



8696

AUTOMOTIVE SYSTEMS AND  
SERVICE (10)

20S/20E/20M

An Automotive Technology Course



# 8696 AUTOMOTIVE SYSTEMS AND SERVICE (10) 20S/20E/20M

## Course Description

A student wanting to develop skills in the automotive service and repair industry must have knowledge of the basic principles related to automotive systems and service. Students learn safety, tools and equipment, automotive systems, and service procedures; they are introduced to diagnostic strategies and learn about tires, wheels, and hubs. This course focuses on the following unit in the Apprenticeship Manitoba Level 1 technical training:

- Unit A1: Learning About Work
- Unit A3: Tools, Equipment, Materials, and Documentation
- Unit A11: Tires, Wheels, and Hubs

---

**Goal 1:** Describe and apply appropriate **health and safety** practices.

**GLO 1.1:** Describe and apply appropriate **health and safety** practices.

- SLO 10.1.1.1 Adhere to safe practices and procedures for facilities, processes, materials, tools, and equipment.
- SLO 10.1.1.2 Identify the process for reporting injuries.
- SLO 10.1.1.3 Identify hazards and adhere to safe work practices pertaining to hoisting and lifting.
- SLO 10.1.1.4 Create and maintain a safe and organized working environment.
- SLO 10.1.1.5 Demonstrate the ability to follow safety information on supplier labels.
- SLO 10.1.1.6 Demonstrate the ability to locate first aid and eyewash stations.
- SLO 10.1.1.7 Identify safety and health requirements. (A2.1)
  - overview of *The Workplace Safety and Health Act*
    - rights and responsibilities of employees under the *Act*
    - rights and responsibilities of employers under the *Act*
    - rights and responsibilities of supervisors under the *Act*
  - fourteen (14) regulations
  - codes of practice
  - guidelines

- right to refuse
  - explanation of right to refuse process
  - rights and responsibilities of employees
  - rights and responsibilities of employers
  - rights and responsibilities of supervisors under the *Act*

SLO 10.1.1.8

Identify personal protective equipment (PPE) and procedures. (A2.2) (TSA 16)

- employer and employee responsibilities as related to personal protective equipment
- standards: ANSI (U.S.A. standards), etc.
- work protective clothing and danger if it fits poorly
- gloves—importance of proper glove selection (when handling chemicals, cold items, slivers, etc.)
- headwear—appropriate protective headwear when required and the approved type of headwear
- eye protection—comparison and distinction of everyday eyeglasses, industrial safety glasses, and safety goggles
- foot protection—when required according to safety standards
- hearing protection
  - hazards of various noise levels (hearing protection must be worn)
  - laws
  - types of hearing protection
- respiratory protection—types, overview of proper selection
- fall protection—Manitoba requirements standards guidelines
  - ANSI (U.S.A. standards), etc.
- ladders and scaffolding
- safety principles for working with or around industrial trucks site-specific (forklifts, pallet trucks, etc.)

- SLO 10.1.1.9 Outline the safety principles for working on and around electrical or energized equipment. (A2.3) (TSA 18)
- effects of electric current on the human body
  - three factors that affect the severity of an electric shock
  - the effects of ARC and blast on the human body and equipment
  - work with energized equipment
- SLO 10.1.1.10 Identify fire safety and outline workplace fire safety principles. (A2.4) (TSA 19)
- types of fires
  - types of firefighting equipment
  - classifications of fire extinguishers (A, B, and C)
  - location of fire extinguishers and fire exits
  - fire alarms and drills
- SLO 10.1.1.11 Identify ergonomics. (A2.5)
- definition of ergonomics and conditions that may affect the body
    - working postures
    - repetition
    - force
    - lifting
    - tools
    - identify tool and safety equipment
    - causes of hand-tool accidents
    - equipment
- SLO 10.1.1.12 Recognize, report, and control hazards. (A2.6)
- safe-work practices
  - basic risk assessment
  - injury prevention and control measures
  - identification of hazards involved in pneumatic tool use and explanation of how to guard against them

- SLO 10.1.1.13 Identify the hazards in confined spaces and the preparation needed to work in them. (A2.7) (TSA 20)
- identification of a confined space
  - hazards of a confined space
    - physical
    - biological
  - working in a confined space
  - emergency response plan
  - self-contained breathing apparatus (SCBA)
- SLO 10.1.1.14 Identify first aid/CPR. (A2.8)
- overview of first-aid regulation
  - obligations of employers regarding first aid
    - Who is certified to provide first aid?
    - What to do while waiting for help?
    - Where is the first-aid kit?
  - Describe basic first-aid requirements and techniques
    - scope and limits of first-aid intervention
    - specific interventions (cuts, burns, abrasions, fractures, suffocation, shock, electrical shock, etc.)
    - What is it?
    - interface with other services and agencies (e.g., Workers Compensation claims)
  - describe basic CPR requirements and techniques
    - How do you get certified?
    - scope and limits of CPR intervention (include varieties of CPR certification)
- SLO 10.1.1.15 Identify the safety requirements as they apply to WHMIS with emphasis on: (A2.9) (TSA 13)
- WHMIS is a system
  - provincial regulation under *The Workplace Safety and Health Act*
    - each province has a WHMIS regulation
  - federal *Hazardous Products Act*
  - WHMIS generic training:
    - WHMIS defined and the format used to convey information about hazardous materials in the workplace

- information found on supplier and workplace labeling using WHMIS
  - hazardous materials in accordance with WHMIS
  - compliance with government safety standards and regulations
  - description of WHMIS (include varieties of WHMIS certification)
    - typology of WHMIS labels, symbols, and classifications
    - scope and use of Materials Safety Data Sheets (MSDS)
- SLO 10.1.1.16 Identify and control hazards. (A2.10)
- basic control measures (injury prevention)
  - safe-work procedures
  - explanation on the importance of industrial housekeeping
  - employer responsibilities
  - how and where to store materials
  - safety measures related to walkways, stairs, and floor openings
  - explanation of how to protect the worker and others when working in traffic paths
- SLO 10.1.1.17 Identify hazards and describe safe work practices pertaining to oxy-acetylene welding and cutting.
- SLO 10.1.1.18 Identify hazards and describe safe work practices pertaining to vehicle maintenance inspections.
- 

**GLO 1.2:** Demonstrate awareness of safety as it pertains to the ***Trade Safety Awareness Curriculum for Level 1 Apprentices.***

No applicable SLOs.

---

**Goal 2:** Select, use, and manage **tools, equipment, materials, and consumables.**

**GLO 2.1:** Select, use, and manage **tools and equipment.**

- SLO 10.2.1.1 Select, use, and manage tools and equipment used in automotive systems and service.
- SLO 10.2.1.2 Identify hazards and describe safe work practices pertaining to the use of tools and equipment. (A3.1)

- SLO 10.2.1.3 Describe hand tools, power tools, and specialized test equipment, as well as the procedures for their use. (A3.2)  
(*Note: This SLO is repeated in 8700.*)
- types and applications, including:
    - electric, pneumatic, and hydraulic
    - scan tools and digital voltage ohmmeters (DVOM)
  - inspection, maintenance, and storage procedures
- SLO 10.2.1.4 Describe and demonstrate measuring tools and procedures for their use. (A3.3)
- types and applications, including:
    - micrometers
    - vernier calipers
  - inspection, maintenance, and storage procedures
- SLO 10.2.1.5 Describe shop equipment and procedures for their use. (A3.4)
- types and applications
  - inspection, maintenance, and storage procedures
- SLO 10.2.1.6 Describe welding, cutting, and heating equipment, as well as procedures for their use. (A3.5)
- types and applications:
    - oxy-acetylene heating and cutting
    - gas metal arc welding (GMAW), metal inert gas welding (MIG)
    - shielded metal arc welding (SMAW)
  - inspection, maintenance, and storage procedures
- SLO 10.2.1.7 Identify types of fasteners, fittings, tubing, and hoses, and describe their applications and procedures for use. (A3.6)
- SLO 10.2.1.8 Describe and demonstrate the procedures used when operating, inspecting, maintaining, and storing hoisting and lifting equipment. (A3.7)
- terminology associated with hoisting and lifting and types of equipment
  - hazards and safe-work practices
  - service information from drawings and specifications
- SLO 10.2.1.9 Identify and interpret identification codes found on the vehicle and vehicle components. (A3.8)
- vehicle identification number (VIN)



- SLO 10.2.1.10 Identify types of trade-related documents and describe their applications. (A3.9)
- work and repair orders
  - schematics, service information, and manufacturers' specifications
  - technical service bulletins (TSB)
  - preventative maintenance schedules
  - industry standard labour guides
- SLO 10.2.1.11 Describe the procedures used to prepare and/or complete trade-related documents. (A3.10)
- work and repair orders
  - pre-delivery inspection
  - preventative maintenance
  - estimates
- 

**GLO 2.2:** Select, use, and manage **materials and consumables**.

No applicable SLOs.

---

**Goal 3: Describe, inspect, diagnose, service, and repair automotive components and systems.**

**GLO 3.1: Describe** automotive components and systems.

- SLO 10.3.1.1 Define terminology associated with tires, wheels, and hubs. (A11.1)
- SLO 10.3.1.2 Identify hazards and describe safe work practices pertaining to tires and wheels. (A11.2)
- SLO 10.3.1.3 Identify types of tires and describe their construction. (A11.3)
- codes and sidewall markings
  - inflation
  - sizing
- SLO 10.3.1.4 Identify types of tools and equipment related to tires, wheels, and hubs, and describe their applications and procedures for use. (A11.4)

- SLO 10.3.1.5 Identify types of wheels and describe their construction. (A11.5)
- construction
  - sizing
  - offset and backspace
- SLO 10.3.1.6 Identify types of tire pressure monitoring systems (TPMS). (A11.7)
- types (direct, indirect)
  - reset procedures
  - servicing and diagnosing
- 

**GLO 3.2: Inspect and diagnose** automotive components and systems.

- SLO 10.3.2.1 Demonstrate the ability to define terminology associated with vehicle maintenance inspections.
- SLO 10.3.2.2 Demonstrate the ability to describe the importance of regular vehicle maintenance inspections.
- SLO 10.3.2.3 Demonstrate the ability to describe and demonstrate the procedures used to perform vehicle maintenance inspections.
- 

**GLO 3.3: Service and repair** automotive components and systems.

- SLO 10.3.3.1 Demonstrate the ability to check vehicle fluid levels.
- SLO 10.3.3.2 Demonstrate the appropriate use of fasteners used in automotive applications.
- SLO 10.3.3.3 Demonstrate an awareness of the application of torque and the units used to measure torque in automotive fasteners.
- SLO 10.3.3.4 Demonstrate the ability to service and repair components and systems (i.e., scheduled maintenance and inspection).
- SLO 10.3.3.5 Perform basic scan-tool fundamentals (i.e., DTC retrieval).
- SLO 10.3.3.6 Demonstrate the ability to perform oil, lube, and filter service.
- SLO 10.3.3.7 Demonstrate the ability to perform basic scan-tool fundamentals (i.e., DTC retrieval).

SLO 10.3.3.8 Describe and demonstrate the procedures used to diagnose, adjust, repair, and/or replace tires and wheels. (A11.8) (Note: This SLO is repeated in 8698 with reference to hubs.)

- tires
  - index and balance
  - rotation and maintenance
  - radial and lateral runout
  - causes of abnormal tire wear
- wheels
  - parts and purpose of wheel sections
  - radial and lateral runout

---

**Goal 4:** Describe and apply transferable **cross-curricular** knowledge and skills.

**GLO 4.1:** Describe and apply knowledge and skills from **information and communication technologies**.

SLO 10.4.1.1 Demonstrate the ability to use service information retrieval systems.

---

**GLO 4.2:** Describe and apply knowledge and skills from the **sciences**.

SLO 10.4.2.1 Demonstrate awareness of how science principles (e.g., ideal gas laws, viscosity, coefficient of friction, atomic model of matter, etc.) apply to automotive systems and service.

---

**GLO 4.3:** **Read, interpret, and communicate** information.

No applicable SLOs.

---

**GLO 4.4:** Describe and apply knowledge and skills from **mathematics**.

SLO 10.4.4.1 Demonstrate the ability to identify the units of measurement on a ruler.

SLO 10.4.4.2 Demonstrate the ability to measure the length and width of various articles using a ruler.

---

---

**Goal 5:** Demonstrate an understanding of **sustainability**.

**GLO 5.1:** Demonstrate an understanding of **sustainability**.

- SLO 10.5.1.1 Demonstrate awareness of efficient materials usage and disposal practices.
- SLO 10.5.1.2 Demonstrate the ability to apply efficient materials usage and disposal practices.

---

**Goal 6:** Demonstrate awareness of **ethical and legal standards**.

**GLO 6.1:** Demonstrate awareness of **ethical and legal standards**.

- SLO 10.6.1.1 Demonstrate awareness of liability concerns related to automotive systems and service.

---

**Goal 7:** Demonstrate **employability skills**.

**GLO 7.1:** Demonstrate **employability skills**.

- SLO 10.7.1.1 Demonstrate problem-solving skills.
- SLO 10.7.1.2 Demonstrate critical-thinking skills.
- SLO 10.7.1.3 Demonstrate regular attendance and punctuality.
- SLO 10.7.1.4 Demonstrate accountability by taking responsibility for their actions.
- SLO 10.7.1.5 Demonstrate adaptability, initiative, and effort.
- SLO 10.7.1.6 Accept and follow direction and feedback.
- SLO 10.7.1.7 Demonstrate teamwork skills.
- SLO 10.7.1.8 Stay on task and use time effectively.
- SLO 10.7.1.9 Communicate respectfully and effectively.

---

**GLO 7.2:** Demonstrate an understanding of the **business operation** of a repair/service facility.

No applicable SLOs.

---

**Goal 8:** Demonstrate an understanding of **educational and career opportunities**.

**GLO 8.1:** Demonstrate an understanding of **educational and career opportunities**.

- SLO 10.8.1.1 Demonstrate awareness of the career and employment opportunities related to automotive technology.

SLO 10.8.1.2 Describe structure and scope of the automotive service technician trade. (A1.1)

- *The Apprenticeship and Certification Act*
  - Apprenticeship and Certification Board and Provincial Advisory Committees
  - general and specific trade regulation
  - policies regarding attendance, evaluation procedures, conduct, and progression requirements (Apprenticeship Manitoba, Training provider)
- uses of the Red Seal Occupational Standard (RSOS)
  - technical training in-school curriculum
  - on-the-job record book of hours (Manitoba blue book)
  - examinations (level placement tests, final certification examinations)
- opportunities and future career options
  - generalists and specialists: The move toward specialization is well known to modern tradespeople. Some prefer to specialize and others want to do it all. Supervisory positions require a broad scope.
  - lead hands and other immediate supervisors: Apprentices need to know how to become a lead-hand as much as they need to know the benefits and pit-falls of leadership between management and shop floor workers.
  - geographic mobility: What does it mean to a construction/industrial worker to have to travel to find work? Are there more opportunities if they do? What are they? What are the drawbacks to being away from home for several weeks at a time?
  - Job hierarchies and innovations. What trade-specific special training opportunities are available in your trade? Is there travel involved? Is there an opportunity to move up the ladder on a work crew as opposed to staying in the shop?

- SLO 10.8.1.3 Describe two levels of workplace competency. (A1.2)
- job competencies related to workplace culture
    - knowledge of workplace equipment and materials
    - skills and techniques
  - social competencies related to workplace culture
    - frame of reference for evaluation workplace events
    - language of work
    - workplace belief systems
    - rules and meanings
    - multiculturalism and equity in the workplace
- SLO 10.8.1.4 Describe accommodation for apprentices with disabilities. (A1.3)
- technical training
    - requirements
    - roles and responsibilities
    - services and information required by persons with disabilities
  - on-the-job
    - requirements
    - roles and responsibilities
    - services and information required by persons with disabilities

---

**Goal 9:** Demonstrate awareness of the **evolution, technological progression, and emerging trends** in the automotive industry.

**GLO 9.1:** Demonstrate awareness of the **evolution, technological progression, and emerging trends** in the automotive industry.

- SLO 10.9.1.1 Demonstrate awareness of changes to vehicle design and their effect on safety, fuel economy, emissions, and vehicle performance.
-