Automotive Service Technician
Level 1
Automotive Service Technician

Unit: A1 Orientation I: Structure and Scope of Automotive Service Technician Trade Learning

Level: One

Duration: 7 hours

Theory: 7 hours
Practical: 0 hours

Overview:

Jobsite learning and teaching have long been fundamental to Automotive Service Technician trade-practice, including its safety, health, and environmental implications. The chance to gain maximum benefit from workplace trade learning can be shaped by such complex factors as production schedules and jobsite politics. As adult trade-learners, Automotive Service Technician apprentices at all levels of skill-development are encouraged to use their eyes, ears, prior knowledge, and interpersonal skills to encourage journeypersons to teach as well as to supervise them. This requires understanding the trade’s dynamics, including the roles and responsibilities that order jobsite activity. Unit content outlines the trade’s skill-requirements and long-term career possibilities. It includes suggestions about trade-related learning styles/strategies. It also introduces the concept of skills stewardship, stressing the obligations that trainees incur in learning from journeypersons to ‘pay it forward’ by assisting other newcomers who will follow them into the trade. The unit’s purpose is to provide this essential information about learning to learn as a Manitoba Automotive Service Technician trainee. Elsewhere in Technical Training, senior trainees explore the importance of learning to teach in trade workplaces – a central function of Automotive Service Technician journeywork.

Objectives and Content:

1. Describe the structure and scope of the trade. 25%
   a. Historical background, including trainee experiences
   b. Structure/scope of the trade
      • International and national characteristics
      • Important features of practicing the trade in Manitoba
      • Trade and construction industry organizations
   c. Historical background, including trainee experiences
      • Generalists and specialists
      • Lead hands and other immediate supervisors
      • Geographic mobility
      • Job hierarchies and innovations

2. Describe the Manitoba Automotive Service Technician Apprenticeship Program. 50%
   a. Concept and significance of skills stewardship
      • To the trade
      • To trainees
      • To journeypersons
3. **Describe special opportunities and challenges re: Automotive Service Technician training.** 25%
   a. Adapting personal learning goals to program contexts
      - Principles of adult learning (including importance of self-direction)
      - Description/recognition of learning and teaching styles
      - Significance of work culture and interpersonal skills re: trade-learning
      - Integrating Technical Training and Practical Training content
      - Possibilities and perils of peer learning
      - Budgeting and other necessary personal arrangements
      - Identifying sources of support (e.g. upgrading trade-related math skills)
   b. On-site learning challenges and opportunities
      - Significance of jobsite supervision roles and teaching styles (e.g. journey-level skills-coach vs. mentor)
      - Communication with journeypersons and employers
      - Coverage of prescribed tasks/subtasks that define the scope of trade, and the content of the certification exam administered to apprentices who are completing their program
      - Getting help and fixing mistakes
      - Maintaining personal record of trade-learning challenges/achievements (e.g. a learning journal, and/or a personal training plan, if possible, discussed with employers and others supporting the apprenticeship journey to certification)
      - Significance of jobsite supervision roles and teaching styles (e.g. journey-level skills-coach vs. mentor)
      - Communication with journeypersons and employers
   c. In-school opportunities/challenges
      - Personal arrangements that support progress in Technical Training
      - “Baggage-handling” – self-assessing potential impacts of previous experiences (favourable/unfavourable) on current learning; availability of supports
      - Techniques for note-taking, record-keeping, and review
      - Relations with instructors (including 'Related'-area faculty)
      - College resources (library, support services, etc.)
Automotive Service Technician

Unit: A2 Trade Safety Awareness

Level: One

Duration: 7 hours
Theory: 7 hours
Practical: 0 hours

Overview:

Safe working procedures and conditions, injury prevention, and the preservation of health are of primary importance to industry in Canada. These responsibilities are shared and require the joint efforts of government, employers, and employees. It is imperative that all parties become aware of circumstances that may lead to injury or harm. Safe learning experiences and environments can be created by controlling the variables and behaviours that may contribute to incidents or injury. It is generally recognized that safety-conscious attitudes and work practices contribute to a healthy, safe, and accident-free working environment. It is imperative to apply and be familiar with the Workplace Safety and Health Act and Regulations. As well, it’s essential to determine workplace hazards and take measures to protect oneself, co-workers, the public, and the environment. Safety education is an integral part of Insulator apprenticeship training both in school and on-the-job. Unit content is supplemented throughout Technical Training by trade-specific information about Insulator safety hazards and precautions presented in the appropriate contexts of discussion and study. Note: No percentage-weightings for test purposes are prescribed for this unit’s objectives. Instead, a ‘Pass/Fail” grade will be recorded for the unit in its entirety.

Objectives and Content:

<table>
<thead>
<tr>
<th>Percent of Unit Mark (%)</th>
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<tbody>
<tr>
<td>1. Identify safety and health requirements. n/a</td>
</tr>
<tr>
<td>a. Overview of The Workplace Safety and Health Act</td>
</tr>
<tr>
<td>• Rights and responsibilities of employees under the Act</td>
</tr>
<tr>
<td>• Rights and responsibilities of employers under the Act</td>
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<tr>
<td>• Rights and responsibilities of supervisors under the Act</td>
</tr>
<tr>
<td>b. Fourteen (14) regulations</td>
</tr>
<tr>
<td>c. Codes of practice</td>
</tr>
<tr>
<td>d. Guidelines</td>
</tr>
<tr>
<td>e. Right to refuse</td>
</tr>
<tr>
<td>• Explanation of right to refuse process</td>
</tr>
<tr>
<td>• Rights and responsibilities of employees</td>
</tr>
<tr>
<td>• Rights and responsibilities of employers</td>
</tr>
<tr>
<td>• Rights and responsibilities of supervisors under the Act</td>
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</tbody>
</table>

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<thead>
<tr>
<th>Percent of Unit Mark (%)</th>
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</thead>
<tbody>
<tr>
<td>2. Identify personal protective equipment (PPE) and procedures. n/a</td>
</tr>
<tr>
<td>a. Employer and employee responsibilities as related to personal protective equipment.</td>
</tr>
<tr>
<td>b. Standards: ANSI (U.S.A. standards), etc.</td>
</tr>
<tr>
<td>c. Work protective clothing and danger if it fits poorly.</td>
</tr>
</tbody>
</table>
| d. Gloves – Importance of proper glove selection (when handling chemicals, cold items,
e. Headwear – appropriate protective headwear when required and the approved type of headwear.
f. Eye protection – comparison and distinction of everyday eyeglasses, industrial safety glasses and safety goggles
g. Foot protection – when required according to safety standards
h. Hearing protection
   • Hazards of various noise levels (hearing protection must be worn)
   • Laws
   • Types of hearing protection
i. Respiratory protection – types, overview of proper selection
j. Fall protection – Manitoba requirements standards guidelines
   • ANSI (U.S.A. standards), etc.
k. Ladders and scaffolding
l. Safety principles for working with or around industrial trucks site-specific (forklifts, pallet trucks, etc.)

3. Identify electrical safety. n/a
   a. Effects of electric current on the human body
   b. Three factors that affect the severity of an electric shock
   c. The effects of ARC and blast on the human body and equipment
   d. Work with energized equipment

4. Identify fire safety. n/a
   a. Types of fires
   b. Types of fire fighting equipment
   c. Classifications of fire extinguishers (A, B and C)
   d. Location of fire extinguishers and fire exits
   e. Fire alarms and drills

5. Identify ergonomics. n/a
   a. 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

6. Hazard recognition and control. n/a
   a. Safe work practices
   b. Basic risk assessment
   c. Injury prevention and control measures
   d. Identification of hazards involved in pneumatic tool use and explanation of how to guard against them

7. Hazard of confined space entry: n/a
   a. Identification of a confined space
   b. Hazards of a confined space
      • Physical
• Biological
  c. Working in a confined space
d. Emergency response plan
e. Self contained breathing apparatus (SCBA)

8. Identify First Aid/CPR: n/a
a. Overview of First Aid Regulation
b. Obligations of employers regarding First Aid
   • Who is certified to provide First Aid?
   • What to do while waiting for help?
   • Where is First Aid kit?
c. 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 (eg. Workers Compensation claims)
d. Describe basic CPR requirements and techniques
   • How do you get certified?
   • Scope and limits of CPR intervention (include varieties of CPR certification)

9. Identify the safety requirements as they apply to WHMIS with emphasis on: n/a
a. WHMIS is a system
b. Provincial Regulation under the Safety and Health Act
   • Each province has a WHMIS regulation
c. Federal Hazardous Products Act
d. 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
e. Description of WHMIS (include varieties of WHMIS Certification)
   • Typology of WHMIS labels, symbols, and classifications
   • Scope and use of Materials Safety Data Sheets (MSDS)

10. Identifying and controlling hazards: n/a
a. Basic control measures (injury prevention)
b. Safe work procedures
c. Explanation on the importance of industrial housekeeping
d. Employer responsibilities
e. How and where to store materials
f. Safety measures related to walkways, stairs and floor openings
g. Explanation of how to protect the worker and others when working in traffic paths

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Automotive Service Technician

Unit: A3 Tools and Equipment

Level: One
Duration: 21 hours
Theory: 14 hours
Practical: 7 hours

Overview:
This unit is designed to provide the apprentice with the knowledge about the various tools and equipment when working with today's automotive vehicles and light trucks. Beginning with safe work practices when using tools and equipment, the unit covers the types of hand and power tools, measuring tools, and scan/measuring tools; the unit also covers procedures and other considerations when operating, using and storing tools and equipment.

Objectives and Content:

<table>
<thead>
<tr>
<th>Objective</th>
<th>Percent of Unit Mark (%)</th>
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</thead>
<tbody>
<tr>
<td>1. Identify hazards and describe safe work practices pertaining to the use of tools and equipment.</td>
<td>10%</td>
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<tr>
<td>2. Identify types of hand tools and describe their applications and procedures for use.</td>
<td>10%</td>
</tr>
<tr>
<td>3. Describe the procedures used to inspect, maintain and store hand tools.</td>
<td>5%</td>
</tr>
<tr>
<td>4. Identify types of power tools and describe their applications and procedures for use.</td>
<td>5%</td>
</tr>
<tr>
<td>a. Electric</td>
<td></td>
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<tr>
<td>b. Pneumatic</td>
<td></td>
</tr>
<tr>
<td>c. Hydraulic</td>
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</tr>
<tr>
<td>5. Describe the procedures used to inspect, maintain and store power tools.</td>
<td>5%</td>
</tr>
<tr>
<td>6. Identify types of measuring tools and describe/demonstrate their applications and procedures for use.</td>
<td>15%</td>
</tr>
<tr>
<td>a. Micrometers</td>
<td></td>
</tr>
<tr>
<td>b. Vernier calipers</td>
<td></td>
</tr>
<tr>
<td>c. Pressure gauges</td>
<td></td>
</tr>
<tr>
<td>7. Identify types of scan tools and digital voltage ohmmeters (DVOM) and describe their applications.</td>
<td>10%</td>
</tr>
<tr>
<td>8. Describe the procedures used to inspect, maintain and store measuring tools.</td>
<td>5%</td>
</tr>
<tr>
<td>9. Identify types of shop equipment and describe their applications and procedures for use.</td>
<td>5%</td>
</tr>
</tbody>
</table>
10. Describe the procedures used to inspect, maintain and store shop equipment. 5%

11. Identify types of welding, cutting and heating equipment and describe their applications.
   a. oxy-acetylene heating and cutting
   b. gas metal arc welding (GMAW)
      • metal inert gas welding (MIG)
   c. shielded metal arc welding (SMAW)

12. Identify types of fasteners and describe their applications and procedures for use. 10%

13. Identify types of tubing and hoses and describe their applications and procedures for use. 5%

14. Identify types of fittings and describe their applications and procedures for use. 5%

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Automotive Service Technician

Unit: A4 Hoisting and Lifting

Level: One
Duration: 7 hours
- Theory: 4 hours
- Practical: 3 hours

Overview:
This unit is designed to provide the apprentice with the knowledge about hoisting and lifting when working with today's automotive vehicles and light trucks. Beginning with terminology and safe work practices, the unit covers hoisting and lifting-related information used on drawings and specifications; the unit also covers procedures and other considerations when using, inspecting and maintaining hoisting and lifting equipment.

Objectives and Content:

1. Define terminology associated with hoisting and lifting. 5%
2. Identify hazards and describe safe work practices pertaining to hoisting and lifting. 25%
3. Interpret information pertaining to hoisting and lifting found on drawings and specifications. 15%
4. Identify types of hoisting and lifting equipment and accessories and describe their applications. 15%
5. Describe and demonstrate the procedures used when hoisting and lifting. 25%
6. Describe the procedures used to inspect, maintain and store hoisting and lifting equipment. 15%

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Automotive Service Technician

Unit: A5 Communication

Level: One

Duration: 7 hours

Theory: 7 hours

Practical: 0 hours

Overview:

This unit is designed to provide the apprentice with the knowledge about the communication skills that are beneficial for effective communication when working with today’s automotive vehicles and light trucks. The unit covers both communication techniques and communication devices.

Objectives and Content:

1. Identify audiences and describe techniques for effective verbal and non-verbal communication. 40%
   a. Apprentices
   b. Other tradespersons
   c. Colleagues
   d. Supervisors
   e. Clients

2. Identify types of communication devices and describe their purpose and operation. 20%
   a. portable and stationary radios
   b. cellular phones and mobility devices
   c. computers
   d. digital camera

3. Describe the importance of communicating job requirements. 40%

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Automotive Service Technician

Unit: A6 Trade Related Documents

Level: One
Duration: 7 hours
Theory: 7 hours
Practical: 0 hours

Overview:
This unit is designed to provide the apprentice with the knowledge to use and complete trade related documents when working with today’s automotive vehicles and light trucks. Beginning with the types of customers encountered, this unit covers the importance of the customer, the effective techniques in communicating with customers and fellow workers. Because of the new electronic and computerized equipment on transport trailers and related advances, electronic manuals and service bulletins are becoming more common.

Objectives and Content:  Percent of Unit Mark (%)

1. Identify sources of related information. 10%

2. Identify and interpret identification codes found on the vehicle and vehicle components.
   a. Vehicle identification number (VIN) 20%

3. Identify types of trade related documents and describe their applications. 40%
   a. Work orders/repair orders
   b. Schematics and service information
   c. Technical service bulletins (TSB)
   d. Preventative maintenance schedules
   e. Estimates
   f. Industry standard labour guides
   g. Manufacturers’ specifications
   h. Codes and standards
   i. Company policies

4. Describe the procedures used to prepare and/or complete trade related documents. 30%
   a. Work orders/repair orders
   b. Estimates
   c. Pre-delivery inspection
   d. Preventative maintenance

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Automotive Service Technician

Unit: A7 Trade Related Math

Level: One

Duration: 14 hours
   Theory: 14 hours
   Practical: 0 hours

Overview:

This unit is designed to provide the apprentice with the knowledge and ability to use mathematics with precision, resourcefulness and confidence. This unit is intended to help make the world of numbers and ratios work for, rather than against, the Automotive Service Technician apprentice. Beginning with an overview of the importance of math to the trade, the unit covers strategies to address math anxiety, a review of general mathematical concepts including the use of calculators, and an overview of trade-related mathematics.

Objectives and Content:

1. Describe the practical importance of math disciplines to the Automotive Service Technician trade. 10%
   a. Definition and scope of relevant math disciplines
   b. Time-sheets, wages, and personal budgeting
   c. Engineering of tools and equipment
   d. Manufacture and packaging of Automotive Service materials and products
   e. Trade documents, including manufacturers’ specifications
   f. Computer technology/applications
   g. Design/technical drawing
   h. Work order preparation
   i. Machinery and equipment set-up
   j. Measurement and related test readings
      • Temperatures
      • Pressures
      • Other measured quantities
   k. Customer relations/perceptions (e.g. schedules, timetables, etc.)
   l. Business management

2. Describe “math anxiety” and its remedies. 10%
   a. Definition
   b. Recognition
   c. Options, resources, and techniques for overcoming math anxiety
   d. Other common problems
      • Importance of adult learner’s recognition of existing math strengths and weaknesses
      • Importance of early resolution during term of apprenticeship
3. **Review general math concepts and use of electronic calculators.** 60%
   a. Basic operations
      - Addition
      - Subtraction
      - Multiplication
      - Division
      - Order of operations
      - Fractions and decimals
   b. Ratio and proportion
   c. Percentage calculations
   d. Constructing/solving simple equations
   e. Units of measure
      - Imperial
      - Metric (SI)
      - Conversion factors

4. **Demonstrate trade-related calculations as specified by instructor.** 20%
   a. Linear measurement
   b. Area and volume
   c. Ratio/proportion
      - Ratios
      - Percentages
      - Rates
   d. SI/Metric Units (including Conversions)

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Automotive Service Technician

Unit: A8 Oxy-Acetylene Welding (OAW) and Cutting

Level: One
Duration: 14 hours
Theory: 4 hours
Practical: 10 hours

Overview:
This unit is designed to provide the apprentice with the knowledge about oxy-acetylene welding and cutting when working with today’s automotive vehicles and light trucks. Beginning with terminology and safe work practices, the unit covers procedures when using, inspecting and maintaining oxy-acetylene welding and cutting equipment; the unit also covers weld defects and their causes, including procedures used to prevent and correct them.

Objectives and Content: Percent of Unit Mark (%)

1. Define terminology associated with oxy-acetylene welding and cutting. 5%

2. Identify hazards and describe safe work practices pertaining to oxy-acetylene welding and cutting.
   a. Personal
   b. Shop/facility
   c. Equipment 15%

3. Identify oxy-acetylene welding and cutting equipment and accessories and describe their applications. 5%

4. Identify types of oxy-acetylene processes and describe their characteristics and applications.
   a. Brazing/welding
   b. Cutting
   c. Heating 20%

5. Describe and demonstrate the procedures used to set-up, adjust and shut-down oxy-acetylene welding and cutting equipment. 30%

6. Describe the procedures used to inspect, maintain and store oxy-acetylene welding and cutting equipment. 5%

7. Describe and demonstrate the procedures used to operate oxy-acetylene equipment. 10%

8. Identify types of weld defects and describe their causes. 5%

9. Describe the procedures used to prevent and correct weld defects. 5%
Automotive Service Technician

Unit: A9 Gas Metal Arc Welding (MIG)

Level: One
Duration: 14 hours
  Theory: 4 hours
  Practical: 10 hours

Overview:

This unit is designed to provide the apprentice with the knowledge about gas metal arc welding (MIG) when working with today’s automotive vehicles and light trucks. Beginning with terminology and safe work practices, the unit covers procedures when using, inspecting and maintaining gas metal arc welding equipment; the unit also covers weld defects and their causes, including procedures used to prevent and correct them.

Objectives and Content:

<table>
<thead>
<tr>
<th>Percent of Unit Mark (%)</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>5%</td>
<td>1. Define terminology associated with gas metal arc welding (GMAW [MIG]).</td>
</tr>
</tbody>
</table>
| 15%                     | 2. Identify hazards and describe safe work practices pertaining to GMAW (MIG).
|                         | a. Personal |
|                         | b. Shop/facility |
|                         | c. Equipment |
| 5%                      | 3. Identify GMAW (MIG) equipment and accessories and describe their applications. |
| 20%                     | 4. Identify types of GMAW (MIG) processes and describe their characteristics and applications. |
| 30%                     | 5. Describe and demonstrate the procedures used to set-up, adjust and shut-down GMAW (MIG) equipment. |
| 10%                     | 6. Describe and demonstrate the procedures used to operate GMAW (MIG) equipment. |
| 5%                      | 7. Describe the procedures used to inspect, maintain and store GMAW (MIG) equipment. |
| 5%                      | 8. Identify types of weld defects and describe their causes. |
| 5%                      | 9. Describe the procedures used to prevent and correct weld defects. |
Automotive Service Technician

Unit: A10 Vehicle Maintenance Inspection

Level: One
Duration: 21 hours
   Theory: 14 hours
   Practical: 7 hours

Overview:

This unit is designed to provide the apprentice with the knowledge about vehicle maintenance inspection when working with today’s automotive vehicles and light trucks. Beginning with terminology and safe work practices, the unit covers the procedures and tools and equipment used when performing inspections; the unit also covers the types of vehicle components and accessories requiring operational checks.

Objectives and Content:

1. Define terminology associated with vehicle maintenance inspections. 5%
2. Identify hazards and describe safe work practices pertaining to vehicle maintenance inspections. 5%
3. Identify tools and equipment used to perform vehicle maintenance inspections and describe their applications and procedures for use. 5%
4. Identify types of vehicle components and accessories requiring operational checks. 40%
   a. Brakes
   b. Tires
   c. Lights and wipers
   d. Steering linkage and suspension
   e. Belts and filters
   f. Exhaust
5. Identify types of lubricants and fluids requiring service checks. 20%
6. Describe and demonstrate the procedures used to perform vehicle maintenance inspections. 20%
7. Describe the importance of regular vehicle maintenance inspections. 5%

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Automotive Service Technician

Unit: B1 Accessory Drive Systems

Level: One
Duration: 7 hours
  Theory:  5 hours
  Practical:  2 hours

Overview:
This unit is designed to provide the apprentice with the knowledge about accessory drive systems when working with today's automotive vehicles and light trucks. Beginning with terminology and safe work practices, the unit covers the types of accessory drive systems and their related tools and equipment; the unit also covers procedures used to adjust, diagnose, repair and/or replace accessory drive system components.

Objectives and Content:

1. Define terminology associated with accessory drive systems. 5%

2. Identify hazards and describe safe work practices pertaining to accessory drive systems. 10%

3. Identify types of tools and equipment relating to accessory drive systems and describe their applications and procedures for use. 10%

4. Identify types of accessory drive systems and describe their components and operation.
   a. Belt tension/tensioners
   b. Belts
   c. Drives
   • Electric
   • Hydraulic
   • Gear
   50%

5. Describe the procedures used to diagnose accessory drive systems. 10%

6. Describe and demonstrate the procedures used to adjust, repair and/or replace accessory drive system components. 15%

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Automotive Service Technician

Unit: D1 Electrical and Electronic Principles

Level: One
Duration: 56 hours
Theory: 28 hours
Practical: 28 hours

Overview:

This unit is designed to provide the apprentice with the knowledge about electrical and electronic principles when working with today’s automotive vehicles and light trucks. Beginning with terminology and safe work practices, the unit covers basic electrical theory, battery related testing, electrical and electronic components and their purpose and operation; the unit also covers procedures used to diagnose, repair and replace circuits and components.

Objectives and Content:

<table>
<thead>
<tr>
<th>Objective</th>
<th>Percent of Unit Mark (%)</th>
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</thead>
<tbody>
<tr>
<td>1. Define terminology associated with electrical, electronic and magnetic principles.</td>
<td>5%</td>
</tr>
<tr>
<td>2. Identify hazards and describe safe work practices pertaining to electrical and electronic components.</td>
<td>5%</td>
</tr>
<tr>
<td>a. Personal</td>
<td></td>
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<tr>
<td>b. Vehicle</td>
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<tr>
<td>3. Interpret information pertaining to electrical and electronic components found on drawings and specifications.</td>
<td>5%</td>
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<tr>
<td>a. Diagnostic flowcharts</td>
<td></td>
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<tr>
<td>b. Schematics</td>
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<tr>
<td>4. Explain basic electrical theory.</td>
<td>5%</td>
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<tr>
<td>a. Conventional theory</td>
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<tr>
<td>b. Electron theory</td>
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<tr>
<td>5. Explain Ohm’s law and its applications to electrical circuits.</td>
<td>15%</td>
</tr>
<tr>
<td>a. Series circuit</td>
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<tr>
<td>b. Parallel circuit</td>
<td></td>
</tr>
<tr>
<td>c. Series-parallel circuits</td>
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<tr>
<td>6. Identify types of tools and equipment used to test and charge batteries and describe/demonstrate their applications and procedures for use.</td>
<td>5%</td>
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<tr>
<td>7. Identify types of batteries and describe their characteristics.</td>
<td>5%</td>
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<tr>
<td>8. Identify types of wire and describe their characteristics, composition and applications.</td>
<td>5%</td>
</tr>
</tbody>
</table>
9. Identify types of electrical components and describe their purpose and operation. 15%
   a. Circuit protection
   b. Control devices
   c. Load devices

10. Identify types of electronic components and describe their purpose and operation. 15%
    a. Diodes
    b. Transistors
    c. Resistors
    d. Integrated circuits

11. Identify tools and equipment used to test circuits and components and describe/demonstrate their applications and procedures for use. 5%
    a. Scan tools
    b. DVOM

12. Describe and demonstrate the procedures used to diagnose circuits and components. 5%

13. Identify methods of wire repair and describe/demonstrate their associated procedures. 5%
    a. Splicing
    b. Terminal replacement
    c. Soldering
    d. Crimping

14. Describe the procedures used to repair and/or replace circuits and components. 5%

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Automotive Service Technician

Unit: E1 Tires, Wheels and Hubs

Level: One
Duration: 21 hours
  Theory: 14 hours
  Practical: 7 hours

Overview:
This unit is designed to provide the apprentice with the knowledge about tires, wheels and hubs when working with today's automotive vehicles and light trucks. Beginning with terminology and safe work practices, the unit covers tire codes and sidewall markings, tools and equipment related to tires, wheels and hubs; the unit also covers procedures used to diagnose, repair or replace tires and wheel assemblies.

Objectives and Content:

Percent of Unit Mark (%)

1. Define terminology associated with tires, wheels and hubs. 5%
2. Identify hazards and describe safe work practices pertaining to tires and wheels. 5%
   a. Tire inflation
   b. Tire sizing
3. Interpret tire codes and sidewall markings. 15%
4. Identify types of tools and equipment relating to tires, wheels and hubs and describe their applications and procedures for use. 5%
5. Identify types of tires and describe their construction. 5%
6. Describe the importance of tire rotation and maintenance. 5%
7. Identify types of wheels and describe their components and operation. 5%
8. Identify types of hubs and bearing assemblies and describe their components and operation. 5%
9. Identify types of tire pressure monitoring systems and describe their applications. 5%
10. Identify types of lubricants and describe their applications and procedures for use. 5%
11. Describe the relationship between the suspension system and wheel assemblies. 5%
12. Describe and demonstrate the procedures used to diagnose tires, wheels and hubs. 10%
13. Describe and demonstrate the procedures used to repair and/or replace tires and wheel assemblies.
   a. Index and balance

14. Describe the procedures used to adjust, repair and/or replace hubs and bearings.

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Automotive Service Technician

Unit: E2 Braking Systems I (Non-ABS)

Level: One

Duration: 42 hours
- Theory: 28 hours
- Practical: 14 hours

Overview:

This unit is designed to provide the apprentice with the knowledge about non-ABS braking systems when working with today's automotive vehicles and light trucks. Beginning with terminology and safe work practices, the unit covers hydraulic principles and types of braking systems including their components and operation; the unit also covers procedures used to adjust, diagnose, repair and replace braking systems.

Objectives and Content:

1. Define terminology associated with braking systems. 5%
2. Identify hazards and describe safe work practices pertaining to braking systems. 5%
   a. Hydraulic pressure
3. Explain hydraulic principles related to braking systems. 10%
   a. Pascal's law
4. Identify types of tools and equipment relating to braking systems and describe their applications and procedures for use. 5%
5. Identify types of braking systems and describe their components and operation. 20%
   a. Disc
   b. Drum
   c. Parking
6. Identify types of power assists and describe their components and operation. 5%
   a. Vacuum
   b. Hydraulic
   c. Electric
7. Identify types of fluids and describe their applications and procedures for use. 5%
8. Identify types of fittings, flaring, tubing and hoses and describe their applications and procedures for use. 5%
9. Describe the procedures used to diagnose braking systems. 10%
10. Describe and demonstrate the procedures used to flush and bleed hydraulic brakes. 10%

11. Describe and demonstrate the procedures used to measure and machine components. 10%

12. Describe and demonstrate the procedures used to adjust, repair and/or replace braking system components. 10%

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Automotive Service Technician

Unit: E3 Suspension Systems I

Level: One
Duration: 21 hours
Theory: 17 hours
Practical: 4 hours

Overview:
This unit is designed to provide the apprentice with the knowledge about suspension systems when working with today’s automotive vehicles and light trucks. Beginning with terminology and safe work practices, the unit covers types of suspension systems, frames, springs, dampers, and their components; the unit also covers the procedures used to adjust, diagnose, repair and replace suspension system components.

Objectives and Content: Percent of Unit Mark (%)

1. Define terminology associated with suspension systems. 5%
2. Identify hazards and describe safe work practices pertaining to suspension systems. 5%
   a. Springs
3. Identify tools and equipment relating to suspension systems and describe their applications and procedures for use. 5%
4. Identify types of suspension systems and describe their components and operation. 5%
   a. Independent
   b. Solid axle
5. Identify types of frames and body construction. 5%
6. Identify types of springs and describe their purpose and operation. 20%
   a. Coil
   b. Leaf
   c. Torsion bar
   d. Air
7. Identify types of dampers and describe their components and operation. 20%
   a. Struts
   b. Shocks
8. Describe the procedures used to diagnose suspension systems. 10%
9. Describe and demonstrate the procedures used to adjust, repair and/or replace suspension system components. 10%

10. Describe types of ball joints and demonstrate their operation and inspection. 15%

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Automotive Service Technician

Unit: F1 Body Components and Trim

Level: One

Duration: 7 hours

Theory: 5 hours
Practical: 2 hours

Overview:

This unit is designed to provide the apprentice with the knowledge about body components and trim when working with today’s automotive vehicles and light trucks. Beginning with terminology and safe work practices, the unit covers body components and accessories, types of electrical/electronic systems, and types and sources of noise, vibration and harshness; the unit also covers the procedures used to adjust, diagnose, repair and replace body components and trim.

Objectives and Content:

1. Define terminology associated with body components and trim. 5%

2. Identify hazards and describe safe work practices pertaining to body components and trim.
   a. Restraint systems 5%

3. Identify tools and equipment relating to body components and trim and describe their applications and procedures for use. 5%

4. Explain the principles of basic aerodynamics related to body design. 5%

5. Identify body components and accessories and describe their purpose and operation.
   a. Interior 5%
   b. Exterior

6. Identify types of electrical/electronic systems and describe their components and operation.
   a. Locks 10%
   b. Latches
   c. Windows

7. Identify types and sources of noise, vibration and harshness (NVH).
   a. Chuckles 15%
   b. Rattles
   c. Knocks and whines
   d. Offensive noises
8. Identify materials used to dampen or interrupt vibration. 
   a. Tapes 
   b. Adhesives 
   c. 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 and demonstrate the procedures used to diagnose body components and trim. 

12. Describe and demonstrate the procedures used to adjust, repair and/or replace body components and trim. 

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Automotive Service Technician

Unit: G1 Introduction to Hybrid Vehicle Systems
Level: One
Duration: 7 hours
  Theory: 7 hours
  Practical: 0 hours

Overview:
This unit of instruction is designed to provide the Automotive Service Technician apprentice with an introduction to the knowledge about current-generation hybrid vehicle systems.

Objectives and Content:

<table>
<thead>
<tr>
<th>Objective</th>
<th>Percent of Unit Mark (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Describe the fundamentals of hybrid technology.</td>
<td>20%</td>
</tr>
<tr>
<td>a. Differences compared to traditional non-hybrid technologies</td>
<td></td>
</tr>
<tr>
<td>• Advantages</td>
<td></td>
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<tr>
<td>• Disadvantages</td>
<td></td>
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<td>b. Types of hybrid powertrain designs</td>
<td></td>
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<tr>
<td>• Series</td>
<td></td>
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<tr>
<td>• Parallel</td>
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<tr>
<td>• Series-parallel</td>
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<tr>
<td>c. Levels of hybrid vehicles</td>
<td></td>
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<tr>
<td>• Mild hybrid</td>
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<tr>
<td>• Medium hybrid</td>
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<td>• Full hybrid</td>
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<tr>
<td>2. Describe hybrid vehicle safety hazards.</td>
<td>50%</td>
</tr>
<tr>
<td>a. Properly tag out the vehicle</td>
<td></td>
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<td>b. Fire hazards</td>
<td></td>
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<td>c. Electrocution hazards</td>
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<tr>
<td>d. Electrolyte hazards</td>
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<tr>
<td>e. Use of hybrid identification markers</td>
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<tr>
<td>f. Working environment</td>
<td></td>
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<tr>
<td>• Dry floor</td>
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<tr>
<td>• With a partner</td>
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<tr>
<td>3. Describe tools for hybrid vehicle safety.</td>
<td>10%</td>
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<tr>
<td>a. Personal protective equipment</td>
<td></td>
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<tr>
<td>• High voltage gloves</td>
<td></td>
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<tr>
<td>• Testing high voltage gloves</td>
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<tr>
<td>• Safety glasses</td>
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</tbody>
</table>
• Insulated steel-toed boots
b. High voltage multimeters and leads (Cat III)
c. Warning pylons
d. Insulated tools
e. Engine crane for battery removal
f. Hook or gaff for electrocution

4. Describe differences with high voltage batteries. 20%
   a. Safety precautions for working on high voltage battery
      • Personal protective equipment
      • One hand rule
   b. Different types of hybrid batteries
      • Lead-acid batteries in series
      • Nickel-metal hydride
      • Lithium-ion
   c. Safety procedures
      • Different disconnect procedures
      • Verify voltage

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