

Area of Operation **VII** - Task **G**

Slip to a Landing

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Key References:

- Airplane Flying Handbook
- Pilot Wind Shear Guide (AC 00-54)
- Pilot's Handbook of Aeronautical Knowledge

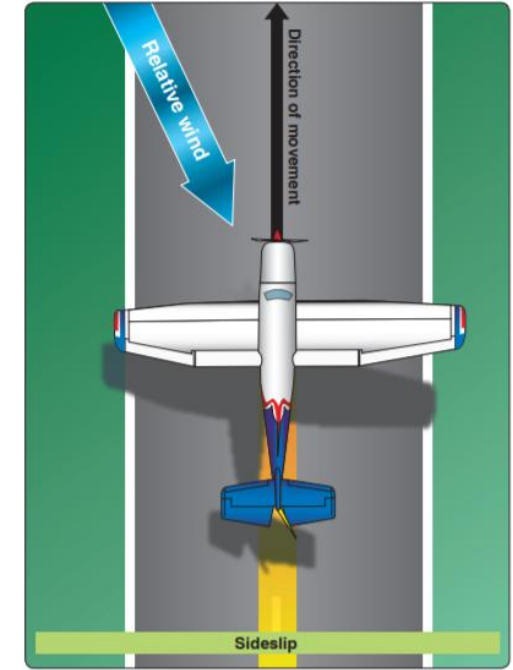
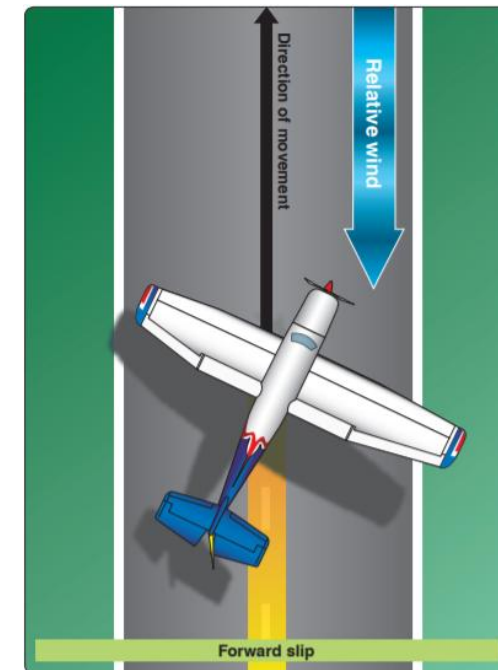
1. Introduction

- **What:** Maneuver where the airplane is flying sideways in an approach to land with the goal of increasing drag and the rate of descent, without increasing airspeed, or just maintaining centerline in crosswind conditions
- **Why:** Used to dissipate altitude without increasing airspeed, and/or adjust ground track during a crosswind
- **Considerations about a slip:**
 - Most airplanes require aileron and rudder input to maintain a slip (because of positive static stability)
 - **Forward Slip**
 - *Steepens descent w/ excessive airspeed increase*
 - *Often used when clearing obstacle*
 - *Bank one side, Yaw opposite, Pitch down*
 - **Sideslip**
 - *Used in crosswind landings to align with centerline / prevent drift*
 - *One wing is lowered to counter the crosswind*
 - *Rudder is applied to align with the runway centerline*



Standard (ACS):

- Forward Slip: Touchdown **+400/-0 ft** (PPL)



2. Basics of a Slip

- **Practical Slip Limit**

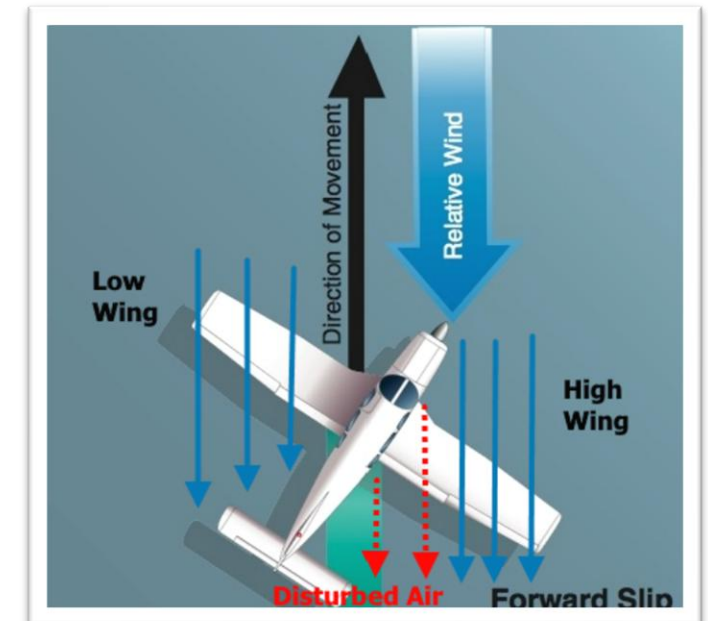
- Amount of slip is limited by the amount of rudder available
- There's a point where full rudder is needed to maintain heading even though ailerons can steepen bank
- Practical Slip Limit: Any additional bank results in a turn, even though full rudder is applied

- **Airspeed Errors**

- Change in either the static or ram air pressure will result in **an unreliable in airspeed**
- Slips can change airflow in/around the pitot and static ports
- Reference the POH for any airspeed errors/limitations

- **Stalls while Slipping**

- **Cross-controlled stalls** are the biggest hazard, especially close to the ground
- **Watch your airspeed** – the reading should be lower than actual, but use caution and may use a slightly higher airspeed
- **Raised wing has a higher AOA and will stall first** which may roll the plane to wings level, preventing a further stall



3. Forward Slip

- **Setup & Configuration**

- Higher than normal approach path
- Reduce power to idle and extend flaps as necessary

- **Entry**

- Lower one wing (slip into the wind, if a crosswind exists)
- Yaw the nose in the opposite direction
- Adjust pitch to maintain airspeed (pitch lower than normal)

- **Stabilized Approach**

- Precise ground track: Yaw the nose as required to maintain track
- Rate of descent: More bank = more sink

- **Discontinuing the Slip**

- Level the wings and simultaneously release rudder and adjust pitch
- Expect higher airspeed after recovery (instruments now accurate)

Used to descend quickly



4. Sideslip

- **Setup & Configuration**

- Normal landing configuration, unless otherwise specified
- Maintain power setting

Used on crosswind landings

- **Entry**

- Lower the upwind wing into the wind and apply rudder to prevent turn
- Aileron keeps the aircraft centered on the runway
- Rudder keeps the longitudinal axis aligned with the centerline

- **Stabilized Approach**

- Select and maintain an aim point like a normal landing (slightly more power due to increased drag)
- Precise ground track – Adjust bank and rudder to maintain runway centerline and alignment

- **Landing**

- Maintain crosswind control inputs during the landing and once on the ground
- Touchdown on the upwind main wheel first, then the downwind wheel, then the nosewheel



5. Obstructions and Hazards

- **Strong, Gusty Winds**

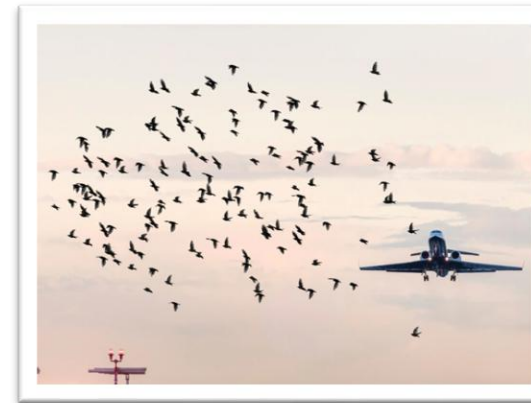
- Increase speed on final approach per the manufacturer's guidelines → Usually + half of the gust factor
 - *Example: Winds 8 gusting 20 knots → Gust factor = 12 → Approach airspeed $65 + 12/2 = 71$ kts*
- Use flaps as recommended in the POH → Often best to land with low flaps (10° or 20°)

- **Obstacles**

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

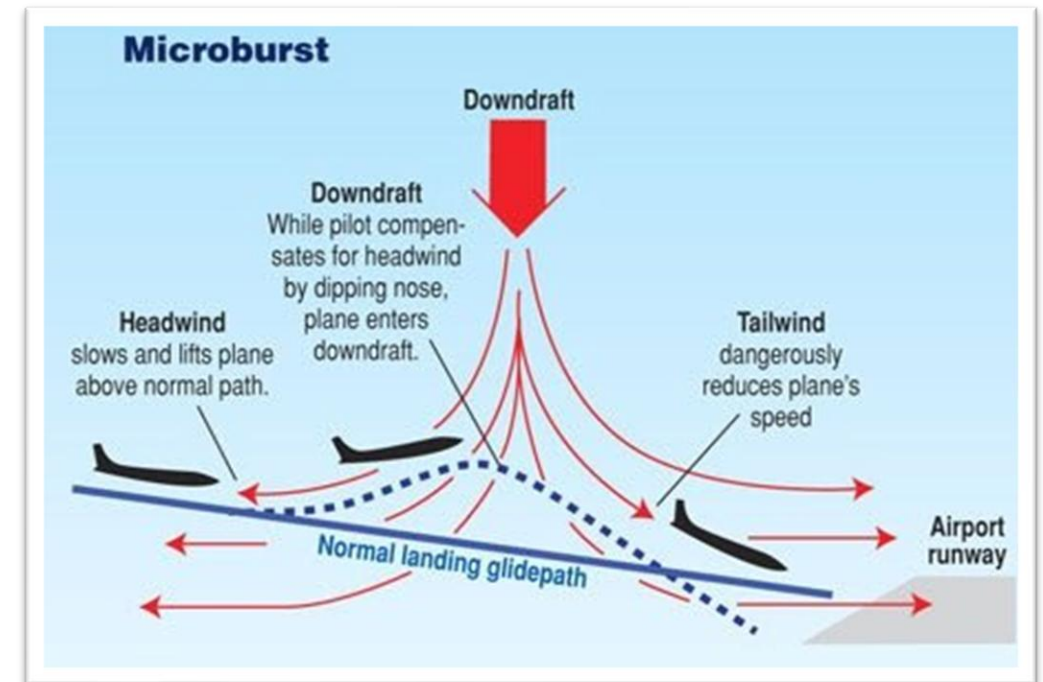
- **Traffic**

- 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



6. Windshear

- **Windshear:** Sudden, drastic change in wind speed and / or direction over a very small area
- **Why is it Dangerous?**
 - Violent updrafts and downdrafts (up to 6,000 fpm)
 - Rapid changes in performance
 - **Microbursts** – Most severe type of windshear
 - 1-2 miles across, strong downdrafts
 - Gains / losses of 30 – 90 knots
 - Signs: virga at cloud base, blowing dust, PIREPs
- **Handling Windshear**
 - If possible, avoid it
 - General techniques include:
 - Higher power and faster approach; Stay as high as feasible until necessary to descend
 - Go-around at the first sign of windshear – Full power and establish a maximum performance climb



7. Wake Turbulence Avoidance

• Wake Turbulence

- Caused by wing vortices (worse in **heavy, clean, slow** aircraft)
- Rolling moments can exceed control authority of the aircraft

• Approach

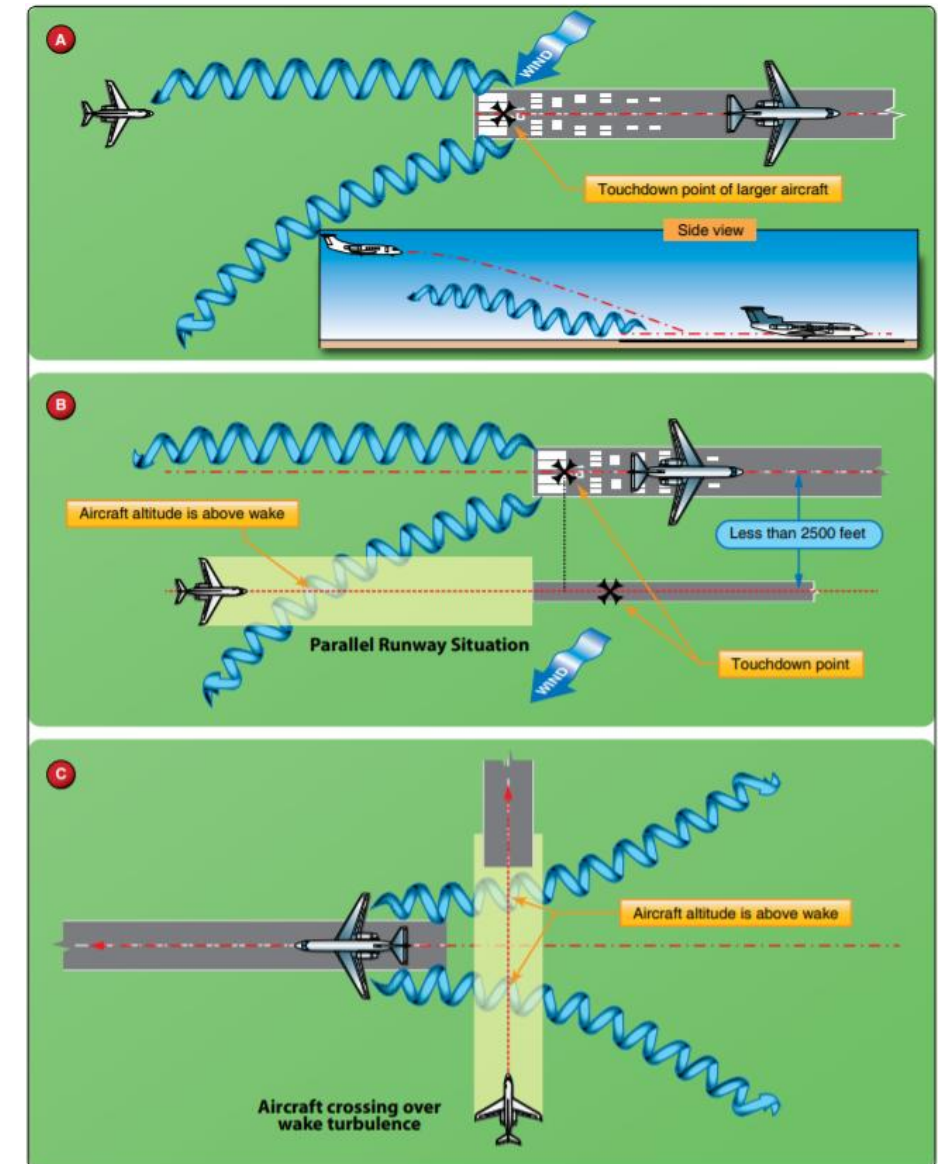
- Behind aircraft: **Stay at/above** their flight path
- On parallel runways: possibility of drift

• Landing

- Behind departing aircraft: **Land prior** to their rotation point
- Behind arriving aircraft: **Land beyond** their touchdown point
- Behind aircraft on a crossing runway: **Cross above** their flight path
- Aircraft executing a missed approach: **Wait at least 2 minutes**

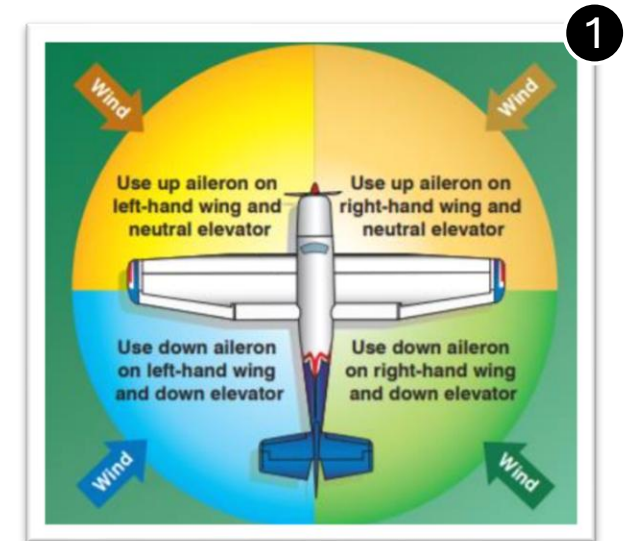
• Departing

- Behind aircraft: Rotate prior to rotation & climb above their flight path
- Intersection takeoff : Be alert to larger aircraft operations on runway
- Wait 2 minutes after a large aircraft executing a missed approach



8. 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 maintain a stabilized slip
4. Inappropriate removal of hand from throttle
5. **Improper procedure during transition from the slip to the touchdown**
6. Poor directional control after touchdown **1**
7. Improper use of brakes



Questions?

