Students please affix one of your self-adhesive identification labels to this space. Do not obscure other parts of this page with the label. If you do not have a self-adhesive identification label, please complete the following information. Write your name as it appears on your badge.

Your Name: _____

Participation Number:

			0	3				0	

Two letter state abbreviation. →

State code (0301, 0302, …… to 0350) ↑

Team member number (01, 02, 03, or 04) ↑

Students please do not write or mark within this box.

Judges, after this skill sheet has been scored and double checked, write the total score for this activity in the blank below.

Skill Activity Score: _____

Judges Initials: _____

2016 National Agricultural Technology & Mechanical Systems Career Development Event
Animal Systems
Electrical Systems Skill Activity

Situation: Livestock facilities that house animals for exhibition will typically have electrical outlets adjacent to bedding stalls and/or grooming areas which provide convenient access to power for operating livestock blower/dryers, clippers, fans and other equipment. Your task is to plan and install a multi-wire branch circuit that will provide access to two individual 120V receptacle outlets mounted on the same yoke. The facility will have concrete floors and should be considered a damp environment at various times during its use.

Directions: Using the tools, supplies/equipment, and references provided, plan and correctly wire this multi-wire branch circuit (Figure 1) so that it complies with all applicable NEC requirements. The circuit should originate at the service panel provided. It is your responsibility to select and use the **correct** circuit breaker, conductors, and receptacle in completing this activity. **You may strip the ends and use any of the individual THHN insulated conductor provided. DO NOT CUT CONDUCTORS TO MAKE THEM SHORTER. DO NOT mount the device in the box. DO NOT tighten the cable clamp. DO NOT BACK WIRE RECEPTACLES. If you cannot distinguish colors, ask a contest official for assistance. DO NOT mark on reference materials.**

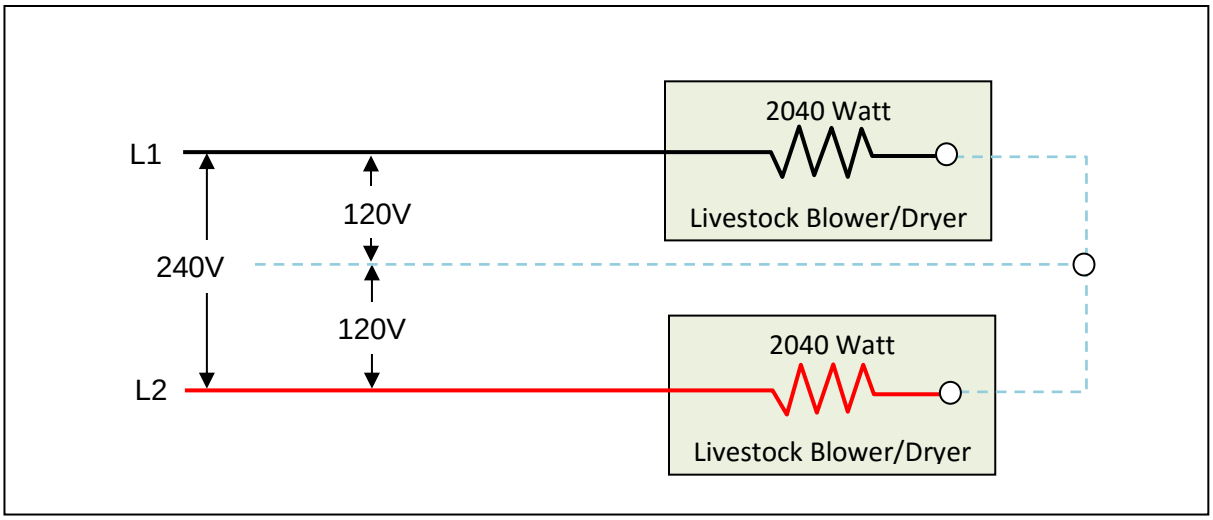

Figure 1

NOTE:

Watts = Volts x Amperes

I = Current (Amperes)

I_T = Total Current (Amperes)

P = Power (Watts)

R = Resistance (ohms)

R_T = Total Resistance (ohms)

E = Electromotive Force (Volts)

$E = I \times R$ $\quad R = E \div I$ $\quad I_T = E_{Source} \div R_T$

$P = E^2 \div R$ $\quad R = E^2 \div P$ $\quad R_T = R_1 + R_2$

Answer the following questions, record your answers with units in the space provided for questions 1 – 3. Circle the best answer for question 4.

1. What is the rated current in amperes for the livestock blower/dryer?_____ (2pts.)

2. What is the resistance in Ohms of one blower/dryer? **(Round to nearest .001)** _____ (2pts.)

3. If two livestock blowers are operated simultaneously on the multi-wire circuit, what will be the total load in amperes on the circuit? **(Round to nearest whole number)** _____ (2pts.)

4. Which of the following statements best describes the multi-wire branch circuit? (2pts.)

   A. Each outlet of the duplex receptacle receives power from the same 120V electrical phase in the service panel and shares an un-grounded conductor.
   B. Each outlet of the duplex receptacle receives power from the same 120V electrical phase in the service panel and utilizes one un-grounded source conductor with individual connections made at each grounded conductor terminal of the device.
   C. Each outlet of the duplex receptacle receives power from electrical bus contacts that are 180° out of phase. The receptacles are wired in series and share an un-grounded conductor.
   D. Each outlet of the duplex receptacle receives power from electrical bus contacts that are 180° out of phase. The receptacles are two separate parallel circuits that share an un-grounded conductor.

Evaluation Score Sheet (for contest officials only)						
	Item	**Points Possible**	**# of Opportunities**	**Points Each**	**Score Based on # missed**	**Points Earned**
1	Proper conductor selection	2	1	2	Incorrect size = 0	
2	Proper size & type over current protection.	2	1	2	All or None	
3	Branch Circuit connections in SEP made correct	5	5	1	1= 4 2= 3 3= 2 4= 1 5= 0	
4	Grounding (bond) wire properly used	2	2	1	1= 1 2 = 0	
5	Correct receptacle installed	2	1	2	All or None	
6	Correct wire connections	4	4	1	1= 3 2= 2 3= 1 4= 0	
7	Wire hooks made and used properly	4	4	1	1= 3 2= 2 3= 1 4= 0	
8	Solderless connectors	1	1	1	All or None	
9	Answers to questions (-1 pt. for no units)	8	4	2	1 = 6 2 = 4 3 = 2 4 = 0	
10	Safety Violations	0	1	2	- 2pts/violation	
	Total Possible:	**30**			**Total Earned:**	

Please write the total score in the space provided at the top of the first page and initial in the space provided.