

**2019 MICHIGAN STATE SKILLS USA CHAMPIONSHIPS  
TASK & MATERIALS LIST**

SKILL OR LEADERSHIP AREA: AVIATION MAINTENANCE TECHNOLOGY

**STATE CONTEST: March 15<sup>th</sup> and 16<sup>th</sup>, 2019**

**CONTEST LOCATION:**

Western Michigan University  
College of Aviation  
135 N. Helmer Rd  
Battle Creek, MI 49037  
[www.wmich.edu/aviation](http://www.wmich.edu/aviation)

**RESUME:**

Each student must submit a one-page printed resume before the contest start at the contest site (present to contest coordinator, not judges). The resume is no longer submitted online. This is the only time that resumes can be turned in. Failure to do so will result in a 10 point penalty.

**SECTION I**

**GENERAL INFORMATION**

TASKS TO BE PERFORMED (Post-Secondary Contest):

1. Composites – Test a structure to determine delaminated areas and answer questions on composite repair procedures
2. Visible Dye Penetrant Inspection – Check a component for cracks using visible dye penetrant
3. Sheet Metal – Fabricate a sheet metal part given an engineering drawing
4. Aircraft Wheels and Tires – Remove, clean, and inspect an aircraft wheel and tire assembly
5. Aileron Rigging – Remove and replace a flight control cable and rig the flight control
6. Electrical Troubleshooting – Find the fault in an electrical circuit. Check continuity and measure electrical circuit values
7. Fluid Line Fabrication – Cut, flare and bend aluminum tubing to a specific dimension
8. Cable Fabrication and Tensioning – Fabricate a flight control cable with Nicopress thimble splices and tension the cable
9. Propeller – Measure blade angle and check propeller track
10. Magneto – Install points and internally time a magneto
11. Safety – Written test on aircraft safety and marshalling
12. Turbine Parts Identification – Identify by part number and nomenclature several turbine engine parts
13. Airframe and Powerplant Knowledge Exam – Written exam taken from FAA airframe and powerplant test questions. Performed on Friday, March 15<sup>th</sup>

## TASKS TO BE PERFORMED (High School Contest):

1. Precision Measuring – Measure the provided set of machined components including depth, inside and outside dimensions and tolerance
2. Hardware ID – Identify various pieces of aviation hardware using measuring tools and reference materials
3. Electrical – Troubleshoot electrical wiring board, make corrections as needed and calculate electrical values using Ohms Law
4. Tube Bending and Flare – Cut, flare and bend aluminum tubing to a specific dimension
5. TCDS/AD's – Answer questions pertaining to Type Certificate Data Sheets and Airworthiness Directives
6. Aircraft Parts Identification – Identify aircraft and instrument panel components using appropriate diagrams
7. Safety – Written exam on safety in the field of aviation maintenance
8. FAR's – Answer questions based on the Federal Aviation Regulations that pertain to aircraft maintenance
9. Weight and Balance – Solve problems relating to weight and balance including moment, center of gravity (CG), and shifting CG
10. Safety Wire – Complete a combination of safety wire on turnbuckles and/or bolts as well as install cotter pins
11. Forms, Records, and Log Entries – Complete logbook entries and 337 Forms
12. Flexible Hose Fabrication – Fabricate flexible hose to a specific standard including fitting installation and made to proper length
13. General Knowledge Exam – Written exam using FAA General test questions. Performed on Friday, March 15th

## Contest Schedule – High School and Post-Secondary

Friday March 15th – Check-in/Registration: 12:00PM – 4:00PM  
Orientation: 3:00PM – 4:00PM  
FAA Knowledge Exam: 4:00 – 4:30PM  
SkillsUSA Leadership Test: 4:30 – 5:00PM

Saturday March 16th – Check-in: 7:30AM – 8:00AM  
Skills Contest: 8:00AM – 4:00PM  
Lunch: 11:30AM – 12:00PM  
Debriefing: 4:00PM – 4:30PM  
Awards Ceremony: 4:30PM

Note: Time is subject to change depending on number of contestants. Check schedule at time of registration. **Briefings and contests will begin promptly at the scheduled times.** Students arriving late will not be allowed to compete.

## STUDENTS MUST SUPPLY: (This applies to all aviation maintenance contests.)

- \* 1 page resume – submitted at check-in
- \* Safety glasses with side shields or goggles
- \* Appropriate dress as described in dress code below
- \* 2 (two) #2 pencils

**STUDENT DRESS CODE:** Due to the professional nature of this contest, contestants are required to wear apparel appropriate to the trade. **Contestant apparel will be checked on Friday. Points will be deducted if inappropriate apparel is worn on Saturday.**

- Leather work shoes are required - no athletic shoes allowed. Steel-toe shoes are not required.
- Only shirts with a collar are acceptable, **NO TEE SHIRTS-no exception.** Shirts are to be tucked into trousers.
- Basic work-style jeans will be acceptable, however Dickies-style work pants are preferable.
- Any necklaces, bracelets and rings must be removed and long hair is to be tied back.
- No name and/or school identifying clothing

It is the responsibility of the instructors to ensure their students are properly prepared and supervised for these events. Students will not be allowed to compete if they do not have the proper shoes or if their attire presents a safety issue. All contestants called into briefing room will be inspected by the Resolution Team\* prior to contest briefing. **ANY CONTESTANT NOT APPROPRIATELY DRESSED WILL RECEIVE A MAXIMUM OF 50 POINT DEMERIT FROM THEIR FINAL SCORE.**

All contestants and instructors are expected to act with courtesy and respect to all contest staff and fellow contestants. **ANYTHING LESS MAY RESULT IN REMOVAL/EXCLUSION FROM CONTEST.**

**\*The Resolution Team will consist of the contest coordinator and two judges from the post-secondary event.**

**SPECIAL INSTRUCTIONS:**

Contestants will be required to locate information and specifications in aircraft maintenance manuals, illustrated parts catalogs, and engineering drawings. They will be expected to know how to use them.

**EQUIPMENT SUPPLIED BY TECHNICAL COMMITTEE:**

Contestants will not have to bring hand tools and equipment to the contest. All tools necessary for accomplishing each task in the skills contest will be provided. Contestants will have the opportunity to orient themselves with the tools on Friday, March 15th during the registration and orientation period.

Cameras and / or video camera policy: **NO VIDEO TAPING BY TEACHERS, ADVISORS, OR PARENTS WILL BE ALLOWED DURING THE CONTEST.** Anyone wanting video of the contest should make arrangements ahead of time by contacting the Technical Committee. Photographs during the contest are allowed from outside the contest area. No photography allowed within the contest area.

## **SECTION II**

### **Contest Overview for Post-Secondary Contest**

**(Note: All tools and equipment for each contest will be provided)**

#### Composites

##### **DESCRIPTION OF CONTEST:**

This contest is designed to test the knowledge of composite repair procedures by:

- \* Checking a composite panel for delamination
- \* Answering questions about composite repair procedures

##### **Tools and Equipment to be used:**

- \* Tap testing instrument

#### Visible Dye Penetrant

##### **Description of Contest:**

This contest is designed to test skill and knowledge of non-destructive methods by:

- \* Applying a visible dye penetrant process to an aircraft part
- \* Identifying the defect in the part

##### **Tools and equipment to be used:**

- \* Spotcheck visible dye penetrant 3-part system
- \* Timer

#### Sheet Metal

##### **Description of Contest:**

This contest is designed to test the contestants on sheet metal fabrication skills by:

- \* Cutting, bending and drilling Aluminum alloy sheet metal
- \* Installing solid rivets
- \* Installed threaded fasteners and other blind/special fasteners

##### **Tools and equipment to be used:**

- \* Air drills and drill bits
- \* Rivet gun and sets
- \* Rivets and other fasteners
- \* Measuring equipment

#### Aircraft Wheels and Tires

##### **Description of Contest:**

This contest is designed to test skills and knowledge of aircraft wheels, tires and brakes by:

- \* Disassembling and reassembling a Cleveland wheel and brake assembly
- \* Inspecting brake discs and linings
- \* Apply proper torque
- \* Inflate tire to proper pressure

**Tools and equipment to be used:**

- \* Tire bead breaker
- \* Appropriate hand tools
- \* Torque wrenches
- \* Air hose and attachments
- \* Measuring equipment
- \* Aircraft maintenance manual

Aileron Rigging

## Description of Contest:

This contest is designed to test skills and knowledge of flight control rigging by:

- \* Checking and adjusting cable tension
- \* Checking flight control deflection

**Tools and equipment to be used:**

- \* Cable tensiometer
- \* Inclinator (digital or manual)
- \* Aircraft maintenance manual

Electrical Troubleshooting

## Description of Contest:

This contest is designed to test skill and knowledge of aircraft electrical systems by:

- \* Troubleshooting and finding the defect in a non-working electrical system
- \* Repair a defect in an electrical systems
- \* Calculate voltage, power and current using Ohm's Law

**Tools and equipment to be used:**

- \* Digital multimeter
- \* Wire crimper and cutter
- \* Calculator

Fluid Line Fabrication

## Description of Contest:

This contest is designed to test skill and knowledge of tubing fabrication by:

- \* Cutting, bending and flaring aluminum tubing
- \* Fabricating aluminum to an exact dimension
- \* Selecting proper hardware

**Tools and equipment to be used:**

- \* Tubing cutter
- \* Tube flaring tool
- \* Tubing bender
- \* Measuring instruments

## Control Cable Fabrication

### Description of Contest:

This contest is designed to test skill and knowledge of aircraft control cables by:

- \* Installing nicropress sleeves
- \* Splicing steel control cables
- \* Applying tension to control cables

### **Tools and equipment to be used:**

- \* Cable cutters
- \* Nicopress crimping tool
- \* Cable tensiometer
- \* Measuring equipment

## Propellers

### Description of Contest:

This contest is designed to test skill and knowledge aircraft propellers by:

- \* Measuring propeller blade angle
- \* Removing and reinstalling a propeller
- \* Applying proper torque
- \* Installing safety wire
- \*

### **Tools and equipment to be used:**

- \* Basic hand tools
- \* Torque wrench
- \* Safety wire pliers
- \* Propeller protractor

## Magneto

### Description of Contest:

This contest is designed to test skill and knowledge of aircraft reciprocating engine ignition systems by:

- \* Replacing points in a Slick magneto
- \* Setting internal timing
- \* Applying proper torque to fasteners

### **Tools and equipment to be used:**

- \* Timing light
- \* Torque wrench
- \* Slick specific timing tools
- \* Slick/Unison manuals

## Safety

### Description of Contest:

This contest is designed to test knowledge of aircraft safety by:

- \* Written exam based on aircraft ramp safety

**Tools and equipment to be used:**

- \* None

Turbine Parts Identification

Description of Contest:

This contest is designed to test knowledge of internal gas turbine engine parts by:

- \* Identifying parts using nomenclature found in engine illustrated parts catalog
- \* Identify basic turbine engine components on turbine engine cutaways

Tools and equipment to be used:

- \* Illustrated parts catalog

**Contest Overview for High School Contest**

**(Note: All tools and equipment for each contest will be provided)**

Precision Measurement

Description of Contest:

This contest is designed to test knowledge and ability of precision measuring by:

- \* Identify measurements from engineering drawings
- \* Measure inside and outside dimensions and depth
- \* Determine tolerance

Tools and equipment to be used:

- \* Outside micrometer
- \* Dial and Vernier calipers
- \* Depth micrometer

Hardware Identification

Description of Contest:

This contest is designed to test knowledge and ability of aircraft hardware by:

- \* Measuring common hardware dimensions
- \* Measure thread pitch
- \* Use reference material to identify aircraft hardware

Tools and equipment to be used:

- \* Dial calipers
- \* Thread pitch gauge

- \* Advisory Circular (AC) 43.13

### Electrical

#### Description of Contest:

This contest is designed to test knowledge and ability of aircraft electrical systems by:

- \* Comparing circuit diagrams with actual circuit board
- \* Correct circuit board to match diagram
- \* Calculate voltage, current, resistance and power using Ohm's Law

#### Tools and equipment to be used:

- \* Digital multimeter
- \* Calculator

### Tube Bending and Flare

#### Description of Contest:

This contest is designed to test knowledge and ability of aircraft fluid lines by:

- \* Cut, bend and flare aluminum tubing
- \* Select proper hardware
- \* Fabricate aluminum tubing to a specific dimension

### Aircraft Parts Identification

#### Description of Contest:

This contest is designed to test knowledge and ability of aircraft parts by:

- \* Identify aircraft instrument panel components
- \* Identify aircraft parts using proper nomenclature
- \* Look up parts in illustrated parts catalogs

#### Tools and equipment to be used:

- \* Aircraft illustrated parts catalogs

### Safety

#### Description of Contest:

This contest is designed to test knowledge and ability of aviation safety by:

- \* Answering questions about safety in aircraft maintenance



Tools and equipment to be used:

- \* N/A

### Federal Aviation Regulations

Description of Contest:

This contest is designed to test knowledge of FAA rules governing aircraft mechanics:

- \* Answer questions pertaining to Federal Aviation Regulations

Tools and equipment to be used:

- \* N/A

### Weight and Balance

Description of Contest:

This contest is designed to test knowledge of aircraft weight and balance by:

- \* Calculating center of gravity
- \* Computing weights and moments

Tools and equipment to be used:

- \* Aircraft flight manual (AFM, POH)
- \* Calculator

### Safety Wire

Description of Contest:

This contest is designed to test knowledge and ability of aircraft hardware safety by:

- \* Installing cotter pins
- \* Install safety wire to turnbuckles and bolts

Tools and equipment to be used:

- \* Stainless steel safety wire
- \* Safety wire pliers
- \* Diagonal cutters

### Forms, Records, and Log Entries

Description of Contest:

This contest is designed to test knowledge of aircraft forms and records by:

- \* Creating a logbook entry
- \* Filling out an FAA 337 Form

Tools and equipment to be used:

- \* FAR Part 43
- \* AC43.9-1F – Instructions for Completion of FAA form 337

### Flexible Hose Fabrication

#### Description of Contest:

This contest is designed to test knowledge and ability of aircraft hose by:

- \* Installing proper hardware
- \* Cutting aircraft hose
- \* Fabricating hose assembly to a specific dimension

#### Tools and equipment to be used:

- \* Hose mandrel
- \* Appropriate hand tools
- \* Lubricating oil

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