



8679

ELECTRICAL FUNDAMENTALS,
COMPUTERS, AND DIAGNOSTIC
EQUIPMENT (12C)

40S/40E/40M

A Heavy Duty Equipment Technician Course

8679: ELECTRICAL FUNDAMENTALS, COMPUTERS, AND DIAGNOSTIC EQUIPMENT (12C) 40S/40E/40M

Course Description

A student wanting to develop skills in the heavy duty equipment industry must have knowledge of electrical fundamentals, computers, and diagnostic equipment. The student will learn electrical theory, including circuits. The student will be able to use electronic diagnostic interfaces to service heavy duty equipment systems and to diagnose and repair problems with them.

Cross-curricular learning outcomes, or essential skills from subject areas including, but not limited to, information and communication technologies, science, English language arts, and mathematics, are to be integrated into the authentic learning activities of the course.

The curriculum is not sequential. For instructional purposes, the sequence of learning outcomes can vary based on the learning activities within the course.

Goal 1: Describe and apply appropriate **safety** practices for heavy duty equipment technicians.

GLO 1.1: Describe and apply appropriate **safety** practices for heavy duty equipment technicians.

- SLO 12C.1.1.1 Describe and apply appropriate health and safety practices as they pertain to electrical fundamentals, computers, and diagnostic equipment.
- SLO 12C.1.1.2 Describe safety practices, Workplace Hazardous Material Information System (WHMIS), and preventative maintenance. (A1.01)
- SLO 12C.1.1.3 Describe cab, canopy, and ROP/FLOP components, and their operation, inspection, repair, and replacement procedures. (A1.02)
- SLO 12C.1.1.4 Describe the servicing of fire suppression systems. (A1.03)
- SLO 12C.1.1.5 Describe forklift operation and safety. (A1.04)
- SLO 12C.1.1.6 Describe restraint systems and their components, and inspection procedure, manufacturers' tests, and repair/replacement of them. (A1.05)
- SLO 12C.1.1.7 Demonstrate safety procedures for hydraulic hydrostatic system servicing.

SLO 12C.1.1.8	Demonstrate safety procedures for HVAC system servicing.
SLO 12C.1.1.9	Describe the importance of using personal protective equipment (PPE). (TSA 16)
SLO 12C.1.1.10	Describe safety procedures when handling wheels, tires, and hubs. (F1.04)
SLO 12C.1.1.11	Maintain a safe and organized work environment.
SLO 12C.1.1.12	Document an understanding of the safe use of heavy duty tools and equipment.

GLO 1.2: Demonstrate knowledge of the *Trade Safety Awareness Manual*.

No applicable SLOs.

Goal 2: Identify, select, use, and maintain **tools, equipment, materials, and consumables**.

GLO 2.1: Identify, select, use, and maintain **tools, equipment, materials, and consumables**.

SLO 12C.2.1.1	Identify, select, use, and maintain tools, equipment, materials, and consumables used for working with electrical fundamentals, computers, and diagnostic equipment.
---------------	--

Goal 3: Describe and demonstrate equipment **access/transport** procedures.

GLO 3.1: Describe and demonstrate equipment **access/transport** procedures.

SLO 12C.3.1.1	Describe lifting equipment. (A2.01)
SLO 12C.3.1.2	Describe safety practices that apply to lifting and to the maintenance of lifting equipment. (A2.02)
SLO 12C.3.1.3	Describe towing, transporting, and coasting precautions. (A2.03)
SLO 12C.3.1.4	Describe manual lifting procedures using correct body mechanics. (A2.04)
SLO 12C.3.1.5	Describe lifting equipment construction, grading, sizing, and limits. (A2.05)
SLO 12C.3.1.6	Select the correct equipment for rigging typical loads. (A2.06)

- SLO 12C.3.1.7 Describe wire rope applications. (A2.07)
SLO 12C.3.1.8 Describe winch design, and operational and troubleshooting procedures. (A2.08)
-

Goal 4: Diagnose and repair problems with heavy duty equipment systems.

GLO 4.1: Diagnose problems with heavy duty equipment systems.

- SLO 12C.4.1.1 Diagnose issues related to electrical fundamentals.
SLO 12C.4.1.2 Demonstrate the use of computerized diagnostic equipment.
-

GLO 4.2: Describe and repair problems with heavy duty equipment.

- SLO 12C.4.2.1 Describe electrical fundamentals. (I2.01)
SLO 12C.4.2.2 Describe Ohm's law and related electrical laws. (I2.02)
SLO 12C.4.2.3 Describe series and parallel circuits. (I2.03)
SLO 12C.4.2.4 Describe basic electrical components and their operation. (I2.04)
SLO 12C.4.2.5 Describe and use diagnostic equipment; diagnose electrical wiring and components. (I2.05)
SLO 12C.4.2.6 Describe the purpose and design of a battery, and identify service ratings of batteries. (I2.06)
SLO 12C.4.2.7 Explain battery charging and precautions; diagnose battery problems and service batteries. (I2.07)
SLO 12C.4.2.8 Describe battery boosting procedures. (I2.08)
-

GLO 4.3: Perform maintenance on heavy duty equipment systems.

- SLO 12C.4.3.1 Describe and perform maintenance on electrical systems.
-

Goal 5: Describe and demonstrate the transferable cross-curricular knowledge and skills pertaining to heavy duty equipment technology.

GLO 5.1: Read, interpret, and communicate information relevant to heavy duty equipment technology.

- SLO 12C.5.1.1 Read, interpret, and communicate information relevant to heavy duty equipment technicians' practices as they apply to electrical fundamentals, computers, and diagnostic equipment.
-

GLO 5.2: Apply knowledge and skills from **mathematics**.

SLO 12C.5.2.1 Apply knowledge and skills from mathematics to heavy duty equipment technicians' practices as they apply to electrical fundamentals, computers, and diagnostic equipment.

GLO 5.3: Apply knowledge and skills from **the sciences**.

SLO 12C.5.3.1 Apply knowledge and skills from the sciences to heavy duty equipment technicians' practices as they apply to electrical fundamentals, computers, and diagnostic equipment.

GLO 5.4: Apply knowledge and skills from **information and communication technology**.

SLO 12C.5.4.1 Apply knowledge and skills from information and communication technology relevant to heavy duty equipment technicians' practices as they apply to electrical fundamentals, computers, and diagnostic equipment.

Goal 6: Demonstrate an awareness of **sustainability** as it pertains to heavy duty equipment technology.

GLO 6.1: Describe the heavy duty equipment industry's **sustainability practices** and its impact on the environment.

SLO 12C.6.1.1 Describe the heavy duty industry's sustainability practices with regard to electrical fundamentals, computers, and diagnostic equipment, and their impact on the environment.

GLO 6.2: Describe the impact of the heavy duty equipment industry on **human health and well-being**.

SLO 12C.6.2.1 Describe the heavy duty equipment industry's sustainability practices with regard to electrical fundamentals, computers, and diagnostic equipment, and their impact on human health and well-being.

GLO 6.3: Describe **sustainable business practices** within the heavy duty equipment service and repair industry.

SLO 12C.6.3.1 Describe sustainable business practices within the heavy duty service and repair industry as they apply to electrical fundamentals, computers, and diagnostic equipment.

Goal 7: Demonstrate an awareness of the **ethical and legal standards** as they pertain to the heavy duty equipment service and repair industry.

GLO 7.1: Demonstrate an awareness of the **ethical and legal expectations** of heavy duty equipment technicians.

SLO 12C.7.1.1 Demonstrate an awareness of the ethical and legal expectations of heavy duty technicians with regard to electrical fundamentals, computers, and diagnostic equipment.

Goal 8: Demonstrate **employability skills** related to the heavy duty equipment service and repair industry.

GLO 8.1: Demonstrate fundamental **employability skills**.

SLO 12C.8.1.1 Demonstrate problem-solving skills.
SLO 12C.8.1.2 Demonstrate critical thinking skills.
SLO 12C.8.1.3 Demonstrate regular attendance and punctuality.
SLO 12C.8.1.4 Demonstrate accountability by taking responsibility for own actions.
SLO 12C.8.1.5 Demonstrate adaptability, initiative, and effort.
SLO 12C.8.1.6 Demonstrate the ability to accept and follow direction and feedback.
SLO 12C.8.1.7 Demonstrate teamwork skills.
SLO 12C.8.1.8 Demonstrate the ability to stay on task and to make effective use of time in class and shop environments.
SLO 12C.8.1.9 Demonstrate the ability to communicate respectfully and effectively with coworkers and customers.

GLO 8.2: Demonstrate an understanding of the **business operation** of a heavy duty equipment service and repair facility.

SLO 12C.8.2.1 Demonstrate an understanding of the business operation of a heavy duty equipment service and repair facility with regard to computers.

Goal 9: Understand **career opportunities** in heavy duty equipment technology and associated professions.

GLO 9.1: Demonstrate an understanding of **career opportunities** in heavy duty equipment technology and associated professions.

SLO 12C.9.1.1 Describe training, career opportunities, and industry groups related to electrical fundamentals, computers, and diagnostic equipment.

Goal 10: Demonstrate an awareness of the **evolution** of heavy duty equipment technology, including its **technological progression and emerging trends**.

GLO 10.1: Describe the **evolution** of heavy duty equipment service and repair, including its **technological progression and emerging trends**.

SLO 12C.10.1.1 Describe the evolution of heavy duty equipment service and repair, including its technological progression and emerging trends, as related to electrical fundamentals, computers, and diagnostic equipment.
