



# **Truck and Transport Mechanic**

## **On-the-Job Training Guide**

**2024**

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*Recognition:*

*To promote transparency and consistency, this document has been adapted from the 2015 Truck and Transport Mechanic National Occupational Standard (Employment and Social Development Canada).*

*A complete version of the Occupational Standard can be found at [www.red-seal.ca](http://www.red-seal.ca)*

# STRUCTURE OF THE ON-THE-JOB TRAINING GUIDE

To facilitate understanding of the occupation, this guide to course content contains the following sections:

**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. The Task Matrix is broken down into the following:

**Major Work Activity:** 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.

**Training Profile Chart:** a chart which outlines the model for Saskatchewan Apprenticeship and Trade Certification Commission (SATCC) technical training.

**Technical Training Course Content for the Carpenter trade:** a chart which outlines the model for SATCC technical training sequencing. For the harmonized level of training, a cross reference to the Harmonized apprenticeship technical training sequencing, at the learning outcome level, is provided.

# TRAINING REQUIREMENTS OF THE TRUCK AND TRANSPORT MECHANIC TRADE

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.

Journeyman to apprentice ratio for this trade is: 1:3

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
- provide guided, hands-on practice in pre-delivery and vehicle inspections
- demonstrate procedures relevant to the inspecting, diagnosing, servicing, repairing, replacing and overhauling of all components of various on-highway heavy transport vehicles including transport trucks, semis, trailers and buses
- 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
- supervise an apprentice's practical skills development
- provide assistance to develop skills to retrieve technical information from manuals, software, and other media

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.

# TRUCK AND TRANSPORT MECHANIC TASK MATRIX CHART

This chart outlines the blocks, tasks and sub-tasks from the 2015 Truck and Transport Mechanic National Occupational Analysis (NOA). 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.

## A – Performs Common Occupational Skills

6%

<b>A-1 Performs safety related functions</b>	<b>1.01 Maintains safe work environment</b>  1	<b>1.02 Uses personal protective equipment (PPE) and safety equipment</b>  1			
<b>A-2 Uses and maintains tools and equipment</b>	<b>2.01 Maintains hand, power, measuring, testing, and diagnostic tools</b>  1	<b>2.02 Maintains shop equipment</b>  1	<b>2.03 Uses hoisting and lifting equipment</b>  1	<b>2.04 Uses welding and cutting equipment</b>  1, 2	
<b>A-3 Performs routine trade activities</b>	<b>3.01 Uses documentation and reference materials</b>  1 (2, 3, 4 in-context)	<b>3.02 Maintains fluids, lubricants, and coolants</b>  1 (2, 3, 4 in-context)	<b>3.03 Services hoses, tubing, and fittings</b>  1 (2, 3, 4 in-context)	<b>3.04 Services filters</b>  1 (2, 3, 4 in-context)	<b>3.05 Services bearings, bushing and seals</b>  1 (2, 3, 4 in-context)
	<b>3.06 Uses fasteners, sealing devices, adhesives and gaskets</b>  1 (2, 3, 4 in-context)				

# B – Engines and Supporting Systems

17%

<p><b>B-4 Services, diagnoses and repairs base engine</b></p>	<p><b>4.01 Services base engine</b></p> <p>3</p>	<p><b>4.02 Diagnoses base engine</b></p> <p>3</p>	<p><b>4.03 Repairs base engine</b></p> <p>3</p>
<p><b>B-5 Services, diagnoses and repairs lubrication system</b></p>	<p><b>5.01 Services lubrication systems</b></p> <p>3</p>	<p><b>5.02 Diagnoses lubrication systems</b></p> <p>3</p>	<p><b>5.03 Repairs lubrication systems</b></p> <p>3</p>
<p><b>B-6 Services, diagnoses and repairs Intake and exhaust systems</b></p>	<p><b>6.01 Services Intake and exhaust systems</b></p> <p>3</p>	<p><b>6.02 Diagnoses Intake and exhaust systems</b></p> <p>3</p>	<p><b>6.03 Repairs Intake and exhaust systems</b></p> <p>3</p>
<p><b>B-7 Services, diagnoses and repairs engine management system</b></p>	<p><b>7.01 Services engine management system</b></p> <p>3</p>	<p><b>7.02 Diagnoses engine management system</b></p> <p>3</p>	<p><b>7.03 Repairs engine management system</b></p> <p>3</p>
<p><b>B-8 Services, diagnoses and repairs fuel delivery system</b></p>	<p><b>8.01 Services fuel delivery system</b></p> <p>3, 4</p>	<p><b>8.02 Diagnoses fuel delivery system</b></p> <p>3, 4</p>	<p><b>8.03 Repairs fuel delivery system</b></p> <p>3, 4</p>
<p><b>B-9 Services, diagnoses and repairs emission systems for diesel engines</b></p>	<p><b>9.01 Services emission systems for diesel engines</b></p> <p>3, 4</p>	<p><b>9.02 Diagnoses emission systems for diesel engines</b></p> <p>3, 4</p>	<p><b>9.03 Repairs emission systems for diesel engines</b></p> <p>3, 4</p>

**B-10 Services, diagnoses and engine retarder systems**

**10.01 Services and repairs engine retarder systems**

3

**10.02 Diagnoses engine retarder systems**

3

**B-11 Services, diagnoses and repairs cooling system**

**11.01 Services cooling system**

3

**11.02 Diagnoses cooling system**

3

**11.03 Repairs cooling system**

3

## C – Air Systems and Brakes

14%

**C-12 Services, diagnoses and repairs air systems**

**12.01 Services air systems**

1, 2

**12.02 Diagnoses air systems**

1, 2

**12.03 Repairs air systems**

1, 2

**C-13 Services, diagnoses and repairs brake systems**

**13.01 Services brake systems**

1, 2

**13.02 Diagnoses brake system**

1, 2

**13.03 Repairs brake systems**

1, 2

## D – Electrical and Electronic Systems

17%

**D-14 Services, diagnoses and repairs batteries**

**14.01 Performs servicing and repair of batteries**

1

**14.02 Diagnoses batteries**

1

**D-15 Services, diagnoses and repairs charging systems**

**15.01 Services charging systems**

1, 2

**15.02 Diagnoses charging systems**

1, 2

**15.03 Repairs charging systems**

1, 2

<b>D-16 Services, diagnoses and repairs spark ignition systems</b>	<b>16.01 Performs servicing and repair of spark ignition systems</b>  1	<b>16.02 Diagnoses spark ignition systems</b>  1	
<b>D-17 Services, diagnoses and repairs starting systems</b>	<b>17.01 Performs servicing and repairs of starting systems</b>  1, 2	<b>17.02 Diagnoses starting systems</b>  1, 2	
<b>D-18 Services, diagnoses and repairs electrical components and accessories</b>	<b>18.01 Performs servicing and repairs of electrical components and accessories</b>  3, 4 (1, 2 in-context)	<b>18.02 Diagnoses electrical components and accessories</b>  3, 4 (1, 2 in-context)	
<b>D-19 Services, diagnoses and repairs vehicle management systems and electronic components</b>	<b>19.01 Services vehicle management systems and electronic components</b>  4 (1, 2, 3 in-context)	<b>19.02 Diagnoses vehicle management systems and electronic components</b>  4 (1, 2, 3 in-context)	<b>19.03 Repairs vehicle management systems and electronic components</b>  4 (1, 2, 3 in-context)

## E – Drivetrain

12%

<b>E-20 Services, diagnoses and repairs clutches</b>	<b>20.01 Services clutches</b>  3	<b>20.02 Diagnoses clutches</b>  3	<b>20.03 Repairs clutches</b>  3
<b>E-21 Services, diagnoses and repairs manual transmission and transfer cases</b>	<b>21.01 Services manual transmission and transfer cases</b>  3	<b>21.02 Diagnoses manual transmission and transfer cases</b>  3	<b>21.03 Repairs manual transmission and transfer cases</b>  3



<b>E-22 Services, diagnoses and repairs automatic transmissions</b>	<b>22.01 Services automatic transmissions</b>	<b>22.02 Diagnoses automatic transmissions</b>	<b>22.03 Repairs automatic transmissions</b>
	3	3	3

## F – Steering, Chassis/Frames, Suspension, Wheels, Hubs and Tires

**14%**

<b>F-27 Services, diagnose, and repairs steering system</b>	<b>27.01 Services steering system</b>	<b>27.02 Diagnoses steering system</b>	<b>27.02 Repairs steering system</b>
	1, 2	1, 2	1, 2
<b>F-28 Services, diagnoses, and repairs chassis/frames</b>	<b>28.01 Services chassis/frames</b>	<b>28.02 Diagnoses chassis/frames</b>	<b>28.03 Repairs chassis/frames</b>
	1, 2	1, 2	1, 2
<b>F-29 Services, diagnoses, and repairs suspension</b>	<b>29.01 Services suspension</b>	<b>29.02 Diagnoses suspension</b>	<b>29.03 Repairs suspension</b>
	1, 2	1, 2	1, 2
<b>F-30 Services, diagnoses, and repairs hitches and couplers</b>	<b>30.01 Services hitches and couplers</b>	<b>30.02 Diagnoses hitches and couplers</b>	<b>30.03 Repairs hitches and couplers</b>
	1, 2	1, 2	1, 2
<b>F-31 Services, diagnoses, and repairs tires, wheels and hubs</b>	<b>31.01 Services tires, wheels and hubs</b>	<b>31.02 Diagnoses tires, wheels and hubs</b>	<b>31.03 Repairs tires, wheels and hubs</b>
	1, 2	1, 2	1, 2

## G – Cab

4%

<b>G-32 Services, diagnoses, and repairs interior cab components</b>	<b>32.01 Services interior cab components</b>  2	<b>32.02 Diagnoses interior cab components</b>  2	<b>32.03 Repairs interior cab components</b>  2
<b>G-33 Services, diagnoses and repairs exterior cab components</b>	<b>33.01 Services exterior cab components</b>  1	<b>33.02 Diagnoses exterior cab components</b>  1	<b>33.03 Repairs exterior cab components</b>  1

## H – Trailers

5%

<b>H-34 Services, diagnoses and repairs trailer components and accessories</b>	<b>34.01 Services trailer components and accessories</b>  2	<b>34.02 Diagnoses trailer components and accessories</b>  2	<b>34.03 Repairs trailer components and accessories</b>  2
<b>H-35 Services, diagnoses and repairs heating refrigeration systems</b>	<b>35.01 Services, heating refrigeration systems</b>  2	<b>35.02 Diagnoses heating refrigeration systems</b>  2	<b>35.03 Repairs heating refrigeration systems</b>  2

## I – Climate Control

6%

<b>I-36 Services, diagnoses and repairs heating and ventilation systems</b>	<b>36.01 Services heating and ventilation systems</b>  1, 4	<b>36.02 Diagnoses heating and ventilation systems</b>  1, 4	<b>36.03 Repairs heating and ventilation systems</b>  1, 4
<b>I-37 Services, diagnoses and repairs air conditioning systems</b>	<b>37.01 Services air conditioning systems</b>  1, 4	<b>37.02 Diagnoses air conditioning systems</b>  1, 4	<b>37.03 Repairs air conditioning systems</b>  1, 4

## J – Hydraulic Systems

5%

<b>J-38 Services, diagnoses and repairs hydraulic components</b>	<b>38.01 Services hydraulic components</b>  1, 2	<b>38.02 Diagnoses hydraulic components</b>  1, 2	<b>38.03 Repairs hydraulic components</b>  1, 2
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# TRAINING PROFILE CHART

This chart outlines the model for Saskatchewan Apprenticeship and Trade Certification Commission (SATCC) technical training sequencing. For the harmonized level of training, a cross reference to the National Occupational Standard (NOA) apprenticeship technical training sequencing, at the learning outcome level, is provided.

Sub-tasks listed are the minimum to be covered in a topic. Related sub-tasks not listed may be used as a reference and taught “in context” in other topics.

Level One	Transcript Code	Hours
Basic Tools	TOOL 145 – Theory	12
	TOOL 146 – Shop	12
Brake Systems	BRAK 111 – Theory	24
	BRAK 112 – Shop	36
Electrical	ELCT 100 – Theory	14
	ELCT 101 – Shop	16
Environmental Control Systems	HVAC 100	6
Hydraulics	HYDR 108 – Theory	24
	HYDR 109 – Shop	36
Steering Systems	STER 100 – Theory	12
	STER 101 – Shop	18
Structural Components and Accessories	MAIN 102 – Theory	12
	MAIN 103 – Shop	18
		240

Level Two	Transcript Code	Hours
Braking Systems ABS	BRAK 211 – Theory	12
	BRAK 212 – Shop	18
Drivetrain Systems	DRTR 201 – Theory	24
	DRTR 202 – Shop	36
Electrical	ELCT 202 – Theory	12
	ELCT 203 – Shop	18
Hydraulics	HYDR 206 – Theory	12
	HYDR 207 – Shop	18
Steering and Directional Control Systems	STER 204 – Theory	12
	STER 205 – Shop	18
Welding OFC/SMAW/GMAW	WELD 235 – Theory	6
	WELD 236 – Shop	24
Truck and Trailer Systems	TRLR 200 – Theory	12
	TRLR 201 – Shop	18
		240

Level Three	Transcript Code	Hours
Alternate Fuels	FUEL 304 – Theory	10
	FUEL 305 – Shop	20
Electrical	ELCT 301 – Theory	14
	ELCT 302 – Shop	16
Engine and Engine Support Systems	ENGN 306 – Theory	55
	ENGN 307 – Shop	65
Powertrain Systems	TRNM 308 – Theory	24
	TRNM 309 – Shop	36
		240

Level Four	Transcript Code	Hours
Drivetrains	DRTR 400 – Theory	12
	DRTR 401 – Shop	18
Electrical	ELCT 400 – Theory	40
	ELCT 401 – Shop	50
Environmental Control Systems	HVAC 400 – Theory	12
	HVAC 401 – Shop	18
Fuel Systems	FUEL 404 – Theory	40
	FUEL 405 – Shop	50
		240

# ON-THE-JOB AND IN-SCHOOL TRAINING

## CONTENT FOR THE TRUCK AND TRANSPORT MECHANIC 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
<b>Basic Tools – Theory</b> <ul style="list-style-type: none"> <li>describe safety rules and regulations</li> <li>describe the purpose and care of shop and hand tools</li> <li>describe various types of fasteners, adhesives and sealing devices</li> </ul>		12 hours
<b>Basic Tools – Shop</b> <ul style="list-style-type: none"> <li>demonstrate safety</li> <li>explain legislative regulations</li> <li>demonstrate use and care of hand tools and shop equipment</li> </ul>		12 hours
<b>Mentors can assist the apprentice to prepare for this section of technical training by:</b> <ul style="list-style-type: none"> <li><i>providing instruction on the safety rules and regulations</i></li> <li><i>providing instruction on the purpose, use and care of shop and hand tools</i></li> <li><i>describing the various types of fasteners, adhesives and sealing devices</i></li> <li><i>providing opportunities to demonstrate shop safety</i></li> <li><i>explaining legislative regulations</i></li> <li><i>providing opportunities to demonstrate the use and care of hand tools and shop equipment</i></li> </ul>		
<b>Brake Systems – Theory</b> <ul style="list-style-type: none"> <li>describe hydraulic brake system operation</li> <li>describe air brake system operation</li> <li>describe various types of park brake systems</li> </ul>		24 hours
<b>Brake Systems – Shop</b> <ul style="list-style-type: none"> <li>evaluate hydraulic brake system operation</li> <li>evaluate air brake system operation</li> <li>evaluate various park brake systems</li> <li>conduct final adjustments and performance tests</li> <li>repair faults</li> </ul>		36 hours
<b>Mentors can assist the apprentice to prepare for this section of technical training by:</b> <ul style="list-style-type: none"> <li><i>providing instruction on hydraulic brake system operation</i></li> <li><i>providing instruction on air brake system operation</i></li> <li><i>providing instruction on various types of park brake systems</i></li> <li><i>providing opportunities to evaluate hydraulic brake system operation</i></li> <li><i>providing opportunities to evaluate air brake system operation</i></li> <li><i>providing opportunities to evaluate various park brake systems</i></li> <li><i>providing opportunities to conduct final adjustments and performance tests</i></li> <li><i>providing opportunities to repair faults</i></li> </ul>		

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**Electrical – Theory** **14 hours**

- apply scientific principles to explain electrical theory and magnetism
- identify electrical circuit types and faults utilizing test equipment
- explain the function and operation of a lead acid battery

**Electrical – Shop** **16 hours**

- measure electrical values and check circuit operation
- evaluate a lead acid battery
- repair faults

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

- *providing instruction on the fundamentals of electrical theory and magnetism*
- *providing instruction on interpreting electrical symbol diagrams*
- *providing instruction on electrical system maintenance and testing procedures*
- *providing instruction on electrical circuit types and faults utilizing test equipment*
- *providing opportunities to measure electrical values and check circuit operation*
- *providing opportunities to evaluate a lead acid battery*
- *providing opportunities to repair faults*

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**Environmental Control Systems – Theory** **6 hours**

- complete the Heating, Refrigeration and Air Conditioning Institute's course on ozone depleting substances

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

- *providing instruction on Heating, Refrigeration and Air Conditioning (HVAC) safety and systems*

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**Hydraulics – Theory** **24 hours**

- explain the fundamentals of a basic hydraulic system and related components
- interpret hydraulic symbol diagrams
- describe hydraulic system maintenance and testing procedures
- describe open and closed centre hydraulic systems

**Hydraulics – Shop** **36 hours**

- service hydraulic system and various components
- test hydraulic systems using correct tools and procedures

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

- *providing instruction on the fundamentals of a basic hydraulic system and related components*
- *providing instruction on interpreting hydraulic symbol diagrams*
- *providing instruction on hydraulic system maintenance and testing procedures*
- *providing instruction on open and closed centre hydraulic systems*
- *providing opportunities to service hydraulic system and various components*
- *providing opportunities to test hydraulic systems using correct tools and procedures*

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**Steering Systems – Theory** **12 hours**

- explain basic wheel and frame alignment angles
- explain manual and integral steering system operation
- describe mounting procedures for tires, rims and hubs

**Steering Systems – Shop** **18 hours**

- perform a basic wheel alignment
- evaluate manual and integral power steering systems
- perform mounting procedures for tires, rims and hubs
- repair system faults

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

- *providing instruction on basic wheel and frame alignment angles*
- *providing instruction on manual and integral steering system operation*
- *providing instruction on mounting procedures for tires, rims and hubs*
- *providing opportunities to perform a basic wheel alignment*
- *providing opportunities to evaluate manual and integral power steering systems*
- *providing opportunities to perform mounting procedures for tires, rims and hubs*
- *providing opportunities to repair system faults*

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**Structural Components and Accessories – Theory** **12 hours**

- describe preventative maintenance programs
- identify hoisting and rigging techniques
- describe tractor frame construction and suspension systems
- describe truck and trailer coupling and docking systems

**Structural Components and Accessories – Shop** **18 hours**

- perform preventative maintenance checks
- perform hoisting and rigging techniques
- repair various hitching and docking systems
- inspect frame and suspension systems

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

- *providing instruction on preventative maintenance programs*
- *providing instruction on hoisting and rigging techniques*
- *providing instruction on tractor frame construction and suspension systems*
- *providing instruction on truck and trailer coupling and docking systems*
- *providing opportunities to perform preventative maintenance checks*
- *providing opportunities to perform hoisting and rigging techniques*
- *providing opportunities to repair various hitching and docking systems*
- *providing opportunities to inspect frame and suspension systems*



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## Level Two

8 weeks

240 hours

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### Brake Systems ABS – Theory

12 hours

- describe antilock braking system components
- describe electric braking system components
- describe traction and stability control system components
- describe SGI safety inspection procedures for truck and trailers

### Brake Systems ABS – Shop

18 hours

- evaluate antilock braking systems
- evaluate electric braking systems
- evaluate traction and stability control systems
- repair system faults
- perform SGI safety inspection

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

- *providing instruction on antilock braking system components*
  - *providing instruction on electric braking system components*
  - *providing opportunities to evaluate antilock braking systems*
  - *providing opportunities to evaluate an electric braking system*
  - *providing opportunities to repair system faults*
- 

### Drivetrain Systems – Theory

24 hours

- identify various seals and bearing types
- discuss various clutch types
- discuss manual transmission operation
- discuss differential operation
- discuss planetary and final drives
- discuss driveline operation

### Drivetrain Systems – Shop

36 hours

- perform the removal and replacement of various seals and bearings
- evaluate various clutch types
- evaluate manual transmission operation
- evaluate differential operation
- evaluate planetary and final drive systems
- evaluate driveline systems
- repair faults

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

- *providing instruction on various seals and bearing types*
- *providing instruction on various clutch types electric braking system components*
- *providing instruction on manual transmission operation*
- *providing instruction on differential operation*
- *providing instruction on planetary and final drives*
- *providing instruction on driveline operation*
- *providing opportunities to perform the removal and replacement of various seals and bearings*
- *providing opportunities to evaluate various clutch types*
- *providing opportunities to evaluate manual transmission operation*
- *providing opportunities to evaluate differential operation*
- *providing opportunities to evaluate planetary and final drive systems*
- *providing opportunities to evaluate driveline systems*
- *providing opportunities to repair faults*

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**Electrical – Theory** **12 hours**

- explain the operation of a cranking system and related components
- explain the operation of an alternating current (AC) charging system and related components

**Electrical – Shop** **18 hours**

- evaluate cranking and charging systems
- repair faults

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

- *providing instruction on the operation of a cranking system and related components*
  - *providing instruction on the operation of an alternating current (AC) charging system and related components*
  - *providing opportunities to evaluate cranking and charging systems*
  - *providing opportunities to repair faults*
- 

**Hydraulics – Theory** **12 hours**

- describe the operation of the different types of flow control valves
- describe a power-beyond hydraulic systems
- describe open and closed loop hydrostatic systems

**Hydraulics – Shop** **18 hours**

- evaluate various types of hydraulic systems and flow control valves
- evaluate open and closed loop hydraulic systems
- repair faults

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

- *providing instruction on the operation of the different types of flow control valves*
  - *providing instruction on a power-beyond hydraulic system*
  - *providing instruction on open and closed loop hydraulic systems*
  - *providing instruction on the operation of a load sensing hydraulic system*
  - *providing instruction on various hydrostatic drive systems*
  - *providing opportunities to evaluate various types of hydraulic systems and flow control valves*
  - *providing opportunities to evaluate a power beyond system*
  - *providing opportunities to evaluate open and closed loop hydraulic systems*
  - *providing opportunities to a load sensing hydraulic system*
  - *providing opportunities to evaluate various hydrostatic drive systems*
  - *providing opportunities to repair faults*
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**Steering and Directional Control Systems – Theory** **12 hours**

- explain the operating principles of tandem steering systems
- explain the operating principles of an auxiliary steering systems
- discuss pilot control and orbital steering systems

**Steering and Directional Control Systems – Shop** **18 hours**

- evaluate a tandem steering system
- evaluate an auxiliary steering systems
- evaluate pilot control and orbital steering systems
- repair system faults

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

- *providing instruction on the operating principles of tandem steering systems*
- *providing instruction on the operating principles of auxiliary steering systems*
- *providing instruction on pilot control and orbital steering systems*
- *providing opportunities to evaluate tandem steering systems*

- *providing opportunities to evaluate auxiliary steering systems*
- *providing opportunities to evaluate pilot control and orbital steering systems*

### **Truck and Trailer Systems – Theory**

**12 hours**

- describe trailer frame and suspension systems
- describe operational fundamentals of trailer heat, ventilation and air conditioning systems
- describe SGI safety inspection procedures for truck and trailers
- describe the operation of cab and engine heaters and auxiliary power generation units

### **Truck and Trailer Systems – Shop**

**18 hours**

- evaluate trailer frame and suspension systems
- evaluate trailer heating, ventilation and air conditioning systems
- perform SGI safety inspection
- evaluate the engine and cab heating and auxiliary power generation units
- repair defects

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

- *providing instruction on trailer frame and suspension systems*
- *providing instruction on the operational fundamentals of trailer heat, ventilation and air conditioning systems*
- *providing instruction on SGI safety inspection procedures for truck and trailers*
- *providing instruction on the operation of cab and engine heaters and auxiliary power generation units*
- *providing opportunities to identify trailer frame and suspension systems*
- *providing opportunities to identify trailer heating, ventilation and air conditioning systems*
- *providing opportunities to perform SGI safety inspection procedures for truck and trailers*
- *providing opportunities to evaluate engine and cab heating and auxiliary power generation units*
- *providing opportunities to repair system defects*

### **OFC/SMAW/GMAW Welding – Theory**

**6 hours**

- Identify safety considerations associated with oxy-fuel units, shielded metal arc welding and gas metal arc welding
- Describe the setup and operation of an oxy-fuel unit, shielded metal arc welding and gas metal arc welding equipment

### **OFC/SMAW/GMAW Welding – Shop**

**24 hours**

- Cut plate and gauge metal using oxy-fuel unit
- Weld ¼" material, T joint, horizontal fillet and surface build up using the SMAW process
- demonstrate use of GMAW in the horizontal and vertical down positions

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

- *identifying basic oxy-acetylene equipment*
- *explaining basic oxy-acetylene equipment*
- *explaining basic SMAW welding equipment*
- *explaining basic GMAW welding equipment*
- *providing instruction on filler rod welding in various positions*
- *providing instruction on cutting torch operation*
- *providing instruction on basic arc welding equipment*

- *providing opportunity to perform weld a variety of metal thicknesses using different types of rods and in various positions*



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## Level Three

## 8 weeks

## 240 hours

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### Alternative Fuels – Theory

10 hours

- describe the ignition process of a spark ignition engine
- describe the fuel delivery process for various fuel types

### Alternative Fuels – Shop

20 hours

- perform servicing, diagnoses and replacement of spark ignition components
- perform servicing, diagnosing and replacement of components related to fuel delivery

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

- *providing instruction on the ignition process of a spark ignition engine*
  - *providing instruction on the fuel delivery process for various fuel types*
  - *providing opportunity to perform servicing, diagnoses and replacement of spark ignition components*
  - *providing opportunity to perform servicing, diagnosing and replacement of components related to fuel delivery*
- 

### Electrical – Theory

14 hours

- explain common electrical components and their applications
- interpret wiring diagrams
- explain common electrical faults

### Electrical – Shop

16 hours

- construct electrical circuits
- measure electrical values
- analyze circuit operation

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

- *providing instruction on the common electrical components and their applications*
  - *providing instruction on the fuel delivery process for various fuel types*
  - *providing direction constructing electrical circuits*
  - *providing direction on measuring electrical values*
  - *providing direction on analyzing circuit operation*
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### Engine and Engine Support Systems – Theory

55 hours

- describe the operational characteristics of a diesel engine
- describe metallurgy and fluid analysis as it pertains to diesel engines
- describe the operational characteristics of various diesel engine support systems
- describe the procedures involved in a diesel engine overhaul
- describe the processes involved in determining component serviceability.
- describe diesel engine failure diagnosis

### Engine and Engine Support Systems – Shop

65 hours

- evaluate a diesel engine for potential faults prior to disassembly
- disassemble engine using correct procedures and shop practices
- evaluate engine components for serviceability
- assemble a diesel engine using proper procedures and serviceable components
- evaluate engines after assembly and inspect for potential faults
- evaluate operating engine for faults

- repair defects as required

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

- *providing instruction on the operational characteristics of a diesel engine*
- *providing instruction on metallurgy and fluid analysis*
- *providing instruction on operational characteristics of various diesel engine support systems*
- *providing instruction on diesel engine overhaul procedures*
- *providing instruction on the processes involved in determining component serviceability*
- *providing instruction on diesel engine failure diagnosis*
- *providing opportunity to evaluate a diesel engine for potential faults prior to disassembly*
- *providing opportunity to disassemble engine using correct procedures and shop practices*
- *providing opportunity to evaluate engine components for serviceability*
- *providing direction to assemble a diesel engine using proper procedures and serviceable components*
- *providing direction to evaluate engines after assembly and inspect for potential faults*
- *providing direction on engine start-up and break-in procedures*
- *providing direction to evaluate operating engine for faults*
- *providing direction to repair defects as required*

**Powertrain Systems – Theory**

**24 hours**

- describe operating principles of a manual transmission
- describe operating principles of an automatic transmission

**Powertrain Systems – Shop**

**36 hours**

- evaluate manual transmissions
- evaluate automatic transmissions
- repair defects

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

- *providing instruction on the operating principles of a manual transmission*
- *providing instruction on the operating principles of a automatic transmission*
- *providing advanced direction on manual transmission disassembly, inspection, and repair procedures*
- *providing advanced direction on automatic transmission disassembly, inspection, and repair procedures*
- *providing direction on the repair of defects on maual and automatic transmissons*

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## Level Four

## 8 weeks

## 240 hours

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### Drivetrains – Theory

12 hours

- describe the operation of a hybrid drive system
- describe the operating principles of an automated manual transmission
- describe electronic controls related to automated shift technology

### Drivetrains – Shop

18 hours

- evaluate hybrid drive systems
- evaluate automated manual transmissions
- diagnose electronic faults

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

- *providing direction on hybrid drive systems*
  - *providing opportunity to diagnose, troubleshoot and repair automated manual transmissions*
  - *providing advanced direction on electronic faults*
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### Electrical – Theory

40 hours

- apply scientific principles to explain electrical theory and magnetism
- identify electrical circuit types and faults utilizing test equipment
- explain the function and operation of a lead-acid battery
- explain the operation of cranking system and related components
- explain the operation of alternating current (AC) charging systems and related components
- explain common electrical and electronic components and their applications
- interpret wiring diagrams
- describe operation of electrical accessories and engine control circuits
- describe basic computer components using correct terminology
- explain operation of various electronic control systems and related components

### Electrical – Shop

50 hours

- diagnose electrical faults
- evaluate a lead acid battery
- evaluate an alternating current (AC) charging system and related components
- evaluate a cranking system and related components
- utilize wiring diagrams for fault diagnosis
- troubleshoot the accessory systems and engine control circuits
- operate various electronic control systems to check for proper function
- utilize diagnostic equipment
- repair defects

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

- *providing advanced direction to diagnose electronic faults*
- *providing opportunity for in-depth analysis, troubleshooting, and repair of electrical circuits, accessories, and computer and electronically controlled systems and devices*
- *providing advanced opportunities to use electric and electronic testing equipment (scan tool, DVOM, laptop computer, on-board diagnostics)*

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**Environmental Control Systems – Theory****12 hours**

- describe the operation of heating, ventilation and air conditioning systems
- identify various heating and air conditioning components
- describe proper usage of test equipment

**Environmental Control Systems – Shop****18 hours**

- demonstrate service procedures
- repair air conditioning and heating components
- repair air conditioning systems

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

- *providing opportunity for in-depth analysis, troubleshooting and repair of heating, ventilation and air conditioning systems*
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**Fuel Systems – Theory****40 hours**

- describe preventive maintenance procedures for diesel fuel storage and delivery systems
- describe proper procedures to diagnose faults in fuel delivery and control systems
- describe proper procedures to inspect, adjust or repair fuel delivery and control systems
- describe the procedures involved in performance testing on diesel engines

**Fuel Systems – Shop****50 hours**

- perform preventative maintenance
- evaluate diesel injection delivery and control components
- evaluate an operating diesel engine
- conduct performance testing
- repair faults

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

- *providing opportunity to inspect, test, and conduct failure analysis of engine diesel fuel system components (fuel supply, fuel pumps and fuel injection systems)*
- *providing direction on the fuel delivery process for diesel fuelled engine types*



**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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