

Appendix A — Professional Flight Foundations (Book 8)

This story is fiction.

The aviation is not.

Everything Tamias experiences in this book reflects real-world commercial flight training and operational aviation principles.

Book 1 was about beginning.

Book 2 was about discipline.

Book 3 was about responsibility.

Book 4 was about operation.

Book 5 was about judgment under scrutiny.

Book 6 was about control without sensation.

Book 7 was about operating when others rely on you.

Book 8 moves one step further.

Becoming the kind of pilot a system can trust.

In Book 8, Tamias learns something subtle but important:

Skill is not enough.

Precision must become routine.

Reliability must become habit.

This appendix gathers the major professional flight concepts introduced in Book 8—organized the way pilots think about them:

Systematically.

Procedurally.

Without unnecessary drama.

Professional Mode—Thinking Ahead of the Airplane

Professor Flugbatt introduces three thinking modes.

Student Mode

You ask: *What do I do now?*

Operator Mode

You ask: *What is the correct procedure?*

Professional Mode

You ask: *What will the system do next?*

Professional pilots constantly anticipate consequences.

Examples include:

- What altitude will the autopilot capture?
- How will weight affect climb rate?
- How much runway is required after configuration change?
- How will wind affect the approach path?

The airplane reacts instantly to physics.

Professionals react before physics forces the correction.

Commercial Pilot Training—What Changes

A commercial certificate does not simply allow a pilot to be paid.

It raises the expected standard of performance.

Commercial pilots must demonstrate:

- Precise aircraft control
- Energy management
- Advanced maneuver proficiency
- Situational awareness
- Professional decision-making

The FAA defines tolerances for most maneuvers.

Typical commercial standards include:

- Altitude control within ± 100 feet
- Heading control within ± 10 degrees
- Airspeed control within ± 10 knots

The goal is not perfection.

The goal is consistent precision.

Energy Management—Controlling the Aircraft's Motion

Aircraft motion is controlled through three variables:

- Pitch
- Power
- Configuration

These determine:

- Airspeed
- Altitude
- Rate of climb or descent

Energy management becomes especially important in larger or faster aircraft.

Jets and turboprops carry momentum.

If the pilot reacts late:

- Airspeed changes slowly
- Altitude corrections overshoot
- Approaches become unstable

Professional pilots anticipate energy changes before they occur.

They manage energy rather than chase it.

Steep Turns—Geometry in Motion

Steep turns are a commercial training maneuver designed to demonstrate:

- Precise control coordination
- Lift vector understanding
- Constant altitude control

Typical parameters:

- Approximately 50° bank angle
- Constant altitude

- Constant airspeed
- Smooth entry and rollout

In a steep turn:

The lift vector tilts with the aircraft.

Only the vertical component of lift supports the airplane's weight.

To maintain altitude, the pilot must increase total lift—usually by increasing back pressure and, when necessary, adjusting power.

The steeper the bank, the greater the total lift required to maintain altitude.

The result is simple geometry.

The airplane is describing a circular flight path while the pilot manages the relationship between bank, lift, airspeed, and altitude.

Pilots are managing the mathematics of lift.

Chandelles—Maximum Performance Climbing Turns

A chandelle is a 180° climbing turn that demonstrates coordinated energy management.

The maneuver begins with:

- Full power
- A smooth climbing turn
- Gradually increasing pitch

During the first 90 degrees of the turn:

- Bank angle remains approximately constant
- Pitch gradually increases to the maximum pitch attitude

During the second 90 degrees of the turn:

- Bank angle gradually decreases
- Maximum pitch attitude is maintained

At the rollout heading:

- The aircraft should be at maximum altitude
- Airspeed should be just above power-on stall speed

The purpose is not aerobatics.

It demonstrates how well a pilot can convert airspeed into altitude while maintaining precise control.

Lazy Eights—Rhythm and Coordination

Lazy eights are among the most graceful training maneuvers.

They demonstrate:

- Smooth control input
- Coordination
- Timing

The aircraft flies two large arcs in the sky that resemble a sideways figure eight.

Key points occur every 45 degrees of heading change:

- 45° — Maximum pitch-up attitude
- 90° — Maximum bank, with the pitch passing through level
- 135° — Maximum pitch-down attitude
- 180° — Return to entry altitude, airspeed, and level flight

The maneuver teaches patience.

Rushed inputs destroy the shape.

The airplane must be allowed to flow through the motion.

Steep Spirals—Emergency Energy Control

Steep spirals simulate an engine failure over a landing point.

The pilot must:

- Glide toward a selected landing site
- Maintain visual reference to the target
- Adjust bank angle to compensate for wind drift
- Control descent without engine power

The purpose is to demonstrate that the pilot can reach a landing area safely after power loss.

Energy management becomes entirely aerodynamic.

Altitude is the only remaining resource.

Seaplane Operations—Water as Runway

Seaplanes operate using floats rather than wheels.

Landing occurs on water rather than pavement.

Key differences include:

- No fixed runway centerline
- No conventional wheel braking
- Surface conditions that change constantly

Pilots must read the water surface carefully.

Indicators include:

- Wind ripples
- Wave direction
- Reflections
- Obstructions

Most seaplane landings are made into the wind when conditions permit.

The pilot establishes the proper touchdown attitude and controls the descent so the floats contact the water smoothly on or near the step.

Excessive speed or an improper touchdown attitude can cause skipping or porpoising.

An excessive descent rate can produce a hard touchdown.

After touchdown, hydrodynamic drag becomes a major factor in slowing and controlling the aircraft.

Water replaces pavement as the operating surface, and the pilot must manage both aerodynamic and hydrodynamic forces.

Amphibious Aircraft—Operating on Land and Water

Aircraft such as the Cessna Caravan can operate from:

- Runways
- Lakes
- Rivers
- Coastal waters

Amphibious floats include:

- Retractable landing wheels
- Water rudders for steering

Critical safety discipline includes verifying gear position.

Landing on water with wheels extended can flip the aircraft.

Landing on land with wheels retracted can damage the aircraft.

Professional amphibious pilots always confirm:

“Gear up for water.
Gear down for land.”

Cargo Flying—Load and Performance

Cargo operations introduce additional performance considerations.

Pilots must account for:

- Cargo weight
- Cargo distribution
- Aircraft center of gravity
- Takeoff distance
- Climb performance

Large cargo loads affect:

- Acceleration
- Rate of climb
- Stall margin
- Landing distance

Cargo must be secured carefully.

A shifting load can alter aircraft balance in flight.

Professional cargo pilots treat loading as a flight-critical procedure.

CAPS Parachute Systems—Whole-Aircraft Recovery

The Cirrus Vision Jet includes a system called CAPS:

Cirrus Airframe Parachute System.

This system allows the pilot to deploy a parachute that lowers the entire aircraft to the ground under canopy.

Activation involves:

- Pulling a handle in the cockpit ceiling
- A rocket deploying the parachute
- The aircraft descending under canopy

CAPS is designed for catastrophic situations such as:

- Structural damage
- Pilot incapacitation
- Loss of control

It has saved many lives.

Like all safety systems, it must be used within operating limits.

Autoland Systems—Aircraft That Land Themselves

Some modern aircraft include emergency autoland systems.

If activated:

The aircraft can:

- Select a suitable airport
- Communicate with air traffic control
- Navigate automatically
- Descend
- Land

These systems are designed for situations where the pilot becomes incapacitated.

Passengers can activate them with a single control.

Automation can assist greatly.

What *Tamias* Really Learns in Book 8

Book 8 is not about learning to fly new airplanes.

It is about becoming dependable.

Tamias learns:

- Precision matters more than flair
- Energy management determines control
- Geometry governs maneuvering flight
- Water requires different judgment than pavement
- Cargo introduces new performance limits
- Professional pilots anticipate consequences

He also learns something quieter.

Aviation is not only technical.

It is communal.

Pilots depend on instructors.

Instructors depend on engineers.

Cargo depends on logistics.

Airports depend on everyone working together.

Tamias receives an honorary degree. But the degree is not the real achievement. The real change is internal. He begins to think like a professional. Which means asking a different question.

Not: *Can I do this maneuver?*

But: *Can I perform it reliably—every time—under pressure?*

Because professionalism is not a single moment.

It is a pattern. And by the end of Book 8, *Tamias* is very close to something important.

Not just being a good pilot.

But becoming the kind of pilot others trust to solve problems.

That is the next step.

And the sky is getting larger.

Appendix B — Glossary

Aviation Terms and Concepts — Books 1–8

ADM (Aeronautical Decision Making)—A structured way pilots learn to make safe choices. ADM means using facts, training, and judgment instead of emotion or wishful thinking.

Aileron—A hinged control surface on the outer part of each wing. Ailerons move in opposite directions to roll the airplane left or right.

Airman Certificate (Pilot Certificate)—The official document granting legal authority to act as Pilot in Command. It confirms that the holder met required knowledge and skill standards. It does not guarantee experience or wisdom.

Airman Certification Standards (ACS)—The official FAA document defining what a pilot must know and demonstrate to pass a practical test. It combines knowledge, risk management, and flight skill into measurable standards.

Airworthiness Certificate—An FAA document authorizing operation of an aircraft, provided the aircraft continues to meet its approved design and is in condition for safe operation. It must be displayed in the aircraft.

AIRMET—A weather advisory for pilots about conditions that may be dangerous, such as turbulence, icing, or low visibility.

Altimeter—An instrument that shows how high the airplane is above sea level, based on air pressure.

Alternate (Airport)—A backup airport a pilot plans to use if the original destination becomes unsafe or unavailable.

Altitude Preselect—An autopilot feature that allows a pilot to dial in a target altitude. The system will climb or descend to that altitude and capture it automatically.

Angle of Attack (AOA)—The angle between the wing and the airflow. If the wing exceeds its critical angle of attack, it stalls.

Applicant—The pilot being evaluated during a practical test. During a checkride, the student is referred to as the applicant.

Approved—In aviation, “approved” means allowed by official rules and authorities. It does not mean “someone thinks it’s fine.”

APR Mode (Approach Mode)—An autopilot setting that allows the airplane to capture and track approach guidance such as a localizer or glideslope.

ATC (Air Traffic Control)—The system of controllers and procedures that helps airplanes stay organized and separated, especially near busy airports.

Attitude—The airplane’s position compared to the horizon (nose up, nose down, wings level, banked, etc.).

Attitude Indicator—An instrument that shows the airplane’s attitude using a small artificial horizon.

Autoland—An automated system that can guide an aircraft to a runway and land it automatically if the pilot becomes incapacitated. Some modern aircraft include emergency autoland systems.

Autopilot—An automated flight control system that moves control surfaces to maintain selected heading, altitude, or navigation paths. It reduces workload but does not remove pilot responsibility.

AVEF—The order of priority for route selection during lost communications: Assigned, Vectored, Expected, Filed.

Avionics—The electronic equipment in an airplane, especially radios, navigation tools, transponders, and flight management systems.

Axis (Axes)—The three invisible lines an airplane rotates around: pitch, roll, and yaw.

Balance (Center of Gravity)—The location inside the airplane where its weight is centered. If balance is outside limits, the airplane may be unsafe.

Baggage Compartment—A storage space in the airplane, usually behind the seats.

Bank Angle—The angle at which the airplane tilts its wings during a turn.

Base Leg—The part of the traffic pattern flown perpendicular to the runway, just before turning onto final.

BasicMed—An alternative to a traditional FAA medical certificate for certain private pilots. It requires a state-licensed physician exam and periodic training but does not allow commercial privileges.

Beacon—A flashing red light on the airplane used to warn others that the engine is starting or running.

Brake(s)—Controls that stop the airplane while on the ground.

Briefing—A structured review before a flight or maneuver explaining what will happen and what to do if something goes wrong.

Buffet—A shaking felt as the wing approaches a stall.

Cabin—The inside of the airplane where the pilot and passengers sit.

CAPS (Cirrus Airframe Parachute System)—A whole-aircraft parachute installed in Cirrus airplanes. Pulling the handle deploys a parachute that lowers the entire aircraft under canopy.

Caravan (Cessna Caravan)—A turboprop aircraft known for strong cargo capability and rugged operation. Many versions operate on amphibious floats for water landings.

Ceiling—The height of the lowest cloud layer covering most of the sky.

Center of Gravity (CG)—The exact point where the airplane balances. It must remain within safe limits.

Certificate Action—The formal outcome of a practical test. It may be issuance (pass), discontinuance, or notice of disapproval.

CFI (Certificated Flight Instructor)—A pilot trained and authorized to provide flight instruction.

CFII (Certificated Flight Instructor—Instrument)—A flight instructor authorized to provide instrument flight training for instrument ratings and related instrument privileges.

Chandelle—A commercial-level maneuver consisting of a maximum-performance climbing 180-degree turn used to demonstrate energy management and aircraft control.

Checkride (Practical Test)—The final flight evaluation with a Designated Pilot Examiner to determine whether a pilot meets certification standards.

Checklist—A written list of required steps. Checklists exist because memory is unreliable under pressure.

Circuit Breaker—A safety device that stops electrical flow if there is a problem.

Climb—Flying upward to gain altitude.

Cockpit—The front part of the airplane where the pilot controls the aircraft.

Commercial Pilot—A certificate level allowing a pilot to conduct certain operations for compensation or hire, provided all applicable qualifications, operating rules, and limitations are met.

Configuration—The physical setup of the airplane, including flaps, landing gear, and power settings.

Control Surface—A movable part (aileron, elevator, rudder) that changes airflow to control the

airplane.

Control Wheel Lock—A device that locks flight controls when parked. It must be removed before flight.

Correct—In aviation, “correct” means the proper, approved method—not “close enough.”

Cowling—The outer covering around the engine.

Crab—Pointing the airplane’s nose into the wind to maintain correct ground track.

Critical Angle of Attack—The angle of attack at which airflow over the wing separates enough to cause a stall.

Cross-Country Flight—A flight from one airport to another. Required in real pilot training.

Crosswind—Wind blowing across the runway.

CTAF (Common Traffic Advisory Frequency)—The radio frequency used at uncontrolled airports for pilot coordination.

Dead Reckoning—Navigation using heading, time, speed, and wind estimates to determine position.

Density Altitude—A value combining altitude, temperature, and pressure. High density altitude reduces performance.

Designated Pilot Examiner (DPE)—An experienced pilot authorized by the FAA to conduct practical tests and issue pilot certificates.

Direct-To (GPS)—A function that allows a pilot to navigate directly to a selected waypoint without following the original flight plan sequence.

Discontinuance—A temporary stop to a practical test due to weather, mechanical issues, or other external factors. It is not a failure.

Downwind Leg—The traffic pattern leg flown parallel to the runway in the opposite direction of landing.

Drag—Air resistance that slows the airplane.

Drift—Sideways movement caused by wind pushing the airplane off course.

Elevator—A hinged surface on the horizontal tail controlling pitch.

Emergency—Any situation where safety may be threatened and immediate action is required.

Empennage—The tail assembly of the airplane.

Energy Management—The discipline of controlling airspeed, altitude, and aircraft momentum through pitch, power, and configuration.

Engine—The machine that produces power or thrust to propel the aircraft. In propeller-driven aircraft, the engine turns the propeller.

Engine Instruments—Gauges showing engine health (oil pressure, RPM, etc.).

Estimated Time En Route (ETE)—Calculated time to reach a destination.

FAA—Federal Aviation Administration, the U.S. aviation regulatory authority.

FAA Approved—Officially accepted under aviation rules.

FAST MOOSE—A common training mnemonic used to remember many of the equipment items required for daytime VFR flight under 14 CFR §91.205. Exact requirements depend on the aircraft and applicable regulations.

Final Approach (Final)—The last straight part of the traffic pattern aligned with the runway.

First-Class Medical—The highest class of FAA medical certificate, generally required when exercising Airline Transport Pilot privileges as pilot in command.

Flap—A hinged surface on the inner trailing edge of the wing used during takeoff and landing.

Flight Controls—Yoke, rudder pedals, trim, and other controls used to fly the airplane.

Flight Director—A display system that provides pitch and roll command bars to guide the pilot or autopilot along a desired flight path.

Flight Instruments—Instruments that show altitude, speed, attitude, and other flight data.

Flight Management System (FMS)—An onboard computer system that manages navigation, route programming, altitude constraints, and performance calculations in modern aircraft.

Floatplane—An aircraft equipped with floats instead of wheels, allowing it to land on water.

Flow—A memorized cockpit setup pattern verified by checklist.

Forecast—A prediction of future weather.

Fuel Burn—The rate at which the engine consumes fuel, usually gallons per hour.

Fuel Reserves—Required extra fuel carried for safety.

Fuselage—The main body of the airplane.

Gauge—An instrument that shows a measurement.

Go-Around—Abandoning a landing attempt and climbing away to try again.

Glideslope—The vertical guidance component of an ILS that provides a stabilized descent path to the runway.

Ground Effect—Reduced drag when flying close to the ground, which can cause floating during landing.

Groundspeed—The airplane's actual speed over the ground.

Heading—The direction the airplane's nose is pointing.

Heading Indicator—An instrument showing heading using a gyro.

Holding Pattern (Hold)—A racetrack-shaped flight path used to delay an aircraft in a structured, predictable manner while awaiting further clearance.

Hydrodynamics—The behavior of water flowing around objects. Floatplanes rely on hydrodynamic behavior during takeoff and landing.

IFR (Instrument Flight Rules)—Regulations that allow flight using instruments for navigation and control when outside visual reference is limited or unavailable.

ILS (Instrument Landing System)—A precision instrument approach providing both lateral (localizer) and vertical (glideslope) guidance to align an aircraft with a runway.

Lazy Eight—A commercial maneuver where the aircraft flies two smooth climbing and descending arcs forming a horizontal figure eight.

Lift—The force created by the wings that holds the airplane up.

Localizer—The lateral guidance component of an ILS that keeps the aircraft aligned with the runway centerline.

Lost Communications—A situation in which a pilot loses radio contact with ATC and must follow published procedures to continue safely.

Magenta Line—The GPS course line displayed on modern navigation systems representing the programmed route.

Medical Certificate (FAA Medical)—An official document confirming a pilot meets required health standards to fly.

Mode Awareness—The discipline of knowing which autopilot or flight guidance mode is active and what the airplane will do next.

Pilot's Operating Handbook (POH)—The official manual containing limitations and procedures.

Preflight—Inspection of the airplane before flight.

Professional Mode—A mindset in which a pilot anticipates consequences and manages the entire system, not just the airplane.

Runway—The strip used for takeoff and landing.

Second-Class Medical—A medical certificate required for pilots exercising commercial privileges.

Seaplane—An airplane designed to take off and land on water using floats or a boat-shaped hull.

Steep Spiral—A power-off maneuver in which the pilot maintains a constant-radius ground track around a selected point while controlling airspeed, bank, and wind drift.

Throttle—The control adjusting engine power.

Trim—A control that reduces the need for constant pressure on the yoke.

Turbulence—Rough, uneven air.

VNAV (Vertical Navigation)—An autopilot or FMS mode that manages climbs and descents based on programmed altitude constraints.

VOR (VHF Omnidirectional Range)—A ground-based radio navigation aid that provides radial direction information to aircraft.

VSI (Vertical Speed Indicator)—Instrument showing rate of climb or descent.

VFR (Visual Flight Rules)—Flying by visual reference in clear weather.

WAAS (Wide Area Augmentation System)—A satellite-based enhancement that improves GPS accuracy and enables precision-like approaches such as LPV.

Weight & Balance—The calculation of total weight and its distribution. The airplane must be below maximum weight and within CG limits to fly safely.

Wing—The structure producing lift.

Yaw—The nose moving left or right.

Yoke—The primary control used to manage pitch and roll.

Cessna 172R Gauge Cluster

Primary instruments:



Airspeed indicator



Attitude Indicator

Altimeter



Turn Coordinator

Heading Indicator

Vertical Speed Indicator

Spanish & Mandarin Pronunciation Guide (Book 8)

Pan—pahn bread

Mesa—MAY-sah table

Plato—PLAH-toh plate

Silla—SEE-yah chair

Piso—PEE-soh floor

Ventana—ven-'TAH-nah window

Agua—AH-gwah water

Tenedor—ten-eh-DOR fork

Arroyo—ah-RROY-yo stream

Miànbāo (面包)—myen-BAO bread

Zhuōzi (桌子)—JWOR-dzuh table

Pánzi (盘子)—PAHN-dzuh

Yǐzi (椅子)—EE-dzuh

Dìbǎn (地板)—DEE-bahn

Chuānghu (窗户)—CHWANG-hoo

Shuǐ (水)—shway water

Chāzi (叉子)—CHAH-dzuh

Zǎocān (早餐)—ZOW-tsahn

Xīliú (溪流)—SHEE-lyoh

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About the Author

David I. Schoen, known to generations of students as Professor Dave, has spent decades helping learners of all ages discover clarity, confidence, and even a little joy in the worlds of language, math, and learning. A veteran educator, tutor, and writer—and an unapologetic lover of books—he specializes in turning complicated ideas into simple, friendly explanations that actually stick.

Dave has guided thousands of students through English, math, writing, grammar, and test preparation, as well as the always-adventurous process of becoming a stronger thinker. His teaching blends humor, precision, and storytelling—a combination that has helped learners from elementary school through adulthood feel empowered instead of intimidated.

He is also an active private pilot, and has been flying for over three decades—an experience that has shaped the realism, detail, and sense of wonder behind *The Flying Explorers Series*. Before becoming an author and educator, he worked as an Air Traffic Controller at JFK International Airport, one of the world's busiest airports, for almost two decades. Aviation is in his blood, just as it is slowly coming to be in 'Tamias'.

When he isn't teaching or writing, Dave can usually be found creating new educational books, experimenting in the kitchen, playing the piano, or working on inventive projects that combine family, learning, and fun. He lives on Long Island, New York, where he is constantly surrounded by stories waiting to be told.

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Keep your head up!
