

**EAGLE FLIGHT TRAINING**

**LIMITED**

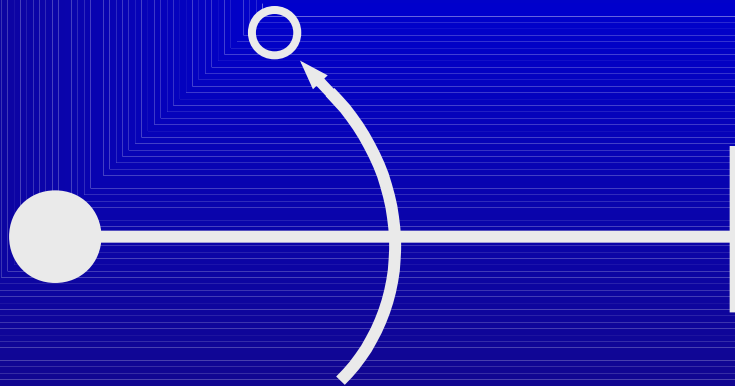


# Aerobatic Flight

## The Barrel Roll

# *Objective*

To pitch and roll the aircraft accurately through 360° - the barrel roll

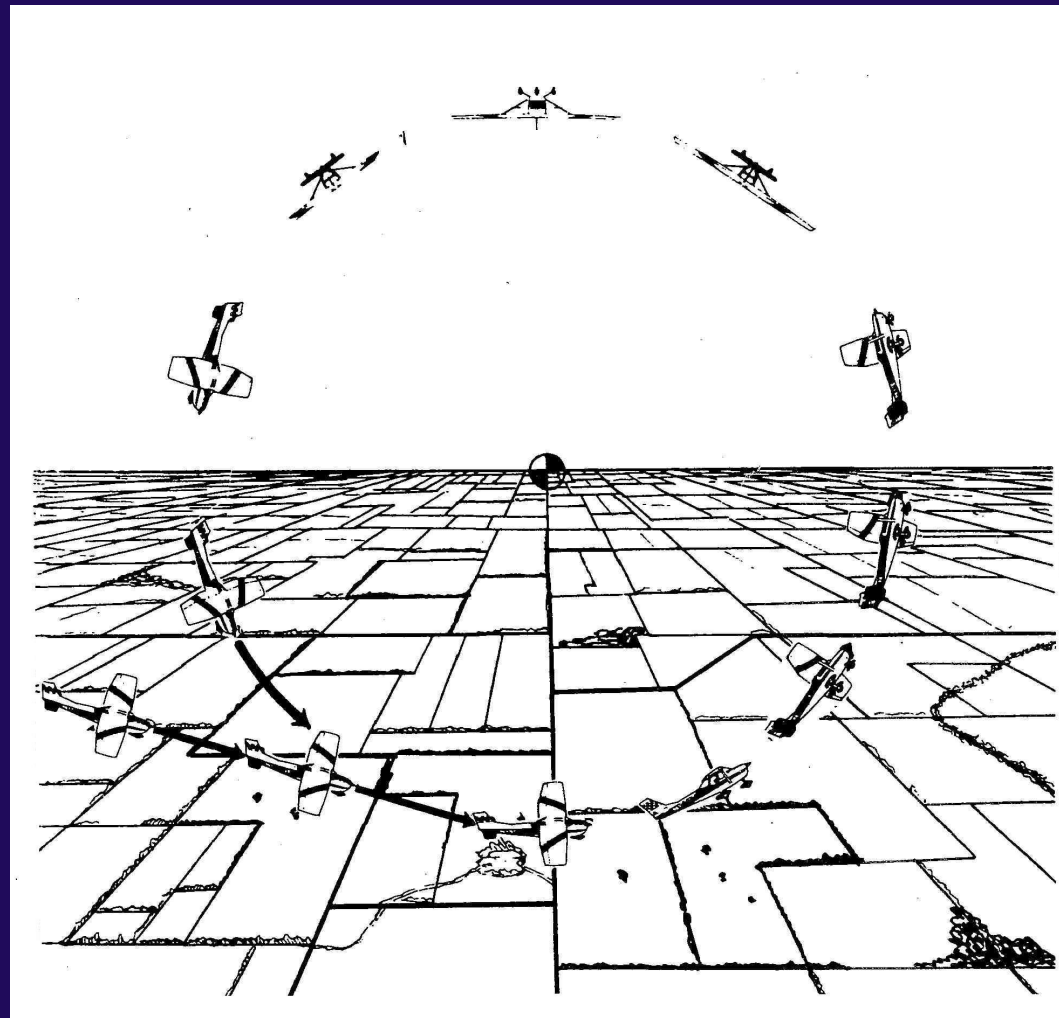


# *Considerations*

## *What is a Barrel Roll?*

- ◆ The Barrel Roll is a combination of the Loop and Aileron Roll.
- ◆ The aircraft's flight path simulates the shape of a Barrel lying on it's side

# *The Barrel Roll*



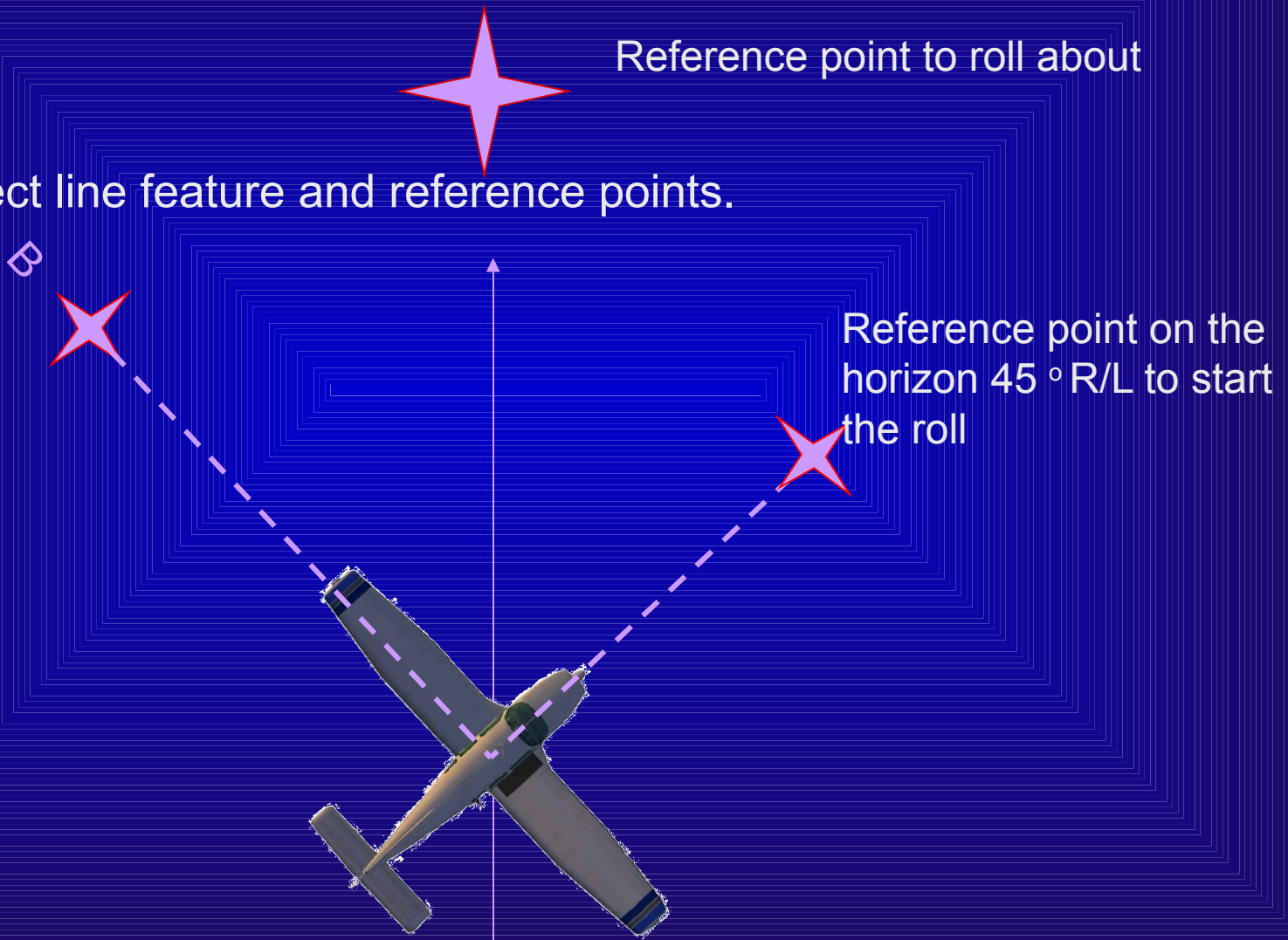
# *Considerations*

## *Reference Points*

- ◆ In order to ensure spatial orientation, the selection of strong reference points and / or line features is required.
- ◆ Three reference points are needed for a barrel roll
  - ◆ Line Feature – central ref point.
  - ◆ Ref point A at 45 deg L/R of central ref point.
  - ◆ Ref Point B at 45 deg L/R of central ref point (in the inverted attitude) – opposite side to ref point A.

# Considerations

- Select line feature and reference points.



# *Considerations*

## *Roll*

- ◆ A constant rate of roll is required for a barrel roll
- ◆ The IAS is constantly changing, therefore control effectiveness will change throughout the manoeuvre
- ◆ Need to progressively increase aileron deflection until inverted and then decrease on the way back down

# *Considerations*

## *Loop*

- ◆ Must keep looping throughout the manoeuvre.

## *Approaching the Vertical*

- ◆ Full power
- ◆ Relaxing back pressure

## *Exit*

- ◆ Controlling RPM (red line)



# *Engine Handling*

- ◆ Power (RPM) Smooth movements (red line)
- ◆ Mixture Full rich
- ◆ Carb heat Normal use
- ◆ T's & P's Monitor

# *Human Factors /Airmanship*

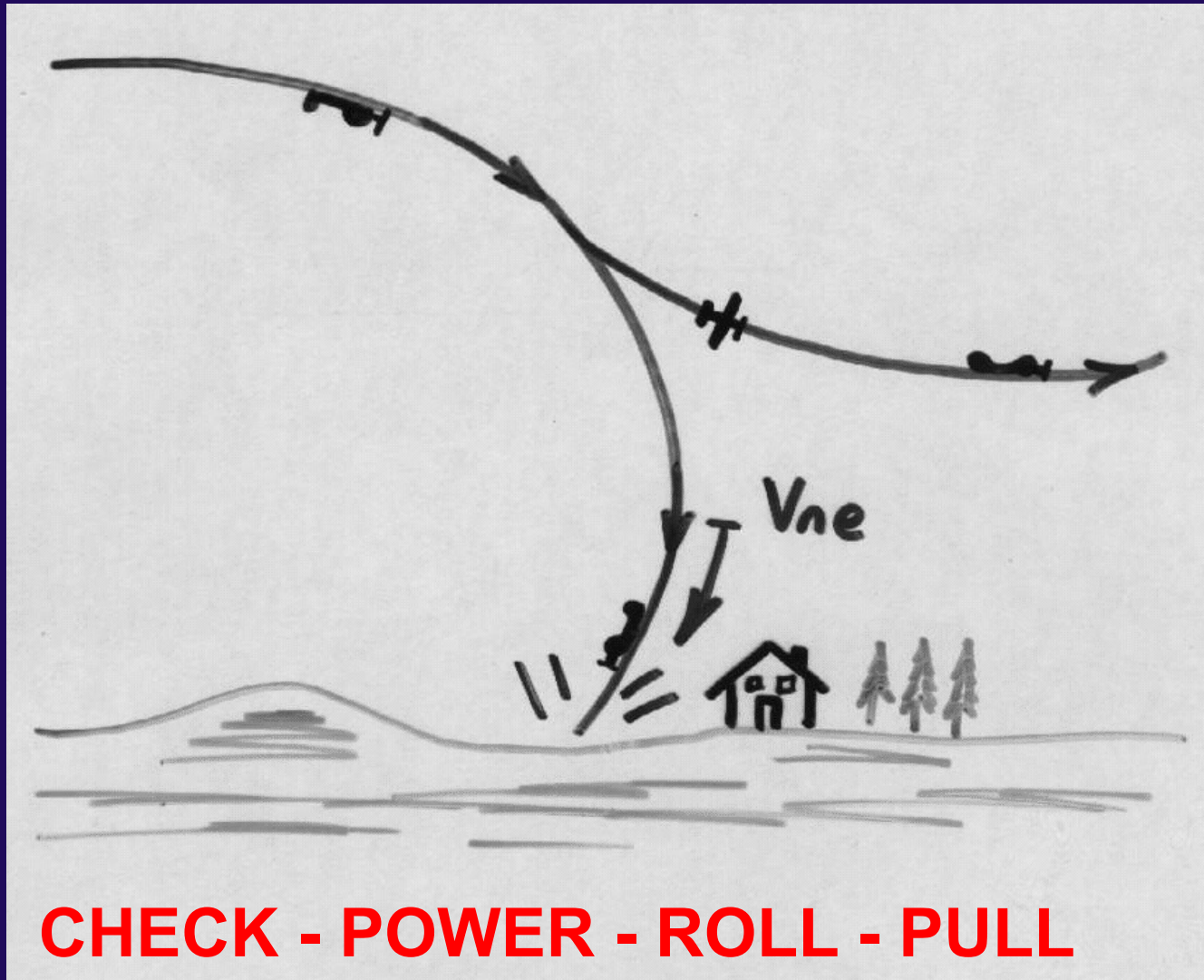
- ◆ **IMSAFE – LOOKOUT – HASELL-HELL**
- ◆ Use well defined ref points and features
- ◆ Flaps up
- ◆ Load factor, airspeed and power limits (AFM)

# *Human Factors /Airmanship*

## *Inverted Unusual Attitude*

- ◆ Danger of “pulling through” with rapid IAS increase (VNE), large altitude loss, excess “g” load and impact with the ground if at low altitudes.

# DO NOT PULL THROUGH!



# *Human Factors /Airmanship*

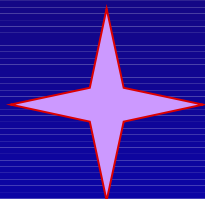
- ◆ **CHECK** Stop the pitching
- ◆ **POWER** Close the throttle
- ◆ **ROLL** To the nearest horizon
- ◆ **PULL** Ease out of the dive

***DO NOT PULL THROUGH!***

# Air Exercise

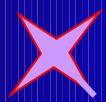
## Entry

- Select line feature and reference points.



Reference point to roll about above on the horizon

B



Reference point on the horizon 45 ° R/L to start the roll



Line feature on the ground

# *Air Exercise*

## *Entry*

- ◆ Make a Shallow bank angle descending turn L/R 45 Deg to ref point (opposite direction to the intended roll) Balance
- ◆ At entry IAS +ve 3.0g pitch up as for a loop and roll to wings level as the nose passes the first ref point
- ◆ Continue roll in the required direction - balance
- ◆ Increase power as normal

# *Air Exercise*

## *To Ref point B*

- ◆ As heels pass horizon, look to wing tip reference point
- ◆ Smoothly apply aileron to get aircraft inverted at reference point B
- ◆ Need to keep increasing aileron deflection as IAS decreases to maintain constant rate of roll to inverted position
- ◆ Note wings level and inverted attitude at reference point (+ve 1.0 g) Look to wing tip for ref point A
- ◆ Do not stop looping but remember to relax back pressure as for a loop and continue constant roll



# *Air Exercise*

## *Exit*

- ◆ Continue co-ordinated pitch and roll (control RPM) to reach ref point A wings level.
- ◆ Make co-ordinated climbing turn to central ref point and ref altitude.

# *Common Errors*

- ◆ Not getting the aircraft inverted in the correct position
- ◆ Reducing aileron deflection at point B and pulling through - inverted U/A
- ◆ Not allowing the nose to pitch up far enough before rolling
- ◆ Failure to continue pitching after initiating roll towards point B
- ◆ Not maintaining a constant rate of roll (changing control effectiveness)
- ◆ Exceeding RPM limit



Questions?