

Short Field/Maximum Performance Takeoff



What is a Short Field Takeoff?

- Maximum Performance
- Uses all available runway
- Climb out at (V_x) until 50ft. AGL

The goal is to minimize ground roll and climb out at steepest angle

When do we execute a Short Field Takeoff?

- Short runway
- Obstacles
- Heavy Airplane
- In the following conditions:
 - Hot
 - Humid
 - High Elevation
 - High Density Altitude
- Tailwind



How do we execute a Short Field Takeoff?

1. Normal pre-takeoff prep, calculations
2. Maximum runway use, centerline
3. Brakes + Full Power + Instruments
4. Release brakes, slight forward elevator pressure
5. Lift off, V_x until 50ft. AGL
6. Climb V_y .

Some Common Errors

- Failure to review performance charts
- Failure to utilize ALL of the runway
- Premature lift off, resulting in high drag
- Holding the airplane on the ground unnecessarily, wheelbarrowing
- Improper initial climb attitude
- Inability to maintain V_x
- Fixation on airspeed indicator during initial climb
- Premature retraction of gear/flaps

Important ACS

- Use maximum available takeoff area, on centerline
- Apply brakes while setting aircraft power
- Confirm takeoff power & normal instrument indications
- Climb out at $V_x + 10/-5$ knots* until 50ft. AGL, thence $V_y + 10/-5$ knots* to safe maneuvering altitude
- Retract gear after positive rate of climb has been established, and flaps as recommended by POH

*Commercial ACS +/-5 knots

Private Pilot ACS

Task	E. Short-Field Takeoff and Maximum Performance Climb (ASEL, AMEL)
References	FAA-H-8083-2, FAA-H-8083-3; POH/AFM
Objective	To determine that the applicant exhibits satisfactory knowledge, risk management, and skills associated with a short-field takeoff, maximum performance climb operations, and rejected takeoff procedures.
Knowledge	The applicant demonstrates understanding of:
<i>PA.IV.E.K1</i>	Effects of atmospheric conditions, including wind, on takeoff and climb performance.
<i>PA.IV.E.K2</i>	V_x and V_y .
<i>PA.IV.E.K3</i>	Appropriate aircraft configuration.
Risk Management	The applicant demonstrates the ability to identify, assess and mitigate risks, encompassing:
<i>PA.IV.E.R1</i>	Selection of runway based on pilot capability, aircraft performance and limitations, available distance, and wind.
<i>PA.IV.E.R2</i>	Effects of:
<i>PA.IV.E.R2a</i>	a. Crosswind
<i>PA.IV.E.R2b</i>	b. Wind shear
<i>PA.IV.E.R2c</i>	c. Tailwind
<i>PA.IV.E.R2d</i>	d. Wake turbulence
<i>PA.IV.E.R2e</i>	e. Runway surface/condition
<i>PA.IV.E.R3</i>	Abnormal operations, to include planning for:
<i>PA.IV.E.R3a</i>	a. Rejected takeoff
<i>PA.IV.E.R3b</i>	b. Engine failure in takeoff/climb phase of flight
<i>PA.IV.E.R4</i>	Collision hazards, to include aircraft, terrain, obstacles, and wires.
<i>PA.IV.E.R5</i>	Low altitude maneuvering/stall/spin.
<i>PA.IV.E.R6</i>	Distractions, loss of situational awareness, and/or improper task management.
Skills	The applicant demonstrates the ability to:
<i>PA.IV.E.S1</i>	Complete the appropriate checklist.
<i>PA.IV.E.S2</i>	Make radio calls as appropriate.
<i>PA.IV.E.S3</i>	Verify assigned/correct runway.
<i>PA.IV.E.S4</i>	Ascertain wind direction with or without visible wind direction indicators.
<i>PA.IV.E.S5</i>	Position the flight controls for the existing wind conditions.
<i>PA.IV.E.S6</i>	Clear the area, taxi into takeoff position and align the airplane on the runway centerline utilizing maximum available takeoff area.
<i>PA.IV.E.S7</i>	Apply brakes while setting aircraft power to achieve maximum performance.
<i>PA.IV.E.S8</i>	Confirm takeoff power prior to brake release and verify proper engine and flight instrument indications prior to rotation.
<i>PA.IV.E.S9</i>	Rotate and lift off at the recommended airspeed, and accelerate to the recommended obstacle clearance airspeed or $V_y + 10/-5$ knots.
<i>PA.IV.E.S10</i>	Establish a pitch attitude that will maintain the recommended obstacle clearance airspeed, or $V_x + 10/-5$ knots, until the obstacle is cleared, or until the airplane is 50 feet above the surface.
<i>PA.IV.E.S11</i>	After clearing the obstacle, establish the pitch attitude for V_y , accelerate to V_x , and maintain $V_y + 10/-5$ knots, during the climb.
<i>PA.IV.E.S12</i>	Retract landing gear and flaps after a positive rate of climb has been verified or in accordance with aircraft manufacturer's guidance.
<i>PA.IV.E.S13</i>	Maintain $V_y + 10/-5$ knots to a safe maneuvering altitude.
<i>PA.IV.E.S14</i>	Maintain directional control and proper wind-drift correction throughout takeoff and climb.
<i>PA.IV.E.S15</i>	Comply with noise abatement procedures.