AGRICULTURAL MECHANICS CAREER DEVELOPMENT EVENT

Purpose:
To provide an opportunity for participants to demonstrate their knowledge, skill, technical competence, and problem solving ability in the areas of agricultural systems and mechanics.

Objectives:
1. Demonstrate competence and skill in the areas of arc and acetylene welding.
2. Demonstrate competence and skill in the areas of tool and metal identification and tool reconditioning.
3. Demonstrate competence and skill in the areas of small engine trouble shooting and problem solving.
4. Demonstrate competence and skill electrical problem solving and wiring.
5. Demonstrate competence and skill in the areas of copper and PVC pipefitting, soldering and gluing.

General Rules:
1. Participants shall wear appropriate safety and shop attire for participation in this event.
2. A team shall consist of three or four members. Each team member shall participate in either one or two of the subject matter areas and the team is encouraged to compete in all six areas. Teams that, for whatever reason, have fewer than three members are not eligible for team awards, but participants may receive individual awards. The team advisor shall assign the members of the team to the subject matter areas.
3. The event shall be developed from the following subject matter areas:
   a. Arc Welding (SMAW), MIG Welding (GMAW)
   b. Oxyacetylene and TIG Welding (GTAW)
   c. Tool and Hardware Identification
   d. Tool Reconditioning / Metal Identification or Pipe Fitting
   e. Electricity (Residential Wiring)
   f. Small Gasoline Engines
4. Each participant shall be responsible for:
   a. Industrial Quality Eye Protection - No participant shall be allowed to participate in the performance skills of the event without wearing industrial quality eye protection. Those participants wearing prescription eyewear of non-industrial quality shall also wear goggles to obtain adequate protection.
   b. Clothing - Each participant shall furnish and wear appropriate coveralls, shop coats or shop work suits. Clothing must be in good repair and fit properly. Long sleeved clothing must be worn when arc, oxyacetylene, or TIG welding. Leather high top shoes are required--high top leather tennis shoes are acceptable.
   c. Gloves - Gloves to be used in arc and oxyacetylene welding shall be furnished by the participant.
   d. Clipboard and Pencil - Each participant shall provide a clipboard and pencil to use in Tool and Hardware Identification and the Small Gasoline Engines.
5. The event chairman shall furnish all tools and materials for the event unless specified under the specific rules for each subject matter area.
6. Participants shall be responsible for reporting to the event at the time and place announced.
7. Participants shall not in any way reveal identity to judges except by the number assigned.
8. When participants begin lining up for the event, no more conferring shall take place between participants and outsiders. Access to the building or area of the event shall be restricted to the participants and the judges. Individuals other than participants or judges wishing access to the event site must receive permission from the event chairman.
9. Maximum time allowed for the activities of each subject matter area shall be 45 minutes. The 45 minutes shall include any warm-ups and/or adjustments.
10. Participants in need of special accommodations (disability or other health issues) must submit the Idaho State FFA Career Development Events Request for Special Accommodation Application found at the end of the General Rules and Regulations at least one month prior to the event.

Format and scoring:

1. Judges shall be responsible for marking by number each participant's work before the event begins.
2. At the close of the event a grade or score shall be given by the judge on all participants in the subject matter area assigned to that judge. Grades or scores shall not be revealed until after the awards assembly.
3. At approximately mid-morning of the day following the event, participants and advisors may go over the work if they wish. Again, no results shall be revealed until the awards assembly.
4. Each of the subject matter areas shall be scored on the basis of 100 possible points.

Awards:

Plaques will be awarded to the top five (5) teams. FFA Award Pins will be presented to the top three (3) individuals in each of the six (6) event areas. During the presentation of awards, the top ten (10) teams and the top five (5) individuals in each event area will be announced.
**Arc Welding**

1. After brief directions from an event supervisor, each participant shall be given 45 minutes to become familiar with, adjust the welder and complete the skill.
2. Participants shall be allowed to choose between an AC or DC welder, if possible. The judge may assign participants to a particular machine within those two types. Each advisor should have received an inventory of the arc welders available for the event.
3. Practice material shall be provided for participants to use in regulating the machine.
4. The electrodes used in the arc welding skill shall be 1/8” diameter. The electrodes will be E6010, E6011, E6013 and E7018. Electrodes will be provided. Participants are not to bring their own electrodes.
5. All electrode types will be specified in the spring mailing.
6. All materials used in the arc welding skill shall be 1/4 inch.
7. Helmets and leathers for the arc welding skill shall be provided.
8. The participants shall perform four of the following skills, selected by the event chairman:
   a. V-Butt weld for tensile pull - 6011
   b. Overhead fillet - 7018
   c. Vertical up fillet - 6011
   d. Horizontal fillet - 7018
   e. MIG horizontal fillet (Amperage and voltage set by chairman but may be changed by participant)
   f. MIG vertical up fillet, single pass (Amperage and voltage set by chairman but may be changed by participant)
   g. Weave weld (to be done between two (2) stringer beads 3/4 inch apart, (center to center) – 6013
   h. Flat Lap – 6013
   i. Pipe (1 1/2 schedule 40) to Plate (1/4") single pass – E6010
# ARC WELDING SCORECARD

Four out of the seven skills listed below shall have equal weight; 25 points each for a total of 100 points.

## A. V-Butt weld for tensile pull (25 pts)

<table>
<thead>
<tr>
<th>Possible Points</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The V filled as to height and ends</td>
<td>5</td>
</tr>
<tr>
<td>2. Strength (pounds of pull)</td>
<td>20</td>
</tr>
<tr>
<td>25</td>
<td></td>
</tr>
</tbody>
</table>

## B. Fillets (Overhead, Pipe to Plate, Vertical, Horizontal and/or MIG Horizontal / Vertical (25 pts each)

<table>
<thead>
<tr>
<th>Possible Points</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Absence of overlap or undercut</td>
<td>7</td>
</tr>
<tr>
<td>2. Equal legs</td>
<td>3</td>
</tr>
<tr>
<td>3. Throat equal to metal thickness</td>
<td>3</td>
</tr>
<tr>
<td>4. Absence of slag inclusion</td>
<td>5</td>
</tr>
<tr>
<td>5. Smoothness and shape of bead</td>
<td>7</td>
</tr>
<tr>
<td>25</td>
<td></td>
</tr>
</tbody>
</table>

## C. Weave (25 pts)

<table>
<thead>
<tr>
<th>Possible Points</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Stringer beads straight and 3/4 inch apart</td>
<td>4</td>
</tr>
<tr>
<td>2. Weave penetration into stringer bead</td>
<td>4</td>
</tr>
<tr>
<td>3. Starting and stopping</td>
<td>3</td>
</tr>
<tr>
<td>4. Absence of slag inclusion</td>
<td>7</td>
</tr>
<tr>
<td>5. Smoothness and shape of bead</td>
<td>7</td>
</tr>
<tr>
<td>25</td>
<td></td>
</tr>
</tbody>
</table>

## D. Flat Lap (25 pts)

<table>
<thead>
<tr>
<th>Possible Points</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Absence of overlap or undercut</td>
<td>7</td>
</tr>
<tr>
<td>2. Appropriate leg length</td>
<td>3</td>
</tr>
<tr>
<td>3. Throat equal to metal thickness</td>
<td>3</td>
</tr>
<tr>
<td>4. Absence of slag inclusion</td>
<td>5</td>
</tr>
<tr>
<td>5. Smoothness and shape of bead</td>
<td>7</td>
</tr>
<tr>
<td>25</td>
<td></td>
</tr>
</tbody>
</table>

**Total Possible Points = 100**
Oxyacetylene and TIG Welding

1. After brief directions by an event supervisor, each participant shall be given 45 minutes to become familiar with, regulate the welder, and complete the skill.

2. The regulator pressures shall be pre-set for the tip size indicated. However, the pressure and tip may be changed by the participant. If the participant is not absolutely sure of the changes he/she wishes to make, that participant shall ask the supervisor for help. The operational information on the system that is being used for the event has been mailed to each instructor at least 5 consecutive years and therefore it is assumed each department has a copy.

3. For fusion welding, copper-clad mild steel welding rods in the sizes of 1/16, 3/32, and 1/8 shall be provided.

For braze welding, a flux-coated rod in the sizes of 3/32 and 1/8 shall be provided. Additional flux shall be provided as needed.

NOTE: Participants may provide their own fusion and braze welding rod.

4. The metal for the welds shall be mild steel of a thickness of 1/16 to 1/8. The metal for cutting shall be mild steel and of a thickness of 1/4 to 5/8. The metal for TIG welding shall be 1/8”.

5. Participants shall bring their own sharpened seriated tungsten 3/32 size for TIG welding. Size to be designated annually by the CDE superintendent.

6. The following welds will be required in the Oxyacetylene Welding section. One TIG (A or B), one fusion or braze (C, D, E, F) and one pattern cut (G)
   a. TIG flat butt weld
   b. TIG horizontal fillet weld
   c. Lap fusion weld
   d. Fillet fusion weld
   e. Lap braze weld
   f. Fillet braze weld
   g. Pattern cut (Participants may cut in any position with or without a rest. The total length of all cuts in the pattern may not be more than eight (8) inches.)

7. TIG weld will be flat butt or horizontal fillet on 1/8” metal.

8. All torches will be Victor Super Range with tip sizes from 00 to 3 for welding and sizes 00, 0, and 1 for cutting.
# Oxyacetylene and Tig Welding Scorecard

<table>
<thead>
<tr>
<th>Category</th>
<th>Possible Points</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Pattern cut</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Fit to pattern</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>2. Angle of cut</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>3. Top corner square</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>4. Underside free of slag</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td><strong>B. Lap fusion weld</strong></td>
<td></td>
<td>34</td>
</tr>
<tr>
<td>1. Penetration</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>2. Edges feathered</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>3. Surface appearance</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>4. Start and stop</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td><strong>C. Fillet fusion weld/TIG fillet weld</strong></td>
<td></td>
<td>33</td>
</tr>
<tr>
<td>1. Absence of undercutting</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>2. Edges feathered</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>3. Concave bead</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>4. Legs equal</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>5. Start and stop</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td><strong>D. Lap braze weld</strong></td>
<td></td>
<td>33</td>
</tr>
<tr>
<td>1. Surface appearance</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>2. Concave bead</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>3. Absence of overheating</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>4. Absence of excess materials</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>5. Adhesion</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td><strong>E. Fillet braze weld</strong></td>
<td></td>
<td>33</td>
</tr>
<tr>
<td>1. Surface appearance</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>2. Concave bead</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>3. Absence of overheating</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>4. Absence of excess material</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>5. Equal legs</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>6. Adhesion</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td><strong>F. TIG Flat Butt weld</strong></td>
<td></td>
<td>33</td>
</tr>
<tr>
<td>1. Penetration</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>2. Edges feathered</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>3. Surface appearance</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>4. Start and stop</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>
**Tool and Hardware Identification**

1. After brief directions from an event supervisor responsible for this area, participants shall have 45 minutes to complete the skill. After the supervisor has passed out the blanks, given instructions and placed the participants around the identification area, the judge shall announce the beginning of the event. Participants may proceed at their own pace and may go back to recheck items.

2. There shall be 100 items selected from the *Tools and Hardware Identification Manual* by Jack McHargue and Dan Hood for the participants to identify.

3. Blanks shall be provided listing 110 items on which each participant shall insert the correct number of the item as it is displayed. Tools/Equipment and Hardware/Supplies shall be listed separately. Participants will not receive credit if there is more than one number per blank.

4. Sixty-six (66) of the items shall be from the Tools and Equipment List and thirty-four (34) shall be from the Hardware and Supplies List.

5. Each participant in this area shall be graded by the judge on the percentage of correct answers.

6. *Tools and Hardware Identification Manual* by Jack McHargue and Dan Hood will be used as the official reference.
### TOOL AND EQUIPMENT LIST

<p>| Awl | Bar, crow | Bar, wrecking | Bevel, sliding T | Bit, auger, solid center | Bit, expansion | Bit, holder, extension | Bit, masonry | Bit, screwdriver | Bit, spade | Blade, metal, abrasive cut-off | Brush, paint | Brush, steel wire | Calipers, inside | Calipers, outside | Calipers, vernier | Card, file | Carrier, battery | Chain, chain saw, chipper | Chain, chain saw, chisel | Chain or tape, surveyor’s | Chisel, cape | Chisel, cold | Chisel, diamond point | Chisel, round nose | Chisel, wood | Clamp, “C” | Clamp, fixtures, pipe | Cleaner, battery post | Cleaner, ring groove | Cleaner, oxyacetylene tip | Compressor, piston ring | Compressor, Valve Spring | Copper, soldering | Countersink | Creeper, auto | Cutter, bolt | Cutter, pipe | Cutter, tubing | Cutter, valve seat | Die, pipe threading | Die stock | Die, thread cutting | Divider, spring | Divider, wing | Dresser, emery wheel | Drill, electric | Drill, star | Drill, twist, straight | Drill, twist, taper shank | Driver, bushing | Driver, nut | Edger, concrete | Expander, piston ring | Extractor, screw | Extractor, tap | File, chain saw | File, double cut, flat | File, mill | File, round | File, slim taper | File, square | Flaring tool, copper tubing | Float, concrete | Gauge, depth | Gauge, dial indicator | Gauge, screw pitch | Gauge, small hole | Gauge, tap and drill | Gauge, telescoping | Gauge, thickness | Gauge, wire (Am. Std.) | Grinder, electric disc | Grinder, valve | Gun, caulkin | Gun, grease | Gun, soldering | Hammer, ball peen | Hammer, bell faced, curved claw | Hammer, bell faced, straight claw | Hammer, blacksmith’s cross peen | Hammer, chipping or slag | Hammer, Tinner's riveting | Handle, axe | Handle, file | Handle, hand saw | Handle, machinist's hammer | Handle, nail hammer | Handle, plane | Handle, speeder |</p>
<table>
<thead>
<tr>
<th>Tool Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socket, deep well ¼&quot;, 3/8&quot;, ½&quot; drive (regular or impact)</td>
<td>Trowel, plasterer's</td>
</tr>
<tr>
<td>Socket, Impact regular or deep</td>
<td>Vise, carpenter's</td>
</tr>
<tr>
<td>Socket, reducer</td>
<td>Vise, drill press</td>
</tr>
<tr>
<td>Socket, universal</td>
<td>Vise, machinist's</td>
</tr>
<tr>
<td>Splitter, nut</td>
<td>Vise, pipe, chain type</td>
</tr>
<tr>
<td>Splitter or separator</td>
<td>Vise, pipe, hinged type</td>
</tr>
<tr>
<td>Bearing Spoon, brake adjusting</td>
<td>Wedge, falling</td>
</tr>
<tr>
<td>Square, combination</td>
<td>Wedge, splitting</td>
</tr>
<tr>
<td>Square, Protractor Head</td>
<td>Welder, spot</td>
</tr>
<tr>
<td>Square, steel framing</td>
<td>Welder, plastic</td>
</tr>
<tr>
<td>Square, T</td>
<td>Wheel, emery grinding</td>
</tr>
<tr>
<td>Square, try</td>
<td>Wrench, adjustable</td>
</tr>
<tr>
<td>Stone, bench, sharpening</td>
<td>Wrench, distributor</td>
</tr>
<tr>
<td>Stripper and crimper, wire</td>
<td>Wrench, double offset, box pattern</td>
</tr>
<tr>
<td>Tachometer, vibration</td>
<td>Wrench, hex</td>
</tr>
<tr>
<td>Tap, machinist’s hand</td>
<td>Wrench, ignition</td>
</tr>
<tr>
<td>Tap, pipe</td>
<td>Wrench, impact, hand</td>
</tr>
<tr>
<td>Tape, flexible steel</td>
<td>Wrench, impact, electric or air</td>
</tr>
<tr>
<td>Tester, compression</td>
<td>Wrench, internal pipe</td>
</tr>
<tr>
<td>Tester, spark</td>
<td>Wrench, oil filter</td>
</tr>
<tr>
<td>Torch, cutting</td>
<td>Wrench, pipe chain</td>
</tr>
<tr>
<td>Torch, propane</td>
<td>Wrench, pipe, stillson type</td>
</tr>
<tr>
<td>Torch, welding</td>
<td>Wrench, ratchet 1/4&quot;, 3/8&quot;, 1/2&quot; drive</td>
</tr>
<tr>
<td>Trowel, masonry brick</td>
<td>Wrench, starter clutch</td>
</tr>
<tr>
<td>Trowel, masonry pointing</td>
<td>Wrench, tap T-handle</td>
</tr>
<tr>
<td>Trowel, concrete</td>
<td>Wrench, (torque)</td>
</tr>
</tbody>
</table>
HARDWARE AND SUPPLY LIST

______ Anchor, concrete
______ Anchor, sheetrock
_____ Block, snatch
_____ Bolt, carriage
_____ Bolt, door, barrel type
_____ Bolt, eye
_____ Bolt, foundation
_____ Bolt, machine (cap screw)
_____ Bolt, plow
_____ Bolt, shoulder
_____ Bolt, stud
_____ Bolt, toggle
______ Bolt, u
_____ Box, electrical, outlet or junction
_____ Box, electrical, receptacle or switch
_____ Bracket, shelf
_____ Brad, wire
_____ Bushing, plastic or metal
_____ Cable, “Romex”, non-metallic
_____ Cable, “Romex” underground feeder
_____ Cap, electrical cord
_____ Caster, roller
_____ Caulking
_____ Chain, roller
_____ Clamp, hose
_____ Clevis, common
_____ Clevis, screw pin
_____ Clip, alligator
_____ Clip, hair pin
_____ Clip, wire rope
_____ Cloth, emery
_____ Cloth, wire
_____ Conduit, thin walled
_____ Connector, electrical cord
_____ Connectors, solderless
_____ Coupler, air and nipple
_____ Fastener, corrugated
_____ Fiber glass, corrugated
_____ Fitting, grease
_____ Fuse, Automotive
_____ Fuse, cartridge
_____ Fuse, plug
_____ Glide, furniture
_____ Grommet, rubber or metal
_____ Hanger, joist
_____ Hasp, safety
_____ Hinge, butt
_____ Hinge, continuous
_____ Hinge, strap
_____ Hinge, tee
_____ Hook, gate
_____ Insert, threaded
_____ Insulation, batt type
_____ Insulation, foil type
_____ Insulation, granulated type
_____ Insulation, pipe
_____ Iron, angle
_____ Iron, channel
_____ Iron, deck plate
_____ Iron, expanded metal
_____ Iron, galvanized
_____ Iron, I Bar
_____ Iron, round
_____ Iron, square
_____ Iron, square tubing
_____ Key, woodruff
_____ Key, stock
_____ Latch, door
_____ Link, chain repair
_____ Lock, door
_____ Lock, drawer
_____ Lock, pad
_____ Material, gasket
_____ Metal, sheet, corrugated, alum.
_____ Metal, sheet, corrugated, galv.
_____ Nail, box
_____ Nail, cement coated
_____ Nail, common
_____ Nail, duplex (double headed)
_____ Nail, finish
_____ Nail, galvanized box
_____ Nail, joist hanger
_____ Nail, masonry
_____ Nail, roofing, neoprene washer
_____ Nail, ring shank
_____ Nail, rooting, large head
**Tool Reconditioning and Pipe Fitting**

1. After brief directions by an event supervisor, participants shall have a total of 45 minutes to complete the skill in this area.

2. The skill for this area of the event shall be one of the following three:
   a. Tool Reconditioning
   b. Copper Pipe Fitting
   c. Plastic Pipe Fitting

   The skills will rotate as follows:
   
   2013- Plastic Pipe Fitting  
   2014- Copper Pipe Fitting  
   2015- Tool Reconditioning / Metal Identification  
   2016- Plastic Pipe Fitting  
   2017- Copper Pipe Fitting

3. Each participant shall be required to provide the following at the beginning of the tool reconditioning phase of the event:
   a. One-half inch twist drill bit
   b. One-half inch common cold chisel

   NOTE: In case the tool reconditioning skill has not been chosen, the participant shall not be asked to provide these tools.

4. All other materials and tools shall be provided for this part of the event.

5. Tool Reconditioning / Metal Identification
   a. The twist drill bit and common cold chisel shall be numbered and blunted by the judge before sharpening begins.
   b. The tools shall be sharpened according to the specifications given on the scorecard.
   c. The tools shall be sharpened on the face of the grinding stone.
   d. Gauges and files shall be furnished, and only those shall be used.
   e. Grinders shall be provided and only those shall be used.
   f. Participants shall not grind on sides of grinding wheel.
   g. Participants will identify metals using the following methods: visual, spark test, weight, magnetism, hardness and chemical.

6. Copper Pipe Fitting
   a. Examples of the project shall be provided for the participant to follow.
   b. The ends of the pipe shall be properly reamed.
   c. The pipe used in this exercise shall be Type L, 1/2 inch and will not exceed 5 fittings.

7. Plastic Pipe Fitting
   a. Examples shall be provided for the participant to follow in cutting, fitting, and cementing of plastic pipe.
   b. The plastic pipe used in this exercise shall be a PVC type and one inch or less in size.
TOOL RECONDITIONING SCORECARD

A. Cold Chisel
   1. Included angle (70°) 8
   2. Side lengths equal 5
   3. Squareness 5
   4. Single faces 4
   5. Sharpness 5
   6. Absence of burning 5

B. Metal Identification
   1. Eight metals will be identified from the sixteen possible with a point value of four points for each correct answer. 32
   2. Metals to be identified by:
      a. Color
      b. Weight
      c. Spark
      d. Chemical
      e. Magnetism
      f. Hardness/File test

C. Twist Drill (Total Cutting Angle 118°) (Rake 8-12°)
   1. Lip angle (59°) (5 pts. each) 10
   2. Lip length 5
   3. Faces 5
   4. Lip clearance 13
   5. Chisel point 3

Total Possible Points = 100
COPPER PIPE FITTING SCORECARD

A. Proper heat
   1. Wood 10
   2. Copper 15
B. Absence of leaks 25
C. Absence of excess solder 15
D. Insides of pipe reamed 5
E. Proper lengths of pipe 20
F. Proper angle of joints 10

SUB - TOTAL 100

** Deduction for improper assembly (up to 20%) ________

TOTAL 100

PLASTIC PIPE FITTING SCORECARD

A. Absence of leaks 25
B. Absence of excess cement 5
C. Proper lengths of pipe 20
D. Proper angle of joints 20
E. Joints properly seated 10
F. Pipes chamfered 10

SUB TOTAL 100

** Deduction for improper assembly (up to 20%) ________

TOTAL 100
Electricity

1. After brief directions from an event supervisor, each participant shall be given 45 minutes to complete the skill.

2. Residential Electricity - There will be two sections including a wiring exercise (30 minutes) and a problem-solving section (15 minutes).

   a. Wiring Exercise:
      1. The electrical wiring shall conform to wiring diagram provided to the participant.
      2. All tools and supplies required for this area shall be provided except for a pocket knife suitable for wire stripping, which shall be provided by the participant. All tools provided by the participant shall be approved by the area judge before use. Multimeter specifications will be supplied at spring mailing; however, students are encouraged to supply their own.
      3. The participant will demonstrate wiring skills which may include:
         a. reading simple wiring diagrams.
         b. wiring single pole switches.
         c. wiring three-way switches.
         d. wiring duplex receptacle.
         e. wiring split-wired switched receptacles.
         f. wiring light fixtures (porcelain type).
         g. reading a multimeter (resistance and voltage).
         h. installing cord caps on power cords.
      4. All wires shall be stripped to specification neatly without wire nicking.
      5. All wire-to-wire connections will be made with solderless connectors provided.
      6. Assembly of circuits will be done on wiring board provided.
      7. All circuits shall provide proper grounding (bare or green conductor) as specified by the National Electrical Code.
      8. Limit three boxes in electricity.

   b. Problem-Solving Section (will include the following):
      1. Determining resistance of a portion of a circuit.
      2. Determining voltage and/or voltage drop for a circuit or portion of a circuit.
      3. Determining continuity of a circuit.
      4. Conductor size and labeling.
      5. Voltage drop due to total length of conductor.
      6. Overcurrent devices and protection.
      7. Grounding for safety.

3. References:


   b. Pamphlet prepared by Ed Dowding, University of Idaho Agricultural Engineering Department.
## ELECTRICAL WIRING SCORECARD

<table>
<thead>
<tr>
<th></th>
<th>Possible Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Wiring exercise (assembled according to example)</td>
<td>35</td>
</tr>
<tr>
<td>B. Workmanship</td>
<td>15</td>
</tr>
<tr>
<td>C. Problem solving</td>
<td>40</td>
</tr>
<tr>
<td>D. Tool handling/safety</td>
<td>10</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100</td>
</tr>
</tbody>
</table>
**Small Gasoline Engines**

1. After brief directions from an event supervisor, participants shall have a total of 45 minutes to complete this area of the event.

2. The small gasoline engines subject matter area shall be divided into problem-solving and mechanical skills. The problem-solving exercise shall take approximately 15 minutes. The mechanical skills portion shall take approximately 30 minutes.

3. The problem solving and mechanical skills shall deal with the Briggs and Stratton small gasoline engine. This shall require that participants be familiar with the 1995 edition of the Briggs and Stratton Repair Manual (black cover), the Briggs and Stratton Parts Manual, and the specialty tools provided for Briggs and Stratton engines repair and overhaul.

4. **Problem Solving**
   a. Participants shall be required to solve approximately 8-10 problems dealing with Briggs and Stratton small gasoline engines.
   b. Problem solving shall include such things as parts identification, looking up specifications, ordering parts, making decisions about reject sizes and making decisions about repair procedures.

5. **Mechanical Skills**
   a. Participants shall be working on identical engines. (Recommend Briggs & Stratton model 80302)
   b. Participants shall be responsible for finding faults or performing common repairs or service on Briggs and Stratton engines.
   c. Participants shall not be required to open the crankcase of the engine.
   d. Participants shall not be required to disassemble the carburetor.
   e. Proper use of tools and safe procedure throughout the event.

### SMALL GASOLINE ENGINES SCORECARD

<table>
<thead>
<tr>
<th></th>
<th>Possible Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. 8-10 Problems (equally weighted)</td>
<td>40</td>
</tr>
<tr>
<td>B. Mechanical Skills</td>
<td>40</td>
</tr>
<tr>
<td>C. Use of Proper Procedures and Tools</td>
<td>20</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>
METAL IDENTIFICATION SCORECARD

Participant No. __________

Instructions: Place the letter of the METAL NAME for each sample in the blank for the appropriate sample number.

METAL NAMES
A. Aluminum
B. Brass & Bronze 1. __________
C. Copper 2. __________
D. Grey Cast Iron 3. __________
E. High Carbon/Tool Steel 4. __________
F. High Speed Steel 5. __________
G. Lead 6. __________
H. Low Carbon/Mild Steel 7. __________
I. Magnesium 8. __________
J. Malleable Cast Iron (Correct identification 4 points each.)
K. Medium Carbon Steel
L. Nickel
M. Stainless Steel
N. White Cast Iron
O. Titanium
P. Tungsten
Q. Zinc Die Cast/Pot Metal

TOTAL SCORE ON METAL ID __________