# Truck and Transport Mechanic

# Guide to Course Content

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1-877-363-0536
apprenticeship@gov.sk.ca
saskapprenticeship.ca

Saskatchewan Apprenticeship and Trade Certification Commission

Online: www.saskapprenticeship.ca

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

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

# STRUCTURE OF THE GUIDE TO COURSE CONTENT

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.

**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.

**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 Truck and Transport Mechanic trade**: a chart which outlines the model for SATCC technical training sequencing.

# 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.

There are four levels of technical training delivered by Saskatchewan Polytechnic in Saskatoon.

Level One: 8 weeks
Level Two: 8 weeks
Level Three: 8 weeks
Level Four: 8 weeks

The information contained in this guide to course content details the technical training delivered for each level of apprenticeship. An apprentice spends approximately 15% of their apprenticeship term in a technical training institute learning the technical and theoretical aspects of the trade. The hours and percentages of technical and practical training may vary according to class needs and progress.

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

**Entrance Requirements for Apprenticeship Training**

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

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

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

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

| Designated Trade Name | **Math Credit** at the Indicated Grade Level❶ | **Science Credit** at Grade Level |
|---|---|---|
| Truck and Transport Mechanic | Grade 11 | Grade 10 |

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

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

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

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

# 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 (apprenticeship year) where the content is delivered is covered. *

* Sub-tasks with numbers in the boxes is where the content will be delivered in training.

## A – Common Occupational Skills — 6%

| | | | | | |
|---|---|---|---|---|---|
| **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 and equipment** | **2.01 Maintains hand, power, measuring, testing, and diagnostic tools** 1 | **2.02 Maintains shop equipment** 1 | **2.03 Uses hoisting and lifting equipment** 1 | **2.04 Uses welding and cutting equipment** 1, 2 | |
| **A-3 Performs routine trade activities** | **3.01 Uses documentation and reference materials** 1 (2, 3, 4 in-context) | **3.02 Maintains fluids, lubricants, and coolants** 1 (2, 3, 4 in-context) | **3.03 Services hoses, tubing, and fittings** 1 (2, 3, 4 in-context) | **3.04 Services filters** 1 (2, 3, 4 in-context) | **3.05 Services bearings, bushing and seals** 1 (2, 3, 4 in-context) |
| | **3.06 Uses fasteners, sealing devices, adhesives and gaskets** 1 (2, 3, 4 in-context) | | | | |

# B – Engine and Supporting Systems

**17%**

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

| | | | |
|---|---|---|---|
| B-10 Services, diagnoses and engine retarder systems | 10.01 Services and repairs engine retarder systems<br>3 | 10.02 Diagnoses engine retarder systems<br>3 | |
| B-11 Services, diagnoses and repairs cooling system | 11.01 Services cooling system<br>3 | 11.02 Diagnoses cooling system<br>3 | 11.03 Repairs cooling system<br>3 |

## C – Air Systems and Brakes 14%

| | | | |
|---|---|---|---|
| C-12 Services, diagnoses and repairs air systems | 12.01 Services air systems<br>1, 2 | 12.02 Diagnoses air systems<br>1, 2 | 12.03 Repairs air systems<br>1, 2 |
| C-13 Services, diagnoses and repairs brake systems | 13.01 Services brake systems<br>1, 2 | 13.02 Diagnoses brake system<br>1, 2 | 13.03 Repairs brake systems<br>1, 2 |

# D – Electrical and Electronic Systems

**17%**

| | | | |
|---|---|---|---|
| **D-14 Services, diagnoses and repairs batteries** | **14.01 Performs servicing and repair of batteries**<br>**1** | **14.02 Diagnoses batteries**<br>**1** | |
| **D-15 Services, diagnoses and repairs charging systems** | **15.01 Services charging systems**<br>**1, 2** | **15.02 Diagnoses charging systems**<br>**1, 2** | **15.03 Repairs charging systems**<br>**1, 2** |
| **D-16 Services, diagnoses and repairs spark ignition systems** | **16.01 Performs servicing and repair of spark ignition systems**<br>**1** | **16.02 Diagnoses spark ignition systems**<br>**1** | |
| **D-17 Services, diagnoses and repairs starting systems** | **17.01 Performs servicing and repairs of starting systems**<br>**1, 2** | **17.02 Diagnoses starting systems**<br>**1, 2** | |
| **D-18 Services, diagnoses and repairs electrical components and accessories** | **18.01 Performs servicing and repair of electrical components and accessories**<br>**3, 4 (1, 2 in-context)** | **18.02 Diagnoses electrical components and accessories**<br>**3, 4 (1, 2 in-context)** | |
| **D-19 Services, diagnoses and repairs vehicle management systems and electronic components** | **19.01 Services vehicle management systems and electronic components**<br>**4 (1, 2, 3 in-context)** | **19.02 Diagnoses vehicle management systems and electronic components**<br>**4 (1, 2, 3 in-context)** | **19.03 Repairs vehicle management systems and electronic components**<br>**4 (1, 2, 3 in-context)** |

# E – Drivetrain

**12%**

| | | | |
|---|---|---|---|
| **E-20 Services, diagnoses and repairs clutches** | **20.01 Services clutches** 3 | **20.02 Diagnoses clutches** 3 | **20.03 Repairs clutches** 3 |
| **E-21 Services, diagnoses and repairs manual transmission and transfer cases** | **21.01 Services manual transmission and transfer cases** 3 | **21.02 Diagnoses manual transmission and transfer cases** 3 | **21.03 Repairs manual transmission and transfer cases** 3 |
| **E-22 Services, diagnoses and repairs automatic transmissions** | **22.01 Services automatic transmissions** 3 | **22.02 Diagnoses automatic transmissions** 3 | **22.03 Repairs automatic transmissions** 3 |
| **E-23 Services, diagnoses and repairs automated transmissions** | **23.01 Services automated transmissions** 4 | **23.02 Diagnoses automated transmission** 4 | **23.03 Repairs automated transmissions** 4 |
| **E-24 Services, diagnoses and driveline systems** | **24.01 Services driveline systems** 3 | **24.02 Diagnoses driveline systems** 3 | **24.03 Repairs driveline systems** 3 |
| **E-25 Services, diagnoses and repairs differentials** | **25.01 Services differentials** 3 | **25.02 Diagnoses differentials** 3 | **25.03 Repairs differentials** 3 |
| **E-26 Services, diagnoses and repairs drive train retarders** | **26.01 Services drive train retarders** 3 | **26.02 Diagnoses drive train retarders** 3 | **26.03 Repairs drive train retarders** 3 |

# F – Steering, Chassis/Frames, Suspension, Wheels, Hubs and Tires 14%

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

## G – Cab

**4%**

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

## H – Trailers

**5%**

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

## I – Climate Control

**6%**

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

## J – Hydraulic Systems

**5%**

| | | | |
|---|---|---|---|
| **J-38 Services, diagnoses and repairs hydraulic components** | **38.01 Services hydraulic components**<br>**1, 2** | **38.02 Diagnoses hydraulic components**<br>**1, 2** | **38.03 Repairs hydraulic components**<br>**1, 2** |

# TRAINING PROFILE CHART

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

| 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 | 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 |

# TECHNICAL TRAINING COURSE CONTENT

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 Analysis (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 — 8 weeks — 240 hours

### Basic Tools – Theory — 12 hours

- describe safety rules and regulations
- describe the purpose and care of shop and hand tools
- describe various types of fasteners, adhesives and sealing devices

### Basic Tools – Shop — 12 hours

- demonstrate safety
- explain legislative regulations
- demonstrate use and care of hand tools and shop equipment

**NOA topics covered in this section of training:**

**A-1 Performs safety-related functions.**
A-1.01 Maintains safe work environment
A-1.02 Uses personal protective equipment (PPE) and safety equipment

**A-2 Uses and maintains tools and equipment**
A-2.01 Maintains hand, power, measuring, testing and diagnostic tools
A-2.02 Maintains shop equipment
A-2.04 Uses welding and cutting equipment

### Brake Systems – Theory — 24 hours

- describe hydraulic brake system operation
- describe air brake system operation
- describe various types of park brake systems

### Brake Systems – Shop — 36 hours

- evaluate hydraulic brake system operation
- evaluate air brake system operation
- evaluate various park brake systems
- conduct final adjustments and performance tests
- repair faults

**NOA topics covered in this section of training:**

**C-12 Services, diagnoses and repairs air systems**
C-12.01 Services air systems
C-12.02 Diagnoses air systems
C-12.03 Repairs air systems

**C-13 Services, diagnoses and repairs brake systems**
C-13.01 Services brake systems
C-13.02 Diagnoses brake systems
C-13.03 Repairs brake systems

## 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

**NOA topics covered in this section of training:**

**D-14 Services, diagnoses and repairs batteries**
D-14.01 Performs servicing and repair of batteries
D-14.02 Diagnoses batteries

**D-15 Services, diagnoses and repairs charging systems**
D-15.01 Services charging systems
D-15.02 Diagnoses charging systems
D-15.03 Repairs charging systems

**D-16 Services, diagnoses and repairs spark ignition systems**
D-16.01 Performs servicing and repair of spark ignition systems
D-16.02 Diagnoses spark ignition systems

**D-17 Services, diagnoses and repairs starting systems**
D-17.01 Performs servicing and repair of starting systems
D-17.02 Diagnoses starting systems

## Environmental Control Systems – Theory — 6 hours

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

**NOA topics covered in this section of training:**

**I-36 Services, diagnoses and repairs heating and ventilation systems**
I-36.01 Services heating and ventilation systems
I-36.02 Diagnoses heating and ventilation systems
I-36.03 Repairs heating and ventilation systems

**I-37 Services, diagnoses and repairs air conditioning systems**
I-37.01 Services air conditioning systems
I-37.02 Diagnoses air conditioning systems
I-37.03 Repairs air conditioning systems

## Hydraulics – Theory — 12 hours

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

## Hydraulics – Shop — 18 hours

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

**NOA topics covered in this section of training:**

**J-38 Services, diagnoses and repairs hydraulic components**
J-38.01 Services hydraulic components
J-38.02 Diagnoses hydraulic components
J-38.03 Repairs hydraulic components

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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

**NOA topics covered in this section of training:**

**F-27 Services, diagnoses and repairs steering system**
F-27.01 Services steering systems
F-27.02 Diagnoses steering systems
F-27.03 Repairs steering systems

**F-28 Services, diagnoses and repairs chassis/frames**
F-28.01 Services chassis/frames
F-28.02 Diagnoses chassis/frames
F-28.03 Repairs chassis/frames

**F-29 Services, diagnoses and repairs suspension**
F-29.01 Services suspension
F-29.02 Diagnoses suspension
F-29.03 Repairs suspension

**F-30 Services, diagnoses and repairs hitches and couplers**
F-30.01 Services hitches and couplers
F-30.02 Diagnoses hitches and couplers
F-30.03 Repairs hitches and couplers

**F-31 Services, diagnoses and repairs tires, wheels and hubs**
F-31.01 Services tires, wheels and hubs
F-31.02 Diagnoses tires, wheels and hubs
F-31.03 Repairs tires, wheels and hubs

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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
- identify hybrid and EV systems and safe work procedures

## 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
- perform hybrid and EV system lockout or safe energy release

**NOA topics covered in this section of training:**

**A-2 Uses and maintains tools and equipment**
A-2.03 Uses hoisting and lifting equipment

**F-28 Services, diagnoses and repairs chassis/frames**
F-28.01 Services chassis/frames
F-28.02 Diagnoses chassis/frames
F-28.03 Repairs chassis/frames

**G-33 Services, diagnoses and repairs exterior cab components**
G-33.01 Services exterior cab components
G-33.02 Diagnoses exterior cab components
G-33.03 Repairs exterior cab components

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**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

**NOA topics covered in this section of training:**

**A- 2 Uses and maintains tools and equipment**
A-2.04 Uses welding and cutting equipment

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**Level One topics from the NOA that are taught in context:**

***Scheduled Maintenance***
***Operational Testing***
***Planning and Communication***

***For details regarding the In Context Topics, see page 28***

## Level Two — 8 weeks — 240 hours

### Brake Systems ABS – Theory — 12 hours

- describe antilock braking system components
- describe electric braking system components
- describe traction and stability control system components

### Brake Systems ABS – Shop — 18 hours

- evaluate antilock braking systems
- evaluate electric braking systems
- evaluate traction and stability control systems
- repair system faults

**NOA topics covered in this section of training:**

**C-12 Services, diagnoses and repairs air systems**
C-12.01 Services air systems
C-12.02 Diagnoses air systems
C-12.03 Repairs air systems

**C-13 Services, diagnoses and repairs brake systems**
C-13.01 Services brake systems
C-13.02 Diagnoses brake systems
C-13.03 Repairs brake systems

### 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

**This section of training exceeds the minimum sequencing as set out by the Truck and Transport Mechanic NOA.**

### 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

**NOA topics covered in this section of training:**

**D-15 Services, diagnoses and repairs charging systems**
D-15.01 Services charging systems
D-15.02 Diagnoses charging systems
D-15.03 Repairs charging systems

**D-17 Services, diagnoses and repairs starting systems**
D-17.01 Performs servicing and repair of starting systems
D-17.02 Diagnoses starting systems

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## Hydraulics – Theory — 12 hours

- identify open and closed center hydraulic systems
- discuss different types of hydraulic pumps and motors
- describe the operation of the different types of control valves
- identify various types of hydraulic actuators

## Hydraulics – Shop — 18 hours

- evaluate various types of hydraulic systems and control valves
- evaluate pumps and motors
- repair hydraulic actuators
- evaluate open and closed center hydraulic systems
- repair faults

**NOA topics covered in this section of training:**

**J-38 Services, diagnoses and repairs hydraulic components**
J-38.01 Services hydraulic components
J-38.02 Diagnoses hydraulic components
J-38.03 Repairs hydraulic components

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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 system
- evaluate pilot control and orbital steering systems
- repair system faults

**NOA topics covered in this section of training:**

**F-27 Services, diagnoses and repairs steering system**
F-27.01 Services steering systems
F-27.02 Diagnoses steering systems
F-27.03 Repairs steering systems

**F-28 Services, diagnoses and repairs chassis/frames**
F-28.01 Services chassis/frames
F-28.02 Diagnoses chassis/frames
F-28.03 Repairs chassis/frames

**F-29 Services, diagnoses and repairs suspension**
F-29.01 Services suspension
F-29.02 Diagnoses suspension
F-29.03 Repairs suspension

**F-30 Services, diagnoses and repairs hitches and couplers**
F-30.01 Services hitches and couplers
F-30.02 Diagnoses hitches and couplers
F-30.03 Repairs hitches and couplers

**F-31 Services, diagnoses and repairs tires, wheels and hubs**
F-31.01 Services tires, wheels and hubs
F-31.02 Diagnoses tires, wheels and hubs
F-31.03 Repairs tires, wheels and hubs

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## Truck and Trailer Systems – Theory — 24 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 — 36 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

**NOA topics covered in this section of training:**

**F-30 Services, diagnoses and repairs hitches and couplers**
F-30.01 Services hitches and couplers
F-30.02 Diagnoses hitches and couplers
F-30.03 Repairs hitches and couplers

**G-32 Services, diagnoses and repairs interior cab components**
G-32.01 Services interior cab components
G-32.02 Diagnoses interior cab components
G-32.03 Repairs interior cab components

**H-34 Services, diagnoses and repairs trailer components and accessories**
H-34.01 Services trailer components and accessories
H-34.02 Diagnoses trailer components and accessories
H-34.03 Repairs trailer components and accessories

**H-35 Services, diagnoses and repairs heating and refrigeration systems**
H-35.01 Services heating and refrigeration systems
H-35.02 Diagnoses heating and refrigeration systems
H-35.03 Repair heating and refrigeration systems

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**Level Two topics from the NOA that are taught in context:**

***Scheduled Maintenance***
***Operational Testing***
***Planning and Communication***

***For details regarding the In-Context Topics, see page 28***

## Level Three — 8 weeks — 240 hours

### 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

**NOA topics covered in this section of training:**

**B-8 Services, diagnoses and repairs fuel delivery system**
B-8.01 Services fuel delivery system
B-8.02 Diagnoses fuel delivery system
B-8.03 Repairs fuel delivery system

### 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

**NOA topics covered in this section of training:**

**D-18 Services, diagnoses and repairs electrical components and accessories**
D-18.01 Performs servicing and repair of electrical components and accessories
D-18.02 Diagnoses electrical components and accessories

### Engine and Engine Support Systems – Theory — 43 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 diagnostics

### Engine and Engine Support Systems – Shop — 47 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

**NOA topics covered in this section of training:**

**B-4 Services, diagnoses and repairs base engine**
B-4.01 Services base engine
B-4.02 Diagnoses base engine
B-4.03 Repairs base engine

**B-5 Services, diagnoses and repairs lubrication system**
B-5.01 Services lubrication system
B-5.02 Diagnoses lubrication system
B-5.03 Repairs lubrication system

**B-6 Services, diagnoses and repairs intake and exhaust system**
B-6.01 Services intake and exhaust systems
B-6.02 Diagnoses intake and exhaust systems
B-6.03 Repairs intake and exhaust systems

**B-7 Services, diagnoses and repairs engine management system**
B-7.01 Services engine management system
B-7.02 Diagnoses engine management system
B-7.03 Repairs engine management system

**B-8 Services, diagnoses and repairs fuel delivery system**
B-8.01 Services fuel delivery system
B-8.02 Diagnoses fuel delivery system
B-8.03 Repairs fuel delivery system

**B-9 Services, diagnoses and repairs emission systems for diesel engines**
B-9.01 Services emission systems for diesel engines
B-9.02 Diagnoses emission systems for diesel engines
B-9.03 Repairs emission systems for diesel engines

**B-10 Services, diagnoses and repairs engine retarder systems**
B-10.01 Services and repairs engine retarder systems
B-10.02 Diagnoses engine retarder systems

**B-11 Services, diagnoses and repairs cooling system**
B-11.01 Services cooling system
B-11.02 Diagnoses cooling system
B-11.03 Repairs cooling system

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## Powertrain Systems – Theory — 24 hours

- describe operating principles of a manual transmission
- describe operating principles of an automatic transmission
- describe the operating principles of an automated manual transmission
- describe electronic controls related to automated shift technology

## Powertrain Systems – Shop — 36 hours

- evaluate manual transmissions
- evaluate automatic transmissions
- repair defects
- evaluate automated manual transmissions

**NOA topics covered in this section of training:**

**E-20 Services, diagnoses and repairs clutches**
E-20.01 Services clutches
E-20.02 Diagnoses clutches
E-20.03 Repairs clutches

**E-21 Services, diagnoses and repairs manual transmissions and transfer cases**
E-21.01 Services manual transmissions and transfer cases
E-21.02 Diagnoses manual transmissions and transfer cases
E-21.03 Repairs manual transmissions and transfer cases

**E-22 Services, diagnoses and repairs automatic transmissions**
E-22.01 Services automatic transmissions
E-22.02 Diagnoses automatic transmissions
E-22.03 Repairs automatic transmissions

**E-24 Services, diagnoses and repairs driveline systems**
E-24.01 Services driveline systems
E-24.02 Diagnoses driveline systems
E-24.03 Repairs driveline systems

**E-25 Services, diagnoses and repairs differentials**
E-25.01 Services differentials
E-25.02 Diagnoses differentials
E-25.03 Repairs differentials

**E-26 Services, diagnoses and repairs drive train retarders**
E-26.01 Services drive train retarders
E-26.02 Diagnoses drive train retarders
E-26.03 Repairs drive train retarders

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## Hydraulics – Theory — 12 hours

- explain pressure and load compensating hydraulic systems
- describe open and closed loop hydrostatic systems

## Hydraulics – Shop — 18 hours

- evaluate pressure and load compensating hydraulic systems
- evaluate open and closed loop hydrostatic systems
- test hydraulic systems using correct tools and procedures
- test hydrostatic systems using correct tools and procedures

**NOA topics covered in this section of training:**

**J-38 Services, diagnoses and repairs hydraulic components**
J-38.01 Services hydraulic components
J-38.02 Diagnoses hydraulic components
J-38.03 Repairs hydraulic components

**Level Three topics from the NOA that are taught in context:**

***Scheduled Maintenance***
***Operational Testing***
***Planning and Communication***

***For details regarding the In Context Topics, see page 28***

## Level Four — 8 weeks — 240 hours

### Drivetrains – Theory — 24 hours

- explain the fundamentals of hybrid and EV drive systems
- describe the operation and components of a hybrid drive system
- describe the operation and components of an EV drive system
- identify tools and equipment for safe testing of hybrid and EV drive systems
- describe procedures to safely test and diagnose hybrid and EV drive systems

### Drivetrains – Shop — 36 hours

- evaluate hybrid drive systems
- demonstrate safe testing and service procedures
- identify hybrid drive system components
- identify EV drive system components
- evaluate EV drive systems
- repair hybrid and EV drive systems

**NOA topics covered in this section of training:**

**E-23 Services, diagnoses and repairs automated transmissions**
E-23.01 Services automated transmissions
E-23.02 Diagnoses automated transmissions
E-23.03 Repairs automated transmissions

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### Electrical – Theory — 28 hours

- recall the theory, function and operation of electrical circuits and wiring diagrams
- recall common electrical and electronic components and their applications
- analyze the operation of electrical accessories and control circuits
- describe vehicle management systems, their components, characteristics, application and operation
- analyze the procedures involved in diagnosing electronic vehicle management systems

### Electrical – Shop — 32 hours

- diagnose electrical faults
- evaluate cranking systems and alternating current (AC) charging system performance
- utilize wiring diagrams for fault diagnosis of electrical and electronic circuits
- evaluate electrical and electronic vehicle management systems
- utilize diagnostic equipment to evaluate vehicle management systems

**NOA topics covered in this section of training:**

**D-18 Services, diagnoses and repairs electrical components and accessories**
D-18.01 Performs servicing and repair of electrical components and accessories
D-18.02 Diagnoses electrical components and accessories

**D-19 Services, diagnoses and repairs vehicle management systems and electronic components**
D-19.01 Services vehicle management systems and electronic components
D-19.02 Diagnoses vehicle management systems and electronic components
D-19.03 Repairs vehicle management systems and electronic components

**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

**NOA topics covered in this section of training:**

**I-36 Services, diagnoses and repairs heating and ventilation systems**
I-36.01 Services heating and ventilation systems
I-36.02 Diagnoses heating and ventilation systems
I-36.03 Repairs heating and ventilation systems

**I-37 Services, diagnoses and repairs air conditioning systems**
I-37.01 Services air conditioning systems
I-37.02 Diagnoses air conditioning systems
I-37.03 Repairs 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

**NOA topics covered in this section of training:**

**D8 Services, diagnoses and repairs fuel delivery system**
B-8.01 Services fuel delivery system
B-8.02 Diagnoses fuel delivery system
B-8.03 Repairs fuel delivery system

**B-9 Services, diagnoses and repairs emission systems for diesel engines**
B-9.01 Services emission systems for diesel engines
B-9.02 Diagnoses emission systems for diesel engines
B-9.03 Repairs emission systems for diesel engines

**Level Four topics from the NOA that are taught in context:**

***Scheduled Maintenance***
***Operational Testing***
***Planning and Communication***
***Electrical***

***For details regarding the In Context Topics, see page 28***

# IN CONTEXT TOPICS

In context means learning that has already taken place and is being applied to the applicable task. Learning outcomes for in context topics are accomplished in other topics in that level.

***Scheduled Maintenance***

**A-3 Performs routine trade activities**
A-3.01 Uses documentation and reference materials
A-3.02 Maintains fluids, lubricants and coolants
A-3.03 Services hoses, tubing and fittings
A-3.04 Services filters
A-3.05 Services bearings, bushings and seals
A-3.06 Uses fasteners, sealing devices, adhesives and gaskets

***Electrical***

**D-18 Services, diagnoses and repairs electrical components and accessories**
D-18.01 Performs servicing and repair of electrical components and accessories
D-18.02 Diagnoses electrical components and accessories

**D-19 Services, diagnoses and repairs vehicle management systems and electronic components**
D-19.01 Services vehicle management systems and electronic components
D-19.02 Diagnoses vehicle management systems and electronic components
D-19.03 Repairs vehicle management systems and electronic components