

PRIVATE PILOT GROUND SCHOOL

MODULE 2-6 — NIGHT OPERATIONS

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FACTS TO REMEMBER

KNOW THESE COLD

- Cones serve center vision, color, and detail, and need light; rods serve peripheral and dim-light vision, detect motion, and see no color.

Source: PHAK ch. 17; AIM 8-1-6

- The night blind spot: rods are absent at the center of vision, so a light stared at directly at night can disappear.

Source: PHAK ch. 17

- Night scanning is off-center: look about 5–10° to the side of what you want to see.

Source: PHAK ch. 17; AIM 8-1-6

- Full dark adaptation takes about 30 minutes — and seconds of bright white light can erase it.

Source: PHAK ch. 17

- Preserving adaptation is procedure: cockpit lights dim, flashlight filtered, eyes shielded from strobes, landing lights, and lightning.

Source: PHAK ch. 17

- Red light preserves night vision but washes out red and magenta chart print; dim white is the chart-reading compromise.

Source: PHAK ch. 17

- A lighted civil land airport beacon flashes white and green.

Source: AIM 2-1-10

- A military airport beacon shows two quick white flashes between the green.

Source: AIM 2-1-10

- Runway edge lights are white; from the approach the threshold shows green and the far end shows red.

Source: AIM 2-1-4/2-1-5

- Taxiway edge lights are blue; taxiway centerline lights, where installed, are green.

Source: AIM 2-1-9

- Two-bar VASI: red over white is on the glide path; white over white high; red over red low ("red over red, you're dead").

Source: AIM 2-1-2

- Four-light PAPI: two white and two red is on path; more white is high, more red is low.

Source: AIM 2-1-2

- Pilot-controlled lighting keys on the CTAF: 7 clicks for high intensity, 5 medium, 3 low — and the lights time out (typically 15 minutes), so key again on final.

Source: AIM 2-1-8

- Obstructions light with steady or flashing red at night and white strobes by day or night — and a lit tower's guy wires are unlit and reach far to the sides of it.

Source: AIM 2-2-3

- Aircraft position lights: red on the left wingtip, green on the right, white on the tail.

Source: 14 CFR 91.205(c); AIM 4-3-23

- Position lights must be lighted from sunset to sunrise — and an aircraft parked or moved in a night operations area must be lighted, illuminated, or in a marked area.

Source: 14 CFR 91.209(a)

- Anticollision lights run for all operations, day and night, unless the PIC determines that turning them off is in the interest of safety (strokes in cloud or on a crowded ramp).

Source: 14 CFR 91.209(b)

- Night VFR equipment is the day list plus: approved position lights, an approved anticollision light system, a landing light if operated for hire, an adequate electrical source, and spare fuses.

Source: 14 CFR 91.205(c)

- Logging night time runs on the civil-twilight clock: night is the time between the end of evening civil twilight and the beginning of morning civil twilight.

Source: 14 CFR 1.1

- Night passenger currency runs on its own clock: 1 hour after sunset to 1 hour before sunrise.

Source: 14 CFR 61.57(b)

- To carry others at night, the PIC needs three takeoffs and three landings to a FULL STOP, in the currency window, within the preceding 90 days, as sole manipulator, in the same category, class, and type if a type rating is required.

Source: 14 CFR 61.57(b)

- Day currency landings may be touch-and-go; night landings must be full-stop — and night full-stops count toward day currency, never the reverse.

Source: 14 CFR 61.57(a)-(b)

- Personal night equipment starts with two flashlights — white for the preflight, red or dim for the cockpit — plus spare batteries.

Source: AFH night ops ch.

- The night cockpit is organized before dark: charts and EFB night mode set, frequencies staged, flashlight within reach — fumbling for gear is the signature night distraction.

Source: AFH night ops ch.

- Night pilotage runs on lighted features — beacons, towns, highways; unlighted landmarks are simply gone.

Source: AFH night ops ch.

- Distances and heights deceive at night: obstacle and terrain clearance comes from the chart and altimeter, not from the view.

Source: AFH night ops ch.

- On dark-terrain legs the instruments corroborate what the window cannot: attitude and altimeter crosscheck guards the lost horizon (1-8's skills, applied at night).

Source: AFH night ops ch.

- Finding the airport at night is beacon-first, runway-lights-second; the beacon is visible far beyond the runway environment.

Source: AIM 2-1-10

- Night weather risk is a visibility-of-weather problem: clouds you cannot see, so the METAR/TAF picture and the disappearing-lights check replace your eyes, and night personal minimums run higher than day.

Source: AFH night ops ch.; NA Personal Minimums Sheet

- Night taxi is slower and lower-trust: blue edges and green centerline, the airport diagram out, progressive taxi

available for the asking.

Source: AFH night ops ch.

- Night ground light discipline for the taxi/landing light: on whenever the airplane is moving, courtesy-off when facing another aircraft head-on.

Source: AIM 4-3-23

- Strobes stay off during taxi and come on when entering the runway.

Source: AIM 4-3-23

- Night runway incursion defense: hold-short lines are harder to see, so position is verified against lighting, signage, and the diagram — unsure means stop and ask.

Source: AIM 2-3-5

- Seeing another aircraft's red and green together means it is coming toward you.

Source: AIM 4-3-23

- Seeing red alone: you face its left side — it is crossing from your right to your left.

Source: AIM 4-3-23

- Seeing green alone: it is crossing from your left to your right.

Source: AIM 4-3-23

- Seeing white alone: it is moving away from you — or you are overtaking it.

Source: AIM 4-3-23

- Autokinesis: a single light stared at in the dark appears to move; the fix is to keep the eyes scanning, never staring.

Source: AIM 8-1-5

- False horizon: sloping cloud decks, lit shorelines, or highway strings masquerade as the horizon; the attitude indicator settles the argument.

Source: AIM 8-1-5

- The black-hole approach: a lighted runway across dark, featureless terrain invites a dangerously LOW approach — fly the VGSI or a computed descent, not the picture.

Source: AIM 8-1-5; AFH

- Roads and light strings get mistaken for runways at night; the beacon, the layout, and the CTAF picture confirm before descent continues.

Source: AFH night ops ch.

- Night collision avoidance is slower and geometric: overlapping off-center scan segments, with position-light logic replacing silhouette recognition.

Source: AIM 8-1-6

- Night currency is the legal floor; night proficiency — recent night landings, this airplane, this airport — is the personal-minimums question, asked separately.

Source: 14 CFR 61.57(b); PHAK ch. 2

- A dead position light after sunset grounds the flight unless the 91.213 inoperative-equipment process clears it — "it worked in daylight" is not a dispatch theory.

Source: 14 CFR 91.209; 91.213 (1-4/3-2 process)

- Night forced landing doctrine: glide toward lighted areas or a known airport, configure early, and save the landing light for late — darkness hides the surface until it matters.

Source: AFH night ops ch.

GOING DEEPER

- Night vision is the first thing mild hypoxia takes, well below the altitudes of daytime symptoms; supplemental

oxygen above about 5,000 ft at night is the FAA's recommendation.

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

– Carbon monoxide, smoking, fatigue, and low blood sugar each degrade night vision before they produce any other symptom you would notice.

Source: PHAK ch. 17

– Beacon color codes extend past land airports: white/yellow marks a water airport, green/yellow/white a heliport.

Source: AIM 2-1-10

– An airport beacon running in daytime in B/C/D/E surface airspace often means weather below basic VFR minimums — advisory, not guaranteed, and no substitute for a METAR.

Source: AIM 2-1-10

– The landing light is required at night only when the flight is for hire — a private night flight without one is legal, and still unwise.

Source: 14 CFR 91.205(c)(4)

– The fuse requirement is specific: one spare set, or three spare fuses of each kind required, accessible to the pilot in flight.

Source: 14 CFR 91.205(c)(6)

– Three definitions of night, three different clocks: civil twilight for logging (1.1), sunset-to-sunrise for lights (91.209), sunset+1 to sunrise-1 for currency (61.57(b)) — knowing which clock a question runs on is the exam trap.

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

– The recency rule now says "carrying persons," not "passengers" — the wording changed in the November 2024 rule, and older materials carry the old word.

Source: 14 CFR 61.57(a)-(b) (Amdt. 61-157)

– Ground lights disappearing along a line means something — cloud, ridge, fog bank — now stands between you and them: the night IMC/CFIT tripwire.

Source: AFH night ops ch.

– Unusually bright runway lighting makes the runway seem closer than it is; unrecognized, the result is a high approach — the mirror error to the black hole.

Source: AIM 8-1-5

– A failed landing light in flight is a technique change, not an emergency: normal approach, flare read from the runway-edge picture.

Source: AFH night ops ch.

– Night fuel practice is fatter than the 45-minute floor: reserves grow and fuel stops are planned where fuel is actually available at that hour — FBO and self-serve hours live in the Chart Supplement.

Source: Chart Supplement; 14 CFR 91.151

THE REGULATIONS BEHIND THIS MODULE

14 CFR 91.209 – Aircraft lights

From sunset to sunrise no person may operate an aircraft unless it has lighted position lights, and an aircraft with an anticollision light system must have it lighted at all times unless the pilot in command determines that turning it off is in the interest of safety.

Where it goes deeper: This module, in the lights Leg.

14 CFR 61.57(b) – Night takeoff and landing experience

No person may act as pilot in command carrying persons from 1 hour after sunset to 1 hour before sunrise unless within the preceding 90 days that person has made three takeoffs and three landings to a full stop in that period, as sole manipulator, in the same category, class, and type.

Where it goes deeper: This module, in the three clocks Leg.