

CASE 4 Learning Agricultural Equipment and Technology Curriculum Assessment



Number	AED Standards	CASE 4 Learning AEMT Performance Objectives
Safety Standards		
1a.1	Identification and use of basic hand tools	Measure components using a dial caliper, dial indicator, torque wrench, and combination square.
		Use a micrometer to make precise measurements.
1a.2	Use of electric tools	
1a.3	Use of air tools	
1a.4	Use of hydraulic tools	Inspect a hydraulic system for safety hazards.
		Record and practice the steps to place a hydraulic system in a zero energy state.
1a.5	Use of lifting equipment	
1a.6	Use of various cleaning equipment	
1a.7	Use of fluid pressure testing equipment	Inspect a fuel injector for faults
1a.8	Environment of service facility	
1a.9	Machine identification and operation	Identify and describe the equipment used in the local area to produce and harvest crops.
		Calibrate a hand sprayer and fertilizer spreader.
		Operate a simulated tractor and guidance system.
1a.10	Mandated regulations	Read an SDS and identify the ISO Standards for hydraulic fluids.
1a.11	Shop and in-field practices	Troubleshoot and complete a work/repair order for a broken drive train.
1a.12	Hazard identification and prevention	Identify the safety hazards found in the internal motions of equipment.
Administrative		
1b.1	Comprehend basic academic functions	Write a work/repair order using technical writing.
		Write a work/repair order for a universal joint repair.
		Repair a universal joint and identify steps to verify operation using a manufacturer's service manual.
		Compile a work portfolio of technical skill competencies.
1b.2	Utilize industry software and electronic communications systems and reference resources	Create a picklist for equipment repair using a digital service manual.
1b.3	Awareness of dealership goals, objectives and policies	Identify interpersonal skills desired by ag equipment dealers.
1b.4	Define basic business practices	Organize notebooks to record coursework and projects.
		Identify bolt size, type, and grade.
1b.5	Describe functions of the dealership service department; explain department goals and procedures	Practice recording assembly and disassembly procedures in a logbook.
		Identify the parts of the six-step diagnostic process during a guest technician presentation.
		Assess the mechanical systems of a tractor and implement and write a work/repair order for recommended maintenance.
		Complete service procedures for hydraulic, electrical, and power train systems.
		Compile a work portfolio of technical skill competencies.
Electronics/Electrical Systems		
2.1	Fundamental knowledge	
2.2	Ohm's law	Test for voltage, resistance, and continuity in an electrical component using a digital multimeter.
		Construct series, parallel, and series-parallel circuits.
		Calculate total resistance in series, parallel, and series-parallel circuits.
2.3	12/24 volt cranking circuits	Test a diode using a digital multimeter.
		Construct circuits using silicon diodes
		Test the continuity of an ignition key switch
		Construct an ignition/shutdown circuit using cables and connectors.
2.4	12/24 volt charging circuits	Construct circuits using Zener diodes.
		Rectify AC voltage to power an LED.
		Troubleshoot a tractor's charging system using a digital multimeter.
		Calculate voltage drop in a circuit.
		Troubleshoot voltage drops with a digital multimeter.
		Diagnose parasitic battery drain with a digital multimeter.
2.5	Lighting, accessory and control systems	Draw a flow chart explaining the relationship between precision agricultural components found on a combine.
		Set up a control system for activating an irrigator.
		Construct a control system modeling a tractor's autosteer system.

		Model a rheostat using a graphite pencil.
		Use a potentiometer to change the voltage in a circuit.
		Identify common terminals used on relays.
		Assemble a circuit using a relay.
		Modify a sprayer to include electrical and GPS controls.
2.6	Electrical schematics/diagrams	Describe a cranking system using an electrical schematic.
		Assemble a shutdown circuit using a wiring schematic.
		Design and construct a circuit to control motor speed and direction.
2.7	SAE computer Can-Bus standards	Identify how a circuit fault in CAN bus impacts an 8-bit signal.
		Simulate CAN bus data in response to sensor data.
2.8	Diagnostics	Construct and troubleshoot a transducer.
		Troubleshoot an ignition/shutdown circuit using a digital multimeter and a schematic.
		Develop a troubleshooting and maintenance plan for a GPS sprayer.
		Complete service procedures for hydraulic, electrical, and power train systems.
Hydraulics/Hydrostatics		
3.1	Theory and operation, hydraulic and hydrostatic	Virtually assemble a fluid power system
3.1	Understand hydraulic theory	Find the force exerted by hydraulic cylinders.
		Use Pascal's Law to find the needed pressure and cylinder size for equipment.
3.1	Understand hydrostatic theory	Model and calculate the advantage of variable displacement pumps in a hydrostatic system.
3.1	Pump identification and operation	Construct example models of hydraulic systems.
		Model and calculate the advantage of variable displacement pumps.
3.1	Motor identification and operation	
3.1	Function and operation of hydraulic valves	Add flow and pressure gauges and adjust the fluid pressure and flow in a hydraulic system.
		Calculate pressure drop in a hydraulic system.
3.1	Electro-hydraulics	Evaluate a solenoid and relay for functionality on electro-hydraulic components.
		Construct an electro-hydraulic system.
3.1	Cylinder identification and operation	Draw and identify the components found in a hydraulic system schematic.
3.1	Accumulator identification and operation	
3.2	Fluids, transfer components and filtering	Compare the physical properties of hydraulic fluids.
		Identify the fittings needed for a hydraulic system.
		Inspect used hydraulic oil for potential causes of contamination
3.3	Maintenance procedures	Fill out a work/repair order for hydraulic parts damaged by contaminated oil.
3.4	Component repair and replacement	Disassemble a hydraulic pump and complete a work/repair order.
		Disassemble a hydraulic cylinder and valve to inspect for wear and damage.
3.5	Hydraulic schematics	Draw and identify the components found in a hydraulic system schematic.
3.6	Diagnostics	Inspect and document the physical characteristics of fluid power systems found on a tractor.
		Complete service procedures for hydraulic, electrical, and power train systems.
Power Trains		
4.1	Theory and operation	Identify types of belts, chains, and gears on a piece of equipment.
		Construct a drive train and measure speed.
		Measure a drive train's torque.
		Identify clutch systems & components present on agricultural equipment.
		Identify and select bearing types used in drive train systems.
		Simulate planetary gear settings and observe the input and output speeds.
4.2	Driveshaft function and construction	•Disassemble and identify the components of a universal joint.
		Diagnose a failed universal joint and identify the root cause using the Five Whys method.
		Adjust and test the settings for an electromagnetic clutch.
		Assemble a model of a differential system.
		Construct a drive train modeling agricultural equipment.
		Assemble a model of a differential system.
		Identify and select tires for a tractor.
		Determine ballast requirements for specific equipment applications.
4.3	Fundamental theory of hydraulic and pneumatic braking systems	
4.4	Understanding maintenance practices in power trains	Disassemble a gearbox, identify components and inspect for wear and backlash.
		Disassemble and adjust tapered bearings on a wheel hub.
4.5	Power train schematics and flow diagrams	
4.6	Troubleshooting and failure analysis	Complete service procedures for hydraulic, electrical, and power train systems.
Diesel Engines		
5.1	Safety	Identify the high and low-pressure components of a fuel system.

5.2	Theory and operation	Identify similarities and differences between small gasoline and diesel engines.
5.3	Maintenance practices	Flare and assemble a fuel line
		Inspect a fuel injector for faults
		Measure the urea content in diesel exhaust fluid samples.
		Inspect a cooling system using industry equipment.
		Change oil and oil filter using OEM specifications.
5.4	Component repair	Inspect and identify the components of a turbocharger and air filter.
5.5	Engine subsystems	Model a cooling system to cool the engine coolant.
5.6	Fuel and governing systems, mechanical and electronic systems	Diagnose faults in a CAN bus model using a DMM.
		Inspect an oil pressure transducer for faults.
		Develop a flowchart of CAN bus operations within fuel and intake systems.
5.7	Diagnostics	Determine the cause of broken engine components and complete a work repair order.
Air Conditioning/Heating		
6.1	Fundamental knowledge	
6.2	AC systems operation	
6.3	Servicing AC systems	
6.4	Testing, troubleshooting, diagnosing and repairing AC systems	
6.5	Heating system operation	
6.6	Servicing heating systems	
6.7	Pressurized cabs	