ACS HELICOPTER MANEUVER SERIES · 18 OF 24

Powerplant Failure at Altitude

Area of Operation VIII — Emergency Operations

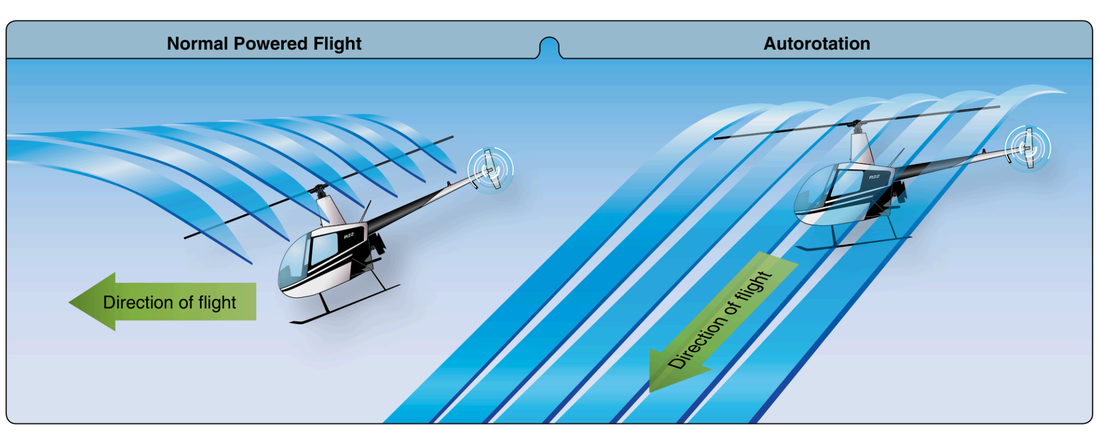
Private Pilot task PH.VIII.B **Commercial Pilot task** CH.VIII.B

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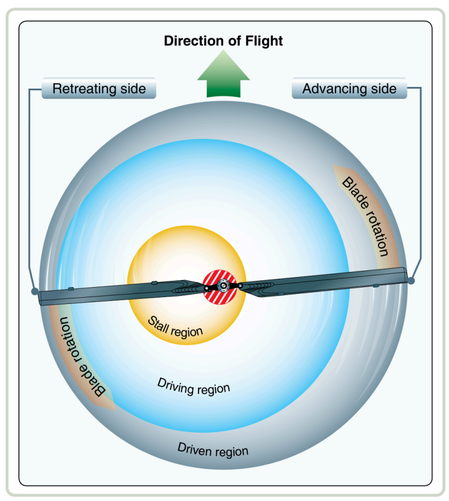
Objective. To determine the applicant exhibits satisfactory knowledge, risk management, and skills associated with a simulated powerplant failure at altitude.

HOW IT IS FLOWN

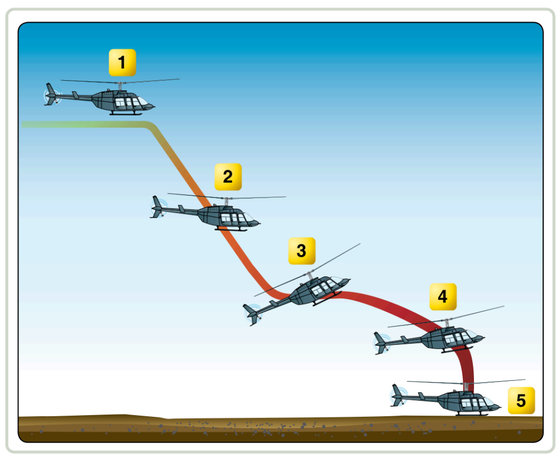
condensed from the FAA Helicopter Flying Handbook, Chapter 11 — Autorotation, RPM Control, Straight-In Autorotation



HFH Figure 11-1. *During an autorotation, the upward flow of relative wind permits the main rotor blades to rotate at their normal speed. In effect, the blades are "gliding" in their rotational plane.*



HFH Figure 2-49. *Blade regions in forward autorotation descent.*



HFH Figure 11-2. *Straight-in autorotation.*

1. On engine or driveline failure the freewheeling unit disengages the engine; the rotor keeps turning only if you lower the collective immediately — this starts the upward flow through the disk that drives the rotor (Figure 11-1). Heading is still controlled with the pedals.
2. Simultaneously: down collective, aft cyclic (to prevent the nose tuck and the rpm loss that comes with it) and pedal/trim. Accident studies show pilots fail to do all three together at cruise speed. Low-inertia rotors lose rpm fast.
3. Set the RFM autorotation airspeed and rpm; adjust for conditions: heavy/high/gusty → slightly faster; light/low → slightly slower. Rpm in the low green gives more distance. Collective manages rpm: up to reduce, down to regain; keep it in the recommended range.
4. If rpm has dropped, a moderate aft cyclic (possibly with a turn) increases airflow up through the rotor and rebuilds it — without over-speeding.
5. Pick the landing area, turn toward it and into the wind early, keep crosschecking attitude, trim, rpm and airspeed; crosswind correction on the course line. Then fly the flare, level-off and cushioned touchdown as for a straight-in autorotation.
6. A helicopter's glide ratio is much less than an airplane's — plan for it. Note: rotor rpm is the most critical element; it provides the lift for a stable descent and the energy to cushion the landing.

COMMON ERRORS — HFH LIST

- Not understanding the need for an immediate entry.
- Insufficient pedal when power is lost.
- Lowering the nose too abruptly → dive.
- Not holding rotor rpm in the descent.
- Collective pulled too high → hard landing and heading loss.
- Not leveling to the landing attitude; lateral drift or misalignment at touchdown.

SKILLS — THE STANDARD

the applicant exhibits the skill to:

	PRIVATE · ACS-15	COMMERCIAL · ACS-16
S1	Establish an autorotation.	
S2	**Establish power-off glide with the helicopter trimmed and autorotation airspeed, ±10 knots.**	**Establish power-off glide with the helicopter trimmed and autorotation airspeed, ±5 knots.**
S3	Maintain main rotor (Nr) within normal limits.	
S4	Select a suitable landing area considering altitude, wind, terrain, and obstructions.	
S5	Maneuver to avoid undershooting or overshooting the selected landing area.	
S6	Make radio calls as appropriate.	
S7	Terminate approach with a power recovery at a safe altitude as directed by the evaluator.	

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

CHECKRIDE RULES — ACS APPENDIX 3

The altitude, airspeed, and location must be considered so the helicopter is in a position to achieve a safe landing if an actual powerplant failure occurs. The minimum altitude to initiate a power failure must be at least 1,000 feet AGL with a power recovery completed by at least 500 feet AGL.

KNOWLEDGE

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

- Elements of a powerplant failure at altitude.
- Effects of wind, weight, temperature, and density altitude.
- Main rotor (Nr) speed.
- Energy management.
- Causes and effects of high descent rates.
- Effect of varying bank angles, airspeeds, and rotor rpm.

RISK MANAGEMENT

PH.VIII.B.R1–R11 · identify, assess and mitigate risk associated with:

- Low entry altitudes.
- Selection of landing area.
- Flight control inputs.
- Turbulence, including wake turbulence.
- Low rotor rpm or rotor stall.
- Windshear.
- Powerplant failure during the maneuver.
- Collision hazards.
- Autorotation power-off never-exceed speed (VNE) limitation.
- Helicopter trim.
- Distractions, task prioritization, loss of situational awareness, or disorientation.

Standards: FAA-S-ACS-15 Private Pilot Helicopter and FAA-S-ACS-16 Commercial Pilot Helicopter (text reproduced from the current ACS). **References:** AC 61-140; 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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