Appendix T

Agriculture, Food and Natural Resources (AFNR)
Youth Apprenticeship

Power, Structural and Technical Systems Pathway
Agriculture Mechanics Technician Unit
Unit 12

Unit 12: Power, Structural and Technical Systems Pathway
Agriculture Mechanics Technician

Competency

1. Select correct hand tools and light duty power tools required for job

Performance Standard Condition

Competence will be demonstrated

- at the worksite
- while assisting a worksite professional

Performance Standard Criteria

Performance will be successful when the learner:

- Uses correct hand tools in a safe and appropriate manner
- Identifies capabilities and limitations of hand and power tools
- Identifies worn, damaged, or abused tools
- Verifies safety equipment and any Personal Protective Equipment (PPE) needed for tool/equipment use
- Demonstrates proper handling and storage of tools

Learning Objectives

- Describe the uses of agricultural mechanics hand and power tools to perform tasks
- Describe the uses of stationary tools used in the agriculture power and machinery applications
- Identify the hand tools commonly used by technicians and describe their uses including: wrenches, sockets and accessories, screwdrivers, pliers, hammers, punches and chisels, etc.
- Identify types of portable power tools used in agriculture power and machinery applications including: grinders, drills/drivers, impact wrenches, saws, and presses, etc.
- Identify the portable power tools commonly used by technicians and describe their uses
- Identify the stationary power tools commonly used by technicians and describe their uses
- Identify risks of using hand and power tools
- Describe the proper handling and storage of hand and power tools

Comments:

Unit 12: Power, Structural and Technical Systems Pathway
Agriculture Mechanics Technician

Competency

2. Demonstrate safe operation of hand tools, light duty power tools and stationary tools

Performance Standard Condition

Competence will be demonstrated

- at the worksite and classroom

Performance Standard Criteria

Performance will be successful when the learner:

- Operates tools and equipment that he/she is trained on
- Operates tools and equipment with guarding devices in manner required for job task
- Inspects tool/equipment and work area for safety considerations
- Demonstrates the general safety rules for operating all power tools, regardless of type
- Follows and completes any tool checklist
- Verifies tool/equipment is available for use and in working order
- Verifies tool/equipment is current for preventative maintenance and/or calibration
- Wears the required Personal Protective Equipment (PPE) at all times as required for the operation of the tool/equipment
- Monitors tool/equipment for safe operation during use
- Documents use and maintenance as required
- Properly shuts down and reports abnormal tool/equipment conditions or failures in operation
- Performs any required preventative maintenance procedures

Learning Objectives

- Describe and demonstrate safety precautions when using hand, power and stationary tools including band saws, drill presses, hydraulic presses, pedestal/bench grinders, abrasive cut-off saws, etc.
- Distinguish between common hand tools including: wrenches, sockets and accessories, screwdrivers, pliers, hammers, punches and chisels, etc.
- Discuss start up and shut down procedures for each tool/equipment you will operate
- Explain the purpose of preventative maintenance
- Describe emergency shutdown procedures for the tool/equipment you will operate
- Explain how to recognize and address malfunctions for the tool/equipment you will operate
- Describe how to recognize wear and tear on equipment components
- List which tools and equipment require safety certification

Comments:

Unit 12: Power, Structural and Technical Systems Pathway
Agriculture Mechanics Technician

Competency

3. Clean, organize and maintain work environment

Performance Standard Condition

Competence will be demonstrated

- at the worksite and classroom

Performance Standard Criteria

Performance will be successful when the learner:

- Inspects tools and work area for safety considerations
- Complies with posted safety warnings and symbols
- Identifies unsafe conditions and/or work habits and reports them to the worksite professional immediately, if applicable
- Helps maintain a clean and safe working environment free of debris and obstacles
- Properly disposes of waste and recyclable materials
- Stores materials and tools properly
- Follows facility procedures for clean-up and shut down after use.
- Cleans light fixtures to ensure proper lighting
- Properly stores tools and equipment
- Cleans and dries floors to prevent injury
- Follows general shop housekeeping procedures

Learning Objectives

- List the major components of a facility safety program
- List the different state and federal agencies that provide regulatory oversight at your facility for personal safety, environmental safety, and equipment safety
- List accident and fire prevention techniques
- Describe how a clean work environment supports safety and efficiency
- Describe posted safety warnings and symbols and what they mean
- Describe safe and unsafe work habits and their implications
- Discuss the importance of keeping the work area and tools/equipment clean
- List mechanical, electrical, and equipment safety hazards at your facility
- Discuss how to identify and report unsafe conditions in your facility
- Discuss safety procedures to prevent accidents
- Describe the requirements at your facility for safety training and auditing
- List hazards that contribute to injury due to slips, trips, or falls
- Outline compliance requirements of sanitation and health inspections

Comments:

Unit 12: Power, Structural and Technical Systems Pathway
Agriculture Mechanics Technician

Competency

4. Identify and demonstrate correct use of fasteners

Performance Standard Condition

Competence will be demonstrated

- at the worksite and classroom

Performance Standard Criteria

Performance will be successful when the learner:

- Identifies correct fasteners for various uses in agriculture power and machinery service operations including screws, bolts, nuts, washers, keys, snap rings, pins and studs
- Selects correct tools and equipment to adjust fasteners
- Accurately measures bolt and nut length, diameter, and thread types
- Properly extracts broken bolts
- Properly restores internal and external threads

Learning Objectives

- List common fasteners used in agriculture power and machinery service operations
- Discuss tools and methods for extracting broken bolts
- Explain how to restore internal and external threads
- Identify different types of threads
- Explain the basic application for screw threads
- Distinguish between single and multiple threads
- Distinguish different classification of springs

Comments:

Unit 12: Power, Structural and Technical Systems Pathway

Agriculture Mechanics Technician

Competency

5. Handle and store oils, grease, chemicals, cleaners, solvents, etc. according to the (M)SDS

Performance Standard Condition

Competence will be demonstrated

- at the worksite and classroom

Performance Standard Criteria

Performance will be successful when the learner:

- Safely identifies, handles, stores, and uses materials according to company procedure, if applicable
- Reviews MSDS sheet to identify hazardous materials
- Performs the approved storage procedures for flammable materials found in repair facilities
- Demonstrates safe procedures for disposal of hazardous materials
- Wears and maintains personal protective equipment, including: eye, ear, hand, respiratory, body, and foot protection

Learning Objectives

- Explain the purpose of a Material Safety Data sheet Instruction on material safety data sheet (MSDS)
- Identify where MSDS sheets are normally located on the job site
- Classify what materials are considered hazardous
- Interpret what the various symbols on the sides of chemical container represent
- Explain how should flammable liquids be stored
- List what information should be on the label of a hazardous material
- Explain safe use of chemicals and equipment
- Demonstrate proper response in an emergency situation

Comments:

Unit 12: Power, Structural and Technical Systems Pathway
Agriculture Mechanics Technician

Competency

6. Assist with proper engine testing and maintenance

Performance Standard Condition

Competence will be demonstrated

- at the worksite and classroom

Performance Standard Criteria

Performance will be successful when the learner:

- Consults with worksite professional to determine appropriate inspections and test(s) to perform based on customer concern
- Assists to perform repair utilizing parts manual
- Develops a preventative maintenance schedule for equipment
- Adjusts equipment for safe and efficient operation
- Determines the cost of routine equipment maintenance
- Interprets and apply service-related information, including: service bulletins, manuals, and parts catalogues

Learning Objectives

- Explain the importance of preventive maintenance on engines and equipment
- Explain the safely practices to follow when servicing equipment
- Identify common maintenance practices associated with major engine systems
- Identify controls and instruments, along with their functions
- Describe personal and environmental safety practices associated with the operation, maintenance and repair of equipment
- Explain how to perform start-up and shut-down procedures on power units and equipment as specified in technical manuals
- Outline where to locate service-related information, including: service bulletins, manuals, and parts catalogues

Comments:

Unit 12: Power, Structural and Technical Systems Pathway
Agriculture Mechanics Technician

Competency

7. Demonstrate safe practices and procedures in the operation, maintenance and repair of engines and equipment

Performance Standard Condition

Competence will be demonstrated

- at the worksite and classroom

Performance Standard Criteria

Performance will be successful when the learner:

- Assists worksite professional to follow up on repaired equipment to ensure that corrective action solved the problem
- Assists worksite professional to investigate abnormal equipment conditions in a timely manner
- Diagnoses, removes, cleans, tests, repairs, and reinstalls parts of machinery and equipment using repair manual
- Follows safety precautions when operating, servicing, and maintaining machines and equipment
- Researches applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins
- Verifies operation of the instrument panel engine warning indicators
- Reviews equipment quality measures for trends and problems as required
- Compares current equipment performance to optimal equipment operations on a regular basis
- Reports any noted deviations from expected performance
- Documents all monitoring activities

Learning Objectives

- Identify basic approaches to maintenance
- Explain how to read and review repair history records
- Describe how trends for malfunctioning equipment might appear in production records
- List the tools and equipment at your facility that must be monitored and maintained
- Identify common failures relating to ignition, fuel, cooling, lubrication etc.
- Interpret service manual information for engine and equipment maintenance and repair

Comments:

Unit 12: Power, Structural and Technical Systems Pathway
Agriculture Mechanics Technician

Competency

8. Assist in the pre-inspection of equipment components

Performance Standard Condition

Competence will be demonstrated

at the worksite and classroom

Performance Standard Criteria

Performance will be successful when the learner:

- Completes a visual inspection
- Consults with worksite professional to determine appropriate inspections and test(s) to perform based on customer concern
- Checks for operation and leaks of hoses, lines, valves and nozzles
- Identifies information needed and the service requested on a repair order
- Locates repair parts, using catalogs, microfiche and computers.
- Reviews vehicle service history

Learning Objectives

- Demonstrate use of the three C's: concern, cause, and correction
- Explain how to interview customers to obtain a description of the program Demonstrate how to interview customer to obtain description of the problem
- Explain how to use effective interpersonal relationships in dealing with customers

Comments:

Unit 12: Power, Structural and Technical Systems Pathway
Agriculture Mechanics Technician

Competency

9. Assist with the setup of equipment and machinery

Performance Standard Condition

Competence will be demonstrated

- at the worksite and classroom

Performance Standard Criteria

Performance will be successful when the learner:

- Organizes work space
- Verifies equipment is available for use and in working order
- Verifies equipment is current for preventative maintenance and/or calibration
- Stages pieces and materials for assembly
- Assembles and adjusts tools and equipment as required
- Documents and keep track of service completed

Learning Objectives

- Identify the importance of an organized work space
- Demonstrate how to set up materials prior to set up
- List the types of labeling used on tools and equipment to indicate whether a tool or piece of equipment is functional and safe to use
- Explain the purpose and importance of preventative maintenance and calibration
- List the situations which require you to obtain help to resolve problems with equipment or production

Comments:

Unit 12: Power, Structural and Technical Systems Pathway
Agriculture Mechanics Technician

Competency

10. Connect software to equipment and retrieve diagnostic trouble codes

Performance Standard Condition

Competence will be demonstrated

- at the worksite and classroom

Performance Standard Criteria

Performance will be successful when the learner:

- Operates different types of service software
- Verifies connection to software and equipment according to manual
- Demonstrates general computer skills
- Demonstrates the ability to toggle between screens when using software
- Interprets readings to icons
- Verifies math and make conversions when appropriate
- Performs procedures as indicated using the service software

Learning Objectives

- Explain the purpose of software in diagnostic trouble shooting
- Describe how to connect software to equipment
- Demonstrate how to read software codes
- Compare software programs
- Demonstrate how to complete math conversions

Comments:

Unit 12: Power, Structural and Technical Systems Pathway
Agriculture Mechanics Technician

Competency

11. Check fluid levels and lubricate machinery and equipment according to manufacturer specifications

Performance Standard Condition

Competence will be demonstrated

- at the worksite and classroom

Performance Standard Criteria

Performance will be successful when the learner:

- Reviews safety and service procedures
- Determines the type of lubricant recommended based on original equipment manufacturer (OEM) requirements
- Identifies importance of oil analysis as a management tool
- Replaces any torn or missing seals
- Applies grease to each fitting and wipe away access
- Inspects fluid levels using dipstick and change oil filters
- Verifies work and make adjustments as needed

Learning Objectives

- Identify the characteristics of liquids used in agricultural equipment
- Explain why fluid must be clean and free of contaminants
- Describe the selection and storage of liquids for agricultural equipment.
- Compare lubricants used in various machinery
- Discuss safety procedures that should be followed when working with lubricants
- Locate the areas of typical joint grease seals
- Demonstrate how to drain fluid systems
- Demonstrate how to install clean fluid and filters

Comments:

Unit 12: Power, Structural and Technical Systems Pathway
Agriculture Mechanics Technician

Competency

12. Maintain vehicle and machinery appearance and cleanliness prior to inspection delivery

Performance Standard Condition

Competence will be demonstrated

- at the worksite and classroom

Performance Standard Criteria

Performance will be successful when the learner:

- Installs shields and hoods
- Verifies machinery is washed and prepped
- Inspects cleanliness of the cab
- Assures windows are clean
- Verifies that there are no external leaks from the machinery/equipment
- Follows any company procedures condition reports

Learning Objectives

- Explain the importance of vehicle/machinery appearance prior to customer delivery
- List ways to provide a positive customer experience at the time of service delivery
- Explain the purpose of a condition report
- Describe how to complete a condition report

Comments:

Unit 12: Power, Structural and Technical Systems Pathway
Agriculture Mechanics Technician

Competency

13. Prepare and complete written documentation of work performed & parts used

Performance Standard Condition

Competence will be demonstrated

- at the worksite and classroom

Performance Standard Criteria

Performance will be successful when the learner:

- Identifies the purpose and importance of keeping records
- Demonstrates procedures for keeping records of equipment maintenance and services
- Documents customer concern on repair order
- Verifies work orders, service invoices, and requisitions
- Prepares a written cost estimate of repair work
- Documents parts used for service repair

Learning Objectives

- Identify and use precise language, domain-specific vocabulary to detail work completed
- Explain how to present information, finding and supporting evidence to convey a detailed record of service work
- Define customer service
- Identify importance of documentation to company bottom line and customer satisfaction
- List steps to follow when handling complaints

Comments:

Unit 12: Power, Structural and Technical Systems Pathway
Agriculture Mechanics Technician

Competency

14. Look up parts

Performance Standard Condition

Competence will be demonstrated

- at the worksite and classroom

Performance Standard Criteria

Performance will be successful when the learner:

- Locates repair parts, using catalogs, microfiche, and computers
- Collects necessary information to determine part requirements
- Locates and accesses serial numbers
- Identifies section and component location on machinery/equipment
- Reviews previous repair orders
- Performs basic computer operation
- Writes up request for parts order
- Maintains agriculture mechanics business records

Learning Objectives

- Explain how to use parts manuals to locate component part information
- Compare and contrast new, used, rebuilt and remanufactured parts
- Identify sources available for replacement parts
- List requirements of replacement parts
- Describe how parts are purchased and charged to the customer.
- Define OEM and how this effects servicing
- Demonstrate how to use a computer to complete database search

Comments:

Unit 12: Power, Structural and Technical Systems Pathway
Agriculture Mechanics Technician

Competency

15. Demonstrate proper use of specific diagnostic tools

Performance Standard Condition

Competence will be demonstrated

- at the worksite and classroom

Performance Standard Criteria

Performance will be successful when the learner:

- Verifies the causes of concerns with stored or active diagnostic trouble codes
- Obtains, graphs, and interprets scan tool data
- Determines necessary action
- Inspects and tests computerized engine control system sensors

Learning Objectives

- Describe common components and systems used on diagrams
- Explain the use of wiring diagrams during the diagnosis of electronic/electronic problems
- Explain the function of the diagnostic tools
- List common preventative maintenance functions and services for instrument control systems

Comments:

Unit 12: Power, Structural and Technical Systems Pathway
Agriculture Mechanics Technician

Competency

16. Cut metal using an oxyacetylene torch and plasma arc torch

Performance Standard Condition

Competence will be demonstrated

- at the worksite and classroom

Performance Standard Criteria

Performance will be successful when the learner:

- Demonstrates proper safety practices while operating all welding and cutting equipment
- Interprets drawings and welding symbols
- Selects appropriate welding and cutting tips for specific applications
- Properly diagnoses equipment failure
- Sets up, adjusts, operates and shuts down oxy-fuel, welding and brazing equipment for a given job
- Lays out and prepare metals for welding
- Properly cuts metal to specifications
- Heats metal parts to assist in removal when required
- Performs start up and shut down of equipment
- Welds basic joints in all positions

Learning Objectives

- Describe what supplies and equipment
- Demonstrate use of safety equipment and protective clothing for welding
- Demonstrate use of heating, cutting and gas welding equipment safely
- Read drawings and welding symbols
- Explain how to change, adjust, shut down and check for leaks in oxygen and acetylene equipment
- Demonstrate how to braze, and weld safely with oxyacetylene equipment
- Outline how to test weld quality and strength

Comments:

Unit 12: Power, Structural and Technical Systems Pathway
Agriculture Mechanics Technician

Competency

17. Read and interpret hydraulic symbols and flow on a schematic drawing

Performance Standard Condition

Competence will be demonstrated

- at the worksite and classroom

Performance Standard Criteria

Performance will be successful when the learner:

- Identifies the basic hydraulic components
- Inspects operation of hydraulic circuit
- Verifies basic hydraulic component functions
- Identifies essential safety practices related to the operation of agriculture equipment using hydraulics
- Performs routine service and maintenance utilizing appropriate service manuals
- References the service manual for correct schematic of component

Learning Objectives

- Describe principles of hydraulic operation
- Identify major components of hydraulics
- Describe the function and relationships of the basic components of a hydraulic system
- Outline the circuit, power flow and action of each actuator
- Identify problems associated with hydraulic systems

Comments:

Unit 12: Power, Structural and Technical Systems Pathway
Agriculture Mechanics Technician

Competency

18. Apply basic knowledge of hydraulics to service maintenance and repair

Performance Standard Condition

Competence will be demonstrated

- at the worksite and classroom

Performance Standard Criteria

Performance will be successful when the learner:

- Demonstrates machinery system knowledge based on current understanding
- Reviews equipment specifications (relief valve pressures, pump output, engine rpm, and operating temperature) to accurately test the system
- Complies with personal safety practices concerning clothing, tool usage, proper ventilation of fumes and securing machining
- Inspects system for temperature, pump flow, pressure tests, leakage etc.
- Uses a pressure and flow tester in diagnosing malfunctions and repairing hydraulic system
- Performs all procedures according to manufacturing requirements

Learning Objectives

- Explain principles of hydraulics
- Outline the components that make up a hydraulic system including the reservoir, pump, valve(s) and actuator(s) (motor, cylinder, etc.)
- Describe safety precautions related to hydraulics systems
- Describe the physical laws of hydraulics
- Describe how hydraulic components function
- Explain how dirt and metal particles can score valves, seize pumps and clog orifices

Comments:

Unit 12: Power, Structural and Technical Systems Pathway
Agriculture Mechanics Technician

Competency

19. **Assist with inspection and diagnosis of hydraulic components**

Performance Standard Condition

Competence will be demonstrated

- at the worksite and classroom

Performance Standard Criteria

Performance will be successful when the learner:

- Completes visual inspection to identify customer complaint based on how the system is supposed to operate
- Consults with worksite professional to determine appropriate inspection and test(s) to perform based on customer concern
- Compares test to manufacturer specifications
- Performs tests according to manual procedures
- Verify an accurate diagnosis of the problem
- Always wears appropriate personal protective equipment when checking for leaks.
- Properly uses safety equipment appropriate to working conditions
- Adjusts pressure control and relief valves
- Measures pressure within hydraulic system
- Measures flow within hydraulic system
- Diagnoses hydraulic failure
- After testing, prepares for service or cleanup work area, returns tools to proper location, and completes appropriate documentation

Learning Objectives

- Explain how to complete a visual inspection of a hydraulic system
- Demonstrate how to test a hydraulic system
- Compare the manufacturer's service library to determine specifications
- Outline how to complete a pressure test of a hydraulic system
- Describe safety considerations when working on hydraulic components

Comments:

Unit 12: Power, Structural and Technical Systems Pathway
Agriculture Mechanics Technician

Competency

20. **Assist with the maintenance and repair of system components**

Performance Standard Condition

Competence will be demonstrated

- at the worksite and classroom

Performance Standard Criteria

Performance will be successful when the learner:

- Consults with worksite professional to determine appropriate inspection and test(s) to perform based on customer concern
- Retrieves shop manuals and/or electronic retrieval systems
- Changes filters and drain, flush, and refill the hydraulic system
- Repairs and replaces parts of the system according to manufacturing procedures and specifications
- Verifies service and adjust the system for proper operation
- Checks fluid levels and condition
- Changes hydraulic fluids
- Inspects system for external leaks and correct where necessary
- Cleans and flushes system based on MFG specifications and recommendations
- Maintains cleanliness during repair

Learning Objectives

- Explain the 3 C's (Concern, cause, correction)
- Describe the different types of service manuals
- Explain the different kinds of information and illustrations used in a service manual
- Describe the three basic types of troubleshooting charts found in service manuals
- Explain how to use computer-based service information
- Demonstrate process for checking fluids and replacing filters
- Explain why cleanliness is critical to proper system operation
- Demonstrate process

Comments:

Unit 12: Power, Structural and Technical Systems Pathway
Agriculture Mechanics Technician

Competency

21. **Interpret electrical symbols and wiring schematics**

Performance Standard Condition

Competence will be demonstrated

- at the worksite and classroom

Performance Standard Criteria

Performance will be successful when the learner:

- Locates and inspect sensors and monitoring systems
- Examines electrical circuits
- Interprets drawings and symbols in service manuals
- Applies information from schematics to identify flow through circuit current
- Tests and troubleshoots electrical systems and components

Learning Objectives

- Describe the use of sensors and monitoring systems
- Explain the role of electrical circuits and specifications
- Explain drawings and symbols used on a drawing/service manual

Comments:

Unit 12: Power, Structural and Technical Systems Pathway
Agriculture Mechanics Technician

Competency

22. **Apply basic electrical theory**

Performance Standard Condition

Competence will be demonstrated

- at the worksite and classroom

Performance Standard Criteria

Performance will be successful when the learner:

- Identifies components in machinery that use electrical components
- Examines machines that use DC currents
- Operates tools and equipment to measure electrical output

Learning Objectives

- Define Electrical terms
- Explain how to use Ohm's law to demonstrate/predict DC electrical behavior
- Outline how to measure the voltage and current flow in electrical circuits
- Demonstrate proficient use of a digital multi-meter
- Recognize and test electrical components and devices
  Identify the symbols on an ISO electrical diagram and locate the components on equipment

Comments:

Unit 12: Power, Structural and Technical Systems Pathway
Agriculture Mechanics Technician

Competency

23. **Assist with repair of failed components and/or repair of wiring**

Performance Standard Condition

Competence will be demonstrated

- at the worksite and classroom

Performance Standard Criteria

Performance will be successful when the learner:

- Interprets a circuit diagram to trouble shoot an electrical problem
- Tests electrical and electronic sensing devices
- Locates the parts to be tested for electrical problems
- Uses instruments to measure Ohms, amps, and volts

Learning Objectives

- Identify and describe the use and function of various electrical components in Agriculture
- Explain the principles of DC circuitry
- Define the scientific principles of electrical systems
- Describe basic alternator/generator theory
- Demonstrate how to test electrical circuits using sensing devices
- Demonstrate proper wire connector and repair
- Describe how to follow diagnostic and repair procedures

Comments:

Unit 12: Power, Structural and Technical Systems Pathway
Agriculture Mechanics Technician

Competency

24. **Assist with inspection and diagnosis of electrical/electronic components**

Performance Standard Condition

Competence will be demonstrated

- at the worksite and classroom

Performance Standard Criteria

Performance will be successful when the learner:

- Completes visual inspection to identify customer complaint based on how the system is supposed to operate
- Consults with worksite professional to determine appropriate inspection and test(s) to perform based on customer concern
- Compares test to manufacturer specifications
- Performs tests according to manual procedures
- Verifies an accurate diagnosis of the problem
- Always wears appropriate personal protective equipment when checking for leaks.
- Properly uses safety equipment appropriate to working conditions
- After testing, prepares for service or cleanup work area, returns tools to proper location, completes appropriate documentation

Learning Objectives

- Identify components in machinery use electrical components
- Identify which machines use DC current
- Describe how to complete a visual inspection
- Demonstrate proper use of electrical testing equipment

Comments:

Unit 12: Power, Structural and Technical Systems Pathway
Agriculture Mechanics Technician

Competency

25. **Assist with the maintenance and repair of electrical/electronic components**

Performance Standard Condition

Competence will be demonstrated

- at the worksite and classroom

Performance Standard Criteria

Performance will be successful when the learner:

- Demonstrates and repairs common failures related to electrical components
- Obtains equipment and materials needed
- Repairs switches, connectors, relays, solenoid devices for proper operation as needed
- Repairs the wires to ensure proper connection and wearing, rubbing or fraying
- Inspects devices and wires during maintenance and repairs
- Cleans up work area and returns tools to proper location
- Completes appropriate documentation

Learning Objectives

- List various electrical components used in agriculture equipment
- Describe common electrical component failures
- Describe electrical connections within agriculture equipment
- Explain necessary precautions when working with electrical wires and components

Comments:

Unit 12: Power, Structural and Technical Systems Pathway
Agriculture Mechanics Technician

26. **Assist with troubleshooting and installation of instrumentation and data acquisition system** (e.g., Global Positioning System (GPS), spraying, planting, and harvesting monitors)

Performance Standard Condition

Competence will be demonstrated

- at the worksite and classroom

Performance Standard Criteria

Performance will be successful when the learner:

- Completes visual inspection to identify customer complaint based on how the system is supposed to operate
- Connects equipment to diagnostic software to evaluate potential errors
- Consults with worksite professional to determine appropriate inspection and test(s) to perform based on customer concern
- Compares test to manufacturer specifications
- Performs tests according to manual procedures
- Verifies an accurate diagnosis of the problem
- Always wears appropriate personal protective equipment when checking for leaks.
- Properly uses safety equipment appropriate to working conditions
- After testing, prepares for service or cleans up work area, returns tools to proper location, and completes appropriate documentation

Learning Objectives

- Explain how to read display systems
- Identify types of instrumentation and data systems available
- Explain purpose behind instrumentation and data systems in agriculture industry
- Describe how to connect software to troubleshoot equipment

Comments:

Unit 12: Power, Structural and Technical Systems Pathway
Agriculture Mechanics Technician

Competency

27. Assist to dismantle defective machines and equipment

Performance Standard Condition

Competence will be demonstrated

- at the worksite and classroom

Performance Standard Criteria

Performance will be successful when the learner:

- Examines assembled product for visual and/or dimensional specification prior to tear down
- Prepares work area to lay out parts after disassembly
- Removes parts according to proper procedure
- Examines parts for defects, such as breakage or excessive wear
- Documents part orientation and location
- Maintains organization and cleans work environment

Learning Objectives

- Explain the importance of organization when dismantling equipment
- Describe how to lay out parts and document orientation during tear down
- Explain how to determine if a part is defective and needs replacement

Comments:

Unit 12: Power, Structural and Technical Systems Pathway
Agriculture Mechanics Technician

Competency

28. Assist with reassembly of machines and equipment

Performance Standard Condition

Competence will be demonstrated

- at the worksite and classroom

Performance Standard Criteria

Performance will be successful when the learner:

- Gathers equipment required to reassemble machinery and equipment
- Studies blueprints or manufacturers' manuals to determine correct installation or operation of machinery
- Assembles and adjusts agricultural equipment, following manufacturer's direction
- Repairs or replaces broken or malfunctioning components of machinery or equipment
- organization
- Records parts or materials used and orders or requisition new parts or materials as necessary
- Maintains organized and clean work environment
- Verifies set up meets assembly requirements and product specifications
- Operates newly repaired machinery or equipment to verify the adequacy of repairs

Learning Objectives

- Explain the importance of an organized and clean work environment
- Demonstrate how to read blueprints and manuals
- Explain how to verify set up is complete

Comments:

Unit 12: Power, Structural and Technical Systems Pathway
Agriculture Mechanics Technician

Competency

29. **Assist with calibration, monitoring and sensing equipment**

Performance Standard Condition

Competence will be demonstrated

- at the worksite and classroom

Performance Standard Criteria

Performance will be successful when the learner:

- Demonstrates how to perform a calibration
- Performs calibrations of metering equipment
- Assists a worksite professional with set up prior to calibration
- Prepares tractors and/or equipment prior to calibration
- Verifies tractor calibrations
- Assists with diagnosing monitoring systems with onboard vehicle diagnostics
- Performs calibration and no error codes in the software once calibration is completed

Learning Objectives

- Describe the various type of electronically controlled systems
- Explain how to complete set up prior to calibration
- Demonstrate a proper calibration of a tractor monitoring function
- Demonstrate a proper calibration of metering sensors for equipment
- Describe how to connect and read system software

Comments: