



# Airline Transport Pilot

# ORAL EXAM GUIDE



**MICHAEL D. HAYES**

THE COMPREHENSIVE GUIDE  
TO PREPARE YOU FOR THE  
FAA CHECKRIDE

**FOURTH EDITION**

*Airline Transport Pilot Oral Exam Guide*  
Fourth Edition  
by Michael D. Hayes

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*This guide is dedicated to the many talented students, pilots and flight instructors I have had the opportunity to work with over the years. Also, special thanks to Mark Hayes and many others who supplied the patience, encouragement, and understanding necessary to complete the project.*

— M.D.H.

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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. The ATP OEG 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.

The Airline Transport Pilot Practical Test Standards book (FAA-H-8081-5) specifies the subject areas in which knowledge must be demonstrated by the applicant before issuance of an Airline Transport Pilot certificate with the associated category and class ratings. The *ATP Oral Exam Guide* contains questions pertaining to those areas as well as other areas of operations critical to flight safety, such as aeronautical decision making, crew resource management, and wake turbulence avoidance.

Questions and answers are organized into six chapters. The first two chapters cover basic turbine aircraft theory, performance and limitations. The next four chapters include information on airline operational procedures, aeronautical decision-making and crew resource management, regulations (Parts 61, 121, and 135), and instrument procedures.

At the end of this guide are three appendices. Appendix A and B contain questions and answers that might be asked in a typical airline type ride concerning aircraft systems and limitations. Appendix C contains the FAA's ATP Airplane Multiengine Applicant Qualifications Job Aid, which provides the specific requirements for the ATP practical test effective August 1, 2014. All questions and answers reference information specific to a Beechcraft 1900C aircraft. Although systems will vary from aircraft to aircraft, this particular aircraft is representative of a typical turboprop aircraft found in many of today's regional airline aircraft fleets and is used so the pilot can learn the basic components and principles, which remain the same. None of the material in

*Continued*

the *ATP Oral Exam Guide* supersedes any aircraft manual, procedure, or document published for the Beechcraft 1900C aircraft.

The *ATP Oral Exam Guide* 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. Also, check the ASA website at [www.asa2fly.com](http://www.asa2fly.com) for the latest updates to this book on our “Textbook Updates” page; all the latest changes in FAA procedures and regulations that affect these questions will be listed there.

14 CFR Part 1	<i>Definitions and Abbreviations</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 95	<i>IFR Altitudes</i>
14 CFR Part 117	<i>Flight and Duty Limitations and Rest Requirements for all Flightcrew Members and Certificate Holders</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: 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</i>
14 CFR Part 135	<i>Operating Requirements: Commuter and On-Demand Operations and Rules Governing Persons On Board Such Aircraft</i>
AC 00-6	<i>Aviation Weather</i>
AC 00-30	<i>Clear Air Turbulence Avoidance</i>
AC 00-33	<i>Nickel-Cadmium Battery Operational, Maintenance and Overhaul Practices</i>
AC 00-45	<i>Aviation Weather Services</i>
AC 00-54	<i>Pilot Windshear Guide</i>



AC 60-22	<i>Aeronautical Decision Making</i>
AC 61-84	<i>Role of Preflight Preparation</i>
AC 61-107	<i>Operations of Aircraft at Altitudes Above 25,000 Feet MSL and/or Mach Number Greater Than 0.75</i>
AC 61-134	<i>General Aviation Controlled Flight into Terrain Awareness</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 91-51	<i>Effects of Icing on Aircraft Control and Airplane Deice and Anti-ice Systems</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>Mitigating the Risks of Runway Overrun on Landing</i>
AC 120-12	<i>Private Carriage Versus Common Carriage of Persons or Property</i>
AC 120-27	<i>Aircraft Weight and Balance Control</i>
AC 120-28	<i>Criteria for Approval of CAT III Landing Weather Minima for Takeoff, Landing, and Rollout</i>
AC 120-29	<i>Criteria for Approval of CAT I and 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 Flight Crewmembers and Flight Attendants</i>
AC 120-51	<i>Crew Resource Management Training</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 120-71	<i>Standard Operating Procedures for Flight Deck Crewmembers</i>

*Continued*

AC 120-74	<i>Parts 91, 121, 125, and 135 Flightcrew Procedures During Taxi Operations</i>
AC 120-85	<i>Air Cargo Operations</i>
AC 120-101	<i>Part 121 Air Carrier Operational Control</i>
AC 120-111	<i>Upset Prevention and Recovery Training</i>
AC 135-117	<i>Pilot Guide – Small Aircraft Ground Deicing</i>
AFM	<i>Airplane Flight Manual</i>
AIM	<i>Aeronautical Information Manual</i>
AURTA	<i>Airplane Upset Recovery Training Aid</i>
CSUS	<i>Chart Supplement U.S.</i>
P/CG	This is the <i>Pilot/Controller Glossary</i> included in the AIM.
Order 8900.1	<i>Flight Standards Information Management System (FSIMS)</i>
SAIB CE-11-17	<i>Instruments (Maneuvering Speed)</i>
FAA-H-8081-5	<i>Airline Transport Pilot Practical Test Standards</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-8083-6	<i>Advanced Avionics 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-8083-30	<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-P-8740-66	<i>Flying Light Twins Safely</i>

## A. Engine

### 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. Explain the basic operation of a gas turbine engine. (FAA-H-8083-3)

The basic gas turbine engine contains four sections: intake, compression, combustion, and exhaust.

- a. To start the engine, the compressor section is rotated by an electrical starter on small engines or an air-driven starter on large engines.
- b. As compressor RPM accelerates, air is brought in through the inlet duct, compressed to a high pressure, and delivered to the combustion chambers.
- c. Fuel is then injected by a fuel controller through spray nozzles and ignited by igniter plugs.
- d. The fuel/air mixture in the combustion chamber is then burned in a continuous combustion process and produces a very high temperature (4,000°F), which heats the entire air mass to 1,600–2,400°F.
- e. The mixture of hot air and gases expands and is directed to the turbine blades, forcing the turbine section to rotate, which in turn drives the compressor by means of a direct shaft.

*Continued*

- f. After powering the turbine section, the high-velocity excess exhaust exits the tail pipe or exhaust section. Once the turbine section is powered by gases from the burner section, the starter is disengaged, and the igniters are turned off.
- g. Combustion continues until the engine is shut down by turning off the fuel supply.

**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 outward centrifugally into a diffuser, where the pressure of the air is increased. The pressurized air is then supplied to the combustion section.

**4. Describe an axial-flow compressor.** (FAA-H-8083-32)

This consists of two main elements, a rotor and a stator. The rotor, turning at high speeds, has blades fixed on a spindle that takes in air at the compressor inlet and impels it rearward through a series of stages paralleling the longitudinal axis of the engine. The action of the rotor increases the compression of the air at each stage, accelerating it rearward through several stages. With this increased velocity, energy is transferred from the compressor to the air in the form of velocity energy. The stator blades act as diffusers at each stage, partially converting high velocity to pressure. Each consecutive pair of rotor and stator blades constitutes a pressure stage; the greater the number of stages, the higher the compression ratio. Most present-day engines utilize from 10 to 16 stages.

**5. What are the main types of gas turbine engines?**

(FAA-H-8083-25, FAA-H-8083-32)

- a. *Turbojet*— is the most fundamental gas turbine engine. The relatively small frontal area results in a small mass of air accelerated through the core to a high velocity; no fan is utilized. Air is compressed, ignited in the combustion section, and expelled at the rear of the engine at high velocity to drive

a turbine, which in turn drives a compressor. Used on aircraft that fly at high airspeeds and altitudes. Inefficient and loud at low altitudes.

- b. *Turbofan*— a gas turbine engine with a duct-enclosed axial flow fan at the front of the engine, driven by the engine's turbine section. A portion of the incoming air entering the engine is compressed and enters a combustion chamber; the other portion is also compressed and bypasses the combustion section altogether. Both are joined together downstream to produce thrust. In high bypass engines, the fan/bypass air produces most of the thrust, approximately 80%. The two types of turbofan engines, low bypass and high bypass, refers to the amount of air bypassing the core. Turbofan engines are a compromise between turbojet and turboprop engines, resulting in better high-altitude performance than the turboprop, and better low-altitude performance than the turbojet.
- c. *Turboprop*— basically a turbojet engine that utilizes exhaust gases to turn a propeller. Two methods are used: 1) high-velocity exhaust gases turn a propeller directly via a compressor shaft and reduction gear box; or 2) exhaust gases turn a power turbine, which is connected to the propeller via a shaft and reduction gear box. A turboprop engine moves a large mass of air at a low velocity and is the ideal application for low-altitude and lower speed aircraft.
- d. *Turboshaft*— much like a turboprop engine; high velocity exhaust gases turn a power turbine connected to a rotor via a shaft and reduction gearbox. Normally used in helicopters where a turboshaft turns both the main and tail rotors.

## 6. Define the term “bypass ratio.” (FAA-H-8083-3)

The bypass ratio is the ratio of the mass airflow in pounds per second through the fan section of a turbofan engine to the mass airflow that passes through the gas generator portion of the engine.

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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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