

# Automotive service technicians NOC 7321

## Introduction

Automotive service technicians inspect, diagnose, repair and service mechanical, electrical and electronic systems and components of cars and light trucks. They are employed by motor vehicle dealers, garages and service stations, automotive specialty shops and retail establishments that have automotive service shops.

The three most important essential skills are:

1. Reading
2. Document Use
3. Thinking (Critical Thinking)

*Note: Each Essential Skills task is followed by a number in brackets, e.g., (2). This number reflects the estimated complexity rating for that task. The actual complexity rating may vary in some workplaces.*

<b>A. Reading</b>	
Typical: 1 to 4	Most Complex: 4
Examples	
<ul style="list-style-type: none"><li>• Read instructions on labels and product packaging, e.g., read instructions on product labels to learn safe storage procedures. (1)</li><li>• Read reminders and short notes, e.g., read notes from service managers to learn about upcoming meetings. (1)</li><li>• Read short text entries on a variety of forms and technical drawings, e.g., read comments on work orders to learn about vehicle repair requirements. (1)</li><li>• Read safety-related information, e.g., read Material Safety Data Sheets (MSDS) to learn how to safely handle refrigerants used in automotive cooling systems. (2)</li><li>• Read sequenced instructions, e.g., read sequenced instructions to learn how to switch internal relays on and off in programmable logic controllers. (2)</li><li>• Read manufacturers' recall notices and technical service bulletins, e.g., read recall notices and technical service bulletins to learn about recurring faults and approved repair procedures. (3)</li><li>• Read magazine and website articles, e.g., read articles in magazines such as <i>CARS</i> to learn about trends within the industry. (3)</li><li>• Read instruction manuals for the use of computerized tools and equipment, e.g., read user guides to learn how to operate equipment such as scan tools. (3)</li><li>• Read a variety of paper-based and electronic repair manuals to learn how to troubleshoot, service and maintain vehicles, e.g., read manuals to learn how to troubleshoot and repair electrical system faults. (3)</li><li>• Read and interpret government regulations, e.g., read regulations to learn about vehicle inspection procedures, hazardous material disposal and the roadworthiness requirements of vehicles. (4)</li></ul>	
<b>Reading Summary</b>	

Type of Text	Purpose for Reading			
	To scan for specific information/To locate information	To skim for overall meaning, to get the 'gist'	To read the full text to understand or to learn	To read the full text to critique or to evaluate
Forms	?			
Labels	?			
Notes, Letters, Memos	?	?		
Manuals, Specifications, Regulations	?	?	?	
Reports, Books, Journals				

B. Document Use	
Typical: 1 to 4	Most Complex: 4
Examples	
<ul style="list-style-type: none"> <li>• Observe hazard and safety icons, e.g., use icons affixed to engine components to learn about burn and electrical shock hazards. (1)</li> <li>• View a variety of manufacturers' labels to locate part numbers, serial numbers, sizes, colours and other information. (1)</li> <li>• Interpret flowcharts, e.g., interpret multi-step flowcharts to learn how to troubleshoot faulty electrical systems. (2)</li> <li>• Enter repair and service data into a variety of work orders, corrective action forms and computerized data management systems, e.g., complete work orders by entering time spent, parts used and steps taken to repair vehicles. (3)</li> <li>• Interpret graphs, e.g, interpret sine waves generated by scan tools such as oscilloscopes to troubleshoot faults and establish the condition of vehicle components. (3)</li> <li>• Locate data in complex tables, e.g., locate data such as classifications, material coefficients, identification numbers, quantities and costs in complex specification tables. (3)</li> <li>• Interpret scale drawings, e.g., use scale drawings to locate drive train components. (3)</li> <li>• Interpret assembly drawings, e.g., study assembly drawings to determine the position of parts within complex transmissions. (4)</li> <li>• Interpret schematic drawings, e.g., study wiring, hydraulic, emission and vacuum system schematics to locate capacities and components, and to troubleshoot faults. (4)</li> </ul>	
<b>Document Use Summary</b>	
<input checked="" type="checkbox"/>	Read signs, labels or lists.
<input checked="" type="checkbox"/>	Complete forms by marking check boxes, recording numerical information or entering words, phrases, sentences or text of a paragraph or more.
<input checked="" type="checkbox"/>	Read completed forms containing check boxes, numerical entries, phrases, addresses, sentences or text of a paragraph or more.
<input checked="" type="checkbox"/>	Read tables, schedules or other table-like text (e.g., read production schedules).

<input checked="" type="checkbox"/>	Enter information on tables, schedules or other table-like text.
<input checked="" type="checkbox"/>	Recognize common angles such as 15, 30, 45 and 90 degrees.
<input checked="" type="checkbox"/>	Draw, sketch or form common shapes such as circles, triangles, spheres, rectangles, squares, etc.
<input checked="" type="checkbox"/>	Interpret scale drawings (e.g., floorplans or maps).
<input checked="" type="checkbox"/>	Take measurements from scale drawings.
<input checked="" type="checkbox"/>	Make sketches.
<input checked="" type="checkbox"/>	Obtain information from sketches, pictures or icons (e.g., computer toolbars).

<b>C. Writing</b>	
Typical: 1 to 2	Most Complex: 3
Examples	
<ul style="list-style-type: none"> <li>• Write brief reminders, e.g., write notes to remind themselves of upcoming deadlines. (1)</li> <li>• Write longer notes, e.g., describe needed repairs on work orders and vehicle inspection forms. (2)</li> <li>• Write brief emails, e.g., write emails to request help for unusual or difficult repairs. (2)</li> <li>• May write reports to describe events leading up to workplace accidents, e.g., write about injuries and events when completing reports for workers' compensation boards. (2)</li> <li>• Write long notes, e.g., write long notes on warranty claim forms to justify why the repair should be covered. (2)</li> <li>• May write short notes on Web forums and technical support sites to request and provide repair information, e.g., provide detailed explanations and descriptions using technical language. (3)</li> <li>• May write longer letters for police and insurance investigations to describe the causes and results of accidents. (3)</li> </ul>	

**Writing Summary**

Length	Purpose for Writing						
	To organize or remember	To keep a record or document	To inform or request information	To persuade or justify a request	To present an analysis or comparison	To present an evaluation or critique	To entertain
Text requiring less than one paragraph of new text	?	?	?	?			
Text rarely requiring more than one paragraph	?	?	?	?			
Longer text		?	?	?			

<b>D. Numeracy</b>	
Typical: 1 to 3	Most Complex: 3
Examples	
<b>Money Math</b>	
<ul style="list-style-type: none"> <li>• May use money math, e.g., use money math to calculate flat rate earnings. (1).</li> </ul>	
<b>Scheduling, Budgeting and Accounting Math</b>	
<ul style="list-style-type: none"> <li>• Not a requirement for this occupation.</li> </ul>	
<b>Measurement and Calculation Math</b>	
<ul style="list-style-type: none"> <li>• Take a variety of measurements using gauges, e.g., use gauges to measure temperatures and oil pressures. (1)</li> <li>• Take a variety of dimension measurements using basic hand tools, e.g., measure the length of parts using tape measures and scales. (1)</li> <li>• Calculate amounts of glycol and water, and oil and gas mixtures, e.g., use ratios to calculate amounts for oil and gas mixtures. (2)</li> <li>• Calculate vehicle system operating parameters, e.g., calculate current flows, voltage drops and electrical resistances. (3)</li> <li>• Take precise measurements using specialized tools, e.g., measure mechanical parts, such as cylinder walls, brake disks and bearings using calipers and dial micrometers. (3)</li> </ul>	
<b>Data Analysis Math</b>	
<ul style="list-style-type: none"> <li>• Compare measurements of energy, dimension, speed, horsepower, temperature and torque to specifications, e.g., compare the measurements of amperage to original equipment manufacturers' specifications to determine the operating condition of batteries and electrical systems. (1)</li> <li>• Calculate summary measures to monitor the progression of faults and wear, e.g. average multiple energy readings to determine the condition of batteries. (2)</li> <li>• Analyze pressure, power, torque, compression and electrical energy readings to assess vehicle performance and troubleshoot faults, e.g., analyze a series of electrical readings produced by computerized scan tools to determine the cause of charging system faults. (3)</li> </ul>	
<b>Numerical Estimation</b>	
<ul style="list-style-type: none"> <li>• Estimate the amount of time required to complete repairs.(1)</li> <li>• Estimate the useful life remaining for parts, such as tires, brake pads and exhaust systems.(2)</li> </ul>	
<b>Math Skills Summary</b>	
<b>a. Mathematical Foundations Used</b>	
Whole Numbers	Read and write, count, round off, add or subtract, multiply or divide whole numbers, e.g., use whole number to count inventory.
Integers	Read and write, add or subtract, multiply or divide integers, e.g., read positive and

	negative values for temperatures.
Fractions	Read and write, add or subtract fractions, multiply or divide by a fraction, multiply or divide fractions, e.g., read the size of screws and bolts measured in fractions of an inch.
Decimals	Read and write, round off, add or subtract decimals, multiply or divide by a decimal, multiply or divide decimals, e.g., measure the heads of engine blocks for smoothness to thousandths of an inch.
Percent	Read and write percents, calculate the percent one number is of another, calculate a percent of a number, e.g., estimate the percentage of brake pad wear.
Equivalent Rational Numbers	Convert between fractions and decimals or percentages, e.g., convert decimal readings on drill bits to fractions.
Equations and Formulae	Use formulae by inserting quantities for variables and solving, e.g., use formulae to calculate voltage drops, resistances and required amperages.
Use of Rate, Ratio and Proportion	Use rates, ratios and proportions, e.g., use ratios to determine the correct fuel-to-air settings on engines.
Measurement Conversions	Perform measurement conversions, e.g., convert litres of gas to gallons; convert between wrench sizes in inches and those in millimetres; convert between measurements in fractions and decimals.
Summary Calculations	Calculate averages and rates other than percentages, e.g., calculate yearly average distances driven in kilometres; calculate rates of fuel consumption.
Use geometry	Use geometry, e.g., use geometry when aligning wheels.
Calculate areas, perimeters and volumes.	Calculate areas and volumes, e.g., calculate the required volume of gasoline additives, antifreeze, engine coolants and oil lubricants.

**b. Measurement Instruments Used**

Examples

- Time using watches and clocks.
- Weight or mass using electronic scales and balances.
- Distance and dimensions using odometers, calipers and micrometers.
- Liquid volumes using graduated containers and fuel gauges.
- Temperatures using liquid and digital thermometers, and laser temperature probes.
- Pressure using air pressure gauges, manometers and engine compression testers.
- Electrical potential (volts) using multimeters, voltmeters and scan tools.
- Wattage using watt meters and scan tools.
- Angles using wheel alignment machines and timing marks on gears and pulleys.
- Voltages, dwell angles, oxygen concentrations and engine temperatures using diagnostic scan tools.



suppliers, servicers						
Participate in group discussion			?	?	?	
Present information to a small group						
Present information to a large group						
<b>Type</b>	<b>Purpose for Oral Communication (Part II)</b>					
	To discuss (exchange information, opinions)	To persuade	To facilitate, animate	To instruct, instill understanding, knowledge	To negotiate, resolve conflict	To entertain
Listening (little or no interaction)						
Speaking (little or no interaction)						
Interact with co-workers	?					
Interact with those you supervise or direct	?					
Interact with supervisor/manager	?	?		?		
Interact with peers and colleagues from other organization	?			?		
Interact with customers/clients/public	?	?		?	?	
Interact with suppliers, servicers	?				?	
Participate in group discussion	?				?	
Present information to a small group						
Present information to a large group						

<b>F. Thinking</b>	
Typical: 1 to 3	Most Complex: 3
<b>a. Problem Solving</b>	
Examples	
<ul style="list-style-type: none"> <li>• Are unable to meet repair deadlines due to heavy workloads and projects that take longer than anticipated to complete. They ask their service managers to prioritize repairs, enlist the help of co-workers and may work overtime to complete high priority work. (2)</li> <li>• Are unable to repair vehicles because specifications and instructions are unavailable. They consult service managers, co-workers, suppliers and colleagues for advice and research</li> </ul>	

<p>websites to locate useable information. (2)</p> <ul style="list-style-type: none"> <li>Find that work is delayed due to equipment breakdowns and incorrect or unavailable parts. They inform service managers about delays and carry out other work until equipment repairs are completed and the needed parts and supplies arrive. (2)</li> </ul>
<b>b. Decision Making</b>
Examples
<ul style="list-style-type: none"> <li>Decide the order of repair and maintenance jobs, e.g., give priority to small tasks that can be turned around quickly. (1)</li> <li>Decide which tools to use, procedures to follow and tests to perform to diagnose and repair vehicles. (1)</li> <li>Decide that a vehicle component cannot be repaired. They consider the condition of parts and regulations governing vehicle roadworthiness requirements. (2)</li> <li>Decide the most efficient course of action to complete particular jobs, e.g., determine troubleshooting and repair sequences to efficiently diagnose and repair vehicle faults. (3)</li> </ul>
<b>c. Critical Thinking</b>
Examples
<ul style="list-style-type: none"> <li>Judge the accuracy of readings taken using equipment such as gas analyzers and dynamometers. They compare readings to other indicators of engine performance, such as vibration and noise. (1)</li> <li>May evaluate the performance of apprentices. They consider apprentices' abilities to diagnose and troubleshoot vehicle faults, locate information such as specifications, and complete repairs effectively. (2)</li> <li>Judge the condition of parts, e.g., inspect sprockets for signs of cracks, missing teeth and loose fit. They examine tires and belts for signs of cracks and exposed cords. (2)</li> <li>Evaluate the severity of vehicle defects and deficiencies. They consider criteria, such as roadworthiness regulations, safety and harm to the environment. (3)</li> <li>Evaluate the quality of repairs. They consider the results of test drives and data from equipment, such as gas analyzers and scan tools. (3)</li> </ul>
<b>d. Job Task Planning and Organizing</b>
Technicians may be assigned jobs one work order at a time or as a set of multiple work orders to be completed during a day. If there is flexibility in job choice, they prioritize jobs for efficiency, often taking care of routine or smaller jobs first to allow more time for complex repairs. They may be assigned jobs based on areas of expertise. Most technicians work on one job at a time unless co-workers need assistance or work is delayed until parts arrive. Planning must allow for unexpected occurrences, such as emergency jobs for fleet customers who rely on their vehicles for work. (2)
<b>Own Job Planning and Organizing</b>
Most technicians develop daily work plans to strategically organize their time. Sequencing multiple tasks for efficiency is a major part of the job and critical to meeting deadlines. (2)
<b>e. Significant Use of Memory</b>
Examples

- Remember the faults associated with error and trouble codes for various makes of vehicles.
- Remember previous repairs that give insight into current jobs of a similar nature.
- Remember the names of frequent customers and the makes of their vehicles.

#### f. Finding Information

##### Examples

- Find information on stickers, labels, assembly drawings, repair manuals and websites to determine proper use, application and installation of parts and supplies. (1)
- Review displays on computerized scanning equipment, onboard vehicle sensors and hand-held diagnostic tools to gain operational information about vehicles. (2)
- Locate information about mechanical faults by reviewing work orders, completing test drives and physical inspections, using scan tools and by speaking with customers and co-workers. (3)
- Locate troubleshooting and repair procedures for unusual faults by calling technical support lines, requesting assistance on Internet blogs and website forums, and by reading repair manuals and technical service bulletins. (3)

#### G. 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.

##### Participation in Supervisory or Leadership Activities

<b>✓</b>	Monitor the work performance of others.
<b>✓</b>	Inform other workers or demonstrate to them how tasks are performed.
<b>✓</b>	Orient new employees.
<b>✗</b>	Make hiring recommendations.
<b>✓</b>	Assign routine tasks to other workers.
<b>✗</b>	Assign new or unusual tasks to other workers.
<b>✓</b>	Identify training that is required by, or would be useful for, other workers.
<b>✗</b>	Deal with other workers' grievances or complaints.

#### H. Digital Technology

Typical: 1 to 2

Most Complex: 2

##### Examples

Word Processing

- May write letters to customers, police and insurance brokers to present the results of mechanical inspections. (2)

#### Spreadsheet Software

- May use spreadsheets, e.g., technicians at flat-rate shops may use spreadsheets to record and track billable hours. (2)

#### Bookkeeping, Billing and Accounting Software

- Not a requirement for this occupation.

#### Communication Software

- Exchange e-mail with other technicians, service managers, colleagues at other locations and manufacturer support specialists. (2)

#### Presentation Software

- Not a requirement for this occupation.

#### Graphics Software

- Use graphics software, e.g., use graphics software incorporated into scan tools to access oscilloscope data displays such as signal values and ignition scope patterns. (2)

#### Data Bases

- Use specialized automotive service databases to access job assignments, input information on new jobs, retrieve and review past service information, and complete work orders. (2)
- Use databases to retrieve repair information and technical drawings. (2)

#### Internet

- Access manufacturers' web sites to access recent technical service bulletins, parts and component information, recall notices, frequently asked questions and specifications. (2)
- Use the Internet to access training courses and seminars offered by suppliers and employers. (2)
- May use the Internet to access articles to stay current on industry trends and practices. (2)

#### Other Digital Technology

- Use hand-held devices such as multimeters to take electrical energy readings. (1)
- Use electronic equipment to access data such as fault codes from onboard computers and

sensors. (1)

- Use scan tools such as oscilloscopes to take energy readings and troubleshoot faults. (2)
- Use laptops connected to digital logic control modules to download data designed to regulate a vehicle's operating parameters. (2)
- Use computerized equipment such as wheel alignment machines to complete repairs. (2)

## I. Continuous Learning

Constant change in the industry makes it important 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 their skills by reading work-related magazines, periodicals and automotive web sites.

### How Learning Occurs

Learning may be acquired:

<input checked="" type="checkbox"/>	As part of regular work activity.
<input checked="" type="checkbox"/>	From co-workers.
<input checked="" type="checkbox"/>	Through training offered in the workplace.
<input checked="" type="checkbox"/>	Through reading or other forms of self-study <ul style="list-style-type: none"><li>• at work.</li><li>• on worker's own time.</li><li>• using materials available through work.</li><li>• using materials obtained through a professional association or union.</li><li>• using materials obtained on worker's own initiative.</li></ul>
<input checked="" type="checkbox"/>	Through off-site training <ul style="list-style-type: none"><li>• with costs paid by the worker and employers.</li></ul>

## J. Other Information

In addition to collecting information for this Essential Skills Profile, interviews with job incumbents also covered the following topics.

### Physical Aspects

Automotive service technicians are constantly in motion. When completing jobs, they move around, under and inside vehicles. They may have to lift heavy weights. Their sense of sound, sight, smell and touch are important in their analysis of automotive faults. It is important that they are able to

distinguish colours, such as blue, green and red wires.

**Attitudes**

Automotive service technicians must have a patient, logical and practical approach to work. They must also be open to new ideas and accept change.