to braking systems.
  - i) Pascal's law
4. Identify types of tools and equipment relating to braking systems and describe their applications and procedures for use.
5. Identify types of braking systems and describe their components and operation.
  - i) disc
  - ii) drum
  - iii) parking
6. Identify types of power assists and describe their components and operation.
  - i) vacuum
  - ii) hydraulic
  - iii) electric
7. Identify types of fluids and describe their applications and procedures for use.
8. Identify types of fittings, flaring, tubing and hoses and describe their applications and procedures for use.

9. Describe the procedures used to diagnose braking systems.
  - i) verify complaint
  - ii) visually inspect
  - iii) retrieve diagnostic codes
  - iv) access service information
  - v) conduct tests and measurements
  - vi) isolate problem and root cause
10. Describe the procedures used to flush and bleed hydraulic brakes.
11. Describe the procedures used to measure and machine components.
12. Describe the procedures used to adjust, repair and/or replace braking system components.
  - i) perform repair
  - ii) verify repair



**Learning Outcomes:**

- Demonstrate knowledge of basic electrical and electronic principles.
- Demonstrate knowledge of batteries, their characteristics and procedures to replace.
- Demonstrate knowledge of circuits, their components and operation.
- Demonstrate knowledge of the procedures used to diagnose and repair circuits and components.

**Objectives and Content:**

1. Define terminology associated with electrical and electronic principles.
2. Identify hazards and describe safe work practices pertaining to electrical and electronic components.
  - i) personal
  - ii) vehicle
3. Interpret information pertaining to electrical and electronic components found on drawings and specifications.
  - i) diagnostic flowcharts
  - ii) schematics
4. Explain basic electrical theory.
  - i) conventional theory
  - ii) electron theory
5. Explain basic computer operation.
  - i) inputs
  - ii) outputs

6. Explain Ohm's law and its applications to electrical circuits.
  - i) series circuit
  - ii) parallel circuit
  - iii) series-parallel circuits
7. Identify types of specialized tools and equipment used to test batteries and describe their applications and procedures for use.
8. Identify types of batteries and describe their characteristics.
9. Describe the procedures used to test and/or charge batteries.
10. Identify types of wire and describe their characteristics, composition and applications.
11. Identify types of electrical components and describe their purpose and operation.
  - i) circuit protection
  - ii) control devices
  - iii) load devices
12. Identify types of electronic components and describe their purpose and operation.
  - i) diodes
  - ii) transistors
  - iii) resistors
  - iv) integrated circuits
13. Identify types of specialized tools and equipment used to test circuits and components and describe their applications and procedures for use.
  - i) scan tools
14. Describe the procedures used to diagnose circuits and components.
  - i) verify complaint
  - ii) visually inspect
  - iii) retrieve diagnostic codes
  - iv) access service information
  - v) conduct tests and measurements
  - vi) isolate problem and root cause

15. Identify methods of wire repair and describe their associated procedures.
  - i) splicing
  - ii) terminal replacement
  - iii) soldering
  - iv) crimping
  
16. Describe the procedures used to repair and/or replace circuits and components.
  - i) perform repair
  - ii) verify repair

## AST-145          Accessory Drive Systems

### Learning Outcomes:

- Demonstrate knowledge of accessory drive systems, their components and operation.
- Demonstrate knowledge of the procedures used to diagnose and repair accessory drive systems.

### Objectives and Content:

1. Define terminology associated with accessory drive systems.
2. Identify hazards and describe safe work practices pertaining to accessory drive systems.
3. Identify types of specialized tools and equipment and describe their applications and procedures for use.
4. Identify the types of accessory drive systems and describe their components and operation.
  - i) belt tension/tensioners
  - ii) belts
  - iii) drives
    - electric
    - hydraulic
    - gear
5. Describe the procedures used to diagnose accessory drive systems.
  - i) verify complaint
  - ii) visually inspect
  - iii) retrieve diagnostic codes
  - iv) access service information
  - v) conduct tests and measurements
  - vi) isolate problem and root cause
6. Describe the procedures used to remove and reinstall accessory drive system components.

7. Describe the procedures used to adjust, repair and/or replace accessory drive system components.
  - i) perform repair
  - ii) verify repair

## AST-150

## Body Components and Trim

### Learning Outcomes:

- Demonstrate knowledge of body components and trim and their applications.
- Demonstrate knowledge of the procedures used to diagnose and repair body components and trim.

### Objectives and Content:

1. Define terminology associated with body components and trim.
2. Identify hazards and describe safe work practices pertaining to body components and trim.
  - i) restraint systems
3. Identify tools and equipment relating to body components and trim and describe their applications and procedures for use.
4. Identify body components and accessories and describe their purpose and operation.
  - i) interior
    - doors
    - seats
    - dashes
  - ii) exterior
    - bumpers
    - mirrors
    - add-on accessories
    - mounts
5. Identify types of electrical/electronic systems and describe their components and operation.
  - i) locks
  - ii) latches
6. Explain the principles of basic aerodynamics related to body design.

7. Identify types and sources of noise, vibration and harshness (NVH).
  - i) chuckles
  - ii) rattles
  - iii) knocks and whines
  - iv) offensive noises
  
8. Identify materials used to dampen or interrupt vibration.
  - i) tapes
  - ii) adhesives
  - iii) insulators
  
9. Identify types and sources of wind and water leaks.
  
10. Identify types of seals, adhesives, cleaners and sealing materials and describe their applications and procedures for use.
  
11. Describe the procedures used to diagnose body components and trim.
  - i) verify complaint
  - ii) visually inspect
  - iii) retrieve diagnostic codes
  - iv) access service information
  - v) conduct tests and measurements
  - vi) isolate problem and root cause
  
12. Describe the procedures used to adjust, repair and/or replace body components and trim.
  - i) perform repair
  - ii) verify repair

## AST-165

## Vehicle Maintenance Inspection

### Learning Outcomes:

- Demonstrate knowledge of vehicle maintenance inspections and their purpose.
- Demonstrate knowledge of the procedures used to perform vehicle maintenance inspections.
- Demonstrate knowledge of pre-delivery inspections and their purpose.
- Demonstrate knowledge of the procedures used to perform pre-delivery inspections.

### Objectives and Content:

1. Define terminology associated with vehicle maintenance inspections.
2. Identify hazards and describe safe work practices pertaining to vehicle maintenance inspections.

### VEHICLE MAINTENANCE INSPECTION

3. Describe the importance of regular vehicle maintenance inspections.
4. Identify tools and equipment used to perform vehicle maintenance inspections.
5. Identify vehicle components and accessories requiring operational checks.
  - i) brakes
  - ii) tires
  - iii) lights and wipers
  - iv) steering linkage
  - v) belts and filters
  - vi) exhaust
6. Identify lubricants and fluids requiring service checks.
7. Describe the procedures used to perform vehicle maintenance inspections.

### PRE-DELIVERY INSPECTION

8. Identify the purpose of pre-delivery inspections.



9. Describe the procedures used to perform pre-delivery inspections.
  - i) inspection instructions
  - ii) specifications and tolerances documentation

**Learning Outcomes:**

- Demonstrate knowledge of drive shafts and axles, their components and operation.
- Demonstrate knowledge of the procedures used to diagnose and repair drive shafts and axles.

**Objectives and Content:**

1. Define terminology associated with drive shafts and axles.
2. Identify hazards and describe safe work practices pertaining to drive shafts and axles.
3. Identify specialized tools and equipment and describe their applications and procedures for use.
  - i) dial indicators
  - ii) inclinometer
4. Identify types of drive shafts and describe their composition.
5. Identify types of drive shaft components and describe their purpose and operation.
  - i) slip yokes and flanges
  - ii) flex joints
  - iii) single cardan joints
  - iv) double cardan joints
  - v) support bearing
  - vi) viscous coupling
6. Identify types of axles and describe their components and operation.
  - i) half shafts
  - ii) floating
  - iii) semi-floating
7. Describe axle disconnects, locking hubs and their purpose.

8. Describe the importance of multiple piece drive shaft phasing and indexing.
9. Identify types of lubricants, fasteners, gaskets, seals and sealants and describe their applications.
10. Describe the procedures used to diagnose drive shafts and axles systems.
  - i) verify complaint
  - ii) visually inspect
  - iii) retrieve diagnostic codes
  - iv) access service information
  - v) conduct tests and measurements
    - measure drive line angles
  - vi) isolate problem and root cause
11. Describe the procedures used to remove and reinstall drive shafts and axles.
12. Describe the procedures used to adjust, repair and/or replace drive shafts and axles and their related components.
  - i) perform repair
  - ii) verify repair