

# Ex. 11 – Slow Flight



# What you will learn:

- ✓ To recognize the signs of slow flight (flight at airspeeds between maximum endurance and stall)
- ✓ To safely maintain control of the aircraft in slow flight, in a variety of configurations
- ✓ To recover to normal airspeed with minimal loss of altitude.

# Why learn this:

- ✓ To know what entry into slow flight feels like, to avoid accidentally entering it
- ✓ On every takeoff and landing you will be in slow flight.

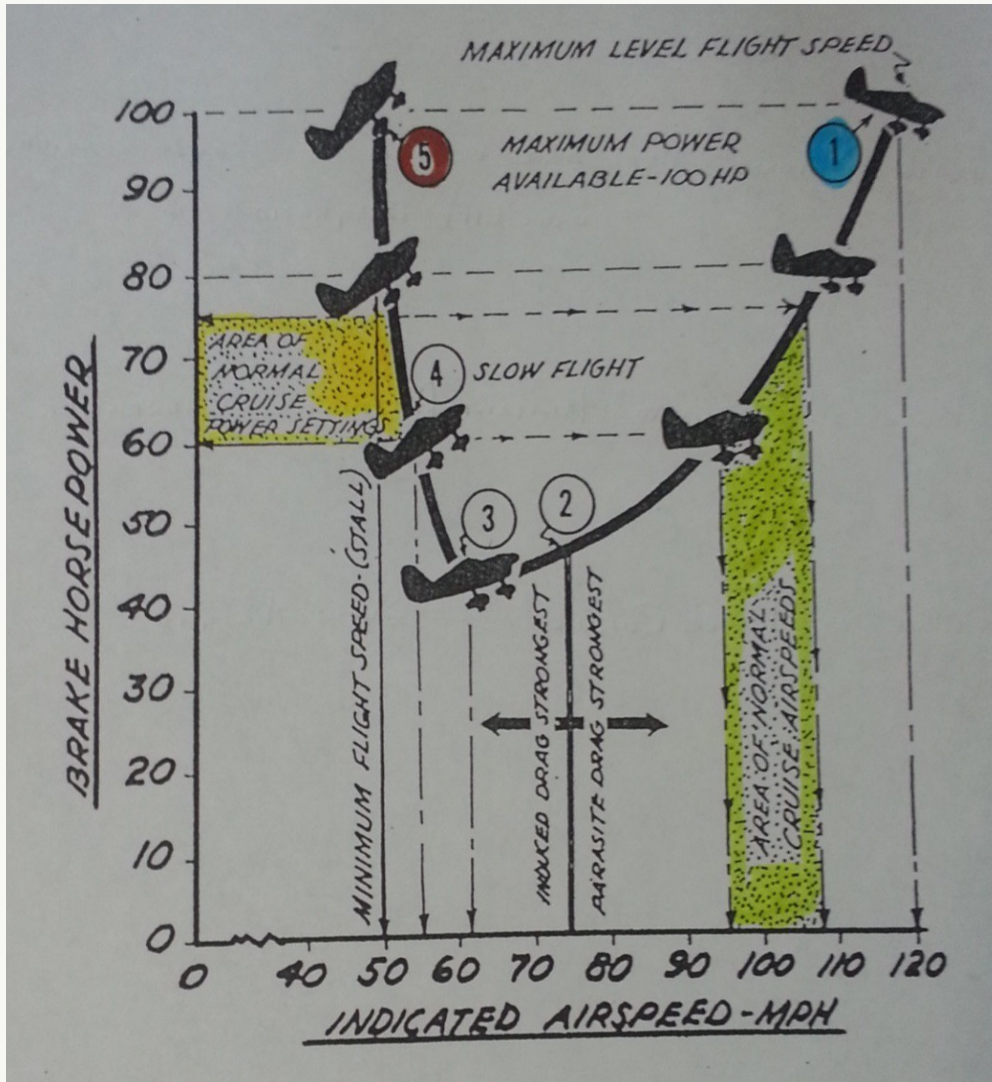
# Links:

- ✓ Climbs, descents and flight at best endurance speed provided you with a chance to fly at reduced airspeed
- ✓ You learned how changes in power and flap settings affect the flight
- ✓ You have been practicing good habits
  - lookout
  - controlling yaw.

# Theories and Definitions:

- ✓ The Power Curve
- ✓ Yaw in Slow Flight
- ✓ Flaps in Slow Flight.

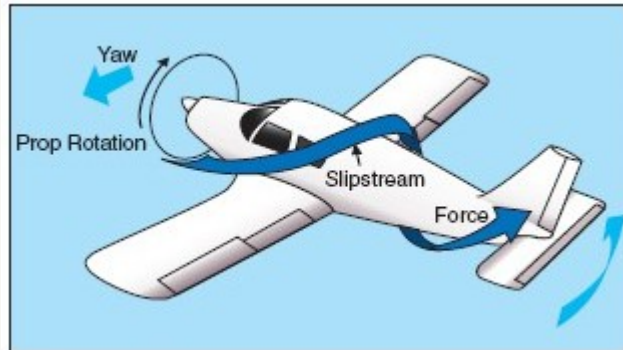
# The Power Curve



- ✓ Minimum power is required for level flight at airspeed for best endurance
- ✓ Slowing down further while maintaining altitude will require an increase in power
- ✓ Slow flight is flight between the airspeed for best endurance and stall speed.

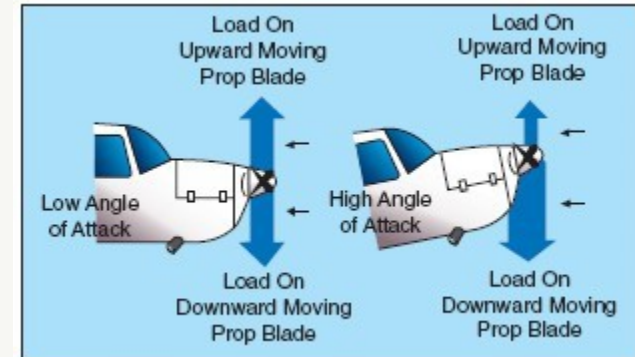
# Yaw in Slow Flight

## SLIPSTREAM



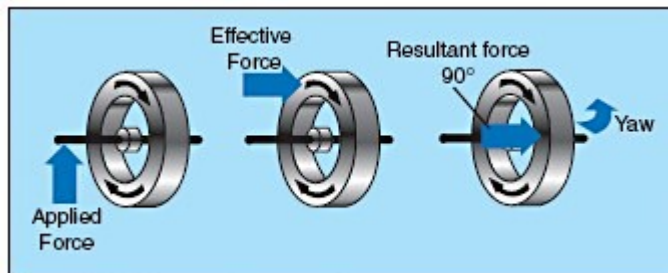
- slipstream pushes tail to the right
- plane wants to yaw to the left

## ASYMMETRIC THRUST



- at high angles of attack, down-going blade has more “bite” and creates more thrust
- left-yawing tendency

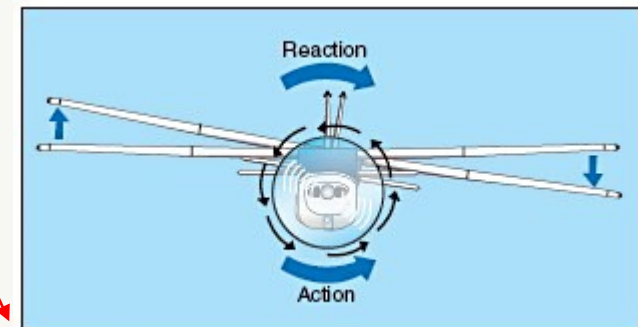
## GYROSCOPIC PRECESSION



- spinning propeller acts as a gyroscope
- raising nose causes right-yawing tendency

## SLOW FLIGHT

## TORQUE



- reaction to prop rotation causes roll to the left
- pilot corrects with right aileron, causes adverse yaw to the left

# Flaps in Slow Flight

## ADVANTAGES OF FLAPS

- ✓ More lift
  - stall speed reduced
- ✓ More nose-down attitude
  - better forward visibility
  - better engine cooling



# Procedures

- ✓ HALT or HASEL check
  
- ✓ Slow Flight
  - Entry
  - During
  - Recovery.

# HALT Check

**H**eight

- Recover by 2000' AGL

**A**irplane

- Pre-landing Check

**L**ocation

- Non-populated area/Practice area

**T**raffic

- two 90° turns or one 180° turn - MINIMUM.

# HASEL Check

Pick your favorite acronym,  
make one up if you like,  
but call out the checks

**H**eight > 2000 ft recovery

**A**rea-safe, not populated city or mountains

**S**ecure-cargo, seat belts

**E**ngine-temperature, pressures

**L**ookout-clearing turns, two 90 degree

# Slow Flight: Entry

- ✓ **HALT check, Position Report**
- ✓ **Pick a reference point (road, lake)**
- ✓ **Reduce power to ~1500 rpm**
- ✓ **Control yaw with rudder**
- ✓ **Attitude – Pitch for airspeed**
- ✓ **Trim – As desired**
- ✓ **Flaps – As desired**
- ✓ **Symptoms**
- ✓ **Instrument Indications**

# Slow Flight: During

- ✓ Keep good **look-out**
- ✓ Maintain altitude with power
- ✓ Maintain airspeed with elevators
- ✓ Maintain heading with ailerons + rudder
- ✓ Control yaw with rudder.

# Slow Flight: Recovery

- ✓ **Full power**
- ✓ **Maintain altitude with elevators (forward pressure)**
- ✓ **Control yaw with rudder**
- ✓ **Flaps up in stages**
- ✓ **Once back to normal cruise airspeed, reduce power back to cruise**
- ✓ **Retrim.**

# Considerations

## ✓ Control Responses

- controls are “sluggish” and “mushy” (one of slow flight signs)
- ailerons are affected the most
- elevator and rudder remain relatively effective due to propeller slipstream
- be prepared for a lot of adverse yaw due to propeller effects and aileron drag

## ✓ Stall

- at a certain airspeed the airplane will reach a critical angle of attack at which it will no longer be controllable and will start descending rapidly
- stall entry and recovery will be practiced in the next lesson.

# SAFETY

- ! Good **look-out** is crucial – visibility is reduced in slow flight
- ! Avoid practicing slow flight for prolonged periods of time – engine may overheat
- ! Max bank in slow flight =  $30^\circ$
- ! Careful control of airspeed: you're on the edge of stall!
- ! Yaw control is critical: what can stalling uncoordinated lead to?



# Conclusion

- ✓ Practicing slow flight will improve your confidence and piloting skills, and help prepare you for mastering take-offs and landings
- ✓ Next lesson: we will slow the plane down even more – to the point of the stall!
- ✓ Read for next lesson: Ex. 12, Stalls

**QUESTIONS?**