

# Airline Transport Pilot

# ORAL EXAM GUDDE

COMPREHENSIVE PREPARATION FOR THE FAA CHECKRIDE

SIXTH EDITION

# Airline Transport Pilot **ORAL EXAM** GUIDE

#### **MICHAEL D. HAYES**

SIXTH EDITION

COMPREHENSIVE PREPARATION FOR THE FAA CHECKRIDE



AVIATION SUPPLIES & ACADEMICS, INC. NEWCASTLE, WASHINGTON Airline Transport Pilot Oral Exam Guide Sixth Edition by Michael D. Hayes

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-M.D.H.

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## Introduction

The Airline Transport Pilot 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 and Type Rating for Airplane 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 Multiengine 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 (14 CFR Parts 1, 61, 91, 111, 117, 121, and 135, and 49 CFR Part 830). 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: (FAA-H-8083-28). 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, Part 121/135 operators, and examiners. Be sure to use the latest references when reviewing for the test. Also, check the ASA website at **asa2fly.com/oegatp** for the most recent updates to this book due to changes in FAA procedures and regulations as well as for Reader Resources containing additional relevant information and updates.

14 CFR Part 1	Definitions and Abbreviations
14 CFR Part 23	Airworthiness Standards: Normal Category Airplanes
14 CFR Part 25	Airworthiness Standards: Transport Category Airplanes
14 CFR Part 61	Certification: Pilots, Flight Instructors, and Ground Instructors
14 CFR Part 91	General Operating and Flight Rules
14 CFR Part 111	Pilot Records Database
14 CFR Part 117	Flight and Duty Limitations and Rest Requirements: Flightcrew Members
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 00-33	Nickel-Cadmium Battery Operational, Maintenance and Overhaul Practices
AC 00-63	Use of Cockpit Displays of Digital Weather and Aeronautical Information
AC 20-147	Turbojet, Turboprop, Turboshaft, and Turbofan Engine Induction System 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) Approved for Part 23 Airplanes
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 61-83	Nationally Scheduled, FAA-Approved, Industry- Conducted Flight Instructor Refresher Course
AC 61-98	<i>Currency Requirements and Guidance for the Flight</i> <i>Review and Instrument Proficiency Check</i>
AC 61-107	Aircraft Operations at Altitudes Above 25,000 Feet MSL or Mach Numbers Greater Than .75
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.
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 91-70	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 a Runway Overrun Upon Landing

AC 91-85	Authorization of Aircraft and Operators for Flight in Reduced Vertical Separation Minimum (RVSM) Airspace
AC 117-2	Fatigue Education and Awareness Training Program
AC 117-3	Fitness for Duty
AC 120-27	Aircraft Weight and Balance Control
AC 120-29	Criteria for Approval of Category I and Category 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 Flightcrew Members and Flight Attendants
AC 120-49	Parts 121 and 135 Certification
AC 120-51	Crew Resource Management Training
AC 120-54	Advanced Qualification Program
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 120-68	Pilot Records Database and Pilot Records Improvement Act
AC 120-71	Standard Operating Procedures and Pilot Monitoring Duties 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	Firefighting of General and High-Energy In-Flight Fires
AC 120-82	Flight Operational Quality Assurance
AC 120-85	Carriage of Cargo
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 Safety
AC 120-109	Stall Prevention and Recovery Training
AC 120-111	Upset Prevention and Recovery Training
AC 120-118	Criteria for Approval/Authorization of All Weather Operations (AWO) for Takeoff, Landing, and Rollout
AC 121-42	Leadership and Command Training for Pilots in Command
AC 121-43	Mentoring Training for Pilots in Command
AC 150/5300-19	Airport Data and Information Program
aes.faa.gov	FAA Automated Exemption System (AES)
AFM	Airplane Flight Manual
AIM	Aeronautical Information Manual
AURTA	Airplane Upset Recovery Training Aid
CAMI	Civil Aerospace Medical Institute
CAMI OK-06-033	Basic Survival Skills for Aviation
CAMI OK-21-0375	Oxygen Equipment Use in General Aviation Operations
CDC/NHANES	CDC/National Health and Nutrition Examination Survey
drs.faa.gov	Dynamic Regulatory System—Order 8900.1
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-8083-9	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

#### Introduction

FAA-H-8083-28	Aviation Weather Handbook
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 InFO 07015	Flight Risk Assessment Tool
FAA InFO 14006	Prohibition on Personal Use of Electronic Devices on the Flight Deck
FAA InFO 23003	Terrain Awareness and Warning Systems (TAWS) Nuisance Alerts
FAA-S-ACS-11	Airline Transport Pilot and Type Rating for Airplane Airman Certification Standards
FCOM	CRJ Regional Jet Flight Crew Operating Manual
NASA AIT	NASA Aircraft Icing Training (online courses)
P/CG	Pilot/Controller Glossary
PRD Pilot User Guide	Pilot Records Database (PRD) Pilot User Guide
SAFO 09013	Fighting Fires Caused by Lithium Type Batteries in Portable Electronic Devices
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
SAIB CE-11-17	Instruments (Maneuvering Speed)

Most of these documents are available on the FAA's website (www.faa.gov). Additionally, many of the publications are reprinted by ASA (asa2fly.com) and are available from aviation retailers worldwide.

A review of the information and references in this guide should provide the necessary preparation for the FAA Airline Transport Pilot Certification Practical Test.

# Operation of Systems

Some of the following questions reference the systems of a Bombardier CRJ regional jet. For accuracy, you should review your aircraft's airplane flight manual (AFM) or flight crew operating manual (FCOM). Be capable of explaining the diagrams and schematics of the various systems in your aircraft.

#### A. Landing Gear

- 1. Describe the landing gear system components of a typical transport category jet. (AFM)
  - a. The aircraft's landing gear is a retractable tricycle type, with two main landing gear assemblies mounted on the wing roots and a steerable nose landing gear assembly mounted on the forward fuselage.
  - b. Each landing gear assembly has two wheels and a shock strut to absorb and dissipate the shock loads upon landing.
  - c. The main landing gear assemblies are equipped with steel multi-disc brakes.
  - d. Landing gear extension and retraction is electrically activated by the landing gear selector lever and controlled by a proximity sensing electronic unit (PSEU).
  - e. Sensors for the PSEU are located on the landing gear and landing gear doors, and the PSEU displays the landing gear position on the engine indicating and crew alerting system (EICAS) display.
  - f. The landing gear is hydraulically actuated by hydraulic system3 in normal operation, and there is an alternate independent means of extending the landing gear if the normal system fails.
  - g. A tail bumper consisting of a shock absorber, a skid assembly, and a strike indicator protects the aircraft's tail structure from tail strikes caused by over-rotation during takeoff.

## 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.
  - 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. *Locked wheel protection* recognizes if a wheel is not rotating. When this occurs, the anti-skid control valve is signaled to fully open, allowing a wheel to recover from a deep skid.

## 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.

## Airline Transport Pilot ORAL EXAM GUIDE

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ASA's Oral Exam Guide Series is an excellent study tool for students and instructors alike. Arranged in a question-and-answer format, this comprehensive guide lists the questions most likely to be asked by evaluators during the practical exam and provides succinct, ready responses. FAA references are provided throughout for further study.

This updated sixth edition of the *Airline Transport Pilot Oral Exam Guide* aligns with the Airman Certification Standards (ACS), with new or expanded information focused on the operation of systems, landing and takeoff performance, weight and balance, advancing technology in weather products, stall prevention, and the Pilot Records Database (Part 111). This book is the complete resource to prepare applicants for the Airline Transport Pilot checkride and is valuable as a general refresher.



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