SPORTY'S®

Sport, Recreational, and Private Pilot Maneuvers Guide

for

Airplane Single-Engine Land

Sporty's Academy, Inc.
Clermont County/Sporty's Airport
Batavia, OH 45103

For additional copies, reorder #M310A

Call: 1 (USA) 800.SPORTYS
(776.7897)

Fax: 1 (USA) 800.359.7794
1 (USA) 513.735.9200
sportys.com

09/17

(Intentionally Left Blank)

Table of Contents

(Intentionally Left Blank)

Preface

The images within this document are only intended to be representations of a particular maneuver. They are not to scale and may be consolidated for demonstration purposes. They should not be construed as accurate for things such as altitude information or distances. Refer to the text for the more accurate description.

The standards for each maneuver are a distillation of those found in the appropriate FAA Airman Certification Standards or Practical Test Standards. These standards provide a minimum level of required performance for each maneuver when taking the practical test. These standards may be unrealistic during the early part of your training. Your flight instructor, training course outline, or syllabus should provide intermediate standards to meet as you progress toward the FAA's standards. Your ultimate goal, as you earn your certificate and continue to grow as a pilot, should be to develop your skills well beyond the minimum FAA requirements.

The procedures are based upon the FAA recommended procedures with enhancements made by our experienced instructional staff. If you find a procedure or standards in this document to be contrary to the latest FAA information, you should follow the latest FAA recommendations.

The procedures are not aircraft specific. The manufacturer of your aircraft may have a recommended procedure for performing a particular maneuver. If this is the case, you should follow their guidance as they know the particulars of your aircraft better than we do.

Your instructor may have a preferred method of performing a maneuver that is different than found within this document. There may be more than one safe method to perform a particular maneuver. Discuss the options with your instructor.

While this document is a great tool for learning and reviewing the steps for a maneuver, it is not a substitute for a competent instructor. Find one and practice, practice, practice...

Sporty's Academy, Staff
September, 2017
Batavia, Ohio

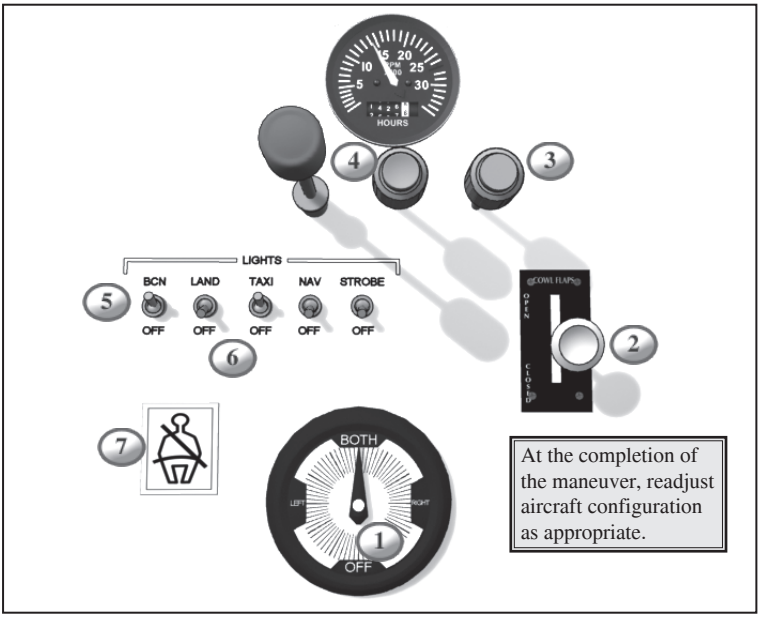
(Intentionally Left Blank)

Pre-Maneuver Checklist

OBJECTIVE: To ensure that the airplane is properly configured for safe operation prior to any maneuvering.
STANDARDS: N/A
CONDITIONS: This checklist must be accomplished prior to the start of any maneuver.

DESCRIPTION:

1. Verify that the **fuel shutoff/selector valve** is in the ON/BOTH or other appropriate position.
2. Adjust **cowl flaps** as required if so equipped.
3. Adjust the **mixture control** to the rich position or as necessary.
4. Set **prop RPM** as required if so equipped.
5. Verify that the **beacon/anticollision light** is ON.
6. Turn the **taxi or landing light** ON.
7. **Seat belts and shoulder harnesses** secured.



At the completion of the maneuver, readjust aircraft configuration as appropriate.

COMMON ERRORS:

- Not using the checklist.

Clearing Turns

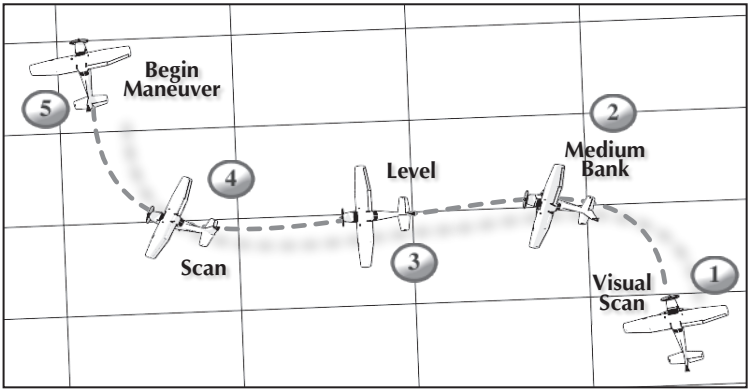
OBJECTIVE: To determine that the airspace immediately surrounding the aircraft is clear of other traffic before the start of any maneuver and that the aircraft is not and will not be over a city, town, or concentration of dwellings during the training maneuver.
STANDARDS: Executed before appropriate maneuvers.
CONDITIONS: N/A

DESCRIPTION:

1. • Visually scan the area to the left and to the right of the aircraft and on the ground below where the aircraft will be during the execution of the training maneuver.

NOTE: In a high wing airplane, raise the wing toward the turn slightly before turning.

2. • Enter a medium banked turn in either direction.
3. • Continuously scan the area above, below, and ahead of the flight path during the turn.
4. • After 90° of turn has been completed, roll the aircraft level.
   • Repeat the steps above in the opposite direction.
5. • Upon completing the turns and determining that the airspace and surface meet the objective above, begin the maneuver.



NOTE: Turning maneuvers should be made in the direction of the last area cleared (opposite last clearing turn). To ensure efficient use of time and remain in the airspace cleared, complete the pre-maneuver checklist during the first turn and complete the first few steps of the maneuver, as necessary, so at the completion of the second turn you are established in the maneuver.

COMMON ERRORS:

- Not looking in the direction of the turn before starting a turn.
- Failure to visually clear above, below, or ahead of the flight path.
- Waiting too long to start the maneuver after completing the clearing turn.
- Omitting the pre-maneuver checklist.

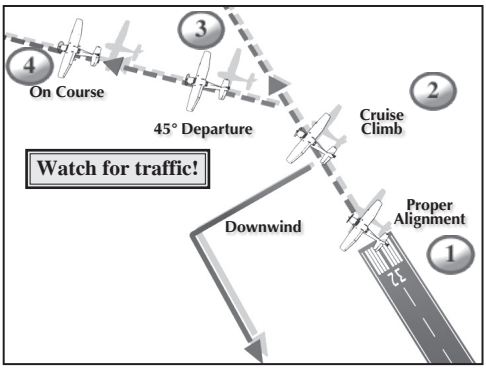
Traffic Pattern Operations – Departure Procedures

OBJECTIVE: To develop safe and efficient airport departure procedures.
STANDARDS: Sport/Recreational/Private - Altitude: ±100 feet and Airspeed: ±10 knots
CONDITIONS: N/A

DESCRIPTION:

1. • After lift-off, maintain proper runway alignment and appropriate climb airspeed, V_X or V_Y. Retract flaps as required and trim for the climb airspeed.
2. • Upon reaching a safe altitude, clear of obstacles, but not less than 500' AGL, accelerate to a cruise climb airspeed (approximately V_Y + 10 knots).
3. • Upon reaching pattern altitude and at a point clear of the airport boundary, depart either straight out or on a 45° ground track in the direction of the traffic pattern, or as instructed by ATC.
4. • Continue climb and maintain ground track until well clear of the pattern traffic, at least 1.5 miles.
   • Set pitch and power once established at pattern or cruise altitude, as appropriate.

NOTE: For operations in the traffic pattern, begin the turn to crosswind leg at an altitude not less than 300' below pattern altitude and at a point clear of the airport boundary, or as other traffic dictates.



NOTE: The above procedures assume an ideal traffic pattern situation. Additional traffic, ATC, local pattern restrictions, obstacles, etc., may necessitate modification of these procedures. In all cases, the pilot will exercise good judgment and maintain positive airplane control.

COMMON ERRORS:

- Not crabbing enough to maintain the extended centerline of the runway.
- Failing to retract flaps in a timely manner.
- Improper trimming of the airplane.
- Not climbing at appropriate speed for altitude or pattern position.
- Improper pattern departure procedure.
- Not watching for traffic.

Traffic Pattern Operations – Entry Procedures

OBJECTIVE: To develop safe and efficient airport arrival procedures.
STANDARDS: Sport/Recreational/Private - Altitude: ±100 feet and Airspeed: ±10 knots
CONDITIONS: N/A

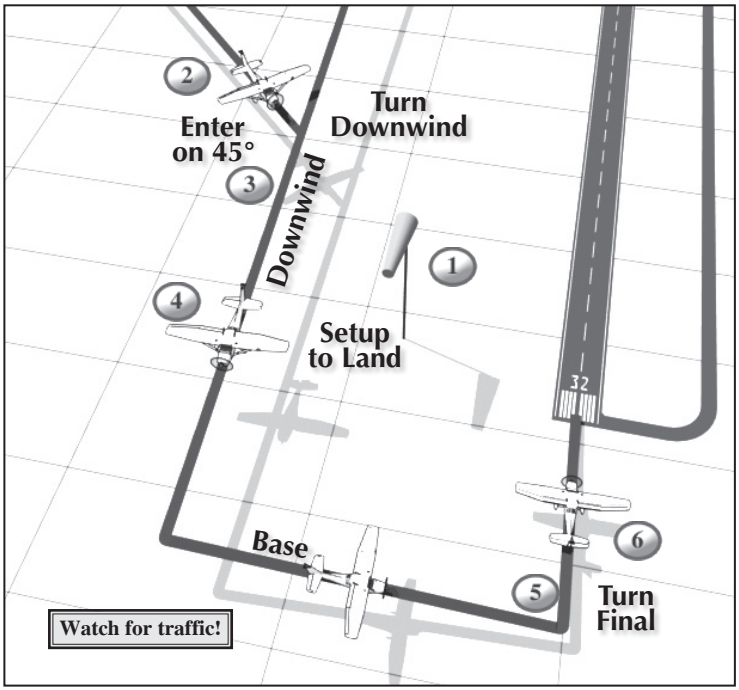
DESCRIPTION:

1. • Determine the active runway.

NOTE: If the airport is non-towered and the active runway cannot be determined prior to arrival, over fly the airport at pattern altitude +500 feet. DO NOT DESCEND until well clear of the downwind leg.

2. • If appropriate, establish the aircraft on a 45° ground track toward the midpoint of the downwind leg. If approaching from the opposite side of the appropriate traffic pattern, enter on a 45° ground track to the upwind leg or enter on the crosswind leg.
   • Pattern altitude and pattern airspeed should be established approximately two miles out.
   • Complete the Before Landing Checklist, verifying that the landing gear is down and locked. Perform an initial GUMPSS check **(Gas-fullest tank/on/both, Undercarriage-down and locked, Mixture-rich/as required, Props - high rpm/as required/defer for final check, Seatbelts-secure, Switches-on as required)**.
3. • Turn the aircraft onto the downwind leg approximately 1/2 to 3/4 mile out from the active runway.
   • Pattern altitude will be maintained unless traffic separation /ATC dictate otherwise.
4. • Opposite the point of intended landing; apply carb heat (if applicable), reduce power, set flaps to the first setting and establish initial approach airspeed.
   • Commence a turn to the base leg when at proper position and traffic permits.
   • Set flaps to the second setting. Coordinate the pitch and power to maintain initial approach airspeed and the desired approach angle. Complete an intermediate GUMPSS check.
5. • Visually clear the area before turning onto final, then commence your turn to final so as to rollout with the aircraft aligned with the extended centerline of the landing runway.
6. • Set the flaps as necessary (normally full flaps by 300' AGL and landing assured). Complete a final GUMPSS check. Coordinate pitch and power to maintain the desired final approach airspeed and approach angle for the appropriate landing procedure.

Traffic Pattern Operations – Entry Procedures



COMMON ERRORS:

- Not establishing pattern altitude and speed prior to pattern entry.
- Not entering the pattern properly.
- Not using the Before Landing Checklist.
- Establishing the downwind leg either too far from or too close to the runway.
- Improper use of flaps.
- Failure to adequately compensate for flap extension.
- Failure to clear the area.
- Following too close to traffic already in the pattern.
- Not maintaining the centerline of the runway on final approach.
- Improper approach speed and airplane attitude.
- Inadequate wind-drift correction on the base leg.
- Overshooting or undershooting the turn onto final approach resulting in too steep or too shallow a turn onto final approach.
- Flat or skidding turns from base leg to final approach as a result of overshooting/inadequate wind drift correction.
- Poor coordination during turn from base to final approach.
- Unstabilized approach.
- Poor trim technique on final approach.
- Attempting to maintain altitude or reach the runway using elevator alone.

Target Speeds for Training Aircraft (Fill In):

Downwind_____ Power Reduced_____ Base_____ Final_____

Normal Takeoff and Climb

OBJECTIVE: To develop proficiency in conducting normal takeoff and climb profiles.
STANDARDS: Sport - Airspeed: Recommended speed +10/-5 knots on climb out
Recreational/Private - Airspeed: V_Y +10/-5 knots on climb out
CONDITIONS: Awareness of obstacles during all takeoffs.

DESCRIPTION:

1. • Ensure that the Before Takeoff Checklist has been completed.
   • Ensure that the items on the Line-up Checklist have been completed and/or reviewed.
   • Visually check for traffic on Downwind, Base, and Final in the active and other traffic patterns.
2. • Communicate, as appropriate – non-towered airport make traffic advisory call, towered airport read back takeoff clearance.
   • Taxi onto the runway, as appropriate.
   • Complete the items from the Line-up Checklist while taxiing. Use the phrase "lights, camera, action" to help remember any items deferred (lights = lights as appropriate, camera = transponder on/altitude, action = mixture rich).
   • Taxi the aircraft into position, centered on the runway with the nosewheel straight, as close to the approach end as possible.
3. • Smoothly and positively apply full power with heels on the floor so as not to hold brakes. Keep a hand on the throttle in the event an abort becomes necessary.
   • Check engine instruments (engine rpm and all other "engine instruments in the green") and airspeed indicator ("airspeed alive").
4. • At V_R, establish and maintain pitch attitude for takeoff. Allow airplane to lift-off when it is ready (approximately V_{LOF}).
5. • Establish the pitch attitude enabling climb out at V_Y or as recommended. Maintain a ground track along the runway and extended centerline with coordinated use of rudder and aileron.

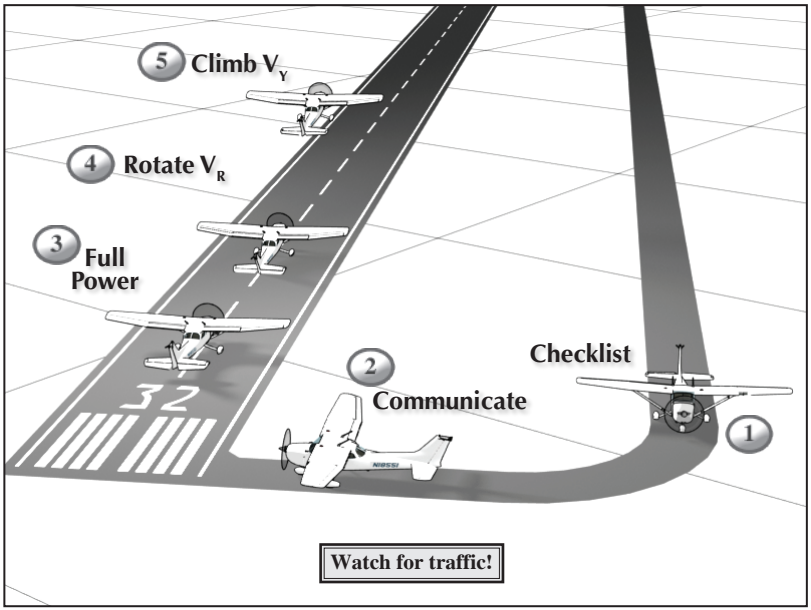
NOTE: In an airplane with retractable landing gear, ensure a positive rate of climb, tap the brakes, and retract the gear when insufficient runway remains to land the airplane.

   • Establish cruise climb above a minimum safe altitude (500-1000' AGL).

NOTE: You should compute takeoff and landing performance data prior to all flights. Special emphasis should be placed on determining that adequate runway exists.

NOTES:

Normal Takeoff and Climb



COMMON ERRORS:

- Failure to adequately clear the area prior to taxiing into position on the active runway.
- Abrupt use of the throttle.
- Failure to check engine instruments for signs of malfunction after applying takeoff power.
- Failure to anticipate the airplane's left turning tendency on initial acceleration.
- Overcorrecting for left turning tendency.
- Relying solely on the airspeed indicator rather than a developed feel for indications of speed and airplane controllability during acceleration and lift-off.
- Failure to attain proper lift-off attitude.
- Inadequate compensation for torque/P-factor during initial climb resulting in a sideslip.
- Overcontrol of elevator during initial climb-out.
- Limiting scan to areas directly ahead of the airplane (pitch attitude and direction), resulting in allowing a wing (usually the left) to drop immediately after lift-off.
- Failure to attain/maintain best rate-of-climb airspeed (V_Y).
- Failure to employ the principles of attitude flying during climb-out, resulting in "chasing" the airspeed indicator.

NOTES:

Crosswind Takeoff and Climb

OBJECTIVE: To develop proficiency in conducting crosswind takeoff and climb profiles.
STANDARDS: Sport - Airspeed: Recommended speed +10/-5 knots on climb out
Recreational/Private - Airspeed: V_Y +10/-5 knots on climb out
CONDITIONS: Awareness of obstacles during all takeoffs.

DESCRIPTION:

1. • Ensure that the Before Takeoff Checklist has been completed.
   • Ensure that the items on the Line-up Checklist have been completed and/or reviewed.
   • Visually check for traffic on Downwind, Base, and Final in the active and other traffic patterns.
2. • Communicate as appropriate – non-towered airport make traffic advisory call, towered airport read back takeoff clearance.
   • Taxi onto the runway as appropriate. Complete the items from the Line-up Checklist while taxiing. Use the phrase "lights, camera, action" to help remember the items deferred (lights = lights as appropriate, camera = transponder on/altitude, action = mixture rich as required).
   • Taxi the aircraft into position, centered on the runway with the nosewheel straight, as close to the approach end as possible.
   • Prior to the start of the takeoff run, the ailerons are fully deflected into the wind and the elevator is in the neutral position.
3. • Smoothly and positively apply full power with heels on the floor so as not to hold brakes. Keep a hand on the throttle in the event an abort becomes necessary.
   • Check engine instruments (engine rpm and all other "engine instruments in the green") and airspeed indicator ("airspeed alive").
   • As the aircraft accelerates, adjust the ailerons as necessary and maintain runway alignment with the rudder.

NOTE: If a significant or gusty conditions crosswind exist, the aircraft should be held on the ground slightly longer than normal so that a smooth and positive lift-off will occur.

4. • At V_R, establish and maintain pitch attitude for takeoff. Allow the airplane to lift-off when it is ready (approximately V_{LOF}).

NOTE: As the aircraft leaves the runway, the holding of ailerons into the wind will result in the downwind wing rising and the downwind main wheel lifting off first.

   • Once the aircraft lifts off, establish a Wind Correction Angle (WCA) to maintain the runway centerline with level wings.

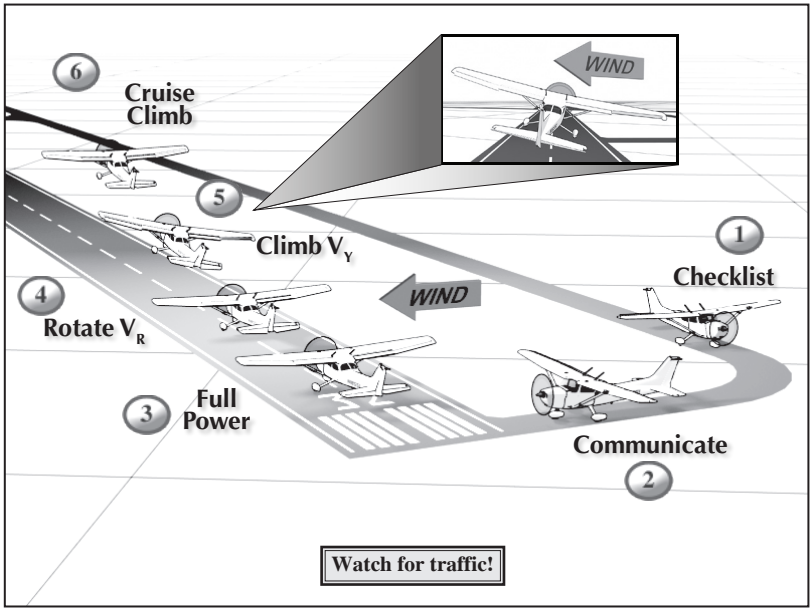
Crosswind Takeoff and Climb

5 • Establish the pitch attitude enabling climb out at V_Y or as recommended. Maintain a ground track along the runway and extended centerline with coordinated use of rudder and aileron.

NOTE: In an airplane with retractable landing gear, ensure a positive rate of climb, tap the brakes, and retract the gear when insufficient runway remains to land the airplane.

6 • Establish cruise climb above a minimum safe altitude (500-1000' AGL).

NOTE: You should compute takeoff and landing performance data prior to all flights. Special emphasis should be placed on determining that adequate runway exists.



COMMON ERRORS:

- Failure to adequately clear the area prior to taxiing onto the active runway.
- Using less than full aileron pressure into the wind initially on the takeoff roll.
- Mechanical use of aileron control rather than sensing the need for varying aileron control input through feel for the airplane.
- Premature lift-off resulting in side-skipping.
- Excessive aileron input in the latter stage of the takeoff roll resulting in a steep bank into the wind at lift-off.
- Inadequate drift correction after lift-off.

NOTES:

Short-Field Takeoff and Maximum Performance Climb

OBJECTIVE: To develop proficiency in conducting short-field takeoffs and climbs.
STANDARDS: Sport/Recreational/Private - Airspeed: V_X +10/-5 knots until obstacle is cleared or until at least 50' above the surface, then V_Y +10/-5 knots
CONDITIONS: Awareness of obstacles during all takeoffs.

DESCRIPTION:

1. • Ensure that the Before Takeoff Checklist has been completed.
2. • Set flaps as appropriate – ensure that flaps come down equally.
3. • Ensure that the items on the Line-up Checklist have been completed and/or reviewed.
4. • Visually check for traffic on Downwind, Base, and Final in the active and other traffic patterns.
5. • Communicate, as appropriate – non-towered airport make traffic advisory call, towered airport read back takeoff clearance.
   - Taxi onto the runway, as appropriate. Complete the items from the Line-up Checklist while taxiing. Use the phrase "lights, camera, action" to help remember the items deferred (lights = lights as appropriate, camera = transponder on/altitude, action = mixture rich as required).
   - Taxi the aircraft into position, centered on the runway with the nosewheel straight, as close to the approach end as possible.
   - Hold the brakes, preventing any movement of the aircraft.
6. • Smoothly and positively apply full power. Keep a hand on the throttle in the event an abort becomes necessary.
   - Check engine instruments (engine rpm and all other "engine instruments in the green").
   - Immediately drop heels onto floor, release the brakes, and apply slight forward pressure on the yoke, allowing the aircraft to accelerate as quickly as possible.
   - Check airspeed indicator ("airspeed alive").
7. • Rotate at V_{LOF}, then establish V_X pitch attitude.
   - Once the aircraft lifts off, establish a Wind Correction Angle (WCA) to maintain the runway centerline with level wings.
8. • Maintain V_X or manufacturer's recommended airspeed until clear of obstacles and at least 50 feet above the surface.
9. • After clearing obstacles, establish V_Y pitch attitude. Maintain a ground track along the runway and extended centerline with coordinated use of rudder and aileron.

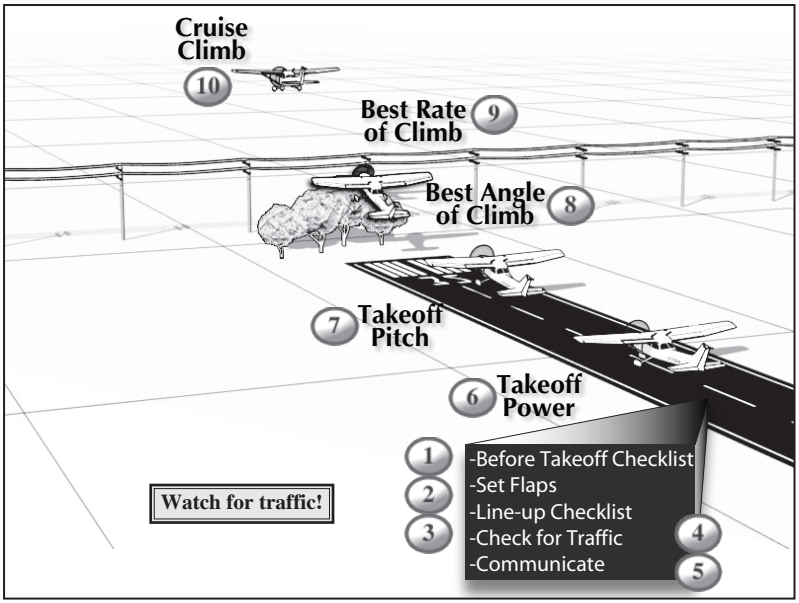
Short-Field Takeoff and Maximum Performance Climb

- Retract flaps after clearing all obstacles and establishing the recommended airspeed, climb out at V_Y

NOTE: In an airplane with retractable landing gear, ensure a positive rate of climb, tap the brakes, and retract the gear when insufficient runway remains to land the airplane.

10 • Establish cruise climb above a minimum safe altitude (500-1000' AGL).

NOTE: You should compute takeoff and landing performance data prior to all flights. Special emphasis should be placed on determining that adequate runway exists.



COMMON ERRORS:

- Failure to adequately clear the area prior to taxiing onto the active runway.
- Failure to utilize all available runway/ takeoff area.
- Failure to have the airplane properly trimmed prior to takeoff.
- Premature lift-off resulting in high drag.
- Holding the airplane on the ground unnecessarily with excessive forward-elevator pressure.
- Inadequate rotation resulting in excessive speed after lift-off.
- Inability to attain/maintain best angle-of-climb airspeed.

NOTES:

Soft-Field Takeoff and Climb

OBJECTIVE: To develop proficiency in conducting soft-field takeoffs and climbs.
STANDARDS: Sport/Recreational/Private - Airspeed: V_X +10/-5 knots or V_Y +10/-5 knots, as appropriate
CONDITIONS: Awareness of obstacles during all takeoffs.

DESCRIPTION:

1. • Ensure that the Before Takeoff Checklist has been completed.
   - Set flaps as appropriate – ensure that flaps come down equally.
   - Maintain full up elevator while taxiing.
   - Ensure that the items on the Line-up Checklist have been completed and/or reviewed.
   - Visually check for traffic on Downwind, Base, and Final in the active and other traffic patterns.
   - Communicate, as appropriate – non-towered airport make traffic advisory call, towered airport read back takeoff clearance.
   - Taxi onto the runway, as appropriate. Complete the items from the Line-up Checklist while taxiing. Use the phrase "lights, camera, action" to help remember the items deferred (lights = lights as appropriate, camera = transponder on/altitude, action = mixture rich as required).
2. • Keep the aircraft moving at a brisk pace while taxiing into position for takeoff – avoid braking and/or stopping. Keep heels on the floor unless braking is required.
3. • Smoothly and positively apply full power. Keep a hand on the throttle in the event an abort becomes necessary.
   - Apply full back pressure until the nose wheel comes off the runway. Adjust back pressure to maintain the nose wheel clear of the runway and to avoid striking the tail.
   - Check engine instruments (engine rpm and all other "engine instruments in the green") and airspeed indicator ("airspeed alive").
   - Allow the airplane to lift-off when it is ready. Establish a Wind Correction Angle (WCA) to maintain the runway centerline with level wings.
4. • Adjust pitch to accelerate to V_X or V_Y in ground effect.

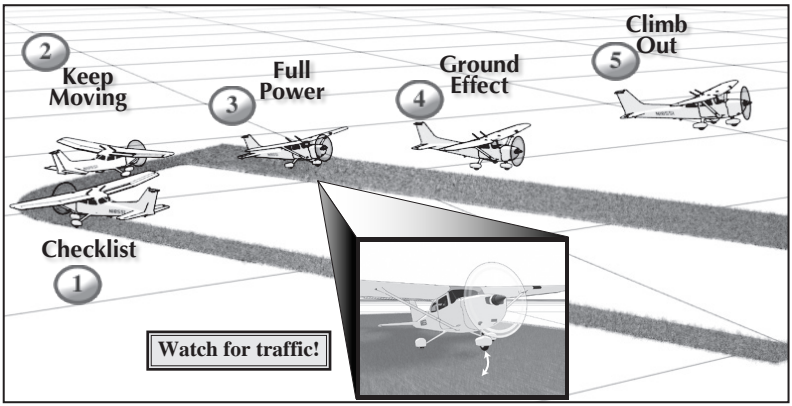
Soft-Field Takeoff and Climb

5
- If No Obstacle is Present:
  - Establish V_Y pitch attitude.
  - Retract flaps at safe altitude and airspeed.
  - Climb out at V_Y.
- To Clear Obstacle:
  - Establish V_X pitch attitude.
  - Continue climb at V_X or manufacturer's recommended airspeed.
  - Once obstacle is cleared, establish V_Y attitude.
  - Retract flaps at safe altitude and airspeed.
  - Climb out at V_Y.

NOTE: In an airplane with retractable landing gear, ensure a positive rate of climb, tap the brakes, and retract the gear when insufficient runway remains to land the airplane.

- Maintain a ground track along the runway and extended centerline with coordinated use of rudder and aileron. Establish cruise climb above a minimum safe altitude (500-1000' AGL).

NOTE: You should compute takeoff and landing performance data prior to all flights. Special emphasis should be placed on determining that adequate runway exists.



COMMON ERRORS:

- Failure to adequately clear the area prior to taxiing onto the active runway.
- Insufficient back elevator pressure, during initial takeoff roll, resulting in inadequate angle of attack.
- Abrupt and/or excessive elevator control while attempting to level off and accelerate after lift-off.
- Poor directional control.
- Climbing too steeply after lift-off.
- Allowing the airplane to "mush" or settle resulting in an inadvertent touchdown after lift-off.
- Attempting to climb out of ground effect area before attaining sufficient climb speed.
- Failure to anticipate an increase in pitch attitude as the airplane climbs out of ground effect.

Rejected Takeoff

OBJECTIVE: To develop proficiency in determining the need for and conducting a rejected takeoff.
STANDARDS: N/A
CONDITIONS: Awareness of braking conditions, runway length requirements, and potential hazards.

NOTE: Refer to the appropriate Abnormal/Emergency Checklist.

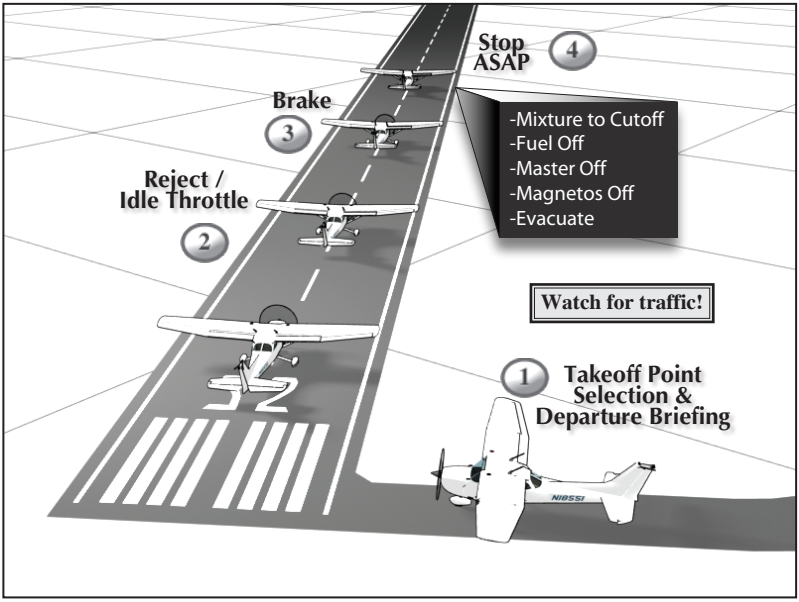
DESCRIPTION:

1. • Select a point along the runway that the airplane should be airborne and conduct a departure briefing.
2. • A takeoff shall be rejected any time abnormalities are noticed in engine indications, or if any other problem develops that may affect safety of flight.
   • The pilot will immediately retard the power to idle.
3. • Apply braking as necessary, maintaining directional control with the rudder and applying appropriate aileron for crosswind conditions.
   • The pilot will call "Abort" and the nature of the problem – "Engine Failure," "Engine Fire," etc.
   • Stop the aircraft as soon as possible.
4. • Once the aircraft has stopped (simulate the following for training purposes):
   – Pull the mixture to idle cut-off.
   – Shut-off the fuel supply.
   – Turn off the master switch.
   – Shut off the magnetos.
   – Evacuate aircraft.

NOTE: This maneuver should be practiced on dual flights only

NOTES:

Rejected Takeoff



COMMON ERRORS:

- Failure to recognize a condition that warrants a rejected landing.
- Indecision.
- Not maintaining proper directional control.
- Not applying appropriate aileron for crosswind conditions.
- Failure to call out the nature of the problem.
- Failure to shut down the engine and secure aircraft if appropriate.

NOTES:

Normal Approach and Landing

OBJECTIVE: To develop proficiency in conducting approaches and landings under normal conditions.

STANDARDS: Sport/Recreational/Private - Approach Airspeed: +10/-5 knots and landing within 400' beyond specified point

CONDITIONS: Awareness of obstacles.

DESCRIPTION:

1. • Ensure that the Before Landing Checklist has been completed.
   • Complete the appropriate traffic pattern.
2. • Prior to 300' AGL on final approach, stabilize the airplane on the extended centerline with the final flap setting.

NOTE: In the absence of a manufacturer's recommended airspeed, a speed not more than 1.3 V_{s0} should be used.

3. • Coordinate pitch and power so as to maintain final approach airspeed and the desired approach angle that will permit landing within the designated area.

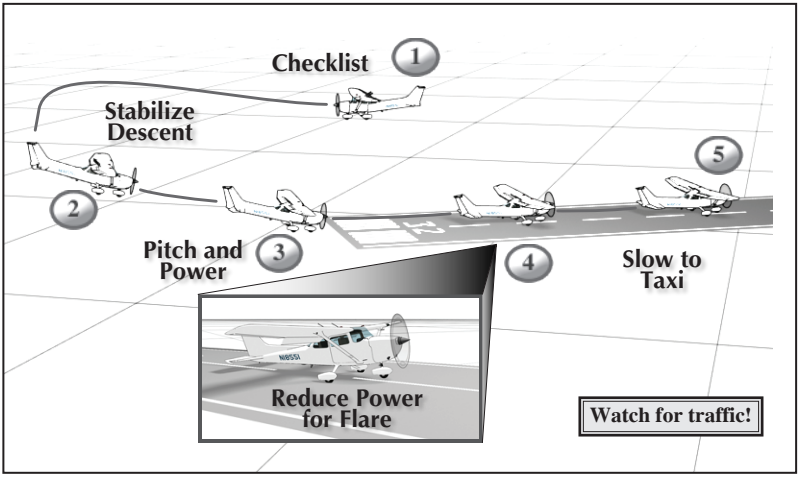
NOTE: If gusty conditions are present, increase final approach airspeed by one half the gust factor. Gust factor = Wind Gusts – Sustained Winds.

4. • At the appropriate flare altitude, slow the descent by raising the pitch attitude and smoothly reducing power to idle so that the airplane settles onto the runway on the main gear.
   • Maintain back pressure on the yoke throughout the landing roll to keep the nose wheel off of the runway as long as possible for maximum aerodynamic braking.
5. • Slow the airplane to normal taxi speed before leaving the runway centerline.
   • Once the airplane is clear of the active runway and stopped, perform the After Landing Checklist.

NOTE: Keep a hand on the throttle throughout the approach and landing in the event immediate application of power is necessary.

NOTES:

Normal Approach and Landing



COMMON ERRORS:

- Failure to complete the landing checklist in a timely manner.
- Unstabilized approach.
- Failure to adequately compensate for flap extension.
- Poor trim technique on final approach.
- Attempting to maintain altitude or reach the runway using elevator alone.
- Focusing too close to the airplane resulting in a too high roundout.
- Focusing too far from the airplane resulting in a too low roundout.
- Touching down prior to attaining proper landing attitude.
- Failure to hold sufficient back elevator pressure after touchdown.
- Excessive braking after touchdown.

NOTES:

Crosswind Approach and Landing

OBJECTIVE: To develop proficiency in conducting approaches and landings under crosswind conditions.

STANDARDS: Sport/Recreational/Private - Approach Airspeed: +10/-5 knots and landing within 400' beyond specified point

CONDITIONS: Awareness of obstacles.

DESCRIPTION:

1. • Ensure that the Before Landing Checklist is completed.
   • Complete the appropriate traffic pattern.
2. • Prior to 300' AGL on final approach, stabilize the airplane on the extended centerline with the final flap setting.

NOTE: In the absence of a manufacturer's recommended airspeed, a speed not more than 1.3 V_{S0} should be used. If gusty conditions are present, increase final approach airspeed by one half the gust factor.

• Coordinate pitch and power so as to maintain final approach airspeed and the desired approach angle that will permit landing within the designated area.

3. • Use the Wind Correction Angle (crab) method of crosswind correction on final to maintain the extended runway centerline.
4. • Use the sideslip method of crosswind correction during transition from approach to roundout.

NOTE: If the required bank is such that full opposite rudder will not prevent a turn, the wind is too strong to safely land on this runway. Use a more favorable runway.

• The proper technique will result in a touch-down on the upwind main wheel first, followed by the downwind main wheel, and finally the nose wheel. The aircraft will be on the runway centerline with its longitudinal axis aligned with the centerline.

• Hold the nose wheel off of the runway as long as possible for maximum aerodynamic braking.

NOTE: If the airplane has nose wheel steering, rudder pressure may need to be relaxed as the nose wheel touches down to prevent swerving.

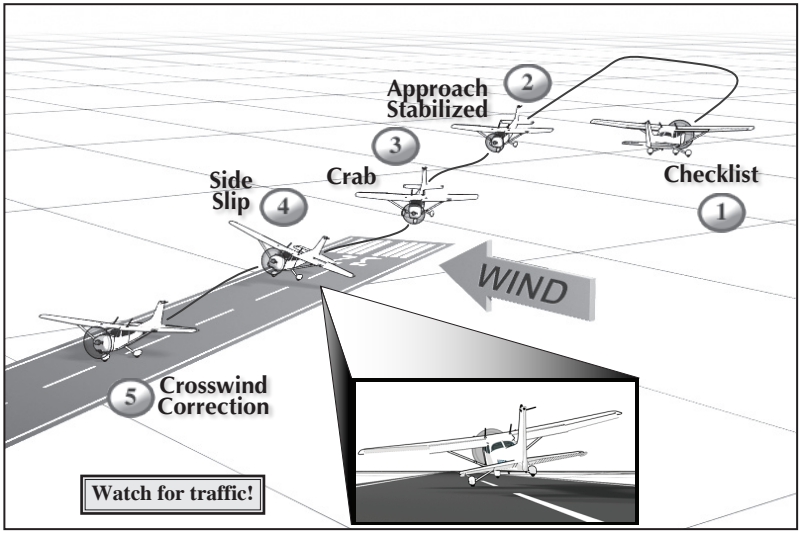
5. • Maintain crosswind control corrections as necessary to maintain alignment with the runway centerline and prevent lifting of the upwind wing.

NOTE: Keep a hand on the throttle throughout the approach and landing in the event immediate application of power is necessary.

Side Note on the Sideslip

1. Enter by lowering the wing in the direction of the desired slip and applying just enough opposite rudder to prevent a turn.
2. The amount of slip is determined by the bank angle.
3. As bank angle is increased, additional opposite rudder is necessary to prevent a turn.

Crosswind Approach and Landing



COMMON ERRORS:

- Attempting to land in crosswinds that exceed the airplane's maximum crosswind capability.
- Inadequate compensation for wind drift on final approach.
- Unstabilized approach.
- Failure to align the longitudinal axis of the airplane with the runway centerline prior to touchdown.
- Failure to compensate for increased drag during sideslip resulting in excessive sink rate and/or too low an airspeed.
- Touchdown while drifting.
- Landing to the left or right of the centerline.

NOTES:

Short-Field Approach and Landing

OBJECTIVE: To develop proficiency in conducting approaches and landings to short runways, with and without obstacles.

STANDARDS: Sport/Recreational/Private - Approach Airspeed: +10/-5 knots and landing within 200' beyond specified point

CONDITIONS: Awareness of obstacles.

DESCRIPTION:

1. • Ensure that the Before Landing Checklist is completed.
   • Complete the appropriate traffic pattern.

NOTE: In the absence of a manufacturer's recommended airspeed, a speed not more than 1.3 V_{S0} should be used. If gusty conditions are present, increase final approach airspeed by one half the gust factor.

2. • Add full flaps and establish recommended short-field approach speed on final before reaching 1/2 mile from the runway.

NOTE: Wind conditions may warrant the use of a lower flap setting.

   • Adjust pitch and power for the desired airspeed and approach angle.
   • The approach should be stabilized on the extended runway centerline no lower than 300' AGL.

3. • Upon obstacle clearance, initiate a power reduction.

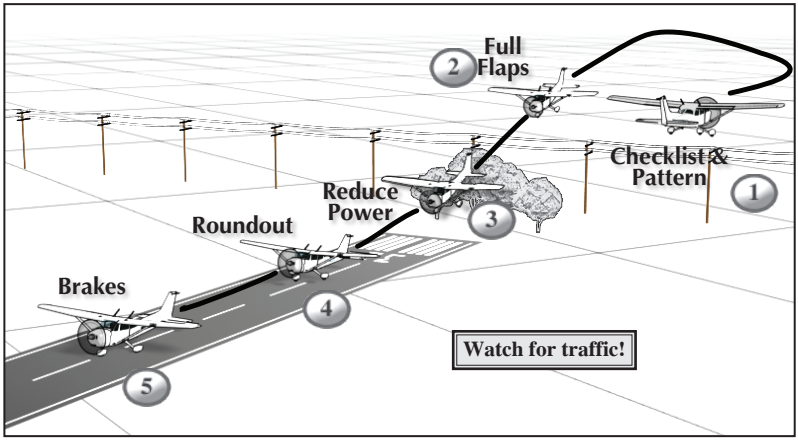
4. • Start the roundout and flare so as to arrive at the power off stall attitude with power reaching idle prior to or just at touchdown.

5. • Immediately upon touchdown, and closing the throttle, the brakes should be applied to minimize the after-landing roll. Stop the airplane within the shortest possible distance consistent with safety and controllability.
   • During the after-landing roll, back pressure should be continuously applied to the elevator to maintain a positive pitch attitude and maximize aerodynamic braking.
   • Maintain directional control and crosswind correction with appropriate rudder and aileron input.

NOTE: Keep a hand on the throttle throughout the approach and landing in the event immediate application of power is necessary.

NOTES:

Short-Field Approach and Landing



COMMON ERRORS:

- Failure to allow enough room on final to set up the approach, necessitating an overly steep approach and high sink rate.
- Unstabilized approach.
- Undue delay in initiating glidepath corrections.
- Too low an airspeed on final resulting in inability to flare properly and landing hard.
- Too high an airspeed resulting in floating on roundout.
- Prematurely reducing power to idle on roundout resulting in hard landing.
- Touchdown with excessive airspeed.
- Excessive and/or unnecessary braking after touchdown.
- Failure to maintain directional control.

NOTES:

Soft-Field Approach and Landing

OBJECTIVE: To develop proficiency in conducting approaches and landings to soft runways, with and without obstacles.
STANDARDS: Sport/Recreational/Private - Approach Airspeed: +10/-5 knots
CONDITIONS: Awareness of Obstacles.

DESCRIPTION:

1. • Ensure that the Before Landing Checklist is completed.
   • Complete the appropriate traffic pattern.

NOTE: In the absence of a manufacturer's recommended airspeed, a speed not more than 1.3 V_{S0} should be used. If gusty conditions are present, increase final approach airspeed by one half the gust factor.

2. • Add full flaps and establish recommended soft-field approach speed on final approximately 1/2 mile from the runway.

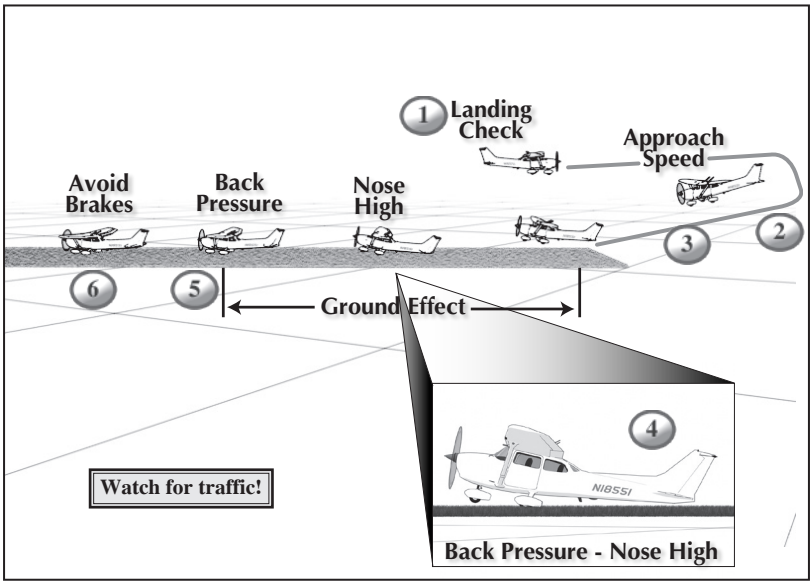
NOTE: Wind conditions may warrant the use of a lower flap setting.

3. • Adjust pitch and power for the desired airspeed and approach angle.
   • The approach should be stabilized on the extended runway centerline no lower than 300' AGL.
4. • Touchdown at minimum speed with the aircraft in a nose-high pitch attitude.
5. • Maintain back pressure on the yoke to keep the nosewheel off the ground until it can no longer aerodynamically be held off of the field surface. At this time, it should be gently lowered.
   • Maintain directional control and crosswind correction with appropriate rudder and aileron input.
6. • Avoid the use of brakes, and use power, if necessary, when taxiing on very soft fields.
   • Maintain full back elevator.

NOTE: Keep a hand on the throttle throughout the approach and landing in the event immediate application of power is necessary.

NOTES:

Soft-Field Approach and Landing



COMMON ERRORS:

- Excessive descent rate on final approach.
- Excessive airspeed on final approach.
- Unstabilized approach.
- Roundout too high above the runway surface.
- Poor power management during roundout and touchdown.
- Hard touchdown.
- Inadequate control of the airplane weight transfer from wings to wheels after touchdown.
- Allowing the nosewheel to "fall" to the runway after touchdown rather than controlling its descent.

NOTES:

Go-Around / Rejected Landing

OBJECTIVE: To develop proficiency in determining when a go-around / rejected landing may be required and in executing the maneuver.

STANDARDS: Sport/Recreational - Airspeed: V_Y +10/-5 knots on climb out
Private - Airspeed: V_X or V_Y, as appropriate, +10/-5 knots on climb out

CONDITIONS: Awareness of obstacles.

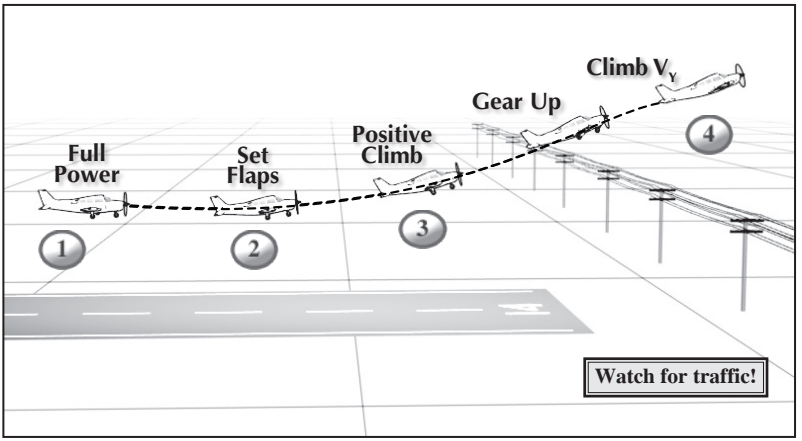
NOTE: The flap settings in the following procedure should be adjusted as recommended by the aircraft manufacturer. Not all training aircraft will have the flap settings noted in this procedure.

DESCRIPTION:

1. Upon a go-around decision, simultaneously apply takeoff power and establish a pitch up attitude to maintain V_Y. (V_X or V_Y as appropriate for Private.)
2. Retract wing flaps to the second flap setting.
3. If obstacles must be cleared, retract flaps to the first flap setting after establishing a positive rate of climb.
   - When a safe altitude has been reached, retract the remaining flaps (above appropriate indicated airspeed) and open cowl flaps as required.

NOTE: In an airplane with retractable landing gear, ensure a positive rate of climb and retract the gear when insufficient runway remains to land the airplane.

4. Establish and maintain V_Y and track the appropriate traffic pattern.



COMMON ERRORS:

- Too slow to make proper decision to enact go-around.
- Failing to establish or maintain V_Y (or V_X).
- Forgetting to retract flaps or landing gear.
- Not maintaining the centerline of the runway with a crab into the wind.

NOTES:

Emergency Approach and Landing

OBJECTIVE: To develop proficiency in conducting landings under emergency conditions.

STANDARDS: Establish and maintain the recommended best glide airspeed (±10 knots) and configuration during simulated emergencies.
Select a suitable landing area within gliding distance.
Plan and follow a flight pattern to the selected landing area, considering altitude, wind, terrain, obstructions, and other factors.
Follow the appropriate emergency checklist.
Attempt to determine the reason for the simulated malfunction.

CONDITIONS: Any shutdown/securing related items should be simulated in training.

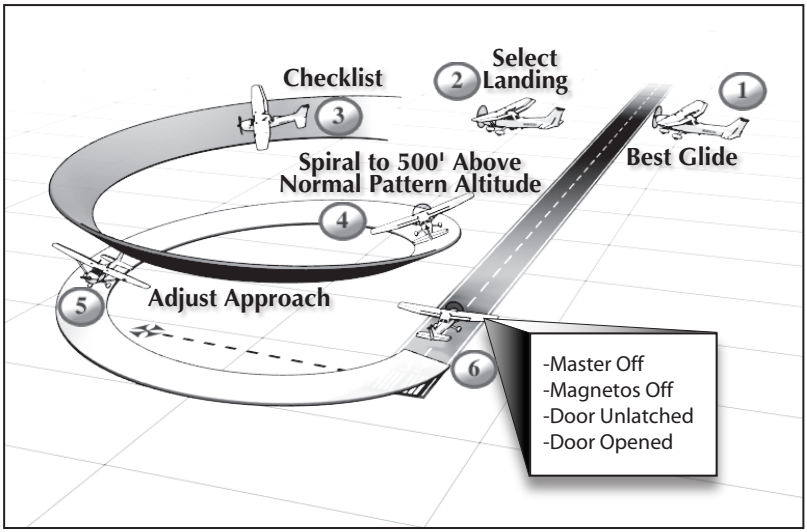
DESCRIPTION:

1. • Establish best glide attitude and airspeed, maintaining altitude if airspeed is above best glide speed.
2. • Proceed directly to the closest, most suitable, landing site (considering altitude, winds and terrain).
3. • If you have sufficient altitude, then do the following:
   – Complete the Engine Failure In Flight Checklist.
   – If restart is unsuccessful, then complete the No Restart or Off Airport Landing Checklist.
4. – Maneuver the aircraft in a spiral above the touchdown point until the aircraft is approximately 500' above the normal traffic pattern altitude, then transition the aircraft to a point abeam the touchdown point at a normal traffic pattern altitude.
5. – The approach should be adjusted as necessary to ensure a safe landing, at the desired touchdown point with the aircraft under full control.
6. – Once committed to the landing, master switch and magnetos OFF; door UNLATCHED and propped open if recommended by the manufacturer (may not be appropriate for canopy or stabilator equipped airplanes).

NOTE: Emergency approach and landings should be practiced on dual flights ONLY! During the maneuver, the Instructor/Check Pilot will momentarily advance the throttle as appropriate to prevent spark plug fouling and to ensure that the engine will still develop power. The Instructor/Check Pilot shall ensure that, unless the approach is to an airport, the exercise **is abandoned before descending below 500' AGL**. If the approach is made to an airport, make full stop landings only. Allow the engine to return to normal operating temperature before initiating the next takeoff.

NOTES:

Emergency Approach and Landing



COMMON ERRORS:

- Too eager to get down – cannot dive at field.
- Arriving at edge of chosen field with too much speed.
- Failure to clear the engine and keep it warm.
- Failure to establish who is in control of the aircraft.
- Not calling off the maneuver when it is clear that the field can be made.
- Failure to check critical items and follow the emergency checklist.

NOTES:

Forward Slip to a Landing

OBJECTIVE: To develop the ability to dissipate altitude without increasing airspeed.
STANDARDS: Sport/Recreational/Private - Landing within 400' beyond specified point
CONDITIONS: Forward slips should be accomplished in both directions with emphasis placed on smoothness and coordination.

DESCRIPTION:

1. • Establish final approach configuration and airspeed +10 knots. Reduce power to idle.

NOTE: Slips with the flaps extended should be avoided in some aircraft.

2. • Lower the appropriate wing (into the wind if a crosswind exists) simultaneously yawing the airplane in the opposite direction with rudder.

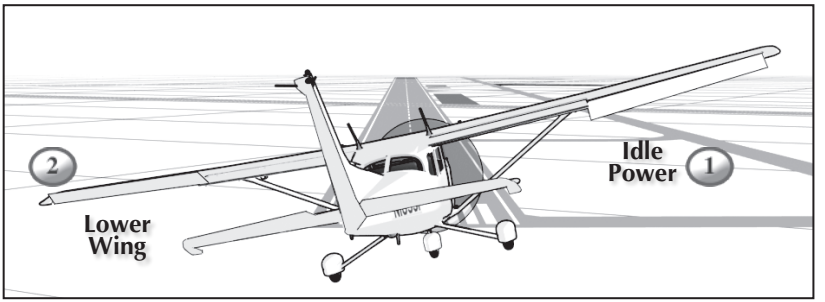
3. • Maintain the flight path on the extended runway centerline throughout the slip.

• Adjust pitch to maintain airspeed.

NOTE: On some single static source installations, airspeed will indicate higher than actual when slipping away from the static source and lower when slipping towards the static source. Maintaining the proper pitch attitude will help avoid confusion with the airspeed indicator.

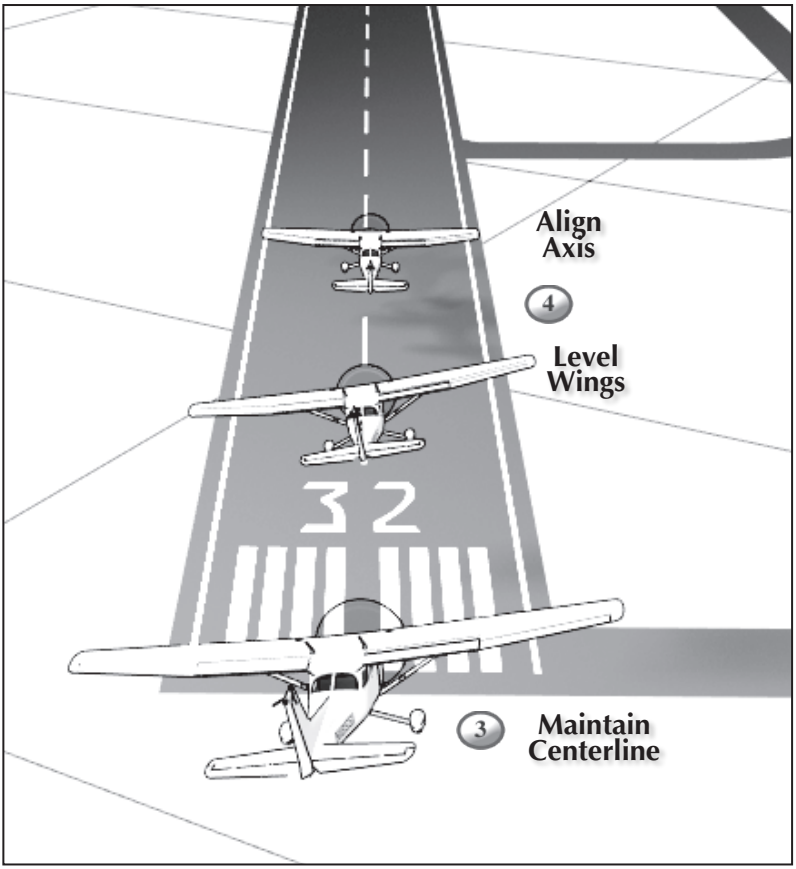
4. • Discontinue slipping by leveling the wings and simultaneously releasing rudder pressure. Realign the longitudinal axis of the airplane with the centerline of the runway.

• Adjust the pitch, as necessary, to maintain the normal glide attitude towards the runway.



NOTES:

Forward Slip to a Landing



COMMON ERRORS:

- Inability of the pilot to recognize the fact that the airspeed is affected by the slip and not control airspeed properly.
- Not maintaining sufficient airspeed to prevent a stall.
- Inability to adjust the bank and rudder pressure necessary to achieve the desired sink rate.
- Inability to hold the extended runway centerline or the runway centerline.
- Inability to align the airplane's longitudinal axis to the runway centerline.
- Not recovering from the slip with sufficient altitude for a safe maneuver.
- Eliminating rudder pressure too quickly causing the airplane's speed to become excessive.

NOTES:

Slow Flight – Cruise Configuration

OBJECTIVE: To recognize changes in aircraft flight characteristics and control effectiveness at critically slow airspeeds in a cruise configuration.

STANDARDS: Sport/Recreational/Private - Airspeed: MCA (Sport/Recreational) or SW (Private) +10/-0 knots, Altitude: ±100 feet of specified altitude, Heading: ±10° of specified heading, and Bank: ±10° of specified bank angle

CONDITIONS: The maneuver should be accomplished in straight flight, turns, climbs, and descents with emphasis placed on smoothness, coordination, and accuracy.

NOTE: For the purposes of this maneuver, MCA is defined as Minimum Controllable Airspeed. In other words, "an airspeed at which any further increase in angle of attack, increase in load factor, or reduction in power, would result in an immediate stall." SW is meant to indicate the speed where the stall warning horn or light will activate. In other words, "an airspeed at which any further increase in angle of attack, increase in load factor, or reduction in power, would result in a stall warning (e.g., aircraft buffet, stall horn, etc.)."

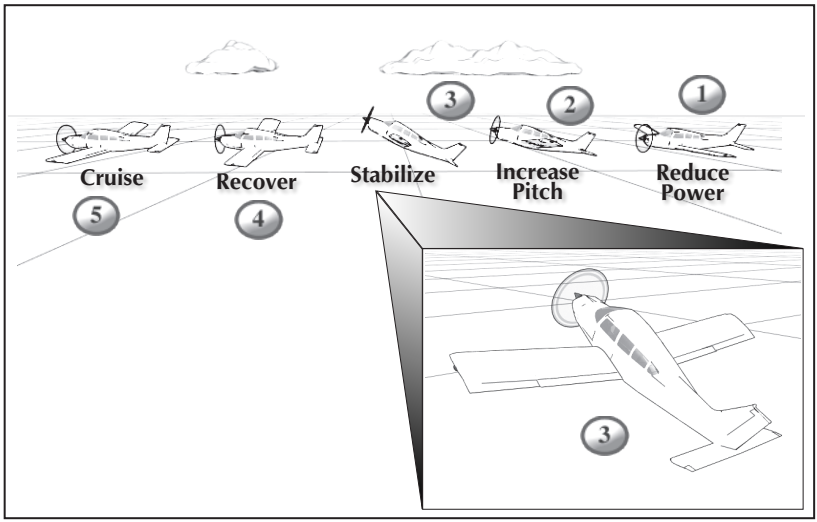
DESCRIPTION:

- Select an altitude that will allow recovery no lower than 1500' AGL (1000' AGL-Sport).
- Perform Pre-Maneuver Checklist.
- Perform clearing turns.

1. Apply carburetor heat, as appropriate, and reduce power to 1200 rpm (or 12" MP).
2. Smoothly increase pitch attitude to maintain altitude as airspeed decreases.
   - As airspeed approaches slow flight, adjust power for level flight (approx. 1900 RPM or 18" MP). Avoid abrupt changes in pitch, bank, and power.
3. Stabilize the aircraft maintaining heading, altitude, and airspeed.
   - Straight and level, turns, climbs, and descents using various bank angles should be performed, as specified, while maintaining slow flight.
4. Recovery is initiated by smoothly applying full power, shutting off carburetor heat, as appropriate, and adjusting pitch to maintain altitude.
5. Resume normal cruise, or as specified.

NOTES:

Slow Flight – Cruise Configuration



COMMON ERRORS:

- Failure to adequately clear the area.
- Inadequate back elevator pressure as power is reduced, resulting in altitude loss.
- Excessive back elevator pressure as power is reduced, resulting in a climb, followed by a rapid reduction in airspeed and "mushing."
- Fixation on the airspeed indicator.
- Inadequate compensation for adverse yaw during turns.
- Failure to anticipate changes in lift as flaps are extended or retracted.
- Inadequate power management.
- Inability to adequately divide attention between airplane control and orientation.

NOTES:

Slow Flight – Landing Configuration

OBJECTIVE: To recognize changes in aircraft flight characteristics and control effectiveness at critically slow airspeeds in a landing configuration.

STANDARDS: Sport/Recreational/Private - Airspeed: MCA (Sport/Recreational) or SW (Private) +10/-0 knots, Altitude: ±100 feet of specified altitude, Heading: ±10° of specified heading, and Bank: ±10° of specified bank angle

CONDITIONS: The maneuver should be accomplished in straight flight, turns, climbs, and descents with emphasis placed on smoothness, coordination, and accuracy.

NOTE: For the purposes of this maneuver, MCA is defined as Minimum Controllable Airspeed. In other words, "an airspeed at which any further increase in angle of attack, increase in load factor, or reduction in power, would result in an immediate stall." SW is meant to indicate the speed where the stall warning horn or light will activate. In other words, "an airspeed at which any further increase in angle of attack, increase in load factor, or reduction in power, would result in a stall warning (e.g., aircraft buffet, stall horn, etc.)."

DESCRIPTION:

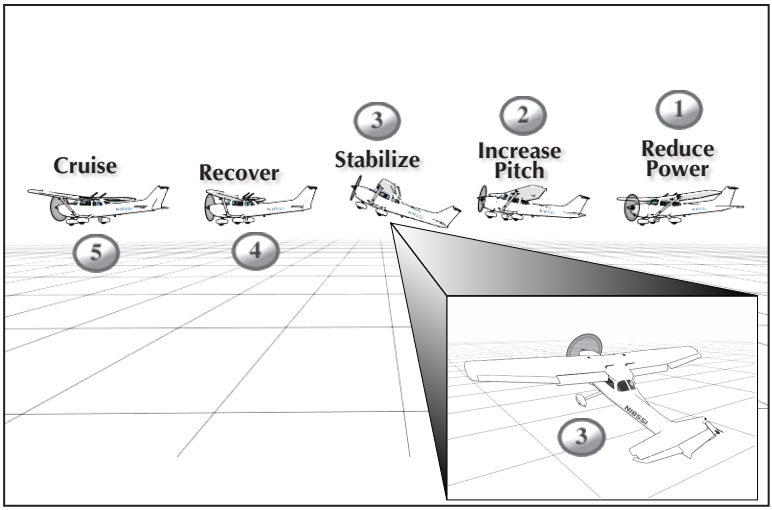
- Select an altitude that will allow recovery not lower than 1500' AGL (1000' AGL-Sport).
- Perform Pre-Maneuver Checklist.
- Perform clearing turns.

1. Apply carburetor heat, as appropriate. Reduce power to 1500 rpm (or 15" MP).
2. Smoothly increase pitch to maintain altitude as airspeed decreases.
   - As airspeed decreases to flap operating range (white arc), extend flaps in increments to full flaps, or as specified. Lower landing gear when below V_{LO}. Trim as necessary to compensate for changes in control pressures.
   - As airspeed approaches slow flight, adjust power for level flight (approx. 2000 RPM or 20" MP). Avoid abrupt changes in pitch, bank, and power.
3. Stabilize the aircraft maintaining heading, altitude, and airspeed.
   - Straight and level, turns, climbs, and descents should be performed using various flap settings and bank angles, as specified, while maintaining slow flight.
4. Recovery is initiated by smoothly applying full power, shutting off carburetor heat, as appropriate, and adjusting pitch to maintain altitude. Select the second flap setting and establish a pitch attitude, as appropriate, to maintain altitude.
   - As airspeed increases, select the first flap setting and establish a pitch attitude, as appropriate, to maintain altitude.

Slow Flight – Landing Configuration

- Above appropriate indicated airspeed, retract remaining flaps and landing gear as required.

5 • Resume normal cruise, or as specified.



COMMON ERRORS:

- Failure to adequately clear the area.
- Inadequate back elevator pressure as power is reduced, resulting in altitude loss.
- Excessive back elevator pressure as power is reduced, resulting in a climb, followed by a rapid reduction in airspeed and "mushing."
- Fixation on the airspeed indicator.
- Inadequate compensation for adverse yaw during turns.
- Failure to anticipate changes in lift as flaps are extended or retracted.
- Inadequate power management.
- Inability to adequately divide attention between airplane control and orientation.

NOTES:

Power-On Stalls Imminent and Full – Cruise Configuration

OBJECTIVE: To recognize the indications of an imminent or full stall during a power on situation and to make prompt, positive recoveries with minimum loss of altitude while maintaining coordinated flight.

STANDARDS: Sport/Recreational/Private - Heading: ±10° or Bank: ≤20° ±10°
Demonstrated proper recovery procedure.
Maintains coordinated flight.
Avoids secondary stalls/spins.
Recovers with minimum altitude loss.

CONDITIONS: Stalls should be accomplished in straight flight and turns simulating departure with emphasis placed on smoothness, coordination, and accuracy.

DESCRIPTION:

- Select an altitude to allow recovery above 1500' AGL (1000' AGL-Sport).
- Perform Pre-Maneuver Checklist.
- Perform clearing turns.

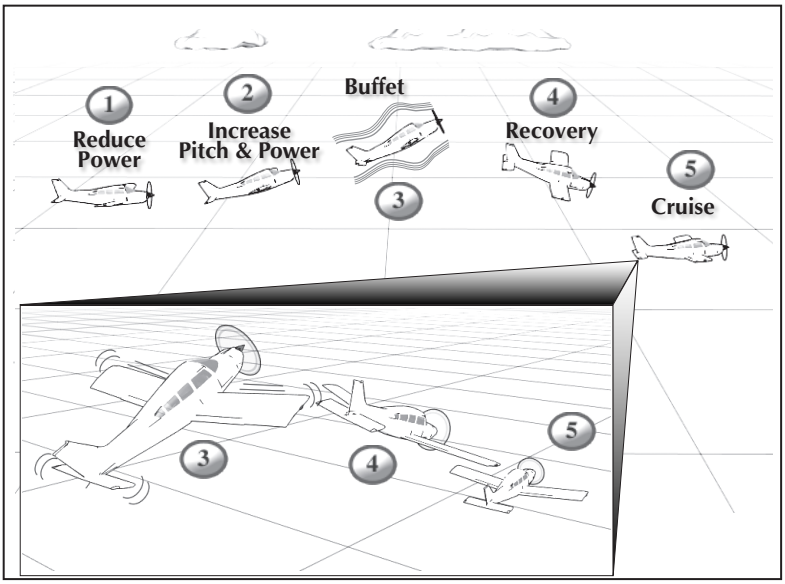
1. Apply carburetor heat, as appropriate. Reduce power to 1200 RPM (or 12" MP). Smoothly increase pitch to maintain altitude as airspeed decreases.
2. As airspeed approaches V_{LOF}, smoothly apply power to full, shutting off carburetor heat, as appropriate, while increasing pitch.

NOTE: Some aircraft may require a reduced power setting to avoid excessively nose high pitch attitudes.

3. Initiate recovery when:
   - Imminent stall-The first buffet or rapid decay of control effectiveness is experienced.
   - Full stall-A sudden loss of control effectiveness occurs, excessive sink rate, or sudden nose pitch down with full up elevator is experienced.
4. Recover by simultaneously verifying full power, decreasing the angle of attack, and leveling the wings. Establish a pitch attitude to minimize altitude loss (approximately V_X attitude) and establish a positive rate of climb.
   - When a positive rate of climb has been obtained and the aircraft is clear of obstacles (simulated), establish V_Y attitude.
5. Resume normal cruise, or as specified.

NOTES:

Power-On Stalls Imminent and Full – Cruise Configuration



COMMON ERRORS:

- Failure to adequately clear the area.
- Inability to recognize an approaching stall condition through feel for the airplane.
- Premature recovery.
- Overreliance on the airspeed indicator while excluding other cues.
- Inadequate scanning resulting in an unintentional wing-low condition during entry.
- Excessive back elevator pressure resulting in an exaggerated nose-up attitude during entry.
- Inadequate rudder control.
- Inadvertent secondary stall during recovery.
- Failure to maintain a constant bank angle during turning stalls.
- Excessive forward-elevator pressure during recovery resulting in negative load on the wings.
- Excessive airspeed buildup during recovery.
- Failure to take timely action to prevent a full stall during the conduct of imminent stalls.

NOTES:

Power-On Stalls Imminent and Full – Specified Configuration

OBJECTIVE: To recognize the indications of an imminent or full stall during a power on situation and to make prompt, positive recoveries with minimum loss of altitude while maintaining coordinated flight.

STANDARDS: Sport/Recreational/Private - Heading: ±10° or Bank: ≤20° ±10°
Demonstrated proper recovery procedure.
Maintains coordinated flight.
Avoids secondary stalls/spins.
Recovers with minimum altitude loss.

CONDITIONS: Stalls should be accomplished in straight flight and turns simulating departure with emphasis placed on smoothness, coordination, and accuracy.

DESCRIPTION:

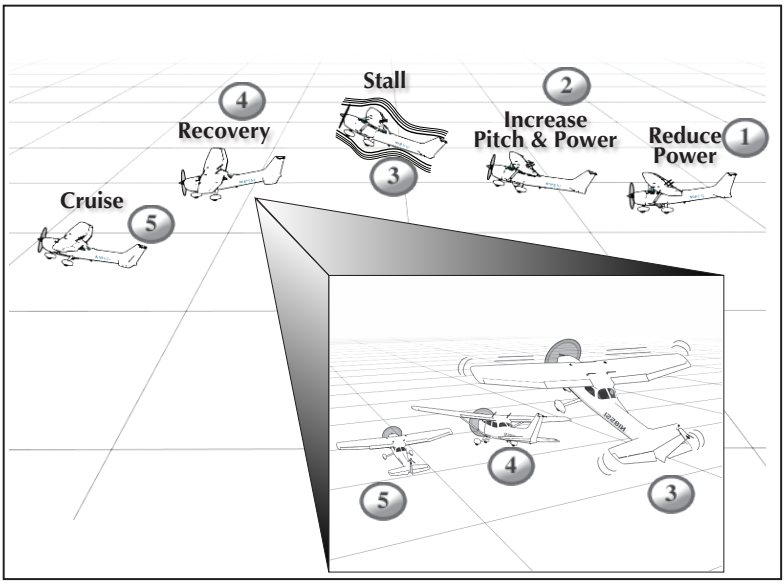
- Select an altitude to allow recovery above 1500' AGL (1000' AGL-Sport).
- Perform Pre-Maneuver Checklist.
- Perform clearing turns.

1. • Apply carburetor heat, as appropriate. Reduce power to 1200 RPM (or 12" MP). Smoothly increase pitch to maintain altitude as airspeed decreases.
   • Add flaps for short-field takeoff as specified in P.O.H. when airspeed is within flap operating range and lower the landing gear when below V_{LO}, as required.
2. • As airspeed approaches V_{LOF}, smoothly apply power to full, shutting off carburetor heat, as appropriate, while increasing pitch.

NOTE: Some aircraft may require a reduced power setting to avoid excessively nose high pitch attitudes.

3. • Initiate recovery when:
   – Imminent stall-The first buffet or rapid decay of control effectiveness is experienced.
   – Full stall-A sudden loss of control effectiveness occurs, excessive sink rate, or sudden nose pitch down with full up elevator is experienced.
4. • Recover by simultaneously verifying full power, decreasing the angle of attack and leveling the wings. Establish a pitch attitude to minimize altitude loss (approximately V_X attitude) and establish a positive rate of climb.
   • When a positive rate of climb and appropriate airspeed have been established, retract flaps and landing gear, as required, while establishing a V_Y attitude.
5. • Resume normal cruise, or as specified.

Power-On Stalls Imminent and Full – Specified Configuration



COMMON ERRORS:

- Failure to adequately clear the area.
- Inability to recognize an approaching stall condition through feel for the airplane.
- Premature recovery.
- Overreliance on the airspeed indicator while excluding other cues.
- Inadequate scanning resulting in an unintentional wing-low condition during entry.
- Excessive back elevator pressure resulting in an exaggerated nose-up attitude during entry.
- Inadequate rudder control.
- Inadvertent secondary stall during recovery.
- Failure to maintain a constant bank angle during turning stalls.
- Excessive forward-elevator pressure during recovery resulting in negative load on the wings.
- Excessive airspeed buildup during recovery.
- Failure to take timely action to prevent a full stall during the conduct of imminent stalls.

NOTES:

Power-Off Stalls Imminent and Full – Cruise Configuration

OBJECTIVE: To recognize indications of an imminent or full stall during power-off situations and to make prompt, positive recoveries, with minimum loss of altitude while maintaining coordinated flight.

STANDARDS: Sport/Recreational/Private - Heading: ±10° or Bank: ≤20° ±10°
Demonstrated proper recovery procedure.
Maintains coordinated flight.
Avoids secondary stalls/spins.
Recovers with minimum altitude loss.

CONDITIONS: Stalls should be accomplished in straight flight and turns. Emphasis should be placed on smoothness, coordination, and accuracy. Some recoveries during training may be with power at idle.

DESCRIPTION:

- Select an altitude to allow recovery above 1500' AGL (1000' AGL-Sport).
- Perform Pre-Maneuver Checklist.
- Perform clearing turns.
- Apply carburetor heat, as appropriate. Reduce power to 1200 RPM (or 12" MP).
- Smoothly increase pitch to maintain altitude while slowing to final approach speed.
- Stabilize aircraft, maintaining heading.
- Adjust power to the approach power setting while establishing the approach attitude.

1 2 • From final approach airspeed and attitude, reduce power to idle and continue to increase pitch. Establish a bank angle up to 20°, if desired, in appropriate direction.

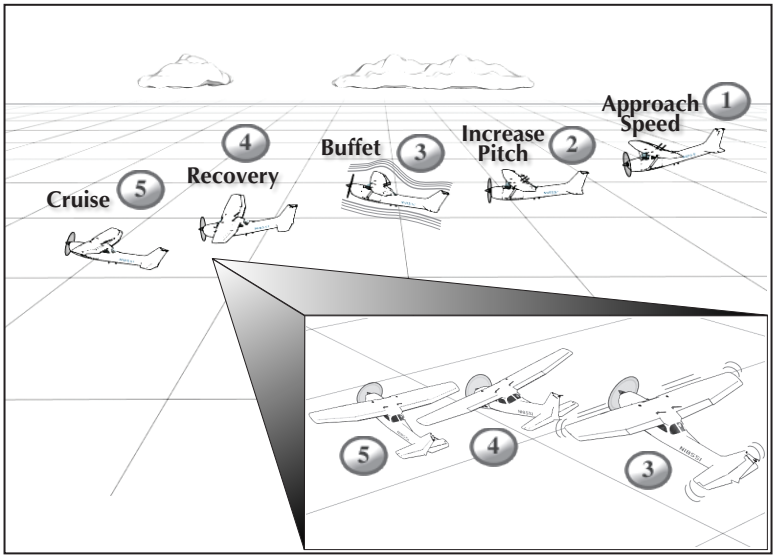
3 • Initiate recovery when:
  – Imminent stall-The first buffet or rapid decay of control effectiveness is experienced.
  – Full stall-A sudden loss of control effectiveness occurs, excessive sink rate, or sudden nose pitch down with full up elevator is experienced.

4 • Recover by simultaneously adding full power (carb heat off as required), decreasing the angle of attack, and leveling the wings. Establish a pitch attitude to minimize altitude loss (approximately V_X attitude) and establish a positive rate of climb.

- With a positive rate of climb, establish V_Y attitude.

5 • Resume normal cruise, or as specified.

Power-Off Stalls Imminent and Full – Cruise Configuration



COMMON ERRORS:

- Failure to adequately clear the area.
- Inability to recognize an approaching stall condition through feel for the airplane.
- Premature recovery.
- Overreliance on the airspeed indicator while excluding other cues.
- Inadequate scanning resulting in an unintentional wing-low condition during entry.
- Excessive back elevator pressure resulting in an exaggerated nose-up attitude during entry.
- Inadequate rudder control.
- Inadvertent secondary stall during recovery.
- Failure to maintain a constant bank angle during turning stalls.
- Excessive forward-elevator pressure during recovery resulting in negative load on the wings.
- Excessive airspeed buildup during recovery.
- Failure to take timely action to prevent a full stall during the conduct of imminent stalls.
- Failure to establish positive rate of climb prior to retracting landing gear.

NOTES:

Power-Off Stalls Imminent and Full – Landing Configuration

OBJECTIVE:	To recognize indications of an imminent or full stall during power-off situations and to make prompt, positive recoveries, with minimum loss of altitude while maintaining coordinated flight.
STANDARDS:	Sport/Recreational/Private - Heading: ±10° or Bank: ≤20° ±10° Demonstrated proper recovery procedure. Maintains coordinated flight. Avoids secondary stalls/spins. Recovers with minimum altitude loss.
CONDITIONS:	Stalls should be accomplished in straight flight and turns using various flap settings. Emphasis should be placed on smoothness, coordination, and accuracy. Some recoveries during training may be with power at idle.

DESCRIPTION:

- Select an altitude to allow recovery above 1500' AGL (1000' AGL-Sport).
- Perform Pre-Maneuver Checklist.
- Perform clearing turns.
- Apply carburetor heat, as appropriate. Reduce power to 1500 RPM (or 15" MP).
- Smoothly increase pitch to maintain altitude while slowing to final approach speed. When airspeed is within flap operating range, add flaps incrementally until full flaps are obtained. When airspeed is below V_{LO}, extend the landing gear as required.
- Stabilize aircraft, maintaining heading.
- Adjust power to the approach power setting while establishing the approach attitude.

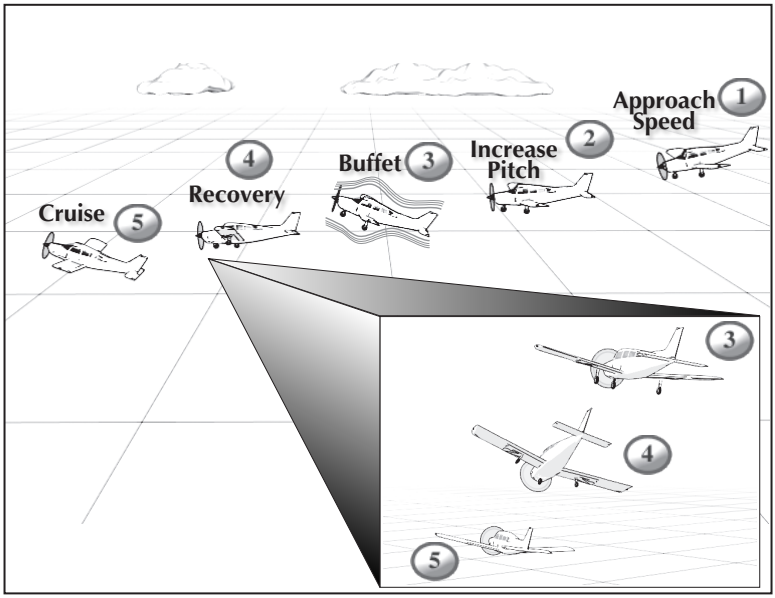
- From final approach airspeed and attitude, reduce power to idle and continue to increase pitch. Establish a bank angle up to 20°, if desired, in appropriate direction.

- Initiate recovery when:
  - Imminent stall-The first buffet or rapid decay of control effectiveness is experienced.
  - Full stall-A sudden loss of control effectiveness occurs, excessive sink rate, or sudden nose pitch down with full up elevator is experienced.

- Recover by simultaneously adding full power (carb heat off as required), decreasing the angle of attack, and leveling the wings. Select the second flap setting, establish a pitch attitude to minimize altitude loss (approximately V_X attitude) and establish a positive rate of climb.

Power-Off Stalls Imminent and Full – Landing Configuration

- With a positive rate of climb, select the first flap setting, retract the landing gear as required, and establish V_Y attitude.
- Above the appropriate indicated airspeed, retract flaps.
- 5 • Resume normal cruise, or as specified.



COMMON ERRORS:

- Failure to adequately clear the area.
- Inability to recognize an approaching stall condition through feel for the airplane.
- Premature recovery.
- Overreliance on the airspeed indicator while excluding other cues.
- Inadequate scanning resulting in an unintentional wing-low condition during entry.
- Excessive back elevator pressure resulting in an exaggerated nose-up attitude during entry.
- Inadequate rudder control.
- Inadvertent secondary stall during recovery.
- Failure to maintain a constant bank angle during turning stalls.
- Excessive forward-elevator pressure during recovery resulting in negative load on the wings.
- Excessive airspeed buildup during recovery.
- Failure to take timely action to prevent a full stall during the conduct of imminent stalls.
- Failure to establish positive rate of climb prior to retracting landing gear.

NOTES:

Accelerated Stalls

OBJECTIVE: To recognize indications of an imminent or full stall condition occurring at a higher than normal airspeed due to an increased load factor.
STANDARDS: N/A
CONDITIONS: N/A

DESCRIPTION:

- Select an altitude to allow recovery above 3000' AGL.
- Perform Pre-Maneuver Checklist.
- Perform clearing turns.

1. Apply carburetor heat, as appropriate. Reduce power to 1500 RPM (or 15" MP). Smoothly increase pitch to maintain altitude as airspeed decreases.
- Stabilize aircraft, maintaining heading.

2. As airspeed decreases to V_S +20, enter a coordinated 45° bank in either direction while smoothly increasing back pressure to maintain altitude and adjusting ailerons so as not to exceed 45° of bank.

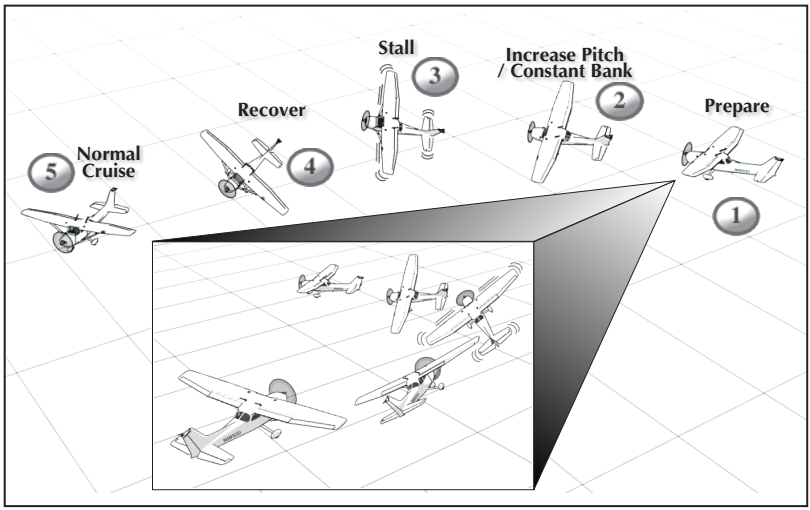
3. Increase back pressure to maintain altitude until stall occurs.

4. Recover by promptly decreasing angle of attack and leveling the wings, while simultaneously applying full power and carburetor heat off, as appropriate.

5. Resume normal cruise, or as specified.

NOTES:

Accelerated Stalls



COMMON ERRORS:

- Failure to adequately clear the area.
- Inability to recognize an approaching stall condition through feel for the airplane.
- Premature recovery.
- Overreliance on the airspeed indicator while excluding other cues.
- Inadequate scanning resulting in an unintentional wing-low condition during entry.
- Excessive back elevator pressure resulting in an exaggerated nose-up attitude during entry.
- Inadequate rudder control.
- Inadvertent secondary stall during recovery.
- Failure to maintain a constant bank angle during turning stalls.
- Excessive forward-elevator pressure during recovery resulting in negative load on the wings.
- Excessive airspeed buildup during recovery.
- Failure to take timely action to prevent a full stall during the conduct of imminent stalls.

NOTES:

Emergency Descent

OBJECTIVE: To recognize situations that require an emergency descent and obtain proficiency in the execution of an emergency descent.

STANDARDS: Recognizes situations, such as depressurization, cockpit smoke, and/or fire that require an emergency descent.
Establishes the appropriate airspeed and configuration for the emergency descent.
Exhibits orientation, division of attention, and proper planning.
Maintains positive load factors during the descent.

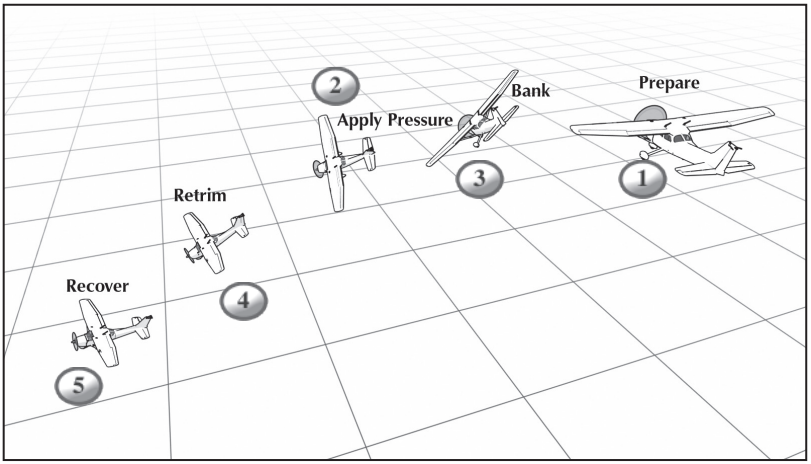
CONDITIONS: This maneuver should be performed at an altitude to allow sufficient time for the maneuver to be accomplished and recovery at a safe altitude (e.g. start above 3000' AGL and recover by 1500' AGL).

DESCRIPTION:

1. • Select an appropriate altitude as described in the conditions.
   - Perform Pre-Maneuver Checklist.
   - Perform clearing turns.
   - Configure the aircraft as recommended by the manufacturer. If a configuration is not specified, determine the configuration that will allow the highest rate of descent within the limitations of the aircraft (V_{NE}, V_{NO}, V_{LE}, or V_{FE} as appropriate for conditions).
   - Apply carburetor heat, as appropriate. Smoothly close the throttle control. Move the propeller control full forward and close the cowl flaps, as appropriate.
2. • Apply forward pressure on the control yoke to adjust the pitch to establish the limiting speed for the configuration and conditions
3. (+0/-10 knots recommended). A bank of up to 60° may be used
4. to help maintain a positive load factor during the pitch over. Retrim the aircraft for the desired airspeed.
5. • Smoothly recover from the descent at a safe altitude and resume cruise flight conditions.

NOTES:

Emergency Descent



COMMON ERRORS:

- Failure to identify reason for executing an emergency descent.
- Improper use of the prescribed emergency checklist to verify accomplishment of procedures for initiating the emergency descent.
- Failure to adequately clear the area before and during the maneuver.
- Failure to establish the appropriate configuration or pitch attitude.
- Excess entry or recovery G's (+ or -).
- Failure to take timely action to prevent exceeding aircraft limitations.
- Improper procedures for recovering from the maneuver.

NOTES:

Rectangular Course

OBJECTIVE: To develop the pilot's ability to maneuver the airplane while compensating for drift during turns, and orient the flight path with ground references while dividing attention inside and outside the airplane.

STANDARDS: Sport/Recreational/Private - Altitude: ±100 feet, Airspeed: ±10 knots, Bank: Avoids banking in excess of 45°

CONDITIONS: N/A

DESCRIPTION:

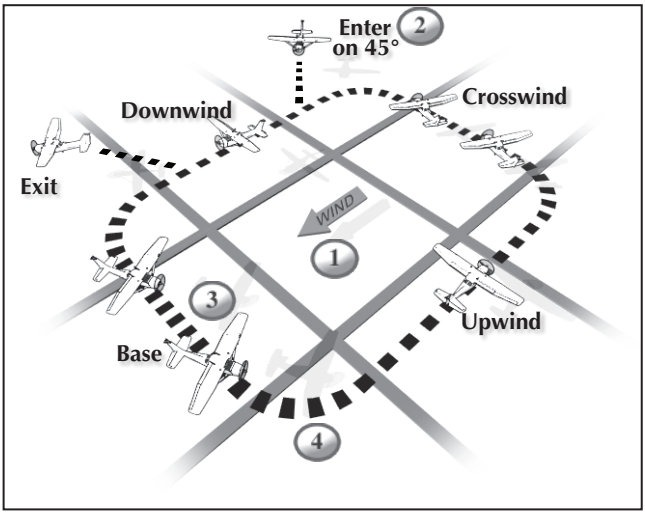
- Select an altitude of 1000' AGL/or an appropriate traffic pattern altitude.

NOTE: Altitudes as low as 600' AGL may be used by the instructor for demonstration purposes.

1. • Select a prominent rectangular field bounded by four section lines whose sides are approximately equal to a typical traffic pattern. The major axis of the rectangle should be approximately parallel to wind direction at flight altitude. The field should also be close to a suitable place to land in case of an emergency.
   • Perform Pre-Maneuver Checklist.
   • Clear the area.
2. • Establish normal cruise airspeed (2300 RPM) and enter the maneuver at a 45° to the downwind, if possible. The first circuit should be to the left.
3. • Establish the proper Wind Correction Angle (WCA) to maintain a uniform distance from the field boundaries.
   • Commence and complete turns abeam the field boundaries.
4. • Vary the bank angle (not to exceed 45°) to maintain a constant radius during the turns.
   • Reverse course, as directed.

NOTES:

Rectangular Course



COMMON ERRORS:

- Failure to adequately clear the area.
- Poor reference selection.
- Failure to establish proper altitude, prior to entry. (Typically entering the maneuver while descending).
- Failure to establish appropriate wind correction angle resulting in drift.
- Gaining or losing altitude.
- Poor coordination. (Typically skidding in turns from a downwind heading and slipping in turns from an upwind heading).
- Abrupt control usage.
- Inability to adequately divide attention between airplane control and maintaining ground track.
- Improper timing in beginning and recovering from turns.
- Inadequate visual lookout for other aircraft.

NOTES:

Turns Around a Point

OBJECTIVE: To develop the ability to maneuver the airplane while compensating for drift during turns, and orient the flight path with ground references while dividing attention inside and outside the airplane.

STANDARDS: Sport/Recreational/Private - Altitude: ±100 feet, Airspeed: ±10 knots, Bank: Avoids banking in excess of 45°
Additional Sport - Exits at the point of entry heading ±15°

CONDITIONS: When performing this maneuver in high winged aircraft, the wing should not block the view of the selected reference point.

DESCRIPTION:

- Select an altitude of 1000' AGL.

NOTE: Altitudes as low as 600' AGL may be used by the instructor for demonstration purposes.

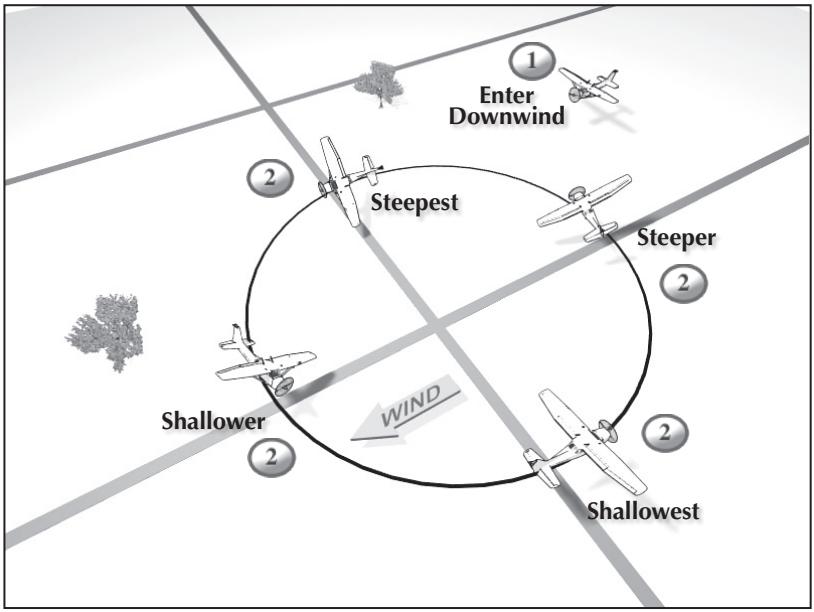
- Select a small but prominent reference point that is close to a suitable place to land in case of an emergency.
- Perform Pre-Maneuver Checklist.
- Clear the area.

1. Establish normal cruise speed (2300 RPM) and enter the maneuver approximately downwind so that the initial bank angle is approximately 45°.
2. Adjust bank angle and Wind Correction Angle, as necessary, to correct for the effects of wind and to maintain a constant radius around the reference point.

- Plan to depart on the entry heading after two turns and reverse course, unless otherwise instructed.

NOTES:

Turns Around a Point



COMMON ERRORS:

- Failure to adequately clear the area.
- Poor reference selection.
- Failure to establish appropriate bank on entry.
- Failure to recognize wind drift.
- Excessive bank and/or inadequate wind correction angle on the downwind side of the circle resulting in drift towards the reference point.
- Inadequate bank angle and/or excessive wind correction angle on the upwind side of the circle resulting in drift away from the reference point.
- Skidding turns when turning from downwind to crosswind.
- Slipping turns when turning from upwind to crosswind.
- Gaining or losing altitude.

NOTES:

S-Turns

OBJECTIVE: To develop the ability to maneuver the airplane while compensating for drift during turns and orient the flight path in relation to ground references while dividing attention inside and outside the airplane.

STANDARDS: Sport/Recreational/Private - Altitude: ±100 feet, Airspeed: ±10 knots, Bank: Avoids banking in excess of 45°

CONDITIONS: N/A

DESCRIPTION:

- Select an altitude of 1000' AGL.

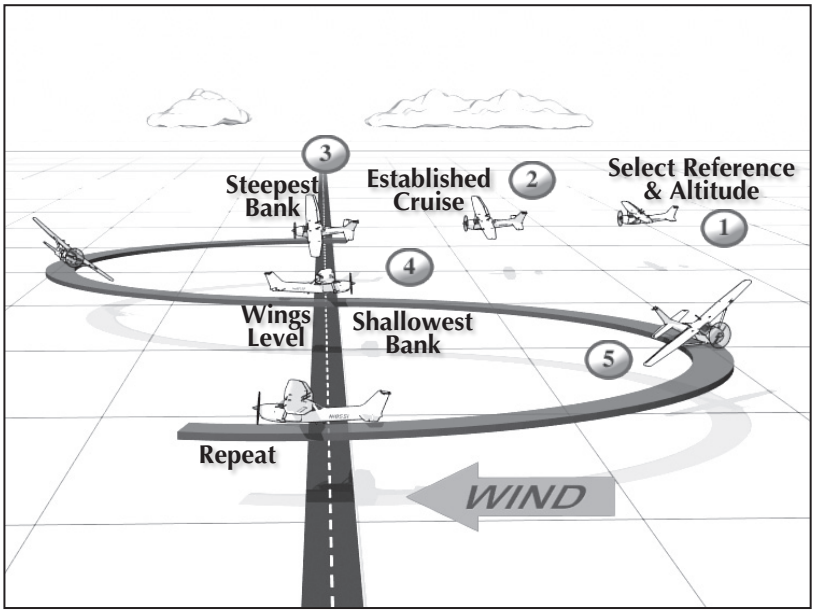
NOTE: Altitudes as low as 600' AGL may be used by the instructor for demonstration purposes.

1. Select a road or other straight reference line running approximately perpendicular to the wind. Also, the road should be close to a suitable place to land in case of an emergency.
   - Perform Pre-Maneuver Checklist.
   - Clear the area.
2. Establish normal cruise speed (2300 RPM).
3. At a point directly over the reference line, heading downwind, initiate a 180° constant radius turn, modifying the bank angle and Wind Correction Angle (WCA) as necessary to compensate for wind drift. At the completion of the turn, the aircraft should be directly over and perpendicular to the reference line with the wings level.
4. Immediately upon completion of the first turn, an identical turn is begun on the upwind side of the reference line in the opposite direction.
5. Bank and WCA should be adjusted, as necessary, throughout the maneuver to achieve two complete semicircles of equal radius.

NOTE: Straight and level flight should occur only during the transition in direction over the reference line.

NOTES:

S-Turns



COMMON ERRORS:

- Failure to adequately clear the area.
- Poor reference selection.
- Poor coordination.
- Gaining or losing altitude.
- Inability to visualize the half circle ground track.
- Poor timing in beginning and recovering from turns.
- Faulty correction for drift.
- Inadequate visual lookout for other aircraft.

NOTES:

Steep Turns

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

STANDARDS: Sport/Recreational/Private - Airspeed: ±10 knots, Altitude: ±100 feet, Bank: 45° ±5°, Heading: ±10° of entry heading

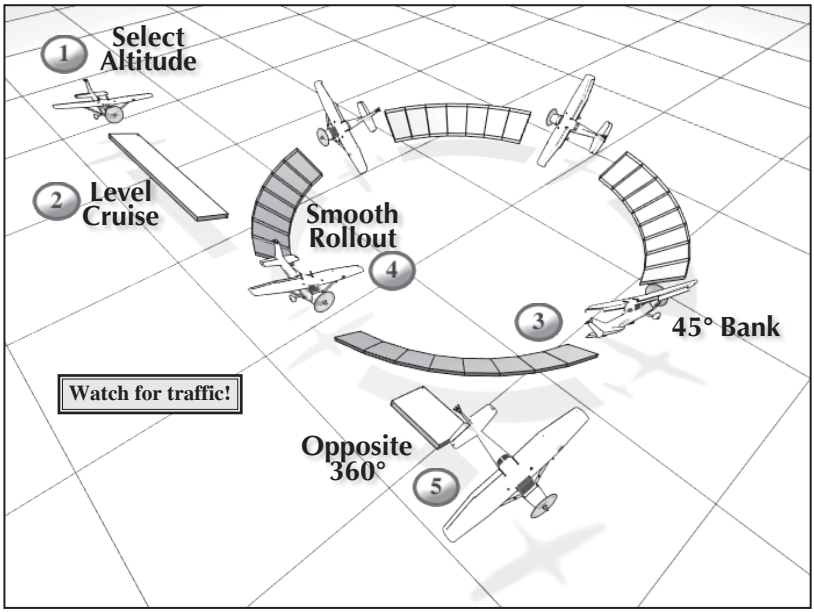
CONDITIONS: The maneuver should be performed at the manufacturer's recommended airspeed or, if one is not stated, a safe airspeed not to exceed V_A.

DESCRIPTION:

1. • Select an altitude that will allow recovery no lower than 1500' AGL.
2. • Stabilize the aircraft in level cruise flight at the appropriate airspeed. Select a suitable visual reference point.
   - Perform Pre-Maneuver Checklist.
   - Clear the area.
3. • Smoothly roll the aircraft into a 45° bank turn.
   - As the bank becomes steeper, adjust back pressure so as to maintain constant altitude and apply power, as necessary, to maintain airspeed.
   - Maintain a constant bank angle, altitude, and airspeed during the turn.
   - Maintain a constant vigilance for traffic so as to clear the area for the second turn.
4. • Rollout:
   – Before the desired visual reference point, initiate a smooth rollout to level flight.
   – Relax the back pressure used to maintain altitude during turns.
   – Reduce power setting to entry setting.
5. • After clearing the airspace during rollout, initiate a 360° turn in the opposite direction.
   - After completion of the second turn, return to straight-and-level at cruise (2300 RPM).

NOTES:

Steep Turns



COMMON ERRORS:

- Failure to adequately clear the area.
- Excessive pitch change during entry or recovery.
- Attempts to start recovery prematurely.
- Failure to stop the turn on a precise heading.
- Excessive rudder during recovery, resulting in skidding.
- Inadequate power management.
- Inadequate airspeed control.
- Poor coordination.
- Gaining altitude in right turns and/or losing altitude in left turns.
- Failure to maintain constant bank angle.
- Disorientation.
- Attempting to perform the maneuver by instrument reference rather than visual reference.
- Failure to scan for other traffic during the maneuver.

NOTES:

Non-Local Departure Procedures (VFR-Recreational)

OBJECTIVE: To develop the ability to properly establish the aircraft on a route to another airport after leaving the departure airport.

STANDARDS: Recreational - Altitude: ±200 feet, Heading: ±15°
Follows the preplanned course by visual reference to landmarks.
Identifies landmarks by relating surface features to chart symbols.
Navigates by means of pilotage.
Verifies position within ±3 NM of the flight planned route at all times.

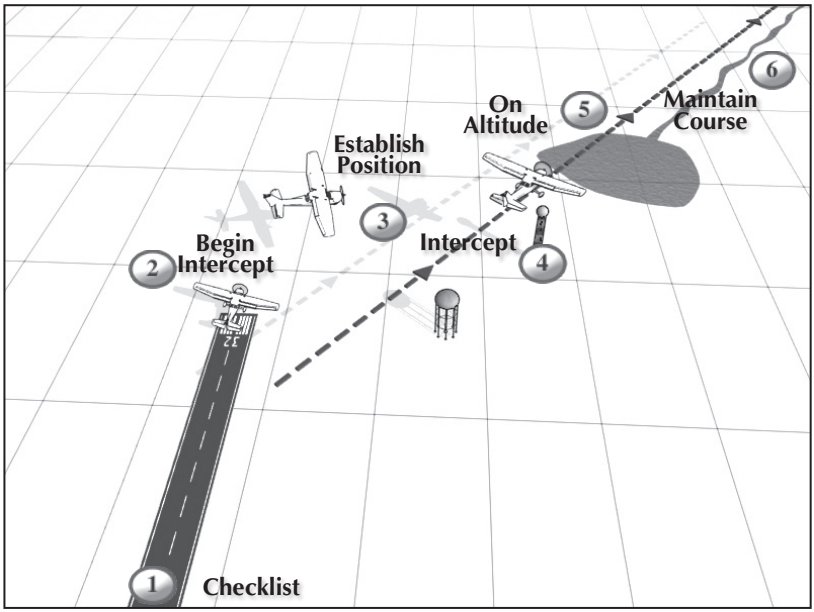
CONDITIONS: N/A

DESCRIPTION:

1. • Complete Lineup Checklist.
2. • Upon appropriate departure from the traffic pattern, begin course intercept.
3. • Establish position using pilotage.
4. • Intercept and establish on course by visual references.
5. • Level-off at selected altitude.
   • Complete Cruise Checklist.
6. • Maintain course by the use of pilotage. Other means may be used to supplement the pilotage, as appropriate, if trained.

NOTES:

Non-Local Departure Procedures (VFR-Recreational)



COMMON ERRORS:

- Being in too big a hurry to depart and forgetting important items.
- Failure to intercept course from the outset.
- Failure to complete a cruise checklist.
- Failure to keep track of the flight by reference to the checkpoints and other landmarks.

NOTES:

Cross-Country Departure Procedures (VFR-Sport/Private)

OBJECTIVE: To develop the ability to properly establish the aircraft on a cross-country route after leaving the departure airport.

STANDARDS: Sport/Private - Altitude: ±200 feet, Heading: ±15°
Follows the preplanned course by visual reference to landmarks.
Identifies landmarks by relating surface features to chart symbols.
Navigates by means of pre-computed headings, groundspeed, and elapsed time.
Combines pilotage and dead reckoning.
Verifies position within ±3 NM of the flight planned route at all times.

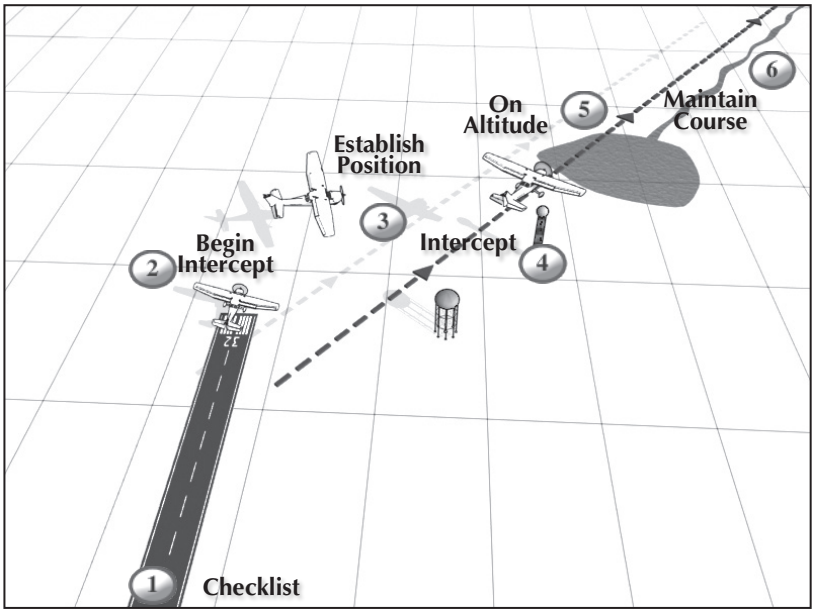
CONDITIONS: N/A

DESCRIPTION:

1. • Complete Lineup Checklist noting time at takeoff.
2. • Upon appropriate departure from the traffic pattern, begin course intercept.
3. • Establish position using pilotage and radio navigation (Private).
4. • Intercept and establish on course by visual references.
   - Contact Flight Service Station (FSS) to open flight plan.
   - Obtain flight following, if applicable.
5. • Level-off at selected altitude.
   - Complete Cruise Checklist.
   - Complete a groundspeed check.
   - Calculate Estimated Time of Arrival (ETA) times.
6. • Maintain course by the use of pilotage, dead reckoning, and radio navigation, as appropriate.

NOTES:

Cross-Country Departure Procedures (VFR-Sport/Private)



COMMON ERRORS:

- Being in too big a hurry to depart and forgetting important items.
- Failure to establish time off.
- Failure to intercept course from the outset.
- Not filing a flight plan.
- Failure to complete a cruise checklist.
- Failure to keep track of the flight by reference to the checkpoints and other landmarks.
- Failure to check groundspeed.
- Not keeping track of the flight using radio navaids.
- Ignoring the prepared flight log.

NOTES:

Diversion to an Alternate (VFR-Sport/Recreational)

OBJECTIVE: To develop the ability to plot courses in flight to alternate destinations when continuation of the flight to the original destination is impracticable.

STANDARDS: Sport/Recreational - Altitude: ±200 feet, Heading: ±15°
Selects an appropriate airport and route.
Diverts promptly toward the alternate airport.
Makes a reasonable estimate of heading and fuel consumption to the alternate airport. (Recreational)
Determines there is sufficient fuel to fly to the alternate airport or landing area. (Sport)

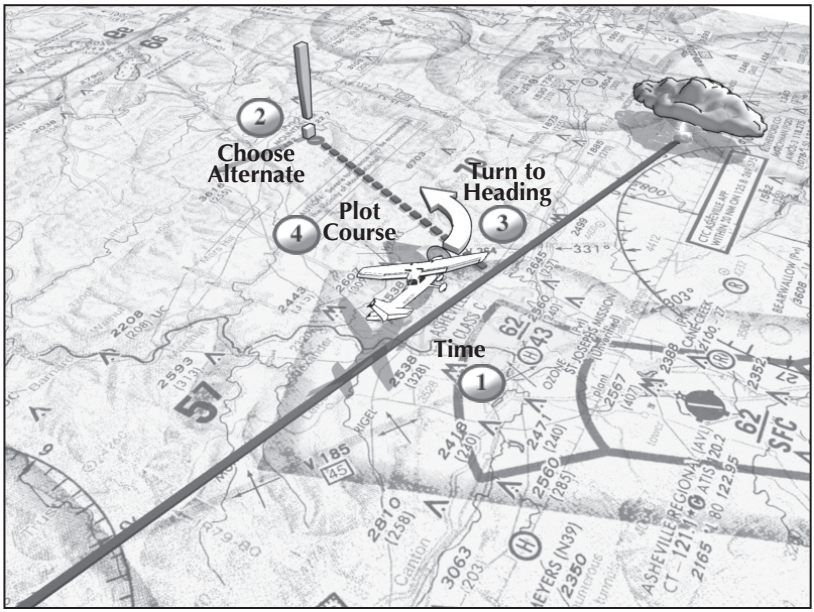
CONDITIONS: N/A

DESCRIPTION:

1. Note time and point of diversion.
2. Determine the alternate.
3. Turn to an approximate heading towards the alternate.
4. Plot the course on a sectional chart and measure the course.
   - Measure the total distance to the alternate.
   - Make a reasonable estimate of heading and fuel consumption to the alternate airport, if time permits.
   - Determine that there is sufficient fuel to fly to the alternate airport or landing area.
   - If a flight plan has been filed, amend it as necessary and close it after landing.

NOTES:

Diversion to an Alternate (VFR-Sport/Recreational)



COMMON ERRORS:

- Acting too slowly in finding an appropriate alternate airport.
- Not properly determining distance to alternate, heading to alternate, and estimating groundspeed to determine an ETA.
- Failure to determine proper landmarks en route.
- Failure to stay on the selected course.

NOTES:

Diversion to an Alternate (VFR-Private)

OBJECTIVE: To develop the ability to plot courses in flight to alternate destinations when continuation of the flight to the original destination is impracticable.

STANDARDS: Private - Altitude: ±200 feet, Heading: ±15°
Selects an appropriate airport and route.
Diverts promptly toward the alternate airport.
Makes a reasonable estimate of heading, groundspeed, arrival time, and fuel consumption to the alternate airport.

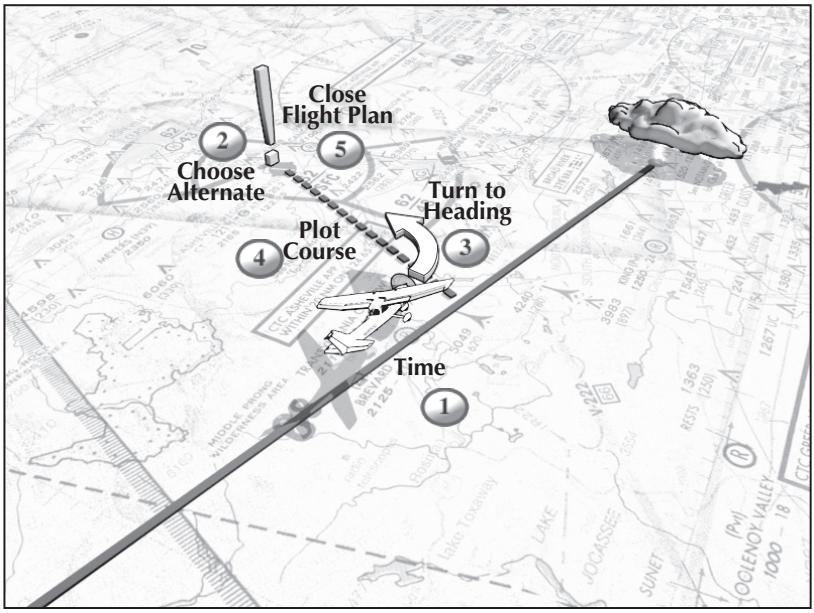
CONDITIONS: N/A

DESCRIPTION:

1. • Note time and point of diversion.
2. • Determine the alternate.
3. • Turn to an approximate heading towards the alternate.
4. • Plot the course on a sectional chart and measure the course.
   - Measure the total distance to the alternate.
   - Accurately determine the groundspeed and the compass heading.
   - Accurately determine ETE, ETA, and fuel burn to the alternate, if time permits.
   - Amend flight plan as necessary.
5. • Close flight plan after landing.

NOTES:

Diversion to an Alternate (VFR-Private)



COMMON ERRORS:

- Acting too slowly in finding an appropriate alternate airport.
- Not properly determining distance to alternate, heading to alternate, and groundspeed to determine an ETA.
- Failure to determine proper landmarks en route.
- Failure to stay on the selected course.

NOTES:

Lost Procedures (VFR-Recreational)

OBJECTIVE: To develop the ability to explain and execute lost procedures, selecting the best course of action when given a lost situation.

STANDARDS: Recreational
Identifies prominent landmarks.
Plans for a precautionary landing, if appropriate.

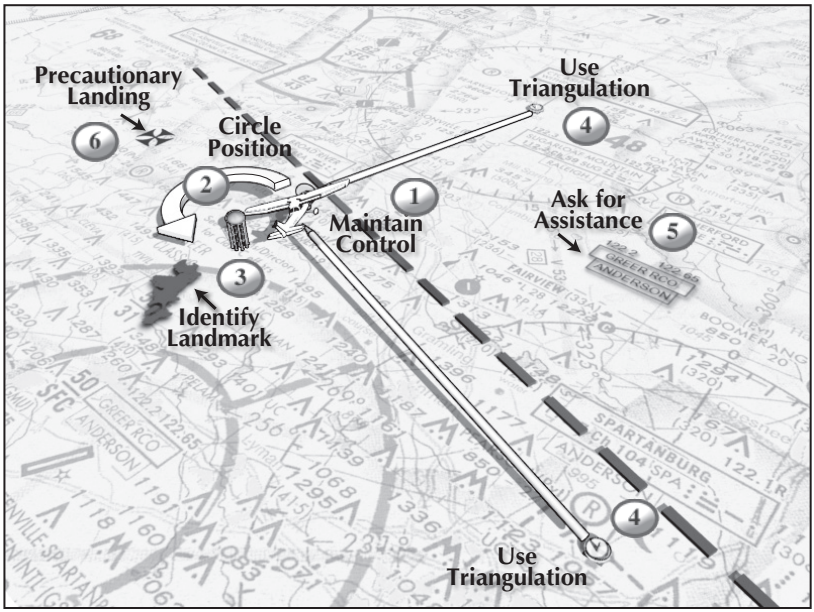
CONDITIONS: N/A

DESCRIPTION:

1. • Maintain aircraft control at all times.
   • Check the Heading Indicator with the Magnetic Compass. Reset the Heading Indicator, as necessary.
2. • Maintain the original heading, or circle your present position over a prominent landmark.
   • If at a low altitude, climb to a higher altitude, if possible.
3. • Using the sectional chart, attempt to locate and identify any prominent landmark(s).
4. • If trained on the use of the available Navaids (VOR, NDB), determine position by triangulation, as appropriate. Use GPS as appropriate.
5. • If unable to determine position, contact ATC for assistance.
   • If unable to determine a facility frequency or unable to establish contact, (simulate) transmit your situation on frequency 121.5 (emergency) and place code 7700 in the transponder.
6. • Plan a precautionary landing if deteriorating weather and/or fuel exhaustion is imminent.

NOTES:

Lost Procedures (VFR-Recreational)



COMMON ERRORS:

- Not having the HI set to the Magnetic Compass.
- Failure to find a prominent landmark and identify it on the sectional.
- Failure to have sufficient altitude to gain a better view of the terrain.
- Failure to utilize the radio aids in the area to help determine position.
- Failure to ask for assistance if unable to determine position.

NOTES:

Lost Procedures (VFR-Sport/Private)

OBJECTIVE: To develop the ability to explain and execute lost procedures, selecting the best course of action when given a lost situation.

STANDARDS: Sport/Private
Identifies prominent landmarks.
Uses navigation systems/facilities, as appropriate.

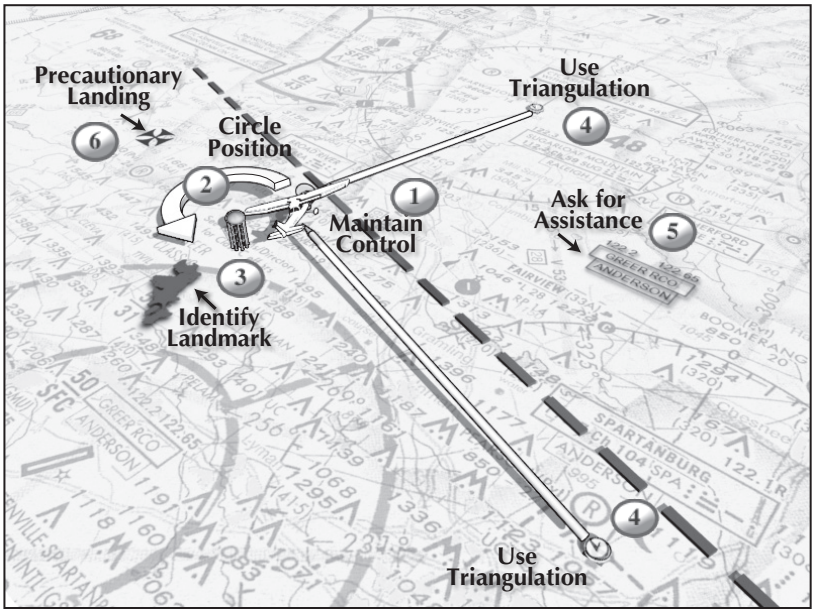
CONDITIONS: N/A

DESCRIPTION:

1. • Maintain aircraft control at all times.
   • Check the Heading Indicator with the Magnetic Compass. Reset the Heading Indicator, as necessary.
2. • Maintain the original heading, or circle your present position over a prominent landmark.
   • If at a low altitude, climb to a higher altitude, if possible.
3. • Using the sectional chart, attempt to locate and identify any prominent landmark(s).
4. • Use available Navaids (VOR, NDB), as appropriate, to determine position by triangulation. Use GPS as appropriate.
5. • If unable to determine position, contact ATC for assistance.
   • If unable to determine a facility frequency or unable to establish contact, (simulate) transmit your situation on frequency 121.5 (emergency) and place code 7700 in the transponder.
6. • Plan a precautionary landing if deteriorating weather and/or fuel exhaustion is imminent.

NOTES:

Lost Procedures (VFR-Sport/Private)



COMMON ERRORS:

- Not having the HI set to the Magnetic Compass.
- Failure to find a prominent landmark and identify it on the sectional.
- Failure to have sufficient altitude to gain a better view of the terrain.
- Failure to utilize the radio aids in the area to help determine position.
- Failure to ask for assistance if unable to determine position.

NOTES:

Navigation Systems – VOR

OBJECTIVE: To obtain proficiency in the orientation, interception, and tracking of navigational signals.

STANDARDS: Private - Altitude: ±200 feet, Heading: ±15°
Exhibits knowledge of the elements related to navigation systems.
Demonstrates the ability to use an airborne electronic navigation system.
Locates the airplane's position using the navigation system.
Intercepts and tracks a given course, radial, or bearing, as appropriate.
Recognizes and describes the indication of station passage.
Recognizes signal loss and takes appropriate action.

CONDITIONS: N/A

NOTE: There are three levels of methods used to intercept VOR radials (Basic, Intermediate, and Advanced). To truly understand intercepting and help build positional awareness, you first must learn to do intercepts using a basic method (the parallel method).

DESCRIPTION:

- Tune and identify the VOR facility to be used.
- Determine position and distance from the facility using all available equipment.
- Check and set the heading indicator with the magnetic compass a minimum of every 10-15 minutes.

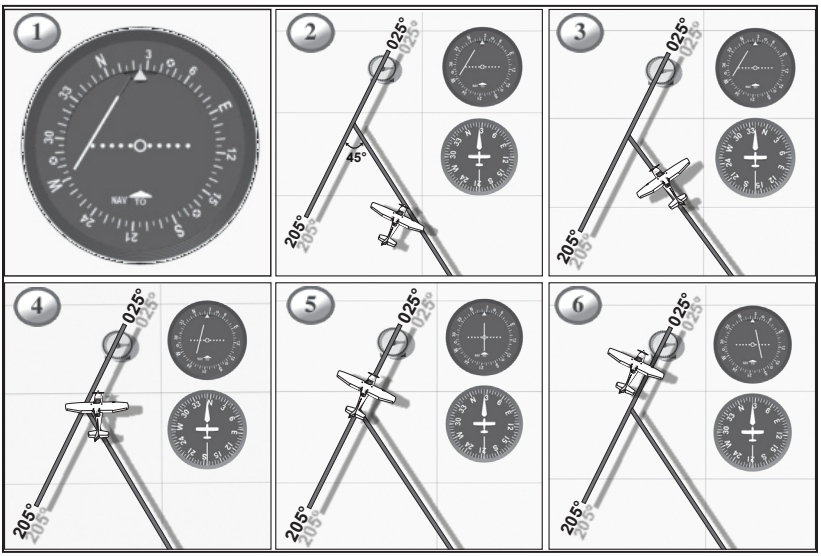
1. Set the OBS to the inbound/outbound course desired (e.g. 180°R outbound, set 180° FROM; 180°R inbound, set 360° TO).
2. Turn the aircraft to parallel the course to be intercepted.
   - Using the course heading set into the top of the OBS and the direction of the CDI deflection, determine the approximate intercept angle heading. Apply the desired intercept angle to the left or right of the course heading, as it corresponds to the direction of the CDI deflection. The maximum intercept angle should be 45° (e.g. 205°R inbound, 025° course inbound, CDI to the left [northwest], intercept heading approximately 340°).
3. Note the present heading and intercept heading. Turn in the direction closest to the intercept heading, establishing and maintaining the intercept heading.

NOTES:

- Determine the quality of the intercept. If the CDI does not indicate progress towards the desired course in an appropriate time:
  - Verify established on the intercept heading.
  - Verify position relative to the desired course.
  - If necessary, increase the intercept angle by selecting and establishing a new intercept heading.

NOTE: Absolute maximum intercept angle 90°.

4. As the CDI begins to center, lead the intercept with a turn to the inbound/outbound course heading so as not to fly through the desired course when established on course.
5. Track inbound/outbound by maintaining the required course heading.
6. Monitor the CDI. If the CDI should show a deflection left or right of center (on course), establish an intercept angle, as necessary.
   - Determine the quality of the intercept as noted previously.
   - Lead the re-centering of the CDI by reducing one-half (1/2) of the intercept angle and maintaining the new heading (wind correction heading) to maintain course.
   - Repeat course intercepts, as necessary, until establishing one heading that maintains the desired course (wind correction heading).



Navigation Systems – VOR

COMMON ERRORS:

- Careless tuning and identification of station.
- Failure to check receiver for accuracy/sensitivity.
- Turning in the wrong direction during an orientation. This error is common until you visualize position rather than heading.
- Failure to check the TO/FROM indicator, particularly during course reversals, resulting in reverse sensing and corrections in the wrong direction.
- Overshooting and undershooting radials on interception problems.
- Overcontrolling corrections during tracking, especially close to the station.
- Failure to parallel the desired radial on a track interception problem. Without this step, orientation to the desired radial can be confusing. Since you think in left/right terms, aligning your aircraft position to the radial/course is essential.
- Chasing the CDI, resulting in homing instead of tracking. Careless heading control and failure to bracket wind corrections makes this error common.

NOTES:

NOTES:

Navigation Systems – GPS

OBJECTIVE: To obtain proficiency in the orientation, interception, and tracking of navigational signals.

STANDARDS: Private - Altitude: ±200 feet, Heading: ±15°
Exhibits knowledge of the elements related to navigation systems.
Demonstrates the ability to use an airborne electronic navigation system.
Locates the airplane's position using the navigation system.
Loads the course appropriately in the GPS navigator.
Intercepts and tracks a given course.
Recognizes navigational receiver or RAIM failure and takes appropriate action.

CONDITIONS: N/A

NOTE: There can be significant differences in the operation of GPS navigators and there are numerous ways in which a GPS course can be defined. This procedure is not intended to teach the operation of a particular navigator. This procedure assumes the use of two defining waypoints for course definition, that the navigator is set in sequencing or leg mode, and the use of an external course selector / OBS head.

DESCRIPTION:

- Load the course into the GPS navigator and determine the course track for the leg to be intercepted.
- Check and set the heading indicator with the magnetic compass a minimum of every 10-15 minutes.
- Set the OBS to the course track. This is done to silence any messages from the navigator and to assist in the course intercept.
- Turn the aircraft to parallel the course track.

1. Using the course track set into the top of the OBS and the direction of the CDI deflection, determine the approximate intercept angle heading. Apply the desired intercept angle to the left or right of the course track, as it corresponds to the direction of the CDI deflection. The maximum intercept angle should be 45°.

2. Note the present heading and intercept heading. Turn in the direction closest to the intercept heading, establishing and maintaining the intercept heading.

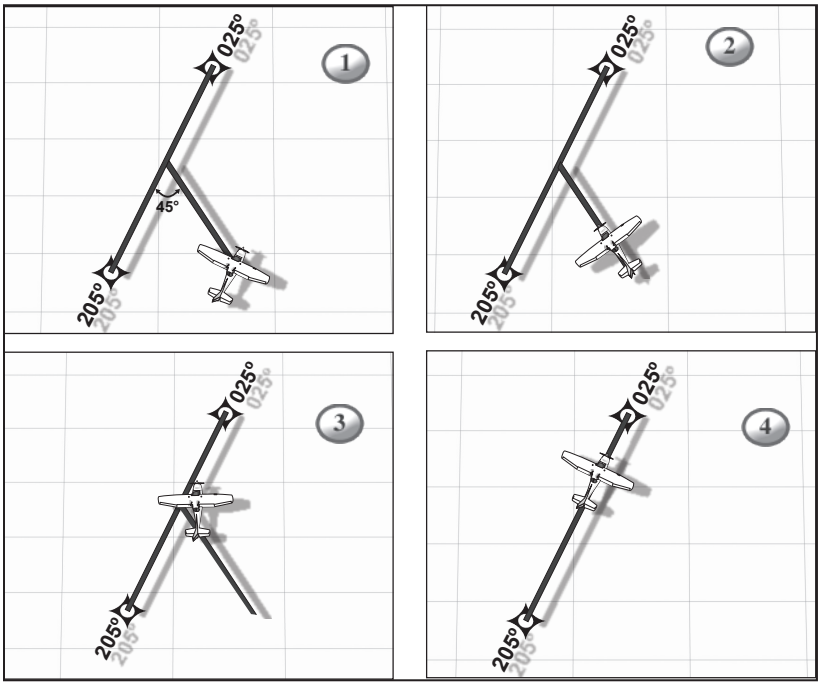
- Determine the quality of the intercept. The quality of the intercept may be determined using the CDI in a manner similar to its use with a VOR. Alternatively, many navigators have a map mode which shows the course track along with the aircraft's ground track. Utilize this feature to determine if the aircraft's ground track will intercept the course track prior to the next waypoint. If necessary, increase the intercept angle by selecting and establishing a new intercept heading.

NOTE: Absolute maximum intercept angle 90°.

3 • As the CDI begins to center, lead the intercept with a turn to the course track heading so as not to fly through the desired course when established on course.

4 • Track toward the next waypoint by maintaining the required course heading.

- Monitor the CDI. If the CDI should show a deflection left or right of center (on course), establish an intercept angle, as necessary.
- Determine the quality of the intercept as noted previously.
- Lead the re-centering of the CDI by reducing one-half (1/2) of the intercept angle and maintaining the new heading (wind correction heading) to maintain course.
- Repeat course intercepts, as necessary, until establishing one heading that maintains the desired course (wind correction heading).



COMMON ERRORS:

- Failing to set up the GPS properly.
- Not using all the information available to resolve the navigation problem.
- Failing to ensure that the GPS is the navigation source for the OBS/ CDI head.

Alphabetical Index of Maneuvers