2026

Powerplant Mechanic TEST GUIDE

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AVIATION SUPPLIES & ACADEMICS, INC.
NEWCASTLE, WASHINGTON

Powerplant Mechanic Test Guide
2026 Edition

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Visit **asa2fly.com/AMP** for additional information and resources related to this book.

FAA questions herein are from United States government sources and contain current information as of May 2025.

None of the material in this publication supersedes any documents, procedures, or regulations issued by the FAA.

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About the Contributors

Keith Anderson has over 40 years of experience in aviation as an A&P mechanic, authorized inspector (IA), commercial pilot, flight instructor, and aeronautical engineer. He has worked in Part 91, 121, and 135 operations, has held multiple DOM (Director of Maintenance) positions, and has taught at the university level. His pilot/mechanic experience includes almost 10 years of living and working in Central and South America and Africa. Keith has worked as a design engineer in aircraft design and certification and has held multiple leadership roles including engineering director and vice president positions.

Aviation Supplies & Academics, Inc. (ASA) is an industry leader in the development and sale of aviation supplies and publications for pilots, flight instructors, aviation mechanics, aircraft dispatchers, air traffic controllers, and drone operators. ASA has provided FAA test preparation materials to millions of aviators resulting in successful airman certification for over 80 years. Visit **asa2fly.com** to learn more.

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Updates and Practice Tests

Free Test Updates for the One-Year Life Cycle of Test Guide Books

The FAA modifies tests as needed throughout the year. ASA keeps abreast of changes to the tests and posts free Test Updates on the ASA website. Before taking your test, be certain you have the most current information by visiting the ASA Test Updates webpage: **asa2fly.com/testupdate**. Additionally, sign up for free email notifications, which are sent when new Test Updates are available.

We Invite Your Feedback

After you take your FAA exam, let us know how you did. Were you prepared? Did ASA's products meet your needs and exceed your expectations? We want to continue to improve these products to ensure applicants are prepared and become safe aviators. Send your feedback to: **cfi@asa2fly.com**.

Introduction

Welcome to the Aviation Supplies & Academics, Inc., (ASA) Test Guide Series, based on the original Fast-Track series written by Dale Crane. This series has been helping aviation mechanics prepare for FAA Knowledge Exams with great success for more than 60 years. We are confident that with the proper use of this book you will score very well on your FAA Knowledge Exam. Additionally, the ASA Test Guides include typical oral test questions and practical projects to help you prepare for the final step in the Aviation Mechanic certification process.

Begin your studies with an instructor-led or home-study ground school course, which will involve reading a comprehensive textbook for aviation maintenance technicians (AMTs). Once complete, visit the Reader Resources for this Test Guide (**asa2fly.com/AMP**) and become familiar with the FAA guidance material available for this certification exam. Then use this Test Guide to prepare for your exam: Read the question, select your choice for the correct answer, and then read the explanation. Use the references that accompany the explanation to identify additional resources for further study. Upon completion of your studies, take practice tests at **prepware.com** (see inside the front cover for your activation code).

Prior to taking an FAA Airman Knowledge Test, all applicants must establish an FAA Tracking Number (FTN) by creating a profile in the Integrated Airman Certification and Rating Application (IACRA) system at **iacra.faa.gov**. Then visit **faa.psiexams.com** to register for your exam and take FAA-created practice tests to become familiar with the computer testing platform.

The FAA exams are "closed tests" which means the exact database of questions is not available to the public. The question and answer choices in this book are based on our extensive history and experience with the FAA testing process as well as the FAA's publicly available information. You might see similarly worded questions on your official FAA exam and answer stems may be rearranged from the A, B, C order you see in this book. Therefore, be sure to fully understand the intent of each question and corresponding answer while studying, rather than memorizing the letter associated with the correct response. Studying and understanding the information in this book and the associated references will give you the tools to answer question variations with confidence.

If your study leads you to question an answer choice, we recommend you seek the assistance of a local instructor. We welcome your questions, recommendations or concerns—send them to:

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The FAA appreciates testing experience feedback. Contact them at:

Federal Aviation Administration, AFS-810
Training & Certification Group, Testing Standards Section
PO Box 25082
Oklahoma City, OK 73125
Email: afs630comments@faa.gov

Instructions

The general qualifications for an Aviation Mechanic certificate require you to have a combination of experience, knowledge, and skill. If you are pursuing an Aviation Mechanic certificate with Airframe and Powerplant ratings, you should review the appropriate sections of 14 CFR Part 65 for detailed information pertaining to eligibility requirements. Further information may be obtained from **faa.gov/mechanics**.

The table below lists the number of questions, allotted testing time, and required passing score for each aviation mechanic knowledge exam, as well as the Test Code you'll use to register for your test.

Test Code	Test Name	Number of Questions	Min. Age	Allotted Time (hrs)	Passing Score
AMP	Aviation Mechanic—Powerplant	100	N/A	2.0	70
AMA	Aviation Mechanic—Airframe	100	N/A	2.0	70
AMG	Aviation Mechanic—General	60	N/A	2.0	70

Description of the Knowledge Test

All test questions are objective multiple-choice and can be answered by the selection of a single response. Each test question is independent of other questions; therefore, a correct response to one does not depend upon, or influence, the correct response to another. Considerable effort is expended to write each question in a clear, precise manner. Make sure you read the instructions given with the test, as well as the statements in each test item. When taking a test, keep the following points in mind:

1. Answer each question in accordance with the latest regulations and guidance publications.
2. Read each question carefully before looking at the possible answers. You should clearly understand the problem before attempting to solve it.
3. After formulating an answer, determine which choice corresponds with that answer. The answer chosen should completely resolve the problem.
4. From the answers given, it may appear that there is more than one possible answer; however, there is only one answer that is correct and complete. The other answers are either incomplete, erroneous, or represent common misconceptions.
5. If a certain question is difficult for you, mark it for review and proceed to the next question. After you answer the less difficult questions, return to those you marked for review and answer them. The review marking procedure will be explained to you prior to starting the test. Although the computer should alert you to unanswered questions, make sure every question has an answer recorded. This procedure will enable you to use the available time to maximum advantage.
6. When solving a calculation problem, select the answer closest to your solution. The problem has been checked several times by various individuals; therefore, if you have solved it correctly, your answer will be closer to the correct answer than any of the other choices.

Your test will be graded immediately upon completion and your score will display on the computer screen.

Knowledge Test Eligibility Requirements

Before taking the certification knowledge and practical tests, you must meet the eligibility requirements for authorization. Applicants may present one or more of the following acceptable forms of authorization:

- Original FAA Form 8610-2, Airman Certificate and/or Rating Application. The proctor will verify that applicable blocks are marked (in upper left corner of form). Those not applicable will have a line drawn through them (identifying Airframe and/or Powerplant).
- Certificate of graduation or completion from an FAA-certificated Aviation Maintenance Technician School (AMTS).
- Military Certificate of Eligibility.

Learn more about the FAA's test authorization requirement by reviewing 14 CFR Parts 65 and 147 and the FAA Airman Knowledge Testing Authorization Requirements matrix posted in the reader resources at **asa2fly.com/AMP**.

Taking the Knowledge Test

The FAA testing provider authorizes hundreds of test center locations that offer a full range of airman knowledge tests. For information on authorized testing centers and to register for the knowledge test, visit **faa.psiexams.com**.

When you contact a knowledge testing center, be prepared to select a test date and make a payment. You may register for test(s) several weeks in advance online or with a telephone call, and you may cancel in accordance with the testing center's cancellation policy. Regardless of your registration method, you will need an FAA Tracking Number (FTN). This FTN will follow you throughout your aviation career. You will obtain your FTN by creating a profile in the Integrated Airman Certificate and Rating Application (IACRA) system at **iacra.faa.gov**. This FTN will be printed on your Airman Knowledge Test Report (AKTR).

For more information, contact:
PSI Services LLC
844-704-1487 or examschedule@psionline.com
faa.psiexams.com

On the day of the Airman Knowledge Test the applicant must provide the following information to be collected in order to complete the registration process at the testing center prior to the test proctor administering the Airman Knowledge Test: Name, FAA Tracking Number (FTN), physical address, date of birth, email address, photo identification, phone number, test authorization (credentials of the individual such as an instructor endorsement), and previous number of test attempts. The **faa.psiexams.com** website, your instructor, or local FAA office can assist you with what documentation to take to the testing facility. Testing center personnel will not begin the test until your identification is verified. Acceptable forms of authorization are:

- FAA Form 8610-2.
- A graduation certificate or certificate of completion from an affiliated testing center.
- A failed, passing, or expired AKTR.

Retesting Procedure

Retests do not require a 30-day waiting period if the applicant presents a signed statement from an airman holding the certificate and rating sought by the applicant. This statement must certify that the airman has given the applicant additional instruction in each of the subjects failed, and that the airman considers the applicant ready for retesting. A 30-day waiting period is required for retesting if the applicant presents a failed airman knowledge test report, but no authorized instructor endorsement.

Applicants taking retests ***after failure*** are required to submit the applicable test report indicating failure to the testing center prior to retesting. The original failed test report shall be retained by the proctor and attached to the applicable sign-in/out log. The latest test taken will reflect the official score.

Applicants retesting ***in an attempt to achieve a higher passing score*** may retake the same test for a better grade after 30 days. The latest test taken will reflect the official score. Applicants are required to submit the ***original*** applicable test report indicating previous passing score to the testing center prior to testing. Testing center personnel must collect and destroy this report prior to issuing the new test report.

Use of Test Aids and Materials

Airman knowledge tests require applicants to analyze the relationship between variables needed to solve aviation problems, in addition to testing for accuracy of a mathematical calculation. The intent is that all applicants are tested on concepts rather than rote calculation ability. It is permissible to use certain calculating devices when taking airman knowledge tests, provided they are used within the following guidelines. The term "calculating devices" is interchangeable with such items as calculators, computers, or any similar devices designed for aviation-related activities.

1. Guidelines for use of test aids and materials. The applicant may use test aids and materials within the guidelines listed below, if actual test questions or answers are not revealed.
    a. Applicants may use test aids, such as a calculating device that is directly related to the test. In addition, applicants may use any test materials provided with the test.
    b. The test proctor may provide a calculating device to applicants and deny them use of their personal calculating

device if the applicant's device does not have a screen that indicates all memory has been erased. The test proctor must be able to determine the calculating device's erasure capability. The use of calculating devices incorporating permanent or continuous type memory circuits without erasure capability is prohibited.

c. The use of magnetic cards, magnetic tapes, modules, computer chips, or any other device upon which prewritten programs or information related to the test can be stored and retrieved is prohibited. Printouts of data will be surrendered at the completion of the test if the calculating device used incorporates this design feature.

d. The use of any booklet or manual containing instructions related to the use of the applicant's calculating device is not permitted.

e. Dictionaries are not allowed in the testing area.

f. The test proctor makes the final determination relating to test materials and personal possessions that the applicant may take into the testing area.

2. Guidelines for applicant's with learning or reading disabilities. An applicant with a learning or reading disability may request approval from the local Flight Standards Office to take an airman knowledge test using one of the following options listed in preferential order:

(1) The applicant may request up to 1½ times the standard time allotted to complete the knowledge test.

(2) The applicant may use a self-contained electronic device which pronounces and displays typed-in words (e.g., the Franklin Speaking Wordmaster®) to facilitate the testing process. The applicant must provide his or her own device, with approval of the device to be determined by the administrator. Note: The device should consist of an electronic thesaurus that audibly pronounces typed-in words and presents them on a display screen. The device should also have a built-in headphone jack for private listening in order to avoid disturbing others during testing.

Cheating or Other Unauthorized Conduct

Computer testing centers are required to follow strict security procedures to avoid test compromise. These procedures are established by the FAA and are covered in FAA Order 8080.6, Conduct of Airman Knowledge Tests. The FAA has directed testing centers to terminate a test at any time a test proctor suspects a cheating incident has occurred. An FAA investigation will then be conducted. If the investigation determines that cheating or other unauthorized conduct has occurred, then any airman certificate or rating that you hold may be revoked, and you will be prohibited for 1 year from applying for or taking any test for a certificate or rating under 14 CFR Part 65.

Test Reports

Your test will be graded immediately upon completion and your score will display on the computer screen. You will receive your Airman Knowledge Test Report (AKTR), which will state your score. See sample AKTR on the next page.

Visit **faa.psiexams.com** to request a duplicate or replacement AKTR due to loss or destruction.

Airman Knowledge Test Reports are valid for 24 calendar months. If the AKTR expires before completion of the practical test, you must retake the knowledge test.

Your AKTR lists the Airman Certification Standard (ACS) code for questions answered incorrectly. The total number of ACS codes shown on the AKTR is not necessarily an indication of the total number of questions answered incorrectly. Study these knowledge areas to improve your understanding of the subject matter. See Cross-Reference B in the back of this book for a listing of ACS codes and their associated questions.

During the oral and practical test, the examiner will re-evaluate the noted areas of deficiency. You will be retested on the subjects identified by the ACS code on the AKTR.

U.S. DEPARTMENT OF TRANSPORTATION
Federal Aviation Administration
Airman Knowledge Test Report

NAME: CHARLES TAYLOR

FAA TRACKING NUMBER (FTN): C1234567 **EXAM ID:** 98765432109876543

EXAM: Aviation Maintenance Technician Powerplant (AMP)

EXAM DATE: 08/15/2025 **EXAM SITE:** ABC12345

SCORE: 88% **GRADE:** Pass **TAKE:** 1

The Airman Certification Standards (ACS) codes listed below represent incorrectly answered questions. These ACS codes and their associated Areas of Operation/Tasks/Elements may be found in the appropriate ACS document at http://www.faa.gov/training_testing/testing/acs.

A single code may represent more than one incorrect response.

AM.III.A.K8 AM.III.C.K7 AM.III.F.K5 AM.III.F.K10 AM.III.I.K13 AM.III.J.K4 AM.III.M.K6

EXPIRATION DATE: 08/30/2027

DO NOT LOSE THIS REPORT

AUTHORIZED INSTRUCTOR'S STATEMENT: (if applicable)

On _____ (date) I gave the above named applicant _____ hours of additional instruction, covering each subject area shown to be deficient, and consider the applicant competent to pass the knowledge test.

Name _____

Cert. No. _____ *(print clearly)*

Type of instructor certificate _____

Signature _____

FRAUDULENT ALTERATION OF THIS FORM BY ANY PERSON IS A BASIS FOR SUSPENSION OR REVOCATION OF ANY CERTIFICATES OR RATINGS HELD BY THAT PERSON.
ISSUED BY: PSI Services LLC
FEDERAL AVIATION ADMINISTRATION

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Sample Airman Knowledge Test Report

Knowledge Exam References

The FAA references the following documents to write the FAA Knowledge Exam questions. You should be familiar with all of these as part of your classroom studies, which you should complete before starting test preparation:

FAA-H-8083-30	*Aviation Maintenance Technician Handbook—General* (FAA)
FAA-H-8083-31	*Aviation Maintenance Technician Handbook—Airframe* (FAA)
FAA-H-8083-32	*Aviation Maintenance Technician Handbook—Powerplant* (FAA)
FAA-H-8083-3	*Airplane Flying Handbook* (FAA)

14 CFR Parts 1, 3, 21, 23, 39, 43, 45, 47, 65, 91, 147

Advisory Circulars (AC) 21-12, 23-21, 23.1309-1, 43.9-1, 43.13-1

Additional resources helpful for AMT studies:

AMT-G	*Aviation Mechanic Series: General* (ASA)
AMT-STRUC	*Aviation Mechanic Series: Airframe Structures* (ASA)
AMT-SYS	*Aviation Mechanic Series: Airframe Systems* (ASA)
AMT-P	*Aviation Mechanic Series: Powerplant* (ASA)
DAT	*Dictionary of Aeronautical Terms* (ASA)
AIM	*Aeronautical Information Manual* (FAA)

Acronyms

For reference, acronyms appearing in this book are defined below.

ABDC	after bottom center (piston cycle location)
AC	Advisory Circular
AC	alternating current
ACC	active clearance control
AD	Airworthiness Directive
AD	ashless dispersant (oil)
ADI	anti-detonant injection
AFM	airplane flight manual
AMC	automatic mixture control
AN	Army-Navy (specification standard)
APU	auxiliary power unit
ATDC	after top center (piston cycle location)
AWG	American Wire Gauge
BBDC	before bottom dead center (piston cycle location)
BTDC	before top dead center (piston cycle location)
CAR	Canadian Air Regulations
CFS	computerized fuel system
CO	carbon monoxide
CO_2	carbon dioxide
CSD	constant-speed drive
DC	direct current
ECC	electronic engine control
EGT	exhaust gas temperature
EMF	electromotive force
EP	extreme pressure (lubricant)
EPR	engine pressure ratio
FOD	foreign object debris
HRD	high-rate discharge (fire extinguisher)
ITT	interstage turbine temperature
METO	maximum except for takeoff (power)
MS	military specification (standard)
OAT	outside air temperature
psi	pounds per square inch
psig	pounds per square inch in gauge (gauge pressure)
RPM	rotations per minute
SAE	SAE International, previously the Society of Automotive Engineers
SSU	Seconds Saybolt Universal
STC	Supplemental Type Certificate
TCDS	Type Certificate Data Sheet
TDC	top dead center (piston cycle location)
TIT	turbine inlet temperature
TSO	Technical Standard Order

ASA Test Guide Layout

Sample FAA questions have been sorted according to subject matter, as defined in the Airman Certification Standards. Some sample FAA questions refer to Figures immediately following the question number, e.g., "8622. (Refer to Figure 5.)." These are FAA Figures from the Airman Knowledge Testing Supplement (FAA-CT-8080-4G) and can be found in Cross-Reference C at the back of this book. The figures will be provided to you as a separate booklet when you take your FAA test.

Following each sample FAA test question is ASA's explanation in italics. The last line of the explanation contains an Airman Certification Standards (ACS) code, as well as a reference for further study. Answers to each question are found at the bottom of each page.

EXAMPLE:

Question number

See the Airman Knowledge Testing Supplement at the back of the book.

8622. (Refer to Figure 5.) Which malfunctions will allow the igniters to operate normally during start but be inoperative when tested? ← **Question**

A— Wire 10 is broken.
B— Wire 14 or 15 is broken. ← **Answer choices**
C— Wire 12 is broken.

The igniters will operate during a normal start, but will be inoperative when the test switch is closed if there is an open in either wire 14 or 15. (AM.III.H.K7) — FAA-H-8083-32 ← **Explanation**

FAA ACS code in parentheses, followed by reference for further study.

8622 [B] ← **Correct answer is found at the bottom of the page.**

Powerplant Knowledge Exam Study Guide

Reciprocating Engines

8035. Which of the following are factors in establishing the maximum compression ratio limitations of an aircraft engine?

A—Design limitations of the engine, the degree of supercharging, and spark plug reach.
B—Detonation characteristics of the fuel, design limitations of the engine, and spark plug reach.
C—Detonation characteristics of the fuel, design limitations of the engine, and the degree of supercharging.

The maximum compression ratio of an engine is limited by the ability of the engine to withstand detonation in its cylinders. The detonation characteristics of the fuel used is a limiting factor. Fuels having a low critical pressure and temperature must not be used with high compression engines. The design limitations of the engine are important, because engines that are not designed strong enough to withstand high cylinder pressures must not have a high compression ratio. The degree of supercharging is extremely important, because the cylinder pressures are a function of both the initial pressure in the cylinder (the pressure caused by the supercharger) and the compression ratio. The only alternative that does not limit the compression ratio is the spark plug reach. (AM.III.A.K1) — FAA-H-8083-32

8004. What is the principal advantage of using propeller reduction gears?

A—To enable the propeller RPM to be increased without an accompanying increase in engine RPM.
B—To enable the engine RPM to be increased with an accompanying increase in power and allow the propeller to remain at a lower, more efficient RPM.
C—To enable the engine RPM to be increased with an accompanying increase in propeller RPM.

The horsepower produced by a reciprocating engine is determined by its RPM. The higher the RPM, the greater the power. But the efficiency of a propeller decreases as the blade tip speed approaches the speed of sound. In order to get the best of both conditions, many of the more powerful aircraft engines drive the propeller through a set of reduction gears. Reduction gears allow the engine to turn fast enough to develop the required power. At the same time, the propeller tip speed is kept low enough that the tips do not approach the speed of sound. (AM.III.A.K2) — FAA-H-8083-32

8005. Which of the following will decrease volumetric efficiency in a reciprocating engine?

A—Full throttle operations, low cylinder head temperatures, and high carburetor air temperatures.
B—Low cylinder head temperatures, improper valve timing, and sharp bends in the induction system.
C—Improper valve timing, sharp bends in the induction system, and high carburetor air temperatures.

The volumetric efficiency of a reciprocating engine is the ratio of the weight of the air-fuel charge taken into the cylinder, to the weight of a charge that would completely fill the entire volume of the cylinder at the same pressure. Anything that decreases the weight of the air entering the cylinder decreases the volumetric efficiency. Improper valve timing, sharp bends in the induction system, and high carburetor air temperature will all decrease the volumetric efficiency. (AM.III.A.K2) — FAA-H-8083-32

8009. A nine-cylinder engine with a bore of 5.5 inches and a stroke of 6 inches will have a total piston displacement of

A—740 cubic inches.
B—1,425 cubic inches.
C—1,283 cubic inches.

The piston displacement of a reciprocating engine is the total volume swept by the pistons in one revolution of the crankshaft.

Find the piston displacement of one cylinder by multiplying the area of the piston in square inches by the stroke, which is measured in inches.

The total piston displacement is the volume of one cylinder, measured in cubic inches, multiplied by the number of cylinders.

Area = 0.7854 × bore^2
= 0.7854 × 30.25
= 23.75 square inches

Volume = piston area × stroke
= 23.75 × 6
= 142.55 cubic inches

Piston displacement = volume × number of cylinders
= 142.55 × 9
= 1,282.95 cubic inches

(AM.III.A.K2) — FAA-H-8083-32

Answers
8035 [C] 8004 [B] 8005 [C] 8009 [C]

8010. The five events of a four-stroke cycle engine in the order of their occurrence are

A—intake, ignition, compression, power, and exhaust.
B—intake, compression, power, ignition, and exhaust.
C—intake, compression, ignition, power, and exhaust.

The five events that take place in a reciprocating engine during each cycle of its operation are:

Intake—The air-fuel mixture is taken into the cylinder.

Compression—The air-fuel mixture is compressed as the piston moves upward (outward) in the cylinder.

Ignition—As the piston nears the top of its stroke, an electrical spark ignites the mixture so it burns and releases its energy.

Power—As the air-fuel mixture burns, it forces the piston downward. This movement of the piston rotates the crankshaft and performs useful work.

Exhaust—After the piston has reached the bottom of its stroke and done the most of its useful work, the piston pushes upward, forcing the burned gases out of the cylinder.

(AM.III.A.K2) — FAA-H-8083-32

8015. On which strokes are both valves on a four-stroke cycle reciprocating aircraft engine open?

A—Power and exhaust.
B—Intake and compression.
C—Exhaust and intake.

Both the intake and exhaust valve are open at the same time only during the period of valve overlap. Valve overlap occurs at the end of the exhaust stroke and the beginning of the intake stroke. The intake valve opens a few degrees of crankshaft rotation before the piston reaches the top of the exhaust stroke. The exhaust valve remains open until the piston has moved down a few degrees of crankshaft rotation on the intake stroke. (AM.III.A.K2) — FAA-H-8083-32

8021. An aircraft reciprocating engine using hydraulic valve lifters is observed to have no clearance in its valve-operating mechanism after the minimum inlet oil and cylinder head temperatures for takeoff have been reached. When can this condition be expected?

A—During normal operation.
B—When the lifters become deflated.
C—As a result of carbon and sludge becoming trapped in the lifter and restricting its motion.

There is no clearance in the valve operating mechanism when an engine equipped with hydraulic valve lifters is operating normally and the minimum oil and cylinder-head temperatures for takeoff have been reached. Hydraulic valve lifters are used because they remove all of the clearance between the rocker arm and the tip of the valve stem. By keeping all of this clearance removed, the valves operate with less noise and less wear. (AM.III.A.K2) — FAA-H-8083-32

8024. If the intake valve is opened too early in the cycle of operation of a four-stroke cycle engine, it may result in

A—improper scavenging of exhaust gases.
B—engine kickback.
C—backfiring into the induction system.

The intake valve opens when the piston is moving upward at the end of the exhaust stroke. Opening at this point allows the low pressure caused by the inertia of the exiting exhaust gases to assist in starting the air-fuel mixture flowing into the cylinder. If the intake valve opens too early, some of the burning exhaust gases could flow into the intake manifold and ignite the mixture. This would cause a backfire in the induction system. (AM.III.A.K2) — FAA-H-8083-32

8026. Which statement is correct regarding a four-stroke cycle aircraft engine?

A—The intake valve closes on the compression stroke.
B—The exhaust valve opens on the exhaust stroke.
C—The intake valve closes on the intake stroke.

The intake valve in a four-stroke cycle aircraft engine closes somewhere around 60° after bottom center on the compression stroke. The exhaust valve opens about 70° before bottom center on the power stroke. The intake valve opens about 20° before top center on the exhaust stroke. The exhaust valve closes about 15° after top center on the intake stroke. (AM.III.A.K2) — FAA-H-8083-32

8029. When is the air-fuel mixture ignited in a conventional reciprocating engine?

A—When the piston has reached top dead center of the intake stroke.
B—Shortly before the piston reaches the top of the compression stroke.
C—When the piston reaches top dead center on the compression stroke.

Ignition occurs in a reciprocating engine somewhere around 30° of crankshaft rotation before the piston reaches top center on the compression stroke. By timing the ignition to occur when the piston is in this position, the maximum pressure inside the cylinder is reached just after the piston passes over top center and starts down on the power stroke. (AM.III.A.K2) — FAA-H-8083-32

Answers
8010 [C] 8015 [C] 8021 [A] 8024 [C] 8026 [A] 8029 [B]

8034. If the exhaust valve of a four-stroke cycle engine is closed and the intake valve is just closed, the piston is on the

A—intake stroke.
B—power stroke.
C—compression stroke.

The intake valve closes when the piston is moving upward on the compression stroke. At this time, the exhaust valve is already closed. (AM.III.A.K2) — FAA-H-8083-32

8058. A characteristic of dyna-focal engine mounts as applied to aircraft reciprocating engines is that the

A—shock mounts eliminate the torsional flexing of the powerplant.
B—engine attaches to the shock mounts at the engine's center of gravity.
C—shock mounts point toward the engine's center of gravity.

Aircraft reciprocating engines are often mounted in a type of suspension called dynamic suspension, or dyna-focal engine mounts. Dyna-focal mounts absorb the vibrations of the engine about the center of gravity of the engine-propeller combination and isolates these vibrations from the aircraft structure. The shock mounts all point toward the engine-propeller center of gravity. (AM.III.A.K2) — FAA-H-8083-32

8081. When does valve overlap occur in the operation of an aircraft reciprocating engine?

A—At the end of the exhaust stroke and the beginning of the intake stroke.
B—At the end of the power stroke and the beginning of the exhaust stroke.
C—At the end of the compression stroke and the beginning of the power stroke.

Both the intake and exhaust valve are open at the same time, only during the period of valve overlap. Valve overlap occurs at the end of the exhaust stroke and the beginning of the intake stroke. The intake valve opens a few degrees of crankshaft rotation before the piston reaches the top of the exhaust stroke. The exhaust valve remains open until the piston has moved down a few degrees of crankshaft rotation on the intake stroke. (AM.III.A.K2) — FAA-H-8083-32

8082. What is an advantage of using metallic-sodium filled exhaust valves in aircraft reciprocating engines?

A—Increased strength and resistance to cracking.
B—Reduced valve operating temperatures.
C—Greater resistance to deterioration at high valve temperatures.

Some aircraft engine exhaust valves are hollow and are partially filled with metallic sodium. When the engine is operating, the sodium melts and as the valve opens and closes, the molten sodium sloshes back and forth in the valve. When it is in the head, it absorbs heat. When it is in the stem, it transfers this heat to the valve guides. Sodium-filled valves reduce the valve operating temperature. (AM.III.A.K2) — FAA-H-8083-32

8084. What is likely to occur if a reciprocating engine is operated at high power settings before it is properly warmed up?

A—Oil starvation of bearings and other parts.
B—Excessive engine oil pressure.
C—Thermal shock of cylinders.

No aircraft engine should be operated at high power settings before it is properly warmed up and the oil is warm enough to flow freely through all the passages. High power operation with cold oil can cause oil starvation to the bearings. (AM.III.A.K2) — FAA-H-8083-32

8088. Increased water vapor (higher relative humidity) in the incoming air to a reciprocating engine will normally result in which of the following?

A—Decreased engine power at a constant RPM and manifold pressure.
B—Increased power output due to increased volumetric efficiency.
C—A leaning effect on engines which use non-automatic carburetors.

The amount of energy released by a burning air-fuel mixture is determined by the weight of both the fuel and the air in the mixture. Water vapor weighs only about 5/8 as much as dry air, and when an engine takes in air with a high relative humidity, it produces less power at the same RPM and manifold pressure than it would produce if it were taking in dry air. (AM.III.A.K2) — FAA-H-8083-32

Answers
8034 [C] 8058 [C] 8081 [A] 8082 [B] 8084 [A] 8088 [A]

8102. One of the best indicators of reciprocating engine combustion chamber problems is

A—excessive engine vibration.
B—starting difficulties.
C—spark plug condition.

The condition of the spark plugs taken from the cylinders of a reciprocating engine is a good indicator of the condition of the combustion chamber of the engine. Spark plugs can show when detonation has been occurring, and they can show up an excessively worn valve guide and induction system filter leaks. (AM.III.A.K2) — FAA-H-8083-32

8105. To what altitude will a turbo charged engine maintain sea level pressure?

A—Critical altitude.
B—Service ceiling.
C—Pressure altitude.

The critical altitude of a turbocharged aircraft engine is the altitude above which the turbocharger can no longer produce sea level manifold pressure and the engine cannot maintain its rated horsepower. (AM.III.A.K2) — FAA-H-8083-32

8011. The primary concern in establishing the firing order for an opposed engine is to

A—provide for balance and eliminate vibration to the greatest extent possible.
B—keep power impulses on adjacent cylinders as far apart as possible in order to obtain the greatest mechanical efficiency.
C—keep the power impulses on adjacent cylinders as close as possible in order to obtain the greatest mechanical efficiency.

The firing order of an opposed engine is designed to provide for balance and to eliminate vibration as much as possible. (AM.III.A.K3) — FAA-H-8083-32

8012. If air-fuel ratio is proper and ignition timing is correct, the combustion process should be completed

A—20 to 30° before top center at the end of the compression stroke.
B—when the exhaust valve opens at the end of the power stroke.
C—just after top center at the beginning of the power stroke.

The ignition of the air-fuel mixture in the cylinder of a reciprocating engine is timed so it occurs when the piston is about 20 to 30 degrees of crankshaft rotation before reaching top center on the compression stroke. If the mixture ratio and ignition timing are both correct, the air-fuel mixture will be all burned shortly after the piston passes over top center. The expanding gases caused by absorbing heat from the burning mixture will exert the maximum amount of push on the descending piston during the power stroke. (AM.III.A.K3) — FAA-H-8083-32

8014. Which statement is correct regarding engine crankshafts?

A—Moveable flyweights serve to reduce the dynamic vibrations in an aircraft reciprocating engine.
B—Moveable flyweights serve to reduce the torsional vibrations in an aircraft reciprocating engine.
C—Moveable flyweights are designed to resonate at the natural frequency of the crankshaft.

Torsional vibration caused by firing impulses of the engine are minimized by the installation of moveable flyweights suspended from certain crank cheeks. These moveable flyweights, called dynamic dampers, rock back and forth and act as pendulums, changing the resonant frequency of the rotating elements, thus reducing the torsional vibration. (AM.III.A.K3) — FAA-H-8083-32

8018. Cam-ground pistons are installed in some aircraft engines to

A—provide a better fit at operating temperatures.
B—act as a compensating feature so that a compensated magneto is not required.
C—equalize the wear on all pistons.

A cam-ground piston is one whose diameter is a few thousandths of an inch greater in a plane perpendicular to the wrist pin boss than it is parallel to the boss. When the piston reaches its operating temperature, the large mass of metal in the piston pin boss expands enough that the piston becomes round. Since the piston is round at its operating temperature, it provides a better seal than it would if it were round while cold and expanded to an out-of-round condition when hot. (AM.III.A.K3) — FAA-H-8083-32

8019. Using the following information, determine how many degrees the crankshaft will rotate with both the intake and exhaust valves seated.

Intake opens 15° BTDC.
Exhaust opens 70° BBDC.
Intake closes 45° ABDC.
Exhaust closes 10° ATDC.

A—290°.
B—245°.
C—25°.

Answers
8102 [C] 8105 [A] 8011 [A] 8012 [C] 8014 [B] 8018 [A] 8019 [B]

Powerplant Oral & Practical Study Guide

The Oral and Practical Tests

Each applicant for a Mechanic Certificate must successfully pass a written test, an oral test, and a practical test to comply with the general eligibility requirements to obtain a mechanic certificate or rating (see 14 CFR §65.53). The O&P tests are typically conducted by an FAA Designated Mechanic Examiner (DME); however, in some circumstances, an FAA inspector may conduct an oral and/or practical test. 14 CFR §65.11 provides that application for a certificate and/or rating must be made on a form and in a manner prescribed by the administrator. As part of the application process, the applicant must contact a DME to schedule the O&P tests. A list of DMEs is available at www.faa.gov or from a local Flight Standards District Office.

Prior to the tests, the evaluator conducts a pretest interview with the applicant. This pretest interview provides the evaluator and applicant with information needed for the test, such as the date, time, and location of the test. It also establishes a testing schedule and allows the evaluator to see any codes associated with the written test report and identify any deficient areas that should be included on the oral test. FAA designees may charge a reasonable fee for their services and this fee should be discussed and agreed upon prior to taking the scheduled test.

The applicant should bring the following documentation to the pretest interview and the O&P test:

- Two identically-prepared FAA Forms 8610-2, Airman Certificate and/or Rating Application, with original signatures;
- Unless early testing under 14 CFR §65.80, written test results indicating a passing grade, applicable to the appropriate rating(s) sought ; and
- A current government-issued photo identification with a signature from the issuing official, such as a passport, U.S. Military ID, driver's license, etc.

Additionally, the applicant should bring the following eligibility documentation:

If testing on the basis of this eligibility:	The applicant should bring this documentation:
Graduation from an FAA certificated 14 CFR Part 147 AMTS	An authenticated document from an AMTS indicating the applicant's date of graduation and curriculum completed, applicable to the certificate or rating sought
Civil or Military Practical experience as provided by 14 CFR §65.77	A signature in Block V of FAA Form 8610-2 authorizing the applicant to test
Practical experience through the JSAMTCC program	A military certificate of eligibility, applicable to the certificate or rating sought
Satisfactory progress at an FAA certificate 14 CFR Part 147 AMTS pursuant to 14 CFR §65.80	A signature in Section II of FAA Form 8610-2 from a school official and FAA inspector authorizing the applicant to test

Oral-related Questions

As per the structure of the mechanic ACS, there will be three oral tests—one for General, one for Airframe, and one for Powerplant. The number of questions that must be asked in the oral test will vary by applicant, depending on the results of the applicant's written test:

- Under the ACS, 14 CFR §65.17 is met at a 70% standard applied to the entire oral test (General, Airframe, Powerplant) as a whole, and not by subject area.
- Each oral test will have a minimum of 4 questions in each section (i.e., a minimum of 4 General questions, 4 Airframe questions, and 4 Powerplant questions), randomly generated by the Mechanic Test Generator, even if an applicant has scored a 100% on their AKTR.
- An applicant that passed the written test with a 70% could get the maximum number of questions on the oral test (i.e., 22 General questions, 34 Airframe questions, 34 Powerplant questions).
- For every ACS code missed on the Airman Knowledge Written Test Report (AKTR) the applicant will have an additional oral question added to on their oral test to validate their knowledge of the material presented.

- Several missed AKTR questions may fall under the same ACS code. In this case, only one additional oral question will be added to the test, as the questions are based on ACS codes missed and NOT number of questions missed.
- Each applicant may be asked a different number of oral questions on their tests, depending on how many ACS codes were missed on their AKTRs, even if they scored the same grade (percentage) on their respective AKTRs.

The oral portion of the test is a standalone test. It must be kept separate from the practical portion of the test. Under §65.17, the minimum passing grade for each test is 70%. The 70% standard is applied to the entire oral test (i.e., either the General, Airframe, or Powerplant test) as a whole, and not by subject area. This does mean that an applicant can miss all the questions in a subject such as electricity and still pass the test. If an applicant fails the oral General test (as a whole), they will have to retest for General, which means they will have to retake the entire General oral test. During the oral testing the applicant is NOT allowed to use reference material. All questions that are on the DME's planning sheet must be asked. The DME does NOT get to pick and choose which questions to ask.

Practical-related Questions

As per the structure of the mechanic ACS, there will be three practical tests—one for General, one for Airframe, and one for Powerplant. The number of practical projects that must be tested is 9 for General, 11 for Airframe, and 11 for Powerplant.

During the practical portion of the test each project is standalone; projects cannot be combined during testing. At a safe and appropriate time during the applicant's performance of the project, the DME must ask 2 practical questions that are relevant to the project, as provided by the Mechanic Test Generator (MTG, the tool DMEs use to generate the O&P for each applicant).

Under §65.17, the minimum passing grade for each test is 70%. The 70% standard is applied to the entire practical test (i.e., either the General, Airframe, or Powerplant test) as a whole, and not by project. Each project, however, is graded using a pass/fail standard. Therefore, the applicant may fail projects and still pass the test. For example, in General there are 9 projects, so the applicant must pass 7 of the 9 projects to pass. If the applicant fails 3 projects, that is less than 70%, and the practical General test is failed. If an applicant completes the project satisfactorily but answers a practical question incorrectly, then the entire project is failed. If the applicant answers the practical questions correctly but fails to complete the project satisfactorily, then the entire project is considered failed.

When an applicant retests the failed practical portion of the test, they will only be retested on the failed projects, as well as any projects that were not tested in their previous test. The applicant will not have to retest on projects previously passed.

The applicant is given an assigned aircraft and appropriate reference material (assigned and provided by the DME) and is assigned the task. At a safe and appropriate time, the DME will ask the applicant the two practical questions associated with this project. If the applicant misses any part of this project, the project is failed.

Sample Oral Exam

AM.III.A.K2 QUESTION: Define the term "operating flexibility" in regard to aircraft engines.

ANSWER: Operating flexibility is the ability of an engine to run smoothly and give desired performance at all speeds from idling to full-power output.

REFERENCE: FAA-H-8083-32

AM.III.B.K1 QUESTION: Define the term "thermal efficiency" in regard to aircraft engines.

ANSWER: It is the ratio of net work produced by the engine to the chemical energy supplied in the form of fuel.

REFERENCE: FAA-H-8083-32

AM.III.C.K3 QUESTION: Name one of the three basic ultrasonic inspection methods.

ANSWER: There are three basic ultrasonic inspection methods: 1. Pulse-echo. 2. Through transmission. 3. Resonance.

REFERENCE: FAA-H-8083-32

AM.III.D.K9 QUESTION: Many large high-bypass turbofan engines use what type of fuel control system?

ANSWER: Many large high-bypass turbofan engines use the FADEC type of fuel control system.

REFERENCE: FAA-H-8083-32

AM.III.E.K4 QUESTION: Where are fire switches normally installed?

ANSWER: Fire switches are typically installed on the center overhead panel or center console in the flight deck.

REFERENCE: FAA-H-8083-32

AM.III.F.K10 QUESTION: Name the components of a basic magnetic circuit.

ANSWER: The magnetic circuit consists of a permanent multi-pole rotating magnet, a soft iron core, and pole shoes.

REFERENCE: FAA-H-8083-32

AM.III.G.K2 QUESTION: Name one type of oil filter used on aircraft engines?

ANSWER: The oil filter used on an aircraft engine is usually one of four types: screen, Cuno, canister, or spin-on.

REFERENCE: FAA-H-8083-32

AM.III.H.K7 QUESTION: Name one general type of inertia starter.

ANSWER: There are three general types of inertia starters: hand, electric, and combination hand and electric.

REFERENCE: FAA-H-8083-32

AM.III.I.K1 QUESTION: Gasoline and other liquid fuels do not burn at all unless they are mixed with what other element?

ANSWER: Gasoline and other liquid fuels do not burn at all unless they are mixed with air.

REFERENCE: FAA-H-8083-32

AM.III.J.K1 QUESTION: The basic induction system of an aircraft reciprocating engine consists of what components?

ANSWER: The basic induction system of an aircraft reciprocating engine consists of an air scoop used to collect the inlet air and ducting that transfers the air to the inlet filter.

REFERENCE: FAA-H-8083-32

AM.III.K.K1 QUESTION: What is the purpose of inlet guide vanes on a turbine engine?

ANSWER: Inlet guide vanes (IGV) help straighten the airflow and direct it into the first stages of the compressor.

REFERENCE: FAA-H-8083-32

AM.III.L.K1 QUESTION: What are two general types of exhaust systems in use on reciprocating aircraft engines?

ANSWER: They are the short stack (open) system and the collector system.

REFERENCE: FAA-H-8083-32

AM.III.M.K1 QUESTION: The propeller control system is divided into two types of control. What are they?

ANSWER: The propeller control system is divided into two types of control: one for flight and one for ground operation.

REFERENCE: FAA-H-8083-32

Sample Practical Exam

Project—Engine Fuel Metering Systems

DESCRIPTION: Locate and explain procedures for removing and installing a turbine engine fuel control unit.

GIVEN: Assigned aircraft, and appropriate reference material.

PERFORMANCE STANDARD: The applicant will locate and explain procedures for removing and installing a turbine engine fuel control unit, as prescribed by reference material.

ACS CODE: AM.III.I.S14

REFERENCE: Appropriate maintenance manuals and other applicable materials.

QUESTION: On the assigned aircraft what is the required torque for installing the fuel control unit?

ANSWER: The torque will be as per the manufacturer's maintenance manual.

REFERENCE: Assigned aircraft's maintenance manual

ACS CODE: AM.III.I.K8

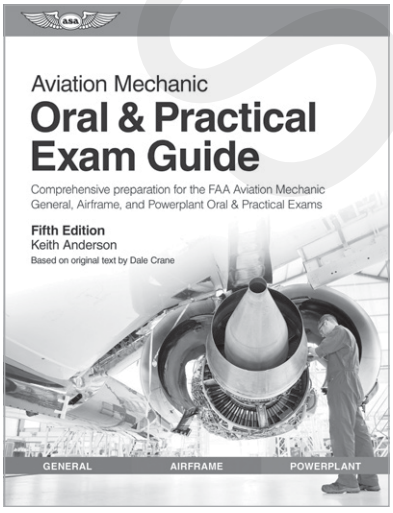
QUESTION: On the assigned aircraft what is the procedure for draining the residual fuel in the fuel control unit?

ANSWER: The procedure will be per the manufacturer's maintenance manual.

REFERENCE: Assigned aircraft's maintenance manual

ACS CODE: AM.III.I.R3

For more oral and practical projects and sample questions covering General, Airframe, and Powerplant:



Aviation Mechanic Oral & Practical Exam Guide

This comprehensive guide will prepare you for the General, Airframe, and Powerplant exams with additional information on the certification process, typical projects and required skill levels, practical knowledge requirements in a question and answer format, and reference materials for further study.

Available at **asa2fly.com** and at your local aviation retailer (order number ASA-OEG-AMT).

Reciprocating Engines

Study Materials

AMT-P, FAA-H-8083-32, 14 CFR Part 43, AC 43.13-1

Typical Oral Questions

1. What is the main advantage of a horizontally opposed engine over a radial engine for powering modern aircraft?

   The horizontally opposed engine has a much smaller frontal area and is easier to streamline than a radial engine.

2. How many throws are there in the crankshaft of a six-cylinder horizontally opposed engine?

   Six.

3. What kind of connecting rod arrangement is used in a radial engine?

   A master rod connects the single throw of the crankshaft with a piston. All of the other pistons are connected to the master rod with link rods.

4. Of what material are most piston rings made?

   Gray cast iron.

5. What is the reason for using hydraulic valve lifters in an aircraft engine?

   Hydraulic valve lifters keep all of the clearance out of the valve operating mechanism. This decreases the wear of the valve train components.

6. At what speed does the camshaft turn, relative to the crankshaft speed in a horizontally opposed engine?

   The camshaft turns at one half of the crankshaft speed.

7. What kind of main bearings are used in a horizontally opposed engine?

   Steel-backed, lead-alloy bearing inserts.

8. On what stroke is the piston of a reciprocating engine when the intake valve begins to open?

   On the exhaust stroke.

9. On what stroke is the piston of a reciprocating engine when the exhaust valve begins to open?

   On the power stroke.

10. Why are both the hot and cold valve clearances given for most radial engines?

    The hot clearance is given for valve timing purposes. The timing is adjusted with the valves in cylinder number one, set with the hot clearance. When the timing is set, all of the valves are adjusted to their cold clearance.

11. What is meant by a cam-ground piston?

    A piston that is not perfectly round. Its dimension parallel with the wrist pin is several thousandths of an inch less than its dimension perpendicular to the wrist pin. When the piston reaches operating temperature, the metal in the piston pin boss expands enough that the piston becomes perfectly round.

12. Where is the piston in a reciprocating engine when the ignition spark occurs?

    About 30 degrees of crankshaft rotation before the piston reaches top center on the compression stroke.

13. What is meant by a full-floating wrist pin?

    A wrist pin that is not clamped in either the piston or the connecting rod. Full-floating wrist pins are kept from scoring the cylinder walls by soft metal plugs in their ends.

14. Why do most aircraft reciprocating engines use more than one spring on each valve?

    By using more than one spring and having the wire diameter and pitch of the springs different, valve float is minimized. The springs have different resonant frequencies, so at least one spring will always be exerting a force on the valve.

15. Would excessive valve clearance cause the valves to open early or late?

    Excessive clearance will cause the valve to open late and close early.

16. What is the purpose of valve overlap in a reciprocating engine?

    Valve overlap allows the inertia of the exhaust gases leaving the cylinder to help the fresh induction charge start flowing into the cylinder.

17. What type of piston rings are installed on the pistons of an aircraft reciprocating engine?

    Compression rings, oil control rings, and oil wiper rings.

18. Why are some exhaust valves partially filled with metallic sodium?

    The metallic sodium melts at engine operating temperature and sloshes back and forth inside the hollow valve. It picks up heat from the valve head and transfers it into the valve stem, so it can be transferred to the cylinder head through the valve guide.

19. What causes detonation in an aircraft engine?

    Excessive heat and pressure in the engine cylinder causes the air-fuel mixture to reach its critical pressure and temperature. Under these conditions, the mixture explodes rather than burns. This explosion is called detonation.

20. Why is a compression check important for determining the condition of an aircraft reciprocating engine?

    A compression check can determine the condition of the seal between the piston rings and the cylinder walls, and the seal between the intake and exhaust valves and their seats.

21. What is meant by the compression ratio of a reciprocating engine?

    The ratio of the volume of the cylinder with the piston at the bottom of its stroke to the volume with the piston at the top of its stroke.

Typical Practical Projects

1. Correctly remove a cylinder and its piston from an engine specified by the examiner.

2. Examine the rings installed on a piston for the correct tension, end gap, and side clearance.

3. Dimensionally inspect an aircraft engine cylinder for bore diameter, out-of-round, and taper.

4. Inspect the valves from an aircraft engine cylinder for stretch and for their fit in the valve guides.

5. Inspect valve springs for their specified compression strength.

6. Grind a valve seat in an engine cylinder, using the correct stones for grinding and for narrowing the seat.

7. Reface an aircraft valve to the recommended angle, and check its fit and seal in the valve seat.

8. Explain to the examiner the correct way to adjust the oil pressure in an aircraft reciprocating engine.

9. Using the correct measuring instruments, measure the diameter of journals of a crankshaft and determine whether or not they are within the tolerances allowed by the engine manufacturer.

10. Examine the bearings in a crankcase specified by the examiner and determine their physical condition and whether or not they are within dimensional tolerance.

11. Examine a rocker arm of an aircraft engine by the magnetic particle inspection method.

12. Examine a cast aluminum or magnesium engine component by the dye penetrant inspection method.

13. Demonstrate to the examiner the correct way to start an aircraft reciprocating engine.

14. Demonstrate to the examiner the proper way to make an engine run-up check to determine the condition of the engine.

15. Identify the sludge plugs in the crankshaft of an aircraft engine and explain their purpose.

16. Explain to the examiner the things that should be checked about engine shock mounts.

17. Perform a crankshaft runout inspection on an engine specified by the examiner.

18. Demonstrate to the examiner the correct way to find the top dead center position of the piston in the cylinder.

2026
Powerplant Mechanic
TEST GUIDE

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