

KHVT 0170 Heavy Duty Electrical

Authors

[Bill Kleman](#), Salt Lake Community College

[Mark Kranendonk](#), Salt Lake Community College

Competencies and Learning Objectives

1. Describe safe handling of refrigerants.
 - Describe refrigerant types and characteristics
 - Describe how to safely handle refrigerants
 - Describe how refrigerants affect the environment
 - Describe the equipment and tools used with different types of refrigerants
2. Describe the basic operating principles of heating and air conditioning systems.
 - Describe how heating system components operate
 - Describe how the defrost system components operate
 - Describe how the air conditioning system components operate
 - Evacuate and replace Freon in the AC system
3. Describe how to repair truck heating and air conditioning systems
 - Describe how to troubleshoot and repair truck heating systems
 - Describe how to troubleshoot and repair truck air conditioning systems
4. Describe the basic operating principles of trailer refrigeration units and demonstrate connecting gauges.
 - Describe basic operating principles of trailer refrigeration units
 - Identify and describe differences between truck and trailer refrigeration systems
 - Troubleshoot and repair trailer refrigeration systems
 - Connect gauges to a truck refrigeration unit
5. Describe the basic operating principles of electricity
 - Describe the electrical elements of atoms
 - Describe characteristics of voltage, amperage and resistance
 - Describe the difference between alternating and direct current
 - Describe Ohm's law
6. Demonstrate proper use of electrical test instruments used for trucks

- Describe types and operation of electrical test equipment
 - Demonstrate correct electrical equipment setup procedures
 - Demonstrate proper use of electrical test equipment
7. Describe electrical circuits and circuit protection in trucks
 - Describe types of electrical circuits
 - Describe factors that cause voltage drop in electrical circuits
 - Describe types of electrical circuit failures
 - Describe types of electrical protection devices
 8. Describe operating principles of circuit control devices in trucks
 - Describe common types of circuit control devices
 - Describe testing procedures used to diagnose and repair circuit control devices
 9. Describe the basic operating principles batteries in trucks
 - Describe the battery types
 - Describe battery components and constructions
 - Describe battery ratings
 - Describe chemical reaction process during charging and discharging
 10. Describe advanced battery technologies for trucks
 - Describe the features of lithium and nickel-metal hydride batteries
 - Describe the features of ultra-capacitors
 11. Service commercial vehicle batteries
 - Describe safe working practices for servicing batteries
 - Describe the procedures and equipment used in testing batteries
 - Describe failure modes of batteries
 - Service and test truck batteries

Course Description

This course will provide theory and practical experience in basic electrical circuits, principles of magnetism, charging and cranking systems, maintenance, testing troubleshooting of all electrical applications. Safety will be stressed.

Competencies

Upon completion of the course, you will be rated as MC (Mastered Competency) or NM (Not-Mastered Competency) based on ability to demonstrate the established competencies for the course. You will:

- Describe safe handling of refrigerants.

- Describe the basic operating principles of heating and air conditioning systems.
- Repair truck heating and air conditioning systems
- Repair trailer refrigeration units.
- Describe the basic operating principles of electricity.
- Demonstrate proper use of electrical test instruments used for trucks.
- Describe electrical circuits and circuit protection in trucks.
- Describe operating principles of circuit control devices in trucks.
- Describe the basic operating principles batteries in trucks.
- Describe advanced battery technologies for trucks.
- Service commercial vehicle batteries.

Assessment

During the course you be given written and performance exams.

Certification Exam (at instructor's discretion)

Shop Exam 1

Shop Exam 2

Written Exam 1

Written Exam 2

You must pass with at least a score of 80% or higher on each summative assessment to be considered Master Competent and complete the course.

Course work

The course work for this class will be available partially online and partially in the lab. You will need to complete both the online and classroom portions to obtain the all of the course information.

Safety

In this course, you are expected to utilize safe behaviors and safety equipment when working around heavy duty vehicles. Safety will be evaluated in all performance exams.

Flexibility

If you feel that you are ready to do the lab final or exams without completing the course modules, please contact your instructor.

Contact and Assistance

If you need additional assistance with course material, you may consult with your instructor during open lab times.

If you have questions about coursework outside of lab hours you may contact your instructor via text/voice or email.

If you have technical issues with Internet access, computer labs, applications, BruinMail, Printing, or software navigate to HelpDesk.

If you have technical issues with Canvas, navigate to Help.

Syllabus *(Note: Books and materials required for this course are listed below. Instructor uses instructional materials from the publisher, including presentations, videos, and other learning materials.)*

The expectations for this course are described in detail in the course syllabus.

The textbook for this course is the Fundamentals of Medium/Heavy Duty Commercial Vehicle, Jones & Bartlett Learning Systems, ISBN 978-1-284-04116-3.

CDX Resources -If you took KHVT-0100 course, you have already registered for access to the resources.

CDX Support

If you experience any difficulties or technical issues, call Customer Support Team at 1-844-273-7537 or send an email to cdxsupport@partnerinpublishing.com to submit an issue to Technical Support Team.

Course Navigation *(Note: Instructions for the learning management system)*

In the left navigation bar is a Course Tools menu. It provides information about what tools you need for the course, and how to navigate in Canvas. Start the course with the first module below. You can also click on the Modules link in the left navigation bar to navigate through the course.

Modules

Module 1: Safe Handling of Refrigerants

Module 1: Overview

Introduction to Module 1: This module will cover safe handling of refrigerants. You will have access to learning materials including reading assignments and a video. You will also complete activities online. Assessment of competencies in this module will take place in a certification exam at the end of this module.

The course work in this module, combined with class sessions should prepare you to:



Describe safe handling of refrigerants.

1. Describe refrigerant types and characteristics
2. Describe how to safely handle refrigerants
3. Describe how refrigerants affect the environment
4. Describe the equipment and tools used with different types of refrigerants

Module 1: Readings (Note: Instructor received permission to use the document for this course.)

Reading Assignment

The purpose of these learning resources is to learn about the dangers of Freon to the environment and yourself. While you are reading, think about the individual procedures required when handling refrigerants. Your goal is to learn how to safely handle Freon.

You can complete the readings for this module in the MACS certification training manual, and your textbook CDXHDCV: pg. 1694 (introduction and brief history of AC). You can also access digital copies of the readings using the links below.

https://www.macs.org/WEB/Images/MACS_Docs/Certification/MACS%202016%20609%20Certification%20Training%20Manual%20LR.pdf

Module 1: Video

Watch the videos about the EPA Section 609 certification.

1. <https://www.youtube.com/watch?v=4mtF33S93Fw>

Click the link to view the video.

Module 1: Homework

Homework

Once you have reviewed the learning resources for this module, do the homework questions. You may access the questions by clicking on the links below. To answer the questions, pause the video, then check your answers when the correct answers are shown. You may also use the manual or your book as a resource.

1. Practice Test 1 <https://www.youtube.com/watch?v=2Bwx4RPvEE8>
2. Practice Test 2 <https://www.youtube.com/watch?v=PZBclLLZndo>
3. Practice Test 3 <https://www.youtube.com/watch?v=uQWvG8iWWh0>
4. Practice Test 4 <https://www.youtube.com/watch?v=BEI6yLcoilY&t=128s>
5. Practice Test 5 <https://www.youtube.com/watch?v=pkcfikoAhNg>
6. Practice Test 6 <https://www.youtube.com/watch?v=SVOzNKRW220>
7. Practice Test 7 <https://www.youtube.com/watch?v=if4rBFcmC78>
8. Practice Test 8 https://www.youtube.com/watch?v=_R9LOxin9ck
9. Practice Test 9 <https://www.youtube.com/watch?v=iamREsIIHoM>
10. Practice Test 10 <https://www.youtube.com/watch?v=mVzchqxoSa8>

Module 1: Check in

Now that you have completed Module 1, check in with your instructor to schedule an appointment to take your certification exam. You may register for the exam at https://www.macsw.org/WEB/MACS/Certification/Section_609_Certification.aspx?WebsiteKey=d89ff0bc-ce9d-41d9-a243-d885ad993b37&Technician_Panel=1#Technician_Panel

Module 2: Basic Operating Principles of Heating and AC

Module 2: Overview

Introduction to Module 2: This module will cover the basic operating principles of heating and air conditioning systems. You will have access to learning materials including reading assignments and videos. You will also complete activities online and in the shop. Assessment of competencies in this module will take place in an exam at the end of module 4, and a performance exam at the end of Module 3.

The course work in this module, combined with class sessions should prepare you to:

Describe the basic operating principles of heating and air conditioning systems.

1. Describe how heating system components operate
2. Describe how the defrost system components operate
3. Describe how the air conditioning system components operate
4. Evacuate and replace Freon in the AC system

Module 2: PowerPoint

The PowerPoint presentation below, will give you information about the basic operating principles of heating and air conditioning systems, with additional notes from your instructor. It may be helpful to do the module readings in your textbook as you view the PowerPoint presentation.

Click the link to get started.

CDX Air Cond chp 51

Module 2: Readings

Reading Assignment

The purpose of these learning resources is to learn the principles of heating, ventilation, and air conditioning system. While you are reading, think about AC components and operating principles. Your goal is to learn how Freon and the AC components are used to transfer heat from the cab.

You can complete the readings for this module in your textbook CDXHDCV: Chapter 51. You can also access digital copies of the readings using the links below.

Module 2: YouTube Videos

Watch the videos about the basic operating principles of heating and air conditioning systems.

1. AC explanation 1 <https://www.youtube.com/watch?v=w17DpGCcRi8>
2. AC explanation 2 <https://www.youtube.com/watch?v=wtRZ5xTajOI>

Click the links to view the videos.

Module 2: CDX Videos

Watch the videos from your CDX text book about basic operating principles of heating and air conditioning systems.

1. AC Compressors
2. AC Control Switches
3. AC principles
4. Condensers and Evaporators
5. TXV system operation
6. Types of TX Valves

Click the links to view the videos.

Module 2: Animations

Try out the animations from Chapter 51 of your CDX text related to the basic operating principles of heating and air conditioning systems.

1. Automatic Climate Control
2. FOT System Operation
3. Mag Clutch Compressor
4. Semi-Automatic Climate Control
5. Var Disp Compress Elec
6. Ventilation

Click the links to view the animations.

Module 2: Homework

Once you have reviewed the learning resources for this module, do the module homework questions. You may answer the questions as many times as you want. You may also use your book as a resource.

The homework questions include ASE style questions, which consist of two true/false style statements. To answer the question, evaluate technician A's statement alone to determine if it is correct, then evaluate technician B's statement alone to determine if it is correct, then make your selection based on your conclusion

Module 2: Shop Exam 1

Now that you have completed the learning materials and homework for Module 2, check in with your instructor for information about Shop Activity 1- Shop Demo Units.

Module 2: Check in

Now that you have completed Module 2, check in with your instructor if you have questions, if not, move on to Module 3.

Module 3: Repairing Heating and AC systems

Module 3: Overview

Introduction to Module 3: This module will prepare you to repair truck heating and air conditioning systems. You will have access to learning materials including reading assignments and videos. You will also complete activities online and in the shop. Assessment of competencies in this module will take place in an exam at the end of module 4, and a performance exam at the end of this module.

The course work in this module, combined with class sessions should prepare you to:

Repair truck heating and air conditioning systems.

1. Troubleshoot and repair truck air conditioning systems

Module 3: PowerPoint

The PowerPoint presentation below, will give you information about repairing truck heating and air conditioning systems, with additional notes from your instructor. It may be helpful to do the module readings in your textbook as you view the PowerPoint presentation.

Click the link to get started.

CDX Air Cond chp 52

Module 3: Readings

Reading Assignment

The purpose of these learning resources is to learn about repairing truck heating and air conditioning systems. While you are reading, think about the process of testing the performance of an air conditioning system. Your goal is to learn how to diagnose and repair heating and air conditioning systems.

You can complete the readings for this module in your textbook CDXHDCV: Chapter 52. You can also access digital copies of the readings using the links below.

Module 3: YouTube Videos

Watch the videos about repairing truck heating and air conditioning systems.

1. Using a Sniffer to find Freon leak <https://www.youtube.com/watch?v=yrhWKIQEPWw>
2. Four ways to find Freon leaks <https://www.youtube.com/watch?v=swEgViUp0f0>
3. Video on use of Mastercool Model 69789 R134a Freon recycle unit.

Click the links to view the videos.

Module 3: CDX Videos

Watch the videos from your textbook about repairing truck heating and air conditioning systems.

1. AC lines
2. Electric Servo motors
3. HVAV servos

Click the links to view the videos.

Module 3: Animations

Try out the animations from your CDX text related to repairing truck heating and air conditioning systems.

1. Performance testing
2. Pressure testing

Click the links to view the animations.

Module 3: Homework

Homework

Once you have reviewed the learning resources for this module, do the module homework questions. You may answer the questions as many times as you want. You may also use your book as a resource.

The homework questions include ASE style questions, which consist of two true/false style statements. To answer the question, evaluate technician A's statement alone to determine if it is correct, then evaluate technician B's statement alone to determine if it is correct, then make your selection based on your conclusion.

Module 3: Shop Activity 1

Now that you have completed the learning materials and homework for Module 3, check in with your instructor for information about Shop Activity 1- Repair AC System.

Module 3: Check in

Now that you have completed Module 3, check in with your instructor for information about Shop Exam 1: Troubleshoot and repair a heating and AC system.

Module 4: Repairing Trailer Refrigeration Systems

Module 4: Overview

Introduction to Module 4: This module will cover the principles of repairing trailer refrigeration systems. You will have access to learning materials including reading assignments and videos. You will also complete activities online and in the shop. Assessment of competencies in this module will take place in an exam at the end of this module, and a performance exam at the end of this module.

The course work in this module, combined with class sessions should prepare you to:

Describe the basic operating principles of trailer refrigeration units and demonstrate connecting gauges.

1. Describe basic operating principles of trailer refrigeration units
2. Identify and describe differences between truck and trailer refrigeration systems
3. Troubleshoot and repair trailer refrigeration systems
4. Connect gauges to a truck refrigeration unit

Module 4: PowerPoint

The PowerPoint presentation below, will give you information about the principles of repairing trailer refrigeration systems, with additional notes from your instructor. It may be helpful to do the module readings in your textbook as you view the PowerPoint presentation.

Click the link to get started.

CDX Air Cond Ch 53

Module 4: Readings

Reading Assignment

The purpose of these learning resources is to learn about the principles of repairing trailer refrigeration systems. While you are reading, think about the process of testing the performance of a trailer refrigeration system. Your goal is to learn how to diagnose and repair trailer refrigeration systems.

You can complete the readings for this module in your textbook CDXHDCV: Chapter 53. You can also access digital copies of the readings using the links below.

Module 4: Videos

Watch the videos about the principles of repairing trailer refrigeration systems.

1. Thermo King Refrigeration unit components
<https://www.youtube.com/watch?v=cwEmb8mcxZI>
2. Thermo King operation <https://www.youtube.com/watch?v=XB6N6G0jYsE>

Click the links to view the videos.

Module 4: Homework

Homework

Once you have reviewed the learning resources for this module, do the module homework questions. You may answer the questions as many times as you want. You may also use your book as a resource.

The homework questions include ASE style questions, which consist of two true/false style statements. To answer the question, evaluate technician A's statement alone to determine if it is correct, then evaluate technician B's statement alone to determine if it is correct, then make your selection based on your conclusion.

Module 4: Shop Activity 2

Now that you have completed the learning materials and homework for Module 4, check in with your instructor for information about Shop Activity 2- Thermo King.

Module 4: Written Exam 1

Once you have completed the learning resources and activities for Modules 1, 2, 3 and 4 take Exam 1.

Testing Procedures:

1. Click Take this Quiz
2. Read each question and choose the best answer(s).
3. When you have answered all the questions, click the Submit You will be shown your score.
4. Check-in with your instructor to discuss the results of your exam.

Module 4: Check in

Now that you have completed Module 4, check in with your instructor if you have questions, if not, move on to Module 5.

Module 5: Basic Operating Principles of Electricity

Module 5: Overview

Introduction to Module 5: This module will cover the basic operating principles of electricity. You will have access to learning materials including reading assignments and videos. You will also complete activities online. Assessment of competencies in this module will take place an exam at the end of module 7, and a performance exam at the end of Module 6.

The course work in this module, combined with class sessions should prepare you to:

Describe the basic operating principles of electricity.

1. Describe the electrical elements of atoms
2. Describe characteristics of voltage, amperage and resistance
3. Describe the difference between alternating and direct current
4. Describe Ohm's law and Watt's law

Module 5: PowerPoint

The PowerPoint presentation below, will give you information about the basic operating principles of electricity, with additional notes from your instructor. It may be helpful to do the module readings in your textbook as you view the PowerPoint presentation.

Click the link to get started.

Chapter 6 Principles

Module 5: Readings

Reading Assignment

The purpose of these learning resources is to learn about the basic operating principles of electricity. While you are reading, the concepts of voltage, amperage and resistance. Your goal is to learn how to explain the relationship between the main aspects of electricity.

You can complete the readings for this module in your textbook CDXHDCV: Chapter 6. You can also access digital copies of the readings using the links below.

Module 5: YouTube Videos

Watch the videos about the basic operating principles of electricity.

1. Electrical safety <https://www.youtube.com/watch?v=MtpLMdBcvqY&list=PLWfo-LUoIT1JO2e911FnqFLICXegVAXLj&index=68>
2. What is Voltage, Amps, Ohms and Ohms law <https://www.youtube.com/watch?v=zYS9kdS56l8>
3. What is DC electricity <https://www.youtube.com/watch?v=ic3D4A9i1oI>
4. More on DC electricity <https://www.youtube.com/watch?v=8qvJzrjwJds>

Click the links to view the videos.

Module 5: CDX Videos

Watch the videos from your textbook about the basic operating principles of electricity.

1. Basic Electron Theory
2. Conductors and Insulators
3. Free Electrons
4. Ground Circuit
5. Intro to Electrical
6. Semiconductors

Click the links to view the videos.

Module 5: Animations

Try out the animations from your CDX text related the basic operating principles of electricity.

1. Electron Theory

Click the links to view the animations.

Module 5: Homework

Homework

Once you have reviewed the learning resources for this module, do the module homework questions. You may answer the questions as many times as you want. You may also use your book as a resource.

The homework questions include ASE style questions, which consist of two true/false style statements. To answer the question, evaluate technician A's statement alone to determine if it is correct, then evaluate technician B's statement alone to determine if it is correct, then make your selection based on your conclusion.

Module 5: Written Exam 1

Once you have completed the learning resources and activities for Modules 1, 2, 3, 4 and 5 take Exam 1.

Testing Procedures:

1. Click Take this Quiz
2. Read each question and choose the best answer(s).
3. When you have answered all the questions, click the Submit You will be shown your score.
4. Check-in with your instructor to discuss the results of your exam.

Module 5: Check in

Now that you have completed Module 5, check in with your instructor if you have questions, if not, move on to Module 6.

Module 6: Using Electrical Test Equipment

Module 6: Overview

Introduction to Module 6: This module will cover the proper use of electrical test instruments used for trucks. You will have access to learning materials including reading assignments and videos. You will also complete activities online and in the shop. Assessment of competencies in this module will take place in a written exam at the end of Module 7 and a shop exam at the end of this module.

The course work in this module, combined with class sessions should prepare you to:

Demonstrate proper use of electrical test instruments used for trucks.

1. Describe types and operation of electrical test equipment
2. Demonstrate correct electrical equipment setup procedures
3. Demonstrate proper use of electrical test equipment

Module 6: PowerPoint

The PowerPoint presentation below, will give you information about the proper use of electrical test instruments used for trucks, with additional notes from your instructor. It may be helpful to do the module readings in your textbook as you view the PowerPoint presentation.

Click the link to get started.

4 Chapter 10 Elec

Module 6: Readings

Reading Assignment

The purpose of these learning resources is to learn about the proper use of electrical test instruments used for trucks. While you are reading, think about the operation of electronic test equipment to perform basic electrical measurements. Your goal is to learn how to set up test equipment and perform electrical measurements.

You can complete the readings for this module in your textbook CDXDECV: Chapter 10. You can also access digital copies of the readings using the links below.

Module 6: YouTube Videos

Watch the videos about proper use of electrical test instruments used for trucks.

1. Kline CL800 (newer model) or Kline CL2000 (older model)
<https://www.youtube.com/watch?v=PNBcH1DV6-U>
2. Repairing a bad connector/terminal <https://www.youtube.com/watch?v=-7oSpcl1jBY>
3. Soldering wires https://www.youtube.com/watch?v=6EiIDNEiB_U
4. Testing for parasitic loads, loss of battery power
<https://www.youtube.com/watch?v=QRso1A0VScw>

Click the links to view the videos.

Module 6: CDX Videos

Watch the videos from your textbook about proper use of electrical test instruments used for trucks.

1. Checking Continuity with DVOM
2. Diagnostic Process
3. DVOM Overview
4. DVOM Ranges
5. Measuring Voltage
6. Pico Scope Intro
7. Pico Scope Measurement
8. Voltmeter Differences

Click the links to view the videos.

Module 6: Animations

Try out the animations from your CDX text related to proper use of electrical test instruments used for trucks.

1. Lighting Operation Test light testing

Click the links to view the animations.

Module 6: Shop Activity 3

Now that you have completed the learning materials and homework for Module 6, check in with your instructor for information about Shop Activity 3- Electro Trainer by Idaho Instrument.

Module 7: Electrical Circuits and Circuit Protection

Module 7: Overview

Introduction to Module 7: This module will cover the electrical circuits and circuit protection in trucks. You will have access to learning materials including reading assignments and videos. You will also complete activities online and in the shop. Assessment of competencies in this module will take place in an exam at the end of this module, and a performance exam at the end of this module.

The course work in this module, combined with class sessions should prepare you to:

Describe electrical circuits and circuit protection in trucks.

1. Describe types of electrical circuits
2. Describe factors that cause voltage drop in electrical circuits
3. Describe types of electrical circuit failures
4. Describe types of electrical protection devices

Module 7: PowerPoint

The PowerPoint presentation below, will give you information electrical circuits and circuit protectors, with additional notes from your instructor. It may be helpful to do the module readings in your textbook as you view the PowerPoint presentation.

Click the link to get started.

Chapter 8 Elect Cir

Module 7: Readings

Reading Assignment

The purpose of these learning resources is to learn about electrical circuits and circuit protectors. While you are reading, think about the behavior of current flow in each type of electrical circuit. Your goal is to understand the relationship between voltage, amperage power and resistance in electrical circuits.

You can complete the readings for this module in your textbook CDXHDCV: Chapter 8. You can also access digital copies of the readings using the links below.

Module 7: YouTube Videos

Watch the videos about electrical circuits and circuit protectors.

1. Series and Parallel circuits https://www.youtube.com/watch?v=x2EuYqj_0Uk
2. Building an electrical circuit <https://phet.colorado.edu/en/simulation/circuit-construction-kit-dc>
3. Using the Power Probe tool to find electrical shorts and opens <https://www.youtube.com/watch?v=RrA6HtLyNmW>
4. Example of finding a short using the Power Probe tool <https://www.youtube.com/watch?v=ufVuWznmJLA>

5. Fuses Circuit protection how they work
<https://www.youtube.com/watch?v=11oFQbVDUU>
6. Fuse and circuit breaker operation <https://www.youtube.com/watch?v=0ihkfUbddsk>
7. How to use a DVOM to check for voltage drop
<https://www.youtube.com/watch?v=9aioZN33xsA>

Click the links to view the videos.

Module 7: CDX Videos

Watch the videos from your textbook about electrical circuits and circuit protectors.

1. Common Electrical Faults
2. Electrical Power
3. Fuses and Circuit Breakers
4. Ohms Law
5. Parallel Circuit Resistance
6. Parallel Circuits
7. Series Circuits
8. Series-Parallel Circuits

Click the links to view the videos.

Module 7: Animations

Try out the animations from your CDX text related to electrical circuits and circuit protectors.

1. DC motor Speed Torque
2. Water Analogy

Click the links to view the animations.

Module 7: Homework

Once you have reviewed the learning resources for this module, do the module homework questions. You may answer the questions as many times as you want. You may also use your book as a resource.

The homework questions include ASE style questions, which consist of two true/false style statements. To answer the question, evaluate technician A's statement alone to determine if it is correct, then evaluate technician B's statement alone to determine if it is correct, then make your selection based on your conclusion.

Module 7: Shop Activity 4

Now that you have completed the learning materials and homework for Module 7, check in with your instructor for information about Shop Activity 4- Electro Trainer by Idaho Instrument part 2.

Module 7: Written Exam 2

Once you have completed the learning resources and activities for Modules 5, 6 and 7 take Written Exam 2.

Testing Procedures:

1. Click Take this Quiz
2. Read each question and choose the best answer(s).
3. When you have answered all the questions, click the Submit You will be shown your score.
4. Check-in with your instructor to discuss the results of your exam.

Module 7: Check in

Now that you have completed Module 7, check in with your instructor if you have questions, if not, move on to Module 8.

Module 8: Basic Operating Principles of Circuit Control Devices

Module 8: Overview

Introduction to Module 8: This module will cover the basic operating principles of circuit control devices. You will have access to learning materials including reading assignments and videos. You will also complete activities online and in the shop. Assessment of competencies in this module will take place in an exam at the end of module 11.

The course work in this module, combined with class sessions should prepare you to:

Describe operating principles of circuit control devices in trucks.

1. Describe common types of circuit control devices
2. Describe testing procedures used to diagnose and repair circuit control devices

Module 8: PowerPoint

The PowerPoint presentation below, will give you information about the basic operating principles of circuit control devices, with additional notes from your instructor. It may be helpful to do the module readings in your textbook as you view the PowerPoint presentation.

Click the link to get started.

Chapter 9 Circuit

Module 8: Readings

Reading Assignment

The purpose of these learning resources is to learn about the basic operating principles of circuit control devices. While you are reading, think about the types of circuit control devices. Your goal is to understand the operation of circuit control devices and how to test them for proper function.

You can complete the readings for this module in your textbook CDXHDCV: Chapter 9. You can also access digital copies of the readings using the links below.



Module 8: YouTube Videos

Watch the videos about the basic operating principles of circuit control devices.

1. Switches <https://www.youtube.com/watch?v=i94ztd5D7VM>
2. Potentiometers <https://www.youtube.com/watch?v=Q225qr0BctA>
3. Thermistors <https://www.youtube.com/watch?v=9opuvLXAetI>
4. Magnetic field <https://www.youtube.com/watch?v=uj0DFDfQajw>
5. Magnetic field around wires, right hand rule
<https://www.youtube.com/watch?v=nfSJ62mzKyY>
6. Inductance in Solenoids, electromagnetism creating electricity
https://www.youtube.com/watch?v=Dmc7HftORZo&index=2&list=PL3JtE4En7sikdch_VVn9YtWVCeTp_KaXr
7. Relays <https://www.youtube.com/watch?v=UAeKTlieYhw>
8. Understanding switches, relays, and solenoids
<https://www.youtube.com/watch?v=iZoGC0BUk5c>
9. Capacitors <https://www.youtube.com/watch?v=pnBRFXgaTMo>
10. Diodes https://www.youtube.com/watch?v=MVy_MG0X2h4
11. Zener Diode <https://www.youtube.com/watch?v=n5c44v6CPoU>
12. Light Emitting Diode LED <https://www.youtube.com/watch?v=u4L8gfzi3sE>
13. Transistor used as a relay/switch <https://www.youtube.com/watch?v=fdeyWjq8Y2k>
14. MOSFET Field Effect Transistor as a relay/switch
<https://www.youtube.com/watch?v=v57O0uuSaE0>

Click the links to view the videos.

Module 8: CDX Videos

Watch the videos from your textbook about safety concerns related to the basic operating principles of circuit control devices.

1. Basic Electronics
2. Capacitors
3. Diodes
4. Relay Design and Operation
5. Thermistors
6. Transistors

Click the links to view the videos.

Module 8: Animations

Try out the animations from your CDX text related to the basic operating principles of circuit control devices.

1. Relays

Click the links to view the animations.

Module 8: Homework

Homework

Once you have reviewed the learning resources for this module, do the module homework questions. You may answer the questions as many times as you want. You may also use your book as a resource.

The homework questions include ASE style questions, which consist of two true/false style statements. To answer the question, evaluate technician A's statement alone to determine if it is correct, then evaluate technician B's statement alone to determine if it is correct, then make your selection based on your conclusion.

Module 8: Shop Activity 5

Now that you have completed the learning materials and homework for Module 8, check in with your instructor for information about Shop Activity 5- Electro Trainer by Idaho Instrument part 3.

Module 8: Check in

Now that you have completed Module 8, check in with your instructor if you have questions, if not, move on to Module 9.

Module 9: Operating Principles of Batteries in Trucks

Module 9: Overview

Introduction to Module 9: This module will cover the basic operating principles of batteries in trucks. You will have access to learning materials including reading assignments and videos. You will also complete activities online and in the shop. Assessment of competencies in this module will take place an exam at the end of module 11.

The course work in this module, combined with class sessions should prepare you to:

Describe the basic operating principles of batteries in trucks.

1. Describe the battery types
2. Describe battery components and constructions
3. Describe battery ratings
4. Describe chemical reaction process during charging and discharging

Module 9: PowerPoint

The PowerPoint presentation below, will give you information about the basic operating principles of batteries in trucks, with additional notes from your instructor. It may be helpful to do the module readings in your textbook as you view the PowerPoint presentation.

Click the link to get started.

Chapter 11 Batteries

Module 9: Readings

Reading Assignment

The purpose of these learning resources is to learn about the basic operating principles of batteries in trucks. While you are reading, the construction and types of truck batteries. Your goal is to understand the operation and application of battery types.

You can complete the readings for this module in your textbook CDXHDCV: Chapter 11. You can also access digital copies of the readings using the links below.

Module 9: YouTube Videos

Watch the videos about the basic operating principles of batteries in trucks.

1. How a battery works https://www.youtube.com/watch?v=4lgHj2Uim_0
2. A bank of batteries, series versus parallel
<https://www.youtube.com/watch?v=w1Mqn6Ewvio>

Click the links to view the videos.

Module 9: CDX Videos

Watch the videos from your textbook about safety concerns related to brakes.

1. Battery Cells
2. Lead Acid Battery

Click the links to view the videos.

Module 9: Animations

Try out the animations from your CDX text related to the basic operating principles of batteries in trucks.

1. Battery Construct Operation

Click the link to view the animation.

Module 9: Homework

Once you have reviewed the learning resources for this module, do the module homework questions. You may answer the questions as many times as you want. You may also use your book as a resource.

The homework questions include ASE style questions, which consist of two true/false style statements. To answer the question, evaluate technician A's statement alone to determine if it is correct, then evaluate technician B's statement alone to determine if it is correct, then make your selection based on your conclusion.

Module 9: Shop Activity 6

Now that you have completed the learning materials and homework for Module 9, check in with your instructor for information about Shop Activity 6- Shop Load Test Batteries.

Module 9: Check in

Now that you have completed Module 9, check in with your instructor if you have questions, if not, move on to Module 10.

Module 10: Advanced Battery Technologies for Trucks

Module 10: Overview

Introduction to Module 10: This module will cover advanced battery technologies for trucks. You will have access to learning materials including reading assignments and videos. You will also complete activities online. Assessment of competencies in this module will take place in a written exam at the end of module 11.

The course work in this module, combined with class sessions should prepare you to:

Describe advanced battery technologies for trucks.

1. Describe the features of lithium and nickel-metal hydride batteries
2. Describe the features of ultra-capacitors

Module 10: PowerPoint

The PowerPoint presentation below, will give you information about advanced battery technologies for trucks, with additional notes from your instructor. It may be helpful to do the module readings in your textbook as you view the PowerPoint presentation.

Click the link to get started.

Chapter 12 Advanced Batteries

Module 10: Readings

Reading Assignment

The purpose of these learning resources is to learn about advanced battery technologies for trucks. While you are reading, think about the types of advanced batteries. Your goal is to learn how to properly test and service these types of batteries.

You can complete the readings for this module in your textbook CDXHDCV: Chapter 12. You can also access digital copies of the readings using the links below.

Module 10: Videos

Watch the videos about advanced batteries for trucks.

1. Lithium ion battery <https://www.youtube.com/watch?v=kqR7MihP5k4>
2. Absorbed Glass Matt AGM Battery <https://www.youtube.com/watch?v=u2QwntIO4Mk>

Click the links to view the videos.

Module 10: Homework

Homework

Once you have reviewed the learning resources for this module, do the module homework questions. You may answer the questions as many times as you want. You may also use your book as a resource.

The homework questions include ASE style questions, which consist of two true/false style statements. To answer the question, evaluate technician A's statement alone to determine if it is correct, then evaluate technician B's statement alone to determine if it is correct, then make your selection based on your conclusion.

Module 10: Check in

Now that you have completed Module 10, check in with your instructor if you have questions, if not, move on to Module 11.

Module 11: Servicing Commercial Vehicle Batteries

Module 11: Overview

Introduction to Module 11: This module will cover how to service commercial vehicle batteries. You will have access to learning materials including reading assignments and videos. You will also complete activities online and in the shop. Assessment of competencies in this module will take place in an exam at the end of this module, and a performance exam at the end of this module.

The course work in this module, combined with class sessions should prepare you to:

Service commercial vehicle batteries.

1. Describe safe working practices for servicing batteries
2. Describe the procedures and equipment used in testing batteries
3. Describe failure modes of batteries
4. Service and test truck batteries

Module 11: PowerPoint

The PowerPoint presentation below, will give you information about servicing commercial batteries, with additional notes from your instructor. It may be helpful to do the module readings in your textbook as you view the PowerPoint presentation.

Click the link to get started.

Chapter 13 Battery

Module 11: Readings

Reading Assignment

The purpose of these learning resources is to learn about servicing commercial batteries. While you are reading, the proper testing methods for each kind of battery. Your goal is to learn how to troubleshoot and repair battery systems.

You can complete the readings for this module in your textbook CDXHDCV: Chapter 13. You can also access digital copies of the readings using the links below.

Module 11: YouTube Videos

Watch the videos about servicing commercial batteries.

1. Load testing a battery <https://www.youtube.com/watch?v=3QiKyjWWiRo>
2. Battery care and Maintenance <https://www.youtube.com/watch?v=MhnVZ7ZPunw>
3. Exploding Battery https://www.youtube.com/watch?v=d_TnsHu2u4c

Click the links to view the videos.

Module 11: CDX Videos

Watch the videos from your textbook about servicing commercial batteries.

1. Battery Load Test
2. Charging a Battery
3. Battery Testing with DTAC
4. Battery Testing with Midtronics

Click the links to view the videos.

Module 11: Homework

Homework

Once you have reviewed the learning resources for this module, do the module homework questions. You may answer the questions as many times as you want. You may also use your book as a resource.

The homework questions include ASE style questions, which consist of two true/false style statements. To answer the question, evaluate technician A's statement alone to determine if it is correct, then evaluate technician B's statement alone to determine if it is correct, then make your selection based on your conclusion.

Module 11: Shop Activity 7

Now that you have completed the learning materials and homework for Module 11, check in with your instructor for information about Shop Activity 7 - Load Test Batteries on a Truck.

Module 11: Written Exam 3

Once you have completed the learning resources and activities for Modules 8, 9, 10 and 11 take Exam 3.

Testing Procedures:

1. Click Take this Quiz
2. Read each question and choose the best answer(s).
3. When you have answered all the questions, click the Submit You will be shown your score.
4. Check-in with your instructor to discuss the results of your exam.

Module 11: Check in Shop Exam

Now that you have completed Module 11, check in with your instructor for information about Shop Exam 2: Using Electrical Test Equipment.

Module 11: Check in

Now that you have completed Module 11, check in with your instructor for exam results and completion of the course.