



Airline Transport Pilot

ORAL EXAM GUIDE



JASON BLAIR

Based on original text by Michael D. Hayes

ESSENTIAL PREPARATION
FOR THE FAA CHECKRIDE

SEVENTH EDITION

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Airline Transport Pilot Oral Exam Guide
Seventh Edition
by Jason Blair
based on original text by Michael D. Hayes

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About the Author



Jason Blair is an active single-engine and multiengine instructor and an FAA Designated Pilot Examiner (DPE) with over 6,000 hours total time, over 3,500 hours of instruction given, and more than 4,000 hours in aircraft as a DPE. In his role as an Examiner, he has issued more than 2,500 pilot certificates. Blair has worked for and continues to work with multiple aviation associations with his work focusing on pilot

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In addition to ASA's Oral Exam Guide series, Blair is also the author of five books in ASA's Aviator's Field Guide series: *Buying an Airplane*, *Owning an Airplane*, *Tailwheel Flying*, *Middle-Altitude Flying*, and *Pilot Career Path*.

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 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.

You may supplement this guide with other comprehensive study materials as noted in brackets at the end of each answer; for example: [CA.I.G; FAA-H-8083-25]. The first items provided are ACS codes for the relevant Areas of Operation and Tasks from the *Airline Transport Pilot and Type Rating for Airplane Airman Certification Standards*

(FAA-S-ACS-11). Additional references pertaining to the questions can be found in the ACS listed under the Tasks corresponding to the provided ACS codes. The next reference(s) in the brackets are other study materials for which abbreviations and corresponding 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 that you use the latest revision of these references when reviewing for the test. Also, check the ASA website at asa2fly.com 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.

14 CFR Part 1	<i>Definitions and Abbreviations</i>
14 CFR Part 23	<i>Airworthiness Standards: Normal Category Airplanes</i>
14 CFR Part 25	<i>Airworthiness Standards: Transport Category Airplanes</i>
14 CFR Part 61	<i>Certification: Pilots, Flight Instructors, and Ground Instructors</i>
14 CFR Part 91	<i>General Operating and Flight Rules</i>
14 CFR Part 111	<i>Pilot Records Database</i>
14 CFR Part 117	<i>Flight and Duty Limitations and Rest Requirements: Flightcrew Members</i>
14 CFR Part 119	<i>Certification: Air Carriers and Commercial Operators</i>
14 CFR Part 121	<i>Operating Requirements: Domestic, Flag, and Supplemental Operations</i>
14 CFR Part 125	<i>Certification and Operations: Aircraft 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</i>
14 CFR Part 135	<i>Operating Requirements: Commuter and On Demand Operations and Rules Governing Persons On Board Such Aircraft</i>

49 CFR Part 830	<i>NTSB: Initial Notification of Aircraft Accidents, Incidents, and Overdue Aircraft – Immediate notification</i>
AC 00-46	<i>Aviation Safety Reporting Program</i>
AC 00-63	<i>Use of Flight Deck Displays of Digital Weather and Aeronautical Information</i>
AC 20-147	<i>Turbojet, Turboprop, Turboshift, and Turbofan Engine Induction System Icing and Ice Ingestion</i>
AC 20-186	<i>Airworthiness and Operational Approval of Cockpit Voice Recorder Systems</i>
AC 23-18	<i>Installation of Terrain Awareness and Warning System (TAWS) Approved for Part 23 Airplanes</i>
AC 25.1329-1	<i>Approval of Flight Guidance Systems</i>
AC 25-23	<i>Airworthiness Criteria for the Installation Approval of a Terrain Awareness and Warning System (TAWS) for Part 25 Airplanes</i>
AC 25-31	<i>Takeoff Performance Data for Operations on Contaminated Runways</i>
AC 43.13-1	<i>Acceptable Methods, Techniques, and Practices—Aircraft Inspection and Repair</i>
AC 60-22	<i>Aeronautical Decision Making</i>
AC 61-83	<i>Nationally Scheduled, FAA-Approved, Industry-Conducted Flight Instructor Refresher Course</i>
AC 61-98	<i>Currency Requirements and Guidance for the Flight Review and Instrument Proficiency Check</i>
AC 61-107	<i>Aircraft Operations at Altitudes Above 25,000 Feet Mean Sea Level or Mach Numbers Greater Than .75</i>
AC 61-138	<i>Airline Transport Pilot Certification Training Program</i>
AC 61-139	<i>Institution of Higher Education's Application for Authority to Certify its Graduates for an Airline Transport Pilot Certificate with Reduced Aeronautical Experience</i>

AC 90-107	<i>Guidance for Localizer Performance with Vertical Guidance and Localizer Performance without Vertical Guidance Approach Operations in the US</i>
AC 90-114	<i>Automatic Dependent Surveillance–Broadcast Operations</i>
AC 90-117	<i>Data Link Communications</i>
AC 90-120	<i>Operational Use of Airborne Collision Avoidance Systems</i>
AC 91.21-1	<i>Use of Portable Electronic Devices Aboard Aircraft</i>
AC 91-70	<i>Oceanic and Remote Continental Airspace Operations</i>
AC 91-73	<i>Parts 91 and 135 Single Pilot, Flight School Procedures During Taxi Operations</i>
AC 91-74	<i>Pilot Guide: Flight in Icing Conditions</i>
AC 91-79	<i>Aircraft Landing Performance and Runway Excursion Mitigation</i>
AC 91-85	<i>Authorization of Aircraft and Operators for Flight in Reduced Vertical Separation Minimum (RVSM) Airspace</i>
AC 117-2	<i>Fatigue Education and Awareness Training Program</i>
AC 117-3	<i>Fitness for Duty</i>
AC 120-27	<i>Aircraft Weight and Balance Control</i>
AC 120-29	<i>Criteria for Approval of Category I and Category II Weather Minima for Approach</i>
AC 120-35	<i>Flightcrew Member Line Operational Simulations: Line-Oriented Flight Training, Special Purpose Operational Training, Line Operational Evaluation</i>
AC 120-48	<i>Communication and Coordination Between Flightcrew Members and Flight Attendants</i>
AC 120-49	<i>Parts 121 and 135 Certification</i>
AC 120-51	<i>Crew Resource Management Training</i>

AC 120-54	<i>Advanced Qualification Program</i>
AC 120-57	<i>Low Visibility Operations/Surface Movement Guidance and Control System (LVO/SMGCS)</i>
AC 120-58	<i>Pilot Guide—Large Aircraft Ground Deicing</i>
AC 120-60	<i>Ground Deicing and Anti-icing Program</i>
AC 120-62	<i>Takeoff Safety Training Aid</i>
AC 120-66	<i>Aviation Safety Action Program</i>
AC 120-68	<i>Pilot Records Database and Pilot Records Improvement Act</i>
AC 120-71	<i>Standard Operating Procedures and Pilot Monitoring Duties for Flight Deck Crewmembers</i>
AC 120-74	<i>Parts 91, 121, 125, and 135 Flightcrew Procedures During Taxi Operations</i>
AC 120-76	<i>Authorization for Use of Electronic Flight Bags</i>
AC 120-80	<i>Firefighting of General and High-Energy In-Flight Fires</i>
AC 120-82	<i>Flight Operational Quality Assurance</i>
AC 120-85	<i>Carriage of Cargo</i>
AC 120-90	<i>Line Operations Safety Audits</i>
AC 120-92	<i>Safety Management Systems for Aviation Service Providers</i>
AC 120-100	<i>Basics of Aviation Fatigue</i>
AC 120-101	<i>Part 121 Air Carrier Operational Control</i>
AC 120-103	<i>Fatigue Risk Management Systems for Aviation Safety</i>
AC 120-109	<i>Stall Prevention and Recovery Training</i>
AC 120-111	<i>Upset Prevention and Recovery Training</i>
AC 120-118	<i>Criteria for Approval/Authorization of All Weather Operations (AWO) for Takeoff, Landing, and Rollout</i>
AC 121-42	<i>Leadership and Command Training for Pilots in Command</i>
AC 121-43	<i>Mentoring Training for Pilots in Command</i>

AC 150/5300-19	<i>Airport Data and Information Program</i>
AFM	<i>FAA-approved airplane flight manual</i>
AIM	<i>Aeronautical Information Manual</i>
AURTA	<i>Airplane Upset Recovery Training Aid</i>
CAMI OK-06-033	<i>Basic Survival Skills for Aviation (Civil Aerospace Medical Institute)</i>
CAMI OK-21-0375	<i>Oxygen Equipment Use in General Aviation Operations (Civil Aerospace Medical Institute)</i>
Chart Supplement	<i>FAA Chart Supplements</i>
drs.faa.gov	<i>Order 8900.1, Dynamic Regulatory System</i>
FAA FITS	<i>FAA/Industry Training Standards: Personal and Weather Risk Assessment Guide</i>
FAA Flight Deck Automation WG	<i>Final Report of the Flight Deck Automation Working Group</i>
FAA-H-8083-1	<i>Aircraft Weight and Balance Handbook</i>
FAA-H-8083-2	<i>Risk Management Handbook</i>
FAA-H-8083-3	<i>Airplane Flying Handbook</i>
FAA-H-8083-9	<i>Aviation Instructor's Handbook</i>
FAA-H-8083-15	<i>Instrument Flying Handbook</i>
FAA-H-8083-16	<i>Instrument Procedures Handbook</i>
FAA-H-8083-25	<i>Pilot's Handbook of Aeronautical Knowledge</i>
FAA-H-8083-28	<i>Aviation Weather Handbook</i>
FAA-H-8083-30	<i>Aviation Maintenance Technician Handbook—General</i>
FAA-H-8083-31	<i>Aviation Maintenance Technician Handbook—Airframe</i>
FAA-H-8083-32	<i>Aviation Maintenance Technician Handbook—Powerplant</i>
FAA InFO 07015	<i>Flight Risk Assessment Tool</i>
FAA InFO 14006	<i>Prohibition on Personal Use of Electronic Devices on the Flight Deck</i>

FAA InFO 23003	<i>Terrain Awareness and Warning Systems (TAWS) Nuisance Alerts</i>
FAA-S-ACS-11: Appx. 6	<i>Airline Transport Pilot and Type Rating for Airplane Airman Certification Standards, Appendix 6: Safety of Flight</i>
FCOM	<i>CRJ Regional Jet Flight Crew Operating Manual</i>
NASA AIT	<i>NASA Aircraft Icing Training (online courses)</i>
NHANES	<i>National Health and Nutrition Examination Survey, cdc.gov/nchs/nhanes/index.html</i>
P/CG	<i>FAA Pilot/Controller Glossary</i>
PRD Pilot User Guide	<i>Pilot Records Database (PRD) Pilot User Guide</i>
SAFO 09013	<i>Fighting Fires Caused by Lithium Type Batteries in Portable Electronic Devices</i>
SAFO 13002	<i>Manual Flight Operations</i>
SAFO 11004	<i>Runway Incursion Prevention Actions</i>
SAFO 16009	<i>Runway Assessment and Condition Reporting</i>
SAFO 17001	<i>Pilot and Flightcrew Awareness of Class B Airspace Boundaries</i>
SAFO 19001	<i>Landing Performance Assessments at Time of Arrival</i>
SAIB CE-11-17	<i>Instruments (Maneuvering Speed)</i>
TSO-C173	<i>Technical Standard Order (TSO) C173, Nickel-Cadmium and Lead-Acid Batteries</i>

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

1

SAMPLE

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.

- 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 system 3 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.

[AA.I.A.K1; AFM]

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

- i. A selector lever in the flight deck 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 flight deck 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.

[AA.I.A.K1]

3. How does a landing gear safety switch function?

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.

[AA.I.A.K1; FAA-H-8083-31]

4. What is a brake anti-skid system?

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.

[AA.I.A.K1; FAA-H-8083-31]

5. What other functions are provided by an anti-skid system?

- 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.

[AA.I.A.K1; FAA-H-8083-31]

6. Describe a typical large aircraft nose-wheel steering system.

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 bellcrank that returns the metering valve to a neutral position once the steering angle has been reached.

[AA.I.A.K1; FAA-H-8083-31]

7. What is the most common method of providing shock absorption during landing?

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.

[AA.I.A.K1; FAA-H-8083-31]

B. Powerplant

1. Describe the major components of a gas turbine engine.

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.

[AA.I.A.K2; FAA-H-8083-32]

2. Turbine engines are classified according to the type of compressors they use. What are the three types of compressors found in turbine engines?

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

[AA.I.A.K2; FAA-H-8083-25]

3. Describe a centrifugal-flow compressor.

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.

[AA.I.A.K2; FAA-H-8083-32]

4. What is the main function of the diffuser section of a turbine engine?

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

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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 essential guide lists the questions most likely to be asked by examiners during the practical test and provides succinct, ready responses. FAA references are provided throughout for further study.

This updated seventh 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, safety, landing and takeoff performance, weight and balance, advancing technology in weather products, stall prevention, and updates to regulations. This book prepares applicants for the FAA Airline Transport Pilot checkride and is valuable as a general refresher.



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