Tractor Electrical Systems
Common Course Outline

Course Information
Organization        South Central College
Developers           Bob Cramer
Revision History     2008-2009
Course Number        AGME1861
Department           Ag Service Technician
Total Credits        3

Description
This course covers the fundamentals of electricity and its application to farm equipment electrical
systems. The content includes wiring diagrams, batteries, test equipment, charging systems, cranking
systems, ignition systems and diagnostic service procedures. If you have a disability and need
accommodations to participate in the course activities, please contact your instructor as soon as possible

Types of Instruction

<table>
<thead>
<tr>
<th>Instruction Type</th>
<th>Contact Hours</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Lecture</td>
<td>16</td>
<td>1</td>
</tr>
<tr>
<td>Lab</td>
<td>64</td>
<td>2</td>
</tr>
</tbody>
</table>

Prerequisites
None

Exit Learning Outcomes
Core Abilities
A. Critical Thinking
B. Math Logic
C. Professionalism

Competencies
1. Describe electrical/electronic safety
   Learning Objectives
   a. Explain system safety
   b. Explain shop practices and work habits
   c. Explain noise protection and sound level (Decibels)
2. Describe basic electrical/electronic theory
   Learning Objectives
   a. Define electrical/electron theory apply Ohm's Law interpret tractor circuit diagrams
   b. Explain current/voltage/resistance
   c. Explain Ohm's Law formulas
   d. Explain electrical circuits
3. **Describe Ohm’s Law**
   **Learning Objectives**
   a. Explain Ohm’s Law formulas
   b. Apply Ohm’s Law

4. **Describe the three circuit types**
   **Learning Objectives**
   a. Explain series circuit
   b. Diagram a series circuit
   c. Test a series circuit with meter
   d. Explain a parallel circuit
   e. Diagram a parallel circuit
   f. Test a parallel circuit with meter
   g. Explain a series/parallel circuit
   h. Diagram a series/parallel circuit
   i. Test a series parallel circuit with meter

5. **Describe wiring schematics and diagrams**
   **Learning Objectives**
   a. Explain wiring diagrams and schematic types
   b. Explain component identification letters
   c. Explain wiring numbers and color codes
   d. Explain wiring diagram and schematic symbols
   e. Explain SAE symbols

6. **Describe electrical components**
   **Learning Objectives**
   a. Explain electrical resistances
   b. Explain and test for failures in electrical circuits
   c. Explain and test electrical circuit protection components
   d. Explain and test electrical switches
   e. Explain and test electrical resistors/capacitors
   f. Explain and test diodes/transistors and transformers

7. **Test electrical components with meter**
   **Learning Objectives**
   a. Test wiring harnesses
   b. Test circuit protection devices
   c. Test switches
   d. Test resistors
   e. Test capacitors
   f. Test diodes
   g. Test transformers

8. **Describe electromechanical components**
   **Learning Objectives**
   a. Explain relays
   b. Explain solenoids
c. Explain generator components
d. Explain alternator components
e. Explain motor components

9. **Test electromechanical components with meter**
   Learning Objectives
   a. Test relays
   b. Test solenoids
   c. Test generator
   d. Test alternator

10. **Describe and test battery**
    Learning Objectives
    a. Explain battery terms
    b. Identify battery circuit test procedures
    c. Perform battery circuit tests

11. **Describe and test charging circuits/components**
    Learning Objectives
    a. Explain DC generator/regulator principles
    b. Identify generator/regulator components
    c. Trace generator/regulator circuits
    d. Tear down and perform generator/regulator testing/adjustment
    e. Identify alternator charging operating principles
    f. Explain alternator component test procedures
    g. Test/repair Delco alternators
    h. Perform on-tractor alternator charging test

12. **Describe and test starting circuits/components**
    Learning Objectives
    a. Explain cranking circuit principles
    b. Identify cranking system components
    c. Disassemble identify and test cranking motor parts
    d. Reassemble/test cranking motor
    e. Describe various cranking safety circuits
    f. Explain on-tractor cranking circuit testing
    g. Perform on-tractor cranking circuit testing

13. **Describe and test ignition circuits/components**
    Learning Objectives
    a. Describe ignition principles
    b. Identify ignition system parts
    c. Identify primary/secondary circuits
    d. Identify and test ignition components
    e. Explain distributor timing procedure
    f. Explain distributor timing procedure
    g. Perform static/dynamic timing procedure on breaker-point ignition distributor