DELAWARE STATE UNIVERSITY

Aviation Program



Flight Maneuvers Standardization Manual

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DELAWARE STATE UNIVERSITY FLIGHT MANEUVERS STANDARDIZATION MANUAL RECORD OF CHANGE PAGE

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INTRODUCTION

The DSU Flight Standardization Manual is designed to standardize procedures for all flight maneuvers required by the current Training Course Outline. This manual should be used in conjunction with the FAA Airplane Flying Handbook (FAA-H-8083-3A) FAA Practical Test Standards (PTS), Aeronautical Information Manual (AIM), and the DSU Flight Operations Manual.

Safety is always our primary concern! Both the instructor and student must work together to ensure that every training flight is conducted at the highest level of operational safety. Throughout the student's training, the flight instructor is responsible for emphasizing the performance of effective visual scanning and collision avoidance procedures. Most maneuvers listed in this manual require visual reference to the horizon while simultaneously interpreting instrument indications. However, fully utilizing outside visual references is critically important in developing a good habit pattern for collision avoidance and maintaining a safe flying environment.

BE SAFE – FLY SAFE!

Pitch attitudes and power settings contained in this manual represent approximate values and are provided simply as a means of assisting the pilot in attaining desired performance. Also, note that the airspeed(s) in the Arrow section of this manual are listed for the PA-28R-200 in **MPH** and for the PA-28R-201 in **KIAS**.

The Aviation Program encourages and welcomes your comments and suggestions to improve the quality of this manual. All recommendations should be submitted to the Chief Flight Instructor in writing. Please include a complete example of the suggest change with your revision recommendation.

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TRAFFIC PATTERN ARRIVAL

Ref: FAA-H-8083-3A (Airplane Flying Handbook) Aeronautical Information Manual (AIM)

Objective: To develop the ability to safely and efficiently arrive at an uncontrolled airport, or after arrival, the procedure to utilize for traffic pattern operations.

- 1. Complete the Descent Checklist
- 2. At least 10 nm from the airport, attempt to determine the active runway

If the runway in use cannot be determined:

3. Over fly the airport at 1000' above traffic pattern altitude to observe traffic, wind direction indications, wind socks to determine a runway to use.

NOTE Remain vigilant for other traffic

- 4. At least 2 nm from the runway enter the traffic pattern at traffic pattern altitude on a 45° entry to the downwind, maintaining a one-half mile distance from the runway on the downwind leg
- 5. Complete the appropriate approach and landing procedures checklist

NOTE

The above procedures assume an ideal pattern situation. Other traffic, ATC, local traffic pattern restrictions and noise abatement procedures, obstacles, etc., may require a modification of these procedures. In all cases, the pilot shall exercise good judgment and maintain positive airplane control

Standards

Private:

Maintains proper spacing from other aircraft

Maintains orientation with landing runway

Maintains traffic pattern altitude \pm 100 and \pm 10 KIAS

Commercial:

Maintains proper spacing from other aircraft

Maintains orientation with landing runway

Maintains traffic pattern altitude \pm 50 and \pm 10 KIAS

Warrior

TRAFFIC PATTERN DEPARTURE



TRAFFIC PATTERN DEPARTURE

Ref: FAA-H-8083-3A (Airplane Flying Handbook) Aeronautical Information Manual (AIM)

Objective: To safely depart an airport after takeoff or integrate into the flow of traffic when remaining in the traffic pattern.

For Non-Tower Operations:

Departing the Pattern

Continue straight out for at least 2 miles before turning on course or After reaching pattern altitude, exit the pattern with a 45° turn in the direction of the traffic pattern Complete the climb checklist when appropriate

Remaining in the pattern

Commence a turn to the crosswind leg when beyond the departure end of the runway and within 300' of pattern altitude (600' at 33N)

NOTE

The above procedures assume an ideal pattern situation. Other traffic, ATC, local traffic pattern restrictions and noise abatement procedures, obstacles, etc., may require a modification of these procedures. In all cases, the pilot shall exercise good judgment an maintain positive airplane control

Standards

Private:

Maintains proper spacing from other aircraft Maintains orientation with landing runway Maintains traffic pattern altitude + 100 and + 10 KIAS Commercial: Maintains proper spacing from other aircraft

Maintains orientation with landing runway Maintains traffic pattern altitude + 50 and + 10 KIAS

Warrior

CLEARING TURNS

Ref: Aeronautical Information Manual (AIM), Section 4

Objective: To exercise conscientious and continuous surveillance of the airspace in which the airplane is being operated.

1. Complete the Maneuvers Checklist

First 90° clearing turn:

- 2. Visually scan the area to the left and to the right of the aircraft
- 3. Select a visual landmark off the wing tip in the direction of the turn to be executed as a 90° reference point to roll onto
- 4. Enter into a 30° bank turn in the direction of the visual landmark
- 5. Continuously scan the area above, below and ahead of the flight path
- 6. After 90° of turn has been completed, rollout to wings level on the selected landmark

Second 90° clearing turn:

- 7. Visually scan the area to the left and right of the aircraft
- 8. Select a visual landmark off the wing tip in the direction of the turn to be executed as a 90° reference point to roll onto
- 9. Enter a 30° bank turn in the same or opposite direction
- 10. Continuously scan the area above, below and ahead of the flight path
- 11. After 90° of turn has been completed, rollout wings level on the selected landmark

NOTE

After completion of the second clearing turn and with no conflicting traffic observed, immediately commence the maneuver to be performed



NORMAL TAKEOFF AND CLIMB

REF: FAA-H-8083-3A (Airplane Flying handbook)

Objective: To safely execute a takeoff under normal conditions

- 1. Complete the Before Takeoff checklists
- 2. Center aircraft on runway centerline with nose wheel straight ahead
- 3. Advance the throttle smoothly forward to 2000 RPM, check engine instruments
- 4. Advance throttle to full forward
- 5. Maintain aircraft on centerline
- 6. Call out "airspeed alive"
- 7. Accelerate aircraft to 53 KIAS call out " V_R rotate" and increase control yoke back pressure to pitch up until the glare shield meets the horizon (approximately 10°)
- 8. Accelerate to 75 KIAS [Vy] and climb on centerline, trim as necessary
- 9. At 1000' AGL, decrease pitch to establish and maintain 87 KIAS climb
- 10. Execute a traffic pattern departure procedure
- 11. After leaving the traffic pattern, complete the climb checklist

IF REMAINING IN THE PATTERN

- 12. Accelerate to 75 KIAS [Vy] and climb on centerline, trim as necessary
- 13. At 600' AGL turn to crosswind
- 14. Continue climb to TPA (900 feet at 33N) and turn downwind, reduce power to 2100 RPM, trim as necessary



Standards:

Private: Airspeed V_Y +10/-5 Commercial: Airspeed V_Y \pm 5

CROSSWIND TAKEOFF AND CLIMB

REF: FAA-H-8083-3A (Airplane Flying handbook)

Objective: To safely execute a takeoff in cross wind conditions

- 1. Complete Before Takeoff checklists
- 2. Note wind direction and velocity
- 3. Taxi aircraft on runway centerline utilizing all runway possible and positioning the flight controls for existing wind conditions (Full ailerons into the wind and neutral elevator)
- 4. Advance the throttle smoothly forward to 2000 RPM check engine instruments
- 5. Advance throttle to full forward
- 6. Maintain aircraft on centerline with rudder pedals
- 7. Call out "air speed alive"
- 8. During ground roll, decrease aileron input to keep wings level
- 9. Accelerate aircraft to 53 KIAS call out "V_R rotate"
- 10. Accelerate to 75 KIAS $[V_Y]$ and climb on centerline, trim as necessary
- 11. At 600' AGL, decrease pitch to establish and maintain 87 KIAS climb
- 12. Execute a traffic pattern departure procedure
- 13. After leaving the traffic pattern, complete the climb checklist

NOTE Maintain V_Y (75 KIAS) if climb performance warrants

IF REMAINING IN THE PATTERN

- 14. Accelerate to 75 KIAS $[V_Y]$ and climb on centerline, trim as necessary
- 15. At 600' AGL turn to crosswind
- 16. Continue climb to TPA (900 feet at 33N) and turn downwind, reduce power to 2100 RPM



Standards:

Private: Airspeed V_Y +10/-5 Commercial: Airspeed V_Y \pm 5

SHORT FIELD TAKEOFF

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To obtain maximum performance during takeoff and minimize the runway length required

- 1. Complete Before Takeoff checklists and set flaps to 25° (2nd notch)
- 2. Taxi aircraft on runway centerline utilizing all available runway and center nose wheel
- 3. Firmly depress the brake pedals to ensure holding the airplane in position during full power run-up
- 4. Advance the throttle forward to 2000 RPM, check engine instruments
- 5. Smoothly advance the throttle to full forward, check static power (2200-2250 RPM), and then release the brakes
- 6. Maintain directional control and runway centerline with the rudder pedals
- 7. Call out *"air speed alive"*
- 8. Accelerate aircraft to 52 KIAS (50 KIAS PA-28-161) call out "V_R rotate"
- 9. Accelerate and climb at 63 KIAS (Vx) until obstacles are cleared or 50 ft. AGL
- 10. Decrease pitch and accelerate to 75 KIAS (Vy)
- 11. Once a positive rate of climb is established at 75 KIAS (Vy) incrementally reduce flaps to 0°
- 12. Climb out as normal



Standards:

Private: Airspeed +10/-5 Commercial: Vx +5/-0 K., then Vy \pm 5

SOFT FIELD TAKEOFF

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To obtain maximum performance when taking off from a soft or rough surface runway.

- 1. Complete Before Takeoff checklists and set flaps to 25° (2nd notch)
- 2. Taxi toward the takeoff position with full back pressure on the yoke while using proper crosswind correction techniques
- 3. Without braking or stopping the airplane, smoothly and continuously apply full throttle, checking engine instruments and lifting the nose wheel clear of the runway as soon as possible (approximately 5-8°)

NOTE

Do not allow the airplane to pitch up excessively causing a tail strike

- 4. Maintain directional control and runway centerline with the rudder pedals
- 5. As the aircraft's nose begins to rise, release a little pressure on the yoke so that the aircraft does not become airborne prior to achieving adequate lift
- 6. As the main wheels lift off the runway, decrease pitch attitude to establish and maintain a level flight attitude while remaining in ground effect and:
- If no obstacles are present, establish a positive rate of climb at 75 KIAS (V_Y) then slowly reduce flaps to 0°
- 8. **If obstacles are present**, accelerate to 63 KIAS (V_X) and after clearing obstacles and positive rate of climb is established at 75 KIAS (V_Y) slowly reduce flaps to 0°
- 9. Climb out as normal.



Standards:

Private V_X or V_Y +10/-5 Commercial: V_X or V_Y ±5

MANEUVERING DURING SLOW FLIGHT

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To recognize changes in aircraft flight characteristics and control effectiveness at critically slow airspeeds in various configurations.

This maneuver may be done with or without flaps and maneuver recovery at or above 1500' AGL

- 1. Complete the maneuvers checklist
- 2. Reduce throttle to 1700 RPM
- 3. Below V_{FE} incrementally extend flaps to 40°
- 4. Maintain heading
- 5. Maintain altitude with power
- 6. Maintain airspeed with pitch
- 7. Establish airspeed at minimum airspeed, just above stall (Stall warning horn may be sounding continuously)
- 8. Execute climbs, descents and turns

On Recovery:

- 9. Apply full power while maintaining altitude
- 10. Return to normal cruise flight 2200-2300 RPM
- 11. Perform cruise checklist



Standards:

Private: altitude ± 100 ft., heading $\pm 10^{\circ}$, bank $\pm 5^{\circ}$, airspeed $\pm 10/-0$ Commercial: altitude ± 50 ft., heading $\pm 10^{\circ}$, bank $\pm 5^{\circ}$, airspeed $\pm 5/-0$

POWER OFF STALLS

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To recognize the indications of an imminent or full stall during power off situations with the flaps down, and to make prompt, positive, and effective recoveries with a minimum loss of altitude.

- 1. Complete the maneuvers checklist and plan to recovery by 2500 feet AGL
- 2. Reduce throttle to 1700 RPM, maintain altitude, trim as necessary
- 3. Below VFE smoothly extend flaps in succession [10,25,40], maintain altitude
- 4. Maintain altitude until reaching 63 KIAS and then establish a stabilized descent (trimmed) at 63 KIAS to simulate a normal approach to landing
- 5. Descend 100 ft. and then reduce throttle to idle
- 6. Maintain altitude in straight flight or in turns with up to 20° bank. Airspeed will drop requiring additional back pressure to maintain altitude
- 7. On first indication of an imminent stall [stall horn, mushy controls, buffeting] or full stall call out "Stalling"
- 8. Simultaneously lower the nose slightly below horizon and apply full throttle
- 9. Reduce flaps to 25°
- 10. Establish Vx and subsequently Vy, look for positive rate climb
- 11. At V_Y and a positive rate climb, retract flaps to 0° and climb to the starting altitude.
- 12. Return to normal cruise flight 2200-2300 RPM
- 13. Perform cruise checklist





Standards:

Private: Heading ±10°, Bank <20° ±10°. Commercial: Heading ±10°, Bank <20° ±5°.

POWER ON STALLS

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To recognize the indications of an imminent or full stall during power on situations and to make prompt, positive, and effective recoveries with a minimum loss of altitude.

- 1. Complete the maneuvers checklist and plan to recovery by 2500 feet AGL
- 2. Reduce throttle to 1700 RPM or idle, adjusting pitch to maintain altitude, trim as necessary
- 3. Maintain altitude until reaching 63 KIAS, then set full power and smoothly increase pitch to approximately 20°
- 4. On first indication of an <u>imminent stall</u> [stall horn, mushy controls, buffeting] or full stall call out "Stalling"
- 5. Maintain coordinated use of the ailerons and rudder to level the wings and prevent entering into a spin
- 6. Simultaneously lower the nose slightly below horizon and apply full throttle
- 7. Adjust pitch to Vy and minimize altitude loss, trim as necessary
- 8. Return to normal cruise flight 2200-2300 RPM
- 9. Perform cruise checklist



Standards:

Private: Heading ±10°, Bank <20° ±10°. Commercial: Heading ±5°, Bank <20° ±5°.

SECONDARY STALL

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To recognize the effects of improper control usage inducing another stall after initiating a recovery from the initial stall.

This is a demonstrated flight maneuver

- 1. Complete the maneuvers checklist and plan to recovery by 2500 feet AGL
- 2. Reduce throttle to 1700 RPM, adjusting pitch to maintain altitude, trim as necessary
- 3. Perform a Power-Off or Power-On Stall, as directed
- 4. At the stall call out, *"Stalling"*, reduce the angle of attack to regain control effectiveness and apply full power
- 5. Maintain coordinated use of the ailerons and rudder to level the wings and prevent a spin
- 6. <u>Immediately</u> increase the pitch attitude to induce another (secondary) stall
- 7. At the stall, call out, "Stalling", reduce the angle of attack to regain control effectiveness and apply full power
- 8. Maintain coordinated use of the ailerons and rudder to level the wings and prevent a spin
- 9. Lower the nose to the horizon
- 10. Return to normal cruise flight 2200-2300 RPM
- 11. Perform cruise checklist



Standards:

Student will demonstrate a basic understanding of the maneuver

ELEVATOR TRIM STALL

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To recognize the effects of not maintaining positive airplane control during a go-around/rejected landing.

This is a demonstrated flight maneuver.

- 1. Complete the maneuvers checklist and plan to recovery by 2500 feet AGL
- 2. Reduce throttle to 1700 RPM, adjusting pitch and trim aircraft to maintain altitude
- Below V_{FE} (103 KIAS), extend flaps to 10°, adjust pitch and trim aircraft to maintain altitude
- 4. Extend the flaps to 25°, adjust pitch and trim aircraft to maintain altitude
- 5. Extend the flaps to 40°, adjust pitch and trim aircraft to maintain altitude
- 6. Maintain altitude until reaching 63 KIAS, and then establish a stabilized descent at 63 KIAS to simulate a normal approach to landing
- 7. Descend 100 feet and, apply full throttle, allowing the airplane to roll left and the pitch to increase to V_X pitch attitude (approx. 12°) or at stall horn
- 8. Use enough forward yoke pressure to reduce the angle of attack and regain control effectiveness
- 9. Maintain coordinated use of the ailerons and rudder to level the wings
- 10. Adjust pitch to V_Y attitude and retract the flaps to 25°, re-trim as necessary
- 11. Incrementally retract flaps as airspeed increases
- 12. Return to the altitude, heading, and airspeed specified





Standards:

Student will demonstrate a basic understanding of the maneuver

CROSS-CONTROL STALL

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To recognize the effects of improper control flight control technique.

This is a demonstrated flight maneuver.

- 1. Complete the maneuvers checklist and plan to recovery by 2500 feet AGL
- 2. Reduce throttle to 1700 RPM, adjusting pitch and trim aircraft to maintain altitude **NOTE**

Because of the possibility of exceeding VFE, flaps are not extended.

- 3. Maintain altitude until reaching 90 KIAS and then establish a stabilized descent at 90 KIAS to simulate a normal flaps up approach to landing
- 4. Descend 100 feet and simultaneously reduce power to idle and pick a reference point off the left or right wing tip
- 5. Turn towards the reference point using a 25-30° bank while:
- 6. Simultaneously applying excessive rudder pressure in the direction of the turn
- 7. Using opposite alleron to prevent over-banking while maintaining a constant 25-30° bank during the turn, and
- 8. Increasing elevator back-pressure to keep the nose from lowering, achieving 11-12° pitch up.
- 9. At imminent stall call out, "Stalling", reduce pitch to regain control effectiveness, and apply full power.

NOTE

Completion of the maneuver should occur by the 90° reference point and before full deflection of the rudder and aileron.

- 10. Maintain coordinated use of the ailerons and rudder to level the wings and prevent entering into a spin.
- 11. Adjust pitch to the V χ attitude (11-12° Up) (re-trimming as necessary) and minimize altitude loss.
- 12. Return to the altitude, heading, and airspeed specified.



Standards:

Student will demonstrate a basic understanding of the maneuver

ACCELERATED STALL

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To demonstrate that the stall is a function of angle of attack, weight, and load factor, rather than airspeed.

This is a demonstrated flight maneuver.

- 1. Complete the maneuvers checklist and plan to recover by 2500 feet AGL
- 2. Reduce throttle to 1700 RPM and decelerate at or below maneuvering speed (V_A) adjusting pitch and trim aircraft to maintain altitude

NOTE The flaps must be in the 0° (Up) position.

- 3. Establish a 45-50° bank to the left or right
- 4. After the bank and turn are established, smoothly and steadily increase elevator back-pressure.
- 5. As the airspeed reaches 20 knots above the un-accelerated stall speed (Vs1), firmly increase elevator back-pressure.
- 6. At imminent stall (buffet):
 - a. Note the indicated airspeed, Call out, "Stalling"
 - b. Reduce pitch to regain control effectiveness
 - c. Add power as necessary.
- 7. Maintain coordinated use of the ailerons and rudder to level the wings and prevent entry into a spin
- 8. Minimize altitude loss.
- 9. Return to the altitude, heading, and airspeed specified.



Standards:

Student will demonstrate a basic understanding of the maneuver

STEEP TURNS

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To develop smoothness, coordination, orientation, division of attention, and control techniques while executing high performance turns.

- 1. Complete the maneuvers checklist and plan to recover by 1500 feet AGL
- 2. Establish airspeed below VA, trim as necessary
- 3. Choose a prominent landmark or note the heading
- 4. Roll into a 45° bank (private) or 50° bank (commercial) and begin a 360° turn
- 5. Rolling through 30°, add power as necessary to maintain altitude and airspeed
- 6. Begin roll out 15°-20° before the originating landmark or heading
- 7. Roll wings level and then,
- 8. Immediately roll into a 360° turn in the opposite direction
- 9. Complete the maneuver and return to straight and level flight
- 10. Complete the cruise checklist



Standard:

Private: Altitude ± 100 ft., Airspeed ± 10 , Bank $\pm 5^{\circ}$, Heading $\pm 10^{\circ}$. Commercial: Altitude ± 100 ft., Airspeed ± 10 , Bank $\pm 5^{\circ}$, Heading $\pm 10^{\circ}$

CHANDELLES

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To develop the pilot's coordination, orientation, planning, and feel for maximum performance flight, and to develop positive control techniques at varying airspeeds and attitudes.

- 1. Complete the maneuvers checklist and plan to recover by 1500 feet AGL
- 2. Establish airspeed below VA, trim as necessary
- 3. Select a reference point directly off the left or right wing tip
- 4. Roll into a coordinated 30° bank turn and neutralize rudder and aileron.
- 5. After the bank is established, smoothly initiate a climbing turn and apply full power
- 6. While maintaining a 30° bank, continue increasing the pitch attitude at a constant rate so as to attain the highest pitch (approx. 13-15°) at the 90° point in the turn
- 7. At the 90° point in the turn, maintain pitch attitude by continuing to increase elevator backpressure (due to decreasing airspeed) and initiate a slow rate of rollout
- Maintain a constant roll out rate with aileron while increasing right rudder and increasing back pressure to maintain pitch, plan to decrease bank 10° by each 30° of heading change
- 9. Arrive at the 180° point with airspeed about 5 KIAS above stall, wings level, and coordinated flight. Maintain pitch for about 3 seconds.
- 10. Begin slowly decreasing pitch attitude to level flight and increasing airspeed. No altitude loss.
- 11. Complete the Cruise checklist



Commercial: Airspeed just above stall, Heading ±10°

LAZY EIGHT





LAZY EIGHT

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To develop the pilot's feel for varying control forces, and the ability to plan and remain oriented while maneuvering the plane with positive and accurate control.

- 1. Complete the maneuvers checklist and complete the maneuver by 1500 feet AGL
- 2. Select a forced landing area and set power to cruise below VA
- 3. Select 45°, 90°, and 135 °reference points on or out toward the horizon
- 4. From straight and level flight, initiate a shallow climbing turn by simultaneously increasing bank and pitch slowly, planning to achieve maximum pitch (approx. 13°-15°) and 15° bank angle at the 45° reference point. If the initial turn is to the left, a slight amount of right rudder and neutral aileron will be required to maintain coordination. If the initial turn is to the right, more right rudder will be required and slight opposite aileron at the 45° reference to prevent over-banking
- 5. From the 45° reference point allow the bank angle to continue increasing, and pitch to decrease so that at the 90° reference point the maximum bank angle (30°) is achieved and the pitch attitude is passing through level flight at minimum airspeed
- 6. From the 90° reference point, allow the pitch attitude to continue decreasing and initiate a slow decrease in bank angle while continuing a descending turn in the direction of the 135° reference point where the maximum pitch down attitude (approx. 13°-15°) should be achieved with a 15° bank angle
- 7. From the 135° reference point, continue decreasing the bank angle while allowing the pitch to increase so that the airplane returns to the entry airspeed and altitude by the 180° reference point
- 8.

NOTE

The airspeed should not exceed the entry airspeed during the turn from the 90° reference point to the 180° reference point

- 9. Proceed through the 180° point with no hesitation and begin a shallow climbing turn in the opposite direction, repeating the steps outlined above
- 10. Complete the maneuver at entry heading, airspeed and altitude
- 11. Return to normal cruise flight 2200-2300 RPM
- 12. Perform cruise checklist

Standards:

Commercial: Bank angle \leq 30°, Altitude ±100 ft., Airspeed ±10 KIAS Heading ±10°.



STEEP SPIRAL

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To improve pilot technique for airspeed and wind drift control, planning, orientation, and division of attention.

- 1. Determine wind direction
- 2. Establish an altitude that will allow at least 3 -360° turns before rollout
- 3. Select a forced landing area where an emergency landing can be made if necessary
- 4. Approach a prominent reference point to spiral around so as to enter on downwind
- 5. Close throttle and adjust pitch to establish and maintain best glide speed (73 KIAS), trim as necessary
- 6. Maintain a constant radius around the reference point adjusting the bank angle as necessary not to exceed 60°

NOTE

Prolonged idle power may result in excessive engine cooling or spark plug fouling, especially during cold weather. The engine should be cleared periodically by briefly advancing the throttle to cruise power. This should be done with a headwind to minimize groundspeed variation

- 7. Complete at least three 360° turns
- 8. Complete the maneuver on entry heading

NOTE

Recover no lower than 1500' AGL unless combining the maneuver with a simulated Emergency Approach and Landing

- 9. Return to normal cruise flight 2200-2300 RPM
- 10. Perform cruise checklist

Standards:

Commercial: Bank angle \leq 60°, Altitude sufficient to complete three 360°, Airspeed ±10 KIAS, Heading ±10°

EMERGENCY DESCENT

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To descend the airplane as rapidly as possible, within the operating limitations of the airplane.

- 1. Complete the maneuvers checklist and complete the maneuver by 1500 feet AGL
- 2. Brief all passengers
- 3. Pick a visual landmark off the wing tip in the direction of turn
- 4. Throttle to Idle, reduce speed below maximum flap speed (VFE), extend flaps to 40°
- 5. Simultaneously roll into a 30°- 45° bank in direction of planned turn and adjust pitch to maintain 98 KIAS
- 6. Roll out on the 180° point in the turn and make shallow S-turns to continue checking for other traffic while descending
- 7. Approaching the target altitude, begin to level off by increasing pitch to reduce the descent rate
- 8. At target altitude, adjust pitch to maintain level flight
- 9. Set the aircraft for normal cruise flight
- 10. Perform Cruise Checklist.
- 11. Return to normal cruise flight 2200-2300 RPM
- 12. Perform cruise checklist

Standards:

Private: Airspeed, establishes appropriate airspeed, Maintains positive load factors during the descent

Commercial: Airspeed \pm 10 KIAS, Maintains positive load factors during the descent, Altitude, \pm 100 feet

EMERGENCY APPROACH AND LANDING

Ref: FAA-H-8083-3A (Airplane Flying Handbook) Piper Warrior Pilot's Operation Manual (POH)

Objective: To execute a safe approach and landing in the event of an engine failure

NOTE

When simulating an engine failure, the Instructor Pilot will call out "Simulated Engine Failure"

- 1. Establish the best glide speed Vg 73 knots, trim as necessary
- 2. Determine wind direction and select a suitable landing site, checking the area in the immediate vicinity of the aircraft's position
- 3. Turn the airplane towards the selected landing site
- 4. Go through the Right to Left memorization checklist. (Carb heat on, Mixture, Throttle, Fuel pump, Primer, Magnetos, Fuel Selector
- 4. If altitude permits, complete the emergency checklist
- 5. If engine restart is unsuccessful, maneuver the aircraft as necessary for the approach and landing
- 6. Squawk transponder code 7700 and transmit mayday on 121.5

NOTE

Prolonged idle power may result in excessive engine cooling or spark plug fouling, especially during cold weather. The engine should be cleared periodically by briefly advancing the throttle to cruise power. This should be done with a headwind to minimize groundspeed variation

NOTE

How to maneuver the aircraft for the pattern and the approach and landing will depend on many variables, including location of the closest suitable landing site to the aircraft's current position, altitude, wind direction, landing direction, obstructions, etc. All variables must be considered when developing a maneuvering plan

- 7. When appropriate, maneuver the aircraft to arrive at a point abeam the point of intended landing at 1000' AGL
- 8. Turn onto the base leg and determine if adjustment of the flight path of the base leg is necessary to conserve or dissipate altitude to ensure reaching the desired landing point
- 9. Complete the Power Off Landing checklist:
 - a. Ignition OFF
 - b. Master Switch OFF
 - c. Fuel Selector OFF
 - d. Mixture IDLE CUT-OFF
 - e. Seat Belts and Harnesses TIGHT

NOTE

Unless the approach is made to an airport runway, the simulated emergency approach and landing should be terminated as soon as it can be determined that a safe landing could have been made, or 500' AGL, whichever occurs first

Standards:

Private: Best Glide ±10 KIAS Commercial: Best Glide ±10 KIAS



RECTANGULAR COURSE



RECTANGULAR COURSE

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To maneuver the airplane over a predetermined ground path while dividing attention inside and outside the airplane.

- 1. Determine the wind direction
- 2. Perform Clearings turns and plan to execute the maneuver between 600-1000 feet AGL
- 3. Select a forced landing area
- 4. Establish and maintain a speed below VA
- 5. Enter either left or right pattern on a 45° angle to the mid-field downwind leg
- 6. Establish a crab angle as necessary to maintain a uniform distance from the area boundaries for each leg of the maneuver

NOTE

The airplane should be flown parallel to and at a uniform distance $\frac{1}{4}$ to $\frac{1}{2}$ mile away from the field boundaries

- 7. Begin the turn to next leg when airplane is abeam the corner of the area boundary
- 8. Vary the bank angle (not to exceed a 45° bank) to maintain a constant radius during the turns
- 9. Depart on a 45° from the downwind at the downwind turn boundary
- 10. Return to normal cruise flight 2200-2300 RPM
- 11. Perform cruise checklist

Standards:

Private: Airspeed ±10 KIAS, Altitude ±100



Warrior

S-TURNS ACROSS A ROAD



S-TURNS ACROSS A ROAD

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To teach the student to maneuver the airplane over a predetermined ground path while dividing attention inside and outside the airplane

- 1. Determine the wind direction
- 2. Perform clearing turns and maneuver must be executed between 600-1000 feet AGL
- 3. Pick an area that includes an emergency landing field
- 4. Establish and maintain a speed below VA
- 5. Enter on a downwind heading
- 6. When directly over a reference line or road (highest groundspeed), roll into the steepest bank (not to exceed 45°) to initiate and maintaining a constant radius
- 7. As the turn continues (groundspeed decreases), begin to shallow the bank as necessary to continue maintaining a constant radius
- 8. Level the wings when crossing the reference point (lowest groundspeed) and immediately begin a turn back in the opposite direction
- 9. As the turn continues (groundspeed increases), begin to steepen the bank as necessary to continue maintaining a constant radius
- 10. Level the wings when crossing the reference point (highest groundspeed)

NOTE

The rollouts must be timed in order to be straight and level directly over and perpendicular to the reference line or road

- 11. Return to normal cruise flight 2200-2300 RPM
- 12. Perform cruise checklist

Standards:

Private: Airspeed ±10 K., Altitude ±100 ft.
Warrior

TURNS AROUND A POINT



TURNS AROUND A POINT

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To maneuver the airplane over a predetermined ground path while dividing attention inside and outside the airplane.

- 1. Determine the wind direction
- 2. Perform Clearings turns and plan to execute the maneuver between 600-1000 feet AGL
- 3. Select a forced landing area
- 4. Establish and maintain a speed below VA
- 5. Enter the maneuver at cruise speed on downwind to one side of the selected reference point at a distance equal to the desired radius of urn
- 6. On entry downwind (highest groundspeed) and abeam the reference point, roll into the steepest bank (not to exceed 45°) to initiate and maintain a constant radius
- 7. As the turn continues (groundspeed decreases), begin to shallow the bank as necessary to continue maintaining a constant radius
- 8. Directly upwind (lowest groundspeed), the bank should be at its shallowest
- 9. As the turn continues (ground speed increases), begin to steepen the bank as necessary to continue maintaining a constant radius
- 10. Complete two complete circles, or as directed, and depart on the entry heading
- 11. Return to normal cruise flight 2200-2300 RPM
- 12. Perform cruise checklist

Standards:

Private: Airspeed ±10 K., Altitude ±100 ft.



EIGHTS ON PYLONS

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To maneuver the airplane over a predetermined ground path while dividing attention inside and outside the airplane.

- 1. Determine the wind direction
- 2. Perform clearing turns and determine the pivotal altitude

NOTETo determine the pivotal altitude, use the following calculation:Pivotal Altitude = $(GS Knots)^2$ (GS MPH)²13

- 3. Select a forced landing area that will allow an emergency landing from any position in the maneuver
- 4. Establish and maintain an entry speed below $V_{\mbox{\scriptsize A}}$
- 5. Enter the maneuver on a 45° to the downwind and at a distance from the pylons that will require up to 30° angle of bank at the steepest point
- 6. At the position where the pylon appears to be just ahead of a line extending from the pilot's eye and parallel to the airplane's lateral axis, lower the upwind wing to place the pilot's line of sight on the pylon
- 7. As the turn is continued, the groundspeed of the airplane will decrease as the wind changes from a tailwind to a crosswind. To keep the pylon on the reference line, the pilot must lower the altitude by pitching down. As the airplane continues to turn, the wind changes to a headwind, ground speed decreases, requiring a lower pivotal altitude to maintain the reference line on the pylon. The pilot adjusts by pitching down if necessary

NOTE

The effects of the wind on the airplane's groundspeed should be anticipated so as to smoothly adjust pitch, where necessary, to maintain the line of sight reference with the pylon

- As the airplane turns toward a downwind heading, plan to roll out to maintain a 45° ground track across the road /section line in straight and level flight for 3 to 5 seconds
- 9. Lead the roll in on the second pylon as in the first and maintain the reference point with pitch changes to continue the maneuver
- 10. Maintain division of attention away from the ground reference point to continue collision avoidance as well as inside the airplane to check flight instruments for accuracy and engine instruments for proper operation

Standards:

Commercial: Maximum bank angle 30-40°.



SPIN AWARENESS

Ref: FAA-H-8083-3A (Airplane Flying Handbook) AC 61-67C

Objective: To develop awareness regarding the recognition of, entry into, and recovery from spins. This outline is presented to facilitate student/instructor discussion.

AERODYNAMICS

- Why does an aircraft spin, and why is it bad?
- Phases
 - Stall: pre-spin, uncoordinated stall
 - Incipient: first few unbalanced turns
 - o Developed: balanced forces, though not necessarily "auto-rotating"
 - Recovery: control inputs might take one turn or more to take effect
- Effects of aileron inputs
- Effects of power and flat spins
 - Unrecoverable spins

CONSIDERATIONS

- Spin-prone situations
 - Base-to-final, slow uncoordinated flight
- Configurations which worsen spins
 - o CG location: forward has easier entry and exit than aft
 - Weight; heavy is harder to enter, but harder to exit

AWARENESS

- Banked, opposite rudder, full aft elevator
- Enters developed phase after one to two turns
- Orientation by outside references
 - Tumbling gyros

RECOGNITION AND RECOVERY

- Wing drop during a stall indicates stall phase of a spin
- Recover by upsetting the aerodynamically balanced or balancing forces
 - Rudder opposite to counter the spin
 - o Controls neutral, forward pressure to break stall
 - Rudder normal
 - Controls to maintain level flight
 - Throttle as required
 - Flat spins require throttle to idle and any forward cg changes possible
 - \circ The pedal with the most resistance will recover the spin
 - \circ $\;$ Avoid over speeding in the recovery dive

AIRCRAFT

- Spin approval
- Aircraft category

DSU Flight Maneuvers Standardization Manual

Warrior

NORMAL APPROACH AND LANDING



NORMAL APPROACH AND LANDING

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To safely and accurately establish and maintain a stabilized approach to a landing in a designated area.

- 1. Complete the Landing Checklist
- At least 2 nm from the runway, enter the traffic pattern at traffic pattern altitude on a 45° entry to the downwind, maintaining ½ mile distance from the runway on the downwind leg
- 3. Abeam the point of intended landing, reduce throttle to 1700 RPM
- 4. Below VFE (103 knots) extend flaps to 10°
- 5. Maintain 85 KIAS and 300-500 ft./min descent
- 6. When the touchdown point is 45° to the rear of the wing root (or as appropriate for wind conditions), commence a turn to the base leg
- 7. Extend flaps to 25° and slow the aircraft to 75 KIAS
- 8. Visually verify that the final approach (including the extended final and the opposite base leg) is clear, and then turn to final
- 9. When landing is assured, extend flaps to 40° establish and maintain 63 KIAS (+1/2 gust factor if appropriate). Trim as necessary

NOTE

The approach must be stabilized by 200 feet. If not, execute a go-around

- 10. At the round out, commence reducing power to idle, continuing the flare to touch down on the main wheels first, holding the nose wheel off with back pressure throughout the rollout; allow settling gently
- 11. Maintain directional control throughout the rollout, slowing sufficiently before turning onto a taxiway

Standards: Private: Airspeed +10/-5 KIAS. Touch Down: 400 ft. Commercial: Airspeed ±5 KIAS. Touch Down 200 ft.

CROSSWIND APPROACH AND LANDING



CROSSWIND APPROACH AND LANDING

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To safely and accurately establish and maintain a stabilized approach to a landing, correcting for a crosswind during the approach, touchdown, and rollout.

- 1. Complete the Landing Checklist
- At least 2 nm from the runway, enter the traffic pattern at traffic pattern altitude on a 45° entry to the downwind, maintaining ½ mile distance from the runway on the downwind leg
- 3. Abeam the point of intended landing, reduce throttle to 1700 RPM
- 4. Below VFE (103 knots) extend flaps to 10°
- 5. Maintain 85 KIAS and 300-500 ft./min descent
- 6. When the touchdown point is 45° to the rear of the wing root (or as appropriate for wind conditions), commence a turn to the base leg
- 7. Extend flaps to 25° and slow the aircraft to 75 KIAS
- 8. Visually verify that the final approach (including the extended final and the opposite base leg) is clear, and then turn to final
- 9. When landing is assured, extend flaps to 40° establish and maintain 63 KIAS (+1/2 gust factor if appropriate). Trim as necessary

Note In gusty wind conditions, consider using no more than 25° of flaps

The approach must be stabilized by 200 feet. If not, execute a go-around

- 10. Use the wing-low method (side slip) for drift control
- 11. At the round out, reduce power to idle and continue the flare to touch down on the upwind main wheel first, followed with the downwind main wheel touchdown while holding the nose wheel off with back pressure throughout the rollout; allow settling gently
- 12. Increase aileron deflection into the wind while maintaining directional control throughout the rollout, slowing sufficiently before turning onto a taxiway

Standards:

Private: Airspeed +10/-5 KIAS. Touch Down: 400 ft. Commercial: Airspeed ±5 KIAS. Touch Down 200 ft.

SHORT-FIELD APPROACH AND LANDING



SHORT FIELD APPROACH AND LANDING

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To safely and accurately establish and maintain a stabilized approach to a landing, obtaining maximum performance by stopping in a minimum distance.

- 1. Complete the Landing Checklist
- At least 2 nm from the runway, enter the traffic pattern at traffic pattern altitude on a 45° entry to the downwind, maintaining ½ mile distance from the runway on the downwind leg
- 3. Abeam the point of intended landing, reduce throttle to 1700 RPM
- 4. Below VFE (103 knots) extend flaps to 10°
- 5. Maintain 80 KIAS and 300-500 ft./min descent
- 6. When the touchdown point is 45° to the rear of the wing root (or as appropriate for wind conditions), commence a turn to the base leg
- 7. Extend flaps to 25° and slow the aircraft to 70 KIAS
- 8. Visually verify that the final approach (including the extended final and the opposite base leg) is clear, and then turn to final
- 9. When landing is assured, extend flaps to 40° establish and maintain 57 KIAS (+1/2 gust factor if appropriate). Trim as necessary

NOTE

The approach must be stabilized by 200 feet. If not, execute a go-around

10. Before the roundout, begin smoothly reducing power, continuing the power reduction during the roundout while increasing pitch to maintain a constant glide path to the desired touchdown point

NOTE

Avoid closing the throttle rapidly, which may result in an immediate increase in the rate of decent and a hard landing

- 11. Touch down at minimum controllable airspeed, with the throttle at idle position, on the main wheels first, plan for minimum float
- 12. Immediately after touchdown, apply maximum aerodynamic braking
- 13. Applying heavy braking when nose wheel is on runway.

Standards:

Private: Airspeed +10/-5 KIAS. Within 200 ft. of intended landing point Commercial: Airspeed ±5 KIAS. Within 100 ft. of intended landing point

SOFT-FIELD APPROACH AND LANDING



SOFT FIELD LANDING

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To develop the student's ability to safely and accurately maintain a stabilized approach to land the airplane obtaining maximum performance by touching down at the slowest possible airspeed.

- 1. Complete the Landing Checklist
- At least 2 nm from the runway, enter the traffic pattern at traffic pattern altitude on a 45° entry to the downwind, maintaining ½ mile distance from the runway on the downwind leg
- 3. Abeam the point of intended landing, reduce throttle to 1700 RPM
- 4. Below VFE (103 knots) extend flaps to 10°
- 5. Maintain 80 KIAS and 300-500 ft./min descent
- 6. When the touchdown point is 45° to the rear of the wing root (or as appropriate for wind conditions), commence a turn to the base leg
- 7. Extend flaps to 25° and slow the aircraft to 70 KIAS
- 8. Visually verify that the final approach (including the extended final and the opposite base leg) is clear, and then turn to final
- 9. When landing is assured, extend flaps to 40° establish and maintain 63 KIAS (+1/2 gust factor if appropriate). Trim as necessary

NOTE

The approach must be stabilized by 200 feet. If not, execute a go-around

- 10. At the round out, commence reducing power as necessary and initiating the flare to hold the airplane 1-2 feet off the surface in ground effect as long as possible to gradually dissipate forward speed, Power may be used to slow the rate of descent and soften the touchdown.
- 11. Touchdown on the main wheels first holding the nose wheel off with back pressure throughout the rollout
- 12. Taxi off runway without stopping and with the use of little or no brakes.

NOTE

Conduct all taxi operations with the control wheel fully aft. On softer surfaces, additional power may be needed to maintain taxi speed and to avoid becoming stuck. Avoid the use of brakes to prevent imposing a heavy load on the nose gear, causing the nose gear to "dig" into the soft surface.

Standards:

Private: Airspeed +10/-5 KIAS Commercial: Airspeed ±5 KIAS

POWER-OFF 180° ACCURACY



POWER-OFF 180° ACCURACY APPROACH AND LANDING

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To demonstrate the judgment, technique, and skill necessary for accurately flying the airplane, without power, to a safe landing.

- 1. Complete the Landing Checklist
- At least 2 nm from the runway, enter the traffic pattern at pattern altitude on a 45° entry to the downwind, maintaining ½ mile distance from the runway on the downwind leg
- 3. Abeam the point of intended landing, reduce throttle to idle, slowing to V_G (73 KIAS), and then commence a descent at 73 KIAS, Trim as necessary
- 4. At a point appropriate for wind conditions, commence a turn to the base leg using a medium to steep bank angle (20°-30°)

NOTE

Establish and then adjust the base leg toward, perpendicular, or away from the intended touchdown point, considering altitude and wind conditions, so as to conserve or dissipate altitude as necessary to reach the intended touchdown point

- 5. On base leg, add flaps as necessary and maintain glide (73 KIAS). The base leg is not a fixed point on the ground and may be adjusted to accommodate varying conditions
- 6. Visually verify that the final approach (including the extended final and the opposite base leg) is clear, and then turn to final
- 7. When landing is assured, extend flaps to 40° establish and maintain 63 KIAS (+1/2 gust factor if appropriate). Trim as necessary

NOTE The approach must be stabilized by 200 feet. If not, execute a go-around

- 8. At the round out, commence reducing power to idle, continuing the flare to touch down on the main wheels first, holding the nose wheel off with back pressure throughout the rollout; allow settling gently
- 9. Maintain directional control throughout the rollout, slowing sufficiently before turning onto a taxiway

Standards:

Commercial: Airspeed ±5 KIAS, Within 200 ft. of intended touchdown point

GO-AROUND/REJECTED LANDING

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

- **Objective:** To develop the ability to safely transition at a critical time from the approach and landing phase to the climb.
- 1. Upon deciding to go-around:
 - a. Power full forward (carb heat off)
 - b. Flaps reduce to 25° immediately
 - c. Pitch up slightly
 - d. Climb at 63 KIAS (Vx)
 - e. Obstacle cleared flaps up incrementally
 - f. Accelerate to 75 KIAS (Vy)
- 2. Maintain directional control and proper wind-drift correction throughout the climb
- 3. Execute an appropriate departure procedure, or remain in the traffic pattern as appropriate
- 4. Complete the Go Around Checklist



Standards:

Private: Airspeed +10/-5 KIAS Commercial: Airspeed ±5 KIAS

INTENTIONALLY LEFT BLANK

Warrior

FORWARD SLIP TO LANDING



DSU Flight Maneuvers Standardization Manual

FORWARD SLIP TO LANDING

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To increase the descent rate on a final approach path without increasing airspeed.

- 1. Visually verify that the final approach (including the extended final and the opposite base leg) is clear, and then turn to final
- 2. Select an intended point of touchdown
- 3. Initiate the slip by simultaneously using down aileron into the wind and opposite rudder
- 4. Use an appropriate amount of bank and yaw to maintain a ground track that is aligned with the runway centerline, the nose should not be aligned with the ground track

NOTE

The amount of slip (sink rate) is determined by the bank angle; the steeper the bank—the greater the descent rate—the greater (steeper) the descent angle—the greater the need for opposite rudder up to the limit of rudder travel

5. Prior to the roundout, recover by simultaneously decreasing aileron and rudder deflections smoothly in time to land with the longitudinal axis of the airplane aligned with the runway centerline

Standards:

Private: Within 400 ft. of intended point of touchdown

Warrior V-Speeds

Rotation Speed (V _R)	53	Maneuvering Speed (V _A)	88 – 111
Best Rate of Climb (Vy)	75 (79 PA-161)	Flaps Extended Speed (VFE)	103
Best Angle of Climb (Vx)	63	Never Exceed Speed (V _{NE})	160
Stall Speed Flaps (V _{S0})	44	Best Glide Speed	73
Stall Speed Clean (Vs1)	50	Cruise Climb	87
			0.

Speeds are for an aircraft operating at a gross weight of 2325

 $1.2V_{S1} = 60$ $1.2V_{S0} = 52$ $1.3V_{S0} = 57$ $V_{NO} = 126$

Flap extended positions	10, 25, 40
Max Demonstrated Crosswind Component	17 knots [sin x (wind)]
Max Gross Weight	2325 lbs.
Standard Empty Weight	1331 lbs
Engine Manufacturer	Lycoming
Model	O-320
Туре	Horizontally Opposed, Air Cooled
Displacement	319 Cubic Inches
Horsepower	150 HP
Rated Speed (RPM)	2700 RPM
Oil	
Max	8 qts
Min	2 qts (DSU Min - 5 qts.)
Prop Length	74 Inches
Wing Span	35 Feet
Fuel Grade	100LL (Blue)
Quantity	48 Gal. Usable \ 2 Gal. Unusable
Tire Pressure	
Main	24 PSI
Nose	30 PSI

Electrical System

Battery Alternator 12 Volts; 25 Amp Hour 14 Volts; 60 Amps

There is an ammeter that measures the electrical load on the alternator.

Fuel System

There are 48 gallons of usable fuel and 2 gallons of unusable fuel, which gives us a total of 50 gallons. There is one engine driven fuel pump and one electric fuel pump in the event of engine driven fuel pump failure.

PIPER ARROW PA-28R-200 AND PA-28R-201

NOTE

Airspeeds for the PA-28R-200 (N402DS) are in MPH and airspeeds for the PA-28R-201 (N495DS) are in KIAS

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NORMAL TAKEOFF AND CLIMB

REF: FAA-H-8083-3A (Airplane Flying handbook)

Objective: To safely execute a takeoff under normal conditions

- 1. Complete the Before Takeoff checklists
- 2. Center aircraft on runway centerline with nose wheel straight ahead
- 3. Advance the throttle smoothly forward to 2000 RPM, check engine instruments
- 4. Advance power to full forward
- 5. Maintain aircraft on centerline
- 6. Call out "airspeed alive"
- 7. Accelerate aircraft to 65 MPH/65 KIAS call out " V_R rotate", increase control yoke back pressure to pitch up until the glare shield meets the horizon (approximately 10°) when positive rate climb call out "Positive rate gear up"
- 8. Accelerate to 100 MPH/90 KIAS [Vy Gear Up] and climb on centerline, trim as necessary
- 9. At 1000' AGL, decrease pitch to establish and maintain 110 MPH/104 KIAS curse climb, set 25" MP and 2500 RPM
- 10. Execute a Traffic Pattern departure procedure
- 11. After leaving the traffic pattern, complete the climb checklist

IF REMAINING IN THE PATTERN

- 12. Accelerate to 100 MPH/90 KIAS [Vy Gear Up] and climb on centerline, trim as necessary
- 13. At 600' AGL turn to crosswind, set 25"MP and 2500 RPM
- 14. Continue climb to TPA (900 feet at 33N) and turn downwind, reduce power to 20" MP

Standards:

Private: Airspeed V_Y +10/-5 Commercial: Airspeed V_Y ±5

SHORT FIELD TAKEOFF

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To obtain maximum performance during takeoff and minimize the runway length required

- 1. Complete Before Takeoff checklists and set flaps to 25° (2nd notch)
- 2. Taxi aircraft on runway centerline utilizing all available runway and center nose wheel
- 3. Firmly depress the brake pedals to ensure holding the airplane in position during full power run-up
- 4. Advance the throttle forward to 2000 RPM, check engine instruments
- 5. Smoothly advance the throttle to full forward, check static power, and then release the brakes
- 6. Maintain directional control and runway centerline with the rudder pedals
- 7. Call out "air speed alive"
- 8. Accelerate aircraft to 60-65 MPH/50-60 KIAS call out "V_R rotate"
- 9. Accelerate to V_x (85 MPH/65 KIAS), when positive rate climb call out *"Positive rate – gear up"* and climb on centerline, trim as necessary
- 10. When obstacle is clear or 50' AGL, accelerate and climb at 100 MPH/90 KIAS [V_Y Gear Up]
- 11. Incrementally reduce flaps to 0°
- 12. At 1000' AGL, decrease pitch to establish and maintain 110 MPH/104 KIAS curse climb, set 25" MP and 2500 RPM
- 13. Climb out as normal

Standards:

Private: Airspeed +10/-5 Commercial: V_X +5/-0 K., then V_Y ±5

SOFT FIELD TAKEOFF

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To obtain maximum performance when taking off from a soft or rough surface runway.

- 1. Complete Before Takeoff checklists and set flaps to 25° (2nd notch)
- 2. Taxi toward the takeoff position with full back pressure on the yoke while using proper crosswind correction techniques
- 3. Without braking or stopping the airplane, smoothly and continuously apply full throttle, checking engine instruments and lifting the nose wheel clear of the runway as soon as possible (approximately 5-8°)

NOTE

Do not allow the airplane to pitch up excessively causing a tail strike

- 4. Maintain directional control and runway centerline with the rudder pedals
- 5. As the aircraft's nose begins to rise, release a little pressure on the yoke so that the aircraft does not become airborne prior to achieving adequate lift
- 6. As the main wheels lift off the runway, decrease pitch attitude to establish and maintain a level flight attitude while remaining in ground effect and:
- If no obstacles are present, accelerate to 95 MPH/78 KIAS (V_Y) and climb when positive rate call out *"Positive rate – gear up"* and climb on centerline, trim as necessary, slowly reduce flaps to 0°
- 8. **If obstacles are present**, accelerate to 85 MPH/72 KIAS (Vx) and climb, when clear of obstacles and positive rate call out *"Positive rate gear up"* and climb on centerline, trim as necessary, slowly reduce flaps to 0°
- 9. At 1000' AGL, decrease pitch to establish and maintain 110 MPH/104 KIAS curse climb, set 25" MP and 2500 RPM
- 10. Climb out as normal.

Standards:

Private V_X or V_Y \pm 10/-5 Commercial: V_X or V_Y \pm 5

MANEUVERING DURING SLOW FLIGHT

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To recognize changes in aircraft flight characteristics and control effectiveness at critically slow airspeeds in various configurations.

This maneuver may be done with or without flaps and gear, recover at or above 1500' AGL

- 1. Complete the maneuvers checklist
- 2. Reduce power to 15" MP then gear down below V_{LE}
- 3. Below VFE incrementally extend flaps to 40°
- 4. Maintain heading
- 5. Maintain altitude with power
- 6. Maintain airspeed with pitch
- 7. Establish airspeed at minimum airspeed, just above stall (Stall warning horn may be sounding continuously)
- 8. Execute climbs, descents and turns

On Recovery:

- 9. Apply full power while maintaining altitude
- 10. Reduce the flaps to 25°
- 11. At 85 MPH/72 KIAS, Gear up (if down)
- 12. Reduce flaps to 0° while maintaining altitude (if extended)
- 13. Return to cruise flight: 23" MP and 2400 RPM
- 14. Perform cruise checklist

Standards:

Private: altitude ± 100 ft., heading $\pm 10^{\circ}$, bank $\pm 5^{\circ}$, airspeed $\pm 10/-0$ Commercial: altitude ± 50 ft., heading $\pm 10^{\circ}$, bank $\pm 5^{\circ}$, airspeed $\pm 5/-0$

POWER OFF STALLS

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To recognize the indications of an imminent or full stall during power off situations with the flaps down, and to make prompt, positive, and effective recoveries with a minimum loss of altitude.

- 1. Complete the maneuvers checklist and plan to recover by 2500 feet AGL
- 2. Reduce power to 15" MP then gear down below V_{LE} and adjust pitch to maintain altitude, trim as necessary
- 3. Below V_{FE} smoothly extend flaps in succession [10,25,40], maintain altitude
- Maintain altitude until reaching 90 MPH/75 KIAS and then establish a stabilized descent (trimmed) at entry airspeed to simulate a normal approach to landing
- 5. Descend 100 ft. and then reduce power to idle
- 6. Maintain altitude in straight flight or in turns with up to 20° bank. Airspeed will drop requiring additional back pressure to maintain altitude
- 7. On first indication of an <u>imminent stall</u> [stall horn, mushy controls, buffeting] or full stall call out "Stalling"
- 8. Apply full throttle and lower the nose slightly below horizon
- 9. Reduce flaps to 25°
- 10. Establish V_X and subsequently V_Y, look for positive rate climb then Gear Up
- 11. During the climb, slowly reduce flaps to zero and climb to starting altitude
- 12. Return to cruise flight: 23" MP and 2400 RPM
- 13. Perform cruise checklist

Standards:

Private: Heading ±10°, Bank <20° ±10°. Commercial: Heading ±10°, Bank <20° ±5°.

POWER ON STALLS

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To recognize the indications of an imminent or full stall during power on situations and to make prompt, positive, and effective recoveries with a minimum loss of altitude.

- 1. Complete the maneuvers checklist and plan to recover by 2500 feet AGL
- 2. Reduce power to 12" MP then gear down below V_{LE} and adjust pitch to maintain altitude, trim as necessary
- 3. Maintain altitude until reaching 85 MPH/72 KIAS, then set power to 20" MP and smoothly increase pitch to approximately 20°
- 4. On first indication of an imminent stall [stall horn, mushy controls, buffeting] or full stall call out *"Stalling"*
- 5. Maintain coordinated use of the ailerons and rudder to level the wings and prevent entering into a spin
- 6. Apply full throttle and lower the nose to the horizon
- 7. Adjust pitch to $V_{\rm Y}$ and minimize altitude loss, look for positive rate climb then Gear Up
- 8. Return to cruise flight: 23" MP and 2400 RPM
- 9. Perform cruise checklist

Standards:

Private: Heading ±10°, Bank <20° ±10°. Commercial: Heading ±5°, Bank <20° ±5°. Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To recognize the effects of improper control usage inducing another stall after initiating a recovery from the initial stall.

This is a demonstrated flight maneuver

- 1. Complete the maneuvers checklist and plan to recover by 2500 feet AGL
- 2. Reduce Power to 15" MP then gear down below V_{LE}, (if performing a power off stall) adjust pitch to maintain altitude, trim as necessary
- 3. Perform a Power-Off or Power-On Stall, as directed
- 4. At the stall call out, *"Stalling"*, reduce the angle of attack to regain control effectiveness and apply full power
- 5. Maintain coordinated use of the ailerons and rudder to level the wings and prevent a spin
- 6. <u>Immediately</u> increase the pitch attitude to induce another (secondary) stall
- 7. At the stall, call out, "Stalling", reduce the angle of attack to regain control effectiveness and ensure full power
- 8. Maintain coordinated use of the ailerons and rudder to level the wings and prevent entering into a spin
- 9. Lower the nose to the horizon
- 10. Adjust pitch to $V_{\rm Y}$ and minimize altitude loss, look for positive rate climb then Gear Up
- 11. Return to cruise flight: 23" MP and 2400 RPM
- 12. Perform cruise checklist

Standards:

ELEVATOR TRIM STALL

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To recognize the effects of not maintaining positive airplane control during a go-around/rejected landing.

This is a demonstrated flight maneuver.

- 1. Complete the maneuvers checklist and plan to recover by 2500 feet AGL
- 2. Reduce power to 15" MP then gear down below VLE, adjust pitch to maintain altitude, trim as necessary
- 3. Below VFE extend flaps to 10°, adjust pitch and trim aircraft to maintain altitude
- 4. Extend the flaps to 25°, adjust pitch and trim aircraft to maintain altitude
- 5. Extend the flaps to 40°, adjust pitch and trim aircraft to maintain altitude
- 6. Maintain altitude until reaching 85 MPH/75 KIAS, and then establish a stabilized descent to simulate a normal approach to landing
- 13. Descend 100 feet and, apply full throttle, allowing the airplane to roll left and the pitch to increase to V_X pitch attitude (approx. 12°) or at stall horn
- 14. Use enough forward yoke pressure to reduce the angle of attack and regain control effectiveness
- 7. Maintain coordinated use of the ailerons and rudder to level the wings
- 8. Adjust pitch to V_Y attitude and retract the flaps to 25°, look for positive rate climb then Gear Up, re-trim as necessary
- 9. Incrementally retract the flaps to 0°, re-trim as necessary
- 10. Return to cruise flight: 23" MP and 2400 RPM
- 11. Perform cruise checklist

Standards:

CROSS-CONTROL STALL

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To recognize the effects of improper control flight control technique.

This is a demonstrated flight maneuver.

- 1. Complete the maneuvers checklist and plan to recover by 2500 feet AGL
- 2. Reduce throttle to 15" MP then gear down below V_{LE}, adjust pitch and trim aircraft to maintain altitude

NOTE Because of the possibility of exceeding VFE, flaps are not extended.

- 3. Maintain altitude until reaching 90 KIAS and then establish a stabilized descent at 90 MPH/75 KIAS to simulate a normal flaps up approach to landing
- 4. Descend 100 feet and simultaneously reduce power to idle and pick a reference point off the left or right wing tip
- 5. Turn towards the reference point using a 25-30° bank while:
- 6. Simultaneously applying excessive rudder pressure in the direction of the turn
- Using opposite aileron to prevent over-banking while maintaining a constant 25-30° bank during the turn, and
- Increasing elevator back-pressure to keep the nose from lowering, achieving 11-12° pitch up.
- 9. At imminent stall call out, "Stalling", reduce pitch to regain control effectiveness, and apply full power.

NOTE

Completion of the maneuver should occur by the 90° reference point and before full deflection of the rudder and aileron.

- 10. Maintain coordinated use of the ailerons and rudder to level the wings and prevent entering into a spin.
- 11. Adjust pitch to V_Y look for positive rate climb then Gear Up, re-trim as necessary 12. Return to cruise flight: 23" MP and 2400 RPM

Standards:

ACCELERATED STALL

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To demonstrate that the stall is a function of angle of attack, weight, and load factor, rather than airspeed.

This is a demonstrated flight maneuver.

- 1. Complete the maneuvers checklist and plan to recover by 2500 feet AGL
- 2. Reduce throttle to 15" MP and decelerate at or below maneuvering speed (V_A) adjusting pitch and trim aircraft to maintain altitude

NOTE The flaps must be in the 0° (Up) position.

- 3. Establish a 45-50° bank to the left or right
- 4. After the bank and turn are established, smoothly and steadily increase elevator back-pressure.
- 5. As the airspeed reaches 20 knots above the un-accelerated stall speed (Vs1), firmly increase elevator back-pressure.
- 6. At imminent stall (buffet):
 - a. Note the indicated airspeed, Call out, "Stalling"
 - b. Reduce pitch to regain control effectiveness
 - c. Add power as necessary.
- 7. Maintain coordinated use of the ailerons and rudder to level the wings and prevent entry into a spin
- 8. Minimize altitude loss.
- 9. Return to the altitude, heading, and airspeed specified.

Standards:

STEEP TURNS

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To develop smoothness, coordination, orientation, division of attention, and control techniques while executing high performance turns.

- 1. Complete the maneuvers checklist and plan to recover by 1500 feet AGL
- 2. Establish airspeed below VA, about 21" MP, trim as necessary
- 3. Choose a prominent landmark or note the heading
- 4. Roll into a 45° bank (private) or 50° bank (commercial) and begin a 360° turn
- 5. Rolling through 30°, add power as necessary to maintain altitude and airspeed
- 6. Begin roll out 15°-20° before the originating landmark or heading
- 7. Roll wings level and then,
- 8. Immediately roll into a 360° turn in the opposite direction
- 9. Return to cruise flight: 23" MP and 2400 RPM
- 10. Perform cruise checklist

Standard:

Private: Altitude \pm 100 ft., Airspeed \pm 10, Bank \pm 5°, Heading \pm 10°. Commercial: Altitude \pm 100 ft., Airspeed \pm 10, Bank \pm 5°, Heading \pm 10°

CHANDELLES

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To develop the pilot's coordination, orientation, planning, and feel for maximum performance flight, and to develop positive control techniques at varying airspeeds and attitudes.

- 1. Complete the maneuvers checklist and plan to recover by 1500 feet AGL
- 2. Establish airspeed below VA, about 21" MP, trim as necessary
- 3. Select a reference point directly off the left or right wing tip
- 4. Roll into a coordinated 30° bank turn and neutralize rudder and aileron.
- 5. After the bank is established, smoothly initiate a climbing turn and apply full power
- 6. While maintaining a 30° bank, continue increasing the pitch attitude at a constant rate so as to attain the highest pitch (approx. 13-15°) at the 90° point in the turn
- At the 90° point in the turn, maintain pitch attitude by continuing to increase elevator backpressure (due to decreasing airspeed) and initiate a slow rate of rollout
- Maintain a constant roll out rate with aileron while increasing right rudder and increasing back pressure to maintain pitch, plan to decrease bank 10° by 30° of heading change
- 9. Arrive at the 180° point with airspeed about 5 KIAS above stall, wings level, and coordinated flight. Maintain pitch for about 3 seconds.
- 10. Begin slowly decreasing pitch attitude to level flight and increasing airspeed. No altitude loss.
- 11. Return to cruise flight: 23" MP and 2400 RPM
- 12. Perform cruise checklist

Standards:

Commercial: Airspeed just above stall, Heading ±10°

<u>LAZY EIGHT</u>

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To develop the pilot's feel for varying control forces, and the ability to plan and remain oriented while maneuvering the plane with positive and accurate control.

- 1. Complete the maneuvers checklist and complete the maneuver by 1500 feet AGL
- 2. Select a forced landing area and set power to cruise below V_A about 21" MP, trim as necessary
- 3. Select 45°, 90°, and 135 °reference points on or out toward the horizon
- 4. From straight and level flight, initiate a shallow climbing turn by simultaneously increase bank and pitch slowly planning to achieve maximum pitch (approx. 13°-15°) and 15° bank angle at the 45° reference point. If the initial turn is to the left, a slight amount of right rudder and neutral aileron will be required to maintain coordination. If the initial turn is to the right, more right rudder will be required and slight opposite aileron at the 45° reference to prevent over-banking
- 5. From the 45° reference point allow the bank angle to continue increasing, and pitch to decrease so that at the 90° reference point the maximum bank angle (30°) is achieved and the pitch attitude is passing through level flight at minimum airspeed
- 6. From the 90° reference point, allow the pitch attitude to continue decreasing and initiate a slow decrease in bank angle while continuing a descending turn in the direction of the 135° reference point where the maximum pitch down attitude (approx. 13°-15°) should be achieved with a 15° bank angle
- 7. From the 135° reference point, continue decreasing the bank angle while allowing the pitch to increase so that the airplane returns to the entry airspeed and altitude by the 180° reference point

NOTE

The airspeed should not exceed the entry airspeed during the turn from the 90° reference point to the 180° reference point

- 8. Proceed through the 180° point with no hesitation and begin a shallow climbing turn in the opposite direction, repeating the steps outlined above
- 9. Complete the maneuver at entry heading, airspeed and altitude
- 10. Return to cruise flight: 23" MP and 2400 RPM
- 11. Perform cruise checklist

Standards:

Commercial: Bank angle \leq 30°, Altitude \pm 100 ft., Airspeed \pm 10 KIAS Heading \pm 10°.

STEEP SPIRAL

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To improve pilot technique for airspeed and wind drift control, planning, orientation, and division of attention.

- 1. Complete the maneuvers checklist
- 2. Determine wind direction
- 3. Establish an altitude that will allow at least 3 -360° turns, rollout before 1500' feet AGL
- 4. Select a forced landing area where an emergency landing can be made if necessary
- 5. Approach a prominent reference point to spiral around so as to enter on downwind
- 6. Close throttle and adjust pitch to establish and maintain best glide speed (105 MPH/79 KIAS), trim as necessary
- 7. Maintain a constant radius around the reference point adjusting the bank angle as necessary not to exceed 60°

NOTE

Prolonged idle power may result in excessive engine cooling or spark plug fouling, especially during cold weather. The engine should be cleared periodically by briefly advancing the throttle to cruise power. This should be done with a headwind to minimize groundspeed variation

- 8. Complete at least three 360° turns
- 9. Complete the maneuver on entry heading

NOTE

Recover no lower than 1500' AGL unless combining the maneuver with a simulated Emergency Approach and Landing

- 10. Return to cruise flight: 23" MP and 2400 RPM
- 11. Perform cruise checklist

Standards:

Commercial: Bank angle \leq 60°, Altitude sufficient to complete three 360°, Airspeed ±10 KIAS, Heading ±10°
EMERGENCY DESCENT

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To descend the airplane as rapidly as possible, within the operating limitations of the airplane.

- 1. Complete the maneuvers checklist and complete the maneuver by 1500 feet AGL
- 2. Brief all passengers
- 3. Pick a visual landmark off the wing tip in the direction of turn
- Throttle to Idle, propeller RPM maximum, gear down below maximum gear extension speed (VLE), reduce speed below maximum flap speed (VFE), extend flaps to 40°
- 5. Simultaneously roll into a 30°-45° bank in direction of planned turn and adjust pitch to maintain 105 MPH/79 KIAS
- 6. Roll out on the 180° point in the turn and make shallow S-turns to continue checking for other traffic while descending
- 7. Approaching the target altitude, begin to level off by increasing pitch to reduce the descent rate
- 8. At target altitude, adjust pitch to maintain level flight
- 9. Set the aircraft for normal cruise flight
- 10. Return to cruise flight: 23" MP and 2400 RPM
- 11. Perform cruise checklist

Standards:

Private: Airspeed, establishes appropriate airspeed, Maintains positive load factors during the descent

Commercial: Airspeed \pm 10 KIAS, Maintains positive load factors during the descent, Altitude, \pm 100 feet

EMERGENCY APPROACH AND LANDING

Ref: FAA-H-8083-3A (Airplane Flying Handbook) Piper Warrior Pilot's Operation Manual (POH)

Objective: To execute a safe approach and landing in the event of an engine failure

NOTE

When simulating an engine failure, the Instructor Pilot will call out "Simulated Engine Failure"

- 1. Establish the best glide speed Vg 105 MPH/79 knots, trim as necessary
- 2. Determine wind direction and select a suitable landing site, checking the area in the immediate vicinity of the aircraft's position
- 3. Turn the airplane towards the selected landing site
- 4. Go through the Right to Left memorization checklist. (Mixture, Props, Throttle, Fuel pump, Magnetos, Fuel Selector)
- 5. If altitude permits, complete the emergency checklist
- 6. If engine restart is unsuccessful, maneuver the aircraft as necessary for the approach and landing
- 7. Squawk transponder code 7700 and transmit mayday on 121.5

NOTE

Prolonged idle power may result in excessive engine cooling or spark plug fouling, especially during cold weather. The engine should be cleared periodically by briefly advancing the throttle to cruise power.

How to maneuver the aircraft for the pattern and the approach and landing will depend on many variables, including location of the closest suitable landing site to the aircraft's current position, altitude, wind direction, landing direction, obstructions, etc. All variables must be considered when developing a maneuvering plan

- 8. When appropriate, maneuver the aircraft to arrive at a point abeam the point of intended landing at 1000' AGL
- 9. Turn onto the base leg and determine if adjustment of the flight path of the base leg is necessary to conserve or dissipate altitude to ensure reaching the desired landing point
- 10. Complete the Power Off Landing checklist:

NOTE

Unless the approach is made to an airport runway, the simulated emergency approach and landing should be terminated as soon as it can be determined that a safe landing could have been made, or 500' AGL, whichever occurs first

Standards:

Private: Best Glide ±10 KIAS Commercial: Best Glide ±10 KIAS

DSU Flight Maneuvers Standardization Manual

RECTANGULAR COURSE

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To maneuver the airplane over a predetermined ground path while dividing attention inside and outside the airplane.

- 1. Complete the maneuvers checklist
- 2. Determine the wind direction
- 3. Perform Clearings turns and plan to execute the maneuver between 600-1000 feet AGL
- 4. Select a forced landing area
- 5. Establish and maintain a speed below VA about 21" MP, trim as necessary
- 6. Enter either left or right pattern on a 45° angle to the mid-field downwind leg
- 7. Establish a crab angle as necessary to maintain a uniform distance from the area boundaries for each leg of the maneuver

NOTE

The airplane should be flown parallel to and at a uniform distance $\frac{1}{4}$ to $\frac{1}{2}$ mile away from the field boundaries

- 8. Begin the turn to next leg when airplane is abeam the corner of the area boundary
- 9. Vary the bank angle (not to exceed a 45° bank) to maintain a constant radius during the turns
- 10. Depart on a 45° from the downwind at the downwind turn boundary
- 11. Return to cruise flight: 23" MP and 2400 RPM
- 12. Perform cruise checklist

Standards:

Private: Airspeed ±10 KIAS, Altitude ±100

S-TURNS ACROSS A ROAD

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To teach the student to maneuver the airplane over a predetermined ground path while dividing attention inside and outside the airplane

- 1. Complete the maneuvers checklist
- 2. Determine the wind direction
- 3. Perform clearing turns and maneuver must be executed between 600-1000 feet AGL
- 4. Pick an area that includes an emergency landing field
- 5. Establish and maintain a speed below VA about 21" MP, trim as necessary
- 6. Enter on a downwind heading
- 7. When directly over a reference line or road (highest groundspeed), roll into the steepest bank (not to exceed 45°) to initiate and maintaining a constant radius
- 8. As the turn continues (groundspeed decreases), begin to shallow the bank as necessary to continue maintaining a constant radius
- 9. Level the wings when crossing the reference point (lowest groundspeed) and immediately begin a turn back in the opposite direction
- 10. As the turn continues (groundspeed increases), begin to steepen the bank as necessary to continue maintaining a constant radius
- 11. Level the wings when crossing the reference point (highest groundspeed)

NOTE

The rollouts must be timed in order to be straight and level directly over and perpendicular to the reference line or road

- 12. Return to cruise flight: 23" MP and 2400 RPM
- 13. Perform cruise checklist

Standards:

Private: Airspeed ±10 K., Altitude ±100 ft.

TURNS AROUND A POINT

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To maneuver the airplane over a predetermined ground path while dividing attention inside and outside the airplane.

- 1. Complete the maneuvers checklist
- 2. Determine the wind direction
- 3. Perform Clearings turns and plan to execute the maneuver between 600-1000 feet AGL
- 4. Select a forced landing area
- 5. Establish and maintain a speed below VA about 21" MP, trim as necessary
- 6. Enter the maneuver at cruise speed on downwind to one side of the selected reference point at a distance equal to the desired radius of turn
- On entry downwind (highest groundspeed) and abeam the reference point, roll into the steepest bank (not to exceed 45°) to initiate and maintain a constant radius
- 8. As the turn continues (groundspeed decreases), begin to shallow the bank as necessary to continue maintaining a constant radius
- 9. Directly upwind (lowest groundspeed), the bank should be at its shallowest
- 10. As the turn continues (ground speed increases), begin to steepen the bank as necessary to continue maintaining a constant radius
- 11. Complete two complete circles, or as directed, and depart on the entry heading
- 12. Return to cruise flight: 23" MP and 2400 RPM
- 13. Perform cruise checklist

Standards:

Private: Airspeed ±10 K., Altitude ±100 ft.

EIGHTS ON PYLONS

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To maneuver the airplane over a predetermined ground path while dividing attention inside and outside the airplane.

- 1. Complete the maneuvers checklist
- 2. Determine the wind direction
- 3. Perform clearing turns and determine the pivotal altitude

NOTE

To determine the pivotal altitude, use the following calculation: Pivotal Altitude = $(GS Knots)^2$ $(GS MPH)^2$ 13 15

- 4. Select a forced landing area that will allow an emergency landing from any position in the maneuver
- 5. Establish and maintain an entry speed below VA about 21" MP, trim as necessary
- 6. Enter the maneuver on a 45° to the downwind and at a distance from the pylons that will require up to 30° angle of bank at the steepest point
- 7. At the position where the pylon appears to be just ahead of a line extending from the pilot's eye and parallel to the airplane's lateral axis, lower the upwind wing to place the pilot's line of sight on the pylon
- 8. As the turn is continued, the groundspeed of the airplane will decrease as the wind changes from a tailwind to a crosswind. To keep the pylon on the reference line, the pilot must lower the altitude by pitching down. As the airplane continues to turn, the wind changes to a headwind, ground speed decreases, requiring a lower pivotal altitude to maintain the reference line on the pylon. The pilot adjusts by pitching down if necessary

NOTE

The effects of the wind on the airplane's groundspeed should be anticipated so as to smoothly adjust pitch, where necessary, to maintain the line of sight reference with the pylon

- As the airplane turns toward a downwind heading, plan to roll out to maintain a 45° ground track across the road /section line in straight and level flight for 3 to 5 seconds
- 10. Lead the roll in on the second pylon as in the first and maintain the reference point with pitch changes to continue the maneuver
- 11. Maintain division of attention away from the ground reference point to continue collision avoidance as well as inside the airplane to check flight instruments for accuracy and engine instruments for proper operation

Standards:

Commercial: Maximum bank angle 30-40°.

NORMAL APPROACH AND LANDING

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To safely and accurately establish and maintain a stabilized approach to a landing in a designated area.

- 1. Complete the Landing Checklist
- 2. At least 2 nm from the runway, enter the traffic pattern at traffic pattern altitude on a 45° entry to the downwind, maintaining ½ mile distance from the runway on the downwind leg
- 3. Set power to 20" MP, gear down at mid-field
- 4. Abeam the point of intended landing, reduce throttle to 15" MP
- 5. Below VFE extend flaps to 10°
- 6. Maintain 105 MPH/95 KIAS and 300-500 ft./min descent
- 7. When the touchdown point is 45° to the rear of the wing root (or as appropriate for wind conditions), commence a turn to the base leg
- 8. Extend flaps to 25° and slow the aircraft to 90 MPH/ 85 KIAS
- 9. Visually verify that the final approach (including the extended final and the opposite base leg) is clear, and then turn to final
- 10. When landing is assured, extend flaps to 40° establish and maintain 90 MPH/75 KIAS (+1/2 gust factor if appropriate). Trim as necessary

NOTE

The approach must be stabilized by 200 feet. If not, execute a go-around

- 11. At the round out, commence reducing power to idle, continuing the flare to touch down on the main wheels first, holding the nose wheel off with back pressure throughout the rollout; allow settling gently
- 12. Maintain directional control throughout the rollout, slowing sufficiently before turning onto a taxiway

Standards:

Private: Airspeed +10/-5 KIAS. Touch Down: 400 ft. Commercial: Airspeed ±5 KIAS. Touch Down 200 ft.

SHORT FIELD APPROACH AND LANDING

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To safely and accurately establish and maintain a stabilized approach to a landing, obtaining maximum performance by stopping in a minimum distance.

- 1. Complete the Landing Checklist
- 2. At least 2 nm from the runway, enter the traffic pattern at traffic pattern altitude on a 45° entry to the downwind, maintaining ½ mile distance from the runway on the downwind leg
- 3. Set power to 20" MP, gear down at mid-field
- 4. Abeam the point of intended landing, reduce throttle to 15" MP
- 5. Below VFE extend flaps to 10°
- 6. Maintain 105 MPH/95 KIAS and 300-500 ft./min descent
- 7. When the touchdown point is 45° to the rear of the wing root (or as appropriate for wind conditions), commence a turn to the base leg
- 8. Extend flaps to 25° and slow the aircraft to 90 MPH/85 KIAS
- 9. Visually verify that the final approach (including the extended final and the opposite base leg) is clear, and then turn to final
- 10. When landing is assured, extend flaps to 40° establish and maintain 83 MPH/72 KIAS (+1/2 gust factor if appropriate). Trim as necessary

NOTE

The approach must be stabilized by 200 feet. If not, execute a go-around

11. Before the roundout, begin smoothly reducing power, continuing the power reduction during the roundout while increasing pitch to maintain a constant glide path to the desired touchdown point

NOTE

Avoid closing the throttle rapidly, which may result in an immediate increase in the rate of decent and a hard landing

- 12. Touch down at minimum controllable airspeed, with the throttle at idle position, on the main wheels first, plan for minimum float
- 13. Immediately after touchdown, apply maximum aerodynamic braking
- 14. Applying heavy braking when nose wheel is on runway.

Standards:

Private: Airspeed +10/-5 KIAS. Within 200 ft. of intended landing point Commercial: Airspeed ±5 KIAS. Within 100 ft. of intended landing point

SOFT FIELD LANDING

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To develop the student's ability to safely and accurately maintain a stabilized approach to land the airplane obtaining maximum performance by touching down at the slowest possible airspeed.

- 1. Complete the Landing Checklist
- 2. At least 2 nm from the runway, enter the traffic pattern at traffic pattern altitude on a 45° entry to the downwind, maintaining ½ mile distance from the runway on the downwind leg
- 3. Set power to 20" MP, gear down at mid-field
- 4. Abeam the point of intended landing, reduce throttle to 15" MP
- 5. Below VFE extend flaps to 10°
- 6. Maintain 105 MPH/95 KIAS and 300-500 ft./min descent
- 7. When the touchdown point is 45° to the rear of the wing root (or as appropriate for wind conditions), commence a turn to the base leg
- 8. Extend flaps to 25° and slow the aircraft to 90 MPH/85 KIAS
- 9. Visually verify that the final approach (including the extended final and the opposite base leg) is clear, and then turn to final
- 10. When landing is assured, extend flaps to 40° establish and maintain 90 MPH/75 KIAS (+1/2 gust factor if appropriate). Trim as necessary

NOTE

The approach must be stabilized by 200 feet. If not, execute a go-around

- 11. At the round out, commence reducing power as necessary and initiating the flare to hold the airplane 1-2 feet off the surface in ground effect as long as possible to gradually dissipate forward speed, Power may be used to slow the rate of descent and soften the touchdown.
- 12. Touchdown on the main wheels first holding the nose wheel off with back pressure throughout the rollout
- 13. Taxi off runway without stopping and with the use of little or no brakes.

NOTE

Conduct all taxi operations with the control wheel fully aft. On softer surfaces, additional power may be needed to maintain taxi speed and to avoid becoming stuck. Avoid the use of brakes to prevent imposing a heavy load on the nose gear, causing the nose gear to "dig" into the soft surface.

Standards:

Private: Airspeed +10/-5 KIAS Commercial: Airspeed ±5 KIAS

POWER-OFF 180° ACCURACY APPROACH AND LANDING

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To demonstrate the judgment, technique, and skill necessary for accurately flying the airplane, without power, to a safe landing.

- 1. Complete the Landing Checklist
- At least 2 nm from the runway, enter the traffic pattern at pattern altitude on a 45° entry to the downwind, maintaining ½ mile distance from the runway on the downwind leg
- 3. Set power to 20" MP, gear down at mid-field
- 4. Abeam the point of intended landing, reduce throttle to idle, slowing to 105 MPH/95 KIAS and commence a descent. Trim as necessary
- 5. At a point appropriate for wind conditions, commence a turn to the base leg using a medium to steep bank angle (20°-30°)

NOTE

Establish and then adjust the base leg toward, perpendicular, or away from the intended touchdown point, considering altitude and wind conditions, so as to conserve or dissipate altitude as necessary to reach the intended touchdown point

- 6. On base leg, add flaps as necessary and maintain descent speed. The base leg is not a fixed point on the ground and may be adjusted to accommodate varying conditions
- 7. Visually verify that the final approach (including the extended final and the opposite base leg) is clear, and then turn to final
- 8. When landing is assured, extend flaps to 40° establish and maintain 90 MPH/75 KIAS (+1/2 gust factor if appropriate). Trim as necessary

NOTE

The approach must be stabilized by 200 feet. If not, execute a go-around

- 9. At the round out, commence reducing power to idle, continuing the flare to touch down on the main wheels first, holding the nose wheel off with back pressure throughout the rollout; allow settling gently
- 10. Maintain directional control throughout the rollout, slowing sufficiently before turning onto a taxiway

Standards:

Commercial: Airspeed ±5 KIAS, within 200 ft. of intended touchdown point

GO-AROUND/REJECTED LANDING

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To develop the ability to safely transition at a critical time from the approach and landing phase to the climb.

- 1. Upon deciding to go-around:
 - a. Power full forward
 - b. Pitch up slightly
 - c. Flaps reduce to 25° immediately
 - d. Positive rate, gear up
 - e. Climb at 96 MPH/78 KIAS (Vx)
 - f. Obstacle cleared flaps up incrementally
 - g. Accelerate to 100 MPH/90 KIAS (Vy)
- 2. Maintain directional control and proper wind-drift correction throughout the climb
- 3. Execute an appropriate departure procedure, or remain in the traffic pattern as appropriate
- 4. Complete the Go Around Checklist

Standards:

Private: Airspeed +10/-5 KIAS Commercial: Airspeed ±5 KIAS

ARROW V SPEEDS

		PA-28R-200	PA28R-201
Rotation (V _R)		65 MPH	65 KIAS
Best Rate of Climb (Vy)	Gear Down	95 MPH	78 KIAS
	Gear UP	100 MPH	90 KIAS
Best Angle of Climb (V _x)	Gear Down	85 MPH	72 KIAS
	Gear Up	96 MPH	78 KIAS
Stall Speed Flaps (Vso)		64 MPH	55 KIAS
Stall Speed Clean (Vs1)		71 MPH	60 KIAS

64 MPH	55 KIAS
71 MPH	60 KIAS
131 MPH	118 KIAS
125 MPH	103 KIAS
150 MPH	129 KIAS
125 MPH	107 KIAS
214 MPH	183 KIAS
105 MPH	79 KIAS
110 MPH	104 KIAS
	64 MPH 71 MPH 131 MPH 125 MPH 150 MPH 125 MPH 214 MPH 105 MPH 110 MPH

Speeds are for an aircraft operating at gross weight

PA-2	8R-200 1.2Vs1= 83 MPH	1.2Vso= 66 I	MPH	1.3Vs0= 72 MPH
PA-2	8R-201 1.2V _{S1} =72 KIAS	1.2 V _{SO} = 66	KIAS	1.3V _{SO} = 72 KIAS
Flap	extended positions		10, 25	5, 40 degrees
Max I	Demonstrated Crosswind	Component	17 Kn	iots [sin x (wind)]
Max	Gross Weight	·	2650	
Stand	dard Empty Weight		1531	
Engir	ne Manufacturer		Lycon	ning
Mode	el		IÓ-36	0
Туре			C1C a	and C1C6
Displ	acement		361 C	Cubic Inches
Horse	epower		200 H	IP
Rate	d Speed (RPM)		2700	RPM
Oil	Max		8 qts	
	Min		6 qts	
Prop	Length		74 İnc	ches
Wing	Span		32.2 F	Feet
Fuel	Grade		100LL	_ (Blue)
	Quantity		48 Ga	al. Usable \ 2 Gal. Unusable
Tire F	Pressure			
	Main		27 PS	SI
	Nose		30 PS	SI

Electrical System

Battery Alternator 12 Volt's; 25 Amp Hour 14 Volt's; 60 Amps

There is an ammeter that measures the electrical load on the alternator.

Fuel System

There are 48 gallons of usable fuel and 2 gallons of unusable fuel, which gives us a total of 50 gallons. There is one engine driven fuel pump and one electric fuel pump in the event of engine driven fuel pump failure.

PIPER SENECA PA-34-200

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NORMAL TAKEOFF AND CLIMB

REF: FAA-H-8083-3A (Airplane Flying handbook)

Objective: To safely execute a takeoff under normal conditions

- 1. Complete the Before Takeoff checklists
- 2. Center aircraft on runway centerline with nose wheel straight ahead
- 3. Advance the throttle smoothly forward to 2000 RPM, check engine instruments
- 4. Advance power to full forward
- 5. Maintain aircraft on centerline
- 6. Call out "airspeed alive"
- 7. Accelerate aircraft to 85 MPH call out " V_R rotate", increase control yoke back pressure to pitch up until the glare shield meets the horizon (approximately 10°) when positive rate climb call out "Positive rate gear up"
- 8. Accelerate to 105 MPH [Vy] and climb on centerline, trim as necessary
- At 1000' AGL, decrease pitch to establish and maintain 120 MPH cruise climb, set 25" MP and 2500 RPM
- 10. Execute a Traffic Pattern departure procedure
- 11. After leaving the traffic pattern, complete the climb checklist

IF REMAINING IN THE PATTERN

- 12. Accelerate to 105 MPH and climb on centerline, trim as necessary
- 13. At 600' AGL turn to crosswind, set 25"MP and 2500 RPM
- 14. Continue climb to TPA (900 feet at 33N) and turn downwind, reduce power to 18" MP

Standards:

Private: Airspeed V_Y +10/-5 Commercial: Airspeed V_Y ±5

SHORT FIELD TAKEOFF 0° Flaps

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To obtain maximum performance during takeoff and minimize the runway length required

- 1. Complete Before Takeoff checklists
- 2. Taxi aircraft on runway centerline utilizing all available runway and center nose wheel
- 3. Firmly depress the brake pedals to ensure holding the airplane in position during full power run-up
- 4. Advance the throttle forward to 2000 RPM, check engine instruments
- 5. Smoothly advance the throttle to full forward, check static power, and then release the brakes
- 6. Maintain directional control and runway centerline with the rudder pedals
- 7. Call out *"air speed alive"*
- 8. Accelerate aircraft to 80 MPH call out "V_R rotate"
- 9. Adjust pitch to climb at 85 MPH
- 10. When obstacle is clear or 50' AGL, accelerate to 90 MPH (Vx), when positive rate climb call out *"Positive rate gear up"* and climb on centerline,
- 11. At 1000' AGL, decrease pitch to establish and maintain 120 MPH cruise climb, set 25" MP and 2500 RPM
- 12. Climb out as normal

Standards:

Private: Airspeed +10/-5 Commercial: V_X +5/-0 K., then V_Y ±5

SHORT FIELD TAKEOFF 25° FLAPS

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To obtain maximum performance during takeoff and minimize the runway length required

- 1. Complete Before Takeoff checklists
- 2. Extend to 25° flaps and trim slightly nose up
- 3. Taxi aircraft on runway centerline utilizing all available runway and center nose wheel
- 4. Firmly depress the brake pedals to ensure holding the airplane in position during full power run-up
- 5. Advance the throttle forward to 2000 RPM, check engine instruments
- 6. Smoothly advance the throttle to full forward, check static power, and then release the brakes
- 7. Maintain directional control and runway centerline with the rudder pedals
- 8. Call out "air speed alive"
- 9. Accelerate aircraft to 70 MPH call out "V_R rotate"
- 10. Adjust pitch to climb at 85 MPH
- 11. When obstacle is clear or 50' AGL, accelerate to 90 MPH (Vx), when positive rate climb call out *"Positive rate gear up"* and climb on centerline,
- 12. Slowly reduce flaps to 0°, trim as necessary
- 13. At 1000' AGL, decrease pitch to establish and maintain 120 MPH cruise climb, set 25" MP and 2500 RPM
- 14. Climb out as normal

Standards:

Private: Airspeed +10/-5 Commercial: V_X +5/-0 K., then V_Y ±5

REJECTED TAKEOFF

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To recognize and properly react to engine failure during takeoff at varying airspeeds.

NOTE

This procedure shall be practiced at airfields with 150 ft. wide and 5000 ft. long runways. For training purposes, simulated engine failures shall be initiated before 50% V_{MC}

- 1. Throttles closed immediately
- 2. Stop straight ahead
- 3. Maintain aircraft control with rudders

If inadequate runway remains:

- 1. Throttles close immediately
- 2. Apply maximum braking (May simulate during training)
- 3. Master switch off (May simulate during training)
- 4. Fuel sectors off (May simulate during training)
- 5. Continue straight ahead, avoid obstacles as necessary
- 6. Maintain aircraft control with rudders

Standards:

Private: Maintains directional control and applies brakes as necessary Commercial: Maintains directional control and applies brakes as necessary

NOTE

The following is provided for discussion and familiarizing purposes only

If adequate runway remains, gear down, and airspeed > 100 MPH

- 1. Throttles close immediately
- 2. Stop straight ahead
- 3. Maintain aircraft control with rudders

If inadequate runway remains and airspeed > 100 MPH

- 1. Maintain heading and airspeed
- 2. When climb is established, call out "positive rate gear up"
- 3. Confirm inoperative engine and complete the Propeller Feather checklist

MANEUVERING DURING SLOW FLIGHT

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To recognize changes in aircraft flight characteristics and control effectiveness at critically slow airspeeds in various configurations.

This maneuver may be done with or without flaps and gear, recover at or above 3000' AGL

- 1. Complete the maneuvers checklist
- 2. Reduce power to 15" MP then gear down below V_{LE}
- 3. Below VFE incrementally extend flaps to 40°
- 4. Maintain heading
- 5. Maintain altitude with power
- 6. Maintain airspeed with pitch
- 7. Establish airspeed at minimum airspeed, just above stall (Stall warning horn may be sounding continuously)
- 8. Execute climbs, descents and turns

On Recovery:

- 9. Apply full power while maintaining altitude
- 10. Reduce the flaps to 25°
- 11. At 90 MPH, Gear up (if down)
- 12. Reduce flaps to 0° while maintaining altitude (if extended)
- 13. Return to slow cruise: 20" MP and 2400 RPM
- 14. Perform cruise checklist

Standards:

Private: altitude ± 100 ft., heading $\pm 10^{\circ}$, bank $\pm 5^{\circ}$, airspeed $\pm 10/-0$ Commercial: altitude ± 50 ft., heading $\pm 10^{\circ}$, bank $\pm 5^{\circ}$, airspeed $\pm 5/-0$

POWER OFF STALLS

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To recognize the indications of an imminent or full stall during power off situations with the flaps down, and to make prompt, positive, and effective recoveries with a minimum loss of altitude.

- 1. Complete the maneuvers checklist and plan to recovery by 3000 feet AGL
- 2. Reduce power to 15" MP then gear down below V_{LE} and adjust pitch to maintain altitude, trim as necessary
- 3. Below V_{FE} incrementally extend flaps to 40° maintain altitude
- 4. Maintain altitude until reaching 95 MPH and then establish a stabilized descent (trimmed) at entry airspeed to simulate a normal approach to landing
- 5. Descend 100 ft. and then reduce power to idle
- 6. Maintain altitude in straight flight or in turns with up to 20° bank. Airspeed will drop requiring additional back pressure to maintain altitude
- 7. On first indication of an <u>i</u>mminent stall [stall horn, mushy controls, buffeting] or full stall call out "*Stalling*"
- 8. Level the aircraft (if in a turn), apply full throttle and lower the nose slightly below horizon
- 9. Reduce flaps to 25°
- 10. Establish V_x and subsequently V_y, look for positive rate climb then Gear Up
- 11. During the climb, slowly reduce flaps to zero and climb to starting altitude
- 12. Return to slow cruise: 20" MP and 2400 RPM
- 13. Perform cruise checklist

Standards:

Private: Heading ±10°, Bank <20° ±10°. Commercial: Heading ±10°, Bank <20° ±5°.

POWER ON STALLS

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To recognize the indications of an imminent or full stall during power on situations and to make prompt, positive, and effective recoveries with a minimum loss of altitude.

- 1. Complete the maneuvers checklist and plan to recovery by 3000 feet AGL
- 2. Reduce power to 13" MP then gear down below V_{LE} and adjust pitch to maintain altitude, trim as necessary
- 3. Cowl flaps open if temperature at or above 30° F
- 4. Maintain altitude until reaching 95 MPH, then set power to 20" MP and smoothly increase pitch to approximately 20°
- 5. On first indication of an imminent stall [stall horn, mushy controls, buffeting] or full stall call out "Stalling"
- 6. Maintain coordinated use of the ailerons and rudder to level the wings and prevent entering into a spin
- 7. Apply full throttle and lower the nose to the horizon
- 8. Adjust pitch to V_Y and minimize altitude loss, look for positive rate climb then Gear Up
- 9. Return to slow cruise: 20" MP and 2400 RPM
- 10. Perform cruise checklist

Standards:

Private: Heading ±10°, Bank <20° ±10°. Commercial: Heading ±5°, Bank <20° ±5°.

STEEP TURNS

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To develop smoothness, coordination, orientation, division of attention, and control techniques while executing high performance turns.

- 1. Complete the maneuvers checklist and plan to recovery by 1500 feet AGL
- 2. Establish airspeed below VA, about 20" MP, trim as necessary
- 3. Choose a prominent landmark or note the heading
- 4. Roll into a 45° bank (private) or 50° bank (commercial) and begin a 360° turn
- 5. Rolling through 30°, add power as necessary to maintain altitude and airspeed
- 6. Begin roll out 15°-20° before the originating landmark or heading
- 7. Roll wings level and then,
- 8. Immediately roll into a 360° turn in the opposite direction
- 9. Return to slow cruise 20" MP and 2400 RPM
- 10. Perform cruise checklist

Standard:

Private: Altitude \pm 100 ft., Airspeed \pm 10, Bank \pm 5°, Heading \pm 10°. Commercial: Altitude \pm 100 ft., Airspeed \pm 10, Bank \pm 5°, Heading \pm 10°

V_{MC} DEMONSTRATION

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To demonstrate aircraft characteristics at minimum controllable airspeeds

- 1. Perform clearing turns and plan to recovery at or above 3000 feet AGL
- 2. Establish airspeed below VA, trim as necessary
- 3. Choose a prominent landmark or note the heading
- 4. Reduce throttle to 13" manifold pressure
- 5. Below VFE flaps may be extended to 25°
- 6. Maintain altitude, cowl flaps open on planned operating engine and closed on planned inoperative engine
- 7. At V_{YSE} (105 MPH) power on the planned inoperative engine should be throttled back to idle as the operative engine power is advanced to the takeoff setting
- 8. Establish zero side slip at VYSE
- 9. Increase pitch to 5° and slow aircraft at 1 MPH/second
- 10. Recover at full rudder input or first indication of V_{MC}
- 11. Recovery:
 - a. Pitch down and reduce power of operating engine
 - b. At 90 MPH increase to full power on operating engine
 - c. Pitch to V_{YSE}

NOTE

Do not decrease rudder pressure as the reduction and increase of power should take only seconds

- 12. Synchronize both engines by:
 - a. Reduce power to 20" manifold pressure on operating engine
 - b. If temperature above 200° F, increase inoperative engine power to match operating engine, If temperature is lower than 200° F, increase power to 15" manifold pressure until 200° F, then match engine power
- 13. Perform cruise checklist

Standards:

Private: Heading <20°, V_{YSE} +10/-5 Commercial: Heading <°, V_{YSE} <u>+</u> 5

DRAG DEMONSTRATION

- 1. Perform clearing turns and plan to recovery at or above 3000 feet AGL
- 2. Establish airspeed below VA, trim as necessary
- 3. Choose a prominent landmark or note the heading
- 4. Mixture rich, propeller full forward.
- 5. Reduce throttle to 13" manifold pressure
- 6. Maintain altitude, cowl flaps open on planned operating engine and closed on planned inoperative engine
- 7. At V_{YSE} (105 MPH) power on the planned inoperative engine should be throttled back to idle as the operative engine power is advanced to the takeoff setting
- 8. Establish zero side slip and maintain V_{YSE}, note VSI
- 9. Simulate feather on inoperative engine (11" manifold pressure), note VSI
- 10. Gear down and pitch to maintain VYSE, note VSI
- 11. Flaps down in increments to 40°, maintain VYSE, note VSI
- 12. Reduce power to idle of inoperative engine, note VSI
- 13. Recover in opposite order while maintain $V_{\mbox{\scriptsize YSE}}$
- 14. Synchronize both engines by:
 - a. Reduce power to 20" manifold pressure on operating engine
 - b. If temperature above 200° F, increase inoperative engine power to match operating engine, If temperature is lower than 200° F, increase power to 15" manifold pressure until 200° F, then match engine power
- 15. Perform cruise checklist

Standards:

Commercial: Maintain entry heading $\pm 10^{\circ}$, V_{YSE} ± 5 MPH and altitude ± 100 ft.

ENGINE FAILURE

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To properly recognize, apply appropriate procedures, and maintain aircraft flight during an inflight engine failure

NOTE

This procedure shall be performed at altitudes above 3000 ft. and near an airport that provides for safe single-engine landing. Engine failures may be initiated by use of fuel shut-off valve. Should the propeller fail to unfeather during engine restart, it shall be treated as an emergency.

- 1. Adjust pitch to VMC and maintain directional control
- 2. Mixture rich
- 3. Propellers full forward
- 4. Throttles full forward
- 5. Bank 5° into operating engine
- 6. Gear up
- 7. Flaps up
- 8. Verify inoperative engine: Retard throttle on inoperative engine, once verified, push throttle forward 1/4".
- 9. Complete the Propeller Feathering checklist

Standards:

Private: Altitude \pm 100 feet, Heading \pm 10° Commercial: Altitude \pm 100 feet, Heading \pm 10°

EMERGENCY DESCENT

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To descend the airplane as rapidly as possible, within the operating limitations of the airplane.

- 1. Complete the maneuvers checklist and complete the maneuver by 1500 feet AGL
- 2. Brief all passengers
- 3. Pick a visual landmark off the wing tip in the direction of turn
- Throttles to Idle, propellers RPM maximum, gear down below maximum gear down speed (VLE), extend flaps to 40° when below maximum flap speed (VFE),
- 5. Simultaneously roll into a 30°-45° bank in direction of planned turn and adjust pitch to maintain 105 MPH
- 6. Roll out on the 180° point in the turn and make shallow S-turns to continue checking for other traffic while descending
- 7. Approaching the target altitude, begin to level off by increasing pitch to reduce the descent rate
- 8. At target altitude, adjust pitch to maintain level flight
- 9. Return to slow cruise: 20" MP and 2400 RPM
- 10. Perform cruise checklist

Standards:

Private: Airspeed, establishes appropriate airspeed, Maintains positive load factors during the descent

Commercial: Airspeed \pm 10 KIAS, Maintains positive load factors during the descent, Altitude, \pm 100 feet

NORMAL APPROACH AND LANDING

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To safely and accurately establish and maintain a stabilized approach to a landing in a designated area.

- 1. Complete the Landing Checklist
- 2. At least 2 nm from the runway, enter the traffic pattern at traffic pattern altitude on a 45° entry to the downwind, maintaining ½ mile distance from the runway on the downwind leg
- 3. Set power to 18" MP and at mid-field, gear down, check three green one in the mirror
- 4. Abeam the point of intended landing, reduce throttle to 15" MP and 2500 RPM
- 5. Below VFE extend flaps to 10°
- 6. Maintain 110 MPH and 300-500 ft./min descent
- 7. When the touchdown point is 45° to the rear of the wing root (or as appropriate for wind conditions), commence a turn to the base leg
- 8. Extend flaps to 25° and slow the aircraft to 105 MPH
- 9. Visually verify that the final approach (including the extended final and the opposite base leg) is clear, and then turn to final
- 10. When landing is assured, extend flaps to 40° establish and maintain 95 MPH (+1/2 gust factor if appropriate). Trim as necessary

NOTE

The approach must be stabilized by 200 feet. If not, execute a go-around

- 11. At the round out, commence reducing power to idle, continuing the flare to touch down on the main wheels first, holding the nose wheel off with back pressure throughout the rollout; allow settling gently
- 12. Maintain directional control throughout the rollout, slowing sufficiently before turning onto a taxiway

Standards:

Private: Airspeed +10/-5 KIAS. Touch Down: 400 ft. Commercial: Airspeed ±5 KIAS. Touch Down 200 ft.

SHORT FIELD APPROACH AND LANDING

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To safely and accurately establish and maintain a stabilized approach to a landing, obtaining maximum performance by stopping in a minimum distance.

- 1. Complete the Landing Checklist
- 2. At least 2 nm from the runway, enter the traffic pattern at traffic pattern altitude on a 45° entry to the downwind, maintaining ½ mile distance from the runway on the downwind leg
- 3. Set power to 18" MP and at mid-field, gear down, check three green one in the mirror
- 4. Abeam the point of intended landing, reduce throttle to 15" MP and 2500 RPM
- 5. Below VFE extend flaps to 10°
- 6. Maintain 110 MPH and 300-500 ft./min descent
- 7. When the touchdown point is 45° to the rear of the wing root (or as appropriate for wind conditions), commence a turn to the base leg
- 8. Extend flaps to 25° and slow the aircraft to 105 MPH
- 9. Visually verify that the final approach (including the extended final and the opposite base leg) is clear, and then turn to final
- 10. When landing is assured, extend flaps to 40° establish and maintain 87 MPH (+1/2 gust factor if appropriate). Trim as necessary

NOTE

The approach must be stabilized by 200 feet. If not, execute a go-around

11. Before the roundout, begin smoothly reducing power, continuing the power reduction during the roundout while increasing pitch to maintain a constant glide path to the desired touchdown point

NOTE

Avoid closing the throttle rapidly, which may result in an immediate increase in the rate of decent and a hard landing

- 12. Touch down at minimum controllable airspeed with the throttle at idle position on the main wheels first, plan for minimum float
- 13. Immediately after touchdown, apply maximum aerodynamic braking
- 14. Applying heavy braking when nose wheel is on runway.

Standards:

Private: Airspeed +10/-5 KIAS. Within 200 ft. of intended landing point Commercial: Airspeed ±5 KIAS. Within 100 ft. of intended landing point

GO-AROUND/REJECTED LANDING

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To develop the ability to safely transition at a critical time from the approach and landing phase to the climb.

- 1. Upon deciding to go-around:
 - a. Power full forward
 - b. Pitch up slightly
 - c. Flaps reduce to 25° immediately
 - d. Positive rate, gear up
 - e. Climb at 90 MPH (Vx)
 - f. Obstacle cleared flaps up
 - g. Accelerate to 105 MPH (Vy)
- 2. Maintain directional control and proper wind-drift correction throughout the climb
- 3. Execute an appropriate departure procedure, or remain in the traffic pattern as appropriate
- 4. Complete the Go Around Checklist

Standards:

Private: Airspeed +10/-5 KIAS Commercial: Airspeed ±5 KIAS

SINGLE ENGINE PRECISION APPROACH

Ref: Pilot Operating Handbook (POH)

Objective: To safely and accurately establish and maintain a stabilized precision single engine approach to a landing

- 1. Complete the approach briefing, descent checklist, and the Single Engine Go-Around procedure prior to the IAF
- 2. Plan to cross the IAF at 120 MPH but not less than 105 MPH
- 3. Complete the approach and landing checklist, as much as possible, prior to the glide slope intercept
- 4. At glide slope intercept reduce power and trim as necessary
- 5. Establish a stable approach at not less than 105 MPH

NOTE Do not allow airspeed to exceed 120 MPH

- 6. Prior to FAF complete the landing checklist, except flap and gear extension
- 7. When landing is assured, extend landing gear and lower wing flaps to 25°

NOTE

A final approach speed of 105 MPH and the use of 25° rather than full wing flaps will place the airplane in the best configuration for a go-around should this be necessary

Standards:

Private: Altitude within 100 ft.; Airspeed + 10/-0 MPH, Heading $\pm 10^{\circ}$; < 3/4 scale deflection of CDI and glide slope

Commercial: Altitude within 100 ft.; Airspeed + 10/-0 MPH, Heading $\pm 10^{\circ}$; < 3/4 scale deflection of CDI and glide slope

SINGLE ENGINE GO-AROUND

Ref: FAA-H-8083-3A (Airplane Flying Handbook), Pilot Operating Handbook (POH)

Objective: To develop the ability to safely transition at a critical time from the approach and landing phase to the single engine climb.

- 1. Upon deciding to go-around:
 - a. Power operating engine full forward
 - b. Flaps retract
 - c. Positive rate, gear up
 - d. Airspeed 105 MPH
 - e. Trim as necessary
 - f. Cowl flaps as required
- 2. Maintain directional control and proper wind-drift correction throughout the climb
- 3. Execute an appropriate departure procedure, or remain in the traffic pattern as appropriate
- 4. Complete the Go Around Checklist

Standards:

Private: Airspeed +10/-5 KIAS Commercial: Airspeed ±5 KIAS

SENECA V SPEEDS

NOTE

Speeds are for an aircraft operating at a gross weight of 4200 lbs.

Rotation Speed (V_R)	85 MPH
Best Rate of Climb (V _Y)	
Two engine (Vyse)	105 MPH
Single engine	105 MPH
Best Angle of Climb (Vx)	
Two engine	90 MPH
Stall Speed Flaps (V _{S0})	67 MPH
Stall Speed Clean (Vs1)	73 MPH
Maneuvering Speed (V _A)	133/146 MPH
Flaps Extended Speed (VFE)	125 MPH
Max. Gear Extend (V _{LE})	150 MPH
Max Gear Retract (VLO)	125 MPH
Never Exceed Speed (V _{NE})	217 MPH
Minimum Controllable Single Engine Speed (V _{MC})	80 MPH
Safe engine failure speed for rejected takeoff before rotation	40 MPH
Cruise Climb	120 MPH
Maximum normal operating speed (V _{NO})	190 MPH

Speeds are for an aircraft operating at a gross weight of 4200 lbs.

1.2Vs1= 88	1.2Vso= 8	30 1.3Vso= 87
Flap extended positions		10, 25, 40
Max Demonstrated Crosswind	Component '	17 Knots
Max Gross Weight	4	4200
Zero Fuel Weight	4	4000
Standard Empty Weight		2200
Engine Manufacturer	l	_ycoming
Model		O-360/LIO-360
Туре	(C1E6
Displacement		361 Cubic Inches
Horsepower		200 HP
Rated Speed (RPM)		2700 RPM
Oil		
Max		8 qts
Min		6 qts
Prop Length	-	76 Inches
Wing Span		38 Feet

Fuel	Grade	100LL (Blue)
	Quantity	93 Gal. Usable \ 5 Gal. Unusable
Tire F	Pressure	
	Main	50 PSI
	Nose	31 PSI
Electi	rical System	
	Battery	12 Volt's; 35 Amp Hour
	2 Alternators	14 Volt's; 60 Amps

There is an ammeter for each alternator that measures the electrical load.

Fuel System

There are 46.5 gallons of usable fuel on each side and 5 gallons of unusable fuel, which gives us a total of 93 gallons usable fuel. There are two engine driven fuel pumps and two electric fuel pumps for starting and engine driven fuel pump failure.

PIPER TOMAHAWK PA-38-112

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NORMAL TAKEOFF AND CLIMB

REF: FAA-H-8083-3A (Airplane Flying handbook)

Objective: To safely execute a takeoff under normal conditions

- 1. Complete the Before Takeoff checklists
- 2. Center aircraft on runway centerline with nose wheel straight ahead
- 3. Advance the throttle smoothly forward to 2000 RPM, check engine instruments
- 4. Advance power to full forward
- 5. Maintain aircraft on centerline
- 6. Call out "airspeed alive"
- 7. Accelerate aircraft to 53 KIAS call out " V_R rotate" and increase control yoke back pressure to pitch up until the glare shield meets the horizon (approximately 10°)
- 8. Accelerate to 70 KIAS [Vy] and climb on centerline, trim as necessary
- 9. At 600' AGL, decrease pitch to establish and maintain 75 KIAS climb
- 10. Execute a Traffic Pattern departure procedure
- 11. After leaving the traffic pattern, complete the climb checklist

IF REMAINING IN THE PATTERN

- 12. Accelerate to 70 KIAS $[V_Y]$ and climb on centerline, trim as necessary
- 13. At 600' AGL turn to crosswind
- 14. Continue climb to TPA (900 feet at 33N) and turn downwind, reduce power to 2200 RPM

Standards:

Private: Airspeed V_Y +10/-5 Commercial: Airspeed V_Y ±5


<u>SPINS</u>

Ref: FAA-H-8083-3A (Airplane Flying Handbook) AC 61-67C

Objective: To develop awareness regarding the recognition of, entry into, and recovery from spins.

- 1. Select an altitude to recover no lower than 3000' AGL
- 2. Perform clearing turns
- 3. Reduce power to 1500 RPM, adjusting pitch (trimming) to maintain altitude

NOTE

The use of power at the entry will assure more consistent and positive entries to the spin

- 4. At the first indication of stall (Entry phase)
- 5. Smoothly pull the elevator control (control yoke) to the full aft position
- 6. Just prior to reaching the stall "break", apply rudder in the desired direction of spin rotation so that full rudder deflection is achieved almost simultaneously with reaching full aft elevator
- 7. As the spin is entered (Incipient phase), reduce the throttle to the idle position and ensure that the ailerons are in the neutral position

NOTE

Allow the spin to develop, and be fully recovered no later than three turns

- 8. Hold the elevator and rudder controls in full until the spin recovery is initiated (Developed phase)
- 9. To recover:
- 10. Verify that the throttle is in the idle position and the ailerons are in the neutral position
- 11. Apply and HOLD full rudder opposite to the direction of the rotation
- 12. Just after the rudder reaches the stop, move the control wheel
- 13. (yoke) briskly forward, far enough to break the stall
- 14. HOLD these flight control inputs until the rotation stops
- 15. As the rotation stops, neutralize the rudder and make a smooth recovery from the resulting dive
- 16. Return to normal cruise flight 2200-2300 RPM
- 17. Perform cruise checklist

NORMAL APPROACH AND LANDING

Ref: FAA-H-8083-3A (Airplane Flying Handbook)

Objective: To safely and accurately establish and maintain a stabilized approach to a landing in a designated area.

- 1. Complete the Landing Checklist
- 2. At least 2 nm from the runway, enter the traffic pattern at traffic pattern altitude on a 45° entry to the downwind, maintaining ½ mile distance from the runway on the downwind leg
- 3. Abeam the point of intended landing, reduce throttle to 1700 RPM
- 4. Below VFE (89 knots) extend flaps to 21°
- 5. Maintain 85 KIAS and 300-500 ft/min descent
- 6. When the touchdown point is 45° to the rear of the wing root (or as appropriate for wind conditions), commence a turn to the base leg
- 7. Slow the aircraft to 75 KIAS
- 8. Visually verify that the final approach (including the extended final and the opposite base leg) is clear, and then turn to final
- 9. When landing is assured, extend flaps to 34° establish and maintain 70 KIAS (+1/2 gust factor if appropriate). Trim as necessary

NOTE

The approach must be stabilized by 200 feet. If not, execute a goaround

- 10. At the round out, commence reducing power to idle, continuing the flare to touch down on the main wheels first, holding the nose wheel off with back pressure throughout the rollout; allow settling gently
- 11. Maintain directional control throughout the rollout, slowing sufficiently before turning onto a taxiway

Standards:

Private: Airspeed +10/-5 KIAS. Touch Down: 400 ft. Commercial: Airspeed ±5 KIAS. Touch Down 200 ft.

TOMAHAWK V SPEEDS

NOTE Speeds are for an aircraft operating at a gross weight of 1670

Rotation Speed (V _R)	53 KIAS
Best Rate of Climb (V _Y)	70 KIAS
Best Angle of Climb (Vx)	61 KIAS
Stall Speed Flaps (Vso)	49 KIAS
Stall Speed Clean (Vs1)	52 KIAS
Maneuvering Speed (V _A)	103 KIAS
Flaps Extended Speed (VFE)	89 KIAS
Never Exceed Speed (V _{NE})	138 KIAS
Best Glide Speed	70 KIAS
Cruise Climb	75 KIAS

Speeds are for an aircraft operating at a gross weight of 1670

1.2Vs1= 62

1.2Vso= 59

1.3Vs0= 64

Flap extended positions	21, 34
Max Demonstrated Crosswind Component	15 knots
Max Gross Weight	1670 lbs
Standard Empty Weight	1108 lbs
Engine Manufacturer	Lycoming
Model	Ó-235
Туре	Horizontally Opposed, Air Cooled
Displacement	233 Cubic Inches
Horsepower	112 HP
Rated Speed (RPM)	2600 RPM
Oil Max.	6 qt
Oil Min.	2 qt (DSU Min - 4 qts)
Prop Length	72 Inches
Wing Span	34 Feet
Fuel Grade	100LL (Blue)
Quantity	30 Gal. Usable \ 2 Gal. Unusable
Tire Pressure	
Main	26 PSI
Nose	26 PSI

Electrical System

Battery Alternator 12 Volt's; 25 Amp Hour 14 Volt's; 60 Amps

There is an ammeter that measures the electrical load on the alternator.

Fuel System

There are 30 gallons of usable fuel and 2 gallons of unusable fuel, which gives us a total of 32 gallons. There is one engine driven fuel pump and one electric fuel pump.

INSTRUMENTS

Instrument Takeoff (ITO)	
VOR Radial Intercept	
VOR Radial Tracking	
Magnetic Compass Turns	
DME Arc	
Precision Approach (ILS)	
Non-Precision Approach	
Missed Approach Procedure	
Circling Approach	
Holding	
-	

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INSTRUMENT TAKEOFF (ITO)

Ref: FAA-H-8083-15 (Instrument Flying Handbook)

Objective: To develop the skills necessary to perform a takeoff solely by reference to the flight instruments.

- 1. Complete the Before Takeoff checklists
- 2. Center aircraft on runway centerline with nose wheel straight ahead
- 3. Set and check the heading indicator or Horizontal Situation Indicator (HSI) and align the "heading bug" to the runway heading, if applicable
- 4. Set and check the Attitude Indicator (AI)
- 5. Advance the throttle smoothly forward to 2000 RPM, check engine instruments
- 6. Advance power to full forward
- 7. Maintain aircraft on centerline
- 8. Call out *"airspeed alive"*
- 9. Accelerate aircraft to rotate speed and call out " V_R rotate", referencing the attitude indicator, pitch up approximately 2-3°.
- 10. After liftoff, establish and maintain V_Y , trim as necessary.
- 11. When positive rate climb call out "Positive rate gear up", if retract gear aircraft
- 12. At 500' AGL, decrease pitch to establish and maintain cruise climb airspeed, trim as necessary
- 13. Complete the climb checklist

Initial 10/31/2013 Instruments VOR RADIAL INTERCEPT DESIRED VOR VOR NDB

VOR RADIAL INTERCEPT

Ref: FAA-H-8083-15 (Instrument Flying Handbook)

Objective: To establish the airplane on a predetermined VOR radial.

NOTE

Ensure that the heading indictor and magnetic compass are aligned. Check the alignment at least once every 15 minutes

TUNE, TURN, TWIST

- 1. Tune the appropriate VOR frequency and verify the identifier with the chart
- 2. Turn the airplane to a heading to parallel the desired course and using all available navigation systems, determine aircraft position from the VOR
- Twist the Omni Bearing Selector (OBS) and center the Course Deviation Indicator (CDI) with a TO flag indication if inbound or a FROM flag indication if outbound from the VOR
- 4. Determine the degree difference between the radial to be intercepted and the radial the aircraft is on.
- 5. Double the difference between the radials to determine the interception angle (intercept angle should not be less than 20°, or more than 90°)

NOTE

Distance between radials varies with distance from the VOR. For example: at 60 nm from the VOR distance between radials = 1 nm, at 30 nm = .5 nm, at 15 nm = .25 nm. Use appropriate intercept angle headings to prevent overshooting the desired course.

- 6. Turn to the resulting intercept heading and hold the heading constant until the CDI begins to center.
- 7. As the CDI begins to center, begin turning to the heading corresponding to the radial or course selected.
- 8. Track the radial inbound or outbound as appropriate.

NOTE As proficiency increases, steps 2 and 3 may be eliminated.



VOR RADIAL TRACKING

Ref: FAA-H-8083-15 (Instrument Flying Handbook)

Objective: To track a VOR radial, making necessary corrections for the effects of wind.

- 1. After the course has been intercepted, maintain the heading that corresponds to the course selected.
- 2. If the CDI moves off center, re-intercept by beginning with a 20° intercept angle toward the deflection of the CDI.
- 3. Maintain the intercept heading until the CDI re-centers and then turn back to a new course equal to $\frac{1}{2}$ of the intercept angle (10°)

EXAMPLE

The airplane has drifted to the right of the 360° radial (outbound). To reintercept the radial, turn left to a heading of 340°. When the CDI re-centers, turn right to maintain a new Course Heading of 350° (10° Wind Correction Angle).

- 4. If the CDI again moves off center, re-intercept by beginning with a 10° intercept angle toward the deflection of the CDI.
- 5. Maintain the intercept heading until the CDI re-centers, and then turn back to a new course equal to $\frac{1}{2}$ of the intercept angle (5°).

EXAMPLE

The airplane has again drifted right of the 360° radial (outbound). To re-intercept the radial, turn left to a heading of 340° (10° heading change). When the CDI recenters, turn right turn to maintain a new Course Heading of 345° (5° heading change)

NOTE

Wind conditions may require the use of intercept angles greater than 20° to recenter the CDI indicator. However, using the "bracketing" procedure described above will still works in determining the appropriate wind correction to use

MAGNETIC COMPASS TURNS

Ref: FAA-H-8083-15 (Instrument Flying Handbook)

Objective: To make turns to specific headings solely by reference to the magnetic compass.

NOTE

Magnetic compass turning errors are approximately equivalent to the airplane's latitude.

OSUN – Overshoot South, Undershoot North

- 1. Estimate the amount of turning error that corresponds to the heading to be flown.
- 2. Enter a standard rate turn in the desired direction.
- 3. When turning to a northerly heading, apply the corresponding rollout **lead** ($\pm \frac{1}{2}$ the angle of bank) to the magnetic compass heading

EXAMPLE

At 35° N latitude and a 16° bank, a right turn to 360° requires a roll-out point of 317° (360-35-8), when turning left to 360°, the roll-out point is 043° (360+35+8)

When turning to a southerly heading, apply the normal rollout **lag** ($\pm \frac{1}{2}$ the angle of bank) to the magnetic compass heading

EXAMPLE

At 35° N latitude and a 16° bank, a right turn to 180° requires a roll out point of 207° (180+35-8), when turning left to 180°, the roll out point is 153° (180-35+8)

DME ARC

Ref: FAA-H-8083-15 (Instrument Flying Handbook), Aeronautical Information Manual (AIM)

Objective: To track a predetermined arc around a navigation aid at a certain distance using DME

- 1. Tune and identify the navaid and DME
- 2. Verify that the heading indicator or HSI is aligned with the magnetic compass
- 3. Complete the approach briefing and decent checklist prior to the IAF
- 4. Establish a track to the navaid frequently checking the DME readout
- When ready to intercept the DME arc, use 0.5 NM lead for groundspeeds less than 150 KIAS and a proportionately greater leading turn for speeds greater than 150 KIAS

EXAMPLE

If using a 10 NM arc, start the turn to the arc at 10.5 NM if inbound or 9.5 NM if outbound from the navaid

If using a relative bearing (RB) pointer;

6. Turn to a heading that is 90° from the radial you are tracking and place the relative bearing (RB) pointer on the wingtip reference

NOTE

In a no wind condition pilots should be able to fly an exact circle around the facility by maintaining the relative RB pointer at the wingtip reference (if so equipped)

- 7. Verify the DME distance after the turn is completed and maintain a constant heading
- 8. Allow the bearing pointer to move 5° to 10° behind the wingtip reference, DME range will increase slightly
- 9. Turn toward the facility until the bearing pointer is 5° to 10° ahead of the wingtip reference and then maintain heading
- 10. Repeat steps 7 and 8 to maintain the approximate arc
- 11. To help maintain positional orientation and situational awareness, use the OBS to determine your position along the arc.

If using the Omni Bearing Selector (OBS)

- 12. Turn to a heading that is 90 from the station and center the CDI indicator. Then turn 10 toward the station and twist the CDI indicator 10 away from the station (if flying clockwise add 10, counter clockwise subtract 10)
- 13. Maintain heading until the CDI indicator centers then repeat step 12 until arriving at the lead radial or final approach course
- 14. At the lead radial, commence a turn to intercept the final approach course.
- 15. For arcs without a lead radial, commence a turn to an appropriate heading to intercept the final approach course, 5° to 10° prior to the final approach course.



PRECISION APPROACH (ILS)

Initial 10/31/2013

DSU Flight Maneuvers Standardization Manual Precision approach (ILS)

PRECISION APPROACH (ILS)

Ref: FAA-H-8083-15 (Instrument Flying Handbook), Aeronautical Information Manual (AIM)

Objective: To safely and accurately maneuver the airplane vertically and horizontally on a precision approach.

- 1. Complete the approach briefing and descent check list prior to the IAF
- 2. Reduce to final approach speed prior to glide slope intercept
- 3. At one dot below glide slope:
 - a. Flaps 10°
 - b. Extend landing gear (If retractable landing gear aircraft) and call out, *"gear down and three green"*,
 - c. Complete the landing checklist
 - d. Adjust power and trim as necessary

NOTE

Determine the initial rate of descent to maintain the glideslope by dividing groundspeed by 2, then multiply the result by 10 (e.g., 70 knots/2= 35, 35×10 = 350 fpm). Extending the gear at glide slope intercept will assist in establishing a descent with little throttle movement

- 4. At the FAF perform the "5 Ts:
 - a. Time: Note the time
 - b. **Turn:** To track the inbound course
 - c. Twist: Verify that the OBS is set to inbound course
 - d. Throttle: Adjust throttle to maintain desired descent
 - e. Talk: Make required reports
- 5. At 1000' above decision altitude, call out, "1000' above DA"
- 6. At 500' above decision altitude, call out, "500' above DA"

NOTE

The approach must be stabilized and the aircraft in the landing configuration by 500 feet

- 7. At 100' above decision altitude call out, "100' above DA"
- 8. Just prior to reaching decision altitude, confirm that visual reference(s) in accordance with **FAR §91.175** are visible, before continuing the descent
- 9. With the runway in sight and the aircraft continuously in a position from which a descent to landing on the intended runway can be made at a normal rate of descent using normal maneuvers, Call out, *"Runway in Sight*"

NOTE

If no visual reference is in sight at decision altitude, or visual reference is lost when continuing the descent from the DA, call out, *"missed approach"*, and execute the published missed approach procedure or as directed.



NON-PRECISION APPROACH

Ref: FAA-H-8083-15 (Instrument Flying Handbook), Aeronautical Information Manual (AIM)

Objective: To safely and accurately maneuver the airplane vertically and horizontally on a non-precision approach.

- 1. Complete the approach briefing and descent checklist prior to; the procedure turn, IAF, or intercepting the final approach course (if vectored)
- 2. Determine the required descent rate for the approach:
 - a. Subtract the Touchdown Zone Elevation (TDZE) from the FAF altitude
 - b. Divide the result by the time inbound

EXAMPLE

With a FAF altitude of 1500' MSL, TDZE is 50' MSL, and estimated time inbound of two (2) minutes, the rate of descent is 725 FPM (1500-50) / 2 = 725

- 3. Just prior to reaching the FAF:
 - a. flaps 10°
 - b. Extend landing gear (If retractable landing gear aircraft) and call out, *"gear down and three green"*,
 - c. complete the landing checklist
 - d. adjust power to maintain the desired rate of descent and trim as necessary

NOTE

Extending the gear will assist in establishing the desired descent rate with little throttle movement

- 4. At the FAF Perform the "5 Ts":
 - a. **Time:** Note the time.
 - b. **Turn:** To track the inbound course.
 - c. **Twist:** Verify that the OBS is set to inbound course.
 - d. Throttle: Adjust throttle to maintain desired descent
 - e. Talk: Make required reports.
- 5. At 1000' above MDA, call out, "1000' above MDA""
- 6. At 500' above MDA, call out, "500' above MDA"

NOTE

The approach must be stabilized and the aircraft in the landing configuration by 500 feet

- 7. At 100' above MDA call out, "100' above MDA
- 8. If arriving at the MDA prior to reaching the time inbound, level the aircraft at or

above the MDA until reaching the missed approach point

- 9. Just prior to reaching the missed approach point, confirm that visual reference(s) in accordance with **FAR §91.175** are visible before descending below the MDA
- 10. With the runway in sight and the aircraft continuously in a position from which a descent to landing on the intended runway can be made at a normal rate of descent using normal maneuvers, Call out, *"Runway in Sight,*

NOTE

If no visual reference is in sight at decision altitude, or visual reference is lost when continuing the descent from the DA, call out, *"missed approach"*, and execute the published missed approach procedure or as directed.

MISSED APPROACH PROCEDURE

Ref: FAA-H-8083-15 (Instrument Flying Handbook), Aeronautical Information Manual (AIM)

Objective: To comply with published missed approach procedures, or as directed by ATC, while maintaining airplane control.

- At the missed approach point and without visual reference(s) as required by FAR §91.175 or if visual reference is lost when continuing the descent, call out, *"missed approach"*
- 2. Simultaneously establish a level pitch attitude, apply full power and level the wings
- Immediately reduce flaps one notch and establish a positive rate climb by easing into a Vy climb. Verify positive rate climb and retract the landing gear (if applicable)
- 4. Accelerate to and maintain Vy making small pitch adjustments, trim as necessary
- 5. When the aircraft is under complete control and safely established in a climb, call ATC and report *"missed approach"*
- 6. Execute the published missed approach procedure or as directed
- 7. At 500' AGL transition to cruise climb
- 8. Complete the Climb Checklist.

NOTE

For missed approaches initiated prior to reaching the MAP, continue flying the published approach course to the MAP at or above MDA or DA before turning unless otherwise cleared by ATC. If the missed approach occurs from a circling approach, make an initial climbing turn toward the landing runway, and then maneuver to intercept the published missed approach course.

NOTE

While the missed approach is in essence a go-around executed on instruments, acceleration forces due to transition from descent into climb and addition of full power plus poor visual cues can cause serious sensory illusions.

A focused and rapid instrument crosscheck is necessary to safely carry out the missed approach procedure. Once committed to the missed approach in IMC, bear down on instruments and ignore outside visual cues to lessen the effects of sensory illusions.

CIRCLING APPROACH



DSU Flight Maneuvers Standardization Manual

CIRCLING APPROACH

Ref: FAA-H-8083-15 (Instrument Flying Handbook), Aeronautical Information Manual (AIM)

Objective: To safely and accurately maneuver the aircraft to a landing from an instrument approach procedure where the runway is not aligned with the approach course.

NOTE

Circling may be made while other aircraft operations are in progress at the airport. Standard left turns or ATC instructions must be considered when planning circling to land.

- 1. Maneuver on the shortest path to the base or downwind leg, as appropriate, considering existing weather conditions.
- 2. Remain within the circling visibility minima during the circling approach.
- 3. Remain at circling minimums until continuously in a position from which a normal descent rate to a landing on the intended runway can be made using normal maneuvering.
- 4. When descending from circling minimums:
- 5. Visually verify that the final approach is clear, and then turn to final
- 6. When landing is assured, set final flaps, establish and maintain final approach speed trim as necessary
- 7. Complete the appropriate landing procedure

NOTE

The approach must be stabilized by 200 feet. If not, execute a go-around

TYPICAL HOLDING ENTRIES

NOTE

While entry into a hold shall be one of the FAA recommended entries below, flight crews should keep in mind that that main priority in holding is to remain on the protected side of the hold and to follow ATC instructions. *Standard holding patterns* are turns to the right and always comply with holding patterns that are depicted on the chart.



Direct Entry – approaching from Zone (c)

Cross the holding fix and then initiate a turn to the outbound leg at a standard rate in the direction specified in the clearance, or as published (right turns, or standard, in the above diagram)

Teardrop Entry – approaching from Zone (b)

After initially crossing the holding fix, execute a standard rate turn to a heading **30°** from the outbound heading, toward the holding side (dashed track beginning in the (b) zone). Remember that during the teardrop entry, the first turn inbound will be made in the same direction as the consequent turns in the hold.

Parallel Entry- approaching from Zone (a)

After initially crossing the holding fix, begin a standard rate turn to a heading outbound from the fix that parallels the inbound holding course. On crossing the fix, start timing so that at the expiration of one minute, or as specified by ATC, the aircraft initiates a standard rate turn toward the inbound holding course. If the aircraft flight path carries it across the holding course into the protected holding area. Complete the turn to a heading that will intercept the inbound holding course.

<u>HOLDING</u>

Ref: FAA-H-8083-15 (Instrument Flying Handbook) AIM (Aeronautical Information Manual)

Objective: To develop the ability to plan and execute an appropriate hold entry and procedure while correcting for the effects of the wind, maintaining situational awareness, and positive aircraft control

- 1. Tune and identify the appropriate navaid(s)
- 2. Verify that the heading indicator or HSI is aligned with the magnetic compass
- 3. Determine the aircraft position relative to the holding fix
- 4. Determine the holding pattern entry relative to aircraft position (see previous page)
- 5. Within 3 minutes from the holding fix reduce to holding speed
- 6. When crossing the holding fix, perform the "5 Ts":
 - a. Time: Note the time.
 - b. Turn: Standard rate to the entry heading.
 - c. Twist: Verify that the OBS is set to inbound course
 - d. Throttle: Maintain holding speed
 - e. Talk: Report the time and altitude entering the hold

NOTE

Initial outbound leg is one (1) minute for altitudes at or below 14,000 feet MSL and 1 $\frac{1}{2}$ minutes or altitudes above 14,000 MSL

7. Begin the outbound leg timing over or abeam the fix, whichever occurs later. If the abeam position cannot be determined, start timing when the turn to the outbound heading is completed

NOTE

When holding at a VOR, begin the turn to the outbound leg at the time of the first complete reversal of the TO/FROM indicator

- 8. Correct for winds in order to achieve the desired holding ground track and timing of the inbound leg:
- 9. On the outbound leg, triple the inbound drift correction (if inbound correction is 12° to the right, outbound correction should be 36° degrees to the left).
- 10. Increase or reduce the timing outbound (considering head or tail winds) to achieve the desired inbound leg timing
- 11. After one minute outbound or as adjusted, begin a standard rate turn towards the inbound course with at least a 30° intercept or as appropriate.
- 12. Start the inbound time at wings-level on the inbound course or on a heading to intercept the inbound course, whichever occurs first. Note the heading that maintains the course inbound

- 13. Adjust the outbound leg time to achieve a one-minute inbound leg time (e.g., 1 minute 15 seconds inbound = 45 seconds outbound)
- 14. After completing the hold, depart as instructed by ATC
- 15. Report time, position and altitude when leaving the hold
- 16. Resume cruise, or as appropriate.