

# AMT A170: POWERPLANT RECIPROCATING ENGINES FAA

Item	Value
Curriculum Committee Approval Date	12/08/2021
Top Code	095020 - Aviation Powerplant Mechanics
Units	6 Total Units
Hours	225 Total Hours (Lecture Hours 54; Lab Hours 171)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	Yes
Basic Skills	Not Basic Skills (N)
Repeatable	No
Open Entry/Open Exit	No
Grading Policy	Standard Letter (S)

## Course Description

Fundamental theory of aircraft reciprocating engines. Practical experience in overhauling, repair, assembly, testing, and troubleshooting various powerplants. ADVISORY: AMT A150 and AMT A153. Transfer Credit: CSU.

## Course Level Student Learning Outcome(s)

1. Demonstrate the ability to overhaul, inspect, repair, install, run, and troubleshoot aircraft reciprocating engines.

## Course Objectives

- 1. Demonstrate and analyze the use of non-destructive testing equipment on reciprocating engine parts.
- 2. Analyze charts, graphs, and engine data specification sheets.
- 3. Interpret, calculate and solve valve-timing problems.
- 4. Explain the principles of the Otto cycle
- 5. Demonstrate and analyze procedures outlined in the overhaul manual.
- 6. Identify different types of corrossions visually.
- 7. Demonstrate the use of precision measuring tools too inspect parts dimensionally.
- 8. Compare the results of dimensional inspection and verify the results to the Table of Limits in the overhaul manual.
- 9. Demonstrate the ability to grind valves and valve seats, define proper valve seat margins.
- 10. Demonstrate the ability to reassemble engine per the overhaul manual verifying acceptable standards and techniques are used.
- 11. Demonstrate and identify proper torque procedures using the overhaul manual and acceptable standards and techniques.
- 12. Demonstrate the ability to correctly write a logbook entry per FAA standards.
- 13. Demonstrate the ability to correctly install an engine in the test cell or aircraft.
- 14. Demonstrate the ability to test run a reciprocating engine.

- 15. Analyze results from test running a reciprocating engine.
- 16. Apply troubleshooting techniques in troubleshooting reciprocating engines.
- 17. Interpret Type Certificate Data Sheets and Airworthiness Directives information and demonstrate the ability to perform a Conformity Inspections.
- 18. Gather information and perform a 100-hour/Annual inspection.
- 19. Evaluate system faults and apply principle in modern engine troubleshooting.

## Lecture Content

RECIPROCATING ENGINES Overhaul reciprocating engines Explain the principles of the Otto cycle Use correct cylinder nomenclature Identify crankshaft and rod assemblies Recognize and classify types of reciprocating engines Recognize and describe propeller reduction systems Identify nose and power cases and describe loads Recognize, identify and describe function of valve springs Identify factors affecting volumetric efficiency Timing valves and explaining valve overlap Identify, clean and inspect various types of bearings Determine firing order of reciprocating aircraft engines Determine direction of rotation and speed of engine accessory drives Identify and describe problems associated with high power operation Preparation of a workstation for overhaul of an engine Overhaul a reciprocating engine Inspect and repair a larger radial engine Inspect and repair reciprocating engines Inspect a cylinder Detect defects in crankcase assemblies Remove and replace a stud Select serviceable bearings Dimensionally inspect a crankshaft Identify, remove and reinstall piston pin retainers Identify, dimensionally inspect various cams and cam-followers Inspect, reface and reseat valves in a cylinder Install cylinder assembly on an engine Inspect, check, service and repair reciprocating engines and engine installations Check and rig cable operated and push pull engine controls Recognize and identify dynamic engine mounts Recognize unbalance and "critical vibration range" of propellers Operate an engine at various power settings Adjust oil pressure Describe operation of an oil dilution system Perform an ignition check on an operating engine Install and time a magneto to an engine Adjust idle speed and mixture on a carbureted engine Perform a compression check of an engine Adjust the valve clearances and make valve-timing checks Identify the probable source of metal particles found in oil screens Install, troubleshoot and remove reciprocating engines Lift or hoist an engine into an engine mount Remove and install a propeller from the propeller shaft Pre-oiling of overhauled engines Remove and reinstall baffles Demonstrate correct engine starting procedures Recognize symptoms that indicate operational distress Operate an engine equipped with a constant speed propeller and/or supercharger Engine Inspection Perform powerplant conformity and airworthiness inspection Inspect an engine for compliance with airworthiness directives Inspect an engine for conformity with specifications Inspect in accordance with a 100 hour inspection

## Lab Content

Faculty input required.

## Method(s) of Instruction

- Lecture (02)
- Lab (04)

## **Instructional Techniques**

1. Detailed multimedia/lectures of each topic covered. 2. Student feedback during each lecture. 3. Detailed illustrative discussion of textbook examples. 4. Concentration on schematic reading and system operation fault diagnosis. 5. Practical troubleshooting. 6. Laboratory exercises pertaining to subjects discussed during which students work individually or in small groups.

## **Reading Assignments**

## **Writing Assignments**

Student must show proficiency in writing logbook entries using correct punctuation, sentence structure and readability.

## **Out-of-class Assignments**

## **Demonstration of Critical Thinking**

Interview, list, multiple choice exams, and short answer.

## **Required Writing, Problem Solving, Skills Demonstration**

Student must show proficiency in writing logbook entries using correct punctuation, sentence structure and readability.

## **Textbooks Resources**

1. Required Jeppesen. AC43.13-1B2A, Acceptable Methods, Techniques, and Practices-Aircraft Inspection and Repair, ed. Superintendent of Documents; U.S. Government Printing Office, 2001 Rationale: latest  
2. Required Jeppesen. AP Technician ?POWERPLANT? Textbook, ed. Englewood: Jeppesen Sanderson, 1998 Rationale: latest  
3. Required Kroes, Michael J and Thomas Wild. Aircraft Powerplant, 7th ed. New York: Glencoe/McGraw-Hill, 1994 Rationale: latest