

AVIATION MAINTENANCE TECHNOLOGY BLUEPRINT

This Blueprint contains the subject matter content of this Skill Connect Assessment. This Blueprint does **NOT** contain the information one would need to fully prepare for a SkillsUSA Championships contest. Please refer to the *SkillsUSA Championships Technical Standards* CD-ROM for the current year or purchase and download the relevant "Contest Singles." Both are available through www.skillsusa.org > Shop > Educational Materials Catalog.

Standards and Competencies (High School)

Apply knowledge of basic aviation electricity to FAA general aviation competencies

- Calculate and measure capacitance and inductance
- Calculate and measure electrical power
- Measure voltage, current, resistance and continuity
- Determine the relationship of voltage, current and resistance in electrical circuits
- Read and interpret aircraft electrical circuit diagrams including solid state devices and logic functions
- Inspect and service batteries

Interpret aircraft drawings to FAA general aviation competencies

- Use aircraft drawings, symbols and system schematics
- Draw sketches of repairs and alterations
- Use blueprint information
- Use graphs and charts

Utilize weight and balance knowledge to FAA general aviation competencies

- Weigh aircraft
- Perform complete weight-and-balance check and record data

Demonstrate the ability to install fluid lines/fittings to FAA general aviation competencies

- Fabricate and install rigid and flexible fluid lines and fittings

Demonstrate a knowledge of materials and processes to FAA general aviation competencies

- Identify and select appropriate nondestructive testing methods
- Perform dye penetrant, eddy current, ultrasonic and magnetic particle inspections
- Perform basic heat-treating processes
- Identify and select aircraft hardware and materials
- Inspect and check welds
- Perform precision measurements

Demonstrate knowledge of ground operation and servicing to FAA general aviation competencies

- Start, ground operate, move, service and secure aircraft and identify typical ground operation hazards
- Identify and select fuels

Demonstrate knowledge of cleaning and corrosion control to FAA general aviation competencies

- Identify and select cleaning materials
- Inspect, identify, remove and treat aircraft corrosion and perform aircraft cleaning

Demonstrate knowledge of mathematics to FAA general aviation competencies

- Extract roots and raise numbers to a given power
- Determine areas and volumes of various geometrical shapes

- Solve ratio, proportion and percentage problem
- Perform algebraic operations involving addition, subtraction, multiplication and division of positive and negative numbers

Utilize maintenance forms and records to FAA general aviation competencies

- Write descriptions of work performed including aircraft discrepancies and corrective actions using typical aircraft maintenance records
- Complete required maintenance forms, records and inspection reports

Recall knowledge of basic physics to FAA general aviation competencies

- Use and understand the principles of simple machines; sound, fluid and heat dynamics; basic aerodynamics; aircraft structures; and theory of flight

Utilize maintenance publications to FAA general aviation competencies

- Demonstrate ability to read, comprehend and apply information contained in FAA and manufacturers' aircraft maintenance specifications, data sheets, manuals, publications and related federal guidelines
- Utilize aviation regulations, airworthiness directives, and advisory material
- Read technical data

Explain mechanic privileges and limitations to FAA general aviation competencies

- Exercise mechanic privileges within the limitations prescribed by part 65 of this chapter

Demonstrate Knowledge of job-related safety requirements to FAA general aviation competencies

- Demonstrate proper application of job site and shop rules and regulations (OSHA)
- Demonstrate correct selection and use of electrical and hand tools
- Demonstrate proper techniques and practices for working on and around live equipment

Demonstrate professional development skills in a simulated customer-service or employment situation. Examples may include:

- Job interview
- Customer service scenario
- Communications
- Decision making, problem solving and/or critical thinking

Standards and Competencies: Airframe Structures, Systems and Components (College/Postsecondary)

Maintain wood structures to FAA power plant and airframe competencies

- Service and repair wood structures
- Identify wood defects
- Inspect wood structures

Maintain aircraft covering to FAA power plant and airframe competencies

- Select and apply fabric and fiberglass covering materials
- Inspect, test and repair fabric and fiberglass

Maintain aircraft finishes to FAA power plant and airframe competencies

- Apply trim, letters and touchup paint
- Identify and select aircraft finishing materials
- Apply finishing materials
- Inspect finishes and identify defects

Maintain sheet metal and nonmetallic structures to FAA power plant and airframe competencies

- Select, install and remove special fasteners for metallic, bonded and composite structures
- Inspect bonded structures
- Inspect, test and repair fiberglass, plastics, honeycomb, composite and laminated primary and secondary structures
- Inspect, check, service and repair windows, doors and interior furnishings
- Inspect and repair sheet-metal structures
- Install conventional rivets
- Form, lay out and bend sheet metal

Demonstrate ability in aviation welding to FAA power plant and airframe competencies

- Weld magnesium and titanium
- Solder stainless steel
- Fabricate tubular structures
- Solder, braze, gas-weld and arc-weld steel
- Weld aluminum and stainless steel

Demonstrate knowledge of assembly and rigging to FAA power plant and airframe competencies

- Rig rotary-wing aircraft
- Rig fixed-wing aircraft
- Check alignment of structures
- Assemble aircraft components, including flight control surfaces
- Balance, rig and inspect movable primary and secondary flight control surfaces
- Jack aircraft

Apply knowledge of airframe inspection to FAA power plant and airframe competencies

- Perform airframe conformity and airworthiness inspections

Apply knowledge of aircraft landing gear systems to FAA power plant and airframe competencies

- Inspect, check, service and repair landing gear, retraction systems, shock struts, brakes, wheels, tires and steering systems

Apply knowledge of hydraulic and pneumatic power systems to FAA power plant and airframe competencies

- Repair hydraulic and pneumatic power systems components
- Identify and select hydraulic fluids
- Inspect, check, service, troubleshoot and repair hydraulic and pneumatic power systems

Ability to apply knowledge of cabin atmosphere control systems to FAA power plant and airframe competencies

- Inspect, check, troubleshoot, service and repair heating, cooling, air conditioning and pressurization systems and air cycle machines
- Inspect, check, troubleshoot, service and repair heating, cooling, air conditioning and pressurization systems
- Inspect, check, troubleshoot, service and repair oxygen systems

Apply knowledge of aircraft instrument systems to FAA power plant and airframe competencies

- Inspect, check, service, troubleshoot and repair electronic flight instrument systems and both mechanical and electrical heading, speed, altitude, temperature, pressure and position indicating systems to include the use of built-in test equipment
- Install instruments and perform a static pressure system leak test

Apply knowledge of communication and navigation systems to FAA power plant and airframe competencies

- Inspect, check and troubleshoot autopilot, service and approach coupling systems
- Inspect, check and service aircraft electronic communication and navigation systems, including VHF passenger address interphones and static discharge devices, aircraft VOR, ILS, LORAN, radar beacon transponders, flight management computers, and GPWS
- Inspect and repair antenna and electronic equipment installations

Apply knowledge of aircraft fuel systems to FAA power plant and airframe competencies

- Check and service fuel dump systems
- Perform fuel management transfer and defueling
- Inspect, check and repair pressure fueling systems
- Repair aircraft fuel system components
- Inspect and repair fluid quantity indicating systems
- Troubleshoot, service and repair fluid pressure and temperature warning systems
- Inspect, check, service, troubleshoot and repair aircraft fuel systems

Apply knowledge of aircraft electrical systems to FAA power plant and airframe competencies

- Repair and inspect aircraft electrical system components; crimp and splice wiring to manufacturers' specifications; and repair pins and sockets of aircraft connectors
- Install, check and service airframe electrical wiring, controls, switches, indicators and protective devices
- Inspect, check, troubleshoot, service and repair alternating and direct current electrical systems
- Inspect, check and troubleshoot constant speed and integrated speed drive generators

Apply knowledge of position and warning systems to FAA power plant and airframe competencies

- Inspect, check and service speed and configuration warning systems, electrical brake controls and anti-skid systems
- Inspect, check, troubleshoot and service landing gear position indicating and warning systems

Apply knowledge of ice and rain control systems to FAA power plant and airframe competencies

- Inspect, check, troubleshoot, service and repair airframe ice and rain control systems

Apply knowledge of fire protection systems to FAA power plant and airframe competencies

- Inspect, check and service smoke and carbon monoxide detection systems
- Inspect, check, service, troubleshoot and repair aircraft fire detection and extinguishing systems

Demonstrate knowledge of job-related safety requirements to FAA power plant and airframe competencies

- Demonstrate proper application of job site and shop rules and regulations (OSHA)
- Demonstrate correct selection and use of electrical and hand tools
- Demonstrate proper techniques and practices for working on and around live equipment

Demonstrate professional development skills in a simulated customer-service or employment situation. Examples may include:

- Job interview
- Customer service scenario
- Communications
- Decision making, problem solving and/or critical thinking

Standards and Competencies: Power Plant Theory, Maintenance, Systems and Components (College/Postsecondary)

Apply knowledge of reciprocating engines to FAA power plant and airframe competencies

- Inspect and repair a radial engine
- Overhaul reciprocating engine

- Inspect, check, service and repair reciprocating engines and engine installations
- Install, troubleshoot and remove reciprocating engines

Apply knowledge of turbine engines to FAA power plant and airframe competencies

- Overhaul turbine engine
- Inspect, check, service and repair turbine engines and turbine engine installations
- Install, troubleshoot and remove turbine engines

Apply knowledge of engine inspection to FAA power plant and airframe competencies

- Perform power plant conformity and air worthiness inspections

Demonstrate knowledge of engine instrument systems to FAA power plant and airframe competencies

- Troubleshoot, service and repair electrical and mechanical fluid rate-of-flow indicating systems
- Inspect, check, service, troubleshoot and repair electrical and mechanical engine temperature, pressure and r.p.m. indicating systems

Demonstrate knowledge of engine fire protection systems to FAA power plant and airframe competencies

- Inspect, check, service, troubleshoot and repair engine fire detection and extinguishing systems

Demonstrate knowledge of engine electrical systems to FAA powerplant and airframe competencies

- Repair engine electrical system components
- Install, check and service engine electrical wiring, controls, switches, indicators and protective devices

Demonstrate knowledge of lubrication systems to FAA powerplant and airframe competencies

- Identify and select lubricants
- Repair engine lubrication system components
- Inspect, check, service, troubleshoot and repair engine lubrication systems

Demonstrate knowledge of ignition and starting systems to FAA power plant and airframe competencies

- Overhaul magneto and ignition harness
- Inspect, service, troubleshoot and repair reciprocating and turbine engine ignition systems and components
- Inspect, service, troubleshoot and repair turbine engine electrical starting systems
- Inspect, service, and troubleshoot turbine engine pneumatic starting systems

Demonstrate knowledge of fuel metering systems to FAA power plant and airframe competencies

- Troubleshoot and adjust turbine engine fuel metering systems and electronic engine fuel controls
- Overhaul carburetor
- Repair engine fuel metering system components
- Inspect, check, service, troubleshoot and repair reciprocating and turbine engine fuel metering systems

Demonstrate knowledge of engine fuel systems to FAA power plant and airframe competencies

- Repair engine fuel system components
- Inspect, check, service, troubleshoot and repair engine fuel systems

Demonstrate knowledge of induction and engine airflow systems to FAA power plant and airframe competencies

- Inspect, check, troubleshoot, service and repair engine ice and rain control systems

- Inspect, check, service, troubleshoot and repair heat exchangers, superchargers, and turbine engine airflow and temperature control systems
- Inspect, check, service and repair carburetor air intake and induction manifolds

Demonstrate knowledge of engine cooling systems to FAA power plant and airframe competencies

- Repair engine cooling system components
- Inspect, check, troubleshoot, service and repair engine cooling systems

Demonstrate knowledge of engine exhaust and reverser systems to FAA power plant and airframe competencies

- Repair engine exhaust system components
- Inspect, check, troubleshoot, service and repair engine exhaust systems
- Troubleshoot and repair engine thrust reverser systems and related components

Demonstrate knowledge of propellers to FAA power plant and airframe competencies

- Inspect, check, service and repair propeller synchronizing and ice control systems
- Identify and select propeller lubricants
- Balance propellers
- Repair propeller control system components
- Inspect, check, service and repair fixed-pitch, constant-speed and feathering propellers, and propeller governing systems
- Install, troubleshoot and remove propellers
- Repair aluminum alloy propeller blades

Demonstrate knowledge of unducted fans to FAA power plant and airframe competencies

- Inspect and troubleshoot unducted fan systems and components

Demonstrate knowledge of auxiliary power units to FAA power plant and airframe competencies

- Inspect, check, service and troubleshoot turbine-driven auxiliary power units

Demonstrate knowledge of job-related safety requirements to FAA power plant and airframe competencies

- Demonstrate proper application of job site and shop rules and regulations to OSHA standards
- Demonstrate correct selection and use of electrical and hand tools
- Demonstrate proper techniques and practices for working on and around live equipment

Demonstrate professional development skills in a simulated customer-service or employment situation. Examples may include:

- Job interview
- Customer service scenario
- Communications
- Decision making, problem solving and/or critical thinking

Committee Identified Academic Skills

SkillsUSA has identified that the following academic skills are embedded in the aviation maintenance technology program and assessment:

Math Skills

- Use fractions to solve practical problems
- Solve practical problems involving percents
- Measure angles
- Find surface area and perimeter of two-dimensional objects

- Find volume and surface area of three-dimensional objects

Science Skills

- Describe and recognize solids, liquids and gases
- Describe characteristics of types of matter based on physical and chemical properties
- Use knowledge of physical properties (shape, density, solubility, odor, melting point, boiling point, color)
- Use knowledge of chemical properties (acidity, basicity, combustibility, reactivity)
- Use knowledge of classification of elements as metals, metalloids and nonmetals
- Use knowledge of potential and kinetic energy
- Use knowledge of mechanical, chemical and electrical energy
- Use knowledge of heat, light and sound energy
- Use knowledge of temperature scales, heat and heat transfer
- Use knowledge of speed, velocity and acceleration
- Use knowledge of Newton's laws of motion
- Use knowledge of work, force, mechanical advantage, efficiency and power
- Use knowledge of simple machines, compound machines, powered vehicles, rockets and restraining devices
- Use knowledge of principles of electricity and magnetism
- Use knowledge of static electricity, current electricity and circuits
- Use knowledge of magnetic fields and electromagnets
- Use knowledge of motors and generators

Language Arts Skills

- Provide information in conversations and in group discussions
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles
- Demonstrate informational writing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Algebra
- Geometry
- Measurement
- Data analysis and probability
- Problem solving
- Reasoning and proof
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. To view high school standards, visit: standards.nctm.org/document/chapter7/index.htm. Select "Standards" from menu.

Science Standards

- Understands atmospheric processes and the water cycle
- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: www.mcrel.org/standards-benchmarks/.

Language Arts Standards

None Identified

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.readwritethink.org/standards/index.html.