



Automotive Service Technician

On-the-Job Training Guide

2020

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Recognition:

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

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

Note: The 2020-2021 School year, Automotive Service Technician Apprenticeship technical training is now fully Harmonized.

However, due to the cancellation of level four technical training caused by the Covid-19 health crisis, every effort will be made to schedule the affected apprentices into a non-harmonized level four class. This will ensure that affected apprentices continue in the correct path to complete their apprenticeship.

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 Training Content for the Automotive Service Technician Trade: a chart which outlines the topics of technical training with on-the-job examples for apprentice to achieve relevant experience at work.

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.

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

The information contained in this on-the-job training guide 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 journeyman'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 Level ^❶	Science Credit at Grade Level
Automotive Service Technician	Grade 10	Grade 10
<p>^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.).</p> <p>*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.</p> <p>For information about high school curriculum, including Math and Science course names, please see: http://www.curriculum.gov.sk.ca/#</p> <p>Individuals not meeting the entrance requirements will be subject to an assessment and any required training.</p>		

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, Parts Technicians 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.

ELEMENTS OF HARMONIZATION FOR APPRENTICESHIP TRAINING

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 was implemented progressively. Level one was 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 (RSOS). Each sub-task details the corresponding essential skill and level of training (apprenticeship year) where the content is delivered in training.

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, 3, 4 In Context	2.02 Uses fasteners, tubing, hoses and fittings 1 2, 3, 4 In Context	2.03 Uses hoisting and lifting equipment 1 2, 3, 4 In Context	2.04 Uses technical information 1 2, 3, 4 In Context
A-3 Uses communication techniques	3.01 Uses communication techniques 1 2, 3, 4 In Context	3.02 Uses mentoring techniques 4		

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
	3	3	3	3
	1, 2, 4 in context	1, 2, 4 in context	1, 2, 4 in context	1, 2, 4 in context
C-11 Repairs vehicle networking systems	11.01 Updates components software	11.02 Replaces components	11.03 Verifies vehicle module communications system repair	
	3	3	3	
	1, 2, 4 in context	1, 2, 4 in context	1, 2, 4 in context	

D – DIAGNOSES AND REPAIRS DRIVELINE SYSTEMS

D-12 Diagnoses driveline systems	12.01 Diagnoses drive shafts and axles	12.02 Diagnoses manual transmissions / transaxles	12.03 Diagnoses automatic transmissions / transaxles	12.04 Diagnoses clutches	12.05 Diagnoses transfer cases
	1	2	4	2	3
	12.06 Diagnoses final drive assemblies				
	2				
D-13 Repairs driveline systems	13.01 Repairs drive shafts and axles	13.02 Repairs manual transmissions / transaxles	13.03 Repairs automatic transmissions / transaxles	13.04 Repairs clutches	13.05 Repairs transfer cases
	1	2	4	2	3

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

4

14.05 Diagnoses electrical options

3

14.06 Diagnoses instrumentation and information displays

4

14.07 Diagnoses electrical accessories

2, 3

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

4

15.05 Repairs electrical options

3

15.06 Repairs instrumentation and information displays

4

15.07 Installs electrical accessories

3

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

4

16.02 Diagnoses refrigerant systems

4

16.03 Diagnoses heating systems

4

E-17 Repairs heating, ventilation and air conditioning (HVAC) and comfort control systems	17.01 Repairs air flow control systems 4	17.02 Repairs refrigerant systems 1, 4	17.03 Diagnoses heating systems 4
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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
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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
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TRAINING PROFILE CHART

This Training Profile Chart represents Saskatchewan Apprenticeship and Trade Certification Commission (SATCC) apprenticeship technical training at the topic level.

Level One (Harmonized)	Transcript Code	Hours
Automotive Shop Fundamentals	SHOP 123	30
Body Components and Service Inspection	ATBD 120	12
Braking Systems	BRAK 122 – Theory	30
	BRAK 123 – Shop	30
Driveline Systems	DRTR 122	30
Electrical System and Components	ELCT 120 – Theory	30
	ELCT 121 – Shop	18
Engine Systems	ENGN 124	30
Steering, Suspension and Control Systems	STER 120	30
		240

Level Two (Harmonized)	Transcript Code	Hours
Braking and Stability Control Systems	BRAK 205 – Theory/Shop	18
Engine Systems	ENGN 208 – Theory	30
	ENGN 209 – Shop	48
Steering, Suspension and Control Systems	STER 200 – Theory	18
	STER 201 – Shop	24
Starting, Charging, Lighting and Wipers	ELCT 200 – Theory	20
	ELCT 201 – Shop	22
Transmission and Final Drive Systems	TRNM 206 – Theory	30
	TRNM 207 – Shop	30
		240

Level Three (Harmonized)	Transcript Code	Hours
Electrical Accessories and Options	ELCT 300	30
Gasoline Engine Performance	FUEL 300 – Theory	45
	FUEL 301 – Shop	45
Ignition Systems	IGNS 300 – Theory/Shop	30
Transfer Cases and Manual Transmissions	TRNM 300 – Theory	30
	TRNM 301 – Shop	30
Vehicle Networking Systems	CNET 300 – Theory/Shop	30
		240

Level Four (Harmonized)	Transcript Code	Hours
Automatic transmissions and Automated AWD/4WD Systems	TRNM 402 – Theory	30
	TRNM 403 – Shop	42
Diesel Engine Support Systems	FUEL 406 – Theory	18
	FUEL 407 – Shop	30
Entertainment Systems, Instrumentation and Information Displays	INST 403 – Theory/Shop	24
HVAC and Comfort Control Systems	HVAC 402 – Theory/Shop	30
Hybrid and Electric Vehicles (EV)	TECH 402 – Theory	18
Mentoring Techniques	MENT 400 – Theory	30
Restraint Systems	ATMC 400 – Theory/Shop	18
		240

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 <ul style="list-style-type: none"> • describe occupation related safety procedures • Safety Related Functions (refrigerant, restraints, hybrid and electric vehicles): <ul style="list-style-type: none"> ○ 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: <ul style="list-style-type: none"> ○ demonstrate knowledge of trade documents ○ apply trade documents to vehicle repair ○ prepare trade documents <p>Mentors can assist the apprentice to prepare for this section of technical training by:</p> <ul style="list-style-type: none"> • <i>providing instruction on the safe handling of refrigerant</i> • <i>providing instruction of the safe work practices around vehicles restraint (SRS) systems</i> • <i>providing instruction of the safe work practices around hybrid and electric vehicles</i> • <i>providing instruction on road test procedures</i> • <i>providing opportunities to learn Interpreting trade documents and communication techniques</i> 		30 hours
Braking Systems – Theory <ul style="list-style-type: none"> • 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 		30 hours
Braking Systems – Shop <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> ○ (oxy-fuel safety, setup and shutdown) • diagnose power assist brake system operation <ul style="list-style-type: none"> ○ (hybrid brake safety) • diagnose brake system operation • Communication Techniques: 		30 hours

- 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

Body Components and Service Inspection – Theory/Shop

12 hours

- describe adjustment of doors, lids and moveable glass
- describe diagnosis and repair of body leaks and noises
- describe basic service inspections

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

- providing instruction in the adjustment of doors, lids and moveable glass
- providing opportunities to perform diagnoses and repair of body leaks and noises
- providing opportunities to perform basic vehicle service inspections

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

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- 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
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Braking and Stability Control Systems – Theory/Shop	18 hours
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- 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*
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Engine Systems - Theory	30 hours
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- 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
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- 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*
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Starting, Charging, Lighting and Wipers – Theory	20 hours
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- 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:

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

- *providing opportunities to perform the evaluation and repair of differential systems*
- *providing opportunities to perform the evaluation and and repair of clutch assemblies*
- *providing opportunities to perform the removal and replacement of manual transmission and automatic transmissions*
- *providing opportunities to perform the maintenance procedures on differential assemblies, transfer case, automatic transmission and engine*

Level Three

8 weeks

240 hours

Electrical Accessories and Options – Theory/Shop

30 hours

- describe the operation, diagnoses and repair of electrical accessories
- describe the operation, diagnoses and repair of electrical options
- perform the evaluation and repair of electrical accessories
- perform the evaluation and repair of electrical options

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

- *describing the operation, diagnoses and repair of electrical accessories*
 - *describing the operation, diagnoses and repair of electrical options*
 - *providing opportunities to perform the evaluation and repair of electrical accessories*
 - *providing opportunities to perform the evaluation and repair of electrical options*
-

Gasoline Engine Performance – Theory

45 hours

- describe vehicle emission legislation
- describe types of engine management systems
- describe the operation, diagnoses and repair of electronic fuel injection (EFI) systems
- describe the operation, diagnoses and repair of On Board Diagnostics (OBD) engine management systems
- describe the operation, diagnoses and repair of emission systems
- describe maintenance procedures for fuel delivery, emission and injection systems
- describe diagnostic tools for on-board diagnostic (OBD) systems
- describe the operation, diagnoses and repair of alternative fuel systems
- describe the operation, diagnoses and repair of turbochargers and superchargers

Gasoline Engine Performance – Shop

45 hours

- perform the diagnoses and repair of engine management systems
- perform the diagnoses and repair of electronic fuel injection (EFI) systems
- perform the diagnoses and repair of emission systems
- perform maintenance procedures on fuel delivery, emission and injection systems
- perform the diagnoses and repair of alternative fuel systems

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

- *explaining vehicle emission legislation*
- *describing the various types of engine management systems*
- *describing the operation, diagnoses and repair of electronic fuel injection (EFI) systems*
- *describing the operation, diagnoses and repair of On Board Diagnostics (OBD) engine management systems*
- *describing the operation, diagnoses and repair of emission systems*
- *providing opportunities to perform the maintenance procedures for fuel delivery, emission and injection systems*

- explaining the diagnostic tools for on-board diagnostic (OBD) systems
- describing the operation, diagnoses and repair of alternative fuel systems
- describing the operation, diagnoses and repair of turbochargers and superchargers
- providing opportunities to perform the diagnoses and repair of engine management systems
- providing opportunities to perform the diagnoses and repair of electronic fuel injection (EFI) systems
- providing opportunities to perform the diagnoses and repair of emission systems
- providing opportunities to perform the maintenance procedures on fuel delivery, emission and injection systems
- providing opportunities to perform the diagnoses and repair of alternative fuel systems

Ignition Systems – Theory/Shop

30 hours

- describe the operation, diagnoses and repair of ignition systems
- describe the use of ignition system testing equipment
- perform the diagnoses and repair of ignition systems
- use ignition system testing equipment

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

- describing the operation, diagnoses and repair of ignition systems
- describing the use of Ignition system testing equipment
- providing opportunities to perform the diagnoses and repair of ignition systems
- providing opportunities to perform Ignition system testing equipment procedures

Transfer Case and Manual Transmissions – Theory

30 hours

- describe the operation, diagnoses and repair of manual transmissions and transaxles
- describe the operation, diagnoses and repair of transfer cases
- describe All Wheel Drive (AWD) and Four Wheel Drive (4WD) systems

Transfer Case and Manual Transmissions – Shop

30 hours

- perform the evaluation and repair of manual transmissions and transaxles
- perform the evaluation and repair of transfer cases
- perform the evaluation and repair of All Wheel Drive and Four Wheel Drive systems

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

- describing the operation, diagnoses and repair of manual transmissions and transaxles
- describing the operation, diagnoses and repair of transfer cases
- describing the operation, diagnoses and repair of All Wheel Drive (AWD) and Four Wheel Drive (4WD) systems
- providing opportunities to perform the evaluation and repair of manual transmissions and transaxles
- providing opportunities to perform the evaluation and repair of transfer cases
- providing opportunities to perform the evaluation and repair of All Wheel Drive and Four Wheel Drive systems

Vehicle Networking Systems – Theory/Shop

30 hours

- describe the diagnostic code types and formats
- describe the various types of networks
- utilize diagnostic code protocols and actions to identify open, short and ground faults
- describe the various types, operation and the interrelationship of modules
- perform computer programming procedures

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

- *describing the diagnostic code types and formats*
- *describing the types of networks*
- *utilizing diagnostic code protocols and actions to identify open, short and ground faults*
- *describing the various types, operation and the interrelationship of modules*
- *providing opportunities to perform computer programming procedures*

Level Four

8 weeks

240 hours

Automatic Transmissions and Automated AWD/4WD Systems – Theory

30 hours

- describe operation, diagnoses and repair of automatic transmissions
- describe alternate types of transmissions
- describe operation, diagnoses and repair of Intelligent/computer controlled AWD/4WD systems

Automatic Transmissions and Automated AWD/4WD Systems – Shop

42 hours

- perform the evaluation and repair of automatic transmissions
- perform the evaluation and repair of Intelligent/computer controlled AWD/4WD systems

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 converters*
- *describing the various alternate types of transmissions*
- *providing opportunities to perform diagnoses and repair of Intelligent/computer controlled AWD/4WD systems*
- *providing opportunities to perform the evaluation and repair of automatic transmissions*
- *providing opportunities to perform the evaluation and repair of Intelligent/computer controlled AWD/4WD systems*

Diesel Engine Support Systems – Theory

18 hours

- describe operation, diagnoses and repair of the diesel fuel injection systems
- describe operation, diagnoses and repair of the turbo charged systems
- describe the operation, diagnoses and repair of the supercharged systems

Diesel Engine Support Systems – Shop

30 hours

- perform the evaluation and repair of diesel fuel injection systems
- perform the evaluation and repair of turbo charged systems
- perform the evaluation and repair of supercharged systems

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

- *providing opportunities to explain the operation and perform the diagnoses and repair of the diesel fuel injection systems*
- *providing opportunities to explain the operation and perform the diagnoses and repair the turbo charged systems*
- *providing opportunities to explain the operation and perform the diagnoses and repair the supercharged systems*
- *providing opportunities to perform the evaluation diesel fuel injection systems*
- *providing opportunities to perform the evaluation of turbo charged systems*
- *providing opportunities to perform the evaluation supercharged systems*

Entertainment Systems, Instrumentation and Information Displays – Theory/Shop

24 hours

- describe the operation, diagnoses and repair of entertainment systems
- describe the operation, diagnoses and repair of instrumentation and information displays
- perform the evaluation and repair of entertainment systems
- perform the evaluation and repair of instrumentation and information displays

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

- *providing advanced instruction on the operation, diagnoses and repair of entertainment systems*
- *providing advanced instruction on the Operation, diagnoses and repair of instrumentation and information displays*
- *providing opportunities to perform the evaluation and repair of entertainment systems*
- *providing opportunities to perform the evaluation and repair of instrumentation and information displays*

HVAC and Comfort Control Systems – Theory/Shop

30 hours

- explain physical properties of gases, liquids and solids
- describe operation, diagnoses and repair of heating system
- describe operation, diagnoses and repair of air conditioning systems and components
- describe operation, diagnoses and repair of air conditioning control systems
- perform the evaluation and repair of the heating systems
- perform the evaluation and repair of the air conditioning systems and components
- perform the evaluation and repair of the air conditioning control systems

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

- *describing the physical properties of gases, liquids and solids*
- *describing the operation, diagnoses and repair of heating system*
- *describing the operation, diagnoses and repair of air conditioning systems and components*
- *describing the operation, diagnoses and repair of air conditioning control systems*
- *providing opportunities to perform the evaluation and repair of the heating systems*
- *providing opportunities to perform the evaluation and repair of the air conditioning systems and components*
- *providing opportunities to perform the evaluation and repair of the air conditioning control systems*

Hybrid and Electric Vehicles (EV) – Theory

18 hours

- describe hybrid vehicles
- describe electric vehicles
- explain hybrid electrical vehicle operation
- describe hybrid electrical vehicle service procedures
- describe hybrid electric vehicle brakes systems

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

- *describing the hybrid electrical vehicle operation*
- *describing the hybrid electrical vehicle service procedures*
- *describing the hybrid electrical vehicle brake systems*

Mentoring Techniques – Theory

30 hours

- research trends and innovations in the automotive industry
- present research findings
- identify and explain strategies for learning skills in the workplace

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- demonstrate strategies for learning skills in the workplace
 - identify and explain strategies for teaching workplace skills
 - demonstrate strategies for teaching workplace skills

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

- *describing strategies for learning skills in the workplace*
 - *providing opportunities to demonstrate strategies for teaching skills in the workplace*
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Restraint Systems – Theory/Shop

18 hours

- describe occupant restraint systems
- repair occupant restraint systems

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

- *describing the various types of occupant restraint systems*
- *providing opportunities to perform the evaluation and repair of occupant restraint systems*

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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