Saskatchewan Apprenticeship and Trade Certification Commission

Automotive Service Technician

On-the-Job Training Guide

2018

Online: www.saskapprenticeship.ca

Recognition:
To promote transparency and consistency, portions of this document has been adapted from the 2016 Automotive Service Technician Red Seal Occupational Standard (Employment and Social Development Canada).

A complete version of the Occupational Standard can be found at www.red-seal.ca

STRUCTURE OF THE ON-THE-JOB TRAINING GUIDE

To facilitate understanding of the occupation, this on-the-job training guide contains the following sections:

Description of the Automotive Service Technician trade: an overview of the trade's duties and training requirements.

Essential Skills Summary: an overview of how each of the nine essential skills is applied in this trade.

Harmonization: a brief description on the pan-Canadian Harmonization Initiative for the Automotive Service Technician trade.

Task Matrix: a chart which outlines graphically the major work activities, tasks and sub-tasks of this standard detailing the essential skills and the level of training where the content is covered.

Major Work Activity (MWA): the largest division within the standard that is comprised of a distinct set of trade activities.

Task: distinct actions that describe the activities within a major work activity.

Sub-task: distinct actions that describe the activities within a task.

On-the-Job and In-school Training Content for the Automotive Service Technician Trade: a chart which outlines on-the-job examples for apprentices to achieve relevant work experience to prepare for topics of technical training.

DESCRIPTION OF THE AUTOMOTIVE SERVICE TECHNICIAN TRADE

Automotive Service Technicians perform inspecting, diagnosing, servicing, repairing, replacing and overhauling of all components of an automobile, light truck or light bus, except body sheet metal repairing and painting.

Automotive service technicians possess the full range of knowledge and abilities required to perform preventative maintenance, diagnose problems and repair vehicle systems including engines, vehicle management, hybrids, steering, braking, tires, wheels, drivetrains, suspension, electrical, electronics, heating, ventilation and air conditioning (HVAC), restraints, trim and accessories of automotive vehicles and light trucks.

Automotive service technicians may be employed by automotive repair shops, dealerships, automotive specialty repair shops, large organizations that may own a fleet of vehicles and motor vehicle body repair companies.

While the scope of the automotive service technician trade includes many aspects of vehicle service and repair, an increasing number of technicians specialize in specific areas of automotive vehicle repair due to the complexity of today's motor vehicle systems..

Technicians usually work indoors and can expect a work environment that includes noise, fumes, odours, hazardous compounds, drafts, vibrations, and confined spaces. The work often requires considerable standing, bending, crawling, lifting, pulling and reaching.

Some important attributes of automotive service technicians are: good hand-eye coordination, mechanical aptitude, time management skills, logical thinking and decision making skills, excellent communication skills, computer skills and the ability to continue learning as technology advances. It is also imperative to have a valid driver's license.

With additional training, experienced automotive service technicians may advance to shop supervisor or service manager positions. Also technicians can transfer their skills and knowledge to related occupations such as automotive instructor, truck and transport mechanic, agricultural equipment technician or heavy duty equipment technician. Some technicians may open their own garage or automotive specialty shop.

Training Requirements: To graduate from each level of the apprenticeship program, an apprentice must successfully complete the required technical training and compile enough on-the-job experience to total at least 1800 hours each year. Total trade time required is 7200 hours and at least 4 years in the trade.

There are four levels of technical training delivered by Saskatchewan Polytechnic in Saskatoon and Moose Jaw. The General Motors Automotive Service Educational Program (ASEP) training is delivered at Saskatchewan Polytechnic in Saskatoon and Regina.

Journeyperson to apprentice ratio for this trade is: 1:2

The information contained in this document serves as a guide for employers and apprentices. Apprenticeship training is mutually beneficial to both employer and apprentice. The employer's investment in training apprentices results in skilled and certified workers. The document summarizes the tasks to be covered by the apprentice during their on-the-job portion of apprenticeship training. An apprentice spends approximately 85% of their apprenticeship term training on-the-job.

It is the employer's or journeyperson's responsibility to supervise an apprentice's practical skills development until a satisfactory level of proficiency has been reached.

EMPLOYER TRAINING RESPONSIBILITY

- promote a safety-conscious workplace
- provide mentored, hands-on practice in the use of tools and equipment
- demonstrate procedures relevant to the inspecting, diagnosing, servicing, repairing, replacing and overhauling of all components of an automobile, light truck or light bus
- provide the opportunity for apprentices to service the above systems and vehicles
- further the apprentice's ability to interpret technical drawings and schematics
- ensure that the apprentice can troubleshoot, diagnose and repair the vehicle and its systems

Employers should make every effort to expose their apprentices to work experience in as many areas of the trade as possible.

In the On-the-Job Training Guide, in-school instruction is listed first; on-the-job suggestions to help employers assist the apprentice to prepare for in-school training are listed next.

The content of the training components is subject to change without notice.

Entrance Requirements for Apprenticeship Training

Your grade twelve transcripts (with no modified classes) or GED 12 is your guarantee that you meet the educational entrance requirements for apprenticeship in Saskatchewan. In fact, employers prefer and recommend apprentices who have completed high school. This ensures the individual has all of the necessary skills required to successfully complete the apprenticeship program, and receive journeyperson certification.

Individuals with "modified" or "general" classes in math or science do not meet our entry requirements. These individuals are required to take an entrance assessment prescribed by the SATCC.

English is the language of instruction in all apprenticeship programs and is the common language for business in Saskatchewan. Before admission, all apprentices and/or "upgraders" must be able to understand and communicate in the English language. Applicants whose first language is not English must have a minimum Canadian Language Benchmark Assessment of six (CLB6).

Note: A CLB assessment is valid for a one-year period from date of issue.

Designated Trade Name	**Math Credit** at the Indicated Grade Level❶	**Science Credit** at Grade Level
Automotive Service Technician	Grade 10	Grade 10

❶ - (One of the following) WA – Workplace and Apprenticeship; or F – Foundations; or P – Pre-calculus, or a Math at the indicated grade level (Modified and General Math credits are not acceptable.).

*Applicants who have graduated in advance of 2015-2016, or who do not have access to the revised Science curricula will require a Science at the minimum grade level indicated by trade.

For information about high school curriculum, including Math and Science course names, please see: http://www.curriculum.gov.sk.ca/#

Individuals not meeting the entrance requirements will be subject to an assessment and any required training.

ESSENTIAL SKILLS SUMMARY

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

Through extensive research, the Government of Canada and other national and international agencies have identified and validated nine essential skills. These skills are used in nearly every occupation and throughout daily life in different ways.

A series of CCDA-endorsed tools have been developed to support apprentices in their training and to be better prepared for a career in the trades. The tools can be used independently or with the assistance of a tradesperson, trainer, employer, teacher or mentor to:

- understand how essential skills are used in the trades;
- learn about individual essential skills strengths and areas for improvement; and
- improve essential skills and increase success in an apprenticeship program.

The tools are available online or for order at: www.esdc.gc.ca/eng/jobs/les/profiles/index.shtml

The application of these skills may be described throughout this document within the skills and knowledge which support each sub-task of the trade. The most important essential skills for each sub-task have also been identified. The following are summaries of the requirements in each of the essential skills, taken from the essential skills profile. A link to the complete essential skills profile can be found at www.red-seal.ca.

READING

Automotive service technicians must read and comprehend a variety of materials including repair manuals, manufacturers' bulletins and safety documents. They refer to government regulations, vehicle inspection procedures, hazardous material handling and disposal and safety requirements of vehicles.

DOCUMENT USE

Automotive service technicians interpret technical drawings and flowcharts. They locate data such as classifications, product and material specifications, identification numbers, quantities and costs. Automotive service technicians often use specification tables. They scan a variety of manufacturers' labels for part numbers, serial numbers, sizes, colours and other information and adhere to hazard and safety icons.

WRITING

Automotive service technicians complete workplace documents such as written explanations to the client, work orders, inspection reports and incident reports.

ORAL COMMUNICATION

Automotive service technicians gather information from different sources about vehicle faults and needed repairs, explain the results of inspections and repairs, and discuss maintenance procedures. They exchange technical repair and troubleshooting information with others such as service managers, apprentices, co-workers, colleagues and suppliers.

NUMERACY

Automotive service technicians take a variety of measurements using digital and analog equipment. They estimate the amount of time required to complete repairs. Automotive service technicians compare measurements of energy, dimension, speed, horsepower, temperature and torque to specifications. They analyze pressure, power, torque, compression and electrical readings to assess vehicle performance and troubleshoot faults.

THINKING

Automotive service technicians use thinking skills and visual analysis to diagnose and repair problems. They evaluate the severity of vehicle defects and deficiencies and the quality of repairs. Automotive service technicians decide the most efficient course of action to complete a job.

WORKING WITH OTHERS

Most automotive service technicians work independently on jobs outlined in work orders. They may assist others with jobs that require two people or are within their specific area of expertise. They collaborate effectively with colleagues including salespersons, partspersons and management to resolve concerns, situations and problems.

DIGITAL TECHNOLOGY

Automotive service technicians use computerized scanning equipment, onboard vehicle diagnostics and hand-held diagnostic tools to gain operational information about vehicles. They access the Internet and databases to retrieve repair information. Automotive service technicians use digital technology to exchange information with other technicians, service managers, colleagues in other locations and manufacturer support specialists. Keyboarding and basic computer skills are an asset.

CONTINUOUS LEARNING

Constant change in the industry makes it vital for automotive service technicians to stay current with the latest technology. They learn on the job, in organized information activities and in work discussion groups. Their training is provided by vehicle manufacturers, parts suppliers, employers and associations. They also advance skills by reading work-related magazines, periodicals and automotive websites.

HARMONIZATION

At the request of industry, the Harmonization Initiative was launched in 2013 to *substantively align* apprenticeship systems across Canada by making training requirements more consistent in the Red Seal trades. Harmonization aims to improve the mobility of apprentices, support an increase in their completion rates and enable employers to access a larger pool of apprentices.

As part of this work, the Canadian Council of the Directors of Apprenticeship (CCDA) identified four main harmonization priorities in consultation with industry and training stakeholders:

1. Trade name

The official Red Seal name for this trade is Automotive Service Technician.

2. Number of Levels of Apprenticeship

The number of levels of technical training recommended for the Automotive Service Technician trade is four.

3. Total Training Hours during Apprenticeship Training

The total hours of training, including both on-the-job and in-school training for the Automotive Service Technician trade is 7200.

4. Consistent sequencing of training content (at each level) using the most recent Occupational Standard

Implementation for harmonization will take place progressively. Level one to be implemented in 2017/2018, level two 2018/2019, level three 2019/2020, and level four in 2020/2021.

AUTOMOTIVE SERVICE TECHNICIAN TASK MATRIX CHART

This chart outlines the major work activities, tasks and sub-tasks from the 2016 Automotive Service Technician Red Seal Occupational Standard. Each sub-task details the corresponding essential skill and level of training where the content is covered*.

* Sub-tasks with numbers in the boxes is where the content will be delivered in training. The Task Matrix Chart will be updated every year until Harmonization implementation is complete. Implementation for harmonization will take place progressively. Level one to be implemented in 2017/2018, level two 2018/2019, level three 2019/2020, and level four in 2020/2021.

A - PERFORMS COMMON OCCUPATIONAL SKILLS

A-1 Performs safety-related functions	**1.01 Maintains safe work environment**  **1**	**1.02 Uses personal protective equipment (PPE) and safety equipment**  **1**		
A-2 Uses and maintains tools, equipment and documentation	**2.01 Uses tools and equipment**  **1** **2 In Context**	**2.02 Uses fasteners, tubing, hoses and fittings**  **1** **2 In Context**	**2.03 Uses hoisting and lifting equipment**  **1** **2 In Context**	**2.04 Uses technical information**  **1** **2 In Context**
A-3 Uses communication techniques	**3.01 Uses communication techniques**  **1** **2 In Context**	**3.02 Uses mentoring techniques** 		

B – DIAGNOSES AND REPAIRS ENGINE AND ENGINE SUPPORT SYSTEMS

B-4 Diagnoses engine systems	**4.01 Diagnoses cooling systems**  **2**	**4.02 Diagnoses lubricating systems**  **2**	**4.03 Diagnoses engine assembly**  **2**	**4.04 Diagnoses accessory drive systems**  **2**
B-5 Repairs engine systems	**5.01 Repairs cooling systems**  **2**	**5.02 Repairs lubricating systems**  **2**	**5.03 Repairs engine assembly**  **2**	**5.04 Repairs accessory drive systems**  **2**
B-6 Diagnoses gasoline engine support systems	**6.01 Diagnoses gasoline fuel delivery and injection systems** 	**6.02 Diagnoses gasoline ignition systems** 	**6.03 Diagnoses gasoline intake / exhaust systems** 	**6.04 Diagnoses gasoline emission control systems** 
B-7 Repairs gasoline engine support systems	**7.01 Repairs gasoline fuel delivery and injection systems** 	**7.02 Repairs gasoline ignition systems** 	**7.03 Repairs gasoline intake / exhaust systems** 	**7.04 Repairs gasoline emission control systems** 
B-8 Diagnoses diesel engine support systems	**8.01 Diagnoses diesel fuel delivery and injection systems** 	**8.02 Diagnoses diesel intake/exhaust systems** 	**8.03 Diagnoses diesel emission control systems** 	
B-9 Repairs diesel engine support systems	**9.01 Repairs diesel fuel delivery and injection systems** 	**9.02 Repairs diesel intake/exhaust systems** 	**9.03 Repairs diesel emission control systems** 	

C – DIAGNOSES AND REPAIRS VEHICLE MODULE COMMUNICATION SYSTEMS

C-10 Diagnoses vehicle networking systems

- **10.01 Reads diagnostic trouble codes (DTCs)**
- **10.02 Monitors data**
- **10.03 Interprets tests results**
- **10.04 Tests system circuitry and components**

C-11 Repairs vehicle networking systems

- **11.01 Updates components software**
- **11.02 Replaces components**
- **11.03 Verifies vehicle module communications system repair**

D – DIAGNOSES AND REPAIRS DRIVELINE SYSTEMS

D-12 Diagnoses driveline systems

- **12.01 Diagnoses drive shafts and axles** — 1
- **12.02 Diagnoses manual transmissions / transaxles** — 2
- **12.03 Diagnoses automatic transmissions / transaxles**
- **12.04 Diagnoses clutches** — 2
- **12.05 Diagnoses transfer cases**
- **12.06 Diagnoses final drive assemblies** — 2

D-13 Repairs driveline systems	**13.01 Repairs drive shafts and axles**  **1**	**13.02 Repairs manual transmissions / transaxles**  **2**	**13.03 Repairs automatic transmissions / transaxles** 	**13.04 Repairs clutches**  **2**	**13.05 Repairs transfer cases** 
	13.06 Repairs final drive assemblies  **2**				

E – DIAGNOSES AND REPAIRS ELECTRICAL AND COMFORT CONTROL SYSTEMS

E-14 Diagnoses electrical systems and components	**14.01 Diagnoses basic wiring and electrical systems**  **1**	**14.02 Diagnoses starting/charging systems and batteries**  **1, 2**	**14.03 Diagnoses lighting and wiper systems**  **2**	**14.04 Diagnoses entertainment systems** 	**14.05 Diagnoses electrical options** 
	14.06 Diagnoses instrumentation and information displays 	**14.07 Diagnoses electrical accessories** 			
E-15 Repairs electrical systems and components	**15.01 Repairs basic wiring and electrical systems**  **1**	**15.02 Repairs starting/charging systems and batteries**  **1, 2**	**15.03 Repairs lighting and wiper systems**  **2**	**15.04 Repairs entertainment systems** 	**15.05 Repairs electrical options** 

	15.06 Repairs instrumentation and information displays	15.07 Installs electrical accessories	15.08 Repairs electrical accessories 2
E-16 Diagnoses heating, ventilation and air conditioning (HVAC) and comfort control systems	16.01 Diagnoses air flow control systems	16.02 Diagnoses refrigerant systems	16.03 Diagnoses heating systems
E-17 Repairs heating, ventilation and air conditioning (HVAC) and comfort control systems	17.01 Repairs air flow control systems	17.02 Repairs refrigerant systems 1	17.03 Diagnoses heating systems

F – DIAGNOSES AND REPAIRS STEERING AND SUSPENSION, BRAKING, CONTROL SYSTEMS, TIRES, HUBS AND WHEEL BEARINGS

F-18 Diagnoses steering and suspension, braking, control systems, tires, wheels, hubs and wheel bearings	18.01 Diagnoses steering, suspension and control systems 1, 2	18.02 Diagnoses braking and control systems 1, 2	18.03 Diagnoses tires, wheels, hubs and wheel bearings 1
F-19 Repairs steering and suspension, braking, control systems, tires, wheels, hubs and wheel bearings	19.01 Repairs steering, suspension and control systems 1, 2	19.02 Repairs braking and control systems 1, 2	19.03 Repairs tires, wheels, hubs and wheel bearings 1

G – DIAGNOSES AND REPAIRS RESTRAINT SYSTEMS, BODY COMPONENTS, ACCESSORIES AND TRIM SYSTEMS

G-20 Diagnoses restraint systems, body components, accessories and trim	**20.01 Diagnoses restraint systems** 	**20.02 Diagnoses wind noises, rattles and water leaks**  1	**20.03 Diagnoses interior and exterior components, accessories and trim**  1	**20.04 Diagnoses latches, locks and movable glass**  1
G-21 Repairs restraint systems, body components, accessories and trim	**21.01 Repairs restraint systems** 	**21.02 Repairs wind noises, rattles and water leaks**  1	**21.03 Repairs interior and exterior components, accessories and trim**  1	**21.04 Repairs latches, locks and movable glass**  1

H – DIAGNOSES AND REPAIRS HYBRID AND ELECTRIC VEHICLES (EV)

H-22 Diagnoses hybrid and electric vehicles (EV)	**22.01 Implements specific safety protocols for hybrid and electric vehicles (EV)** 	**22.02 Diagnoses hybrid and electric vehicle (EV) systems** 
H-23 Repairs hybrid and electric vehicles (EV)	**23.01 Repairs hybrid vehicle systems** 	**23.02 Repairs electric vehicle (EV) systems** 

ON-THE-JOB AND IN-SCHOOL TRAINING CONTENT FOR THE AUTOMOTIVE SERVICE TECHNICIAN TRADE

This chart outlines on-the-job examples for apprentices to achieve relevant work experience to prepare for the topics of technical training. Topics of technical training are provided with the associated learning outcomes.

Level One — 8 weeks — 240 hours

Automotive Shop Fundamentals – Theory/Shop — 30 hours

- describe occupation related safety procedures
- **Safety Related Functions (refrigerant, restraints, hybrid and electric vehicles):**
  - describe safe handling of refrigerants
  - describe restraint systems safety precautions
  - describe hybrid and electric vehicle safety
- describe occupation related tools and equipment
- describe road test procedures
- demonstrate knowledge of trade documents
- **Communication Techniques:**
  - demonstrate knowledge of trade documents
  - apply trade documents to vehicle repair
  - prepare trade documents

Mentors can assist the apprentice to prepare for this section of technical training by:

- *providing instruction on the safe handling of refrigerant*
- *providing instruction of the safe work practices around vehicles restraint (SRS) systems*
- *providing instruction of the safe work practices around hybrid and electric vehicles*
- *providing instruction on road test procedures*
- *providing opportunities to learn Interpreting trade documents and communication techniques*

Braking Systems – Theory — 30 hours

- describe the operation, diagnosis and repair procedures for brake system operation
- describe brake system hydraulic component evaluation and replacement
- describe the evaluation and repair of drum brake, disc brake and park brake assemblies
- describe power assist brake system operation and evaluation

Braking Systems – Shop — 30 hours

- demonstrate brake system hydraulic component evaluation and replacement
- demonstrate brake system flushing and bleeding procedures
- demonstrate the evaluation and repair of drum brake, disc brake and park brake assemblies
  - (oxy-fuel safety, setup and shutdown)
- diagnose power assist brake system operation

    - (hybrid brake safety)
- diagnose brake system operation
- **Communication Techniques**:
    - apply trade documents to vehicle repair
    - prepare trade documents

Mentors can assist the apprentice to prepare for this section of technical training by:

- *providing instruction in the operation, diagnosis and repair procedures for brake system operation*
- *providing instruction in brake system hydraulic component evaluation and replacement*
- *providing opportunities to perform the evaluation and repair of drum brake, disc brake and park brake assemblies*
- *providing instruction in power assist brake system operation and evaluation*
- *providing opportunities to perform brake system hydraulic component evaluation and replacement*
- *providing instruction in performing brake system flushing and bleeding procedures*
- *providing opportunities to perform evaluation and repair of drum brake, disc brake and park brake assemblies including Oxy-Fuel safety, setup and shutdown*
- *providing instruction in performing diagnoses of power assist brake system operation including Hybrid brake safety*
- *providing instruction in performing diagnoses of brake system operation*
- *providing instruction in applying trade documents to vehicle repair*

Driveline Systems – Theory/Shop **30 hours**

- Describe operation, diagnosis and repair of driveshafts and axles
- Repair drive shafts and axles
- Describe operation, diagnosis and repair procedures for wheels and tires
- Describe operation, diagnosis and repair of wheel bearings and seals
- **Tires, Wheels, Hubs and Wheel Bearings:**
    - repair wheels and tires
    - service wheel bearings and seals
    - perform the evaluation and repair of tire pressure monitor systems

Mentors can assist the apprentice to prepare for this section of technical training by:

- *providing instruction in the operation, diagnoses and repair of driveshafts and axles*
- *providing instruction in the operation, diagnoses and repair procedures for wheels and tires*
- *providing instruction in the operation, diagnoses and repair procedures of wheel bearings and seals*
- *providing opportunities to perform repairs to wheels and tires*
- *providing opportunities to perform servicing wheel bearings and seals*
- *providing opportunities to perform the evaluation and repair of tire pressure monitor systems*

Electrical Systems and Components – Theory **30 hours**

- describe types of electrical circuits
- construct electrical circuits
- use electrical test equipment
- describe battery operation, diagnosis and repair
- describe schematics and flowcharts
- describe conductors and insulators
- describe solid state components
- describe the operation, diagnosis and repair of computer control systems

Electrical Systems and Components – Shop **18 hours**

- repair conductors and connectors
- construct electrical circuits

- use electrical test equipment
- diagnose batteries

Mentors can assist the apprentice to prepare for this section of technical training by:

- *providing instruction in the various types of electrical circuits*
- *providing instruction in constructing electrical circuits*
- *providing instruction in the use of electrical testing equipment*
- *providing opportunities to maintain, charge, and test batteries*
- *providing instruction in interpreting electrical schematics and flowcharts*
- *providing instruction in understanding conductors, insulators and solid state components*
- *providing opportunities to perform computer control systems diagnoses and repair*
- *providing opportunities to perform conductors and connectors repair*

Engine Systems – Theory/Shop — 30 hours

- describe the operation of engine types
- describe the operation and diagnosis of engine cooling and lubrication systems
- describe the operation and diagnosis of engine induction and exhaust systems
- test engine cooling and lubrication system
- inspect induction and exhaust systems

Mentors can assist the apprentice to prepare for this section of technical training by:

- *discussing the operation of gasoline and diesel engines and their support systems*
- *providing opportunities to inspect, diagnose and repair cooling, lubrication, and exhaust systems*
- *providing opportunities to conduct cooling system pressure tests, exhaust restriction tests, and oil pressure tests*

Steering, Suspension and Control Systems – Theory/Shop — 30 hours

- describe the operation and diagnosis of suspension systems
- describe the operation and diagnosis of steering systems
- perform the evaluation of suspension systems
- perform the evaluation of steering systems

Mentors can assist the apprentice to prepare for this section of technical training by:

- *discussing the evaluation, operation and diagnoses of steering, suspension and control systems*
- *providing opportunities to perform the basic evaluation, operation and diagnoses of steering, suspension and control systems*

Level Two — 8 weeks — 240 hours

Braking and Stability Control Systems – Theory/Shop — 18 hours

- describe the operation, diagnoses and repair of anti-lock, traction and stability control systems
- perform the evaluation and repair of anti-lock brake, traction and stability control systems

Mentors can assist the apprentice to prepare for this section of technical training by:

- *discussing the operation, diagnoses and repair of anti-lock, traction and stability control systems*
- *providing opportunities to perform the diagnoses and repair of anti-lock, traction and stability control systems*

Engine Systems – Theory — 46 hours

- describe the operation, diagnosis and construction of cylinder head and block assembly
- describe the types and use of automotive engine measuring tools
- describe the engine assembly procedures
- describe the diagnosis and repair of an engine
- describe engine replacement procedures
- describe the diagnoses and repair of induction and exhaust systems
- describe the diagnoses and repair of lubrication and cooling systems

Engine Systems - Shop — 48 hours

- perform the evaluation and repair of cylinder head and block assemblies
- use precision measuring tools
- assemble engine
- diagnose engine faults
- replace engine
- perform the evaluation and repair of induction and exhaust systems
- perform the evaluation and repair of engine lubrication and cooling systems

Mentors can assist the apprentice to prepare for this section of technical training by:

- *describing the operation, diagnoses and construction of the various cylinder head and block assemblies*
- *explaining the various precision engine measuring tools and their uses*
- *describing engine assembly procedures*
- *providing opportunities to perform engine assembly procedures*
- *providing opportunities to perform the diagnosis and repair of an engine*
- *describing engine replacement procedures*
- *providing opportunities to perform engine replacement procedures*
- *describing the diagnoses and repair of induction and exhaust systems*
- *describing the diagnoses and repair of lubrication and cooling systems*
- *providing opportunities to perform the evaluation and repair of cylinder head and block assemblies*
- *providing opportunities to diagnose engine faults*
- *providing opportunities to perform the evaluation and repair of induction and exhaust systems*
- *providing opportunities to perform the evaluation and repair of engine lubrication and cooling systems*

Starting, Charging, Lighting and Wipers – Theory — 20 hours

- describe the operation, diagnoses and repair of starting systems
- describe the operation, diagnoses and repair of charging systems
- describe the operation, diagnoses and repair of wiper systems
- describe the operation, diagnoses and repair of lighting systems

Starting, Charging, Lighting and Wipers – Shop — 22 hours

- perform the evaluation and repair of a starting system
- replace a starter
- perform the evaluation and repair of a charging system
- replace a generator
- perform the evaluation and repair of lighting systems
- perform the evaluation and repair of wiper systems

Mentors can assist the apprentice to prepare for this section of technical training by:

- *describing the operation, diagnoses and repair of various starting and charging systems*

- *providing opportunities to perform the evaluation and repair of a starting system*
- *providing opportunities to perform the evaluation and repair of a charging system*
- *describing the operation, diagnoses and repair of various wiper and lighting systems*
- *providing opportunities to perform the evaluation of a wiper system*
- *providing opportunities to perform the evaluation of a lighting system*

Steering, Suspension and Control Systems – Theory **18 hours**

- describe the diagnoses and repair of steering systems
- describe the diagnoses and repair of suspension systems
- describe the principles of wheel alignment

Steering, Suspension and Control Systems – Shop **24 hours**

- perform the diagnoses and repair of steering systems
- perform the diagnoses and repair of suspension systems
- perform wheel alignment procedures

Mentors can assist the apprentice to prepare for this section of technical training by:

- *describing the operation, diagnoses and repair steering, suspension and control systems*
- *providing opportunities to perform the diagnoses and repair of steering systems*
- *providing opportunities to perform the diagnoses and repair of suspension systems*
- *providing opportunities to perform wheel alignment procedures*

Transmission and Final Drive Systems – Theory **30 hours**

- describe the operation, diagnoses and repair of differential assemblies
- describe the evaluation and repair of clutch assemblies
- describe transmission, transaxle, transfer case removal and installation procedures
- describe maintenance procedure for transmission, transaxle, transfer case, differential and engine

Transmission and Final Drive Systems – Shop **30 hours**

- perform the evaluation and repair of differential systems
- perform the evaluation and repair of clutch assemblies
- replace manual transmission and automatic transmissions
- perform maintenance procedures on differential assemblies, transfer case, automatic transmission and engine

Mentors can assist the apprentice to prepare for this section of technical training by:

- *providing opportunities to perform oxy-fuel welding and cutting processes (set-up, testing, adjustment, equipment selection)*
- *providing opportunities to perform trade related oxy-fuel welding, cutting and heating*
- *providing opportunities to perform* GMAW *welding processes (set-up, adjustment, maintenance)*
- *providing instruction on the protection of electronic components and circuits when* GMAW *welding*
- *providing opportunities to perform trade related* GMAW *welding*

Level Three 8 weeks 240 hours

Anti-lock Brake Systems (ABS) – Theory/Shop **22 hours**

- Diagnose and repair of anti-lock brake systems
- Diagnose and repair traction and stability control systems

Mentors can assist the apprentice to prepare for this section of technical training by:

- *providing opportunities to diagnose, test, and repair anti-lock brake, traction and stability control systems*
- *providing opportunities to R&R brake components*

Chassis Systems **26 hours theory**
30 hours shop

- Maintenance and inspection
- Component repair/replacement
- Steering column diagnosis and repair
- Wheel alignment and adjustments
- Electric steering

Mentors can assist the apprentice to prepare for this section of technical training by:

- *providing opportunities to diagnose and repair suspension and steering components (electronic controlled steering and suspension, hydraulic steering system tests, steering columns, linkages and switches)*
- *providing opportunities to perform 4 wheel alignment procedures and adjustments*
- *providing opportunities to diagnose steering and handling concerns*
- *providing opportunities to R&R front and rear suspension and steering components*
- *providing opportunities to diagnose and repair active and passive occupant restraint systems*
- *providing opportunities to diagnose and replace air bags and system components*
- *providing opportunities to diagnose and repair electric steering systems and components*

Differentials **14 hours theory**
16 hours shop

Diagnostic procedures
Overhaul procedures

Mentors can assist the apprentice to prepare for this section of technical training by:

- *providing opportunities to diagnose and evaluate manual transmissions, transaxles, transfer cases, and differentials*

Heating, Ventilation and Air Conditioning (HVAC) Systems **24 hours theory**
30 hours shop

- Heater and a/c system maintenance
- A/C system diagnostics and repair
- Manual and electronic control system diagnostics and repair

Mentors can assist the apprentice to prepare for this section of technical training by:

- *providing access to CFC training*
- *providing opportunities to inspect, maintain, test, and repair HVAC systems (manual and electronic control)*
- *providing opportunities to perform leak detection procedures*
- *providing instruction on refrigerant recovery, recycling, flushing, and recharging HVAC systems*
- *providing opportunities to R&R HVAC components (compressor, evaporator, condenser, controls, heater core)*

Manual Transmissions **24 hours theory**
30 hours shop

- Diagnostic procedures
- Overhaul procedures

Mentors can assist the apprentice to prepare for this section of technical training by:

- *providing opportunities to diagnose and evaluate manual transmissions, transaxles, transfer cases, and differentials*
- *providing opportunities to diagnose and repair electric shift control and monitoring systems*

- *providing opportunities to disassemble, inspect, measure, evaluate, reassemble, and adjust manual transmissions, transaxles, transfer cases, and differentials*

Vehicle Communication Systems – Theory/Shop **24 hours**

- Diagnose and repair vehicle communication systems
- Diagnostic code types and formats

Mentors can assist the apprentice to prepare for this section of technical training by:

- *providing opportunities to diagnose, test, and repair vehicle communication systems*
- *providing opportunities to expose the apprentice to various types of diagnostic codes and communication systems such as ISO, CAN and UART*

Level Four — 8 weeks — 240 hours

Automatic Transmissions **30 hours theory**
45 hours shop

- Diagnostic procedures
- Overhaul procedures

Mentors can assist the apprentice to prepare for this section of technical training by:

- *providing advanced instruction on diagnostic testing and evaluation of automatic transmissions, transaxles and electronic control systems*
- *providing opportunities to disassemble, inspect, measure, evaluate, reassemble, adjust, and test automatic transmissions and torque converter*

Diesel Fuel Injection Systems **28 hours theory**
23 hours shop

- Maintenance and adjustment procedures
- Operation, diagnosis and repair
- Diagnose and repair turbochargers and superchargers

Mentors can assist the apprentice to prepare for this section of technical training by:

- *providing opportunities to inspect and maintain diesel fuel injection and fuel supply systems*
- *providing opportunities to diagnose and repair diesel fuel systems (mechanical and electronic) and components*
- *providing opportunities to diagnose, and repair turbochargers, superchargers and control systems*

Gasoline Engine Management Systems **30 hours theory**
30 hours shop

- Gasoline fuel injection
- Alternate fuel systems
- Diagnostics and repair

Mentors can assist the apprentice to prepare for this section of technical training by:

- *providing advanced instruction on diagnostic testing and repair of fuel injection systems*
- *providing opportunities to diagnose, repair, maintain, and R&R components of gasoline and alternate fuel systems*

New Technology – Theory/Shop **54 hours**

- Trends of the auto industry
- Apprenticeship training review
- New technology courses
- Hybrid and electric technologies

Mentors can assist the apprentice to prepare for this section of technical training by:

- *providing opportunities for apprentices to participate in service training opportunities*
- *providing access to information on new technologies*
- *providing opportunities to diagnose and repair hybrid system*

Consider apprenticeship training as an investment in the future of your company and in the future of your workforce. Ultimately, skilled and certified workers increase your bottom line.

Get involved in the apprenticeship training system. Your commitment to training helps to maintain the integrity of the trade.

Do you have employees who have been working in the trade for a number of years but don't have trade certification? Contact your local apprenticeship office for details on how they might obtain the certification they need.

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