Airline Transport Pilot

ORAL EXAM GUIDE

MICHAEL D. HAYES

THE COMPREHENSIVE GUIDE TO PREPARE YOU FOR THE FAA CHECKRIDE

FIFTH EDITION

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AVIATION SUPPLIES & ACADEMICS
NEWCASTLE, WASHINGTON

Airline Transport Pilot Oral Exam Guide
Fifth Edition
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Fifth Edition published 2020.

See the ASA website at **asa2fly.com/reader/OEGATP** for the "Reader Resources" page containing additional information and updates relating to this book.

ASA-OEG-ATP5
ISBN 978-1-64425-023-5

Additional formats available:
Kindle ISBN 978-1-64425-025-9
eBook ePub ISBN 978-1-64425-024-2
eBook PDF ISBN 978-1-64425-026-6

Printed in the United States of America
2024 2023 2022 2021 2020 9 8 7 6 5 4 3 2 1

Library of Congress Cataloging-in-Publication Data:

Names: Hayes, Michael D., author.
Title: Airline transport pilot oral exam guide : the comprehensive guide to prepare you for the FAA checkride / Michael D. Hayes.
Other titles: Oral exam guide : the comprehensive guide to prepare you for the FAA checkride
Description: Fifth edition. | Newcastle, Washington : Aviation Supplies & Academics, Inc., 2020. | "ASA-OEG-ATP5"—title page verso.
Identifiers: LCCN 2020028828 (print) | LCCN 2020028829 (ebook) | ISBN 9781644250235 (trade paperback) | ISBN 9781644250242 (epub) | ISBN 9781644250259 (kindle edition) | ISBN 9781644250266 (pdf)
Subjects: LCSH: Airplanes—Piloting—Examination—Study guides. | Airplanes—Piloting—Examinations, questions, etc. | Air pilots—Licenses—United States. | LCGFT: Study guides.
Classification: LCC TL710 .H36 2020 (print) | LCC TL710 (ebook) | DDC 629.132/5216076—dc23
LC record available at https://lccn.loc.gov/2020028828
LC ebook record available at https://lccn.loc.gov/2020028829

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Introduction

The *ATP Oral Exam Guide* is a comprehensive guide designed for pilots who are involved in training for the Airline Transport Pilot Certificate. This book will also prove beneficial for those pilots transitioning to turbine aircraft or who have been accepted and are preparing for entry into an initial training course at an airline ground school or ATP Certification Training Program (ATP CTP). It's also a great tool for pilots wanting to maintain and/or refresh their knowledge.

The Airline Transport Pilot Airman Certification Standards (FAA-S-ACS-11) specifies the areas of operation and tasks in which knowledge must be demonstrated by the applicant before issuance of an ATP Certificate with an airplane category multi-engine class rating or an ATP Certificate issued with a type rating. This book contains questions and answers pertaining to those areas, as well as references to source material where additional detailed information can be found.

Questions and answers are organized into seven chapters. The first two chapters cover aircraft systems and performance and limitations. The next four chapters include information on weather, high altitude aerodynamics, air carrier operations, and human factors. The last chapter provides a review of the Federal Aviation Regulations (Parts 1, 61, 91, 117, 121, and 135). At the end of this guide are two appendixes. Appendix A contains the FAA's ATP Airplane Multiengine Applicant Qualifications Job Aid, which provides the specific requirements for the ATP practical test. Appendix B contains an ATP Practical Test Checklist, to be used when making final preparations for the checkride.

This book may be supplemented with other comprehensive study materials as noted in parentheses after each question, for example (AC 00-45). The abbreviations for these materials and their titles are listed below. If no reference is given after a question, the answer for that question was researched from interviews with airline pilots, 121/135 operators, and examiners.

Be sure to use the latest references when reviewing for the test. Check the ASA Textbook Updates webpage at **asa2fly.com/TextbookUpdates** for the latest updates to this book; all the latest changes in FAA procedures and regulations that affect these questions will be listed there. Additional resources, like the BE-1900 Limitations and links to the comprehensive study materials listed below, can be found on the Reader Resources webpage for this book at **asa2fly.com/reader/OEGATP**.

14 CFR Part 1	Definitions and Abbreviations
14 CFR Part 61	Certification: Pilots, Flight Instructors, and Ground Instructors
14 CFR Part 91	General Operating and Flight Rules
14 CFR Part 117	Flight and Duty Limitations and Rest Requirements for all Flightcrew Members and Certificate Holders
14 CFR Part 119	Certification: Air Carriers and Commercial Operators
14 CFR Part 121	Operating Requirements: Domestic, Flag, and Supplemental Operations
14 CFR Part 125	Certification and Operations: Airplanes Having a Seating Capacity of 20 or More Passengers or a Maximum Payload Capacity of 6,000 Pounds or More; and Rules Governing Persons on Board Such Aircraft
14 CFR Part 135	Operating Requirements: Commuter and On-Demand Operations and Rules Governing Persons On Board Such Aircraft
AC 00-6	Aviation Weather
AC 00-24	Thunderstorms
AC 00-30	Clear Air Turbulence Avoidance
AC 00-33	Nickel-Cadmium Battery Operational, Maintenance and Overhaul Practices
AC 00-45	Aviation Weather Services
AC 00-54	Pilot Windshear Guide
AC 00-57	Hazardous Mountain Winds and Their Visual Indicators
AC 00-63	Use of Cockpit Displays of Digital Weather and Aeronautical Information

AC 20-147	Turbojet, Turboprop, Turboshaft, and Turbofan Engine Induction Icing and Ice Ingestion
AC 20-186	Airworthiness and Operational Approval of Cockpit Voice Recorder Systems
AC 23-18	Installation of Terrain Awareness and Warning System (TAWS)
AC 25.1329	Approval of Flight Guidance Systems
AC 25-23	Airworthiness Criteria for the Installation Approval of a Terrain Awareness and Warning System (TAWS) for Part 25 Airplanes
AC 25-31	Takeoff Performance Data for Operations on Contaminated Runways
AC 60-22	Aeronautical Decision Making
AC 61-67	Stall and Spin Awareness Training
AC 61-83	Nationally Scheduled, FAA-Approved, Industry-Conducted Flight Instructor Refresher Course
AC 61-84	Role of Preflight Preparation
AC 61-107	Operations of Aircraft at Altitudes Above 25,000 Feet MSL and/or Mach Number Greater Than 0.75
AC 61-134	General Aviation Controlled Flight into Terrain Awareness
AC 61-138	Airline Transport Pilot Certification Training Program
AC 61-139	Institution of Higher Education's Application for Authority to Certify its Graduates for an Airline Transport Pilot Certificate with Reduced Aeronautical Experience
AC 90-107	Guidance for Localizer Performance with Vertical Guidance and Localizer Performance without Vertical Guidance Approach Operations in the U.S. National Airspace System
AC 90-114	Automatic Dependent Surveillance–Broadcast Operations
AC 90-117	Data Link Communications
AC 91.21-1	Use of Portable Electronic Devices Aboard Aircraft

AC 91-51	Effects of Icing on Aircraft Control and Airplane Deice and Anti-ice Systems
AC 91-70	Oceanic and Remote Continental Airspace Operations
AC 91-73	Parts 91 and 135 Single Pilot, Flight School Procedures During Taxi Operations
AC 91-74	Pilot Guide: Flight in Icing Conditions
AC 91-79	Mitigating the Risks of Runway Overrun on Landing
AC 91-85	Authorization of Aircraft and Operators for Flight in RVSM Airspace
AC 117-2	Fitness for Duty
AC 117-3	Fatigue Education and Awareness Training Program
AC 120-12	Private Carriage Versus Common Carriage of Persons or Property
AC 120-27	Aircraft Weight and Balance Control
AC 120-28	Criteria for Approval of CAT III Landing Weather Minima for Takeoff, Landing, and Rollout
AC 120-29	Criteria for Approval of CAT I and II Weather Minima for Approach
AC 120-35	Flightcrew Member Line Operational Simulations: Line-Oriented Flight Training, Special Purpose Operational Training, Line Operational Evaluation
AC 120-48	Communication and Coordination Between Flight Crewmembers and Flight Attendants
AC 120-49	Parts 121 and 135 Certification
AC 120-51	Crew Resource Management Training
AC 120-57	Surface Movement Guidance and Control System
AC 120-58	Pilot Guide—Large Aircraft Ground Deicing
AC 120-60	Ground Deicing and Anti-icing Program
AC 120-62	Takeoff Safety Training Aid
AC 120-71	Standard Operating Procedures for Flight Deck Crewmembers
AC 120-74	Parts 91, 121, 125, and 135 Flightcrew Procedures During Taxi Operations

AC 120-76	Authorization for Use of Electronic Flight Bags
AC 120-80	In-Flight Fires
AC 120-82	Flight Operational Quality Assurance
AC 120-85	Air Cargo Operations
AC 120-90	Line Operations Safety Audits
AC 120-92	Safety Management Systems for Aviation Service Providers
AC 120-100	Basics of Aviation Fatigue
AC 120-101	Part 121 Air Carrier Operational Control
AC 120-103	Fatigue Risk Management Systems For Aviation
AC 120-109	Stall Prevention and Recovery Training
AC 120-111	Upset Prevention and Recovery Training
AC 121-42	Leadership and Command Training for Pilots in Command
AC 121-43	Mentoring Training for Pilots in Command
AC 135-117	Pilot Guide—Small Aircraft Ground Deicing
AC 150/5300-19	Airport Data and Information Program
AFM	Airplane Flight Manual
AIM	Aeronautical Information Manual
AURTA	Airplane Upset Recovery Training Aid
CAMI	Civil Aerospace Medical Institute
CDC/NHANES	CDC/National Health and Nutrition Examination Survey
CSUS	Chart Supplement U.S.
FAA FITS	FAA/Industry Training Standards Personal and Weather Risk Assessment Guide
FAA	Flight Deck Automation Final Report
FAA-H-8083-1	Aircraft Weight and Balance Handbook
FAA-H-8083-2	Risk Management Handbook
FAA-H-8083-3	Airplane Flying Handbook
FAA-H-8083-6	Advanced Avionics Handbook
FAA-H-8083-9	Aviation Instructor's Handbook

FAA-H-8083-15	Instrument Flying Handbook
FAA-H-8083-16	Instrument Procedures Handbook
FAA-H-8083-25	Pilot's Handbook of Aeronautical Knowledge
FAA-H-8083-30	Aviation Maintenance Technician Handbook—General
FAA-H-8083-31	Aviation Maintenance Technician Handbook—Airframe
FAA-H-8083-32	Aviation Maintenance Technician Handbook—Powerplant
FAA-P-8740-40	Wind Shear
FAA-P-8740-41	Medical Facts for Pilots
FAA-P-8740-66	Flying Light Twins Safely
INFO 07015	Flight Risk Assessment Tool
OK 09-439	Oxygen Equipment Use in General Aviation Operations
Order 8900.1	Flight Standards Information Management System (FSIMS)
P/CG	Pilot/Controller Glossary
SAFO 13002	Manual Flight Operations
SAFO 11004	Runway Incursion Prevention Actions
SAFO 17001	Pilot and Flightcrew Awareness of Class B Airspace Boundaries
SAFO 19001	Landing Performance Assessments at Time of Arrival
SAFO 09013	Fighting Fires Caused By Lithium Type Batteries in Portable Electronic Devices
SAIB CE-11-17	Instruments (Maneuvering Speed)

Operation of Systems 1

A. Landing Gear

1. What components are used in a typical hydraulic landing gear system? (FAA-H-8083-31)

Engine-driven and electrical hydraulic pumps, actuating cylinders, selector valves, solenoids, uplocks, downlocks, sequence valves, emergency override controls, tubing, and other conventional hydraulic components.

2. Describe the operational sequence of a typical hydraulic landing gear system.

a. *Extension:*
   i. A selector lever in the cockpit electrically commands the gear to extend.
   ii. A solenoid valve directs hydraulic pressure to the extension side of system.
   iii. Sequencing valves hold the landing gear in place until the landing gear doors have opened.
   iv. With gear doors open, hydraulic pressure causes uplocks to be released and hydraulic pressure is applied to the actuators to extend the gear.
   v. Once extended, downlocks are positioned hydraulically.
   vi. Landing gear position switches provide indicating system with information on gear position.
   vii. Sequencing valves direct hydraulic pressure to close the landing gear doors.

b. *Retraction:*
   i. A selector lever in the cockpit electrically commands the gear to retract.
   ii. Landing gear position switches provide indicating system with information on gear position (in-transit).
   iii. A solenoid valve directs hydraulic pressure to the retraction side of system.
   iv. Sequencing valves prevent the landing gear from retracting until the landing gear doors have opened.
   v. With gear doors now open, hydraulic pressure is applied to the actuators to retract the gear.

Continued

vi. Wheel rotation is stopped by hydraulic pressure routed to the brake system.
vii. Landing gear uplocks are positioned.
viii. Landing gear position switches provide indicating system with information on gear position (up and locked).
ix. Sequencing valves direct hydraulic pressure to close the landing gear doors.

3. How does a landing gear safety switch function? (FAA-H-8083-31)

Also known as a ground proximity switch or landing gear squat switch, this switch is usually mounted in a bracket on one of the main gear shock struts and mechanically actuated via the landing gear torque links. The torque links spread apart or move together as the shock strut piston extends or retracts in its cylinder. When the strut is compressed (aircraft on the ground), the torque links are close together, causing the adjusting links to open the safety switch. During takeoff, as the weight of the aircraft leaves the struts, the struts and torque links extend causing the adjusting links to close the safety switch. A ground is completed when the safety switch closes and the solenoid then energizes, unlocking the selector valve so that the gear handle can be positioned to raise the gear. Squat switches also provide signals to other various aircraft systems indicating whether the aircraft is in the air or on the ground such as pressurization, nose wheel steering, thrust reversers, APU, etc.

4. What is a brake anti-skid system? (FAA-H-8083-31)

A system in high-performance aircraft braking systems that provides anti-skid protection and subsequent maximum braking efficiency. Anti-skid system sensors monitor and compare wheel rotation speed to the expected value on a dry runway. Once the system detects a rotational value less than normal, a skid control valve removes some of the hydraulic pressure to the wheel, permitting the wheel to rotate a little faster and stop its sliding. The more intense the skid is, the more braking pressure is removed. The skid detection and control of each wheel is completely independent of the others. The wheel skid intensity is measured by the amount of wheel slow down.

5. What other functions are provided by an anti-skid system? (FAA-H-8083-31)

a. *Touchdown protection*—this circuit prevents the brakes from being applied during the landing approach, even if the brake pedals are depressed. This prevents the wheels from being locked when they contact the runway.

b. *Fail-safe protection*—this circuit monitors operation of the skid control system. It automatically returns the brake system to full manual in case of system failure.

6. Describe a typical large aircraft nose-wheel steering system. (FAA-H-8083-31)

Control of steering is accomplished from the flight deck through the use of a small wheel, tiller, or joystick typically mounted on the left side wall. Mechanical, electrical, or hydraulic connections transmit the controller input movement to a steering control unit (metering or control valve) which directs hydraulic fluid under pressure to one or two actuators designed with various linkages to rotate the lower strut. An accumulator and relief valve, or similar pressurizing assembly, keeps fluid in the actuators and system under pressure at all times which permits the steering actuating cylinders to also act as shimmy dampers. A follow-up mechanism consists of various gears, cables, rods, drums, and/or bell-crank that returns the metering valve to a neutral position once the steering angle has been reached.

7. What is the most common method of providing shock absorption during landing? (FAA-H-8083-31)

A typical pneumatic/hydraulic shock strut uses compressed air or nitrogen combined with hydraulic fluid to absorb and dissipate shock loads. It is sometimes referred to as an air/oil or oleo strut. A shock strut is constructed of two telescoping cylinders or tubes that are closed on the external ends. The upper cylinder is fixed to the aircraft and does not move. The lower cylinder is called the piston and is free to slide in and out of the upper cylinder. Two chambers are formed, with the lower chamber filled with hydraulic fluid and the upper chamber filled with compressed air or nitrogen. An orifice located between the two cylinders provides a passage for the fluid from the bottom chamber to enter the top cylinder chamber when the strut is compressed.

B. Powerplant

1. **Describe the major components of a gas turbine engine.** (FAA-H-8083-32)

   A typical gas turbine engine consists of:

   a. An air inlet.

   b. Compressor section.

   c. Combustion section.

   d. Turbine section.

   e. Exhaust section.

   f. Accessory section.

   g. The systems necessary for starting, lubrication, fuel supply, and auxiliary purposes, such as anti-icing, cooling, and pressurization.

2. **Turbine engines are classified according to the type of compressors they use. What are the three types of compressors found in turbine engines?** (FAA-H-8083-25)

   Centrifugal flow, axial flow, and centrifugal-axial flow.

3. **Describe a centrifugal-flow compressor.** (FAA-H-8083-32)

   This compressor has an impeller surrounded by a ring of diffuser vanes. The impeller is driven at high speed by a turbine. Air is drawn into the air inlet and directed to the center of the impeller. The air is then forced centrifugally outward into a diffuser, where the pressure of the air is increased. The pressurized air is then supplied to the combustion section.

4. **What is the main function of the diffuser section of a turbine engine?** (FAA-H-8083-32)

   The diffuser is the divergent section of the engine after the compressor and before the combustion section. It has the all-important function of reducing high-velocity compressor discharge air to a slower velocity at increased pressure. This prepares the air for entry into the flame burning area of the combustion so that the flame of combustion can burn continuously.

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The OEG Series is an excellent study tool for students and instructors alike, arranged in a question-and-answer format. Use when you're gearing up for the Practical Exam, as well as for a general refresher! Other Oral Exam Guides available from ASA...

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Aviation Supplies & Academics, Inc.
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Newcastle, Washington 98059 USA
425-235-1500 | asa2fly.com

TRANSPORTATION USD $14.95

ISBN 978-1-64425-023-5

51495 >

9 781644 250235

ASA-OEG-ATP5