

PRIVATE PILOT GROUND SCHOOL

MODULE 1-6 — SYSTEMS 1

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FACTS TO REMEMBER

KNOW THESE COLD

- 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

GOING DEEPER

- 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

THE REGULATIONS BEHIND THIS MODULE

14 CFR 91.107 — Use of safety belts, shoulder harnesses, and child restraint systems

Before takeoff the pilot in command must brief each person on board on how to fasten and unfasten the belt and shoulder harness, and must ensure each person is belted for surface movement, takeoff, and landing. A child under 2 can be held by an adult.

Where it goes deeper: This module, in the flight deck management Leg.

14 CFR 91.9 — Civil aircraft flight manual, marking, and placard requirements

No person can operate a civil airplane without complying with the operating limitations in the approved flight

manual, the markings, and the placards. The Warrior's starting, runup, and shutdown procedures are in its handbook.

Where it goes deeper: Module 1-4 taught where the limitations live. This module reads the Warrior's Section II and Section VII.