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. 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.
2. 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
3. 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.

4. The event chairman shall furnish all tools and materials for the event unless specified under the specific rules for each subject matter area.
5. Participants shall be responsible for reporting to the event at the time and place announced.
6. Participants shall not in any way reveal identity to judges except by the number assigned.
7. 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.
8. 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.
9. 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.

		Possible Points
A.	V-Butt weld for tensile pull (25 pts)	
1.	The V filled as to height and ends	5
2.	Strength (pounds of pull)	20
		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	7
		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	7
		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	7
		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

		Possible Points
A.	Pattern cut	
	1. Fit to pattern	12
	2. Angle of cut	5
	3. Top corner square	7
	4. Underside free of slag	10
		34
B.	Lap fusion weld	
	1. Penetration	12
	2. Edges feathered	6
	3. Surface appearance	10
	4. Start and stop	5
		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	5
		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	7
		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	5
		33
F.	TIG Flat Butt weld	
	1. Penetration	12
	2. Edges feathered	6
	3. Surface appearance	10
	4. Start and stop	5
		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
_____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
_____Cailpers, 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

_____Holder, flywheel
_____Hone, brake cylinder
_____Hone, cylinder
_____Indicator, speed
_____Iron, soldering, electric
_____Jack, hydraulic
_____Jack, screw
_____Knife, draw
_____Knife, linoleum
_____Knife, putty
_____Knife, Utility
_____Level, carpenter's
_____Level, transit
_____Lifter, valve
_____Light, timing
_____Light, trouble
_____Lighter, spark
_____Line, chalk
_____Mallet, rubber
_____Mallet, wood
_____Micrometer, outside
_____Micrometer, inside
_____Micrometer, depth
_____Oil can, pump type
_____Oil can, spring bottom
_____Plane, block
_____Plane, jack
_____Plane, jointer
_____Plane, smooth
_____Pliers, battery or gripping
_____Pliers, Tongue and Groove
_____Pliers, diagonal cutting
_____Pliers, fencing
_____Pliers, hose clamp
_____Pliers, lineman's
_____Pliers, locking
_____Pliers, needle nose
_____Pliers, round nose
_____Pliers, snap ring
_____Pliers, universal slip joint
_____Plumb bob
_____Puller, flywheel
_____Puller, gear
_____Puller, nail
_____Punch, center
_____Punch, long taper (aligning)
_____Punch, pin

_____ Punch, roll pin or pilot
_____ Punch, sheet metal
_____ Punch, starter
_____ Rasp, wood, flat
_____ Rasp, wood, half round
_____ Reamer, cylinder ridge
_____ Reamer, expansion
_____ Reamer, pipe
_____ Regulator, oxygen or acetylene
_____ Remover, stud
_____ Ripper, cable
_____ Riveter, pop
_____ Rule, machinist
_____ Saw, back
_____ Saw, circular combination
_____ Saw, Circular, plywood
_____ Saw, compass
_____ Saw, coping
_____ Saw, hand crosscut
_____ Saw, hand hack
_____ Saw, hand rip
_____ Saw, hole
_____ Saw, keyhole
_____ Saw, meat
_____ Saw, pruning
_____ Scraper, cabinet
_____ Scraper, carbon
_____ Screwdriver, common
_____ Screwdriver, offset
_____ Screwdriver, Phillips
_____ Screwdriver, stubby
_____ Screwdriver, Torx
_____ Scriber
_____ Set, nail
_____ Set, rivet
_____ Shear, bench
_____ Shear, Pruning
_____ Shear, Squaring
_____ Shield, face
_____ Sink, heat
_____ Sledge, blacksmith, double face
_____ Snips, Tinner’s vaiation
_____ Snips, Tinner’s combination
_____ Socket,6 pt., ¼”, 3/8”, 1/2” drive
_____ Socket, 8 pt., ¼”, 3/8”, ½” drive
_____ Socket,12 pt., ¼”, 3/8”, ½” drive

_____Socket, deep well ¼”, 3/8”, ½” drive (regular or impact)
_____Socket, Impact regular or deep
_____Socket, reducer
_____Socket, universal
_____Splitter, nut
_____Splitter or separator
_____Bearing Spoon, brake adjusting
_____Square, combination
_____Square, Protractor Head
_____Square, steel framing
_____Square, T
_____Square, try
_____Stone, bench, sharpening
_____Stripper and crimper, wire
_____Tachometer, vibration
_____Tap, machinist’s hand
_____Tap, pipe
_____Tape, flexible steel
_____Tester, compression
_____Tester, spark
_____Torch, cutting
_____Torch, propane
_____Torch, welding
_____Trowel, masonry brick
_____Trowel, masonry pointing
_____Trowel, concrete

_____ Trowel, plasterer's
_____ Vise, carpenter's
_____ Vise, drill press
_____ Vise, machinist's
_____ Vise, pipe, chain type
_____ Vise, pipe, hinged type
_____ Wedge, falling
_____ Wedge, splitting
_____ Welder, spot
_____ Welder, plastic
_____ Wheel, emery grinding
_____ Wrench, adjustable
_____ Wrench, distributor
_____ Wrench,double offset,box pattern
_____ Wrench, hex
_____ Wrench, ignition
_____ Wrench, impact, hand
_____ Wrench, impact, electric or air
_____ Wrench, internal pipe
_____ Wrench, oil filter
_____ Wrench, pipe chain
_____ Wrench, pipe, stillson type
_____ Wrench, ratchet 1/4", 3/8", 1/2" drive
_____ Wrench, starter clutch
_____ Wrench, tap T-handle
_____ Wrench, (torque)

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
_____Cabel, “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

_____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

		Possible Points
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
		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	3
		36

Total Possible Points = 100

COPPER PIPE FITTING SCORECARD

		Possible Points
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

		Possible Points
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 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. S*tep-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	10
	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	20
	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 _____