

# Federal Wage System Job Grading Standard for Aircraft Engine Mechanic, 8602

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## WORK COVERED

This standard provides grading criteria for all nonsupervisory work performing maintenance, troubleshooting, repair, overhaul, modification, and testing of conventional, modified, and experimental aircraft engines, their components, assemblies, and subassemblies. This standard also covers work involving engine accessories such as starters, generators, anti-icers, and fuel control devices when such assignments are incidental to work on the completed engine. Some work situations within this series may require varying levels of electronics knowledge.

This standard cancels and supersedes the Job Grading Standard for Aircraft Engine Mechanic, 8602, issued September 1974.

## WORK NOT COVERED

This standard does not cover work that primarily involves:

- Maintenance and repair of fixed and rotary wing aircraft systems, airframes, components, and assemblies. (See [Job Grading Standard for Aircraft Mechanic, 8852.](#))
- Maintenance and repair of hydraulic, pneumatic, oxygen, or fuel systems. (See [Job Grading Standard for Aircraft Pseudraulic Systems Mechanic, 8268.](#))
- Maintenance and repair of liquid fuel rocket engines. (See [Liquid Fuel Rocket Engine Series, 8675.](#))
- Repair, maintenance, modification, or overhaul of aircraft mechanical or aircraft engine parts, components, subassemblies, or assemblies removed from the aircraft, that do not require a substantive knowledge of aircraft systems and their interrelationships. (See [Job Grading Standard for Aircraft Mechanical Parts Repairer, 8840.](#))
- Fabrication, modification, repair, assembly, and installation of aircraft sheet metal items. (See [Job Grading Standard for Sheet Metal Mechanic, 3806.](#))
- Maintenance, troubleshooting, repair, overhaul, and modification of aircraft electrical systems or of aircraft electronic systems. (See [Job Grading Standard for Aircraft Electrician, 2892](#) or appropriate Job Grading Standards in the [Electronic Equipment Installation and Maintenance Family, 2600.](#))
- Maintenance and repair of starters, compressors, generators, or other ground support units. (See [Job Grading Standard for Powered Support Systems Mechanic, 5378.](#))

## TITLES

The title for jobs at grade 9 and below is *Aircraft Engine Repairer*. The title for jobs at grade 10 and above is *Aircraft Engine Mechanic*.

## GRADE LEVELS

This standard describes work at grades 8, 9, and 10. Grades 9 and 10 describe separate journey levels of work within this occupation. It does not describe all possible levels at which jobs might be established. You may grade jobs that differ substantially from the level of skill, knowledge, and other work requirements described in this standard, above or below these grades, based on applying sound job grading principles.

## HELPER AND INTERMEDIATE JOBS

Use the Office of Personnel Management Job Grading Standards for Trades Helper and Intermediate Jobs to grade Helper and Intermediate Aircraft Engine Mechanic jobs. Use grade 9 or grade 10 as the "journey-level" grade in applying the Intermediate Job Grading Table, depending on the grade level of the target job.

## NOTES TO USERS

Ongoing technological advancements in the field of electronics will continue to impact electrical components and devices common to newer, more complex aircraft engines covered by this standard. As a result, some work situations within this occupation may require varying levels of knowledge regarding electrical and/or electronic theory and basic troubleshooting techniques. For example, when electronic-based devices replace electro-mechanical controls, the design may be such that you can repair and adjust the mechanism in accordance with detailed instructions, for which little electronics knowledge is required rather than using journey-level electronic skills and knowledge. Typically, the [Job Grading Standard for Electronics Mechanic, 2604](#), would grade such work at or below grade 8. In other cases, the overall complexity of the unit may be greater due to integration of systems, but the electronic devices are generally part of a self-contained unit that would not exceed the complexity described at the grade 10 level in the 2604 standard. Evaluate work using an appropriate electronics standard in the Electronics Family, 2600, only when electronics knowledge is paramount and the work involves installing, troubleshooting, maintaining, and repairing electronics equipment and/or complete operational systems.

Aircraft engine repairers and mechanics are also experiencing a corresponding increase in the use of computerized testing and on-board diagnostic equipment and/or systems in the maintenance, troubleshooting, repair, and overhaul of engines. The application of this equipment and/or systems by individuals in this series has no direct grade level impact.

## AIRCRAFT ENGINE REPAIRER, GRADE 8

**General:** Grade 8 aircraft engine repairers perform standard, routine disassembly and assembly operations and make prescribed modifications to aircraft engines, engine assemblies, and accessories. They perform limited assembly of components and less complex modules such as compressors. Aircraft engine repairers perform routine disassembly and limited assembly duties independently. They assist higher-grade repairers and/or mechanics in the full-range of disassembly and assembly duties. They perform visual, dimensional, and tactile checks of individual parts for foreign object damage, stress fractures, excessive wear, etc. Grade 8 repairers determine the condition of all component parts in accordance with technical specifications and recondition or replace parts as necessary. They assemble subassemblies of limited complexity (e.g., rotors, stator cases, combustion chambers, and augmentors/afterburners) in accordance with specific procedures and requirements.

In some work situations, grade 8 repairers assemble major components, assemblies, and/or dynamic balance rotor assemblies based on specified methods and procedures for each phase of work. They may perform the full-range of engine assembly under the direction of a higher-grade aircraft engine repairer or mechanic. Aircraft engine repairers at this level routinely use personal computers or computer terminals to reference technical manuals, order parts, and track engine parts or components in process.

**Skill and Knowledge:** Grade 8 aircraft engine repairers must have and apply skill and basic knowledge in the following:

- Disassembling aircraft engines and components and removing tubing, fuel controls, pumps, and other accessories from engines and breaking down major assemblies in proper sequence and reassembling engines and components.
- Determining whether disassembled parts are reusable, recognizing scratches, burns, cracks, deformation, etc.
- Using special disassembly jigs and tools to work efficiently and to prevent damage to parts.
- Freeing frozen or damaged parts and fastenings to prevent further damage to them or attached parts.
- Using standard measuring and testing instruments such as spring balance scales, continuity testers, go/no-go gages, squares, rules, vernier calipers, and automated test equipment to test disassembled parts for defects such as warping, incorrect weight, or for continuity of wiring harnesses, in order to route defective parts to repair or salvage.
- Reading and interpreting blueprints and specification sheets when checking aircraft engine parts visually and dimensionally for damage or deterioration.
- Detecting wear patterns of engine parts, components, and mechanical systems that differ from those normally observed.
- Estimating serviceability of disassembled parts in order to route for repair or discard.
- Detecting mismatched or misaligned parts as a possible cause for damage or malfunction.
- Using computer terminals or personal computers to access technical manuals and related materials or order and track engine parts and/or components in an automated supply system.

- Recognizing faulty, worn, or otherwise unserviceable electric wiring harnesses, hydraulic and fuel lines, fittings, and other connections.
- Using hand and power tools common to the trade.

**Responsibility:** Supervisors, lead engine mechanics, or higher-grade employees provide grade 8 aircraft engine repairers detailed oral instructions and written work orders on work assignments. On routine assignments, repairers determine work methods and tools necessary to accomplish the assignment based on standard practices and procedures. Grade 8 repairers use clearly described procedures and instructions to make judgments or decisions. The work consists of recurring steps involved in the disassembly or reassembly of parts, subassemblies, and larger components. The supervisor, higher-grade repairer, or engine mechanic spot checks work in progress. The supervisor, higher-grade repairer, or engine mechanic is available for assistance. The supervisor, leader, or higher-grade employee checks completed work for compliance with instructions, specifications, and standardized shop practices and procedures. Grade 8 aircraft engine repairers perform new assignments under close review.

**Physical Effort:** Grade 8 work assignments normally require moderate to strenuous effort. Repairers must climb, bend, stoop, crawl, stand on concrete or metal surfaces, and work in confined spaces for prolonged periods. They frequently lift parts and equipment that weigh up to 9 kilograms (20 pounds). Occasionally, they may lift and carry items that weigh up to 23 kilograms (50 pounds) with the aid of mechanical lifting devices or assistance from other workers.

**Working Conditions:** Grade 8 aircraft engine repairers normally work in hanger areas that are clean, well lighted, and well ventilated. In some work situations, grade 8 engine repairers may be required to work outdoors, in parked aircraft, and sometimes in hazardous noise areas. Repairers may be exposed to extremes of heat, cold, and inclement weather. They may be required to work in confined spaces and in awkward positions. Dirt, dust, grease, and aircraft fluids are common in the work place. They are exposed to oil, fuels, hydraulic fluids, solvents, and hazardous fluids and gases, such as hydrazine and Halon. They are exposed to the possibility of cuts, bruises, muscle strain, and injury from falls from scaffolds, ladders, and aircraft surfaces. In some work situations, they may be subject to exposure to toxic fumes, high-pressure air and fluids, intake suction, rotating propellers, or extreme heat from engine exhaust.

## AIRCRAFT ENGINE REPAIRER, GRADE 9

**General:** Grade 9 aircraft engine repairers perform the full-range of disassembly/assembly of conventional and/or modified aircraft engines. They work on any of a variety of aircraft engines that are complicated due to the number of assemblies and accessory systems and the requirement to maintain critical tolerances in the assembly process. They assemble major components and accessories, such as compressor sections, combustion chambers, turbine wheels, and accessory drive gear boxes, and complete the final assembly of the total engine by installing accessories such as fuel regulators, ignition systems, and pumps. They prepare engines for test cell

evaluations. Aircraft engine repairers at this grade level perform assignments independently in accordance with specifications and directives. In comparison, grade 8 aircraft engine repairers disassemble engines and perform limited assembly operations, i.e., work on less complex subassemblies or perform work assignments such as shown above when specifically instructed on the methods and procedures to use in accomplishing the assignment. In some work situations, grade 9 aircraft engine repairers remove or assist in the removal and/or installation of engines from aircraft or test cells and make prescribed modifications.

***Skill and Knowledge:*** Grade 9 aircraft engine repairers have skill and detailed knowledge of a variety of conventional and/or modified aircraft engines and their accessory systems. They also have skill and a thorough knowledge of mechanical systems and methods of scraping, and grinding in order to assemble parts to critical tolerances; adjust and synchronize complex gear trains and control mechanisms, etc. Repairers at this level must have and apply skill and knowledge in the following:

- Adapting to new or modified assembly practice.
- Assembling and adjusting procedures to achieve and maintain critical tolerances and measurements, for example, assembling compressor or turbine sections to assure proper clearance between rotor and stator assemblies, assure proper clearances in main bearings to allow for heat expansion, or matching turbine nozzle vanes to assure required airflow.
- Using precision measuring instruments common to the occupation such as micrometers and feeler and stretch gages to check used parts for deviation from original specifications and selecting matching parts, and dynamic balancing machines to determine and correct imbalance of rotor assemblies.
- Using dial indicators to check and adjust end play of gears and rotors and measure vane openings when assembling jet engine nozzles.
- Selecting proper tools, assembly jigs, and fixtures to perform work efficiently and safely.
- Using torque wrenches to get required tension on bolts and fastenings, and automated measuring devices used to insure bearing assemblies are within tolerance.
- Using specialized disassembly/assembly tools and remote visual inspection systems, e.g., borescopes.
- Using computer terminals or personal computers to obtain the most up-to-date reference materials such as technical orders, technical manuals, and manufacturers manuals, used in conjunction with job orders and work process sheets to determine sequence of work processes, positioning of parts and critical tolerances required in the assembly of major components and complete engines.
- Reading and interpreting multi-view blueprints and schematic drawings.
- Locating and identifying problems such as nicks or burrs in machined surfaces that force assemblies out of alignment or improper size of bushings or bearings that prevent adjusting gear backlash or introduce vibration in rotating assemblies, by using visual inspection techniques or disassembling and measuring parts.

In addition, grade 9 repairers must have a practical knowledge of hydraulic, electrical, electronic, and pneumatic systems to assure proper installation and operation of accessory systems such as those for fuel, lubrication, ignition, instrumentation, and anti-icing. They also must have a

thorough knowledge of aircraft engine assembly practices and skill to set up work areas when changing over to new or different engine assignments.

**Responsibility:** Compared to grade 8 repairers who follow specific instructions to perform the routine disassembly, repair, and assembly of engine components, grade 9 engine repairers determine the nature and extent of repairs required on a variety of complete aircraft engines. Supervisors provide grade 9 aircraft engine repairers work assignments in the form of work orders accompanied by diagrams, and oral and written instructions that cover sequence of operations, critical dimensions, and unusual aspects of the job. Repairers at this level are responsible for determining the proper tools and methods to use and for maintaining dimensions and tolerances to specifications. Grade 9 repairers provide on-the-job training to lower grade repairers on aircraft engine repair practices and procedures, technical aspects of new/modified engines and components, and instruct them on safety procedures. The training may include giving instructions on tools, materials, devices, and instruments used in the trade. The supervisor or a higher-grade engine mechanic is available to assist with unusual problems and to check completed work for conformance to specifications.

**Physical Effort:** Physical effort is similar to that described at [grade 8](#).

**Working Conditions:** Working conditions are similar to those described at [grade 8](#).

## AIRCRAFT ENGINE MECHANIC, GRADE 10

**General:** Grade 10 aircraft engine mechanics troubleshoot one or more types or models of malfunctioning conventional and/or modified aircraft engines while in the aircraft or in an engine test cell. Characteristic of work at this level is the need to consider the total engine system when troubleshooting or evaluating operational engine performance, since defects in one area often appear as symptoms in different areas. They determine the degree of disassembly needed, repair or replace defective parts or components, make prescribed modifications, and make final adjustments to achieve acceptable engine operation. They may also troubleshoot, test, repair, and inspect the aircraft secondary power systems to include the auxiliary power unit and the accessory drive gearbox. Grade 10 aircraft engine mechanics troubleshoot, repair, and adjust the complete engine, including minor repair or replacing attached electrical, pneumatic, fuel subsystems, engine controls, and instrumentation. In comparison, grade 9 aircraft engine repairers assemble engines, achieving the correct settings, fits, and tolerances according to prescribed specifications.

In some work situations, supervisors may require aircraft engine mechanics at this level to perform “engine run-ups” of single or multi-engine aircraft as part of their work assignment.

**Note:** Evaluate aircraft engine mechanic work that meets and substantially exceeds the criteria described at this level at the next higher grade. This work includes: (1) aircraft engines that have not been fielded; (2) prototype engines; (3) extensively modified production aircraft engines that are dedicated to support research, testing, development, and evaluation of engines and aircraft; and/or (4) in-service testing of potential engine replacement items

***Skill and Knowledge:*** Grade 10 aircraft engine mechanics have skill and through knowledge in installing, removing, operating, and repairing a variety of conventional and modified aircraft engines and accessory systems in order to troubleshoot, maintain, repair, and/or test different types of engines in aircraft test cells, maintenance shops, and on the flight line. They have thorough knowledge of repair methods, degrees of disassembly necessary, and the extent of rework required before reassembly.

Grade 10 aircraft engine mechanics must have and apply skill and a thorough knowledge of engine repair procedures in the following:

- Identifying and selecting alternative methods and trade techniques to adapt accepted repair procedures to new or unfamiliar engine or accessory systems, and to anticipate what tools and parts will be required, and to set up the work area.
- Repairing and reworking engine parts and components; reassembling accessories such as portions of electrical, pneumatic, and hydraulic systems; and trimming units to maximum operating capability. (For example, they analyze such problems as fuel fluctuation, compressor instability, or excessive vibration and take corrective action, disassembling to the extent necessary to make needed repairs and adjustments.)
- Using standard and precision measuring instruments such as vibration analyzers to detect and locate the source of vibration in propellers, reduction gears, or engine rotors.
- Operating diagnostic and on-board electronic equipment and systems to aid in identifying aircraft related problems that may affect engine operation.
- Adapting emerging technology developed within the field and utilizing new tools, test devices, and equipment associated with the trade, such as digital diagnostic equipment, on-board electronic equipment and systems, engine analysis software, specialized measuring devices, and automated storage and retrieval of in-flight and historical performance data.
- Using pyrometers to check engine combustion and test benches that read multiple parameters in oil, air vacuum, and torque.
- Retrieving and correlating engine and aircraft digital diagnostic data to observed or reported discrepancies.
- Using engine analysis software to evaluate engine performance parameters and troubleshoot engine/aircraft malfunctions.
- Making initial diagnosis, selecting appropriate tools to disassemble the engine or accessory systems.
- Using test equipment to locate and determine the cause of the defect, such as possible material failure, foreign objects, or incorrect assembly, and determine the repairs needed.
- Selecting appropriate troubleshooting techniques to identify engine malfunctions, including skill in interpreting crew reports and pilot reported discrepancies.
- Using and interpreting technical orders, manufacturers catalogs, maintenance bulletins, complex multi-view blueprints, schematic drawings, etc. to obtain the technical information needed to troubleshoot, assemble and trim engines. (For example, using technical orders and specifications to determine the sequence and tolerances for adjusting variable stator systems or determining tolerances of turbine bearing parts when troubleshooting a vibration problem.)



**Responsibility:** In comparison to the grade 9 aircraft engine repairers, who receive general assignments to repair various aircraft engines, grade 10 aircraft engine mechanics are responsible for repairing, troubleshooting, testing, and certifying acceptable performance of all conventional or modified aircraft engines prior to their being installed in the aircraft or placed in inventory. Supervisors give grade 10 aircraft engine mechanics oral assignments or work orders. Aircraft engine mechanics independently determine the type and extent of repairs needed, work sequence, and the parts, tools, and materials necessary to accomplish the repair with occasional spot checks during progress. They refer to operation logs, aircraft digital diagnostic data, trouble reports, and technical manuals when locating and correcting defects. They follow clearance and adjustment specifications found in technical manuals, blueprints, schematics, and engineering change orders. Grade 10 mechanics provide on-the-job training to lower-grade repairers on aircraft engine repair practices and procedures, technical aspects of new/modified engines and components, and instruct them on safety procedures. The training may include giving instructions on tools, materials, devices, and instruments used in the trade. The supervisor insures that overall work meets accepted trade standards and provides assistance on unusual problems when requested.

**Physical Effort:** Physical effort is similar to that described at [grade 8](#).

**Working Conditions:** Working conditions are similar to those described at [grade 8](#).