

# Heavy Equipment & Transportation Technology Curriculum Outline

## Technical Performance Standards for high school program

Technological proficiency is developed through a series of carefully articulated learning stages accompanied by exercises, simulations and practical experiences. As the technician grows and develops, he or she acquires the following essential abilities:

- *Seek, browse, evaluate and retrieve information/data available from electronic media, technology and telecommunications;*
- *Extend and expand his/her capabilities as a critical thinker, analyzer and selector of information and technologies to solve problems, address issues and transform ideas into reality;*
- *Use technology and telecommunications tools in his/her daily life, work situations and learning environments;*
- *Communicate effectively;*
- *Conduct him/herself responsibly in a technological environment*
- Vocational/Technical Goals are that students:
- *Have a Working Knowledge of the Fundamental Scientific Principles of Equipment Technology.*
- *Have a Working Knowledge of Technical Equipment Components, Understand Their Operational Functions, Conduct Experiments and Solve Problems.*
- *Acquire basic skills in the use of technical tools and materials and demonstrate safe work habits and techniques in their usage.*

Following are the Equipment Technology Industry Standards for the Vocational/ Technical Goals:

## **Electricity**

- 1a. Perform mathematical computations dealing with electricity.
- 1b. Know the basic concepts of electricity.
- 1c. Comprehend and utilize electrical quantities and units.
- 1d. Demonstrate an understanding of magnetism and electromagnetism.
- 1e. Know and use the vocabulary pertaining to electricity.
- 2a. Analyze and compare basic circuits, laws and measurements.
- 2b. Understand the fundamentals of capacitance, inductance, AC and DC voltage.
- 2c. Trace and analyze multiple-load and complex circuits.
- 2d. Know the basic theory related to the operation of a battery.
- 2e. Understand the basic operation of transformers and electrical motors.
- 3a. Demonstrate safe work practices in an electrical shop; including proper usage of tools, equipment, cleaning solvents/equipment, personal safety apparatus/clothing, environmental protection and fire prevention/suppression.
- 3b. Follow a technical manual to analyze and repair a circuit operation problem; including the removal, replacement and/or rebuilding of malfunctioning components.

## **Hydraulics**

- 1a. Trace the history and development of hydraulics.
- 1b. Know and apply the concepts of hydraulic design and operation.
- 1c. Understand the basic principles of hydraulic theory, including open and closed center systems.
- 1d. Identify hydraulic schematics and their symbols in relation to the components which they represent.
- 1e. Know and use the vocabulary pertaining to hydraulics.
- 2a. Demonstrate an understanding of the various hydraulic fluids, filtering systems and pumping systems.
- 2b. Identify the different types and usage's of hydraulic pipe fittings, tubing, hoses and seals.
- 2c. Understand the basic functions, operations and usage's of the major types of hydraulic accumulators, cylinders, motors, pumps and valves.
- 3a. Perform hydraulics maintenance checks; including flushing systems, preventing leaks and protecting against overheating.
- 3b. Demonstrate safe work practices in a hydraulics shop; including proper usage of tools, equipment, cleaning solvents/equipment, personal safety apparatus/clothing, environmental protection and fire prevention/suppression.
- 3c. Follow a technical manual to analyze and repair a hydraulic equipment operation problem; including the removal, replacement and/or rebuilding of malfunctioning components.

## **Electronics**

- 1a. Trace the history and development of electronics.
- 1b. Perform mathematical computations dealing with electronics.
- 1c. Demonstrate knowledge of the basic concepts of electronics.
- 1d. Know and utilize the concepts, principles and processes of electronic design.
- 1e. Know and use the vocabulary pertaining to electronics.
- 2a. Understand the composition of semiconductors, junction diodes and transistors.
- 2b. Know and utilize the concepts pertaining to small signal, large signal and operational amplifiers.
- 2c. Analyze, compare and evaluate oscillators and linear integrated circuits.
- 2d. Understand the basic operation of power supplies, VOMs and oscilloscopes.
- 3a. Demonstrate safe work habits in an electronics shop; including proper usage of tools, equipment, cleaning solvents/equipment, personal safety apparatus/clothing, environmental protection and fire protection/suppression.
- 3b. Follow a technical manual to analyze and repair a malfunctioning electronic system; including removal, replacement and/or rebuilding components using electronic instrumentation.

## **Small Engines/Repair**

- 1a. Trace the history and development of engines.
- 1b. Perform mathematical measurements and computations pertaining to engines.
- 1c. Know the basic concepts of small engine functions and operations.
- 1d. Apply the concepts, principles and processes of small engine design and its various components.
- 1e. Know and use the vocabulary pertaining to small engines.
- 2a. Identify the different types of small engines.
- 2b. Understand the basic principles of cooling and lubricating systems.
- 2c. Demonstrate an understanding of small engine blocks and cylinders.
- 2d. Know the concepts pertaining to fuel systems and intake/exhaust systems.
- 2e. Understand the concepts of crankshafts and bearings
- 2f. Know the functions of an electrical engine system.
- 3a. Exhibit the correct techniques for using hand, power and precision tools.
- 3b. Demonstrate safe work practices in a small engine shop; including proper usage of tools, equipment, cleaning solvents/equipment, personal safety apparatus/clothing, environmental protection and fire prevention/suppression.

- 3c. Follow a technical manual to analyze and repair a small engine operation problem; including the removal, replacement and/or rebuilding of malfunctioning components.

## **Power Train**

- 1a. Trace the history and development of the power train.
- 1b. Perform mathematical computations dealing with a power train.
- 1c. Demonstrate knowledge of the basic concepts a power train.
- 1d. Know and use the schematics and vocabulary pertaining to a power train.
- 2a. Understand the theory and principles of torque converters, manual transmissions and powershift transmissions.
- 2b. Know the theory and principles of clutches, their components and functions.
- 2c. Comprehend the theory and principles of electronic-controlled transmissions and hydrostatic transmissions.
- 2d. Demonstrate knowledge of driveshaft function/construction and the theories and principles of differentials and final drives.
- 3a. Use hand, power and precision tools correctly when examining, operating and/or repairing power train equipment.
- 3b. Demonstrate safe work practices when handling power train equipment, including proper usage of tools, equipment, cleaning solvents/equipment, personal safety apparatus/clothing, environmental protection and fire prevention/suppression.
- 3c. Follow a technical manual to analyze and repair a power train, including the removal, replacement and/or rebuilding of malfunctioning components.

## **Equipment Technology Safety Practices**

- 1a. Know and apply the concepts of equipment technology safety practices.
- 1b. Identify equipment technology schematics and symbols related to safe equipment identification and operation.
- 1c. Know and use the vocabulary pertaining to equipment technology safety practices.
- 2a. Demonstrate an understanding of the appropriate usage of air, electric, hand and hydraulic tools.
- 2b. Comprehend and safely utilize lifting equipment.
- 2c. Know the chemical and thermal functions of equipment technology gases, liquids and solids which have safety implications.
- 2d. Understand appropriate and safe usage of ventilation and building exhaust systems.
- 2e. Know the various O.S.H.A. regulations, federal/state labor laws and workman's compensation/accident prevention rules related to the field of equipment technology.
- 3a. Demonstrate safe work practices in the equipment technology laboratories.

- 3b. Identify and prevent potential equipment technology safety hazards in the equipment technology laboratory environments.
- 3c. Maintain and monitor equipment usage logs to determine when periodic maintenance functions should be completed and to detect equipment defects and failures.