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| U.S. Department of Labor Employment and Training Administration Office of Apprenticeship Training, Employer and Labor Services (OATELS) Washington, D.C. 20210 | <u>Distribution:</u> National Office All Field Tech SD+RD+SAC+; Lab.Com | Subject: New Apprenticeable Occupation – Airframe Mechanic <u>Code:</u> 200 |
| Symbols: DSNIP/FG | | Action: Immediate |

PURPOSE: To inform the Office of Apprenticeship Training, Employer and Labor Services (OATELS), Bureau of Apprenticeship and Training (BAT) Staff of a new apprenticeable occupation:

Airframe Mechanic
RAIS Code: 1044
O*NET Code: 49-3011.01
Training Term: 3100 hours
Type of Training: Time - based

BACKGROUND: The United Services Military Apprenticeship Program (USMAP) initiated the apprenticeability request for this occupation.

Airframe Mechanic will be added to the list of occupations recognized as apprenticeable by the Office of Apprenticeship Training, Employer and Labor Services when the list is reissued.

ACTION: BAT staff should review and retain a copy of this bulletin, including all attachments, as a source for developing apprenticeship standards and/or providing technical assistance.

Attachment

WORK PROCESS SCHEDULE
AIRFRAME MECHANIC
RAIS CODE: 1044 O*NET CODE: 49-3011.01

DESCRIPTION: Use aircraft drawings, blueprint information, graphs and charts and apply information contained in FAA and manufacturer's aircraft maintenance manuals. Identify and select appropriate non-destructive testing methods. Inspect, identify, remove, and treat aircraft corrosion and perform aircraft cleaning. Select, apply, inspect, test, and repair fabric and fiberglass. Select, install, and remove, test and repair sheet metal and non-metallic structures. Weld magnesium and titanium; solder stainless steel; fabricate tubular structures; solder, braze, gas and arc-weld steel, weld aluminum and stainless steel. Perform airframe conformity and airworthiness inspections. Inspect, check, service and repair landing gear systems. Repair hydraulic and pneumatic power system components. Inspect, check, troubleshoot, and service communication and navigation systems. Check and service aircraft fuel systems. Repair and inspect aircraft electrical systems. Inspect, check and service position and warning systems and fire protection systems.

| SKILL AREAS | HOURS |
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| A. GENERAL TASKS | 1100 |
| 1. BASIC ELECTRICITY (100) 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. | |
| 2. AIRCRAFT DRAWINGS (100) Use aircraft drawings, symbols, and system schematics; draw sketches of repairs and alterations; use blueprint information; use graphs and charts. | |
| 3. WEIGHT AND BALANCE (20) Weigh aircraft; perform complete weight-and-balance check and record data. | |
| 4. FLUID LINES AND FITTINGS (25) Fabricate and install rigid and flexible fluid lines and fittings. | |
| 5. MATERIALS AND PROCESSES (50) Identify and select appropriate non-destructive 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. | |
| 6. GROUND OPERATION AND SERVICING (150) Start, ground operate, move, service, and secure aircraft and identify typical ground operation hazards; identify and select fuels. | |

7. CLEANING AND CORROSION CONTROL (145)

Identify and select cleaning materials, inspect, identify, remove, and treat aircraft corrosion and perform aircraft cleaning.

8. MATHEMATICS (75)

Extract roots and raise numbers to a given power; determine areas and volumes of various geometrical shapes; solve ratio, proportion, and percentage problems; perform algebraic operations involving addition, subtraction, multiplication, and division of positive and negative numbers.

9. MAINTENANCE FORMS AND RECORDS (125)

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

10. BASIC PHYSICS (70)

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

11. MAINTENANCE PUBLICATIONS (70)

Demonstrate ability to read, comprehend, and apply information contained in FAA and manufacturer" aircraft maintenance specifications, data sheets, manuals, publications, and related Federal Aviation Regulations, Airworthiness Directives, and Advisory materials, read technical data.

12. MECHANIC PRIVILEGES AND LIMITATIONS (70)

Exercise mechanic privileges within the limitations prescribed by FAR 65.

13. AVIATION SAFETY (100)

Fuels, lubricants, or hydraulic fluids; flammable cements, rosins, sealants, paints and thinners; fluids under pressure; compressed gasses, including oxygen; batteries; aviation ordnance and pyrotechnics; electrical and electronic circuits; operating radio transmitters and radar systems; hazardous noise sources.

B. AIRFRAME STRUCTURES.....800

1. AIRCRAFT COVERING (100)

Select and apply fabric and fiberglass covering materials; inspect, test, and repair fabric and fiberglass.

2. AIRCRAFT FINISHES (100)

Apply trim, letters, and touchup paint; identify and select aircraft finishing materials; apply finishing materials; inspect finishes and identify defects.

3. SHEET METAL AND NON-METALLIC STRUCTURES (200)

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.

4. WELDING (150)

Weld magnesium and titanium; solder stainless steel; fabricate tubular structures; solder, braze, gas-, and arc-weld steel, weld aluminum and stainless steel.

5. ASSEMBLY AND RIGGING (150)

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.

6. AIRFRAME INSPECTION (100)

Perform airframe conformity and airworthiness inspections.

C. AIRFRAME SYSTEMS AND COMPONENTS1200

1. AIRCRAFT LANDING GEAR SYSTEMS (100)

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

2. HYDRAULIC AND PNEUMATIC POWER SYSTEMS (100)

Repair hydraulic and pneumatic power system components; identify and select hydraulic fluids; inspect, check, service, troubleshoot, and repair hydraulic and pneumatic power systems.

3. CABIN ATMOSPHERE CONTROL SYSTEMS (100)

Inspect, check, troubleshoot, service, and repair heating, cooling, air conditioning, pressurization systems, and air cycle machine; inspect, check, troubleshoot, service, and repair heating, cooling, air-conditioning, and pressurization systems; inspect, check, troubleshoot, service and repair oxygen systems.

4. AIRCRAFT INSTRUMENT SYSTEMS (150)

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

5. COMMUNICATION AND NAVIGATION SYSTEMS (150)

Inspect, check, and troubleshoot autopilot, servos 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.

6. AIRCRAFT FUEL SYSTEMS (100)

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.

7. AIRCRAFT ELECTRICAL SYSTEMS (150)

Repair and inspect aircraft electrical system components; crimp and splice wiring to manufacturer's 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.

8. POSITION AND WARNING SYSTEMS (125)

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.

9. ICE AND RAIN CONTROL SYSTEMS (125)

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

10. FIRE PROTECTION SYSTEMS (100)

Inspect, check, and service smoke and carbon monoxide detection systems; inspect, check, troubleshoot, and repair aircraft fire detection and extinguishing systems.

TOTAL HOURS.....3100

RELATED INSTRUCTION
AIRFRAME MECHANIC
O*NET CODE: 49-3011.01 RAIS CODE: 1044

| INSTRUCTION | Approximate Hours |
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MAINTENANCE PROGRAMS AND PUBLICATIONS

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| 1. Introduction to AM (H&S) | 4 |
| The AM curriculum is designed to provide the aviation structural mechanic with the basic aircraft maintenance training. This training will enable the mechanic to perform maintenance on aircraft and components under supervision. | |
| 2. Theory of Flight | 8 |
| Familiarization of terms and definitions of basic aerodynamics factors which affect the performance of all aircraft in flight. Basic theory of flight and different types of aircraft. | |
| 3. Naval Aviation Maintenance Program (NAMP) | 10 |
| Outlines command, administrative, and management relationships and establishes policies and procedures for the assignment of maintenance tasks and responsibilities. Explains the basic document and governing authority of all naval aviation maintenance. | |
| 4. Maintenance Programs and Processes | 10 |
| Explain maintenance programs such as Foreign Object damage, Tool Control, Aircraft Battle Damage Repair, Hazardous Material Control and Management, Halocarbon Usage and Safety. Explain maintenance processes use in naval aviation maintenance. | |
| 5. Tire & Wheel Maintenance and Safety | 10 |
| Discuss all aspects of aircraft tire and wheel maintenance and safety including tire inspection and intervals, servicing, removal and installation procedures, overheated brakes, malfunctioning brakes, and safety precautions. | |
| 6. Publications | 12 |
| Explain the different types of technical manuals and publications used in aviation maintenance. Discuss Planned Maintenance System, (PMS) Maintenance requirement Cards (MRC) Technical Directives (TD) Technical Publication Deficiency Reporting (TPDR) Technical manual libraries, numbering systems, and publication updating methods | |
| 7. Maintenance Instruction Manuals/ Maintenance Requirement Cards | 15 |
| Use and interpret the information contained in maintenance instruction manuals and maintenance requirement card. | |

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| 8. Illustrated Parts Breakdown and Work Unit Code Manual | 8 |
| Use and interpret the information contained in an Illustrated Parts Breakdown (IPB) and a Work Unit Code manual (WUC). | |
| 9. Maintenance and Material Documentation | 10 |
| Perform proper maintenance and material documentation using Visual Information Display System/Maintenance Action Form (VIDS/MAF), Naval Aviation Logistics Command Management Information System (NALCOMIS). Perform proper VIDS/MAF initiation and so flow and control of a VIDS/MAF. | |
| 10. Corrosion Control | 15 |
| Prevent, detect, remove, and treat all forms of corrosion on aircraft and associated hardware. Perform corrosion inspections and Emergency Reclamation procedures. Apply different types of paint systems. | |
| 11. Hydraulic Fluid Contamination | 15 |
| Discuss the objective of the Hydraulic Contamination Control program and the source of hydraulic contamination. Perform analysis of hydraulic fluid, classify fluid contamination, and decontaminate hydraulic systems. | |
| 12. Basic Math Skills | 10 |
| Use addition, subtraction, multiplication, and division to solve problem using whole numbers, fractions, and decimals in order to manufacture and fabricate aircraft parts. | |
| 13. Common Hand Tools | 5 |
| Demonstrate a working knowledge of common hand tools and know how to utilize them to perform aircraft maintenance actions. | |
| 14. Structural Hardware | 5 |
| Display the knowledge of how to use, identify, install, and remove semi-permanent hardware and fasteners. | |
| 15. Torquing and Safetying | 5 |
| Describe and perform proper torquing and safetying procedures and requirements. | |

AIRCRAFT METALLIC/NON-METALLIC FABRICATIONS

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| 16. Radomes and Antenna Covers..... | 15 |
| Display a basic working knowledge of radome and antenna cover design, construction, and repair procedures. | |
| 17. Composite Materials | 15 |
| Describe Advanced Composite Materials and discuss the construction and application of advanced composite materials used in naval aviation. Discuss the training and medical prerequisites for composite repair technicians. Explain the safety precautions to be followed when working with composite materials. | |

- 18. Transparent Plastics** 10
 Discuss the two types of plastics, their uses, and the maintenance of transparent plastics used in naval aircraft.
- 19. Fundamentals of Metal Working**..... 10
 Explain the qualities and characteristics of aircraft metals as well as the numbering system, and the consideration to be taken when selecting aircraft metals for use.
- 20. Layout Fundamentals** 5
 Discuss and familiarize yourself with drawings, diagrams, layout procedures and develop your ability to make flat pattern layouts. Perform computation of bend allowance problems. Perform a flat pattern layout on paper and on a simulated structural member in accordance with applicable safety precautions.
- 21. Cutting Structural Materials**..... 5
 Demonstrate proper structural material cutting procedures, including the use of cutting tools and their proper uses.
- 22. Forming Structural Materials**..... 10
 Familiarization with the proper procedures and intended use of each type of machine used in forming structural materials.

AIRCRAFT METAL FABRICATION

- 23. Hole Preparation** 5
 Describe and demonstrate the use of drills, drilling equipment, and drilling and countersinking procedures in accordance with applicable safety precautions. Layout rivet patterns on an aircraft structural assembly.
- 24. Permanent Fasteners**..... 5
 Discuss the purpose and identify the different types of permanent fasteners including selection and installation on aircraft structural materials.

AIRCRAFT CONSTRUCTION AND DAMAGE REPAIR

- 25. Aircraft Construction and Damage Repair** 20
 Describe an aircraft structure, classification of damage, and methods of repair. Repair damage to aircraft skin and aircraft internal structures in accordance with applicable safety precautions.

MAINTENANCE OF AIRCRAFT HYDRAULIC/PNEUMATIC SYSTEMS

- 26. Basic Hydraulic System Theory & Components** 15
 State the principles and characteristics of hydraulics as applied to aircraft. State the description and purpose of a basic hydraulic system. Describe and demonstrate the operation of a hydraulic jack. Determine the applicable formulas used in hydraulics.

- 27. Hydraulic Reservoirs..... 10**
Describe hydraulic reservoirs and servicing. State the types and characteristics of fluids used in servicing hydraulic reservoirs.
- 28. Hydraulic Pumps 10**
State the purpose of a hydraulic pump and its location in a hydraulic system. Describe the classification of hydraulic pumps, the different types of pumps, and the maintenance of hydraulic pumps.
- 29. Hydraulic Filters 5**
Describe a hydraulic filter and their uses. Identify the maintenance publication that pertains to hydraulic filters.
- 30. Hydraulic Relief Valves 5**
State the purpose, types, description, operation, and maintenance of hydraulic relief valves. State the requirements for adjustment, installation, and removal of hydraulic relief valves.
- 31. Hydraulic Accumulators 10**
State the purpose and function of hydraulic accumulators. Discuss the different types of hydraulic accumulators and their operation. Explain maintenance requirements and safety precautions for hydraulic accumulators.
- 32. Hydraulic Pressure Reducing Valves 10**
State the purpose and location of hydraulic pressure reducing valves. List the components of a hydraulic pressure reducing valve. Describe the operation, maintenance requirements, and safety precautions of hydraulic pressure reducing valves.
- 33. Solenoid Operated Selector Valves 10**
State the purpose, the components and operation of a solenoid operated selector valve. Describe solenoid manual selector valves. State the maintenance requirements of the solenoid operated selector valve.
- 34. Hydraulic Actuating Units 10**
Describe a hydraulic actuating cylinder and its maintenance requirements. Describe a hydraulic motor and its maintenance requirements.
- 35. Hydraulic Sequence Valves..... 10**
State the purpose, type, operation and location of hydraulic sequence valves and their components.
- 36. Hydraulic Sealing Devices..... 5**
Identify and explain the different types of seals and sealing material. Describe the types of leakage and seal classification. Describe replacement procedures for sealing devices.

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| 37. Hydraulic Lines and Fittings..... | 15 |
| Explain fluid line identification and tape codes. Describe rigid tubing and flexible hoses. | |
| 38. Independent Master Cylinder | 15 |
| State the purpose and location of the independent master cylinder and identify its components. Explain the operation and maintenance requirements for the independent master cylinder. | |
| 39. Power Boost Master Cylinder..... | 15 |
| Describe the purpose and the components of the power boost master cylinder. Describe the operation and the maintenance requirements for the power boost master cylinder. | |
| 40. Power Brake Control Valve | 5 |
| Describe the purpose and components of the power brake control valve. Describe the operation, maintenance requirements, and adjustments of the power brake control valve. | |
| 41. Disc Type Brake | 5 |
| State the purpose and location of disc type brakes. Describe the type, components, operation and maintenance requirements for disc type brakes. | |
| 42. Segmented Rotor Brake | 5 |
| State the purpose and location of a segmented rotor brake. Describe the components, operation, and maintenance requirements of a segmented rotor brake. | |
| 43. Reading Hydraulic Diagrams..... | 10 |
| State the definition, purpose and types of diagrams. Identify the symbols used on hydraulic diagrams. Explain schematic diagram readings. | |
| 44. Lubrication of Naval Aircraft & Components..... | 5 |
| State the purpose and types of aircraft lubrication. Explain aircraft and component lubrication procedures. | |
| 45. Basic Electrical Theory and Use of a Digital Multimeter..... | 15 |
| State the purpose, system description, components, and operation of an electrically controlled hydraulic system. Explain the comparison between electrical components and hydraulic components. State common electrical terms and their definitions. Describe and utilize a Fluke 77 Digital multimeter. Troubleshoot an electrically controlled hydraulic system. List safety precautions pertaining to troubleshooting an electrically controlled hydraulic system. | |
| TOTAL HOURS | 432 |