

Directions:	Evaluate the trainee using the rating scale below and check the appropriate number to indicate the degree of competency achieved. The numerical ratings of 3, 2, 1, and 0 are not intended to represent the traditional school grading system of A, B, C, D, and F. The descriptions associated with each of the numbers focus on level of student performance for each of the tasks listed below.
Rating Scale:	<p>0 - No Exposure - no information nor practice provided during training program, complete training required.</p> <p>1 - Exposure Only - general information provided with no practice time, close supervision needed and additional training required.</p> <p>2 - Moderately Skilled - has performed independently during training program, limited additional training may be required.</p> <p>3 - Skilled - can perform independently with no additional training.</p>

1. Number of Competencies Evaluated	_____
2. Number of Competencies Rated 2 or 3	_____
3. Percent of Competencies Attained (2/1)	_____
_____	_____
Grade	
_____	_____
Instructor Signature	Date

01.0 Safety

The student will be able to:

0 1 2 3

- 01.01 Identify safety equipment necessary for agricultural power technology
- 01.02 Apply basic laboratory safety instruction
- 01.03 Describe safety practices when using electrical equipment
- 01.04 Apply safety practices when using tools and equipment

02.0 Electrical Tools and Equipment

The student will be able to:

0 1 2 3

- 02.01 Identify, adjust, maintain and properly use the following tools:
 - a. volt meter
 - b. amp meter
 - c. ohm meter
 - d. portable GFCI
 - e. wire stripper
 - f. circuit tester
 - g. continuity tester
 - h. linesman pliers
 - i. conduit bender
 - j. fish-tape
 - k. deburring tool
 - l. growler

03.0 Electricity and Wiring

The student will be able to:

0 1 2 3

- 03.01 Describe electrical energy and how it works
- 03.02 Define common electrical terms and their relationships
- 03.03 Determine the amount of electrical energy used
- 03.04 Compute the cost of using electrical energy
- 03.05 Read and interpret wiring plans
- 03.06 Locate and mark routes for small appliances, general purpose and individual circuits
- 03.07 Install device boxes and outlet boxes
- 03.08 Install 120-volt, 120/240-volt circuits
- 03.09 Connect receptacles, switches and figures for each circuit
- 03.10 Ground the electrical system and equipment
- 03.11 Determine the type and of service entrance equipment to install
- 03.12 Install service entrance equipment using cable or conduit with overhead or underground conductors
- 03.13 Install ground fault circuit interrupters
- 03.14 Install conduit
- 03.15 Estimate wiring costs
- 03.16 Install wiring for agricultural and other utility buildings

04.0 Electrical Controls

The student will be able to:

- 0 1 2 3
- 04.01 Describe the function and importance of controls and control circuits in the operation of electric equipment
 - 04.02 Explain the terminology and symbols used in discussing electric control circuits
 - 04.03 Identify the characteristics of automatic and non-automatic control systems
 - 04.04 Identify the characteristics of switches most commonly used in control circuits
 - 04.05 Connect the tumbler switch having a built-in overload protector into a motor circuit
 - 04.06 Explain how the overload protection device protects the motor from shore circuit or overload damage
 - 04.07 Identify the function of a limit switch
 - 04.08 Connect a limit switch into a motor circuit
 - 04.09 List the characteristics of relays and the function of relay devices in control circuits
 - 04.10 Connect the relay into a control circuit
 - 04.11 Connect a time-delay relay into a motor control circuit
 - 04.12 Identify the characteristics and types of motor control devices in an electrical circuit
 - 04.13 Connect a commercial type starter switch and stop-start push-button stations into a motor control circuit
 - 04.14 Describe the automatic sensing control devices available and how they might be applied in the control circuits used on the farm and in the home
 - 04.15 Connect automatic sensing control devices into a control circuit
 - 14.16 Explain how the automatic sensing control devices control an electric load

05.0 Electric Motors

The student will be able to:

- 0 1 2 3
- 05.01 Describe factors needing consideration if electric motors were to be replaced by alternative power sources
 - 05.02 Use nameplate information to describe an electric motor
 - 05.03 Identify electric motors by type
 - 05.04 Match types of electric motors to starting load and duty characteristics

0 1 2 3

- 05.05 Identify major construction characteristics of electric motors by type of enclosures, mounts, bearings and lubrication systems
- 05.06 Spot motor ailments by sight, sound and touch
- 05.07 Use an organized trouble shooting procedure to identify the specific problem
- 05.08 Decide which problems can be corrected in place and which require removal to repair station
- 05.09 Identify possible causes and results of overloading an electric motor without overload protection
- 05.10 Recognize the modus operandi for overload protection devices
- 05.11 Replace or reset activated overload protection devices
- 05.12 Determine and order proper size of components for drive systems needing replacement
- 05.13 Remove and replace the needed drive systems
- 05.14 Explain how the poles of permanent magnet and electro-magnet attract and repel each other
- 05.15 Describe how the attracting and repelling forces of an electro-magnet can cause a free rotating magnet to turn
- 05.16 Identify a split-phase motor and a shaded-pole motor based on major internal parts and characteristics
- 05.17 Explain the operating principles of a split phase and shaded-pole motor integrating the parts and characteristics identified
- 05.18 List and describe loads requiring low starting torque
- 05.19 Identify capacitor-start motors based on major internal parts and characteristics
- 05.20 Explain the operating principles of the capacitor start motor integrating the parts and characteristics identified
- 05.21 List and describe loads requiring moderate starting torque
- 05.22 Identify repulsion-start and universal motors based on major internal parts and characteristics
- 05.23 Explain the operating principals of a repulsion start and universal motors integrating the parts and characteristics identified
- 05.24 List and describe loads requiring high starting torque
- 05.25 Identify electric motors that are reversible and are dual-voltage based on operating principles, nameplate information and wiring diagrams
- 05.26 Identify the leads to the starting and running windings of electric motors
- 05.27 Explain the operating principles involves when changing rotation and/or voltage of electric motors

- 0 1 2 3
- 05.28 Change the rotation and voltage of electric motors
- 05.29 Use the following terms in analyzing electric motors:
- a. torque
 - b. starting current
 - c. horsepower
 - d. voltage drop
 - e. efficiency
 - f. power factor
 - g. apparent power
 - h. real power
- 05.30 Use a prony break, watt meter, volt meter, amp meter and appropriate formulas to collect data on various motors
- 05.31 Analyze the data and draw appropriate conclusion
- 05.32 Select an electric motor for a particular work situation according to the following variables:
- a. power requirement of the load
 - b. capacity of the electric service entrance
 - c. speed requirements of the load
 - d. duty time required
 - e. starting torque required
 - f. direction of rotation
 - g. cost
- 05.33 Select the type of motor enclosure needed for a particular environment
- 05.34 Select the type of bearings and lubrications system needed based on the method and frequency of lubrication and the mounting position
- 05.35 Use a manufacturer's catalog and order the motor most nearly matching specifications given
- 05.36 Select the correct size of wire for the electric motor used
- 05.37 Order or purchase materials for installation of a motor
- 05.38 Evaluate hypothetical or real motor installations

06.0 Agricultural Hydraulic Systems

The student will be able to:

- 0 1 2 3
- 06.01 Identify the applications of hydraulics in agriculture
- 06.02 Identify the components of a hydraulics system
- 06.03 Define terminology associated with hydraulic systems
- 06.04 Describe operating principles of hydraulic systems
- 06.05 List the advantages and disadvantages of utilizing hydraulics in agriculture
- 06.06 Read and interpret basic hydraulic schematic diagrams
- 06.07 Select the proper hydraulic fluid for a specific hydraulic system and operating condition
- 06.08 Drain, flush and refill hydraulic systems on agricultural equipment
- 06.09 Service and maintain hydraulic seals and packings
- 06.10 Select hydraulic tubing, pipe and remove hoses to fulfill specific pressure, volume and exposure requirements
- 06.11 Service, maintain and/or operate hydraulic fittings and couplers
- 06.12 Service and maintain hydraulic fluid filters
- 06.13 Trouble-shoot hydraulic motor operating problems
- 06.14 Select hydraulic motors to fit specific applications on agriculture equipment and power units
- 06.15 Determine relief valve pressure setting by the T-test method