

UNIT V - ELECTRICITY

Lesson 6: Electrical Symbols in Wiring Plans

Competency/Objective: Identify the symbols used in agricultural wiring plans.

Study Questions

1. Which symbols are used to indicate lighting, receptacle, and switch outlets?
2. Which symbols are used to indicate power, fusing, and grounding?
3. Which symbols are used to indicate panelboards, switchboards, and related equipment?
4. Which symbols are used to indicate remote control stations for motors or other equipment?
5. Which symbols are used to indicate miscellaneous connections?

References

1. *Agriculture Structures (Student Reference)*. University of Missouri-Columbia: Instructional Materials Laboratory, 1999, Unit V.
2. Transparency Master
 - a) TM 6.1: Electrical Wiring Symbols
3. Activity Sheet
 - a) AS 6.1: Diagramming Electrical Wiring

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Lesson 6: Electrical Symbols in Wiring Plans

TEACHING PROCEDURES

A. *Review*

Lesson 5 discussed guidelines for lights, outlets, switches, and circuit protection in agricultural structures. Before one can begin to install these items, a wiring plan must be developed. A set of symbols is used to stand for the different aspects of electrical systems shown on these plans.

B. *Motivation*

Ask students what electrical items in the classroom would be identified in a wiring schematic. Discuss the importance of planning the placement of those devices in the overall wiring process.

C. *Assignment*

D. *Supervised Study*

E. *Discussion*

1. The use of symbols is a standardized method of identifying the location of electrical components. Familiarity with the symbols is necessary for being able to read plans and correctly install electrical components. Discuss the symbols commonly used for lighting, receptacle, and switch outlets. TM 6.1 can be used throughout the lesson to illustrate the symbols used on plans.

Which symbols are used to indicated lighting, receptacle, and switch outlets?

- a) Lighting outlets
 - 1) Ceiling
 - (a) Surface or pendant incandescent or similar lamp fixture
 - (b) Surface or pendant individual fluorescent fixture
 - (c) Surface or pendant continuous row fluorescent fixture
 - (d) Blanked outlet
 - (e) Junction box
 - 2) Wall
- b) Receptacle outlets
 - 1) Single
 - 2) Duplex
 - 3) Triplex
 - 4) Duplex - split wired
 - 5) Single special purpose

- 6) Double special purpose
 - 7) Range outlet
 - 8) Clock hanger
 - c) Switch Outlets
 - 1) Single-pole (SPST)
 - 2) Double-pole (DPST)
 - 3) Three-way (SPDT)
 - 4) Four-way (DPDT)
 - 5) Switch and pilot lamp
 - 6) Switch and single receptacle
 - 7) Switch and double receptacle
 - 8) Door switch
 - 9) Time switch
 - 10) Ceiling pull switch
2. In wiring diagrams, it is also necessary to identify the power source and fusing and grounding locations.

Which symbols are used to indicate power, fusing, and grounding?

- a) Electric motor
 - b) Electric generator
 - c) Power transformer
 - d) Electric watt-hour meter
 - e) Circuit breaker
 - f) Fusible element
 - g) Ground
3. When planning for agricultural wiring, identifying the location of the service entrance panel and any specialized switches is also necessary. Point out the different symbols used for these components.

Which symbols are used to indicate panelboards, switchboards, and related equipment?

- a) Surface-mounted panelboard and cabinet
 - b) Motor or other power controller
 - c) Externally operated disconnection switch
 - d) Combination controller and disconnection means
4. Agricultural structures tend to utilize more motorized equipment than the home or other types of businesses. Therefore, symbols are frequently used to indicate specialized wiring and switches for motors.

Which symbols are used to indicate remote control stations for motors or other equipment?

- a) Push-button station
 - b) Float switch - mechanical
 - c) Limit switch - mechanical
 - d) Pneumatic switch - mechanical
 - e) Thermostat
5. Because of the environmental and physical considerations of agricultural structures, it is necessary to identify electrical devices designed to provide protection. TM 6.1 shows some of these symbols. Have students complete AS 6.1.

Which symbols are used to indicate miscellaneous connections?

- a) Weather proof
 - b) Water tight
 - c) Dust tight
 - d) Grounded
 - e) Vapor tight
 - f) Rain tight
 - g) Explosion proof
 - h) Recessed
- F. ***Other Activities***
Show students an actual wiring diagram of the classroom or mechanics laboratory discussed in the motivation. Discuss how their previous observations matched, or did not match, what is identified on the diagram.
- G. ***Conclusion***

To successfully wire a structure, reading electrical wiring diagrams is required. The key to using these diagrams is identifying electrical symbols for the different components of the electrical system.
- H. ***Answers to Activity Sheet***
- I. ***Answers to Evaluation***

- 1. g
- 2. I
- 3. e
- 4. c
- 5. j
- 6. a
- 7. b
- 8. d
- 9. h
- 10. f

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EVALUATION

 Match the symbol on the left with the terms on the right.



1. _____

10. _____

S

2. _____

S_p

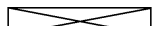
3. _____



4. _____



5. _____



6. _____



7. _____



8. _____

9. _____

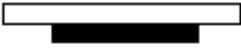
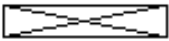
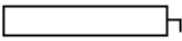
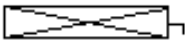
- a. Ground
- b. Power controller
- c. Switch with pilot lamp
- d. Thermostat
- e. Single-pole switch
- f. Fusible element
- g. Surface lighting element
- h. Vapor tight
- I. Duplex receptacle
- j. Motor connection

	Similar Lamp Fixture
	Surface or Pendant Individual Fluorescent Fixture
	Surface or Pendant Continuous Row Fluorescent Fixture
	Blanked Outlet
	Junction Box
Wall	
	To indicate wall installation of above outlets, place circle near wall and connect with line as shown.
	Single Switch
	Duplex
	Triplex
	Duplex Split Wt
	Single S Recepta
	Duplex Recepta
	Range C
	Clock H

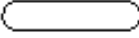




TM 6.1 (Cont.)

TM 6.1 (Cont.)

Panelboards, Switchboards, and Related Equipment

	Surface-Mounted Panelboard and Cabinet
	Motor or Other Power Controller
	Externally Operated Disconnection Switch
	Combination Controller and Disconnection Means

Remote Control Stations for Motors or Other Equipment

	Push-Button Station
	Float Switch - Mechanical
	Limit Switch - Mechanical
	Pneumatic Switch - Mechanical
	Thermostat

Diagramming Electrical Wiring

Objective: Diagram a wiring plan for an agricultural structure.

Draw the symbols for the fixtures listed below in the appropriate area of the machine shop diagram. You will choose where the entrances are located. Draw a line from the switches used to the fixtures controlled.

- 4 ceiling light fixtures
- 6 wall mount light fixtures
- 4 duplex receptacles (GFCI)
- Wall switches (you decide how many)

