

Area of Operation **VII** - Task I

Short-Field Approach and Landing

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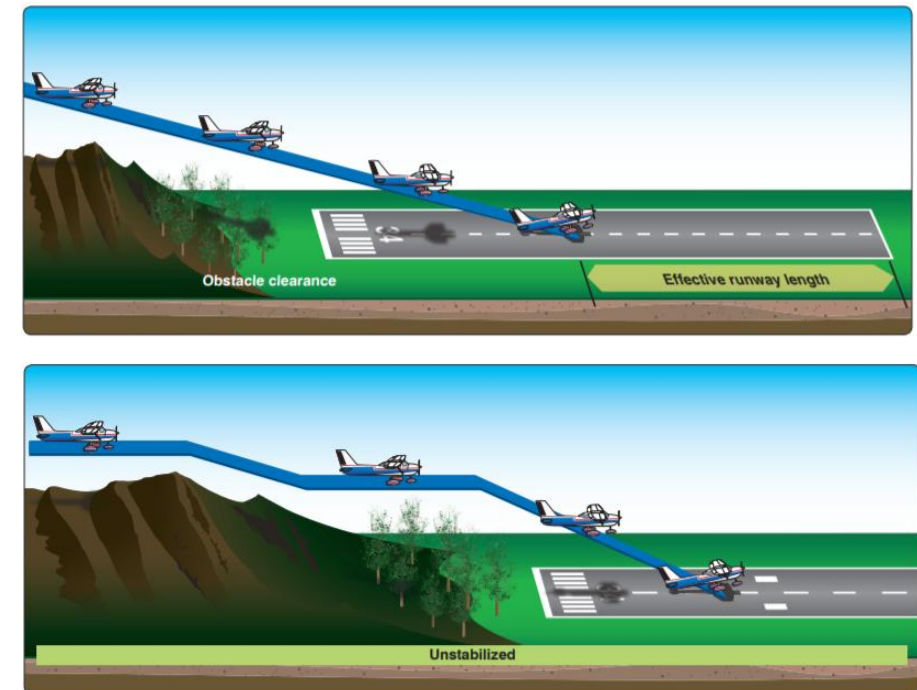
Key References:

- Airplane Flying Handbook
- POH/AFM

1. Introduction

- **What:** Approach procedure at low-speed, power-on (related to flight at minimum controllable airspeeds) for landing in relatively short distances or where there are obstacles limiting the available landing area
- **Why:** To land within a short-field, the pilot must have precise, positive control of the descent and airspeed
- **Considerations:**
 - 4⁰ Stabilized Approach (*maintain coordination, shallow banks*)
 - Obstacles require **steeper approach** and **lower airspeed**
 - Use **Trim** for approach speed (**higher than normal nose up**)
 - *Attention for potential Trim Stall during a go-around*
 - **Region of Reverse Command**
 - Looking for Minimal Float and Max Effective Braking
 - Less available runway
 - **Higher precision on landing point**

- ➡ **Standard (ACS):**
- PPL: Approach airspeed **+10/-5 kts**, Touchdown **+200/-0 ft**
 - CPL: Approach airspeed **±5 kts**, Touchdown **+100/-0 ft**



2. Landing Performance & Limitations

Limitations

- POH Chapter 2

- Flaps

Performance

- POH Chapter 5

- Ground Roll

- Runway required

SECTION 5 PERFORMANCE

CESSNA
MODEL 172S NAV III
GFC 700 AFCS

SHORT FIELD LANDING DISTANCE AT 2550 POUNDS

CONDITIONS:

Flaps FULL
Power IDLE
Maximum Braking

Zero Wind
Paved, Level, Dry Runway
Speed at 50 ft: 61 KIAS

Pressure Altitude Feet	0°C		10°C		20°C		30°C		40°C	
	Gnd Roll Feet	Total Feet To Clear 50 Foot Obst	Gnd Roll Feet	Total Feet To Clear 50 Foot Obst	Gnd Roll Feet	Total Feet To Clear 50 Foot Obst	Gnd Roll Feet	Total Feet To Clear 50 Foot Obst	Gnd Roll Feet	Total Feet To Clear 50 Foot Obst
Sea Level	545	1290	565	1320	585	1350	605	1380	625	1415
1000	565	1320	585	1350	605	1385	625	1420	650	1450
2000	585	1355	610	1385	630	1420	650	1455	670	1490
3000	610	1385	630	1425	655	1460	675	1495	695	1530
4000	630	1425	655	1460	675	1495	700	1535	725	1570
5000	655	1460	680	1500	705	1535	725	1575	750	1615
6000	680	1500	705	1540	730	1580	755	1620	780	1660
7000	705	1545	730	1585	760	1625	785	1665	810	1705
8000	735	1585	760	1630	790	1670	815	1715	840	1755

NOTE

- Short field technique as specified in Section 4.
- Decrease distances 10% for each 9 knots head wind. For operation with tail winds up to 10 knots, increase distances by 10% for each 2 knots.
- For operation on dry grass runway, increase distances by 45% of the "ground roll" figure.
- If landing with flaps up, increase the approach speed by 9 KIAS and allow for 35% longer distances.

SECTION 2 OPERATING LIMITATIONS

CESSNA
MODEL 172S NAV III
GFC 700 AFCS

AIRSPEED LIMITATIONS

Airspeed limitations and their operational significance are shown in Figure 2-1. Maneuvering speeds shown apply to normal category operations. The utility category maneuvering speed is 98 KIAS at 2200 pounds.

AIRSPEED LIMITATIONS

SYMBOL	SPEED	KCAS	KIAS	REMARKS
V _{NE}	Never Exceed Speed	160	163	Do not exceed this speed in any operation.
V _{NO}	Maximum Structural Cruising Speed	126	129	Do not exceed this speed except in smooth air, and then only with caution.
V _A	Maneuvering Speed:			Do not make full or abrupt control movements above this speed.
	2550 Pounds	102	105	
	2200 Pounds	95	98	
V _{FE}	Maximum Flap Extended Speed:			Do not exceed this speed with flaps down.
	FLAPS 10°	107	110	
	FLAPS 10° to FULL	85	85	
-----	Maximum Window Open Speed	160	163	Do not exceed this speed with windows open.

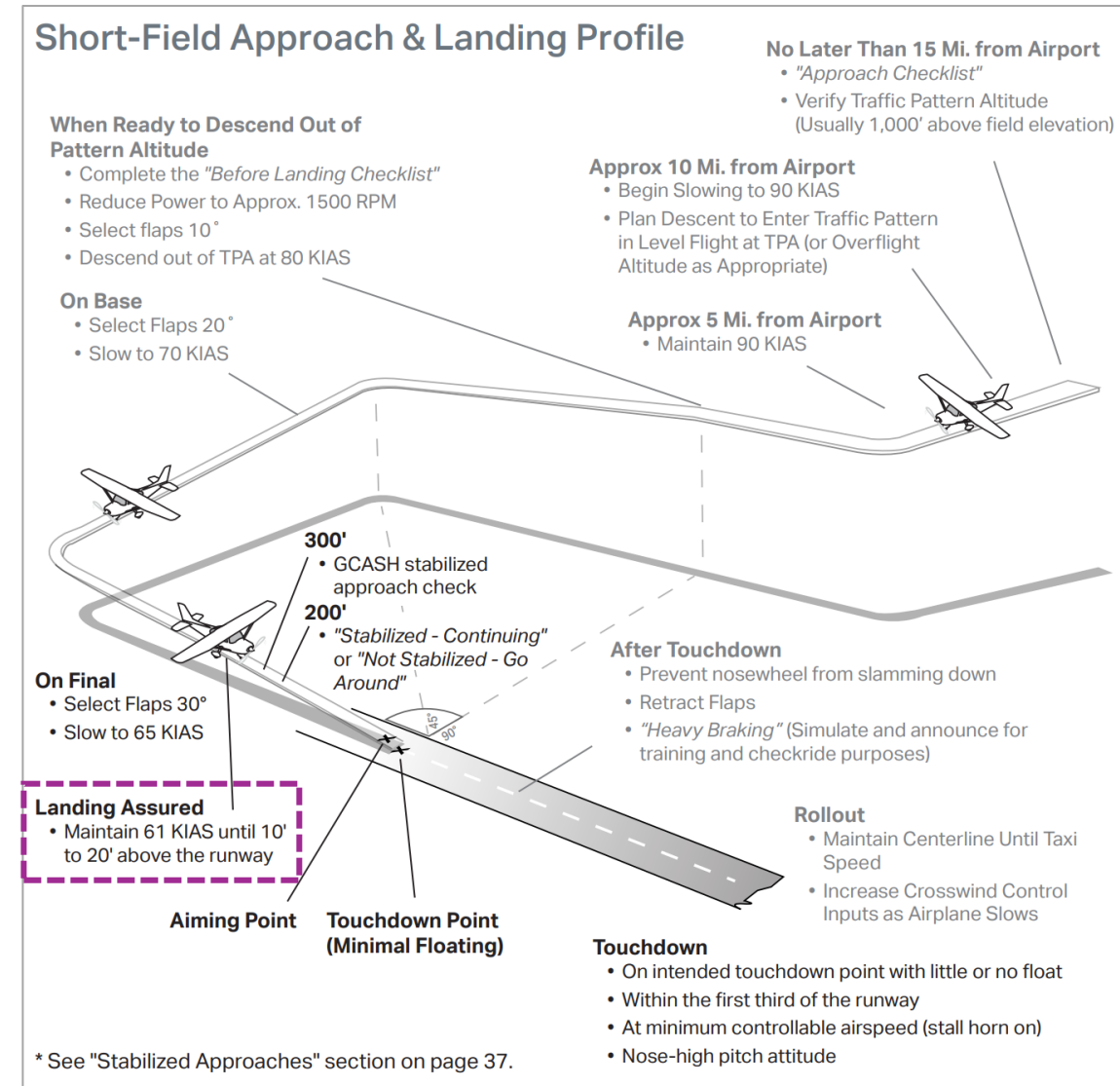
Figure 2-1

NOTE

Maximum demonstrated crosswind velocity is 15 knots (not a limitation).

3. Short-Field Approach and Landing

- Slow to **90 kts** prior to entering downwind or traffic pattern
- Enter the traffic pattern at published TPA (typically 1,000' AGL)
- Execute “Before Landing Checklist” at mid-point
- When abeam touchdown point
 - Reduce power (1500 RPM)
 - Flaps 10° and initiate descent at **80kts**
- Check for traffic on final, turn base, flaps 20°, trim for **70kts**
- Turn final, flaps 30° and trim to **65kts**
- **Slow to 61kts when landing is assured**
- Close throttle slowly during flare
- **Touchdown at minimal speed (stall horn) and minimal floating**
- **Retract the flaps after touchdown**
- **Max braking (“simulated”)**



4. Final Approach

- **Wind Correction**

- **Headwind**: More power and a lower rate of descent – landing distance is decreased
- **Tailwind**: Less power and an increased rate of descent – landing distance is increased
- **Ground track**: Use crosswind landing techniques to maintain ground track

- **Roundout & Flare**

- The goal is minimum float – airplane should settle quickly onto the aim point

- **Touchdown**

- Minimum controllable airspeed / pitch attitude that will result in a power off stall when throttle is closed
- Max effective braking on touchdown → Retract flaps to reduce lift and increase weight on wheels after touchdown
- Maintain pitch attitude as long as elevators remain effective to assist with braking

- **Directional Control**

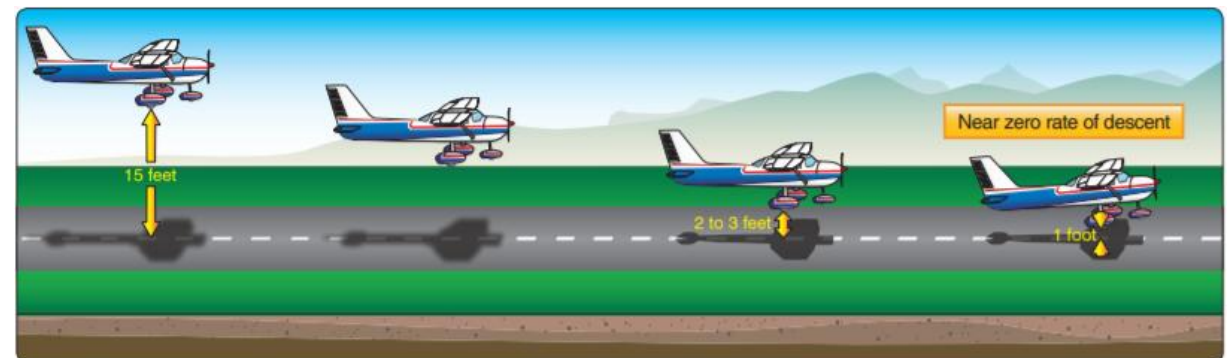
- Maintain the required aileron crosswind corrections on landing, rollout, and taxi
- Use rudder to maintain directional control. Brake evenly

SHORT FIELD LANDING

For a short field landing in smooth air conditions, approach at **61 KIAS** with **FULL flaps** using enough power to control the glide path. Slightly higher approach speeds should be used in turbulent air conditions. After all approach obstacles are cleared, smoothly reduce power and hold the approach speed by lowering the nose of the airplane. The main wheels must touch the ground before the nosewheel with power at idle. Immediately after the main wheels touch the ground, carefully lower the nosewheel and apply heavy braking as required. For maximum brake performance, retract the flaps, hold the control wheel full back, and apply maximum brake pressure without skidding the tires.

5. Roundout and Touchdown

- **Start the Roundout approximately 10-20' above the ground** → Reduce power and gently increase pitch
- **Decreasing lift, Increasing pitch**
 - As airspeed decreases, AOA is increased to allow the airplane to gently settle on the runway
 - If AOA is increased too rapidly → balloon // expect high sink – hold attitude + add a little power, or go around
 - If AOA is increased too slowly → land flat // it is unsafe (also NEVER land Nose First)
 - If airplane is too fast → expect Float
- **Touchdown**
 - Hold the wheels a few inches off the ground as long as possible → **Look towards the end of the runway**
 - Increase back pressure to gently allow the main wheel to touchdown, followed by the nose wheel → Full stall
 - **NO side loads!** **Aileron** keeps the airplane on centerline. **Rudder** keeps the longitudinal axis aligned to the centerline
- **After Touchdown (Short-Field)**
 - Apply full brakes
 - **Retract Flaps** and **elevator up** (aerodynamic brake)
 - Steer with rudder and differential brake



6. Obstructions and Hazards

- **Strong, Gusty Winds**

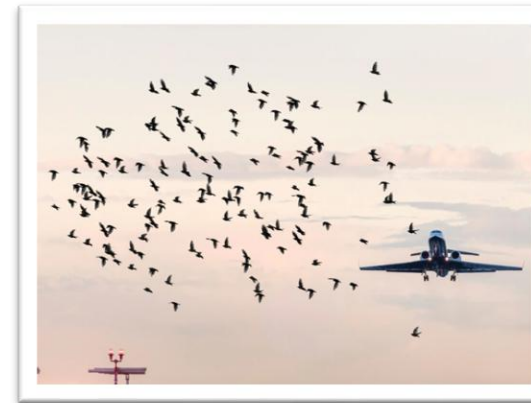
- Increase speed on final approach per the manufacturer's guidelines → Usually + half of the gust factor
 - *Example: Winds 8 gusting 20 knots → Gust factor = 12 → Approach airspeed $65 + 12/2 = 71$ kts*
- Use flaps as recommended in the POH → Often best to land with low flaps (10° or 20°)

- **Obstacles**

- Powerlines, Trees, towers, construction equipment, birds, animals in the runway, etc.
- Be aware of potentially hazardous obstructions and ensure airplane performance

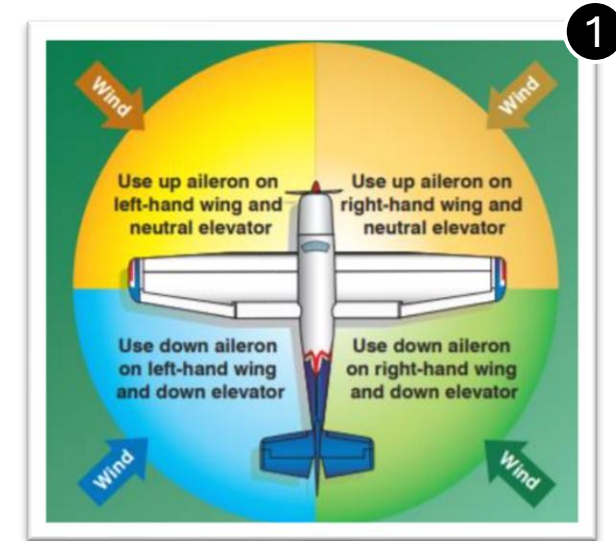
- **Traffic**

- Near airports is where most mid-air collisions happen
- Be aware of traffic → Particularly in uncontrolled fields
 - Is there an airplane extending upwind or downwind?
 - Any airplane on final? (e.g. in an instrument approach)
 - An aircraft joining the patterns?
 - Is there a helicopter in the pattern?
- Use radio calls and any other available tools to build a mental picture of traffic



7. Common Errors

1. Improper use of landing performance data and limitations
2. Failure to establish approach and landing configuration at appropriate time or in proper sequence.
3. Failure to establish and maintain a stabilized approach
4. Improper procedure in use of power, wing flaps, and trim
5. Inappropriate removal of hand from throttle
6. Improper procedure during roundout and touchdown
7. Poor directional control after touchdown **1**
8. Improper use of brakes



Questions?

