

Automotive Service Technician Level 2

Automotive Service Technician

Unit: B1 Engine Diagnosis and Repair

Level: Two

Duration: 42 hours

Theory: 21 hours

Practical: 21 hours

Overview:

This unit is designed to provide the apprentice with the knowledge about engine mechanical repair when working with today's automotive vehicles and light trucks. Beginning with terminology and safe work practices, the unit covers types and sources of engine problems and procedures to diagnose mechanical engine problems; the unit also covers the procedures used to remove and reinstall engines, and adjust, repair and replace engine components.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with engine repair.	10%
2. Identify hazards and describe safe work practices pertaining to engine repair.	5%
3. Identify tools and equipment relating to engine repair and describe their applications and procedures for use.	10%
4. Identify types and sources of engine problems. a. Low power b. Smoke c. Oil consumption d. Fluid contamination e. Rough running f. Internal/external leaks g. Noises h. Lubrication	25%
5. Describe and demonstrate the procedures used to diagnose and repair mechanical engine problems. a. Adjustment procedures b. Component replacement	25%
6. Describe and demonstrate the procedures used to diagnose and repair engine system components and lubrication systems. a. Component replacement	25%

Automotive Service Technician

Unit: B2 Cooling and Accessory Drive Systems

Level: Two

Duration: 14 hours

Theory: 7 hours

Practical: 7 hours

Overview:

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

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with cooling and accessory drive systems.	5%
2. Identify hazards and describe safe work practices pertaining to cooling and accessory drive systems.	5%
3. Identify tools and equipment relating to cooling and accessory drive systems, and describe their applications and procedures for use.	10%
4. Identify types of cooling and accessory drive systems.	30%
a. Cooling	
• Liquid	
• Air cooled	
b. Accessory drive systems	
• Belt tension/tensioners	
• Belts	
• Drives (electric, hydraulic, gear)	
c. Coolant	
• Chemical additives	
• Handling, storing and disposing	
d. Hoses, tubing, belts, gaskets, seals and sealants	
5. Describe and demonstrate the procedures used to diagnose cooling and accessory drive system problems.	20%
6. Identify warning systems and indicators on cooling systems, and describe their purpose and operation.	5%
a. Lights	
b. Gauges	

- c. Audible

- 7. Identify types of cooling fan systems and describe their components and operation. 5%**
 - a. Mechanical
 - b. Electric
 - c. Hydraulic

- 8. Identify related systems and describe their relationship to cooling systems. 5%**
 - a. Heating, ventilation and air conditioning (HVAC)
 - b. Coolers and auxiliary coolers
 - c. Coolant heaters

- 9. Describe and demonstrate the procedures used to diagnose and repair cooling and accessory drive systems. 15%**
 - a. Adjustment procedures
 - b. Component replacement

Automotive Service Technician

Unit: B3 Starting, Charging and Electrical Systems

Level: Two

Duration: 56 hours

Theory: 42 hours

Practical: 14 hours

Overview:

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

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with electronic components, starting and charging systems.	10%
2. Identify hazards and describe safe work practices pertaining to electronic components, starting and charging systems.	5%
3. Identify types of tools and equipment relating to starting and charging systems, and describe their applications and procedures for use.	10%
4. Identify types of electronic components and semiconductors, and describe their purpose and operation. a. Diodes b. Transistors c. Resistors d. Integrated circuits	20%
5. Identify types of starting and charging systems, and describe their components and operation.	10%
6. Describe and demonstrate the procedures used to diagnose and repair electrical and electronic circuits and components. a. Component replacement	20%
7. Describe and demonstrate the procedures used to diagnose and repair starting and charging systems. a. Component replacement	25%

Automotive Service Technician

Unit: B4 Lighting and Wiper Systems

Level: Two

Duration: 21 hours

Theory: 14 hours

Practical: 7 hours

Overview:

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

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with lighting and wiper systems.	10%
2. Identify hazards and describe safe work practices pertaining to lighting and wiper systems.	5%
a. High intensity discharge (HID)	
b. Light emitting diode (LED)	
c. Other emerging technologies	
3. Identify tools and equipment relating to lighting and wiper systems and describe their applications and procedures for use.	15%
4. Identify types of lighting systems and describe their components and operation.	20%
5. Identify types of wiper systems and describe their components and operation.	20%
6. Describe and demonstrate the procedures used to diagnose and repair lighting and wiper systems.	30%
a. Adjustment procedures	
b. Component replacement	

Automotive Service Technician

Unit: B5 Steering and Suspension Systems II

Level: Two

Duration: 42 hours

Theory: 21 hours

Practical: 21 hours

Overview:

This unit is designed to provide the apprentice with the knowledge about steering systems when working with today's automotive vehicles and light trucks. Beginning with terminology and safe work practices, the unit covers types of steering systems, steering gears, assist systems, and their components; the unit also covers the procedures used to adjust, diagnose, repair and replace steering systems and their components.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with steering and suspension systems.	10%
2. Identify hazards and describe safe work practices pertaining to steering and suspension systems.	5%
3. Identify tools and equipment relating to steering and suspension systems, and describe their applications and procedures for use.	10%
4. Identify types of steering and suspension systems, and describe their components and operation. a. Mechanical <ul style="list-style-type: none">Steering columnsSteering linkagesSteering gearsIndependent and solid axle suspensionBall jointsShocks and struts b. Electronic and control systems <ul style="list-style-type: none">Ride height controlLoad levelingElectronically-controlled shocksOther emerging suspension control systems	30%
5. Describe the operation of steering systems. a. Linkage b. Rack-and-pinion c. Four wheel steering	10%

- 6. Identify types of steering gears and describe their components and operation. 10%**
- a. Recirculating ball
 - b. Rack-and-pinion
- 7. Describe the operation of steering assist systems. 10%**
- a. Electric
 - b. Hydraulic
 - c. Variable
 - d. Other emerging steering assist systems
- 8. Identify types of fluids and lubricants, fasteners, tubing, hoses, gaskets and seals and describe their applications. 5%**
- 9. Describe and demonstrate the procedures used to diagnose and repair steering and suspension systems. 10%**
- a. Adjustment procedures
 - b. Component replacement

Automotive Service Technician

Unit: B6 Wheel Alignments

Level: Two

Duration: 21 hours

Theory: 14 hours

Practical: 7 hours

Overview:

This unit builds on the level-one unit, E3: Suspension Systems I, and is designed to provide the apprentice with additional knowledge and skills about suspension systems when working with today's automotive vehicles and light trucks. Beginning with steering geometry principles, the unit covers types of electronically controlled suspension systems and their components and operation; the unit also covers procedures used to adjust, diagnose, repair and replace electronically controlled suspension systems and components, including the procedure to perform a wheel alignment.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with steering geometry and wheel alignments.	10%
2. Identify hazards and describe safe work practices relating to steering geometry and performing wheel alignments	5%
3. Identify tools and equipment relating to wheel alignments, and describe their applications and procedures for use.	10%
4. Describe wheel alignment theory, and steering and suspension geometry.	40%
a. Centre of gravity	
b. Decimals, fractions, negative fractions	
c. Metric	
d. Centrifugal force	
e. Vehicle alignment angles and measurements	
• Caster	
• Camber	
• Toe	
• Steering axis inclination	
• Included angle	
• Turning radius	
• Ride height	
• Thrust line	
• Centre line	
• Setback	
• Track	
• Steering wheel position reset procedures	

- 5. Describe types of vehicle suspension alignment. 5%**
- a. Two-wheel geometric centre line alignment
 - b. Two-wheel thrust alignment
 - c. Four-wheel thrust alignment
 - d. Four-wheel geometric centre alignment
- 6. Describe wheel alignment adjustments and procedures. 5%**
- a. Shim adjustments
 - b. Eccentric adjustments
 - c. Strut rod adjustments
 - d. Elongated holes (slots)
- 7. Describe and demonstrate the procedures used to perform inspection of and diagnose steering and suspension geometry. 10%**
- a. Operating procedures of alignment equipment
 - b. Suspension component checks
- 8. Describe and demonstrate the procedures to perform wheel alignments. 15%**

Automotive Service Technician

Unit: B7 Clutches and Flywheels

Level: Two

Duration: 14 hours

Theory: 12 hours

Practical: 2 hours

Overview:

This unit is designed to provide the apprentice with the knowledge about clutches and flywheels when working with today's automotive vehicles and light trucks. Beginning with terminology and safe work practices, the unit covers types of clutches and flywheels, and their components and operation; the unit also covers the procedures used to adjust, diagnose, repair and replace clutches, flywheels and their related components.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with clutches and flywheels.	10%
2. Identify hazards and describe safe work practices pertaining to clutches and flywheels.	5%
3. Identify tools and equipment relating to clutches and flywheels and describe their applications and procedures for use.	5%
4. Identify types of clutches and describe their components and operation.	20%
5. Identify types of flywheels and describe their components and operation.	10%
6. Identify mechanical and hydraulic clutch operating systems and describe their components and operation.	10%
7. Identify types of fluids, fasteners, tubing, hoses and seals and describe their applications.	10%
8. Describe the procedures used to diagnose, adjust and repair clutches, flywheels and their related components.	30%

Automotive Service Technician

Unit: B8 Manual Transmissions and Transaxles

Level: Two

Duration: 28 hours

Theory: 14 hours

Practical: 14 hours

Overview:

This unit is designed to provide the apprentice with the knowledge about manual transmissions and transaxles when working with today's automotive vehicles and light trucks. Beginning with terminology and safe work practices, the unit covers types of manual transmissions and transaxles, and their components and operation; the unit also covers the procedures used to adjust, diagnose, repair and replace manual transmissions and transaxles and their related components.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with manual transmissions and transaxles.	10%
2. Identify hazards and describe safe work practices pertaining to manual transmissions and transaxles.	5%
3. Identify tools and equipment relating to manual transmissions and transaxles and describe their applications and procedures for use.	10%
4. Identify types of manual transmissions and transaxles and describe their components and operation.	25%
5. Explain power flow as it relates to manual transmissions and transaxles.	10%
6. Describe gear ratios, their purpose and calculation.	10%
7. Identify types of lubricants, fasteners, gaskets, seals and sealants and describe their applications.	5%
8. Describe and demonstrate the procedures used to diagnose and repair manual transmissions and transaxles, and their related components.	25%
a. Adjustment procedures	
b. Component replacement	

Automotive Service Technician

Unit: B9 Differentials and Final Drive Assemblies

Level: Two

Duration: 28 hours

Theory: 14 hours

Practical: 14 hours

Overview:

This unit is designed to provide the apprentice with the knowledge about differentials and final drive assemblies when working with today's automotive vehicles and light trucks. Beginning with terminology and safe work practices, the unit covers types of differentials, final drive assemblies and differential housings; the unit also covers the procedures used to adjust, diagnose, repair and replace differentials, final drive assemblies, and their related components.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with differentials and final drive assemblies.	5%
2. Identify hazards and describe safe work practices pertaining to differentials and final drive assemblies.	5%
3. Identify tools and equipment relating to differentials and final drive assemblies and describe their applications and procedures for use.	5%
4. Identify types of differentials and final drive assemblies and describe their components and operation. a. Locking b. Non-locking	10%
5. Identify types of differential housings. a. Integral b. Non-integral	5%
6. Identify types of differential control systems and final drive assemblies, and describe their components and operation. a. Electronically controlled/electric b. Vacuum c. Mechanical	20%
7. Explain power flow as it relates to differentials and final drive assemblies.	10%
8. Describe gear ratios, their purpose and calculations.	10%

9. **Identify types of lubricants, additives, fasteners, gaskets, seals and sealants and describe their applications.** 5%
10. **Describe and demonstrate the procedures used to diagnose and repair differentials and final drive assemblies, and their related components.** 25%
- a. Adjustment procedures
 - b. Component replacement

Automotive Service Technician

Unit: B10 Braking Systems II (ABS)

Level: Two

Duration: 14 hours

Theory: 10 hours

Practical: 4 hours

Overview:

This unit builds on the level-one unit, A10: Braking Systems I (Non-ABS), and is designed to provide the apprentice with the knowledge about ABS braking systems when working with today's automotive vehicles and light trucks. Beginning with terminology and safe work practices, the unit covers types of ABS and their modes of operation and components; the unit also covers procedures used to adjust, diagnose, repair and replace ABS braking systems and components.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with anti-lock braking systems.	10%
2. Identify hazards and describe safe work practices pertaining to anti-lock braking systems and their components.	10%
3. Identify tools and equipment relating to anti-lock braking systems, and describe their applications and procedures for use.	5%
4. Identify types of anti-lock braking and control systems, and describe their components and operation. a. Traction control system (TCS) b. Anti-lock braking system (ABS) c. Stability control d. Type of trailer brakes and controls	40%
5. Describe and demonstrate the procedures used to diagnose and repair anti-lock braking systems. a. Flush and bleed b. Component replacement	35%
