

PRIVATE PILOT

V. AREA OF OPERATION: PERFORMANCE MANEUVER

TASK: STEEP TURNS

OBJECTIVE

To determine that the applicant:

1. Exhibits knowledge of the elements related to steep turns.
2. Establishes the manufacturer's recommended airspeed or, if one is not stated, a safe airspeed not to exceed V_A .
3. Rolls into a coordinated 360° turn; maintains a 45° bank.
4. Performs the task in the opposite direction, as specified by the examiner.
5. Divides attention between airplane control and orientation.
6. Maintains the entry altitude +/-100 feet (30 meters), airspeed +/-10 knots, bank +/-5°, and rolls out on the entry heading +/-10°.

ELEMENTS

1. A steep turn is a maximum performance turn when the airplane is near its performance limits.
2. The bank beyond 45° causes an overbanking tendency during which maximum turning performance is attained.
3. Because of high loads, steep turns should not be flown at any airspeed over V_A .
4. Steep turn performance limits (fastest rate of turn and smallest radius of turn) are determined by available engine power, limit load factor and aerodynamic characteristics.
5. A coordinated angle of bank produces the same load factor regardless of airspeed, but a faster airspeed will result in a larger radius of turn.
6. Clear the area of traffic before starting a steep turn.
7. Establish the manufacturer's recommended entry speed.
8. Roll into a bank of 45° and simultaneously increase back-elevator pressure (to offset the increased load and the loss of vertical lift to horizontal lift) and power (to offset the increase in drag).
9. To maintain altitude and orientation, refer to the relative position of the nose, the horizon, the wings and the amount of bank.
10. Altitude and speed changes can be neutralized by adjusting the amount of back-elevator pressure and power.
11. A small increase or decrease of 1° to 3° of bank angle may be used to control small altitude deviations.
12. The rollout should be timed to end the turn in a full 360° turn. Half the bank angle of 45° = 22.5°. Start the rollout 22.5° from the entry heading.

COMMON ERRORS

- a. Failure to adequately clear the area.
- b. Improper pitch, bank, and power coordination during entry and rollout.
- c. Attempts to start recovery prematurely.
- d. Uncoordinated use of flight controls.
- e. Inadequate power management.
- f. Inadequate airspeed control.
- g. Poor coordination.
- h. Gaining altitude in right turns and/or losing altitude in left turns.
- i. Failure to maintain constant bank angle.
- j. Attempting to perform the maneuver by instrument reference rather than visual reference.
- k. Improper procedure in correcting altitude deviations.
- l. Excessive rudder during recovery, resulting in skidding.
- m. Failure to stop the turn on a precise heading.
- n. Loss of orientation.

REFERENCES

1. FAA-H-8083-3A, Airplane Flying Handbook, Chapter 9.
2. POH / AFM, Pilot Operating Handbook / FAA-Approved Airplane Flight Manual.