

SHORT-FIELD TAKEOFF AND MAXIMUM PERFORMANCE CLIMB

OBJECTIVE

To teach the multi engine student pilot the knowledge of the elements related to a short-field takeoff and maximum performance climb.

COMPLETION STANDARDS

1. Positions the flight controls for the existing wind conditions; sets flaps as recommended.
2. Clears the area; taxis into takeoff position utilizing maximum available takeoff area and aligns the airplane on the runway center/takeoff path.
3. Applies brakes (if appropriate), while advancing the throttle smoothly to takeoff power.
4. Lifts off at the recommended airspeed, and accelerates to the recommended obstacle clearance airspeed or V_X .
5. Establishes the pitch attitude that will maintain the recommended obstacle clearance airspeed, or V_X ,
Private - +10/-5 knots,
Commercial - +5/-0 knots,
until the obstacle is cleared, or until the airplane is 50 feet (20 meters) above the surface.
6. After clearing the obstacle, establishes the pitch attitude for V_Y , accelerates to V_Y , and maintains V_Y ,
Private - +10/-5 knots, during the climb.
Commercial - ± 5 knots, during the climb.
7. Retracts the landing gear, if appropriate, and flaps after clear of any obstacles or as recommended by manufacturer.
8. Maintains takeoff power and V_Y ,
Private - +10/-5 knots to a safe maneuvering altitude.
Commercial - ± 5 to a safe maneuvering altitude.
9. Maintains directional control and proper wind-drift correction throughout the takeoff and climb.
10. Completes the appropriate checklist.

DESCRIPTION

The airplane is accelerated in the shortest distance possible, rotated at lift off speed to the best angle of climb so as to minimize total takeoff distance and/or clear an obstacle.

PROCEDURE

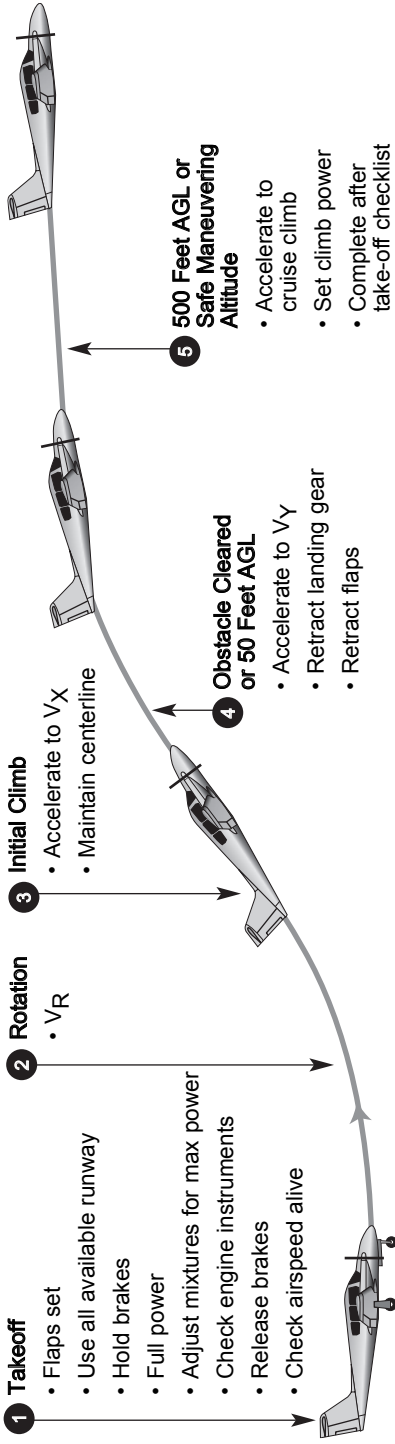
1. Set flaps to recommended setting.
2. Clear final approach.
3. After receiving clearance from tower or announcing intentions on the common traffic advisory frequency, taxi into position at the end of the runway so that maximum runway is available for takeoff.
4. Set flight controls for the existing winds.
5. Hold brakes and smoothly add maximum power.
6. Lean mixtures for maximum power.
7. Check engine instruments and static power.
8. Release brakes.
9. Check airspeed alive.
10. Maintain runway centerline by use of the rudder, avoid using brakes.
11. Rotate at computed V_R for airplane weight. If V_R is within 5 knots of V_{MCA} , consider using a different runway or reducing takeoff weight to lower V_{MCA} . This will allow a larger margin of safety in case of an engine failure right after liftoff.
12. Set V_X attitude and accelerate to V_X for appropriate airplane weight.
13. Keep the wings level with use of the ailerons.
14. Climb at V_X until obstacle is cleared or until at least 50 feet above the surface, set pitch for V_Y .
15. Retract landing gear as recommended in the POH/.AFM.
16. Retract the wing flaps when at a safe altitude (minimum 50 feet AGL) and at safe speed.
17. Accelerate and maintain V_Y .
18. Maintain takeoff power to 500 feet AGL or safe maneuvering altitude.
19. Ensure that airplane tracks out on the extended centerline until turn is required.
20. Accelerate to cruise climb airspeed and set climb power.
21. Avoid noise sensitive areas.
22. Complete after-takeoff checklist.

Note: FAR 91.103 requires takeoff and landing performance data to be computed prior to all flights.

References

- Private Pilot Practical Test Standards* FAA-S-8081-14A, pg. 2-13
Commercial Pilot Practical Test Standards FAA-S-8081-12B, pg. 2-13.
Airplane Flying Handbook FAA-H-8083-3, pg. 5-8 ⇨ 5-10, 12-16 ⇨ 12-17.
Pilot Operating Handbook/Approved Flight Manual.

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AIRCRAFT	FLAP SETTING	V_{MCA}	V_R	V_X	V_Y	CLIMB POWER	CRUISE CLIMB
PA44	0	56	70	82	88	25"/2500 RPM	105

Private Limitations — $V_X +10/-5$ Knots • $V_Y +10/-5$ Knots
 Commercial Limitations — $V_X +5/-0$ Knots • $V_Y \pm 5$ Knots