

PRIVATE PILOT GROUND SCHOOL

MODULE 4-2 — CHECKRIDE WEEK 2: TASKS B AND G

Generated study guide — do not edit; the module page is the source.

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.

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.

FACTS TO REMEMBER

KNOW THESE COLD

- 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)

- 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 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 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)

– 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)

– 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 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)

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

Source: 14 CFR 91.103

– "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 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

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

Source: PHAK ch. 6

- 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

- 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

- 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

- 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

- 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

- 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

- 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

- "Airworthy" is a two-part legal test: the aircraft conforms to its type design AND is in a condition for safe operation.

Source: 14 CFR 3.5(a) TB

- The owner or operator is primarily responsible for maintaining the aircraft in an airworthy condition.

*Source: 91.403(a) eCFR**

- The pilot in command is responsible for determining whether the aircraft is in condition for safe flight.

*Source: 91.7(b) eCFR**

- The pilot in command must discontinue the flight when unairworthy mechanical, electrical, or structural conditions occur.

*Source: 91.7(b) eCFR**

- After any maintenance, the aircraft may not be operated until it has been approved for return to service by an authorized person.

*Source: 91.407(a)(1) eCFR**

- After any maintenance, the aircraft may not be operated until the required maintenance record entry has been made.

*Source: 91.407(a)(2) eCFR**

- "Calendar month" arithmetic: a 12-calendar-month interval runs to the last day of the month, not to the

anniversary date.

*Source: 91.409(a) eCFR**

- The 100-hour inspection is required only when carrying persons for hire, or when giving flight instruction for hire in an aircraft the instructor provides.

*Source: 91.409(b) eCFR**

- An annual inspection can substitute for a 100-hour inspection, but a 100-hour never substitutes for an annual.

*Source: 91.409(a),(b) eCFR**

- The 100-hour limit may be exceeded by up to 10 hours, and only while en route to a place where the inspection can be done.

*Source: 91.409(b) eCFR**

- Maintenance records come in two kinds: work/inspection records, and permanent status records.

*Source: 91.417(a)(1),(2) eCFR**

- Work and inspection records must be kept until the work is repeated or superseded, or for one year.

*Source: 91.417(b)(1) eCFR**

- Status records — total time, life-limited parts, overhaul times, inspection status, AD status, Form 337s — stay with the aircraft and transfer when it is sold.

*Source: 91.417(a)(2),(b)(2) eCFR**

- A maintenance record entry needs a description of the work, the completion date, and the signature, certificate number, and certificate kind of the person approving return to service.

*Source: 43.9(a) eCFR**

- Deciding an airplane is legal to fly requires reading its maintenance records — the cockpit documents alone cannot prove it.

Source: 91.409, 91.417 eCFR; TB*

- The transponder check every 24 calendar months applies to VFR aircraft too, whenever the transponder is used.

Source: 91.413 TB

- An airworthiness directive is a regulation: operating a product that does not comply violates part 39.

Source: 39.7 TB

- AD compliance is required at all times, not just at inspections — an aircraft can be inspection-legal and AD-unairworthy at the same time.

Source: AC 39-7D ¶11a TB

- ADs may be one-time or recurring; recurring ADs repeat at stated intervals of hours or calendar time.

Source: part 39; AC 39-7D TB

- A SAIB is non-regulatory, non-mandatory information — never a compliance requirement.

Source: FAA Order 8110.100B TB

- A special flight permit lets an aircraft that does not currently meet airworthiness requirements, but is capable of safe flight, fly to a place where repairs or storage can be done.

Source: 21.197(a) TB

- A private pilot may perform preventive maintenance on an aircraft they own or operate, as long as it is not used under parts 121, 129, or 135.

*Source: 43.3(g) eCFR**

- The preventive maintenance list in part 43 Appendix A(c) is exclusive: if a task is not on the list, it is not preventive maintenance.

Source: 43 App. A(c) eCFR; AC 43-12A TB*

- Listed examples: tires, spark plugs, batteries, position and landing light bulbs, safety belts, prefabricated fuel lines, oil and fuel strainers/filter elements.

*Source: 43 App. A(c) eCFR**

- The pilot must log preventive maintenance: description of work, date, signature, and certificate kind and number.

Source: 43.9(a) eCFR; AC 43-12A TB*

- When equipment is found inoperative, the governing rule is 91.213 — 91.205 enters later, inside the process, never first.

Source: 91.213 eCFR; AC 91-67A TB*

- Three legal paths to fly with inoperative equipment: an approved MEL with letter of authorization, the 91.213(d) process, or a special flight permit.

Source: AC 91-67A TB

- 91.213(d) screen one: the item must not be part of the VFR-day type certification instruments and equipment.

*Source: 91.213(d)(2)(i) eCFR**

- 91.213(d) screen two: the item must not be indicated as required on the aircraft's equipment list or on the KOEL for the kind of flight.

*Source: 91.213(d)(2)(ii) eCFR**

- 91.213(d) screen three: the item must not be required by 91.205 or any other rule for the specific kind of flight being conducted.

*Source: 91.213(d)(2)(iii) eCFR**

- 91.213(d) screen four: the item must not be required to be operational by an airworthiness directive.

*Source: 91.213(d)(2)(iv) eCFR**

- Disposition: the item is either removed, the cockpit control placarded, and the work recorded — or deactivated and placarded "Inoperative."

*Source: 91.213(d)(3) eCFR**

- Final step: a certificated pilot or mechanic determines the inoperative item is not a hazard to the aircraft.

*Source: 91.213(d)(4) eCFR**

- Legal is not the same as safe: after the 91.213 paperwork, the PIC's hazard judgment and 91.7(b) still decide the flight.

*Source: 91.213(d)(4), 91.7(b) eCFR**

- The airworthiness certificate must be displayed at the cabin or cockpit entrance, legible to passengers or crew.

Source: 91.203(b) TB

- A standard airworthiness certificate stays valid only as long as maintenance is performed per parts 43 and 91 — its blank expiration is conditional, not eternal.

Source: 21.181(a)(1) TB

- Aircraft registration expires 7 years after the last day of the month it was issued (the old 3-year answer is stale).

Source: 47.40(a) TB

GOING DEEPER

- 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)

- 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 mechanic's signature approves return to service only for the work performed — it is not a statement that the whole aircraft is airworthy.

*Source: 43.9(a)(4) eCFR**

– ELT battery replacement is due after more than 1 cumulative hour of use, or at 50 percent of useful battery life.

Source: 91.207(c) TB