

# 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.

	<u>Possible Points</u>
A. V-Butt weld for tensile pull (25 pts)	
1. The V filled as to height and ends	5
2. Strength (pounds of pull)	<u>20</u>
	25
B. Fillets (Overhead, Pipe to Plate, Vertical, Horizontal and/or MIG Horizontal / Vertical (25 pts each)	
1. Absence of overlap or undercut	7
2. Equal legs	3
3. Throat equal to metal thickness	3
4. Absence of slag inclusion	5
5. Smoothness and shape of bead	<u>7</u>
	25
C. Weave (25 pts)	
1. Stringer beads straight and 3/4 inch apart	4
2. Weave penetration into stringer bead	4
3. Starting and stopping	3
4. Absence of slag inclusion	7
5. Smoothness and shape of bead	<u>7</u>
	25
D. Flat Lap (25 pts)	
1. Absence of overlap or undercut	7
2. Appropriate leg length	3
3. Throat equal to metal thickness	3
4. Absence of slag inclusion	5
5. Smoothness and shape of bead	<u>7</u>
	25

**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

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

### **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

_____ Awl	_____ Dresser, emery wheel
_____ Bar, crow	_____ Drill, electric
_____ Bar, wrecking	_____ Drill, star
_____ Bevel, sliding T	_____ Drill, twist, straight
_____ Bit, auger, solid center	_____ Drill, twist, taper shank
_____ Bit, expansion	_____ Driver, bushing
_____ Bit, holder, extension	_____ Driver, nut
_____ Bit, masonry	_____ Edger, concrete
_____ Bit, screwdriver	_____ Expander, piston ring
_____ Bit, spade	_____ Extractor, screw
_____ Blade, metal, abrasive cut-off	_____ Extractor, tap
_____ Brush, paint	_____ File, chain saw
_____ Brush, steel wire	_____ File, double cut, flat
_____ Calipers, inside	_____ File, mill
_____ Calipers, outside	_____ File, round
_____ Calipers, vernier	_____ File, slim taper
_____ Card, file	_____ File, square
_____ Carrier, battery	_____ Flaring tool, copper tubing
_____ Chain, chain saw, chipper	_____ Float, concrete
_____ Chain, chain saw, chisel	_____ Gauge, depth
_____ Chain or tape, surveyor's	_____ Gauge, dial indicator
_____ Chisel, cape	_____ Gauge, screw pitch
_____ Chisel, cold	_____ Gauge, small hole
_____ Chisel, diamond point	_____ Gauge, tap and drill
_____ Chisel, round nose	_____ Gauge, telescoping
_____ Chisel, wood	_____ Gauge, thickness
_____ Clamp, "C"	_____ Gauge, wire (Am. Std.)
_____ Clamp, fixtures, pipe	_____ Grinder, electric disc
_____ Cleaner, battery post	_____ Grinder, valve
_____ Cleaner, ring groove	_____ Gun, caulkin
_____ Cleaner, oxyacetylene tip	_____ Gun, grease
_____ Compressor, piston ring	_____ Gun, soldering
_____ Compressor, Valve Spring	_____ Hammer, ball peen
_____ Copper, soldering	_____ Hammer, bell faced, curved claw
_____ Countersink	_____ Hammer, bell faced, straight claw
_____ Creeper, auto	_____ Hammer, blacksmith's cross peen
_____ Cutter, bolt	_____ Hammer, chipping or slag
_____ Cutter, pipe	_____ Hammer, Tinner's riveting
_____ Cutter, tubing	_____ Handle, axe
_____ Cutter, valve seat	_____ Handle, file
_____ Die, pipe threading	_____ Handle, hand saw
_____ Die stock	_____ Handle, machinist's hammer
_____ Die, thread cutting	_____ Handle, nail hammer
_____ Divider, spring	_____ Handle, plane
_____ Divider, wing	_____ Handle, speeder

_____	Holder, flywheel	_____	Punch, roll pin or pilot
_____	Hone, brake cylinder	_____	Punch, sheet metal
_____	Hone, cylinder	_____	Punch, starter
_____	Indicator, speed	_____	Rasp, wood, flat
_____	Iron, soldering, electric	_____	Rasp, wood, half round
_____	Jack, hydraulic	_____	Reamer, cylinder ridge
_____	Jack, screw	_____	Reamer, expansion
_____	Knife, draw	_____	Reamer, pipe
_____	Knife, linoleum	_____	Regulator, oxygen or acetylene
_____	Knife, putty	_____	Remover, stud
_____	Knife, Utility	_____	Ripper, cable
_____	Level, carpenter's	_____	Riveter, pop
_____	Level, transit	_____	Rule, machinist
_____	Lifter, valve	_____	Saw, back
_____	Light, timing	_____	Saw, circular combination
_____	Light, trouble	_____	Saw, Circular, plywood
_____	Lighter, spark	_____	Saw, compass
_____	Line, chalk	_____	Saw, coping
_____	Mallet, rubber	_____	Saw, hand crosscut
_____	Mallet, wood	_____	Saw, hand hack
_____	Micrometer, outside	_____	Saw, hand rip
_____	Micrometer, inside	_____	Saw, hole
_____	Micrometer, depth	_____	Saw, keyhole
_____	Oil can, pump type	_____	Saw, meat
_____	Oil can, spring bottom	_____	Saw, pruning
_____	Plane, block	_____	Scraper, cabinet
_____	Plane, jack	_____	Scraper, carbon
_____	Plane, jointer	_____	Screwdriver, common
_____	Plane, smooth	_____	Screwdriver, offset
_____	Pliers, battery or gripping	_____	Screwdriver, Phillips
_____	Pliers, Tongue and Groove	_____	Screwdriver, stubby
_____	Pliers, diagonal cutting	_____	Screwdriver, Torx
_____	Pliers, fencing	_____	Scriber
_____	Pliers, hose clamp	_____	Set, nail
_____	Pliers, lineman's	_____	Set, rivet
_____	Pliers, locking	_____	Shear, bench
_____	Pliers, needle nose	_____	Shear, Pruning
_____	Pliers, round nose	_____	Shear, Squaring
_____	Pliers, snap ring	_____	Shield, face
_____	Pliers, universal slip joint	_____	Sink, heat
_____	Plumb bob	_____	Sledge, blacksmith, double face
_____	Puller, flywheel	_____	Snips, Tinner's vaiation
_____	Puller, gear	_____	Snips, Tinner's combination
_____	Puller, nail	_____	Socket, 6 pt., 1/4", 3/8", 1/2" drive
_____	Punch, center	_____	Socket, 8 pt., 1/4", 3/8", 1/2" drive
_____	Punch, long taper (aligning)	_____	Socket, 12 pt., 1/4", 3/8", 1/2" drive
_____	Punch, pin		

_____ Socket, deep well 1/4", 3/8", 1/2" drive (regular or impact)	_____ Trowel, plasterer's
_____ Socket, Impact regular or deep	_____ Vise, carpenter's
_____ Socket, reducer	_____ Vise, drill press
_____ Socket, universal	_____ Vise, machinist's
_____ Splitter, nut	_____ Vise, pipe, chain type
_____ Splitter or separator	_____ Vise, pipe, hinged type
_____ Bearing Spoon, brake adjusting	_____ Wedge, falling
_____ Square, combination	_____ Wedge, splitting
_____ Square, Protractor Head	_____ Welder, spot
_____ Square, steel framing	_____ Welder, plastic
_____ Square, T	_____ Wheel, emery grinding
_____ Square, try	_____ Wrench, adjustable
_____ Stone, bench, sharpening	_____ Wrench, distributor
_____ Stripper and crimper, wire	_____ Wrench, double offset, box pattern
_____ Tachometer, vibration	_____ Wrench, hex
_____ Tap, machinist's hand	_____ Wrench, ignition
_____ Tap, pipe	_____ Wrench, impact, hand
_____ Tape, flexible steel	_____ Wrench, impact, electric or air
_____ Tester, compression	_____ Wrench, internal pipe
_____ Tester, spark	_____ Wrench, oil filter
_____ Torch, cutting	_____ Wrench, pipe chain
_____ Torch, propane	_____ Wrench, pipe, stillson type
_____ Torch, welding	_____ Wrench, ratchet 1/4", 3/8", 1/2" drive
_____ Trowel, masonry brick	_____ Wrench, starter clutch
_____ Trowel, masonry pointing	_____ Wrench, tap T-handle
_____ Trowel, concrete	_____ Wrench, (torque)

## HARDWARE AND SUPPLY LIST

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

- \_\_\_\_\_ Nut, castellated
- \_\_\_\_\_ Nut, machine, NF
- \_\_\_\_\_ Nut, self locking
- \_\_\_\_\_ Nut, standard, NC
- \_\_\_\_\_ Nut, thumb (Wing)
- \_\_\_\_\_ Paper, emery
- \_\_\_\_\_ Paper, sand
- \_\_\_\_\_ Pin, common cotter
- \_\_\_\_\_ Pin, Lynch
- \_\_\_\_\_ Pin, roll or tension
- \_\_\_\_\_ Pipe, black iron
- \_\_\_\_\_ Pipe, galvanized iron
- \_\_\_\_\_ Pipe iron fitting, bushing
- \_\_\_\_\_ Pipe iron fitting, cap
- \_\_\_\_\_ Pipe iron fitting, coupling
- \_\_\_\_\_ Pipe iron fitting, elbow, standard 45°
- \_\_\_\_\_ Pipe iron fitting, elbow, standard 90°
- \_\_\_\_\_ Pipe iron fitting, nipple, standard
- \_\_\_\_\_ Pipe iron fitting, plug
- \_\_\_\_\_ Pipe iron fitting, street elbow
- \_\_\_\_\_ Pipe iron fitting, tee
- \_\_\_\_\_ Pipe iron fitting, union
- \_\_\_\_\_ Pipe iron fitting union Dielectric
- \_\_\_\_\_ Pipe, plastic ABS DWV – black
- \_\_\_\_\_ Pipe, ABS fitting, 90° elbow
- \_\_\_\_\_ Pipe, ABS fitting, 45° street elbow
- \_\_\_\_\_ Pipe, ABS fitting, 90° street elbow
- \_\_\_\_\_ Pipe, ABS fitting, female adapter
- \_\_\_\_\_ Pipe, ABS fitting, male adapter
- \_\_\_\_\_ Pipe, ABS fitting, plug
- \_\_\_\_\_ Pipe, ABS fitting, closet flange
- \_\_\_\_\_ Pipe, ABS fitting, coupling
- \_\_\_\_\_ Pipe, copper, flexible
- \_\_\_\_\_ Pipe, copper, rigid
- \_\_\_\_\_ Pipe, (copper, rigid), fittings, 90° elbow
- \_\_\_\_\_ Pipe, (copper, rigid), fittings, male adapter
- \_\_\_\_\_ Pipe, (copper, rigid), fittings, cap
- \_\_\_\_\_ Pipe, (copper, rigid), fittings, tee
- \_\_\_\_\_ Pipe, (copper, rigid), fittings, drop leaf elbow
- \_\_\_\_\_ Pipe, (copper, rigid), fittings, 45° elbow
- \_\_\_\_\_ Pipe, (copper, rigid), fittings, female adapter
- \_\_\_\_\_ Pipe, (copper, rigid), fittings, union
- \_\_\_\_\_ Pipe, (copper, rigid), fittings, coupling
- \_\_\_\_\_ Pipe, (copper, rigid), fittings, tee, copper by female pipe
- \_\_\_\_\_ Pipe, plastic PVC – white
- \_\_\_\_\_ Pipe, PVC fitting, 90° elbow
- \_\_\_\_\_ Pipe, PVC fitting, 45° elbow
- \_\_\_\_\_ Pipe, PVC fitting, tee
- \_\_\_\_\_ Pipe, PVC fitting, coupling
- \_\_\_\_\_ Pipe, PVC fitting, female adapter
- \_\_\_\_\_ Pipe, PVC fitting, male adapter
- \_\_\_\_\_ Pipe, PVC fitting, cap
- \_\_\_\_\_ Pipe, PVC fitting union
- \_\_\_\_\_ Plate, strike
- \_\_\_\_\_ Receptacle, duplex
- \_\_\_\_\_ Ring, retaining E clip
- \_\_\_\_\_ Ring, snap
- \_\_\_\_\_ Ring, snap, external
- \_\_\_\_\_ Ring, snap, internal
- \_\_\_\_\_ Rivet, blind
- \_\_\_\_\_ Rivet, countersunk head
- \_\_\_\_\_ Rivet, flat head, soft iron
- \_\_\_\_\_ Rivet, round head, soft iron
- \_\_\_\_\_ Roofing, composition shingles
- \_\_\_\_\_ Roofing, roll
- \_\_\_\_\_ Screw, dry wall
- \_\_\_\_\_ Screw, eye
- \_\_\_\_\_ Screw, lag
- \_\_\_\_\_ Screw, machine, flat head
- \_\_\_\_\_ Screw, machine, round head
- \_\_\_\_\_ Screw, molly
- \_\_\_\_\_ Screw, self drilling
- \_\_\_\_\_ Screw, sheet metal
- \_\_\_\_\_ Screw, square hook
- \_\_\_\_\_ Screw, thumb
- \_\_\_\_\_ Screw, wood, flat head
- \_\_\_\_\_ Screw, wood, round head
- \_\_\_\_\_ Sealer, sill

\_\_\_\_\_ Sheetrock (gypsum board)  
\_\_\_\_\_ Shield, expansion  
\_\_\_\_\_ Shim stock  
\_\_\_\_\_ Slide, drawer  
\_\_\_\_\_ Soapstone  
\_\_\_\_\_ Solder, bar Solder, flux core  
\_\_\_\_\_ Solder, solid core  
\_\_\_\_\_ Spring, compression coil  
\_\_\_\_\_ Spring, extension coil  
\_\_\_\_\_ Staple, fence  
\_\_\_\_\_ Staple, poultry netting  
\_\_\_\_\_ Staple, romex  
\_\_\_\_\_ Steel, tool, octagonal  
\_\_\_\_\_ Switch, single pole  
\_\_\_\_\_ Switch, 3-way  
\_\_\_\_\_ Tack, carpet  
\_\_\_\_\_ Tack, double pointed  
\_\_\_\_\_ Tape, electrical, plastic  
\_\_\_\_\_ Tape, duct  
\_\_\_\_\_ Tape, masking  
\_\_\_\_\_ Tape, teflon  
\_\_\_\_\_ Terminal, wire  
\_\_\_\_\_ Thimble, wire rope  
\_\_\_\_\_ Tie, cable  
\_\_\_\_\_ Tubing, heat shrink  
\_\_\_\_\_ Turnbuckle  
\_\_\_\_\_ Wall plate, receptacle, duplex  
\_\_\_\_\_ Wall plate, switch  
\_\_\_\_\_ Washer, flat  
\_\_\_\_\_ Washer, lock  
\_\_\_\_\_ Wire, baling (tie)  
\_\_\_\_\_ Wire, barbed

## **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

		<u>Possible Points</u>
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	<u>5</u>
		32
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	<u>3</u>
		36

**Total Possible Points = 100**

## COPPER PIPE FITTING SCORECARD

		Possible <u>Points</u>
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	<u>10</u>
	SUB - TOTAL	100
**	Deduction for improper assembly (up to 20%)	_____
	TOTAL	100

## PLASTIC PIPE FITTING SCORECARD

		Possible <u>Points</u>
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	<u>10</u>
	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 included 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:
  - a. *Step-By-Step Guide Book on Home Wiring*, available at many hardware stores or from: Step-By-Step Guide Book Co., PO Box 70865, Salt Lake City, UT 84170.
  - b. Pamphlet prepared by Ed Dowding, University of Idaho Agricultural Engineering Department.

## ELECTRICAL WIRING SCORECARD

	Possible Points
A. Wiring exercise (assembled according to example)	35
B. Workmanship	15
C. Problem solving	40
D. Tool handling/safety	<u>10</u>
TOTAL	100

## **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**

	Possible Points
A. 8-10 Problems (equally weighted)	40
B. Mechanical Skills	40
C. Use of Proper Procedures and Tools	<u>20</u>
TOTAL	100

## 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
- C. Copper
- D. Grey Cast Iron
- E. High Carbon/Tool Steel
- F. High Speed Steel
- G. Lead
- H. Low Carbon/Mild Steel
- I. Magnesium
- J. Malleable Cast Iron
- K. Medium Carbon Steel
- L. Nickel
- M. Stainless Steel
- N. White Cast Iron
- O. Titanium
- P. Tungsten
- Q. Zinc Die Cast/Pot Metal

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

5. \_\_\_\_\_

6. \_\_\_\_\_

7. \_\_\_\_\_

8. \_\_\_\_\_

(Correct identification 4 points each.)

**TOTAL SCORE ON METAL ID** \_\_\_\_\_