

## PRIVATE PILOT GROUND SCHOOL

# MODULE 1-R — PHASE 1 CUMULATIVE REVIEW

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## MNEMONICS

**ATOMATOFLAMES —** Airspeed, Tachometer, Oil pressure, Manifold pressure, Altimeter, Temperature (liquid-cooled), Oil temperature, Fuel gauge, Landing gear indicator, Anticollision lights, Magnetic compass, ELT, Safety belts

The day-VFR equipment list in 14 CFR 91.205(b), one letter per item. Run it when an instrument or a light is broken before a flight. An item on this list that does not work grounds the airplane until the 91.213 flow is worked. The list also carries flotation gear for hire over water and shoulder harnesses by manufacture date, which the letters do not name.

**AVIATE(S) —** Annual, VOR check (IFR, 30 days), 100-hour (for hire), Altimeter and pitot-static (IFR, 24 months), Transponder (24 months), ELT (12 months, plus the battery), Static system

The inspections a pilot checks in the maintenance records before a flight. Each letter has its own clock: 12 calendar months for the annual and the ELT, 100 hours of time in service for the 100-hour, 24 calendar months for the transponder and the altimeter. Two of the letters apply only to IFR flight. Run it in the logbooks, not on the ramp.

**DECIDE —** Detect, Estimate, Choose, Identify, Do, Evaluate

Six steps for working a problem once one exists: detect that something changed, estimate what it means for the flight, choose a desired outcome, identify actions that get there, do the best one, then evaluate whether it worked — and go around the loop again if it did not.

**5P —** Plan, Plane, Pilot, Passengers, Programming

The single-pilot resource check, run at set decision points in a flight (before takeoff, cruise checks, before descent, before approach): is the Plan still good, is the Plane still good, is the Pilot still good, are the Passengers still good, is the Programming set for what comes next?

**FLAPS —** Fuses (spares), Landing light (for hire), Anticollision lights, Position lights, Source of electrical energy

The night-VFR additions in 14 CFR 91.205(c). Night requires each item on the day list plus these five. Run it before any flight that will land after sunset. A position light that does not work grounds a night flight and does not ground a day flight.

**IMSAFE —** Illness, Medication, Stress, Alcohol, Fatigue, Emotion (or Eating)

The personal preflight checklist — the deep look at the P in PAVE. Run it before every flight, not only when feeling sick. Any letter that fails is a no-go about the pilot, no matter how good the airplane and the weather are.

Two of the letters carry hard regulatory numbers. Alcohol (14 CFR 91.17):

no acting as a crewmember within 8 hours of consuming any alcohol, while under the influence, or with a blood or breath alcohol concentration of 0.04 or greater — and a hangover is impairment even when the clock and the number both pass. Medication (14 CFR 61.53): flying is prohibited while taking any medication or treatment that leaves you unable to meet your medical certificate's requirements. For over-the-counter drugs the FAA's guidance is concrete: if the label warns about drowsiness or operating machinery, wait at least five maximal dosing intervals after the last dose — and when in doubt, ask an AME. The other letters — Illness, Stress, Fatigue, Emotion — have no numbers, which is exactly why they demand the most honesty.

**Lights, Camera, Action — Lights on, transponder on (the camera), call sign announced (the action)**

The three things done when the tower clears the airplane for takeoff, or before it enters the runway at a non-towered airport. Landing light and strobes so the airplane can be seen, transponder so it can be tracked, and the call so it can be heard. The AC adds a look down final and down the runway before the airplane crosses the hold line.

**PARE — Power idle, Ailerons neutral, Rudder full opposite the rotation, Elevator forward**

The first four steps of the generic spin recovery, in order. The Warrior's handbook adds two more: rudder neutral when the rotation stops, then control wheel as required to regain level flight. A pilot who stops at E flies the recovery into a dive with the rudder still in. Say all six.

**PAVE — Pilot, Aircraft, enVironment, External pressures**

The preflight risk checklist. Before every flight, check each of the four categories honestly: the Pilot flying, the Aircraft as it is equipped and loaded today, the enVironment the flight passes through, and the External pressures pushing on the decision. In flight, the same four categories drive the continue/divert decision.

**RAIIM — Resignation, Anti-authority, Impulsivity, Invulnerability, Macho**

The handle for the five hazardous attitudes. The FAA names the five but gives you no way to hold them; RAIIM is how we carry them — say the word, recover the five, then pair each with its antidote. Starting with Resignation is deliberate: it is the quietest of the five and the easiest to miss in yourself.

**3P — Perceive, Process, Perform**

The continuous in-flight risk loop: perceive the hazard, process what its risk is on this flight, perform the mitigation — then start perceiving again. It never finishes; it runs from engine start to shutdown.

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## FACTS TO REMEMBER

### KNOW THESE COLD

- PAVE names the four risk categories a pilot checks before every flight: Pilot, Aircraft, enVironment, External pressures.

*Source: FAA-H-8083-2; PHAK ch. 2*

- Aeronautical decision making (ADM) is a systematic approach to finding hazards, judging their risk, and choosing the safest course of action.

*Source: PHAK ch. 2*

- Single-pilot resource management (SRM) means using everything available to a pilot flying alone: the airplane's equipment, ATC, charts, passengers, and the pilot's own planning.

*Source: PHAK ch. 2*

- Crew resource management (CRM) is the same resource discipline applied when more than one crewmember shares the flight deck.

*Source: PHAK ch. 2*

- IMSAFE is the personal preflight checklist: Illness, Medication, Stress, Alcohol, Fatigue, Emotion (some FAA material uses Eating for the E — accept either).

*Source: FAA-H-8083-2*

- The IMSAFE check is a go/no-go decision about the pilot, made before every flight, not only when feeling sick.

*Source: FAA-H-8083-2*

- The five hazardous attitudes, in RAIIM order, are resignation, anti-authority, impulsivity, invulnerability, and macho.

*Source: PHAK ch. 2*

- The antidote for anti-authority ("don't tell me") is: follow the rules — they are usually right.

*Source: PHAK ch. 2*

- The antidote for impulsivity ("do it quickly") is: not so fast — think first.

*Source: PHAK ch. 2*

- The antidote for invulnerability ("it won't happen to me") is: it could happen to me.

*Source: PHAK ch. 2*

- The antidote for macho ("I can do it") is: taking chances is foolish.

*Source: PHAK ch. 2*

- The antidote for resignation ("what's the use") is: I'm not helpless — I can make a difference.

*Source: PHAK ch. 2*

- Recognizing a hazardous thought and saying its antidote out loud is the FAA's taught method for breaking the attitude's hold.

*Source: PHAK ch. 2*

- The DECIDE model names six steps for working a problem: Detect, Estimate, Choose, Identify, Do, Evaluate.

*Source: PHAK ch. 2*

- The 3P model runs a continuous loop in flight: Perceive the hazard, Process its risk, Perform the mitigation — then perceive again.

*Source: FAA-H-8083-2A ch. 8*

- A risk assessment matrix rates each risk by two axes — likelihood and severity — and the combination

decides whether the flight changes or cancels.

*Source: FAA-H-8083-2A ch. 4*

- Personal minimums are set on the ground, in calm conditions, and are stricter than the regulations; they are never renegotiated in the air.

*Source: FAA-H-8083-2; PHAK ch. 2*

- External pressures — get-there-itis, a waiting passenger, sunk rental money — are the PAVE category pilots are least honest about, and the standard mitigation is an out planned before takeoff (a firm alternate, a told-in-advance backup plan).

*Source: FAA-H-8083-2*

- The enVironment check covers weather, terrain, route, obstructions, airports, and airspace for the specific flight planned.

*Source: PHAK ch. 2*

- The Aircraft check asks whether this airplane, as equipped and loaded today, can do this mission — not whether it is merely legal.

*Source: FAA-H-8083-2*

- Confirmation bias is hunting only for information that supports the decision already made, and it is countered by actively looking for disconfirming evidence.

*Source: PHAK ch. 2*

- Expectation bias is hearing or seeing what you expected instead of what actually happened — the classic case is reading back the clearance you expected rather than the one issued.

*Source: PHAK ch. 2*

- Task priority in any abnormal situation is aviate, navigate, communicate — in that order.

*Source: AFH ch. 18; PHAK ch. 2*

- Situational awareness is an accurate picture of what is happening now and what happens next; distraction and fixation are its two main killers.

*Source: PHAK ch. 2*

- The go/no-go decision is not made once: it is re-made continuously in flight as continue/divert, against the same PAVE categories.

*Source: FAA-H-8083-2*

- Before any flight, the pilot in command must become familiar with all available information concerning that flight — the regulation PAVE puts into practice.

*Source: 14 CFR 91.103*

- The standard traffic pattern uses left turns; right traffic exists only where light signals or visual markings (or the Chart Supplement) say so.

*Source: 14 CFR 91.126(b)(1); AIM 4-3-3*

- Pattern legs in order: upwind, crosswind, downwind, base, final — flown at the published pattern altitude, typically 1,000 ft AGL for piston singles.

*Source: AIM 4-3-3; AFH ch. 7*

- The standard nontowered entry is at 45 degrees to the midpoint of the downwind, at pattern altitude.

*Source: AIM 4-3-3; AC 90-66C*

- Standard departure is straight out or a 45-degree turn toward the pattern side after reaching pattern altitude.

*Source: AIM 4-3-3; AC 90-66C*

- The segmented circle packages the airport's visual signals: wind indicator in the center, traffic pattern indicators showing which runways use right traffic.

*Source: AIM 4-3-4*

- Runway choice at a nontowered field: land and take off into the wind, read the sock and the pattern in use, and never assume the calm-wind runway is in use without listening first.

*Source: AIM 4-3-3; AC 90-66C*

- ATIS is the towered field's recorded information, re-issued each hour or on change and lettered phonetically; AWOS/ASOS are automated weather broadcasts, continuous, at fields with no ATIS.

*Source: AIM 4-1-13; AIM 7-1-10*

- Listening to the automated weather and CTAF before entering the area is how the pattern is entered already knowing the runway, wind, and who is where.

*Source: AC 90-66C; AIM 4-1-9*

- See and avoid is every pilot's baseline duty whenever weather permits, IFR or VFR, radar or not.

*Source: 14 CFR 91.113(b)*

- An aircraft in distress has right-of-way over all other air traffic.

*Source: 14 CFR 91.113(c)*

- Converging same-category aircraft: the one on the right has right-of-way; different categories: a balloon has right-of-way over every other category; a glider over powered aircraft; an aircraft towing or refueling others over all other powered aircraft, including airships; an airship over the remaining powered aircraft.

*Source: 14 CFR 91.113(d)*

- Head-on: both alter course right. Overtaking: the overtaken aircraft has right-of-way, and the overtaker passes well clear to the RIGHT.

*Source: 14 CFR 91.113(e), (f)*

- Landing: aircraft on final or landing have right-of-way over other traffic, and between two arriving aircraft the lower one has it — but neither rule may be abused to cut in front of or force anyone off.

*Source: 14 CFR 91.113(g)*

- Except for takeoff and landing, minimum altitude anywhere is one allowing an emergency landing without undue hazard to people or property if the engine fails; over other-than-congested areas the floor is 500 ft above the surface (or 500 ft from any person, vessel, vehicle, or structure over open water and sparse areas).

*Source: 14 CFR 91.119(a), (c)*

- Over any congested area or open-air assembly, the minimum is 1,000 ft above the highest obstacle within a 2,000 ft horizontal radius.

*Source: 14 CFR 91.119(b)*

- Effective scanning is a series of short, regularly spaced eye fixations — roughly 10-degree sectors held about a second each — because the eye detects nothing while sweeping.

*Source: AIM 4-4-15; AC 90-48*

- Traffic on a constant bearing with no relative motion is on a collision course — the target that never moves in the windshield is the one that hits you.

*Source: AIM 4-4-15; AC 90-48*

- High-wing airplanes hide traffic above and inside the turn; low-wing hide it below — lift a wing before turning, and clear the area with turns before maneuvering.

*Source: AC 90-48; AFH ch. 3*

- Most midair collisions happen in daylight VMC, near airports, below 3,000 ft AGL — the pattern is the highest-risk airspace a student flies.

*Source: AC 90-48*

- Distraction in the pattern (radio fiddling, passenger chatter, checklist heads-down at the turn) is the pattern's own killer; the module rule is eyes up in the turns, tasks on the straightaways.

*Source: AC 90-48; AFH ch. 7*

- Wake turbulence is wingtip vortices, generated whenever a wing makes lift, strongest behind aircraft that are **HEAVY, CLEAN, and SLOW**.

*Source: AIM 7-4; PHAK ch. 14*

- Vortices sink 300–500 ft per minute behind the generating aircraft, level off a few hundred feet below its path, and drift with the wind — a light quartering tailwind parks the upwind vortex on the runway.

*Source: AIM 7-4*

- Landing behind a larger aircraft: stay at or above its final approach path and land **BEYOND** its touchdown point.

*Source: AIM 7-4*

- Departing behind a larger aircraft: rotate **BEFORE** its rotation point, climb upwind of its path, and give it time — two to three minutes is the controller's standard separation for a reason.

*Source: AIM 7-4*

- Windshear near the pattern (gust fronts, thermals, terrain rotors) shows up as sudden airspeed excursions; the response is power, pitch for the target speed, and a go-around decision made early.

*Source: AIM 7-1 (wind shear PIREPs); PHAK ch. 12*

- Towered pattern operations run on tower instructions — but a clearance never transfers the see-and-avoid or wake-avoidance duty away from the PIC.

*Source: 14 CFR 91.113(b); AIM 4-3-2*

- A stabilized approach is on speed, in configuration, on glidepath, and aligned, with a constant descent to the aiming point — energy managed so that no large correction is needed close to the ground.

*Source: AFH ch. 8 (pin-needed)*

- An approach that goes unstable ends in a go-around: the go-around is planned on every approach and is a normal outcome, never an admission of failure.

*Source: AFH ch. 8 (pin-needed)*

- The go-around decision is made early and high — delaying it at low altitude to salvage a bad landing, in the flare or after a bounce, is how runway-loss and stall accidents happen.

*Source: AFH ch. 8 (pin-needed)*

- A crosswind drifts the airplane off the runway track and weathervanes the nose into the wind on the ground — every takeoff and landing carries a computed crosswind component and a correction plan.

*Source: AFH ch. 5/8 (pin-needed)*

- Crosswind takeoff: full aileron into the wind at the start of the roll, easing out as speed builds, with a clean, positive liftoff — no skipping sideways off the runway.

*Source: AFH ch. 5 (pin-needed)*

- Wind correction on final is a crab transitioned to a wing-low sideslip (or a sideslip throughout): the low wing stops the drift, opposite rudder holds the nose on the centerline, and touchdown comes on the upwind main wheel first.

*Source: AFH ch. 8 (pin-needed)*

- A **LAHSO** clearance means land and hold short of a crossing runway or point; accepting it is the pilot in command's choice, and declining costs nothing.

*Source: AIM 4-3-11*

- Accept **LAHSO** only after comparing the published available landing distance (ALD) against your real landing performance with margin — and student pilots flying solo should not accept **LAHSO** at all.

*Source: AIM 4-3-11*

- The rectangular course is the traffic pattern abstracted: the same legs and the same wind corrections — a crab on each straightaway, the steepest turn where the groundspeed is highest.

*Source: AFH ch. 6 (pin-needed)*

- Frequencies come from the sectional chart and the Chart Supplement: tower, ground, CTAF, ATIS/AWOS, and approach are all published — guessing is never necessary.

*Source: Chart Supplement; AIM 4-1-4*

- CTAF is the common traffic advisory frequency for a given airport — the tower frequency at part-time towered fields (Salinas: 119.525 for both), UNICOM or MULTICOM elsewhere.

*Source: AIM 4-1-9*

- The standard self-announce call has four parts: who you're calling (airport traffic), who you are, where you are, what you intend — ending with the airport name again.

*Source: AIM 4-1-9*

- Position reports at a nontowered field: inbound with intentions before entering the pattern, then each leg — downwind, base, final — and clear of the runway.

*Source: AIM 4-1-9; AC 90-66C*

- A first call to any controller carries: who they are, who you are, where you are (with ATIS letter when arriving), and what you want.

*Source: AIM 4-2-3*

- Numbers and letters are spoken in ICAO phonetics and single digits ("one one nine point five two five"), because misheard call signs and headings are how incursions start.

*Source: AIM 4-2-7, 4-2-8*

- Standard responses: WILCO (will comply), UNABLE, SAY AGAIN, STAND BY — and STAND BY is not an answer to a hold-short instruction.

*Source: AIM 4-2-1; Pilot/Controller Glossary*

- Runway assignments, hold-short instructions, and "line up and wait" must be read back with the runway number and call sign — full readback, every time.

*Source: AIM 4-3-18; AC 91-73*

- "Line up and wait" clears you ONTO the runway but not to take off; if no takeoff clearance follows promptly, ask.

*Source: AIM 4-3 (LUAW); Pilot/Controller Glossary*

- An ATC clearance is not a command to violate anything: the PIC refuses with UNABLE when a clearance would compromise safety, and an amended clearance is requested when needed.

*Source: AIM 4-4-1; 14 CFR 91.3*

- A late runway change is an invitation to rushed configuration and wrong-runway lineup: the defense is slowing down, rebriefing the new runway, and UNABLE if not ready.

*Source: AC 91-73; AFH ch. 2*

- Light gun, steady green: on the ground — cleared for takeoff; in flight — cleared to land.

*Source: 14 CFR 91.125; AIM 4-3-13*

- Light gun, flashing green: on the ground — cleared to taxi; in flight — return for landing (steady green will follow at the proper time).

*Source: 14 CFR 91.125; AIM 4-3-13*

- Light gun, steady red: on the ground — stop; in flight — give way to other aircraft and continue circling.

*Source: 14 CFR 91.125; AIM 4-3-13*

- Light gun, flashing red: on the ground — taxi clear of the runway in use; in flight — airport unsafe, do not land.

*Source: 14 CFR 91.125; AIM 4-3-13*

- Light gun, flashing white: return to your starting point on the airport (surface only).

*Source: 14 CFR 91.125; AIM 4-3-13*

- Light gun, alternating red and green: exercise extreme caution — surface or airborne.

*Source: 14 CFR 91.125; AIM 4-3-13*

- Acknowledging light signals: in daylight, rock the wings (on the ground, move ailerons/rudder); at night, flash the landing or navigation lights.

*Source: AIM 4-3-13*

- The transponder squawks 1200 for VFR unless assigned otherwise, with altitude reporting (Mode C/ALT) on whenever airborne.

*Source: AIM 4-1-20; 14 CFR 91.215(c)*

- Emergency squawk codes: 7500 hijacking, 7600 lost communications, 7700 emergency.

*Source: AIM 6-4-2, 6-2-4*

- VFR flight following (radar traffic advisories) is requested from approach/center, given workload permitting, and never transfers see-and-avoid to the controller.

*Source: AIM 4-1-15, 4-1-16*

- Radar services add safety alerts and vectors on request — help that costs one transmission, which is why the module's habit is flight following on every leg that leaves the pattern.

*Source: AIM 4-1-16*

- MAYDAY (repeated three times) declares distress; PAN-PAN declares urgency; either gets priority handling, and a controller can also be told plainly "declaring an emergency."

*Source: AIM 6-3-1, 6-3-2*

- Declaring an emergency costs nothing by rule — the only paperwork is a report IF the Administrator requests one; hesitation to declare is the actual hazard.

*Source: 14 CFR 91.3(c); AIM 6-1-1*

- Runway status lights (at equipped airports) are automatic red in-pavement lights: red means STOP regardless of any clearance received — clearance and lights disagree, hold and ask.

*Source: AIM 2-1-6*

- Blocked or garbled radio calls are normal: never act on a clearance you are not sure was yours; confirm with call sign, because two similar call signs on frequency is a standard accident setup.

*Source: AIM 4-2-3; AC 91-73*

- Red signs with white letters are mandatory instruction signs — the runway holding position sign is the one that keeps you alive.

*Source: AIM 2-3-8*

- Black signs with yellow letters tell you where you ARE (location); yellow signs with black letters and arrows tell you where things GO (direction/destination).

*Source: AIM 2-3-9, 2-3-10*

- Runway distance-remaining signs count down thousands of feet of runway left.

*Source: AIM 2-3-13*

- The runway holding position marking is four yellow lines: two solid, two dashed. Solid side = hold here; dashed side = you are ON the runway, cross and clear.

*Source: AIM 2-3-5*

- At a towered airport you cross a runway holding position marking only with an explicit clearance for THAT runway; at a nontowered airport, only after looking both ways down the runway and final.

*Source: AIM 2-3-5; AC 91-73*

- Runway numbers are the runway's magnetic heading rounded to the nearest 10 degrees with the zero

dropped — runway 31 points about 310 magnetic.

*Source: AIM 2-3-3*

– A displaced threshold (arrows leading to a solid bar) may be used for taxi and takeoff, but landings touch down beyond the bar.

*Source: AIM 2-3-3*

– Chevrons mark blast pads and stopways: no taxi, no takeoff, no landing — not pavement for use.

*Source: AIM 2-3-3*

– Taxiways carry a continuous yellow centerline; an enhanced centerline (dashes flanking it) warns a runway holding position is ahead.

*Source: AIM 2-3-4*

– The airport rotating beacon flashes white-green for a lighted civilian land airport; military is two whites and a green.

*Source: AIM 2-1-9*

– Runway edge lights are white (turning amber in the final 2,000 ft or half the runway on instrument runways); threshold lights show green to arrivals, and the far end shows red.

*Source: AIM 2-1-4*

– Taxiway edges are blue; taxiway centerlines, where lighted, are green.

*Source: AIM 2-1-10*

– VASI: red over white, you're all right (on glidepath); white over white too high, red over red too low.

*Source: AIM 2-1-2*

– PAPI: four lights in a row — two white two red on path; more whites high, more reds low.

*Source: AIM 2-1-2*

– Pilot-controlled lighting: key the mic on the CTAF — 7 clicks highest intensity, 5 medium, 3 low; the lights run on a 15-minute timer.

*Source: AIM 2-1-8*

– Before taxi: airport diagram out, expected route drawn or spoken, hot spots (charted circled areas of past confusion) identified.

*Source: AC 91-73; Chart Supplement*

– NOTAMs are checked before taxi for closed runways and taxiways, unlighted obstacles, and construction — the diagram shows what was, NOTAMs show what is.

*Source: AIM 5-1-3; AC 91-73*

– The windsock points AWAY from the wind source and gives a rough speed by its angle; a tetrahedron points INTO the wind — both are read before every takeoff and landing.

*Source: AIM 4-3-4*

– Aircraft lights on the ground: beacon on whenever the engine runs; nav lights sunset to sunrise; strobes off when they would blind others taxiing nearby, on crossing any runway.

*Source: 14 CFR 91.209; AIM 4-3-23*

– Night and low-visibility taxi discipline: slower, progressive taxi instructions if unsure, follow the greens, and stop the airplane the moment position is uncertain.

*Source: AC 91-73; AIM 4-3-18*

– Heads-down tasks (programming, checklists, texting the FBO) are done stopped, clear of movement areas — a moving airplane gets undivided eyes.

*Source: AC 91-73*

– Runway incursion defense in one sentence: know where you are, know where you're cleared to, read back

anything involving a runway, and never cross a red sign or red lights without resolving the doubt.

*Source: AC 91-73; AIM 2-3-5*

- Expectation bias on taxi routes — hearing yesterday's route in today's clearance — is defeated by writing the clearance down and following the written version, not the remembered one.

*Source: AC 91-73*

- U.S. airspace comes in six classes, A through G (there is no F in the U.S.), plus special use areas — every point in the sky is in exactly one class.

*Source: PHAK ch. 15; AIM 3-1-1*

- The alphabet runs from most controlled to least: A is the most restrictive, G is uncontrolled.

*Source: PHAK ch. 15*

- Class A is the high-altitude en route structure from 18,000 ft MSL to FL600, IFR only — it is not drawn on the sectional because it is everywhere above 18,000.

*Source: PHAK ch. 15; AIM 3-2-2*

- Class B surrounds the nation's busiest airports, shaped like an upside-down wedding cake, drawn with solid blue lines on the sectional.

*Source: PHAK ch. 15; sectional legend*

- Class C surrounds busy airports with radar approach control, drawn with solid magenta lines.

*Source: PHAK ch. 15; sectional legend*

- Class D surrounds smaller airports with an operating control tower, drawn with a dashed blue line, its ceiling printed in a dashed blue box.

*Source: PHAK ch. 15; AIM 3-2-5*

- Class D is tied to the tower's operating hours: when a part-time tower closes, the airspace becomes E or G per the Chart Supplement.

*Source: AIM 3-2-5; Chart Supplement*

- Salinas is Class D while the tower operates; when the tower is closed it is Class G at the surface with Class E starting at 700 ft AGL (verified against JO 7400.11, 2026-08-18).

*Source: JO 7400.11*

- Class E is controlled airspace that isn't A, B, C, or D — most of the map. The magenta vignette (faded band) means E starts at 700 ft AGL inside it; elsewhere E typically starts at 1,200 ft AGL.

*Source: PHAK ch. 15; sectional legend*

- Class G is the uncontrolled leftover between the surface and the overlying Class E floor — ATC issues no clearances there.

*Source: PHAK ch. 15; AIM 3-3-1*

- "Controlled" means ATC services and IFR separation exist there — it does not mean VFR aircraft need permission everywhere; what each class demands of a VFR pilot is Phase 2 material.

*Source: PHAK ch. 15*

- Special use airspace exists and has names worth recognizing on the chart: Prohibited (P-), Restricted (R-), Warning (W-), Military Operations Areas, and Alert Areas — the rules for each come in 2-5/3-5.

*Source: PHAK ch. 15; sectional legend*

- The sectional legend decodes every symbol on the chart — the recognition habit is: unknown line or box, open the legend, not guess.

*Source: Sectional chart legend*

- A silent radio is diagnosed before it is declared dead: volume and squelch, correct frequency, correct radio selected, audio panel switches, headset plugs, hand mic as backup.

*Source: AIM 4-2-13*

- Common causes of "lost comm" that aren't failures: wrong frequency dialed, transmit selector on the other radio, a pulled-back volume knob, an unplugged headset — which is why the checklist beats panic.

*Source: AIM 4-2-13*

- Receiver-only failure: transmit intentions in the blind ("transmitting blind"), state position and intentions, and watch for light gun signals.

*Source: AIM 4-2-13; AIM 6-4-1*

- Transmitter-only failure: acknowledge ATC by rocking wings (day) or flashing lights (night) and comply with light-gun instructions.

*Source: AIM 4-3-13*

- If the radio dies, squawk 7600 — the transponder tells ATC what the radio cannot.

*Source: AIM 6-4-2*

- Lost communication under VFR is not, by itself, an emergency: fly the airplane, stay VFR, and work the arrival plan — the airplane never needed the radio to fly.

*Source: AIM 6-4-1*

- NORDO arrival at a towered field (the 91.126(d)/91.129(d) rule): you may operate and land if weather is at or above basic VFR minimums, you keep visual contact with the tower, and you receive a clearance to land — the steady green light.

*Source: 14 CFR 91.129(d)(2); 14 CFR 91.126(d)*

- The NORDO towered arrival technique: remain clear, observe the flow and runway in use, enter the pattern conforming to it, and watch the tower for the light gun on downwind and final.

*Source: AIM 4-3-13; AIM 4-2-13*

- Flashing red or no light on final means go around and re-enter — landing without the green at a towered field is landing without a clearance.

*Source: 14 CFR 91.129(d)(2)(iii); AIM 4-3-13*

- NORDO at a nontowered field: fly the standard pattern with extra vigilance — everyone else is self-announcing around an airplane they cannot hear.

*Source: AC 90-66C; AIM 4-1-9*

- If the silence came from the electrical system (ammeter discharge, dimming panel), the problem is bigger than the radio: shed load, plan battery minutes, and prefer landing over troubleshooting (system work is 1-9's drill).

*Source: PA-28-151 POH sec. 4; AIM 6-4-1*

- Prevention habits: radio check before taxi, both radios tuned when two exist, frequencies pre-set for the route, and the light-gun table reviewed cold before every tower-field solo.

*Source: AIM 4-3-13*

- When the engine quits, the first act is airspeed: pitch for best glide and trim for it — altitude is spent buying time and distance, never speed above or below the number.

*Source: PA-28-151 POH 4-2; AFH ch. 18*

- The Warrior's best glide speed is 85 MPH; once the field is made, the book slows to 76.

*Source: PA-28-151 POH 4-2*

- Wind bends the glide: a headwind steepens the path over the ground and a tailwind stretches it — pick fields with the wind, not against it, when options are equal.

*Source: AFH ch. 18*

- Altitude is the option-maker: know the glide cone at pattern altitude versus cruise, and the practical consequence — climb-outs and low passes shrink the menu to what's ahead.

*Source: PHAK ch. 11; AFH ch. 18*

- The Warrior restart flow (POH 4-1, seven items): hold at least 85 MPH, fuel selector to a tank containing fuel, electric fuel pump on, mixture rich, carb heat on, engine gauges checked for cause, primer checked locked.

*Source: PA-28-151 POH 4-1*

- Fuel starvation (fuel aboard, not reaching the engine — wrong tank, selector between detents, pump failure) is a leading cause of power loss, and it is nearly always pilot-preventable.

*Source: PHAK ch. 7; AFH ch. 18*

- Fuel exhaustion (nothing left aboard) is a planning failure that begins on the ground — the gauge-versus-watch discipline starts at the preflight quantity check.

*Source: PHAK ch. 7*

- Carburetor ice forms in high humidity across a wide temperature band (roughly 20–70°F OAT), most readily at low power; in a fixed-pitch airplane it shows as a slow RPM decay and roughness.

*Source: PHAK ch. 7; PA-28-151 POH sec. 4*

- Carb heat response is full on and LEAVE IT ON: the melting ice will briefly worsen the roughness before power returns — pulling the heat back off at the stumble is the trap.

*Source: PHAK ch. 7; PA-28-151 POH sec. 4*

- Rough engine at altitude: fly airspeed first, pick the field second, run the checklist third — at 6,500 ft there is time, and the order is the answer.

*Source: PA-28-151 POH 4-1, 4-2*

- The same symptom at 1,000 ft in the pattern inverts the answer: land. Fuel-selector changes at low altitude are specifically warned against — an error costs the recovery time you no longer have.

*Source: PA-28-151 POH Operating Tips 3*

- Field selection priorities: wind direction, field length and surface, slope, obstacles on the approach, and proximity to help — decided high, held low.

*Source: AFH ch. 18*

- Commit to the chosen field: changing fields late is a leading way survivable forced landings become stall/spin accidents — switch only for a clearly better option found early.

*Source: AFH ch. 18*

- The forced-landing pattern is energy management: arrive abeam the touchdown point at a planned altitude, fly a normal-looking base and final, and hold flaps until the field is assured.

*Source: AFH ch. 18*

- Engine failure on the takeoff roll: throttle idle, brake, stop straight ahead — every takeoff carries a briefed abort point where the numbers must be there.

*Source: AFH ch. 5*

- Engine failure after liftoff, low: lower the nose immediately and land within roughly 30 degrees either side of the nose — obstacles are accepted; stall/spin is not.

*Source: AFH ch. 5, ch. 18*

- Load factor in the gliding turnback is the killer mechanism: steepening the bank to make the runway raises stall speed exactly when airspeed is bleeding — the 1-5 math flown for real.

*Source: PHAK ch. 5; AFH ch. 18*

- Once down is assured, secure the airplane: fuel off, mixture cut, mags off, master off after flaps, door unlatched before touchdown per the POH — and belts tight, passengers braced.

*Source: PA-28-151 POH 4-2; AFH ch. 18*

- Mayday goes out when workload allows, on the working frequency or 121.5, squawk 7700, with position, souls, and intentions — ATC in turn clears the way and starts the rescue clock.

*Source: AIM 6-3-1, 6-3-2*

– After the stop: people out and clear, ELT confirmed on, stay with the airplane — the wreck is the biggest signal mirror you own.

*Source: AIM 6-2-5; AFH ch. 18*

– Diversion triggers: weather closing ahead or behind, fuel below the planned line, a sick passenger or pilot, a rough engine or system doubt, a closing airport, or lost situational awareness.

*Source: PHAK ch. 16; FAA-H-8083-2*

– The diversion decision is cheapest early: every mile flown toward deteriorating conditions spends fuel, daylight, and options — the module rule is divert while it is still an inconvenience.

*Source: FAA-H-8083-2; PHAK ch. 2*

– Alternate selection weighs weather at the alternate, runway length and surface, fuel to reach it with reserve intact, terrain en route, services, and familiarity.

*Source: PHAK ch. 16*

– Nearest is not always best: a strip two minutes closer loses to a longer runway with fuel, phone, and weather reporting — unless the emergency says otherwise.

*Source: PHAK ch. 16; AFH ch. 18*

– Personal minimums are the diversion tripwires: when a pre-set number (ceiling, visibility, fuel, daylight) is crossed, the divert decision was already made on the ground.

*Source: FAA-H-8083-2*

– Rough-and-ready diversion math: turn toward the alternate first, then refine — estimate the course with the chart's compass rose or a pencil line, distance with the sectional's scale or thumb-widths, time from groundspeed.

*Source: PHAK ch. 16; AFH ch. 9*

– Deviating from a flight plan or an ATC instruction is allowed when the situation requires it — tell ATC what you need; amend, don't silently wander.

*Source: 14 CFR 91.3; AIM 4-4-1*

– ATC, flight following, and (Phase 2) Flight Service are diversion resources: position, vectors, weather ahead, and airport information are one call away.

*Source: AIM 4-1-16; PHAK ch. 16*

– EFB and GPS "nearest" functions are legitimate diversion tools — used as a cross-check on the pilot's own picture, not a replacement for it.

*Source: PHAK ch. 16; AC 90-109A*

– Heads-down replanning is the diversion's collision trap: eyes out on a schedule, and the reroute worked in pieces — aviate, navigate, communicate holds rank.

*Source: AC 90-48; PHAK ch. 2*

– Fly the airplane through the turn first: new heading, altitude appropriate to the new course and terrain, THEN the math, THEN the radio call.

*Source: AFH ch. 9; PHAK ch. 16*

– The fuel reserve is protected, not spent: a diversion that lands with the reserve intact was flown correctly; a destination reached by burning into the reserve was a gamble that happened to pay.

*Source: PHAK ch. 16; FAA-H-8083-2*

– On a solo, the diversion brief is pre-loaded: before takeoff the student can name the alternate for each leg and the condition that sends them there — nobody is aboard to catch the hesitation.

*Source: FAA-H-8083-2; North Aero practice*

– External pressure is the diversion's real opponent — the meeting, the rental return time, the passenger's schedule; the counter is announcing the alternate as part of the plan so diverting is keeping a promise, not

breaking one.

*Source: FAA-H-8083-2; PHAK ch. 2*

- 14 CFR Part 61 governs pilot certification: certificates, ratings, privileges, currency.

*Source: 14 CFR 61*

- 14 CFR Part 91 governs how aircraft are operated: general operating and flight rules.

*Source: 14 CFR 91*

- 14 CFR Parts 67 and 68 govern medical standards: Part 67 the three medical certificate classes, Part 68 BasicMed.

*Source: 14 CFR 67; 14 CFR 68*

- The FARs are law — binding on every pilot; violating one can cost a certificate.

*Source: 14 CFR 61; 14 CFR 91*

- The AIM is the FAA's official guide to flying in the National Airspace System; it is guidance, not regulation, but it states the procedures the FAA expects.

*Source: AIM, Preface*

- Advisory Circulars are non-binding FAA guidance; their numbering mirrors the CFR (AC 61-x pilots, AC 91-x operations).

*Source: AC 00-2 series; PHAK ch. 1*

- The pilot in command is directly responsible for, and the final authority as to, the operation of the aircraft.

*Source: 14 CFR 91.3(a)*

- In an in-flight emergency requiring immediate action, the PIC may deviate from any rule of Part 91 to the extent required to meet that emergency.

*Source: 14 CFR 91.3(b)*

- After an emergency deviation, a written report goes to the FAA only if the Administrator requests one.

*Source: 14 CFR 91.3(c)*

- An NTSB "accident" is an occurrence between boarding with intent to fly and disembarking, in which a person suffers death or serious injury or the aircraft receives substantial damage.

*Source: 49 CFR 830.2*

- Accidents require immediate notification to the nearest NTSB office; so do listed serious incidents even when no accident occurred.

*Source: 49 CFR 830.5*

- The immediate-notification incident list includes flight control system malfunction or failure, required crewmember unable to perform duties from injury or illness, in-flight fire, and in-flight collision.

*Source: 49 CFR 830.5(a)*

- The written NTSB report (Form 6120.1) is due within 10 days of an accident, or after 7 days if an overdue aircraft is still missing; for an incident, a report is filed only if the NTSB requests it.

*Source: 49 CFR 830.15*

- A student pilot certificate for airplanes requires being at least 16 years old and able to read, speak, write, and understand English.

*Source: 14 CFR 61.83*

- A private pilot certificate (airplane) requires being at least 17 years old.

*Source: 14 CFR 61.103(a)*

- Student pilot certificates issued today carry no expiration date; they remain valid unless surrendered, suspended, or revoked.

*Source: 14 CFR 61.19(a)*

- The private certificate requires at least 40 hours of flight time, including at least 20 hours of flight training and 10 hours of solo flight in the required areas of operation.

*Source: 14 CFR 61.109(a)*

- Becoming a private pilot also requires passing the FAA knowledge test and the practical test, each after an instructor endorsement.

*Source: 14 CFR 61.103(d)–(h)*

- Medical certificates come in three classes — first (airline transport privileges), second (commercial), third (private, recreational, student).

*Source: 14 CFR 61.23(a); PHAK ch. 17*

- Private and student pilot privileges require at least a third-class medical — or a qualifying alternative such as BasicMed.

*Source: 14 CFR 61.23(a)(3), (c)*

- For a pilot under 40 on the exam date, a third-class medical lasts through the end of the 60th month after the month of the exam.

*Source: 14 CFR 61.23(d)*

- For a pilot 40 or older on the exam date, a third-class medical lasts through the end of the 24th month after the month of the exam.

*Source: 14 CFR 61.23(d)*

- A pilot may not fly during any known medical deficiency: whoever knows, or has reason to know, of a condition that would make them unable to operate safely is grounded by rule, whatever their medical certificate says.

*Source: 14 CFR 61.53(a)*

- Temporary disqualifications include everyday things: a head cold that blocks the ears, a new medication, an ongoing dental anesthetic, acute stress or fatigue — the IMSAFE letters made regulatory.

*Source: 14 CFR 61.53; AIM 8-1-1*

- BasicMed qualification: have held any FAA medical after July 14, 2006, hold a valid U.S. driver's license, complete the online medical course every 24 calendar months, and get the CMEC physician exam every 48 months.

*Source: 14 CFR 61.23(c)(3); 14 CFR 68.3, 68.5*

- BasicMed aircraft limits: authorized to carry not more than 7 occupants, maximum takeoff weight 12,500 lb or less, and no more than 6 passengers on board.

*Source: 14 CFR 61.113(i)(1)*

- BasicMed flight limits: at or below 18,000 ft MSL, indicated airspeed not over 250 knots, and inside the United States unless the other country authorizes it.

*Source: 14 CFR 61.113(i)(2)*

- To exercise pilot privileges you must have your pilot certificate in physical possession or readily accessible in the aircraft.

*Source: 14 CFR 61.3(a)(1)*

- You must also carry a photo ID (driver's license, government or military ID, passport, or other form the Administrator accepts) and, when one is required, your medical certificate — same carriage standard.

*Source: 14 CFR 61.3(a)(2), (c)*

- Certificate, medical, and photo ID must be presented on request to the FAA, the NTSB, any federal, state, or local law enforcement officer, or the TSA.

*Source: 14 CFR 61.3(l)*

- A student pilot must carry the logbook and student pilot certificate in the aircraft on all solo cross-country

flights, as evidence of the required clearances and endorsements.

*Source: 14 CFR 61.51(i)(2)*

- A flight review is required within the preceding 24 calendar months to act as PIC, and its minimum is 1 hour of flight training plus 1 hour of ground training.

*Source: 14 CFR 61.56(a), (c)*

- To carry other people, a pilot needs three takeoffs and landings within the preceding 90 days as sole manipulator, in the same category, class, and type (if required).

*Source: 14 CFR 61.57(a)*

- In a tailwheel airplane, the three 90-day landings must be to a full stop.

*Source: 14 CFR 61.57(a)(1)*

- Night currency requires three takeoffs and three landings to a full stop, made 1 hour after sunset to 1 hour before sunrise, within the preceding 90 days.

*Source: 14 CFR 61.57(b)*

- A permanent address change must be reported to the FAA Airman Certification Branch in writing within 30 days, or the certificate cannot be exercised.

*Source: 14 CFR 61.60*

- A private pilot may not act as PIC for compensation or hire, and may not pay less than a pro rata share of fuel, oil, airport expenditures, or rental fees when sharing costs with passengers.

*Source: 14 CFR 61.113(a), (c)*

- Currency is the legal minimum; proficiency is actual skill — they are different measurements, and the rules only check the first.

*Source: AC 61-98E; PHAK ch. 2*

- Meeting 61.57 currency does not by itself make a pilot safe for a given flight — the personal minimums check carries that decision.

*Source: AC 61-98E; PHAK ch. 2*

- Before flying an unfamiliar make and model, get a checkout that covers its POH numbers, systems, and handling differences — regulations require no endorsement for most transitions, so the discipline is on the pilot.

*Source: AC 90-109A; FAA-H-8083-3*

- ARROW names the documents that must be aboard: Airworthiness certificate, Registration, Radio station license (international flights only), Operating limitations, Weight and balance data.

*Source: 14 CFR 91.203(a); 14 CFR 91.9(b)*

- An appropriate and current airworthiness certificate must be aboard the aircraft to operate it.

*Source: 14 CFR 91.203(a)(1)*

- An effective U.S. registration certificate must be aboard.

*Source: 14 CFR 91.203(a)(2)*

- Operating limitations ride in the airplane as the approved AFM/POH, plus placards, instrument markings, or any combination — that is the O in ARROW.

*Source: 14 CFR 91.9(b)*

- Airworthy means two things at once: the aircraft conforms to its type design AND is in condition for safe operation. Either prong alone is not enough.

*Source: 14 CFR 3.5(a)*

- No person may operate a civil aircraft unless it is airworthy, and the PIC is the one responsible for determining the aircraft is in condition for safe flight.

*Source: 14 CFR 91.7(a), (b)*

- The PIC must discontinue the flight when an unairworthy mechanical, electrical, or structural condition occurs — the duty does not end at takeoff.

*Source: 14 CFR 91.7(b)*

- The owner or operator is primarily responsible for maintaining the aircraft in airworthy condition; the PIC is responsible for determining it is safe for this flight — two different duties held by two different people.

*Source: 14 CFR 91.403(a); 14 CFR 91.7(b)*

- ATOMATOFLAMES is the day-VFR required equipment mnemonic covering the 91.205(b) list. (Mnemonic object; covers 1-4.p13–p22.)

*Source: 14 CFR 91.205(b)*

- Day VFR requires an airspeed indicator, an altimeter, and a magnetic direction indicator.

*Source: 14 CFR 91.205(b)(1)–(3)*

- Day VFR requires a tachometer for each engine.

*Source: 14 CFR 91.205(b)(4)*

- Day VFR requires an oil pressure gauge for each engine using a pressure system and an oil temperature gauge for each air-cooled engine.

*Source: 14 CFR 91.205(b)(5), (7)*

- Day VFR requires a fuel gauge indicating the quantity in each tank — one dead fuel gauge grounds a two-tank airplane until the rule is worked.

*Source: 14 CFR 91.205(b)(9)*

- Day VFR requires a landing gear position indicator if the gear is retractable.

*Source: 14 CFR 91.205(b)(10)*

- For hire over water beyond power-off gliding distance from shore, day VFR adds flotation gear for each occupant and a pyrotechnic signaling device.

*Source: 14 CFR 91.205(b)(12)*

- Day VFR requires an approved safety belt for each occupant 2 years or older, and shoulder harnesses per the airplane's manufacture date (front seats after July 18, 1978; all seats after December 12, 1986).

*Source: 14 CFR 91.205(b)(13), (14)*

- Day VFR requires an ELT when 91.207 applies — the ELT's rules live in their own section, not in 91.205.

*Source: 14 CFR 91.205(b)(15); 14 CFR 91.207*

- FLAPS is the night-VFR add-on mnemonic: Fuses (spares), Landing light (if for hire), Anticollision lights, Position lights, Source of electrical energy. (Mnemonic object; covers 1-4.p24–p26.)

*Source: 14 CFR 91.205(c)*

- Night VFR requires everything on the day list plus approved position lights and an approved red or white anticollision light system.

*Source: 14 CFR 91.205(c)(1)–(3)*

- Night VFR requires one electric landing light only if the aircraft is operated for hire.

*Source: 14 CFR 91.205(c)(4)*

- Night VFR requires an adequate source of electrical energy for all installed electrical and radio equipment.

*Source: 14 CFR 91.205(c)(5)*

- Night VFR requires one spare set of fuses, or three spare fuses of each kind required, accessible to the pilot in flight.

*Source: 14 CFR 91.205(c)(6)*

- Finding installed equipment inoperative invokes 91.213 and a decision flow before flight — the flow itself is taught with full airworthiness in 3-2; the Phase 1 rule is: a broken airplane is not flown until that flow is worked

with the school.

*Source: 14 CFR 91.213*

- AVIATE(S) is the required-inspections mnemonic: Annual, VOR (IFR), 100-hour, Altimeter/pitot-static, Transponder, ELT (+ Static). (Mnemonic object; covers 1-4.p30–p36.)

*Source: 14 CFR 91.409, 91.411, 91.413, 91.207*

- An annual inspection within the preceding 12 calendar months is required to operate any aircraft.

*Source: 14 CFR 91.409(a)*

- A 100-hour inspection is required only when carrying any person (other than a crewmember) for hire, or when giving flight instruction for hire in an aircraft that instructor provides.

*Source: 14 CFR 91.409(b)*

- The ELT must be inspected within 12 calendar months for installation, battery corrosion, control and crash-sensor operation, and antenna signal.

*Source: 14 CFR 91.207(d)*

- ELT batteries must be replaced (or recharged) after more than 1 cumulative hour of use, or when 50 percent of their useful life has expired.

*Source: 14 CFR 91.207(c)*

- The transponder must be tested and inspected within the preceding 24 calendar months to be used; the altimeter/pitot-static check on the same 24-month clock is required for IFR operations.

*Source: 14 CFR 91.413; 14 CFR 91.411*

- Standard airworthiness certificates cover aircraft type certificated in the normal, utility, acrobatic, commuter, or transport categories, plus manned free balloons and special classes.

*Source: 14 CFR 21.175(a)*

- Special airworthiness certificates cover primary, restricted, provisional, and limited category aircraft, light-sport, experimental, and aircraft operating under a special flight permit.

*Source: 14 CFR 21.175(b)*

- Before any flight, the PIC must become familiar with ALL available information concerning that flight.

*Source: 14 CFR 91.103*

- For every flight, preflight action includes runway lengths at the airports of intended use and the airplane's takeoff and landing distance data.

*Source: 14 CFR 91.103(b)*

- For a flight away from the airport's vicinity, preflight action adds weather reports and forecasts, fuel requirements, alternatives if the flight cannot be completed, and known traffic delays.

*Source: 14 CFR 91.103(a)*

- The preflight inspection follows the POH checklist for this airplane — the manufacturer's sequence, every time, not memory.

*Source: PA-28-151 POH (preflight checklist); AFH ch. 2*

- Every checklist item exists to catch a specific failure — knowing WHY each item is checked is what turns the walkaround from ritual into inspection.

*Source: AFH ch. 2; PHAK ch. 2*

- Fuel is sumped to catch water and sediment: water sits at the bottom as a clear bubble, and the sample is checked for color, smell, and grade before every first flight and after each fueling.

*Source: AFH ch. 2; PA-28-151 POH (preflight)*

- Common preflight catches: control-surface freedom and security, tire condition and strut extension, fuel vents clear, pitot and static openings clear, oil quantity within limits, no fresh stains under the cowl.

*Source: AFH ch. 2*

- Any discrepancy found in flight or after it is written up and reported to the operator before the next flight — the next pilot's preflight starts from your squawk.

*Source: 14 CFR 91.7; AFH ch. 2*

- "Is it legal" and "is it safe" are different questions, and the PIC must answer both yes before flying — equipment can pass every rule and still be wrong for tonight's flight.

*Source: 14 CFR 91.213(d)(4); FAA-H-8083-2*

- The four forces on an airplane are lift, weight, thrust, and drag; in steady unaccelerated flight the opposing pairs are in balance.

*Source: PHAK ch. 4*

- Angle of attack is the angle between the wing's chord line and the relative wind — not the angle to the horizon.

*Source: PHAK ch. 4*

- A wing stalls when it exceeds its critical angle of attack — and only then. It can happen at any airspeed, any attitude, and any weight.

*Source: PHAK ch. 5*

- Lift comes from the wing deflecting air downward and the pressure difference across the wing — increasing angle of attack or airspeed increases lift until the critical angle.

*Source: PHAK ch. 4*

- Parasite drag grows with the square of airspeed; induced drag (the price of lift) grows as airspeed decreases. Total drag is least where the two curves cross.

*Source: PHAK ch. 5*

- Load factor is lift divided by weight, measured in Gs; in a level 60-degree-bank turn it is 2.0 regardless of airplane type.

*Source: PHAK ch. 5*

- Stall speed rises with the square root of load factor — at 60 degrees of bank, stall speed is about 1.41 times the wings-level number.

*Source: PHAK ch. 5*

- The Warrior proves the math in its own book: flaps-up stall 64.5 MPH level becomes 91 MPH at 60 degrees of bank ( $64.5 \times 1.41$ ).

*Source: PA-28-151 AFM 3-7*

- Weight raises stall speed; forward CG raises it slightly more (the tail must pull down harder); aft CG lowers stall speed but reduces stability and makes stall/spin recovery harder.

*Source: PHAK ch. 5, ch. 10*

- Uncoordinated flight (ball out of center) means the airplane is slipping or skidding — and a stall in uncoordinated flight is how spins start.

*Source: PHAK ch. 5; AFH ch. 5*

- The left-turning tendencies are torque, P-factor, spiraling slipstream, and gyroscopic precession; right rudder is the answer.

*Source: PHAK ch. 5*

- P-factor is strongest at high power and high angle of attack — takeoff and departure stalls — because the descending blade takes a bigger bite.

*Source: PHAK ch. 5*

- Adverse yaw is the nose yawing away from the turn as the raised wing's aileron adds drag; coordinated rudder cancels it.

*Source: PHAK ch. 5; AFH ch. 3*

- Ground effect within about one wingspan of the surface reduces induced drag: the airplane can lift off before it can climb, and it floats in the flare.

*Source: PHAK ch. 5*

- In slow flight, controls feel mushy, more right rudder is needed, and the airplane sits behind the power curve — configuration (flaps, gear) changes the speeds but not the logic.

*Source: AFH ch. 5*

- An impending stall announces itself by sight (nose attitude), sound (quieting slipstream, stall horn), and feel (buffet, mushy controls, reduced control effectiveness).

*Source: AFH ch. 5*

- Stall warning devices fire before the stall, but the warning margin shrinks with abrupt inputs and load factor — the horn is a boundary, not a countdown.

*Source: AFH ch. 5; AC 61-67*

- Stall recovery fundamentals, in order: reduce angle of attack (pitch down), level the wings with coordinated controls, add power as needed, return to the desired flightpath.

*Source: AFH ch. 5*

- Power-off (approach) stalls happen where approaches happen: the skidding base-to-final turn, stretching a glide, distraction in the pattern.

*Source: AFH ch. 5*

- The base-to-final cross-control stall is the classic fatal spin entry: overshooting final, holding bank off with opposite aileron while skidding with inside rudder, slow — the inside wing stalls first with no altitude to recover.

*Source: AFH ch. 5*

- A secondary stall is a second stall caused by recovering from the first one too aggressively — relax the pull, recover again.

*Source: AFH ch. 5*

- An accelerated stall is a stall above normal stall speed from added load factor — steep turns and abrupt pull-ups.

*Source: AFH ch. 5*

- An elevator trim stall is the go-around trap: full power with landing trim pitches the nose hard up — push forward, retrim, then climb.

*Source: AFH ch. 5*

- Power-on (departure) stalls happen at high power and low speed: liftoff, initial climb, go-around — with strong left-turning tendencies loading the stall with yaw.

*Source: AFH ch. 5*

- A spin is an aggravated stall with autorotation: one wing more deeply stalled than the other. No stall, no spin — and the yaw came from somewhere.

*Source: AFH ch. 5; AC 61-67*

- A spin has three phases: entry (stall plus yaw), incipient (first turns, spin not yet stabilized, recovery quickest here), and developed (stabilized rotation and descent).

*Source: AFH ch. 5*

- Generic spin recovery is PARE: Power idle, Ailerons neutral, Rudder full opposite the rotation, Elevator briskly forward — then rudder neutral when rotation stops, and ease out of the dive. (Mnemonic object.)

*Source: AFH ch. 5; AC 61-67*

- Intentional spins are prohibited in the Warrior in both Normal and Utility categories — prohibited is not the same as impossible, which is why recovery is memorized anyway.

*Source: PA-28-151 AFM 3-4, 3-5*

- Va, maneuvering speed, is the maximum speed for full deflection of a single control — 124 MPH placarded in the Warrior.

*Source: PA-28-151 AFM 3-2*

- Key Warrior limit speeds: Vne 176 MPH (never exceed, red line), Vno 140 (top of green, smooth air only above), Vs1 64.5 (clean stall), Vso 58 (landing configuration stall). All MPH calibrated.

*Source: PA-28-151 AFM 3-2*

- Warrior climb speeds: Vy 87 MPH best rate; the short-field procedure holds 66 MPH to clear the obstacle (the book never labels a Vx — the procedure on POH 7-5 is the answer).

*Source: PA-28-151 POH 1-1, 7-5*

- High density altitude degrades everything at once — engine power, propeller thrust, and lift — so the same indicated airspeeds produce longer rolls and shallower climbs.

*Source: PHAK ch. 11*

- Turbulence, gusts, and windshear can spike angle of attack without any pilot input — the margin above stall must grow when the air gets rough.

*Source: AFH ch. 5; PHAK ch. 12*

- Stall practice altitude rule: recover no lower than 1,500 ft AGL in a single-engine airplane (the ACS completion standard).

*Source: FAA-S-ACS-6C VII*

- Clear the area before stall or spin practice — collision vigilance does not pause for maneuvers.

*Source: FAA-S-ACS-6C VII; AFH ch. 5*

- Distraction is the documented first link in most inadvertent stall/spin chains — the defense is dividing attention deliberately and letting the maneuver wait.

*Source: AFH ch. 5; AC 61-67*

- Inadvertent slow flight with the stall warning on — low, slow, dragging it in — is itself the emergency: lower the nose and add power before anything else.

*Source: AFH ch. 5*

- In a steep turn the outside wing travels faster and makes more lift, creating an overbanking tendency the pilot holds off with aileron against the turn.

*Source: PHAK ch. 5 (pin-needed); AFH ch. 9 (pin-needed)*

- Rate and radius of turn are set by bank and speed: steeper bank quickens and tightens the turn; more speed slows the rate and widens the radius — over the ground, it is groundspeed that sets the track.

*Source: PHAK ch. 5 (pin-needed)*

- The primary flight controls are ailerons (roll), elevator or stabilator (pitch), and rudder (yaw).

*Source: PHAK ch. 6*

- The Warrior's pitch control is a stabilator — the whole horizontal tail moves — with an anti-servo tab that adds control feel and doubles as the trim tab.

*Source: PA-28-151 POH sec. 2; PHAK ch. 6*

- Trim relieves control pressure; it is set for a condition, and re-set every time airspeed or configuration changes.

*Source: PHAK ch. 6; AFH ch. 3*

- Flaps increase lift and drag, letting the airplane fly a steeper approach at a lower speed without accelerating.

*Source: PHAK ch. 6*

- Warrior flaps are manual: a spring-loaded handle between the front seats, settings 10, 25, and 40 degrees, cable-operated — no motor to fail, and instant retraction if needed.

*Source: PA-28-151 POH 2-6*

- Expect a pitch change when flaps extend or retract — anticipate it and retrim rather than chase it.

*Source: PA-28-151 POH 2-6; AFH ch. 8*

- The Warrior's engine is a Lycoming O-320-E3D: four cylinders, horizontally opposed, 319.8 cubic inches, air-cooled, carbureted, producing 150 hp at 2700 RPM.

*Source: PA-28-151 POH 1-2*

- The propeller is fixed-pitch, so the tachometer is the power instrument — RPM is what the throttle sets.

*Source: PA-28-151 POH sec. 1; PHAK ch. 7*

- Ignition is two engine-driven magnetos, fully independent of the electrical system — the engine keeps running with the master switch off.

*Source: PHAK ch. 7*

- Two magnetos and two spark plugs per cylinder exist for redundancy and better combustion — which is exactly what the runup mag check verifies.

*Source: PHAK ch. 7*

- The mixture control sets the fuel-air ratio: leaning compensates for thinner air at altitude; full rich is takeoff and landing default at low field elevations.

*Source: PHAK ch. 7*

- The carburetor mixes fuel and air by venturi suction — and cools itself doing it, which is why carburetor ice exists (recognition and response are taught in 1-15).

*Source: PHAK ch. 7*

- Carburetor heat routes unfiltered warm air to the carburetor: it melts and prevents carb ice, costs some power, and enriches the mixture while on.

*Source: PHAK ch. 7; PA-28-151 POH sec. 2*

- The Warrior holds 50 gallons in two 25-gallon wing tanks, 24 usable each — 48 usable. Two gallons of unusable fuel is not a reserve.

*Source: PA-28-151 POH 1-2, 2-7*

- The Warrior's fuel selector has LEFT, RIGHT, and OFF — there is no BOTH. Fuel management means switching tanks on a schedule, and getting the selector wrong means the engine stops.

*Source: PA-28-151 POH 2-7*

- The electric fuel pump is ON for all takeoffs and landings and when switching tanks; it backs up the engine-driven pump.

*Source: PA-28-151 POH 2-7; AFM 3-5*

- Use only the fuel grade the POH specifies; a higher octane is acceptable in a pinch, a lower one never is. Aviation gasoline is dyed by grade (100LL is blue).

*Source: PA-28-151 POH sec. 1; PHAK ch. 7*

- Oil lubricates, cools, cleans, and seals; the Warrior's wet-sump system holds 8 quarts, with a published minimum safe quantity of 2 quarts.

*Source: PA-28-151 POH 10-8*

- The Warrior's only hydraulic system is the brakes: cylinders above each toe pedal plus one hand lever below the instrument panel that doubles as the parking brake, all on MIL-H-5606 fluid.

*Source: PA-28-151 POH 2-4, 10-7*

- The landing gear is fixed tricycle with oleo (air-oil) struts; the nosewheel steers through the rudder pedals, and strut extension is a preflight item.

*Source: PA-28-151 POH sec. 2; PHAK ch. 7*

- Before takeoff, the PIC must brief passengers on safety belts and shoulder harnesses and confirm they are

fastened for taxi, takeoff, and landing.

*Source: 14 CFR 91.107(a)*

- Each occupant 2 or older needs their own belt; a child under 2 may be held on an adult's lap.

*Source: 14 CFR 91.107(a)(3)*

- Checklists are used as do-verify flows or read-do lists, but they are USED — memory is for immediate-action items only, and the checklist backs it up afterward.

*Source: PHAK ch. 2; AFH ch. 1*

- Navigation data must be current and appropriate: charts in date, database cycles current if using GPS.

*Source: PA.II.B refs (AC 120-71); AIM ch. 1*

- Loose items get secured before flight — anything free in the cabin becomes a projectile in turbulence and a control-jam hazard on the floor.

*Source: AFH ch. 2*

- Portable electronics and automation are managed like any system: set them up on the ground, and drop them the moment they compete with flying.

*Source: PA.II.B refs; FAA-H-8083-2*

- Passengers are briefed on sterile-cockpit moments: no questions during takeoff, landing, or radio work — and the brief is given before engine start, when they can hear it.

*Source: FAA-H-8083-2; AFH ch. 2*

- Engine start follows the POH for the condition — cold, hot, or flooded each has its own prime/throttle/mixture recipe, and guessing floods or fires it.

*Source: PA-28-151 POH sec. 7 (starting checklists)*

- Before turning the prop: brakes set, area clear front and rear, and a loud "CLEAR PROP" with time for an answer. The propeller is treated as live whenever the mags are not verified off.

*Source: AFH ch. 2; PHAK ch. 7*

- After start, oil pressure must rise within the POH's stated seconds or the engine is shut down at once.

*Source: PA-28-151 POH sec. 7; AFH ch. 2*

- The before-takeoff (runup) check verifies engine, controls, instruments, and configuration while there is still time to taxi back — every line exists to catch a specific way the airplane can betray a takeoff.

*Source: PA-28-151 POH sec. 7; AFH ch. 2*

- The mag check verifies each ignition system alone within the POH's allowed RPM drop and difference; a dead-smooth zero drop is also a failure (the switch may not be grounding).

*Source: PA-28-151 POH sec. 7; PHAK ch. 7*

- Runup happens with the airplane pointed to keep prop blast and the runway approach path clear, brakes holding, and eyes dividing between the checklist and the outside.

*Source: AFH ch. 2*

- Shutdown and securing follow the POH: avionics off, mixture idle-cutoff, mags off, master off — then control lock, tie-downs, chocks, and pitot cover. An untied airplane is one gust from a claim.

*Source: PA-28-151 POH sec. 7; AFH ch. 2*

- Passengers are escorted on the ramp: clear of props, no wandering, out the briefed path — the PIC's duty does not end until they are off the movement area.

*Source: AFH ch. 2*

- The pitot-static instruments are the airspeed indicator, altimeter, and vertical speed indicator; the gyroscopic instruments are the attitude indicator, heading indicator, and turn coordinator; the magnetic compass stands alone.

*Source: PHAK ch. 8*

- The airspeed indicator is the only instrument that uses both pitot (ram) and static pressure — it displays their difference.

*Source: PHAK ch. 8*

- Indicated airspeed is what the dial shows; calibrated corrects it for installation error; true airspeed corrects calibrated for density altitude.

*Source: PHAK ch. 8*

- Airspeed indicator markings: white arc  $V_{SO}$  to  $V_{FE}$  (flap range), green arc  $V_{S1}$  to  $V_{NO}$  (normal), yellow arc caution (smooth air only), red line  $V_{NE}$ .

*Source: PHAK ch. 8; PA-28-151 AFM 3-2*

- The altimeter is a stack of sealed aneroid wafers reading static pressure against the setting dialed in the Kollsman window.

*Source: PHAK ch. 8*

- Altimeter setting is updated in flight to the nearest reporting station; standard sea-level pressure is 29.92 inches Hg.

*Source: PHAK ch. 8; 14 CFR 91.121*

- One inch of altimeter setting is worth roughly 1,000 feet of indicated altitude.

*Source: PHAK ch. 8*

- Flying from high pressure toward low pressure (or hot to cold) without resetting makes the altimeter read higher than you are: "high to low, look out below."

*Source: PHAK ch. 8*

- The altitude vocabulary: indicated (dial), pressure (29.92 set), density (pressure corrected for temperature), true (above sea level), absolute (above ground).

*Source: PHAK ch. 8*

- The VSI shows rate of climb or descent from the lag in a calibrated static leak; the needle trend is instant but the rate value lags several seconds.

*Source: PHAK ch. 8*

- The attitude indicator is the only instrument giving pitch and bank directly; its gyro holds rigid in space while the case moves around it.

*Source: PHAK ch. 8*

- The heading indicator drifts from gyro precession and must be realigned with the magnetic compass every 10–15 minutes, in straight-and-level unaccelerated flight.

*Source: PHAK ch. 8*

- The turn coordinator's canted gyro shows rate of turn and roll rate; the miniature aircraft says nothing about bank angle or pitch.

*Source: PHAK ch. 8*

- Standard rate is 3 degrees per second — a full circle in two minutes — marked by the turn coordinator's index.

*Source: PHAK ch. 8*

- The inclinometer ball shows coordination: ball toward the inside of the turn is a slip, toward the outside is a skid — step on the ball.

*Source: PHAK ch. 8*

- A left turn with the ball out to the right is a skid: too much left rudder for the bank — and the skidded, slow version of this picture is the base-to-final killer.

*Source: PHAK ch. 8*

– Magnetic variation is the angle between true and magnetic north; deviation is the compass error from the airplane's own fields, corrected by the card below the compass.

*Source: PHAK ch. 8*

– Compass acceleration error (northern hemisphere, east/west headings): Accelerate-North, Decelerate-South — ANDS. (Mnemonic object.)

*Source: PHAK ch. 8*

– Compass turning error: turning from a northerly heading the compass lags (shows a turn the opposite way at first); from a southerly heading it leads — Undershoot North, Overshoot South (UNOS). (Mnemonic object.)

*Source: PHAK ch. 8*

– The magnetic compass is reliable only in straight, level, unaccelerated flight — every other moment it is lying by a known recipe.

*Source: PHAK ch. 8*

– The instrument cross-check (scan) keeps the eyes moving through the panel with the attitude indicator as hub; staring at one instrument is fixation, skipping one is omission, and trusting one too much is emphasis.

*Source: IFH ch. 6; PHAK ch. 8*

– Instruments are read as a committee: no single indication is acted on until a second instrument confirms it — that is how a failed instrument is caught before it flies the airplane.

*Source: IFH ch. 6*

– Spatial disorientation is the body's motion sensors disagreeing with reality; without a visible horizon, the inner ear cannot be trusted at all.

*Source: PHAK ch. 17; AIM 8-1-5*

– The body senses attitude three ways — vision, inner-ear vestibular organs, and muscle/seat pressure — and in clouds or darkness the last two lie.

*Source: PHAK ch. 17*

– The leans: after a slow, unnoticed bank is corrected, the body swears the airplane is now banked the other way — the most common disorientation illusion.

*Source: PHAK ch. 17; AIM 8-1-5*

– The graveyard spiral: in a prolonged banked descent the turn sensation fades; pulling up without leveling the wings only tightens the spiral.

*Source: PHAK ch. 17*

– The Coriolis illusion: moving the head sharply during a prolonged turn tumbles the inner ear — keep the head still on instruments, move the eyes instead.

*Source: PHAK ch. 17*

– The somatogravic illusion: rapid acceleration feels like pitching up (and deceleration like pitching down) — the killer version is pushing over after a night or IMC takeoff.

*Source: PHAK ch. 17; AIM 8-1-5*

– Recovery from disorientation is procedural, not sensory: get on the instruments, believe them, and fly them until the conflict passes.

*Source: PHAK ch. 17; IFH ch. 6*

– A runway that is narrower or wider than usual, or that slopes, moves the visual approach: narrow or upsloping runways make you feel high (and fly a dangerously low approach).

*Source: PHAK ch. 17; AIM 8-1-5*

– The black-hole approach: a featureless dark area short of the runway invites a long, low descent into terrain — fly the glidepath aids, not the picture.

*Source: PHAK ch. 17*

- False horizons: sloping cloud decks, lit shorelines, or star/ground light blends get mistaken for level — cross-check the attitude indicator.

*Source: PHAK ch. 17*

- Hypoxia is oxygen starvation of the brain; its cruelty is that the first symptom is often euphoria and impaired judgment — the victim feels fine.

*Source: PHAK ch. 17; AIM 8-1-2*

- Hypoxia response: oxygen on if available, descend, and treat night vision as already degraded above roughly 5,000 ft cabin altitude.

*Source: PHAK ch. 17; AIM 8-1-2*

- Hyperventilation — over-breathing from stress — produces symptoms that mimic hypoxia (tingling, lightheadedness); the fix is consciously slowing the breathing.

*Source: PHAK ch. 17; AIM 8-1-3*

- Ear and sinus blocks come from pressure changes with a cold or congestion; they hurt worst on descent, are cleared by yawning, swallowing, or Valsalva — and the real answer is not flying congested.

*Source: PHAK ch. 17; AIM 8-1-2*

- Motion sickness: eyes on the horizon, cool air, gentle maneuvers, and land if it progresses — airsick pilots fly badly, and airsick passengers distract pilots.

*Source: PHAK ch. 17; AIM 8-1-9*

- Carbon monoxide reaches the cabin through a cracked exhaust and the heater shroud; it is odorless, and its headache/drowsiness builds slowly.

*Source: PHAK ch. 17; AIM 8-1-4*

- CO response: heat off, vents and windows open, land as soon as practicable, oxygen if available.

*Source: AIM 8-1-4; PHAK ch. 17*

- Stress: acute stress narrows attention and chronic stress erodes it; the margin is built on the ground — the IMSAFE S is a real gate, not a formality.

*Source: PHAK ch. 17*

- Fatigue comes in acute (one bad night — fixed by sleep) and chronic (weeks of deficit — not fixed by one night) forms, and it degrades judgment before it degrades stick skills.

*Source: PHAK ch. 17*

- Dehydration and skipped meals degrade performance at altitude faster than on the ground — carry water, eat before flying.

*Source: PHAK ch. 17*

- Hypothermia is a survival risk after any off-field landing even in mild seasons — which is why clothing for the terrain, not the cabin, is part of preflight (gear list lives in 1-9).

*Source: PHAK ch. 17*

- After scuba diving, wait 12 hours before flying up to 8,000 ft cabin altitude (24 hours if the diving required decompression stops), and 24 hours before flying above 8,000 ft.

*Source: AIM 8-1-2*

- The alcohol rule: no flying within 8 hours of any alcohol, with 0.04 blood alcohol or any degree of impairment grounding you regardless of the clock.

*Source: 14 CFR 91.17(a)*

- Medications rule of thumb: no flying on any drug whose effects or underlying condition are disqualifying; for over-the-counter drugs, when in doubt, ask the AME — sedating antihistamines are the classic trap.

*Source: 14 CFR 61.53; AIM 8-1-1*

- Unusual attitudes are prevented by the same three controls that fix them: a working scan, a trimmed airplane, and refusing distraction at low altitude.

*Source: IFH ch. 7; AFH ch. 3*

- Nose-high recovery on instruments, in order: add power, lower the nose, level the wings, return to level flight.

*Source: IFH ch. 7; AFH ch. 17*

- Nose-low recovery on instruments, in order: power to idle, level the wings, THEN ease out of the dive — pulling first tightens the spiral and loads the wings.

*Source: IFH ch. 7; AFH ch. 17*

- Before recovering, read the attitude off the panel as a committee (attitude indicator confirmed by airspeed trend, altimeter, VSI, turn coordinator) — recovering from the wrong attitude is how upsets kill.

*Source: IFH ch. 7*

- Inadvertent VFR into IMC is escaped by the numbers: believe the instruments, level the wings, begin a coordinated 180-degree level turn back to visual conditions, and climb only for terrain.

*Source: AFH ch. 17; PHAK ch. 17*

- VFR-into-IMC is among GA's most lethal scenarios; the survival move is made BEFORE entry — turning around while the ground is still visible.

*Source: PHAK ch. 17; FAA-H-8083-2*

- Lost in deteriorating conditions, the play is CONFESS early: tell ATC, accept help, declare an emergency if needed — assistance exists and using it is airmanship, not failure.

*Source: AIM 6-1-1; PHAK ch. 17*

- ATC radar can give vectors, position, and terrain-safe headings to a VFR pilot in trouble; flight following makes that help one transmission away.

*Source: AIM 4-1-16; AIM ch. 4*

- Basic instrument navigation help: track a heading, hold an altitude, and let the equipment (VOR/GPS taught in 2-2) or the controller do the geometry — the Phase 1 skill is flying the airplane while asking.

*Source: IFH ch. 6*

- The Warrior's electrical system is a 14-volt, alternator-and-battery system; the alternator carries the load in flight and the battery is the reserve.

*Source: PA-28-151 POH sec. 2; PHAK ch. 7*

- The ammeter tells the story: charging after start is normal recovery; a persistent discharge in cruise means the alternator has quit and the battery is now a countdown timer.

*Source: PA-28-151 POH sec. 2; PHAK ch. 7*

- The master switch controls the battery contactor and alternator field; circuit breakers and fuses protect each circuit, and a popped breaker is reset once at most — never held in.

*Source: PHAK ch. 7*

- Total electrical failure does not stop the engine (magnetos are self-powered); it takes the radios, transponder, flaps-if-electric, and lights — the lost-communications drill in 1-14 is the electrical-failure drill.

*Source: PHAK ch. 7; PA-28-151 POH sec. 4*

- Alternator failure response: verify with the ammeter, try one reset per the POH, then shed load and plan for the battery's remaining minutes — daylight VFR gets home, night needs a landing sooner.

*Source: PA-28-151 POH sec. 4*

- Avionics run off the electrical bus behind an avionics master switch, which protects them from starting-voltage spikes — avionics off before start and shutdown.

*Source: PHAK ch. 7*

- The pitot tube feeds ram air to the airspeed indicator only; the static ports feed the airspeed indicator, altimeter, and VSI.

*Source: PHAK ch. 8*

- A blocked pitot tube (drain also blocked) turns the airspeed indicator into an altimeter: indication climbs as the airplane climbs — the classic insect-nest or icing signature.

*Source: PHAK ch. 8*

- Blocked static ports freeze the altimeter, zero the VSI, and make the airspeed indicator lie (reads low above the blockage altitude, high below it).

*Source: PHAK ch. 8*

- The engine-driven vacuum pump spins the attitude and heading gyros; the turn coordinator is electric precisely so one power source cannot take all three.

*Source: PHAK ch. 8*

- Vacuum failure is insidious: the attitude indicator dies slowly, tilting by degrees, and a pilot following it rolls with it — the suction gauge and instrument disagreement are the tells.

*Source: PHAK ch. 8; IFH ch. 5*

- Suspect instrument failure procedure: cross-check the committee, identify the liar by what agrees, then cover the failed instrument so it cannot recapture the scan.

*Source: IFH ch. 6*

- Cabin heat is ram air warmed by a shroud around the exhaust — effective, simple, and the CO pathway when the exhaust cracks (recognition and response in 1-8).

*Source: PHAK ch. 7; PA-28-151 POH sec. 2*

- The Warrior has no ice protection and is prohibited from flight into known icing; its anti-ice equipment is limited to pitot heat (if installed) and carb heat.

*Source: PA-28-151 POH; PHAK ch. 7*

- Structural ice needs visible moisture and near-freezing surface temperatures; the escape is always an immediate change — altitude, course, or a 180.

*Source: PHAK ch. 12; AIM 7-1-21*

- Supplemental oxygen regulation: required crew use above 12,500 ft cabin altitude past 30 minutes, crew use at all times above 14,000, and every occupant must be PROVIDED oxygen above 15,000.

*Source: 14 CFR 91.211*

- An abnormal indication is worked with the checklist, not memory alone — the POH emergency section exists because troubleshooting under stress invents wrong answers.

*Source: PA-28-151 POH sec. 4; AFH ch. 18*

- Startle is expected: the first response to any bang, light, or silence is fly the airplane — pitch, power, trim — then diagnose.

*Source: AFH ch. 18*

- An emergency descent is flown for cabin fire, smoke, or medical emergency: power idle, configure per the POH, bank to keep the belly's blind spot clear, descend at the appropriate limit speed for the air.

*Source: AFH ch. 18; PA-28-151 POH sec. 4*

- The descent target is chosen before the descent: altitude to level at, direction to turn, and where the landing goes if the emergency continues.

*Source: AFH ch. 18*

- Engine fire in flight: fuel selector OFF, mixture idle-cutoff, fuel pump off, cabin heat off — the engine is being starved on purpose, and the flight is now a forced landing (1-15).

*Source: PA-28-151 POH sec. 4*

- Electrical fire: master off first (kill the source), extinguisher on the fire, ventilate after — then decide what, if anything, gets switched back on to land.

*Source: PA-28-151 POH sec. 4; AFH ch. 18*

- A door popping open in flight is noise, not aerodynamics: the Warrior flies normally — fly the pattern, land, close it on the ground.

*Source: PA-28-151 POH; AFH ch. 18*

- Flap failure means a no-flap landing: faster approach speed, flatter picture, longer float and rollout — an inconvenience with a procedure, not an emergency.

*Source: AFH ch. 8*

- The ELT activates on impact G-forces, transmits on 121.5 and (406 models) satellite-monitored 406 MHz, and can be armed, tested, or switched on manually from the unit or a panel remote.

*Source: AIM 6-2-5; 14 CFR 91.207*

- A cabin fire extinguisher is checked for charge and security on preflight and used with the PASS pattern (Pull, Aim, Squeeze, Sweep) — then ventilate the cabin.

*Source: AFH ch. 18; POH/AFM*

- Survival gear is packed for the terrain and season overflown, not the departure weather: the planning figure is surviving 48 to 72 hours — water, clothing/shelter, signaling.

*Source: PHAK ch. 2; AFH ch. 18*

- Mountainous terrain adds shelter, insulation, and signaling weight to the kit; overwater beyond gliding distance adds flotation for every occupant — the gear list is a route decision.

*Source: PA.IX.D refs; 14 CFR 91.205(b)(12)*

- Ballistic parachutes (where installed) have a deployment envelope and a decision rule — loss of control, structural failure, pilot incapacitation — and passengers are briefed on the handle before engine start.

*Source: POH/AFM supplement; FAA-S-ACS-6C IX.D*

- After any forced landing, the survival sequence is people first, then fire risk, then signal: activate the ELT, stay with the aircraft, and make yourself findable.

*Source: AIM 6-2-5; AFH ch. 18*

## GOING DEEPER

- A hazard is a condition or object; risk is how bad and how likely the harm from that hazard is on this flight. They are not the same thing.

*Source: FAA-H-8083-2A ch. 3*

- The 5P variant of SRM checks Plan, Plane, Pilot, Passengers, and Programming at set decision points in the flight.

*Source: PHAK ch. 2 (the 5 Ps; dropped from FAA-H-8083-2A)*

- Automation and glass displays are resources to manage, not a substitute for flying: the pilot states what the automation is doing and reverts to hand-flying the moment it surprises them.

*Source: AC 90-109A; PHAK ch. 2*

- Arriving from the far side, the preferred alternate is crossing midfield at least 500 ft above pattern altitude, descending clear of the pattern, then joining the 45.

*Source: AC 90-66C*

- Landing lights and strobes on in the pattern and within 10 miles of an airport make the airplane findable — the Operation Lights On practice.

*Source: AIM 4-3-23; AC 90-48*

- Helicopters shed strong downwash and vortices in hover taxi and slow flight — give a hovering helicopter at

least three rotor diameters.

*Source: AIM 7-4*

– A go-around off an accepted LAHSO clearance is still shaped by it: fly the expected path to stay clear of the crossing traffic — which is why the out is briefed before the clearance is accepted.

*Source: AIM 4-3-11*

– "Any traffic in the area please advise" is nonstandard, adds congestion, and the AIM says not to use it.

*Source: AIM 4-1-9*

– When changing codes, avoid dialing through 7500/7600/7700 — momentary emergency codes light up scopes.

*Source: AIM 4-1-20*

– ILS critical area and other boundary markings exist and are honored when instructed to hold clear (ladder marking; sign with "ILS").

*Source: AIM 2-3-5*

– A rotating beacon running during daylight hours in Class B/C/D/E surface airspace often means weather is below basic VFR minimums — a caution, not an official signal.

*Source: AIM 2-1-9*

– REIL — synchronized flashing lights at the threshold — exist to make the runway end findable against city lights.

*Source: AIM 2-1-3*

– Ramp security is part of ground operations: aircraft locked and tied, gates closed behind you, and unfamiliar persons around aircraft challenged or reported (AOPA Airport Watch, 866-GA-SECURE).

*Source: TSA/AOPA Airport Watch; AIM ch. 2*

– A dashed magenta line marks Class E beginning at the SURFACE, protecting an instrument approach at an airport with no tower.

*Source: PHAK ch. 15; sectional legend*

– A stuck microphone blocks the whole frequency for everyone; if the frequency goes strangely quiet after your call, check your own PTT first.

*Source: AIM 4-2-2*

– A phone is a legal and practical backup: after landing NORDDO — and in flight if workload truly allows — the tower's number is in the Chart Supplement.

*Source: Chart Supplement; AIM 4-2-13*

– The IFR lost-comm rule (91.185) is a different animal for a different rating — a VFR pilot's rule is stay VFR and land; do not fly a remembered IFR procedure.

*Source: 14 CFR 91.185; 14 CFR 91.126(d)*

– Best glide maximizes distance per foot of altitude; minimum sink maximizes TIME aloft — slower, used when circling to be found beats gliding somewhere.

*Source: AFH ch. 18; PHAK ch. 11*

– If fuel pressure is absent after the flow, recheck the fuel selector position — the most common restart is the tank you should have been on.

*Source: PA-28-151 POH 4-1*

– Water and sediment contamination announce themselves at low power or the first tank switch — which is why sumping and a full-power runup check matter (and why tanks are switched over an airport when practical).

*Source: PHAK ch. 7; AFH ch. 2*

– Magneto or ignition failure shows as roughness that changes with the mag switch — troubleshooting is the

runup check flown in the air, and the answer may be one mag and a precautionary landing.

*Source: PHAK ch. 7*

– Atmospheric conditions move the plan: density altitude stretches the glide's ground speed, gusts demand margin above 85, and into-sun or over-water picks change what a "good field" is.

*Source: AFH ch. 18; PHAK ch. 11*

– The "impossible turn" is a briefed number, not an instinct: below the pre-briefed turnback altitude the answer is ahead, because the 180-plus-realignment costs hundreds of feet and the gliding turn raises stall speed.

*Source: AFH ch. 5; FAA-H-8083-2*

– 91.3(b) is the legal floor under all of it: in the emergency, the PIC may deviate from any Part 91 rule to the extent required — altitude minimums included.

*Source: 14 CFR 91.3(b); 14 CFR 91.119(a)*

– Tell ATC "minimum fuel" when reaching destination with less than reserve becomes possible — it is an advisory, not an emergency; declare the emergency when priority handling is actually needed.

*Source: AIM 5-5 (minimum fuel); Pilot/Controller Glossary*

– Regulations change; the current text lives on eCFR, and a figure memorized from an old study guide can be wrong today.

*Source: eCFR (ecfr.gov)*

– "Serious injury" includes hospitalization over 48 hours starting within 7 days, any bone fracture except simple fractures of fingers, toes, or nose, severe hemorrhage or organ damage, and second- or third-degree burns over more than 5 percent of the body.

*Source: 49 CFR 830.2*

– "Substantial damage" means damage affecting structural strength, performance, or flight characteristics that would normally require major repair — engine failure damage limited to the engine, bent fairings, dented skin, and small punctured holes do not count.

*Source: 49 CFR 830.2*

– Property damage (other than the aircraft) estimated over \$25,000 and release of all or part of a propeller blade (except by ground contact) are also on the immediate-notification list.

*Source: 49 CFR 830.5(a)*

– Before the NTSB takes custody, wreckage may be moved only to rescue people, protect the wreckage from further damage, or protect the public.

*Source: 49 CFR 830.10*

– The NTSB investigates accidents and issues safety recommendations; the FAA regulates and enforces — two different agencies with two different jobs.

*Source: 49 CFR 830; PHAK ch. 1*

– Medical duration is counted in calendar months, so the certificate dies at month-end: an exam on September 23 expires September 30 of the target year, not September 23.

*Source: 14 CFR 61.23(d)*

– A first- or second-class medical does not go blank when its higher privileges lapse — it keeps working as a third-class for the third-class duration.

*Source: 14 CFR 61.23(d)*

– The 61.53 self-grounding duty also applies to operations that do not require a medical certificate at all — under BasicMed it IS the medical standard between physician exams.

*Source: 14 CFR 61.53(b)*

– Under BasicMed the most recently issued medical may be expired — but it cannot have been suspended or revoked, and the most recent application cannot have been completed and denied.

*Source: 14 CFR 61.23(c)(3)*

- BasicMed paperwork (the completed CMEC and the course certificate) lives in the pilot's logbook — it is not carried in the airplane.

*Source: 14 CFR 61.113(i)(3)*

- A private pilot practical test may be taken while operating under BasicMed conditions and limitations.

*Source: 14 CFR 61.23(a)(3)(iii)*

- A student pilot may exercise student privileges without a Part 67 medical by holding a valid U.S. driver's license and meeting the BasicMed conditions.

*Source: 14 CFR 61.89(d)*

- The logbook is different: it must be presented for inspection on a reasonable request from the FAA, an NTSB representative, or law enforcement — but a certificated private pilot is not required to carry it in flight.

*Source: 14 CFR 61.51(i)(1)*

- The flight review window runs from the beginning of the 24th calendar month before the month of the flight — end-of-month math, like the medical.

*Source: 14 CFR 61.56(c)*

- A passed practical test (any checkride) substitutes for the flight review; so does completing one or more phases of the FAA WINGS program.

*Source: 14 CFR 61.56(d), (e); AC 61-91K*

- Since December 2024 the currency rule says carrying "persons," not "passengers" — Part 61 now defines a passenger, and instructors and checkride examiners fall outside the definition.

*Source: 14 CFR 61.57(a), (b); 14 CFR 61.1*

- A non-current pilot can legally regain day or night currency with an authorized instructor on board (sole occupants), and the currency rules do not apply to the examiner or applicant during a practical test.

*Source: 14 CFR 61.57(e)(5), (6)*

- Logging PIC and acting as PIC are two separate ledgers: a pilot logs PIC as sole manipulator of an aircraft they are rated for, even when someone else is acting PIC.

*Source: 14 CFR 61.51(e); Chief Counsel (Speranza, 2009)*

- "Rated" for logging means category and class ratings, not endorsements: complex or high-performance endorsements are needed to act as PIC, not to log PIC.

*Source: 14 CFR 61.51(e); 14 CFR 61.31*

- Compensation does not require money or profit: logged flight time and expected goodwill count as compensation.

*Source: AC 61-142 para 8.1*

- The common purpose test for cost sharing: the pilot must have their own independent reason to make the flight — a pilot who would not have flown but for splitting the cost is sharing illegally.

*Source: AC 61-142 para 9.2*

- Cost-sharing reimbursement may come only from the people on board — never from a third party such as an employer.

*Source: 14 CFR 61.113(c); Chief Counsel (Mangiamele, 2009)*

- 61.113 carries several narrow exceptions besides cost sharing — business-incidental flights, charitable events under 91.146 (which require 500 hours), search and location, glider towing, aircraft sales demos at 200 hours.

*Source: 14 CFR 61.113(b)–(h); 14 CFR 91.146(b)(9)*

- Advertising flights to the public — including on social media — is "holding out," which requires a commercial operation; sharing is legal only within a defined group you already know.

*Source: AC 61-142 para 10.2*

- Loss of control in flight was the number one cause of fatal GA accidents from 2012 through 2021, which is why the FAA pushes proficiency training beyond the legal minimums.

*Source: AC 61-98E ch. 2*

- The flight review is a training event in which proficiency is evaluated, not a test — the instructor tailors it and signs it when proficiency is shown.

*Source: AC 61-98E ch. 4; 14 CFR 61.56(a)*

- No endorsement is required to move between round-dial and glass-cockpit versions of the same airplane, and the NTSB found glass-cockpit light aircraft had lower total but HIGHER fatal accident rates — transition training fills the gap the rules leave open.

*Source: NTSB SS-10/01; AC 90-109A*

- Three different clocks define "night": position lights on sunset-to-sunrise, logging night from end of evening civil twilight, and night currency landings 1 hour after sunset to 1 hour before sunrise.

*Source: 14 CFR 91.209(a); 14 CFR 1.1; 14 CFR 61.57(b)*

- A standard airworthiness certificate stays effective only as long as maintenance, preventive maintenance, and alterations are performed per Parts 43 and 91 — its blank expiration is conditional, not eternal.

*Source: 14 CFR 21.181(a)(1)*

- The FCC radio station license is required only for flights outside the United States.

*Source: FCC rules; PHAK ch. 9*

- Day VFR requires a manifold pressure gauge for each altitude engine and a temperature gauge for each liquid-cooled engine — neither applies to the Warrior, and knowing why is the point.

*Source: 14 CFR 91.205(b)(6), (8)*

- Small airplanes certificated after March 11, 1996 need an approved red or white anticollision light system for day VFR; if one light fails, the flight may continue to a place where repairs can be made.

*Source: 14 CFR 91.205(b)(11)*

- 91.205 applies to powered civil aircraft holding a STANDARD U.S. airworthiness certificate — an experimental's equipment rules live in its own operating limitations instead.

*Source: 14 CFR 91.205(a); 14 CFR 91.319*

- The 100-hour limit may be exceeded by up to 10 hours only to reach a place where the inspection can be done, and the overrun counts against the NEXT 100 hours.

*Source: 14 CFR 91.409(b)*

- An annual may substitute for a 100-hour inspection, but a 100-hour may never substitute for an annual — same checklist scope, different signer.

*Source: 14 CFR 91.409(b); 14 CFR 43 App. D; 14 CFR 65.95*

- A ferry (special flight) permit is itself a special airworthiness certificate — the full permit machinery is taught in 3-2.

*Source: 14 CFR 21.175(b)(4); 14 CFR 21.197*

- Flying slower than best-glide/max-endurance speed puts the airplane in the region of reversed command: more power is needed to fly slower.

*Source: PHAK ch. 11; AFH ch. 5*

- The Warrior's book recovery has six steps, not four: after throttle idle, ailerons neutral, full opposite rudder, control wheel full forward — then rudder neutral when rotation stops, and smooth back pressure to level. Stopping at "stick forward" flies the recovery into a split-S.

*Source: PA-28-151 AFM 3-5*

- The Warrior's Utility category (1,950 lb, no baggage, no aft passengers) exists for higher load factors, not for spins.

*Source: PA-28-151 AFM 3-4*

- Va decreases as weight decreases: a lighter airplane stalls at a lower speed, so it can reach damaging load factors at lower airspeeds.

*Source: PHAK ch. 5*

- Va protects against a single full input on one axis — full alternating inputs, or full inputs on more than one axis at once, can break the airplane below Va.

*Source: PHAK ch. 5; AIM 7-4 (structural awareness)*

- Warrior flap limit speed splits by serial number: Vfe 125 MPH on serials 7415001–7515449, 115 MPH on 7615001 and up — check the airplane you are flying.

*Source: PA-28-151 AFM 3-2*

- The Warrior's right flap is the boarding step: it carries a load only when fully retracted.

*Source: PA-28-151 POH 2-6*

- The electric pump stays OFF in cruise so an engine-driven pump failure shows itself immediately (as a pressure drop) instead of hiding behind the backup.

*Source: PA-28-151 POH Operating Tips 7*

- The POH minimum is not the dispatch minimum: North Aero sets its own higher number for the day, and the pilot should be able to explain the difference.

*Source: PA-28-151 POH 10-8*

- Oil grade is chosen by temperature from the POH table — any grade whose range brackets the day's temperature is acceptable.

*Source: PA-28-151 POH 10-8*

- Starting from external power follows the POH's battery/alternator switch sequence exactly — the risk is a dead battery masking a charging failure after takeoff.

*Source: PA-28-151 POH sec. 7; PHAK ch. 7*

- Starter limits exist: cranking is limited to short bursts with cooling pauses per the POH, or the starter burns.

*Source: PA-28-151 POH sec. 7*

- True airspeed exceeds calibrated by roughly 2 percent per 1,000 ft of altitude — same indicated, faster over the ground as you climb.

*Source: PHAK ch. 8*

- The Warrior's Flight Manual publishes speeds in MPH calibrated while the pilot flies indicated — the correction table is on POH 7-9.

*Source: PA-28-151 POH 7-9*

- Cold outside temperature makes true altitude lower than indicated — terrain clearance shrinks on cold days even with the right setting.

*Source: PHAK ch. 8; AIM 7-3*

- Older attitude gyros have pitch/bank limits and small acceleration errors (slight pitch-up indication on takeoff acceleration); they precess slowly out of true and re-erect in level flight.

*Source: PHAK ch. 8; IFH ch. 5*

- The lead/lag of the compass in turns is roughly equal to the latitude of the flight.

*Source: IFH ch. 5*

- Control and performance: set attitude and power first, then trim, then cross-check the performance instruments to confirm — attitude flying works identically on instruments.

*Source: IFH ch. 6*

- Autokinesis: a single static light stared at in the dark appears to move — scan, don't stare.

Source: PHAK ch. 17; AIM 8-1-5

- Haze makes lights and terrain look farther away (and rain on the windshield makes you feel high); flicker vertigo from prop-chopped light is rare but real.

Source: PHAK ch. 17; AIM 8-1-5

- The four hypoxia types: hypoxic (altitude — not enough O<sub>2</sub> pressure), hypemic (blood can't carry it — CO, anemia), stagnant (blood isn't moving — G-loads), histotoxic (cells can't use it — alcohol, cyanide).

Source: PHAK ch. 17

- The hypoxia-versus-hyperventilation differential: if oxygen is available and symptoms persist on it, suspect hyperventilation; when in doubt treat for both — O<sub>2</sub> on, breathe slow, descend.

Source: PHAK ch. 17; AIM 8-1-3

- Decongestant self-medication before flight trades an ear block for drowsiness and rebound congestion at altitude — check the medication, not just the symptom.

Source: PHAK ch. 17; AIM 8-1-1

- CO binds hemoglobin about 200 times more readily than oxygen — it is hypemic hypoxia, and it lingers for hours after exposure.

Source: PHAK ch. 17

- Eight hours is a floor, not a clearance: the AIM's guidance is 12 to 24 hours bottle-to-throttle, and a hangover is impairment even at 0.00.

Source: AIM 8-1-1; 14 CFR 91.17(a)(3)

- A crewmember must submit to blood-alcohol testing on a law enforcement request made under the rule, and no pilot may carry an obviously intoxicated person except in an emergency.

Source: 14 CFR 91.17(b), (c)

- FAA guidance after a new medication: wait at least five maximal dosing intervals before flying, so side effects show on the ground.

Source: FAA OTC medication guidance; AIM 8-1-1

- The autopilot (if installed) is a legitimate escape tool in IMC: wings-level mode buys thinking time — but it is monitored, not trusted.

Source: IFH ch. 7; AC 90-109A

- An alternator needs engine RPM and field current but produces full output even at low RPM — the reason airplanes moved off generators.

Source: PHAK ch. 7

- An alternate static source (or, in a pinch, a broken VSI glass) feeds cabin pressure, which is slightly lower than outside — expect the altimeter and airspeed to read a bit high.

Source: PHAK ch. 8; POH supplement

- The 91.211 numbers are legal floors; physiology (night vision, fatigue, smoking) argues for oxygen well below them.

Source: AIM 8-1-2; PHAK ch. 17

- Emergency descent speed discipline: smooth air allows up to V<sub>no</sub>/V<sub>ne</sub> judgment per the POH; turbulence caps it at V<sub>a</sub> logic — speed is survival time, but not past the airframe's limits.

Source: AFH ch. 18; PA-28-151 AFM 3-2

- Stuck trim is flown with muscle and configuration planning: choose the flap/speed combination that minimizes the force, and land early.

Source: AFH ch. 18

- 406 MHz ELTs are registered to the aircraft with NOAA, which turns an anonymous beacon into a phone call to the owner within minutes — registration currency is part of airworthiness housekeeping.

*Source: AIM 6-2-5*

- ELT ground testing is confined to the first 5 minutes after the hour, three audio sweeps maximum; after any hard landing, monitor 121.5 to check for inadvertent activation.

*Source: AIM 6-2-5*

- Emergency autoland systems (where installed) are activated when the pilot cannot fly — the briefing point is that passengers must know the button exists.

*Source: POH/AFM supplement; FAA-S-ACS-6C IX.D*

- Automation monitoring rule: know what mode it is in, what it should do next, and what you will do the moment it does anything else.

*Source: AC 90-109A; PHAK ch. 2*