PAA – Flight Training Maneuvers Manual – 172 R/S/SP

Pinnacle Aviation Academy, (PAA) has developed a Flight Training Maneuvers Manual, (FTM) to provide students with the flight maneuvers to be flown in the training courses used at PAA. This specific training manual incorporates the required flight maneuvers for students seeking a Private or Commercial Certification. The training will be done in Cessna 172R / S / SP models used at PAA. The only exception to this would be for Commercial students because they will be spending a limited amount of time will also be in the Cessna 182S to secure a "High Performance" endorsement. All airspeeds, angles of bank and other flight parameters are shown as optimum values in this manual. At the conclusion of each maneuver, the Airman Certification Standards, (ACS) requirements for Private, (PVT) and Commercial, (COM) reference SOME but not ALL of the requirements and flight tolerances to be flown in the certification process. Please take the time to look up and review the specific ACS requirements for the Private or Commercial to get an understanding of ALL the requirements for the respective certificates.

Prior to conducting a flight, it is highly recommended that the instructor and student review in detail each maneuver. This review should provide the student a chance to address the procedures for any given maneuver as well as how a particular maneuver should be flown. It should be made clear that this manual should not be used in the aircraft by the student because it will divert the student's attention from visually scanning the area outside the aircraft for other traffic.

V-SPEEDS	172R	172S & SP
Vne	- 163 KIAS	- 163 KIAS
Vno	- 129 KIAS	- 129 KIAS
Vy	- 79 KIAS @ SL	- 74 KIAS @ SL
Vx	- 60 KIAS @ SL	- 62 KIAS @ SL
Vr	- 55 KIAS	- 55 KIAS
Va	- 2450 lbs. - 99 KIAS	- 2550 lbs. - 105 KIAS
	- 2100 lbs. - 92 KIAS	- 2200 lbs. - 98 KIAS
	- 1600 lbs. – 82 KIAS	- 1900 lbs. - 90 KIAS
Vg (MAX GLIDE)	- 65 KIAS	- 68 KIAS
Vfe	- 10° - 110 KIAS	- 10° - 110 KIAS
	- 20° or Greater - 85 KIAS	- 20° or Greater - 85 KIAS
Vs1	- 44 KIAS	- 48 KIAS
Vso	- 33 KIAS	- 33 KIAS
MAX X-WIND	- 15 KIAS	– 15 KIAS
SHORT FLD LD App.	- 62 KIAS flaps 30°	- 61 KIAS flaps 30°
Balked Landing:		
Throttle FULL Open	- 55 KIAS flaps 20°	- 60 KIAS flaps 20°

TAKEOFF and DEPARTURE CLIMB: For both Private & Commercial

- **Prior to ANY departure, NO MATTER which takeoff procedure is used, the following questions NEED to be ASKED and ANSWERED:**
  - **Is this a NORMAL takeoff or CROSSWIND (X-WIND) takeoff? (crosswind shall be noted in this manual as: X-WIND)**
  - **If it is a X-Wind takeoff, WHAT is the Crosswind Component?**
  - **Is this a NORMAL, SHORT or SOFT field takeoff?**
  - **What condition(s) could affect the TAKEOFF and CLIMBOUT PERFORMANCE?**
  - **WHAT are your Personal Minimums?**

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Normal Takeoff:

Maneuver

- Alignment: RUNWAY CENTERLINE - Taxi out and align the aircraft with the runway centerline.
- Ailerons: NEUTRAL
  (X-WIND) - FULL deflection into the wind for a X-WIND takeoff.
- Throttle: FULL Open (smoothly apply)
- Ailerons: NEUTRAL as aircraft accelerates to Vr.
  (X-WIND) - Reduce deflection to the ANGLE of the X-Wind as aircraft accelerates to Vr.
- Elevator: NEUTRAL as aircraft accelerates to Vr.
- Rudder: WHATEVER is required to keep the airplane longitudinally ALIGNED down the runway accelerating to Vr.
- Elevator: AT Vr - Lift and hold the nose wheel off the runway.
  (X-WIND) – The UPWIND wheel of the main gear should be the last wheel to leave runway.
- Elevator: PITCH to Vy (site picture)
  - AIRSPEED – climb @ Vy
- Ground Track (Up-wind): WHATEVER HEADING required to remain ALIGNED down the centerline of the runway
- Crosswind Turn: GREATER than 400 feet AGL

ACS – PVT:

- Position flight controls for existing wind conditions.
- Rotate and liftoff @ Vr and accelerate to Vy.
- Establish PITCH attitude and MAINTAIN climb attitude @ Vy: + 10 / - 5 KIAS
- Maintain direction control and proper WIND-DRIFT correction throughout takeoff and climb.

ACS – COM:

- Position flight controls for existing wind conditions.
- Rotate and liftoff @ Vr and accelerate to Vy.
- Establish PITCH attitude and MAINTAIN climb attitude @ Vy: + - 5 KIAS
- Maintain direction control and proper WIND-DRIFT correction throughout takeoff and climb.

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Short Field Takeoff:

Maneuver

- Use MAXIMUM available runway for takeoff
- Alignment: RUNWAY CENTERLINE - Taxi out and align the aircraft with the runway centerline.
- Ailerons: NEUTRAL
  (X-WIND) - FULL deflection into the wind for a X-WIND takeoff
- Brakes: APPLY
- Throttle: FULL Open (smoothly apply)
- Brakes: RELEASE
- Ailerons: NEUTRAL – As aircraft accelerates to Vr.
  (X-WIND) - Reduce deflection to the ANGLE of the X-WIND as aircraft accelerates to Vr.
- Elevator: SLIGHTLY TAIL LOW as aircraft accelerates to Vr.
- Rudder: WHATEVER is required to keep the airplane longitudinally ALIGNED down the centerline accelerating to Vr.
- Elevator: AT Vr – Lift and hold the nose wheel off the runway.
  (X-WIND) – The UPWIND wheel of the main gear should be the last wheel to leave runway.
- Elevator: PITCH to Vx (site picture)
  - AIRSPEED – Climb out @ Vx until OBSTACLE is cleared
- Elevator: PITCH to Vy (site picture)
  - AIRSPEED – Climb out @ Vy
- Flaps: Retract to 0° AFTER reaching 60 KIAS
  - AIRSPEED - Climb @ Vy
- Ground Track (up-wind): HEADING to remain ALIGNED with the extended centerline of the runway.
- Crosswind Turn: Greater than 400 feet AGL

ACS – PVT:

- Position flight controls for existing wind conditions.
- Hold BRAKES while setting Full Throttle and confirm that power has been set.
- Rotate and liftoff @ Vr and accelerate to Vx.
- Establish PITCH attitude and MAINTAIN climb attitude @ Vx: + 10 / - 5 KIAS until obstacle is clear. Then PITCH to and MAINTAIN Vy: + 10 / - 5 KIAS.
- Maintain direction control and proper WIND-DRIFT correction throughout takeoff and climb.

ACS – COM:

- Position flight controls for existing wind conditions.
- Hold BRAKES while setting Full Throttle and confirm that power has been set.
- Rotate and liftoff @ Vr and accelerate to Vx.
- Establish PITCH attitude and MAINTAIN climb attitude @ Vx: + - 5 KIAS until obstacle is clear. Then PITCH to and MAINTAIN Vy: + - 5 KIAS.
- Maintain direction control and proper WIND-DRIFT correction throughout takeoff and climb.

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Soft Field Takeoff:

Maneuver

- Elevator: FULL Back
- Alignment: RUNWAY CENTERLINE - Taxi out and align the aircraft with the runway centerline.
- Ailerons: NEUTRAL
  (X-WIND) - FULL deflection into the wind for a X-WIND takeoff
- Brakes: NONE – No Stopping
- Throttle: FULL Open (smoothly apply)
- Ailerons: NEUTRAL – As aircraft accelerates to Vr.
  (X-WIND) - Reduce deflection to the ANGLE of the X-WIND as aircraft accelerates to Vr.
- Rudder: WHATEVER is required to keep the airplane longitudinally ALIGNED down the centerline of the runway.
- Elevator: FULL back and LIFT the nose wheel off runway ASAP.
  (X-WIND) – UPWIND wheel of the main gear should be the last wheel to leave runway.
- Elevator: PITCH to remain in GROUND EFFECT and accelerates to Vx or Vy as directed by instructor.

WITH OBSTRUCTION:

- Elevator: PITCH to Vx (site picture)
  - AIRSPEED: Climb out @ Vx until OBSTACLE is cleared, then Vy

NO OBSTRUCTION:

- Elevator: PITCH to Vy (site picture)
  - AIRSPEED: Climb @ Vy
- Flaps: Retract to 0° AFTER reaching 60 KIAS
  - AIRSPEED - Climb @ Vy
- Ground Track (up-wind): WHATEVER HEADING to remain ALIGNED with the extended centerline of the runway.
- Crosswind Turn: GREATER than 400 feet AGL

ACS – PVT:

- Position flight controls for existing wind conditions.
- Lift off at the LOWEST possible airspeed and remain in GROUND EFFECT while accelerating to Vx or Vy as directed by instructor.
- Establish PITCH attitude and MAINTAIN climb attitude @ Vx or Vy as directed by instructor.
- Airspeed: Vx or Vy: + 10 / - 5 KIAS
- Maintain direction control and proper WIND-DRIFT correction throughout takeoff and climb.

ACS – COM:

- Position flight controls for existing wind conditions.
- Lift off at the LOWEST possible airspeed and remain in GROUND EFFECT while accelerating to Vx or Vy as directed by instructor.
- Establish PITCH attitude and MAINTAIN climb attitude @ Vx or Vy as directed by instructor.
- Airspeed: Vx or Vy: + - 5 KIAS
- Maintain direction control and proper WIND-DRIFT correction throughout takeoff and climb.

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Steep Turns:

Setup for Maneuver:

- Perform Pre-Maneuver Checklist.
- Throttle - 1900 RPM (approx. 90 KIAS; do NOT exceed 95 Va on entry speed)

Maneuver:

- Bank: Roll into Bank (45° PVT, 50° COM)
- Throttle: Increase by 100 - 200 RPM @ 25° - 30° Bank Angle.
- Elevator: Adjust back pressure as necessary to Maintain Entry Altitude.
- Rudder: Adjust as needed to remain in coordinated flight.
- Start roll out 1/2 the number of degrees of Bank Angle PRIOR Entry Reference Point / Heading. (PVT: 20° prior; COM: 25° prior)
- 1st - 360° Turn: Roll out ON Entry Reference Point / Heading.
- Elevator: Adjust back pressure as necessary to Maintain Entry Altitude
- Rudder: Adjust as needed to remain in coordinated flight.
- 2nd – 360* Turn: Roll into OPPOSITE Direction (45° PVT, 50° COM)
- Elevator: Adjust back pressure as necessary to Maintain Entry Altitude.
- Start roll out 1/2 the number of degrees of Bank Angle PRIOR Entry Reference Point / Heading. (PVT: 20° prior; COM: 25° prior)
- Throttle: Decrease to 1900 RPM on rollout @ 25° - 30° Bank Angle.
- Elevator: Decrease back pressure as necessary to Maintain Entry Altitude

Recovery:

- Roll out ON the: Entry Reference Point / Heading & ON Entry Altitude
- Cruise Flow Checklist

ACS – PVT:

- MAX Bank Angle: 45°; Altitude: + - 100 ft; Airspeed: + - 10 KIAS; Roll out on Entry Heading: + - 10°;

ACS – COM:

- MAX Bank Angle: 50°; Altitude: + - 100 ft; Airspeed: + - 10 KIAS; Roll out on Entry Heading: + - 10°;

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Slow Flight:

Setup for Maneuver:

- Perform Pre-Maneuver Checklist.
- Target Airspeed in Slow Flight – 50 KIAS.

Maneuver:

- Throttle: 1500 RPM
- Maintain Entry Altitude & Reference Point / Heading.
- Flaps: Extend to 10° increments @ Vfe or below
- Throttle: As necessary to maintain Entry Altitude
- Elevator: As needed to maintain Target Airspeed
- Turns, Climbs & Descents as directed by instructor

Recovery:

- Throttle: FULL Open (smoothly)
- Flaps: Reduce to 20°
- Elevator: Maintain Entry Altitude & Reference Point / Heading.
- Flaps – Reduce to 10°
- Maintain Entry Altitude & Reference Point / Heading.
- Flaps: Reduce Zero
- Complete maneuver ON: Entry Altitude & Reference Point / Heading

ACS – PVT:

- Entry Airspeed @ 5 – 10 KIAS ABOVE stall speed
- Altitude: + - 100 ft; Heading: + - 10°; Airspeed: + 10 / - 0 KIAS; Bank: + - 10°;
- Maintain coordinated flight throughout maneuver for S&L flight, turns, climbs & descents.

ACS – COM:

- Entry Airspeed @ 5 – 10 KIAS ABOVE stall speed
- Altitude: + - 50 ft; Heading: + - 10°; Airspeed: + 5 / - 0 KIAS; Bank: + - 5°;
- Maintain coordinated flight throughout maneuver for S&L flight, turns, climbs & descents.

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Power On Stall:

Setup for Maneuver:

- Perform Pre-Maneuver Checklist.
- Establish recovery climb attitude @ Vx or Vy as designated by instructor.

Maneuver:

- Throttle: 1500 RPM
- Elevator: Maintain Entry Altitude & Reference Point / Heading.
- Airspeed: Slow to 50 KIAS
- Throttle: FULL Open (smoothly)
- Bank: NO BANK or BANK as specified by instructor. (MAX Bank 20°)
- Elevator: Increase Pitch Attitude to the Stall @ 1° per second
- VERBALLY ANNOUNCE the FIRST indication AND/OR when the FULL stall occurs, as directed by instructor.

Recovery:

- Simultaneously
    - Elevator: Reduce the Angle of Attack to NO MORE than 10° below horizon.
    - Rudder: Level Wings with the horizon with RUDDERS. (NO Ailerons)

  Once the wing is no longer stalled
- Elevator: PITCH for Vx or Vy as directed by instructor (site picture)
- Establish POSITIVE Rate of Climb
- Climb @ Vx or Vy until advised by the instructor to level off at a specified altitude

ACS – PVT:

- Heading: + - 10° in straight flight OR in turning flight to a MAX Bank Angle of 20°: + - 10° in turning flight.
- Configure the airplane in the approach & landing configuration.
- VERBALLY ANNOUNCE the FIRST indication of a stall AND after the FULL stall occurs.
- PITCH to Vx or Vy as specified by instructor.
- Climb @ Vx or Vy until directed by the instructor to level off at a specified altitude
-

ACS – COM:

- Heading: + - 10° in straight flight OR in turning flight to a MAX Bank Angle of 20°: + - 10° in turning flight.
- Configure the airplane per manufacture, and accelerate to Vx or Vy.
- VERBALLY ANNOUNCE the FIRST indication of a stall OR after the FULL stall occurs, as specified by instructor.
- PITCH to Vx or Vy as specified by instructor.
- Climb @ Vx or Vy until directed by the instructor to level off at a specified altitude.

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Power Off Stall:

Setup for Maneuver:

- Perform Pre-Maneuver Checklist..
- Establish recovery climb attitude @ Vx or Vy as designated by instructor.

Maneuver:

- Throttle: 1500 RPM
- Maintain Target Altitude& Reference Point.
- Flaps: Extend flaps @ 10° INCRIMENTS @ Vfe and below.
- Maintain Entry Altitude & Reference Point / Heading.
- Airspeed: Slow to 65 KIAS.
- Establish 500 FPM rate of descent @ 65 KIAS for 3 seconds.
- Throttle: IDLE.
- Bank: NO BANK or TURN as specified by Instructor. (MAX Bank 20°)
- Elevator: PITCH Up to the Stall @ 1° per second.
- VERBALLY ANNOUNCE the FIRST indication AND/OR when the FULL stall occurs, as directed by instructor.

Recovery:

- Simultaneously
    - Elevator: Reduce Angle of Attack to NO MORE than 10° BELOW the horizon.
    - Rudder: Level Wings to horizon w/ RUDDERS
    - Throttle: FULL Open.
    - Flaps: Retract to 20°

  Once the wings are no longer stalled
- Elevator: PITCH To: Vy or Vy as specified by instructor. (site picture)
- Establish POSITIVE Rate of Climb
- Elevator: PITCH to: Vy or Vy as specified by instructor. (site picture)
- Flaps: Retract to 10°
- Maintain POSITIVE Rate of Climb
- Elevator: PITCH to: Vy or Vy as specified by instructor. (site picture)
- Flaps: Retract to Zero (Fully Retracted)
- Climb @ Vy or Vy as specified by instructor.
- Continue climb until directed to level off at an altitude specified by instructor.

ACS – PVT:

- Heading: + - 10° in straight flight OR in turning flight to a MAX Bank Angle of 20°: + - 10° in turning flight.
- Configure the airplane in the approach & landing configuration.
- VERBALLY ANNOUNCE the FIRST indication of a stall AND after the FULL stall occurs.
- PITCH to Vx or Vy as specified by instructor.
- Climb @ Vx or Vy until directed by the instructor to level off at a specified altitude

ACS – COM:

- Heading: + - 10° in straight flight OR in turning flight to a MAX Bank Angle of 20°: + - 10° in turning flight.
- Configure the airplane per manufacture, and accelerate to Vx or Vy.
- VERBALLY ANNOUNCE the FIRST indication of a stall OR after the FULL stall occurs, as specified by instructor.
- PITCH to Vx or Vy as specified by instructor.
- Climb @ Vx or Vy until directed by the instructor to level off at a specified altitude

Emergency Descent: High Speed – For Decompression, Smoke in the Cockpit, Engine or Electrical fires.

Setup for Maneuver:

- Perform Pre-Maneuver Checklist.
- Determine if area BELOW is clear of other aircraft and terrain.
- Determine maneuver Completion Target Altitude.

Maneuver:

- Throttle: IDLE
- Bank: 30°– 45°
- Airspeed: 100 KIAS; if fire is NOT Increase Airspeed @ 10 KIAS increments to MAX or 129 KIA until fire is out.
- Review Emergency Checklist for FIRE.

Recovery:

- Bank: Roll Level to Horizon
- Elevator: PITCH Up to the horizon in S & L flight ON Completion Target Altitude.

ACS – PVT & COM:

- Airspeed: + 0 / - 10 KIAS. – Appropriate for scenario specified by instructor and covered in POH for Emergency Descent.
- Altitude: Level Off ON Completion Target Altitude: + - 100 ft,
- Bank: MIN - 30°; MAX - 45°;
- Demonstrate orientation, division of attention and proper planning.
- Establish an Emergency Field. (subject to scenario)

PRIVATE – GROUND REFERENCE MANEUVERS:

Turns Around A Point:

Setup for Maneuver:

- Perform Pre-Maneuver Checklist.
- Determine the Wind Direction.
- Determine the Ground Reference Point
- Determine Entry Altitude (approx. 1000 feet AGL)
- Determine the appropriate distance from the Ground Reference Point. (est. 1/4 - 1/3 mile)
- Throttle: 2100 RPM (approx. 100 KIAS)
- Enter maneuver on DOWNWIND.

Maneuver:

- Bank: Adjust as necessary to maintain a GROUND TRACK with a CONTANT RADIUS TURN around the Ground Reference Point.
- Maintain collision avoidance procedures with other aircraft.
- Minimum of two (2) – 360° turns around the Ground Reference Point
- Exit Maneuver: As directed by instructor.

ACS – PVT:

- Altitude: + - 100 ft
- Airspeed: + - 10 KIAS
- Apply adequate wind-drift correction to maintain ground tracking of a constant radius turn around the Ground Reference Point.
- Divide attention between aircraft control, traffic avoidance and ground track while maintaining coordinated flight.
- Maintain coordinated flight throughout the maneuver.

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S-Turns:

Setup for Maneuver:

- Perform Pre-Maneuver Checklist.
- Determine the Wind Direction.
- Determine the Ground Reference Line that is PERPENDICULAR to the wind.
- Determine the Entry Altitude. (approx. 1,000 feet)
- Enter the Maneuver on DOWNWIND.
- Throttle: 2100 RPM (approx. 100 KIAS)

Maneuver:

- Bank Angle: Adjust as necessary to maintain an equal semi-circle GROUND TRACK on both sides of the Ground Reference Line.
- Reverse the turn DIRECTLY OVER the Ground Reference Line.
- Maintain collision avoidance procedures with other aircraft.

ACS – PVT:

- Altitude: + - 100 ft
- Airspeed: + - 10 KIAS
- Apply adequate wind-drift correction to maintain ground tracking of a constant radius turn on each side of the Ground Reference Line.
- Reverse the turn DIRECTLY OVER the Ground Reference Line.
- Divide attention between aircraft control, traffic avoidance and ground track while maintaining coordinated flight.
- Maintain coordinated flight throughout the maneuver.

Rectangular Pattern:

Setup for Maneuver:

- Perform Pre-Maneuver Checklist.
- Determine the Wind Direction.
- Determine the Rectangle Ground Reference Area.
- Determine the Entry Altitude. (approx. 1,000 feet AGL)
- Enter the maneuver 45° to the DOWNWIND
- Throttle - 2100 RPM (approx. 100 KIAS)

Maneuver:

- Bank Angle: Adjust as necessary to maintain the rectangular ground track.
- Turn Angle: Adjust as necessary considering the wind during straight and turning flight to maintain a rectangular ground track.
- Heading: Adjust as necessary considering the wind during straight and turning flight to maintain a rectangular ground track.
- Maintain collision avoidance procedures with other aircraft.
- Exit - On heading maneuver was Entered OR as directed you instructor.

ACS – PVT:

- Altitude: + - 100 ft
- Airspeed: + - 10 KIAS
- Apply adequate wind-drift correction, (crabbing) during straight and turning flight, (turns> = < 90°) to maintain ground tracking around the Rectangular Ground Reference Area.
- Divide attention between aircraft control, traffic avoidance and ground track while maintaining coordinated flight.
- Maintain coordinated flight throughout the maneuver.

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COMMERCIAL – FLIGHT MANEUVERS:

Eights on Pylons:

Setup for Maneuver:

- Perform Pre-Maneuver Checklist.
- Determine the Wind Direction.
- Identify the Pylons. (distance between the pylons should allow for S&L flight between pylons)
- Determine the Pivotal Altitude.
- Determine Reference Line from airplane.
- Throttle - 1900 RPM (approx. 90 KIAS)
- Enter – On a 45° angle to the DOWNWIND

Maneuver:

- Bank: Constantly changing throughout the maneuver keeping pylon in site. (MAX bank 40°)
  - NO Slipping or Skidding turns throughout the maneuver.
- Elevator: Adjust accordingly to maintain the Line-of-Sight REFERENCE LINE (row of rivets) on the pylon.
  - If pylon moves FORWARD – PITCH slightly up
  - If pylon moves BACK – PITCH slightly down

ACS – COM:

- Maintain coordinated flight throughout the maneuver.
- Determine the Pivotal Altitude.
- Selection of suitable pylons that permit S&L flight between pylons.
- Correctly enter maneuver at appropriate Altitude and Airspeed.
- Apply corrections so that the Line-of-sight reference line remains on the pylon.
- Establish appropriate Bank Angle for the conditions. (MAX bank 40°)
- Division of attention between accurate, coordinated airplane control and outside references.
- Maintain pylon position using Pivotal Altitude with NO Slips or NO Skids.

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Lazy Eights:

Setup for Maneuver:

- Perform Pre-Maneuver Checklist.
- Determine the Entry Altitude.
- Determine the Starting Reference Point / Heading.
- Determine the Reference Points at the 45°, 90°, 135° and finishing Reference Point / Heading
- Determine the Entry Airspeed. (Throttle - 2100 RPM - approx. 100 KIAS do NOT exceed 105 KIAS entry speed)

Maneuver:

1st - 45°, (Starting Reference Point / Heading - 45°)

- Pitch: Gradual INCREASEING to MAX pitch up attitude at 45° Reference Point.
- Bank: Gradual INCREASEING. to 15° @ 45° Reference Point.
- Altitude: Gradual INC.
- Airspeed: LOWEST @ at 45° Reference Point.

2nd - 45° (45° - 90°)

- Pitch: Gradual DECREASING so longitudinal access passes through the 90° Reference Point LEVEL to horizon.
- Bank: Gradual. INCREASING to 30° (MAX bank) at 90° Reference Point.
- Altitude: HIGHEST @ 90° Reference Point.
- Airspeed: Gradual INCREASING

3rd - 45° (90° - 135°)

- Pitch: Grad DECREASING to MAX pitch down attitude @ 135° Reference Point.
- Bank: Gradual DECREASING to 15° @ 135° Reference Point.
- Altitude: Gradual DECREASING
- Airspeed: HIGHEST @ 135° Reference Point.

4th - 45° (135° - 180° or Finishing Reference Point / Heading)

- Pitch: Gradual INCREASING to S&L flight @ 180° Reference Point.
- Bank: Gradual DECREASING to S&L flight @ 180° Reference Point.
- Altitude: @ Entry Altitude.
- Airspeed: @ Entry Airspeed.

ACS – COM:

- Maintain coordinated flight throughout the maneuver.
- Complete the maneuver per the following:
  - Bank: Approx. 30° @ steepest point
  - Constantly changing pitch, roll rate and airspeed.
  - Altitude @ 180° point: + - 100 ft from Entry altitude.
  - Airspeed @ 180° point: + - 10 KIAS from Entry airspeed.
  - Heading @ 180° point: + - 10°
- Continue the maneuver through a number of symmetrical loops until advised by instructor to resume S&L flight.

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Chandelles:

Setup for Maneuver:

- Perform Pre-Maneuver Checklist.
- Determine Entry Altitude.
- Determine Entry Reference Point / Heading
- Determine Reference Point 90° & 180° from the Entry Reference Point / Heading
- Throttle - 2100 RPM (approx. 100 KIAS do NOT exceed 105 KIAS entry speed)

Maneuver:

First 90°

- Simultaneously:
  - Throttle: FULL Open.
  - Bank: Roll into a 30° bank.
  - Elevator: Gradually pitch up to maintain a coordinated climbing turn to a MAX pitch up altitude @ the 90° point.

Second 90°

- Simultaneously:
  - Bank: Begin a coordinated constant rate rollout to finish at the 180° point with NO bank.
  - Elevator: Maintain the MAX pitch up altitude established at the 90° point to the 180° point.
  - Airspeed: Finish the maneuver just above a stall at the 180° point. (any further increase in pitch would be a stall)

Recovery:

- Altitude: Maintain the altitude established at the 180° point AND accelerate to S&L flight.

ACS – COM:

- Maintain coordinated flight throughout the maneuver.
- First 90°: Simultaneously – Full throttle & pitch to maintain a smooth coordinated climbing turn at a constant bank angle, (MAX 30°), with Airspeed constantly decreasing.
- Second 90°: Begin rollout of the bank at a constant rate rollout while maintaining the pitch attitude established at the 90° point.
- Finish the maneuver at 180° at a Heading: + - 10° and Airspeed just above a stall.

Recovery: Resume S&L flight at cruise with minimum loss in finishing altitude.

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Power Off 180° Accuracy Approach and Landing:

Setup for Maneuver:

- Perform Pre-Maneuver Checklist.
- Determine the Wind Direction and how it will affect your flight path and rate of descent.
- Determine the Touchdown Point.
- Enter on the DOWNWIND leg, parallel to the runway and configured.
- Throttle - 1900 RPM (approx. 95 KIAS)

Maneuver:

- Throttle: IDLE abeam the touchdown point.
- Airspeed: PITCH to Vg - Adjust as necessary to Land on the Touchdown Point on the runway centerline.
- Bank: Adjust as necessary to Land on the Touchdown Point on the runway centerline.
- Flaps / Forward or Side Slips: Use as necessary to Land on the Touchdown Point on the runway centerline.
- Ground Track: Adjust as necessary to Land on the Touchdown Point on the runway centerline.

ACS – COM:

- Establish a pre-determined touchdown point.
- Plan the flight path taking into account altitude, wind, terrain and obstructions.
- Position aircraft on downwind leg, parallel to landing runway correctly configured.
- Touchdown ON or within 200 ft beyond the Touchdown Point.
- Touchdown with NO side drift and the airplane's longitudinal access aligned with and over the runway centerline.

Accelerated Stall:

Setup for Maneuver:

- Perform Pre-Maneuver Checklist.
- Determine the Entry Altitude.
- Target Airspeed to BEGIN maneuver - 80 KIAS (don't exceed Va)
- Establish recovery climb attitude @ Vx or Vy as designated by instructor.

Maneuver:

- Throttle: 1500 RPM
- Elevator: Maintain Entry Altitude.
- Bank: Roll into 45° bank
- Ailerons: NEUTRALIZE
- Throttle: IDLE
- Elevator: INCREASE back pressure to FIRST indication of an impending stall. (buffet, stall warning)
- VERBALLY ANNOUNCE the FIRST indication and recover promptly.

Recovery:

- Simultaneously
    - Elevator: Reduce Angle of Attack to the horizon
    - Bank: Roll wings level to horizon with coordinated use of RUDDER and AILRONS.
    - Throttle: FULL Open
    - Elevator: PITCH to climb @ Vx or Vy as specified by instructor. (site picture)
    - Climb @ Vx or VY until directed to level off at an altitude specified by the instructor.

ACS – COM:

- Select an Entry airspeed that doesn't exceed Va.
- Establish and maintain a coordinated turn to a 45° bank, increase elevator backpressure smoothly until an impending stall is reached.
- VERBALLY ANNOUNCE first indication of an impending stall.
- Pitch to Vx or Vy
- Climb @ Vx or Vy until directed by the instructor to level off at a specified altitude

Steep Spirals:

Setup for Maneuver:

- Perform Pre-Maneuver Checklist.
- Determine the Wind Direction.
- Starting Altitude – 5,500 ft MSL.
- Determine an Entry altitude to perform at least the three (3) – 360 turns.
- Determine the Ground Reference Point.
- Determine the maneuver Completion Target Reference Point OR Heading as specified by the instructor.
- Throttle - 2100 RPM (approx. 100 KIAS)
- Start maneuver Abeam the Ground Reference Point

Maneuver:

- Throttle: IDLE
- Airspeed: Vg + 10 KIAS MAX
- Bank Angle: Adjust to maintain constant radius circle around the Ground Reference point. (MAX 60°)
- Wind Drift: Apply wind-drift corrections to track a constant radius circle around the Ground Reference Point.
- Elevator: PITCH to maintain Vg + 10 KIAS MAX
- Throttle: Clear Engine every 360° turn.

Recovery:

- Simultaneously
  - Bank: Coordinated rollout to Level Wings to horizon w/ RUDDERS
  - Elevator: Pitch Up to the horizon in S&L flight.
  - Rollout: ON the maneuver Completion Target Reference point OR Heading as specified by the instructor.
- Throttle: FULL Open
- Heading: ON Completion Target Reference Point OR Heading: + - 10°
- Airspeed: + - 10 KIAS

ACS – COM:

- Sufficient altitude for maneuver.
- Establish and maintain a steep spiral with a bank not to exceed 60° with a constant radius about a Ground Reference Point.
- Apply wind-drift corrections to track a constant radius circle around a Ground Reference Point for 3 – 360° turns.

APPROACH & LANDING: For both Private & Commercial

- **Prior to ANY approach and landing, NO MATTER what procedure is used, the following questions NEED to be asked and answered:**
  - **Is this AIRPORT a towered or non-towered?**
  - **Do I know which RUNWAY is in use and it's length?**
  - **HOW will I enter the Traffic Pattern?**
  - **Is this a NORMAL or CROSSWIND landing? (crosswind shall be noted in this manual as - X-WIND)**
  - **If it is a X-Wind landing, WHAT is the Crosswind Component?**
  - **Do I use a NORMAL, SHORT or SOFT FIELD landing procedure?**
  - **WHERE is my AIMING & TOUCHDOWN points?**
  - **WHAT are the elements that can affect the approach and landing performance?**
  - **HOW do the elements identified above affect the approach and landing procedures?**
  - **WHAT are your Personal Minimums?**

Normal Landing

Setup for Landing:

- Determine the Aiming & Touchdown Point.

Final

- Throttle: Adjust as needed to maintain a Stabilized Approach to the Aiming Point.
- Flaps: 20° or as needed.
- Airspeed: 65 - 75 KIAS
- Ground Track: Crab to maintain a ground track down the centerline of the runway.

Short Final – ¼ to ½ mile out from the runway

- Throttle: Adjust as needed to maintain a Stabilized Approach to the Aiming Point.
- Flaps: 30° (Full Down)
- Airspeed: 60 – 70 KIAS
- Ailerons & Rudder:
  WHATEVER is needed to maintain aircraft's longitudinal axis ALIGNED with and OVER the center of the runway.
  (X-WIND) – SIDESLIP to maintain aircraft's longitudinal axis ALIGNED with and OVER the center of the runway.

Round Out:

- Throttle: Adjust as necessary to arrest the descent until touchdown.
- Elevator: At approximately 8 - 10 feet over the runway, apply back pressure to pitch the aircraft to level flight.
- Ground Track: Maintain whatever heading is necessary to maintain a ground track down the centerline of the runway.
- Ailerons & Rudder:
  WHATEVER is needed to maintain aircraft ALIGNMENT longitudinally down the center of the runway.
  (X-WIND) – SIDE SLIP to maintain aircraft's longitudinal axis ALIGNED with and OVER the center of the runway.

Flare

- Elevator: As airplane sinks to the runway, back pressure will be applied to touch on the main gear with nose wheel just off the runway.
- Ground Track: Maintain whatever heading is necessary to maintain a ground track down the centerline of the runway.
- Ailerons & Rudder:
  WHATEVER is needed to maintain aircraft ALIGNMENT longitudinally down the center of the runway.
  (X-WIND) – SIDE SLIP to maintain aircraft's longitudinal axis ALIGNED with and OVER the center of the runway.

Touchdown - ACS: PVT: ON or within: 400 ft; COM: ON or within 200 ft from a Touchdown Point.

- Ailerons & Rudder:
  WHATEVER is needed to maintain aircraft ALIGNMENT longitudinally down the center of the runway.
  (X-WIND) – SIDE SLIP to maintain aircraft's longitudinal axis ALIGNED with and OVER the center of the runway.
- Brakes: Minimum required

Rollout

- Ailerons: NEUTRAL.
  (X-WIND) – INCREASE the deflection into the X-WIND as aircraft decelerates to taxi speed.
- Rudders: WHATEVER is necessary to maintain the longitudinal axis ALIGNED with and OVER the center of the runway UNTIL ready to taxi off the runway**.**

Normal Landing - continued

ACS – PVT:

- Consider wind conditions, landing surface, obstructions, and selection of suitable touchdown point.
- Establish the recommended approach & landing configuration, airspeed, adjust pitch attitudes & power as required for a stable approach.
- Maintain Manufacture's published approach airspeed plus gust factor if needed OR 1.3 Vso. PVT: + 10 / - 5 KIAS.
- Maintain crosswind correct & directional control throughout approach & landing.
- Make smooth, timely, and control applications during round out and touchdown.
- Touchdown ON or WITHIN 400 ft beyond the Touchdown Point.
- Touchdown with NO side drift and the airplane's LONGITUDINAL ACCESS aligned with and OVER the runway centerline.
- Establish and Maintain crosswind correct flight control position during taxi.
  Execute a timely go-around if required.

ACS – COM:

- Consider wind conditions, landing surface, obstructions, and selection of suitable touchdown point.
- Establish the recommended approach & landing configuration, airspeed, adjust pitch attitudes & power as required for a stable approach.
- Maintain Manufacture's published approach airspeed plus gust factor if needed OR 1.3 Vso. COM: + - 5 KIAS.
- Maintain crosswind correct & directional control throughout approach & landing.
- Make smooth, timely, and control applications during round out and touchdown.
- Touchdown ON or WITHIN 200 ft beyond the Touchdown Point.
- Touchdown with NO side drift and the airplane's LONGITUDINAL ACCESS aligned with and OVER the runway centerline.
- Establish and Maintain crosswind correct flight control position during taxi.
- Execute a timely go-around if required.

Short Field Landing

Setup for Landing:

- Determine the Aiming & Touchdown Point.

Final:

- Throttle: Adjust as needed to maintain a Stabilized Approach to the Aiming Point.
- Flaps: 30° (Full Down)
- Airspeed: 65 - 75 KIAS
- Ground Track: Crab to maintain a ground track down the centerline of the runway.

Short Final – ¼ to ½ mile out from the runway:

- Throttle: Adjust as needed to CLEAR obstacle, Then IDLE.
- Flaps: 30° (Full Down)
- Airspeed: 62 KIAS
- Ailerons & Rudder:
  WHATEVER is needed to maintain aircraft's longitudinal axis ALIGNED with and OVER the center of the runway.
  (X-WIND) – SIDESLIP to maintain aircraft's longitudinal axis ALIGNED with and OVER the center of the runway.

Round Out:

- Throttle: IDLE.
- Airspeed: 62 KIAS (172R) 61 KIAS (172S / SP)
- Elevator: At approximately 8 - 10 feet over the runway, apply back pressure to land ON Touchdown Point. (NO FLOAT)
- Ailerons & Rudder:
  WHATEVER is needed to maintain aircraft ALIGNMENT longitudinally down the center of the runway.
  (X-WIND) – SIDE SLIP to maintain aircraft's longitudinal axis ALIGNED with and OVER the center of the runway.

Flare:

- Elevator – As airplane sinks to the runway, back pressure will be applied to touch the main landing gear to the runway.
- Ailerons & Rudder:
  WHATEVER is needed to maintain aircraft ALIGNMENT longitudinally down the center of the runway.
  (X-WIND) – SIDE SLIP to maintain aircraft's longitudinal axis ALIGNED with and OVER the center of the runway.

Touchdown: ACS: PVT: within - 200 ft; COM: within - 100 ft from a Touchdown Point.

- Ailerons & Rudder:
  WHATEVER is needed to maintain aircraft ALIGNMENT longitudinally down the center of the runway.
  (X-WIND) – SIDE SLIP to maintain aircraft's longitudinal axis ALIGNED with and OVER the center of the runway.
  Brakes: Apply Heavily (Simulated if called for by instructor)
- Flaps: RETRACT

Rollout:

- Ailerons: NEUTRAL.
  (X-WIND) – INCREASE the deflection into the X-WIND as aircraft decelerates to taxi speed.
- Rudders: WHATEVER is necessary to maintain the longitudinal axis ALIGNED with and OVER the center of the runway UNTIL ready to taxi off the runway**.**

Short Field Landing - continued

ACS – PVT:

- Consider wind conditions, landing surface, obstructions, and selection of suitable touchdown point.
- Establish the recommended approach and landing configuration and airspeed and adjust pitch attitudes and power as required to maintain a stable approach.
- Maintain manufacture's published approach airspeed plus gust factor if needed OR 1.3 Vso. PVT: + - 5 KIAS.
- Maintain crosswind correct & directional control throughout approach & landing.
- Make smooth, timely, and control applications during round out and touchdown.
- Touchdown ON or WITHIN 200 ft beyond the Touchdown Point.
- Touchdown with NO side drift and the airplane's LONGITUDINAL ACCESS aligned with and OVER the runway centerline.
- Establish and Maintain crosswind correct flight control position during taxi.
- Execute a timely go-around if required.

ACS – COM:

- Consider wind conditions, landing surface, obstructions, and selection of suitable touchdown point.
- Establish the recommended approach and landing configuration and airspeed and adjust pitch attitudes and power as required to maintain a stable approach.
- Maintain manufacture's published approach airspeed plus gust factor if needed OR 1.3 Vso. COM: + - 5 KIAS.
- Maintain crosswind correct & directional control throughout approach & landing.
- Make smooth, timely, and control applications during round out and touchdown.
- Touchdown ON or WITHIN 100 ft beyond the Touchdown Point.
- Touchdown with NO side drift and the airplane's LONGITUDINAL ACCESS aligned with and OVER the runway centerline.
- Establish and Maintain crosswind correct flight control position during taxi.
- Execute a timely go-around if required.

Soft Field Landing

Setup for Landing:

- Determine the Aiming & Touchdown Point.

Final

- Throttle: Adjust as needed to maintain a Stabilized Approach to the Aiming Point.
- Flaps: 20° or as needed.
- Airspeed: 65 - 75 KIAS
- Ground Track: Crab to maintain a ground track down the centerline of the runway.

Short Final – ¼ to ½ mile out from the runway

- Throttle: Adjust as needed to maintain a Stabilized Approach to the Aiming Point.
- Flaps: 30° (Full Down)
- Airspeed: 60 – 70 KIAS
- Ailerons & Rudder:
  WHATEVER is needed to maintain aircraft's longitudinal axis ALIGNED with and OVER the center of the runway.
  (X-WIND) – SIDESLIP to maintain aircraft's longitudinal axis ALIGNED with and OVER the center of the runway.

Round Out:

- Throttle: Adjust as necessary to arrest the descent until touchdown.
- Elevator: At approximately 8 - 10 feet over the runway, apply back pressure to pitch the aircraft to level flight.
- Ground Track: Maintain whatever heading is necessary to maintain a ground track down the centerline of the runway.
- Ailerons & Rudder:
  WHATEVER is needed to maintain aircraft ALIGNMENT longitudinally down the center of the runway.
  (X-WIND) – SIDESLIP to maintain aircraft's longitudinal axis ALIGNED with and OVER the center of the runway.

Flare:

- Elevator: As airplane sinks to the runway, back pressure will be applied to touch the main landing gear to the runway.
- Ground Track: Maintain whatever heading is necessary to maintain a ground track down the centerline of the runway.
- Ailerons & Rudder:
  WHATEVER is needed to maintain aircraft ALIGNMENT longitudinally down the center of the runway.
  (X-WIND) – SIDE SLIP to maintain aircraft's longitudinal axis ALIGNED with and OVER the center of the runway.

Touchdown:

- Ailerons & Rudder:
  WHATEVER is needed to maintain aircraft ALIGNMENT longitudinally down the center of the runway.
  (X-WIND) – SIDE SLIP to maintain aircraft's longitudinal axis ALIGNED with and OVER the center of the runway.
- Brakes: Minimum required

Rollout:

- Ailerons: NEUTRAL.
  (X-WIND) – INCREASE the deflection into the X-WIND as aircraft decelerates to taxi speed.
- Elevator: INCREASE the back pressure as aircraft decelerates to FULL BACK keeping nosewheel lite.
- Rudders: WHATEVER is necessary to maintain the longitudinal axis ALIGNED with and OVER the center of the runway UNTIL ready to taxi off the runway**.**
- Throttle: Adjust as NEEDED to maintain a SPEED that would preclude sinking into the surface.

Soft Field Landing - continued

ACS – PVT:

- Consider wind conditions, landing surface, obstructions, and selection of suitable touchdown point.
- Establish the recommended approach and landing configuration and airspeed and adjust pitch attitudes and power as required to maintain a stable approach.
- Maintain manufacture's published approach airspeed plus gust factor if needed OR 1.3 Vso. PVT: + 10 / - 5 KIAS.
- Maintain crosswind correct & directional control throughout approach & landing.
- Make smooth, timely, and control applications during round out and touchdown.
- Touchdown, keeping the nose wheel OFF the surface until loss of elevator effectiveness.
- Touchdown with MINUMUM sink rate, NO side drift and the airplane's LONGITUDINAL ACCESS aligned with and OVER the runway centerline.
- Maintain elevator back during rollout and exit the "SOFT AREA" at a speed that would preclude sinking into the surface.
- Establish and Maintain crosswind correct flight control position during taxi.
- Execute a timely go-around if required.

ACS – COM:

- Consider wind conditions, landing surface, obstructions, and selection of suitable touchdown point.
- Establish the recommended approach and landing configuration and airspeed and adjust pitch attitudes and power as required to maintain a stable approach.
- Maintain manufacture's published approach airspeed plus gust factor if needed OR 1.3 Vso. COM: + - 5 KIAS.
- Maintain crosswind correct & directional control throughout approach & landing.
- Make smooth, timely, and control applications during round out and touchdown.
- Touchdown, keeping the nose wheel OFF the surface until loss of elevator effectiveness.
- Touchdown with MINUMUM sink rate, NO side drift and the airplane's LONGITUDINAL ACCESS aligned with and OVER the runway centerline.
- Maintain elevator back during rollout and exit the "SOFT AREA" at a speed that would preclude sinking into the surface.
- Establish and Maintain crosswind correct flight control position during taxi.
- Execute a timely go-around if required.

Go-Around / Missed Approach or Rejected / Balked Landing

Go-Around / Rejected Landing:

- When announced by the instructor to Go-around, determine if Vx or Vy is the appropriate pitch attitude for an obstacle(s) at the end of the runway.

Maneuver:

- Verbalize and perform the 5 C's
- Maneuver the airplane to the side of the runway to avoid converging traffic.

ACS – PVT:

- Complete the appropriate checklist.
- Make appropriate radio calls.
- Apply take off power and transition to a climb to pitch attitude of Vx or Vy as appropriate: + 10 / - 5 KIAS.
- Configure the airplane after positive rate of climb.
- Offset to the side of the runway / landing area when necessary to clear and avoid converging traffic.
- Maintain Vy + 10 / -5 KIAS to a safe altitude.
- Maintain directional control and proper WIND-DRIFT correction throughout the climb.

ACS – COM:

- Complete the appropriate checklist.
- Make appropriate radio calls.
- Apply take off power and transition to a climb to pitch attitude of Vx or Vy as appropriate: + - 5 KIAS.
- Configure the airplane after positive rate of climb.
- Offset to the side of the runway / landing area when necessary to clear and avoid converging traffic.
- Maintain Vy: + -5 KIAS to a safe altitude.
- Maintain directional control and proper WIND-DRIFT correction throughout the climb.