ACS HELICOPTER MANEUVER SERIES · 20 OF 24

Low Rotor RPM Recognition and Recovery

Area of Operation VIII — Emergency Operations

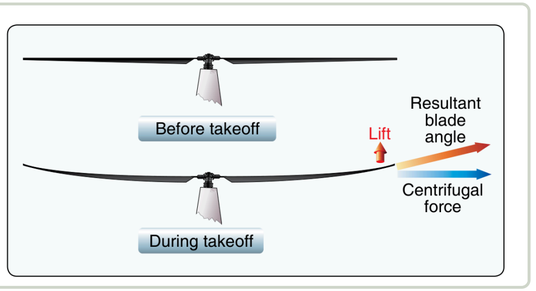
Private Pilot task PH.VIII.F **Commercial Pilot task** CH.VIII.F

Poster 20 of 24

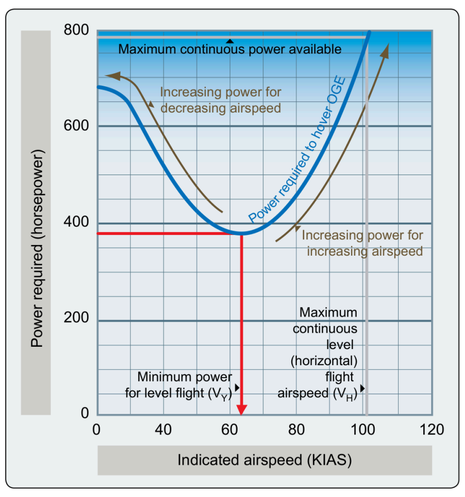
Objective. To determine the applicant exhibits satisfactory knowledge, risk management, and skills associated with low rotor rpm recognition and recovery.

HOW IT IS FLOWN

condensed from the FAA Helicopter Flying Handbook, Chapter 11 — Low Rotor RPM and Rotor Stall



HFH Figure 2-29. *During takeoff, the combination of centrifugal force and lift cause the rotor disk to cone upward.*



HFH Figure 2-34. *Power versus airspeed chart.*

1. Helicopters will not fly below a certain rotor rpm, just as airplanes will not fly below a certain airspeed. Below the safe range the helicopter is in a low-rpm situation; if rpm keeps falling the rotor stalls — and rotor stall is not recoverable. Above about 50 ft it is likely fatal.
2. Power-on causes (the most common accidents): 'overpitching' — pulling more collective than the engine can support, especially at high density altitude or heavy out of a confined area; rolling the throttle the wrong way; governor failure. As rpm falls, engine horsepower falls with it (10% rpm ≈ 10% horsepower), so the situation feeds on itself.
3. Power-off causes: not lowering the collective quickly after an engine failure; raising collective too high at the bottom of an autorotation.
4. Recognition: rotor tachometer decreasing, a yaw from the torque change, a noticeable drop in engine noise, increasing vibration at speed or in turns, the low-rpm warning horn/light.
5. Recovery — simultaneously: lower the collective, increase throttle if available, aft cyclic to hold a level attitude. At higher airspeeds additional aft cyclic helps rebuild rpm. Recover first, investigate second; practice until it is a conditioned reflex.
6. Why it is unrecoverable once stalled: the retreating blade stalls first, the disk blows back, the tail boom and stabilizer pitch the nose down, and the blades can strike the tail boom; tail rotor thrust is lost with main rotor rpm.

WATCH FOR — DRAWN FROM THE HFH DISCUSSION

- Pulling collective to stop the settling as rpm decays.
- Raising collective at too great a height at the bottom of an autorotation.
- Not lowering collective immediately on engine failure.
- Ignoring the horn, the yaw and the change in engine note.
- Investigating before recovering.

SKILLS — THE STANDARD

the applicant exhibits the skill to:

	PRIVATE · ACS-15	COMMERCIAL · ACS-16
S1	Complete the appropriate checklist(s).	
S2	Clear the area.	
S3	Detect the development of low rotor rpm and initiate prompt corrective action.	
S4	Execute the recovery procedure to return rotor rpm to normal limits.	

▢ Shaded rows are where the Commercial standard is tighter than Private. Unshaded rows apply to both certificates.

CHECKRIDE RULES — ACS APPENDIX 3

The evaluator must test the applicant orally on this Task if the helicopter used for the practical test has a governor that cannot be disabled. During the pre-flight briefing, evaluators must discuss avoiding any condition that may lead to rotor stall during the demonstration of this Task. If the skills are tested in flight, evaluators and applicants must ensure the helicopter's main rotor system remains in a safe operating range in accordance with the POH/RFM. Evaluators must not test this Task during critical phases of flight (e.g., takeoffs or landings).

KNOWLEDGE

PH.VIII.F.K1–K6 · the applicant demonstrates understanding of:

- Elements related to low rotor rpm recovery energy management, including the combination of conditions that may lead to this situation.
- Effects of wind, weight, temperature, and density altitude.
- Aerodynamics that affect low rotor rpm conditions.
- Powerplant performance.
- Main rotor (Nr) limitations.
- Difference between low rotor rpm and blade stall.

RISK MANAGEMENT

PH.VIII.F.R1–R5 · identify, assess and mitigate risk associated with:

- Powerplant limitations.
- Powerplant governor operation.
- Collision hazards.
- Distractions, task prioritization, loss of situational awareness, or disorientation.
- Low inertia rotor systems.

Standards: FAA-S-ACS-15 Private Pilot Helicopter and FAA-S-ACS-16 Commercial Pilot Helicopter (text reproduced from the current ACS). **References:** FAA-H-8083-2, FAA-H-8083-21, FAA-H-8083-25; POH/RFM.
Figures and technique: FAA Helicopter Flying Handbook, FAA-H-8083-21B — figures reproduced unmodified.
Always confirm tolerances against the ACS in force on your checkride date and procedures against the R44 POH/RFM.

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