

INTRODUCTION

This manual is a compilation of flight training maneuvers and procedures for the Cessna Skyhawk SP. This manual provides standardized procedures for completing each VFR and IFR maneuver required by the FAA's Practical Test Standards for the Private, Instrument, Commercial, and Flight Instructor Practical Tests.

This manual does not take the place of current FAA publications. References to those publications can be found at the top and bottom of each page for further study. These references should be used in order to enhance the students understanding of each maneuver.

It is important to keep in mind that this manual provides only a standardized guide to performing each maneuver, and that actual pitch or power settings may vary. All VFR maneuvers should be completed with references to pitch attitude made using the horizon. All IFR maneuvers should be completed with references to pitch attitude made using the attitude indicator. The student should be aware that small adjustments to pitch and power should be made in flight in order to successfully complete each maneuver.

It is the instructor's responsibility to teach each maneuver based upon this guide and to ensure the student fully understands and can perform each maneuver required.

This manual should serve only as a guide to completing the required maneuvers and should not be used in place of competent instruction or thorough and complete study of FAA publications. Students should use this manual in combination with the Airplane Flying Handbook, the Instrument Flying Handbook, the Pilot's Handbook of Aeronautical Knowledge, the FAA Practical Test Standards, and any other relevant FAA documents.

Cessna 172-S

Skyhawk SP

Maneuvers Manual

C172-S MANEUVERS MANUAL

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BRIEFINGS

To ensure a positive flight training experience, briefings should be used for certain phases of flight so that all parties involved understand important characteristics of the flight.

PASSENGER BRIEFINGS

During the "Before Start" checklist, each aircraft occupant should be thoroughly briefed on:

- Seatbelt operation.
- Aircraft entry and exit procedures.
- Emergency procedures and equipment location. (i.e. fire extinguishers)
- No eating, smoking, or drinking, except water.

TAKEOFF BRIEFINGS

During the "Before Takeoff" checklist, the pilot should give a takeoff briefing that includes:

- Type of takeoff.
- Applicable aircraft V-speeds.
- Takeoff distances.
- Emergency procedures during takeoff.
- Positive exchange of flight controls.

APPROACH BRIEFINGS

When approaching an airport for landing under VFR, the pilot should give an approach briefing that includes:

- Active runway.
- Type of landing.
- Landing distance.
- Emergency procedures during landing.

For IFR flights, the pilot should use the approach plate as a guide to give the approach briefing proceeding from the header to the minimums section of the approach plate.

- Frequencies.
- Inbound final approach course.
- MDA or DA.
- Timing.
- Missed approach procedure.

SPARK PLUG CLEARING PROCEDURE

An excessive drop in engine RPM during the magneto ground check is often due to a fouled spark plug. The following procedure should be used for clearing a fouled spark plug:

1. Verify the engine oil temperature gauge is within the normal operating range or, "In the green arc".
2. Verify that the magnetos are set to both.
3. Smoothly apply power to full static RPM, approximately 2400 RPM.
4. Lean the mixture until the first indication of an RPM drop or engine roughness.
5. Maintain this mixture and RPM combination for 10-20 seconds.
6. Move the mixture control to full rich while simultaneously reducing power to 1800 RPM. Perform the magneto check again and if within limits continue with the before takeoff checklist. If not, return to step #3 and repeat the spark plug clearing procedure.
7. If after the second attempt the magneto drop is still out of limits, return to the ramp for maintenance and advise flight operations.

FLIGHT AT TRAINING CRUISE

Training Cruise has been established for use prior to any maneuvering flight. Its purpose is to keep the training airplane at an appropriate airspeed prior to the commencement of a maneuver and to ensure that during maneuvering the airplane remains within a limited geographic area.

1. From a climb, smoothly level off at the desired altitude by slowly lowering the nose to a level pitch attitude.
2. Allow the airplane to accelerate to 90 KIAS.

Operations at 90 KIAS allow for a safe margin below V_A , even at lighter operating weights. Maneuvers performed at a constant speed (constant altitude turns, ground reference maneuvers, etc.) should be done at 90 KIAS. Decelerating maneuvers (stalls, maneuvering at slow flight, etc.) should be started at 90 KIAS.

3. Adjust RPM to maintain 90 KIAS for the existing conditions. Set trim. This power setting should be approximately 2100 RPM. The configuration may vary depending upon altitude, temperature, and aircraft weight.
4. Complete the Cruise Checklist.

ENROUTE CRUISE

Enroute Cruise is to be used when relatively long periods of straight and level flight are required (cross country navigation or flying between airports in the local area). Before starting air work, slow to Training Cruise.

1. Level off smoothly at the desired altitude by slowly lowering the nose to a level pitch attitude.
2. Allow the airplane to accelerate to the appropriate airspeed.

The airspeed for enroute cruise will be determined by using either the Best Economy Cruise or the Best Power Cruise performance table, as required.

3. Set the power according to the performance chart being used and trim for level flight.
4. Complete the Cruise Checklist.

SKYHAWK SP V-SPEEDS IN KIAS

Symbol	Speed	KIAS	Symbol	Speed	KIAS
V_{NE}	Never Exceed	163	V_{SO}	Stall Speed Flaps 30°	40
V_{NO}	Max. Structural Cruise	129	V_{S1}	Stall Speed Flaps Up	48
V_A	Design Maneuvering Speed: 2550 lbs. 1900 lbs	105 90	V_X	Best Angle of Climb	62
			V_Y	Best Rate of Climb	74
V_{FE}	Max. Flap Extended Speed: 10° Flaps 20°-30°	110 85	—	Enroute Cruise Climb	85
V_{GLIDE}	Best Glide Flaps Up	68	—	Normal Approach Flaps 30°	60-65
—	Instrument Approach Flaps 10°	90	—	Short Field Approach Flaps 30°	61

TAXI OPERATIONS

FAA-H-8083-3, page 2-8

Maneuver: Taxiing is the controlled movement of the airplane under its own power while on the ground. Since an airplane is moved under its own power between the parking area and the runway, the pilot must thoroughly understand and be proficient in taxi procedures.

Objective: To develop the student's ability to safely operate the airplane during ground and taxi operations.

Procedure:

1. A taxi clearance must be obtained from ground control prior to moving an aircraft onto the airport movement area when an air traffic control tower is in operation.
2. At an airport without a control tower or when the tower is closed, the pilot should announce his or her intentions to taxi on the appropriate frequency.
3. When first beginning to taxi, the brakes should be tested for operation as soon as the airplane is put in motion. If braking action is unsatisfactory, the engine should be shut down immediately.
4. Steering the airplane is accomplished with rudder pedals and minimal usage of brakes. Turns should be made at a slow, safe speed.
5. The taxi speed should be slow enough so that when the throttle is closed the airplane can be stopped promptly.
6. When yellow taxiway centerline stripes are provided, the airplane's nosewheel should remain on the line unless necessary to clear other airplanes or obstructions.
7. In no-wind, the ailerons and elevator controls should be held in a neutral condition.
8. In windy conditions;
 - Headwind: Deflect ailerons into the wind, neutral elevator.
 - Tailwind: Deflect ailerons away from the wind, elevator full forward.
9. While taxiing, clear all taxiway and runway intersections visually and verbally, i.e. "Clear left, clear center, clear right." Also, when taxiing onto an active runway clear the final approach paths in both directions.
10. Although ATC issues a taxi clearance, it is the pilot's responsibility to avoid collision with other aircraft, vehicles, and objects on the ground.

STANDARDS: Private Pilot PTS, Area of Operation 2, Task D
Commercial Pilot PTS, Area of Operation 2, Task D
Flight Instructor PTS, Area of Operation 5, Task D

TRAFFIC PATTERN OPERATIONS

FAA-H-8083-3, page 7-1
AIM 4-3-1

Maneuver: To assure that air traffic flows into and out of an airport in an orderly manner, an airport traffic pattern is established appropriate to the local conditions, including the direction and placement of the pattern, the altitude to be flown, and the procedures for entering and leaving the pattern.

Objective: To develop the student's ability to conduct safe and efficient traffic pattern operations when approaching to land at an airport with an operating control tower.

Procedure:

1. Determine the active runway.
2. Establish pattern altitude report your position to the tower, and slow to 90 KIAS.
3. Establish a 45 degree entry at the midpoint to the downwind leg or as directed by the tower controller.* Complete the before landing checklist.
4. Turn onto the downwind leg and maintain ½ to 1 mile from the active runway, approximately half the distance between wingtip and wing strut fairing.
5. Abeam the point of intended landing, reduce power to between 1200-1500 RPM, and set flaps to 10 degrees. Maintain altitude while decelerating to 80 KIAS.
6. Then begin a gradual descent at 80 KIAS.
7. At a point approximately 45 degrees from the approach end of the runway, begin a medium bank turn onto the base leg. Set flaps to 20 degrees and slow to 70 KIAS.
8. While on the base leg, visually clear the final approach area.
9. Refer to the appropriate landing procedure.

*Note: The tower controller may instruct pilots to enter the traffic pattern at any point or to make a straight-in approach without flying the usual rectangular pattern. Therefore, the descent to landing should be adjusted depending on entry. During the pattern under normal conditions, the airplane should be flown at no greater than power-off gliding distance from the runway.

STANDARDS: Private Pilot PTS, Area of Operation 3, Task B
Commercial Pilot PTS, Area of Operation 3, Task B
Flight Instructor PTS, Area of Operation 6, Task B

TRAFFIC PATTERN OPERATIONS AT NON-TOWERED AIRPORTS

FAA-H-8083-3, page 7-1
AIM 4-1-9 and 4-3-3

Maneuver: Operations at non-towered airports require specific procedures for aircraft arriving and departing. Only the additional procedures required for a non-towered airport are presented here.

Objective: To develop the student's ability to conduct safe and efficient traffic pattern operations at an airport without an operating control tower.

Procedure:

1. When approaching to land at a non-towered airport, monitor the appropriate radio frequencies no later than 10 NM from the airport, (i.e. CTAF, UNICOM ASOS, AWOS); in order to determine the active runway, airport conditions, and other traffic in the pattern.
2. If unable to determine the active runway or if landing at an unfamiliar airport, plan to fly overhead the airport at 500 feet above the published traffic pattern altitude and circle to the left.
3. Determine the most suitable runway by the use of visual wind indicators, i.e. the segmented circle; wind sock, flags, smoke, etc.
4. After determining the runway in use, maneuver overhead and fly away from the airport on a heading perpendicular to the landing runway until clear of the downwind leg.
5. Descend to pattern altitude, report your position and altitude on the appropriate frequency, and slow to 90 KIAS.*
6. Maneuver well clear of the traffic pattern and plan to enter on a 45 degree angle at the midpoint of the downwind leg. Complete the before landing checklist.
7. Turn onto the downwind leg and maintain ½ to 1 mile from the active runway, approximately half the distance between the wingtip and the wing strut fairing.
8. Refer to the appropriate landing procedure.

*Note: Reports in the pattern should be made when approaching, entering the downwind, base, final, and when departing the pattern. During the pattern under normal conditions, the airplane should be flown at no greater than power-off gliding distance from the runway.

STANDARDS: Private Pilot PTS, Area of Operation 3, Task B
Commercial Pilot PTS, Area of Operation 3, Task B
Flight Instructor PTS, Area of Operation 6, Task B

NORMAL TAKEOFF AND CLIMB

FAA-H-8083-3, page 3-2

Maneuver: The normal takeoff is one in which the airplane is headed directly into the wind, or the wind is calm. Also, the takeoff surface is firm and of sufficient length to permit the airplane to accelerate to lift-off and climb out speed, and there are no obstructions along the takeoff path.

Objective: To develop the student's ability to safely takeoff and depart the takeoff area under normal conditions.

Procedure:

1. Taxi into takeoff position without stopping unless directed by tower to taxi into position and hold.
2. Smoothly and continuously apply takeoff power.
3. Check static RPM, approximately 2400 RPM, and verify airspeed rising.
4. Use rudder as necessary to maintain directional control.
5. When the flight controls become effective, gradually apply back-elevator pressure to attain a lift-off pitch attitude.
6. Note the position of the airplane's nose in relation to the horizon and adjust as necessary to attain a V_L pitch attitude.
7. At 1,000ft AGL, slightly lower the nose to attain a cruise climb pitch attitude.

STANDARDS: Private Pilot PTS, Area of Operation 4, Task A
Commercial Pilot PTS, Area of Operation 4, Task A
Flight Instructor PTS, Area of Operation 7, Task A

NORMAL APPROACH AND LANDING

FAA-H-8083-3, page 7-3

Maneuver: This type of approach and landing involves the use of procedures for what is considered a normal situation; that is, when engine power is available, the wind is light or the final approach is made directly into the wind, the final approach has no obstacles, and the landing surface is firm and of sufficient length to gradually bring the airplane to a stop.

Objective: To develop the student's ability to safely and accurately land the airplane.

Procedure:

1. Final approach:
 - Set an aiming point in order to land within the first 1/3 of the runway.
 - Set flaps to 30 degrees.
 - Normal approach speed 65 KIAS.
 - On short final gradually slow to 60 KIAS.
2. Maintain aiming point with pitch and power corrections until approaching round out.
3. At the round out, reduce power to idle and continue the flare to touchdown on the main wheels first at approximately stalling speed.
4. Upon touchdown, hold the nose wheel off the runway as long as the elevator remains effective to provide aerodynamic braking, as appropriate.
5. Maintain directional control using rudder.
6. Do not initiate the after-landing checklist until clear of the runway.

STANDARDS: Private Pilot PTS, Area of Operation 4, Task B
Commercial Pilot PTS, Area of Operation 4, Task B
Flight Instructor PTS, Area of Operation 7, Task F

CROSSWIND TAKEOFF AND CLIMB

FAA-H-8083-3, page 3-4

Maneuver: A crosswind will affect the airplane during takeoff much as it does during taxiing. Therefore, the crosswind takeoff technique closely parallels the crosswind correction techniques used in taxiing.

Objective: To develop the student's ability to safely takeoff and depart the takeoff area during crosswind conditions.

Procedure:

1. Taxi into takeoff position without stopping unless directed by tower to taxi into position and hold.
2. Note wind direction and deflect full aileron into the wind.
3. Smoothly and continuously apply takeoff power.
4. Check static RPM, approximately 2400 RPM, and verify airspeed rising.
5. Use rudder as necessary to maintain directional control.
6. As airspeed builds, reduce aileron input to maintain a wings level attitude.
7. When the flight controls become effective, gradually apply back-elevator pressure to attain a lift-off pitch attitude.
8. Note the position of the airplane's nose in relation to the horizon and adjust as necessary to attain a V_Y pitch attitude.
9. At 1,000ft AGL, slightly lower the nose to attain a cruise climb pitch attitude.

STANDARDS: Private Pilot PTS, Area of Operation 4, Task A
Commercial Pilot PTS, Area of Operation 4, Task A
Flight Instructor PTS, Area of Operation 7, Task A

CROSSWIND APPROACH AND LANDING

FAA-H-8083-3, page 7-11

Maneuver: Many runways or landing areas are such that landings must be made while the wind is blowing across rather than parallel to the landing direction. All pilots should be prepared to cope with these situations when they arise. The same basic principles and factors involved in a normal approach and landing apply to a crosswind approach and landing; therefore, only the additional procedures required for correcting wind drift are presented here.

Objective: To develop the student's ability to safely and accurately land the airplane while correcting for a crosswind during the landing approach, touchdown, and roll out.

Procedure:

1. Establish approach configuration (normal, short-field, soft-field).
2. Maintain alignment with centerline using the wing-low method.* At the round out, reduce power to idle and continue the flare to touchdown on the upwind main wheel first.
3. As the airplane slows, increase aileron deflection into the wind, slowly increase back-elevator pressure, and gently apply brakes.
4. Do not initiate the after-landing checklist until clear of the runway.

*Note: The crab method can be used to correct for a crosswind on final, however, it's preferable to maintain the wing low method. In some airplanes, there may not be sufficient rudder travel to compensate for the crosswind, in this case the airplanes crosswind capacity has been exceeded and a go-around should be initiated.

STANDARDS: Private Pilot PTS, Area of Operation 4, Task B
Commercial Pilot PTS, Area of Operation 4, Task B
Flight Instructor PTS, Area of Operation 7, Task F

TURBULENT AIR APPROACH AND LANDING

FAA-H-8083-3, page 7-13

Maneuver: Power-on approaches at airspeeds slightly above the normal approach speed should be used for landing in turbulent air. This provides for more positive control of the airplane when strong horizontal wind gusts, or up and downdrafts, are experienced.

Objective: To develop the student's ability to land the airplane when turbulent and gusty wind conditions are encountered.

Procedure:

1. Final approach:
 - Set an aiming point in order to land within the first 1/3 of the runway.
 - Set flaps to no greater than 20 degrees.
 - Final approach speed $65 \text{ KIAS} + \frac{1}{2} \text{ gust}^*$
2. Maintain aiming point with pitch adjustments and power for airspeed until approaching roundout.
3. At the roundout, and just as the main wheels contact the landing surface in approximately a level pitch attitude, reduce the power to idle.*
4. Maintain directional control with rudder and apply brakes gently.
5. Do not initiate the after-landing checklist until clear of the runway.

*Gust factor: Take the difference between the maximum sustained surface winds and the reported gusts, and add this number to the final approach speed.

Example: 360/10G20. Maximum wind = 10 knots
Maximum gust = 20 knots
Difference = 10 knots/2 = 5 knot gust factor.

*Note: The pitch attitude at touchdown should only be high enough to prevent the nosewheel from contacting the surface before the mains. Refer to the no-flap landing procedures for turbulent air approaches and landings without flaps.

STANDARDS: There are no specific standards for this maneuver.

SOFT-FIELD TAKEOFF AND CLIMB

FAA-H-8083-3, page 3-7

Maneuver: Takeoffs and climbs from soft fields require operational techniques for getting the airplane airborne as quickly as possible to eliminate drag caused by tall grass, soft sand, mud, snow, etc., and may or may not require climbing over an obstacle. These same techniques are also useful on a rough field where it is advisable to get the airplane off the ground as soon as possible to avoid damaging the landing gear.

Objective: To obtain maximum performance when taking off from other than a smooth, hard surface runway.

Procedure:

1. Verify flaps are set to 10 degrees.
2. Taxi into takeoff position while maintaining full aft elevator, without using brakes or stopping.
3. Smoothly and rapidly apply takeoff power.
4. Check static RPM, approximately 2400 RPM, and verify airspeed rising.
5. Use rudder as necessary to maintain directional control.
6. Maintain a nose-high attitude throughout the takeoff run.
7. As the nose wheel leaves the ground, slightly reduce back-elevator pressure until the main wheels leave the ground.
8. Use appropriate pitch attitude to remain in ground effect.
9. Without an obstacle – accelerate in ground effect to V_Y and climb out at V_Y . Verify a positive rate of climb and retract the flaps in increments at a safe altitude while maintaining a V_Y pitch attitude.
10. With an obstacle – accelerate in ground effect to V_X and climb out at V_X until the obstacle has been cleared. Verify a positive rate of climb and retract the flaps in increments while accelerating to V_Y .
11. At 1,000ft AGL, slightly lower the nose to attain a cruise climb pitch attitude.

*Note: Refer to the soft-field/grass runway guidelines in the operations manual for operational requirements.

STANDARDS: Private Pilot PTS, Area of Operation 4, Task C
Commercial Pilot PTS, Area of Operation 4, Task C
Flight Instructor PTS, Area of Operation 7, Task C

SOFT-FIELD APPROACH AND LANDING

FAA-H-8083-3, page 7-15

Maneuver: Landings on fields that are rough or have soft surfaces, such as snow, sand, mud, or tall grass requires unique procedures. The approach for the soft-field landing is similar to the normal or short-field depending on field selection. The major difference between the two is that during the soft-field landing, the airplane is held 1 to 2 feet off the surface as long as possible to dissipate the forward speed sufficiently to allow the main wheels to touch down gently at minimum forward speed and minimum rate of descent.

Objective: To develop the student's ability to land safely on soft fields.

Procedure:

1. Fly a normal or short-field approach procedure.
2. At the round out, reduce the power to idle and continue the flare to touch down on the main wheels first at the slowest possible airspeed and with a nose-high pitch attitude.
3. If necessary a slight addition of power during and immediately after touchdown will aid in easing the nosewheel down.
4. Hold sufficient back-elevator pressure to keep the nosewheel off the ground until it can no longer aerodynamically be held off the field surface.
5. Do not initiate the after-landing checklist until clear of the runway.

STANDARDS: Private Pilot PTS, Area of Operation 4, Task D
Commercial Pilot PTS, Area of Operation 4, Task D
Flight Instructor PTS, Area of Operation 7, Task J

SHORT-FIELD TAKEOFF AND CLIMB

FAA-H-8083-3, page 3-6

Maneuver: Takeoffs and climbs from fields where the takeoff area is short or the available takeoff area is restricted by obstructions require that the pilot operate the airplane at the limit of its performance capabilities. To depart from such an area safely, the pilot must exercise positive and precise control of airplane's attitude and airspeed so that takeoff and climb performance results in the shortest ground roll and the steepest angle of climb.

Objective: To develop the student's ability to obtain maximum airplane performance during the takeoff and climb-out phases.

Procedure:

1. Verify flaps are set to 10 degrees.
2. Taxi into takeoff position and hold the brakes.*
3. Smoothly and continuously apply takeoff power.
4. Check static RPM, approximately 2400 RPM, release the brakes and verify airspeed rising.
5. Use rudder as necessary to maintain directional control.
6. Smoothly and firmly apply back-elevator pressure as the calculated lift-off speed approaches.
7. Maintain a V_X climb attitude until the obstacles have been cleared or 50 feet, if there are no obstacles. With a positive rate of climb, fully retract the flaps.
8. Slightly lower the nose to attain a V_Y pitch attitude.
9. At 1,000ft AGL, slightly lower the nose to attain a cruise climb pitch attitude.

*Note: An alternate method to perform the short-field takeoff is to start at the beginning of the takeoff area and as the airplane is aligned with the intended takeoff path power is applied without braking.

STANDARDS: Private Pilot PTS, Area of Operation 4, Task E
Commercial Pilot PTS, Area of Operation 4, Task E
Flight Instructor PTS, Area of Operation 7, Task B

SHORT-FIELD APPROACH AND LANDING

FAA-H-8083-3, page 7-14

Maneuver: Short-field approaches and landings require the use of procedures and techniques for landing at fields with a relatively short landing area or where an approach is made over obstacles that limit the available landing area.

Objective: To develop the student's ability to obtain maximum aircraft performance in order to land safely within confined landing areas.

Procedure:

1. Final approach:
 - Set desired aiming point to clear obstacles.
 - Set flaps to 30 degrees.
 - Short-field approach speed 61 KIAS.
 - On short final gradually slow to 55 KIAS.
2. Adjust pitch to maintain a steeper than normal angle of descent and power to maintain airspeed.
3. At the round out, continue the flare to touchdown on the main wheels first in approximately the pitch attitude that will result in a power-off stall just as the power is reduced to idle.
4. Upon touchdown, hold this pitch attitude as long as the elevator remains effective to provide aerodynamic braking, as appropriate.
5. Brakes should be applied evenly and firmly to minimize the after-landing roll without skidding.
6. Do not initiate the after-landing checklist until clear of the runway.

STANDARDS: Private Pilot PTS, Area of Operation 4, Task F
Commercial Pilot PTS, Area of Operation 4, Task F
Flight Instructor PTS, Area of Operation 7, Task I

180 DEGREE POWER-OFF ACCURACY APPROACH

FAA-H-8083-3, page 7-18

Maneuver: Power-off accuracy approaches and landings are made by gliding with the engine idling, through a specific pattern to a touchdown beyond and within 200 feet of a designated line or mark on the runway.

Objective: The objective is to instill in the pilot the judgment and procedures necessary for accurately flying the airplane, without power to a safe landing.

Procedure:

1. Fly the normal traffic pattern without extending flaps on downwind.
2. Reduce power to idle abeam desired landing spot.
3. Maintain altitude while slowing to normal glide speed.
4. Establish a normal glide pitch attitude.
5. Use a medium to steeper bank turn to the base leg and set flaps to 10 degrees. Plan the base leg turn for varying wind conditions.
6. Slow to 70 KIAS on base.
7. The base-to-final turn should be planned so that when rolling out on final the airplane will be aligned with the runway centerline.
8. On final, use flaps as needed and slow to normal approach speed.
9. Do not initiate the after-landing checklist until clear of the runway.

*Note: Although accurate spot touchdowns are important, safe and properly executed approaches are vital. The pilot must never sacrifice a good approach and landing just to land on the desired spot.

STANDARDS: Commercial Pilot PTS, Area of Operation 4, Task K
Flight Instructor PTS, Area of Operation 7, Task K

FORWARD SLIP TO LANDING

FAA-H-8083-3, page 7-8

Maneuver: A forward slip can be used to increase the airplane's descent angle without increasing airspeed. This could prove useful in making an emergency landing, or in landing in an area with obstructions. **A forward slip should not be used to lose altitude because of poor planning.**

Objective: To develop the student's ability to perform forward slips.

Procedure:

WITHOUT FLAPS

1. Reduce power to idle, lower the upwind wing using aileron and apply opposite rudder to prevent the airplane from turning toward the lowered wing.
2. Adjust the pitch attitude to maintain normal approach airspeed.
3. Maintain the slip until the normal glide path is attained, and then the slip may be discontinued.
4. Continue with the appropriate landing procedure

WITH FLAPS*

1. Maintain a slightly higher than normal altitude on final approach until ready to begin the slip
2. Reduce power to idle and establish the normal approach to landing configuration.
3. Lower the upwind wing using aileron and apply opposite rudder to prevent the airplane from turning toward the lowered wing.
4. Adjust the pitch attitude to maintain normal approach airspeed.
5. Maintain the slip until the normal glide path is attained, and then the slip may be discontinued.
6. Continue with the appropriate landing procedure

* Steep slips should be avoided with flap settings greater than 20 degrees due to a slight tendency for the elevator to oscillate under certain combinations of airspeed, sideslip angle, and center of gravity loadings. (Textron/Cessna)

STANDARDS: Private Pilot PTS, Area of Operation 4, Task K
Commercial Pilot PTS, Area of Operation 4, Task K
Flight Instructor PTS, Area of Operation 7, Task G

GO-AROUNDS (REJECTED LANDINGS)

FAA-H-8083-3, page 7-8

Maneuver: Occasionally, it may be advisable to discontinue the landing approach and make another approach under more favorable conditions. Air traffic control requirements, low base to final turns, wake turbulence, or unexpected hazards on the runway are some examples of hazardous situations that would demand initiating a go-around.

Objective: To develop the student's ability to safely initiate a go-around during a rejected landing.

Procedure:

1. Smoothly apply full power, level the wings, and transition to a V_x climb pitch attitude to slow or stop the descent.
2. After the descent has stopped, set flaps to 20 degrees.
3. After a positive rate of climb is established and as the airplane accelerates past V_x , retract the remaining flaps in increments.
4. Pitch for a V_Y climb attitude and continue the climb to traffic pattern altitude at V_Y .

STANDARDS: Private Pilot PTS, Area of Operation 4, Task L
Commercial Pilot PTS, Area of Operation 4, Task L
Flight Instructor PTS, Area of Operation 7, Task H

STEEP TURNS

FAA-H-8083-3, page 6-14

Maneuver: This maneuver consists of a turn in either direction using a bank angle steep enough to cause an over banking tendency during which maximum turning performance is attained and relatively high load factors are imposed.

Objective: The objective of the maneuver is to develop smoothness, coordination, orientation, division of attention, and control techniques while executing high performance turns.

Procedure:

1. Begin maneuver at 90 KIAS.
2. Smoothly roll into a bank angle of 45 or 50 degrees, as appropriate.
3. Maintain altitude and airspeed by adjusting the pitch, bank, and power as necessary.
4. After completing a 360 degree turn, roll wings level and immediately begin a steep turn in the opposite direction.*
5. The rollout from the turns should be timed so that the wings reach level exactly on the entry heading.

* Note: Step 4 can be omitted for a Private Pilot applicant.

STANDARDS: Private Pilot PTS, Area of Operation 5
Commercial Pilot PTS, Area of Operation 5, Task A
Flight Instructor PTS, Area of Operation 9, Task A

STEEP SPIRAL

FAA-H-8083-3, page 6-15

Maneuver: A steep spiral is a constant gliding turn, during which a constant radius around a point on the ground is maintained similar to the maneuver turns around a point. The turn radius should be such that the steepest bank will not exceed 60 degrees. The spiral has practical application by providing a procedure for dissipating altitude while remaining over a selected spot in preparation for emergency forced landings.

Objective: The objective is to improve pilot techniques for power-off turns, wind drift control, planning, orientation, and division of attention.

Procedure:

1. Obtain sufficient altitude that will allow at least three 360 degree turns to be completed no lower than 1,000 feet AGL, unless performing an emergency landing in conjunction with the spiral.
2. Select a prominent ground reference point and plan to enter the maneuver into the wind.
3. Reduce the throttle to idle and slow to normal glide speed.
4. Begin a gliding spiral and maintain a turn of constant radius around the selected reference point by varying the bank angle as necessary.
5. Clear the engine by briefly advancing the throttle to normal cruise power when headed into the wind during the spiral.
6. Maintain normal glide speed throughout the maneuver.
7. Execute three turns and smoothly roll out on the entry heading.

STANDARDS: Commercial Pilot PTS, Area of Operation 5, Task B
Flight Instructor PTS, Area of Operation 9, Task B

CHANDELLE

FAA-H-8083-3, page 6-16

Maneuver: The chandelle is a maximum performance climbing turn beginning from approximately straight-and-level flight, and ending at the completion of 180 degrees of turn in a wings-level, nose-high attitude at the minimum controllable airspeed. The maneuver demands that the maximum flight performance be obtained with the airplane gaining the most altitude possible for a given degree of bank and power setting without stalling.

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

Procedure:

1. Select a prominent 90 degree reference point.
2. Enter the maneuver from straight and level flight at 90 KIAS.
3. Roll into approximately but not exceeding a 30 degree bank, either right or left.
4. Smoothly apply back-elevator pressure while simultaneously applying takeoff power to enter a coordinated climbing turn.
5. Increase the pitch attitude at a constant rate to attain the highest pitch attitude as 90 degrees of turn is completed.
6. The bank angle should remain constant until 90 degrees of turn is completed.
7. When the turn has progressed 90 degrees from the original heading, begin rolling out of the bank at a constant rate while maintaining a constant pitch attitude.
8. Complete the rollout at the 180 degree point just above stall airspeed and maintain that airspeed momentarily while avoiding a stall.
9. Resume straight and level flight with minimum loss of altitude.

STANDARDS: Commercial Pilot PTS, Area of Operation 5, Task C
Flight Instructor PTS, Area of Operation 9, Task C

LAZY EIGHTS

FAA-H-8083-3, page 6-18

Maneuver: This maneuver derives its name from the manner in which the extended longitudinal axis of the airplane is made to trace a flight pattern in the form of a figure 8 lying on its side. A lazy 8 consists of two 180 degree turns in opposite directions, while making a climb and descent in a symmetrical pattern during each of the turns.

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

Procedure:

1. Select prominent reference points on the horizon at 45, 90, and 135 degrees in the direction the maneuver is begun as an aid in making symmetrical loops.
2. Enter at 90 KIAS, and at an altitude that will allow the maneuver to be completed no lower than 1,500 feet AGL.
3. Begin a gradual climbing turn in the direction of the 45 degree point so as to reach it at maximum pitch up attitude with approximately 15 degrees of bank.
4. Passing the 45 degree point, the bank should continue to increase while the pitch attitude is allowed to slowly decrease toward the horizon and the 90 degree reference point.
5. At the 90 degree point, the bank should be at the maximum of approximately 30 degrees, the airspeed at its minimum, and the pitch attitude should be passing through level flight.
6. Passing the 90 degree point, continue to fly the airplane into a descending turn so that the airplane's nose describes the same size loop below the horizon as it did above it.
7. At the 135 degree point, the nose should be in its lowest pitch attitude and bank should be at approximately 15 degrees.
8. Adjust the rate of rollout and pitch change so that the wings become level and the entry airspeed is attained in level flight just as the 180 degree point is reached.
9. Perform maneuver in the opposite direction to complete the second half of the eight in the same manner as the first.

STANDARDS: Commercial Pilot PTS, Area of Operation 5, Task D
Flight Instructor PTS, Area of Operation 9, Task D

EIGHTS-ON-PYLONS

FAA-H-8083-3, page 6-11

Maneuver: This is an advanced training maneuver that involves flying the airplane in circular paths, alternately left and right, in the form of a figure 8 around two selected points or pylons on the ground. In this maneuver, no attempt is made to maintain a uniform distance from the pylon. Instead the plane is flown at an altitude and airspeed that a line parallel to the airplane's lateral axis, and extending from the pilot's eye, appears to pivot on each of the pylons.

Objective: To develop coordination skills while the pilot's attention is directed at maintaining a pivotal position on a selected pylon.

Procedure:

1. Select suitable pylons perpendicular to the wind well away from other air traffic and near where an emergency landing can be made.
2. Enter maneuver at 45 degrees to the downwind at 90 KIAS, and at the pivotal altitude,* using a bank angle of approximately 30 to 40 degrees at the steepest point.
3. As the airplane approaches a position where the pylon appears to be just ahead of the wingtip, begin the turn to place the pilot's line of sight reference on the pylon.
4. Maintain the correct line of sight reference on the pylon;
 - Reference line forward – control rearward to climb
 - Reference line rearward – control forward to descend
5. After completing the turn on the first pylon allow approximately 3 to 5 seconds of straight-and-level flight, and begin a turn in the opposite direction towards the second pylon.
6. After completing the turn around the second pylon, depart on entry heading.

*Note: Pivotal altitude, in calm wind, can be estimated by squaring the true airspeed in knots and then dividing by 11.3.

STANDARDS: Commercial Pilot PTS, Area of Operation 6
Flight Instructor PTS, Area of Operation 10, Task D

RECTANGULAR COURSE

FAA-H-8083-3, page 6-4

Maneuver: This is a training maneuver in which the ground track of the airplane is equidistant from all sides of a rectangular area on the ground. While performing the maneuver, altitude and airspeed should be held constant. Practice of this maneuver will be helpful in recognizing the effects of wind drift toward or away from an airport runway during the various legs of the airport traffic pattern.

Objective: The objectives are to develop division of attention between the flight path and ground references, while controlling the airplane and watching for other air traffic.

Procedure:

1. Select a suitable rectangular reference area well away from other air traffic and near where an emergency landing can be made.
2. Plan the maneuver so as to enter a left or right pattern at 45 degrees to the downwind leg, at 1,000 feet AGL,* at 90 KIAS.
3. Maintain an appropriate distance from the field boundary of ½ to 1 mile, approximately half the distance between the fuel cap and the wing tip.
4. All turns should be started when the airplane is abeam the corner of the field boundaries, and the bank should normally not exceed 45 degrees.
5. Vary the bank angle used during the turns as necessary to maintain a constant radius from the field.
6. Apply adequate wind-drift correction during the straight and level legs to maintain a constant ground track around the rectangular reference area.
7. Maintain entry altitude and airspeed during the maneuver.
8. Exit the maneuver at the end of the downwind leg 45 degrees away from the field.

*Note: The PTS allows this maneuver to be completed at an altitude between 600 and 1,000 feet AGL.

STANDARDS: Private Pilot PTS, Area of Operation 6, Task A
Flight Instructor PTS, Area of Operation 10, Task A

S-TURNS ACROSS A ROAD

FAA-H-8083-3, page 6-6

Maneuver: This is a training maneuver in which the airplane's ground track describes semicircles of equal radii on each side of a selected straight line on the ground. The maneuver consists of crossing a line at a 90 degree angle and immediately beginning a series of 180 degree turns of equal radius in opposite directions, crossing the line at a 90 degree angle just as each 180 degree turn is completed.

Objective: The objectives are to develop the ability to compensate for drift during turns, orient the flight path with ground references, and divide the pilot's attention inside and outside the aircraft.

Procedure:

1. Select a suitable ground reference line, perpendicular to the wind and well away from other air traffic and near where an emergency landing can be made.
2. Plan to enter the maneuver downwind at 1,000 feet AGL,* at 90 KIAS.
3. Apply adequate wind-drift correction and bank angle to track a constant radius 180 degree turn back towards the reference line using up to a maximum bank angle of 45 degrees.
4. After 180 degrees of turn, and back over the reference line with wings level, continue the maneuver in the opposite direction.
5. Depart the maneuver on the entry heading.

*Note: The PTS allows this maneuver to be completed at an altitude between 600 and 1,000 feet AGL.

STANDARDS: Private Pilot PTS, Area of Operation 6, Task B
Flight Instructor PTS, Area of Operation 10, Task B

URNS AROUND A POINT

FAA-H-8083-3, page 6-7

Maneuver: This is a training maneuver in which the airplane is flown in two or more complete circles of uniform radius from a prominent ground reference point. Wind drift control, altitude, and airspeed must be maintained throughout the entire maneuver.

Objective: The objective, as in other ground reference maneuvers, is to help the pilot develop the ability to control the airplane while dividing attention between the flight path and ground references, and watching for other air traffic, obstacles, and birds.

Procedure:

1. Select a suitable ground reference point well away from other air traffic and near where an emergency landing can be made.
2. If desired, select four equidistant points around the ground reference point to aid in making a symmetrical circle.
3. Plan the maneuver so as to enter a left or right pattern downwind at 1,000 feet AGL,* and at a distance equal to the desired radius of turn at 90 KIAS.
4. Maintain constant airspeed, altitude, and radius around the point while adjusting bank and drift correction using up to but not exceeding 45 degrees of bank angle.
5. Depart the maneuver after a minimum of two circles on the entry heading.

*Note: The PTS allows this maneuver to be completed at an altitude between 600 and 1,000 feet AGL.

STANDARDS: Private Pilot PTS, Area of Operation 6, Task C
Flight Instructor PTS, Area of Operation 10, Task C

DIVERSION

FAA-H-8083-25, page 14-27

Maneuver: Cross country diversion.

Objective: The objective of this maneuver is to pilot the aircraft to an alternate airport in case the point of intended landing is no longer available. This can include reasons due to unpredicted weather, a system malfunction, or poor preflight planning.

Procedure:

1. Once the decision to divert to an alternate airport is made, consideration should be given to returning to your last checkpoint or a prominent landmark and circling until your navigation planning is complete.
2. Estimate an approximate heading, distance, and estimated time enroute (ETE) to the alternate airport and note the time that the diversion began.*
3. Turn to the estimated magnetic heading, attempt to identify any prominent landmarks nearby, and maintain the appropriate VFR cruising altitude.
4. If time permits, and once established on course towards the alternate airport, an accurate course, groundspeed, ETE, and fuel consumption can be determined using the E6B Flight Computer.
5. Call the appropriate Flight Service Station (FSS) and approach control if applicable, to amend your flight plan and provide a pilot report (UA/UUA).
6. Use the Airport Facilities Directory (AF/D) to determine any airport restrictions at the alternate airport.
7. Identify airspace along the diversion route.

*Note: Because of limited cockpit space, and because attention must be divided between flying the airplane, making calculations, and scanning for other air traffic, take advantage of all possible shortcuts and rule of thumb calculations. For example: Use a straight edge and a VOR compass rose for magnetic heading. For groundspeed, 90 KIAS equals 1.5 nautical miles per minute. Thus, it would take approximately 7 minutes to travel 10 nautical miles, plus or minus winds aloft. For fuel consumption, the Skyhawk SP would use approximately .2 gallons/min. at 75% power. During a diversion, priority must be given to flying the airplane while dividing attention between navigation and planning.

STANDARDS: Private Pilot PTS, Area of Operation 7, Task C
Commercial Pilot PTS, Area of Operation 7, Task C

LOST PROCEDURES

FAA-H-8083-25, page 14-27

Maneuver: Lost Procedures

Objective: The objective of this maneuver is to identify different methods of determining aircraft location in the event of becoming lost during flight. This can occur during a cross country into unfamiliar terrain, by poor preflight planning, or restricted visibility due to weather.

Procedure:

1. Climb, being mindful of traffic and weather conditions, to identify prominent landmarks.
2. Scan the area around the aircraft for prominent landmarks to determine the aircraft's location.
3. Using the aircraft's navigational instruments, plot an azimuth from either two VOR or NDB facilities, to determine approximate location.
4. Circle, so as not to aggravate the situation or wander into restricted or controlled airspace.
5. Communicate if still unable to determine location, and request assistance from ATC. Comply with all ATC or FSS instructions.
6. Remain Calm at all times.
7. Conserve fuel by reducing power to 55% and lean the mixture.
8. If the situation becomes an emergency, squawk "7700" on the transponder and seek assistance on 121.50.

STANDARDS: Private Pilot PTS, Area of Operation 7, Task D
Commercial Pilot PTS, Area of Operation 7, Task D

MANEUVERING DURING SLOW FLIGHT AT MINIMUM CONTROLLABLE AIRSPEED (MCAS)

FAA-H-8083-3, page 5-2

Maneuver: This maneuver demonstrates the flight characteristics and degree of controllability of an airplane at just above stall speed. The pilot's ability to estimate the margin of safety above the stalling speed by the diminishing control effectiveness is of great importance.

Objective: To develop the student's ability to recognize changes in airplane flight characteristics and control effectiveness at critically slow airspeeds.

Procedure:

1. Reduce power to 1500 RPM.
2. Set flaps to 30 degrees when in the white arc.
3. Set required power to maintain altitude while using pitch attitude to control airspeed at MCAS.*
4. Turns, climbs, and descents should be practiced in this configuration.
5. Recover using takeoff power while maintaining altitude.
6. Retract the flaps in increments as the airplane accelerates.

*Note: Minimum controllable airspeed is defined as the airspeed at which any further increase in angle of attack or load factor, or reduction in power will cause an immediate stall. The aural stall warning horn should remain activated throughout the maneuver.

STANDARDS: Private Pilot PTS, Area of Operation 8, Task A
Commercial Pilot PTS, Area of Operation 8, Task A
Flight Instructor PTS, Area of Operation 11, Task A

POWER-OFF STALL

FAA-H-8083-3, page 5-6

Maneuver: The practice of power-off stalls is usually performed in a normal approach to landing configuration in order to simulate an accidental stall occurring during landing. The stalls can be performed to either imminent or full stall conditions. Also, they should be practiced in a no-flap configuration, with full flaps, and in turns.

Objective: The objectives in performing intentional stalls are to familiarize the pilot with conditions that produce stalls, to recognize an approaching stall, and to develop the habit of taking prompt corrective action.

Procedure:

1. Reduce power to idle and set flaps to desired configuration.
2. Maintain altitude while slowing to normal approach speed.
3. Establish and trim for a glide at normal approach speed.
4. When approach speed and attitude have stabilized, smoothly raise the nose to an attitude that will induce a stall.*
5. Announce the onset of the stall as recognized by clues such as full back elevator, airframe buffeting, high descent rate, or nose down pitching.
6. Immediately recover from the stall by releasing back-elevator pressure to decrease the angle of attack and advancing throttle to takeoff power.
7. Lower the nose as necessary to regain flying speed.
8. Set a V_X pitch attitude and set flaps to 20 degrees with a minimum loss of altitude.
9. Accelerate to V_X or V_Y before final flap retraction.
10. Climb at V_Y while returning to original assigned heading and altitude.

*Note: Recovery from power-off stalls should also be practiced from shallow banked turns not to exceed 20 degrees, to simulate an inadvertent stall during a base to final turn. The stall should normally be made to occur within a heading change of approximately 90 degrees.

STANDARDS: Private Pilot PTS, Area of Operation 8, Task B
Commercial Pilot PTS, Area of Operation 8, Task B
Flight Instructor PTS, Area of Operation 11, Task C

POWER-ON STALL

FAA-H-8083-3, page 5-7

Maneuver: Power-on stall recoveries are practiced from straight climbs and climbing turns with up to 20 degrees of bank to simulate an accidental stall during takeoffs and climbs. Flaps should be set to the or short-field takeoff or climb configuration.

Objective: To teach the student to recognize the indications of an approaching or full stall during power on situations and to take prompt corrective action to prevent a prolonged stalled condition.

Procedure:

1. Reduce power to idle.
2. Establish the short-field takeoff or climb configuration.
3. Slow to normal lift off speed, approximately 50-55 KIAS, and apply takeoff power.
4. Smoothly and continuously apply back-elevator pressure while climbing straight ahead or banking up to 20 degrees until the stall occurs.
5. Maintain coordinated flight with rudder.
6. Announce the onset of the stall as recognized by clues such as full-back elevator, airframe buffeting, high descent rate, or nose down pitching.
7. Immediately recover from the stall by releasing back-elevator pressure to reduce the angle of attack.
8. Lower the nose as necessary to regain flying speed.
9. Set a V_X pitch attitude with a minimum loss of altitude.
10. Accelerate to V_X or V_Y before final flap retraction.
11. Return to the specified heading and altitude.

STANDARDS: Private Pilot PTS, Area of Operation 8, Task C
Commercial Pilot PTS, Area of Operation 8, Task C
Flight Instructor PTS, Area of Operation 11, Task B

SECONDARY STALL (DEMONSTRATION)

FAA-8083-3, page 5-8

Maneuver: This stall demonstrates improper recovery techniques caused by attempting to hasten the completion of a stall recovery before the airplane has regained sufficient flying speed. This stall usually occurs when the pilot uses abrupt control input after a stall or spin recovery.

Objective: To teach the student to recognize the effects of improper control usage during stall recoveries.

Procedure:

1. Reduce power to idle.
2. Maintain altitude while slowing to normal approach speed and establish desired configuration.
3. Smoothly lower the nose into a normal approach attitude.
4. When approach speed and attitude have stabilized, smoothly raise the nose to an attitude that will induce a stall.
5. Recover from the stall without using power followed by an immediate increase in pitch to induce a secondary stall.
6. Upon reaching a secondary stall release back-elevator pressure and apply takeoff power.
7. Lower the nose as necessary to regain flying speed.
8. Set a V_X pitch attitude and set flaps to 20 degrees with a minimum loss of altitude.
9. Accelerate to V_X or V_Y before final flap retraction.
10. Return to the specified heading and altitude.

*Note: This maneuver is for dual only demonstration purposes.

STANDARDS: Flight Instructor PTS, Area of Operation 11, Task F

CROSS-CONTROL STALL (DEMONSTRATION)

FAA-H-8083-3, page 5-10

Maneuver: This is a type of stall that occurs when the flight controls are crossed and aileron pressure is applied in one direction and rudder pressure in the opposite direction. This stall is most apt to occur during a poorly planned and executed base-to-final approach turn, and often is the result of overshooting the centerline of the runway during that turn.

Objective: The objective of this demonstration maneuver is to show the effect of improper control technique and to emphasize the importance of using coordinated control pressures whenever making turns.

Procedure:

1. Reduce power to idle and verify flaps retracted.
2. Maintain altitude until the airspeed approaches normal approach speed.
3. Establish and trim for a normal glide pitch attitude and airspeed.
4. Once stabilized, initially roll into a medium banked turn to simulate a base-to-final approach turn that would overshoot the runway centerline.
5. During the turn, allow the airplane to assume uncoordinated flight by applying excessive rudder pressure in the direction of turn and opposite aileron pressure.
6. At the same time, back-elevator pressure is required to keep the nose from dropping so as to maintain approach speed.
7. Maintain increasing control pressures until the airplane stalls.
8. When the stall occurs, release control pressures and increase power as necessary to recover.

*Note: This maneuver is for dual only demonstration purposes.

STANDARDS: Flight Instructor PTS, Area of Operation 11, Task D

ELEVATOR TRIM STALL (DEMONSTRATION)

FAA-H-8083-3, page 5-11

Maneuver: This stall demonstrates what can happen when takeoff power is applied for a go-around and positive control of the airplane is not maintained. This situation can occur during a go-around from a normal approach to landing or from a simulated emergency landing approach.

Objective: To show the importance of making smooth power applications while overcoming strong trim forces and maintaining positive control of the airplane.

Procedure:

1. Reduce power to idle and set flaps to normal approach to landing configuration.
2. Maintain altitude until approaching normal approach speed.
3. Establish and trim for a glide at normal approach speed.
4. Smoothly apply takeoff power and allow the pitch attitude to increase above a normal climbing attitude.
5. When it is apparent that a stall is approaching, apply adequate forward pressure to return to a normal climb attitude.
6. While holding the airplane in this attitude, adjust trim to relieve the heavy control pressures.
7. After recovery, resume the normal go-around and level off procedures.

*Note: This maneuver is for dual only demonstration purposes.

STANDARDS: Flight Instructor PTS Area of Operation 11, Task E

POWER-OFF STALL (FALLING LEAF DEMONSTRATION)

Maneuver: The falling leaf demonstration is the same as the normal power-off stall, except that recovery is not immediately initiated and the airplane is held in a stalled condition.

Objective: The objectives in performing this maneuver are to further develop the pilot's confidence in performing intentional stalls, as well as to demonstrate rudder effectiveness versus lack of aileron effectiveness in a stall.

Procedure:

1. Reduce power to idle and set flaps to desired configuration.
2. Maintain altitude while slowing to normal approach speed.
3. Establish and trim for a glide at normal approach speed.
4. When approach speed and attitude have stabilized, smoothly raise the nose to an attitude that will induce a stall.
5. Announce the onset of the stall as recognized by clues such as full back elevator, airframe buffeting, high descent rate, or nose down pitching.
6. Do not immediately recover from the stall; instead continue to hold full back elevator pressure.
7. Use coordinated rudder and aileron pressure to keep the wings level and allow the descent to continue for approximately 500-1,000 feet.
8. Recover from the stall by releasing back-elevator pressure and observe how the airplane flies out of the stall.
9. Advance the throttle to takeoff power, lower the nose as necessary to regain flying speed and set a V_x pitch attitude with minimum loss of altitude.
10. With a positive rate of climb, retract the flaps in increments delaying final flap retraction until the airplane accelerates past V_x .
11. Climb at V_x while returning to original assigned heading and altitude.

*Note: This maneuver is for dual only demonstration purposes.

STANDARDS: There are no specific standards for this maneuver.

ACCELERATED STALL (DEMONSTRATION)

FAA-H-8083-3, page 5-8

Maneuver: This stall demonstrates a stall at higher indicated airspeeds when excessive maneuvering loads are imposed by steep turns, pull-ups, or other abrupt changes in the airplane's flight path are made. It further demonstrates that a stall is a function of angle of attack rather than airspeed.

Objective: The objective in demonstrating accelerated stalls is not to develop competency in setting up the stall, but rather to learn how they may occur and to develop the ability to recognize such stalls immediately, and to take prompt, corrective action.

Procedure:

1. Enter the maneuver in straight-and-level flight at an airspeed below design maneuvering speed (90 KIAS for training purposes), and verify flaps retracted.
2. Establish a level steep turn with no more than a 45 degree bank without adding power.
3. Smoothly and firmly increase back-elevator pressure until the stall occurs.
4. Recover promptly by releasing back pressure and increasing power while using coordinated control pressures to return to straight-and level flight.

*Note: This maneuver is for dual only demonstration purposes.

STANDARDS: There are no specific standards for this maneuver.

EMERGENCY APPROACH AND LANDING

FAA-H-8083-3, page 12-2

Maneuver: An emergency approach and landing is used when the aircraft experiences engine power loss during any phase of flight.

Objective: The objective of this maneuver is to safely transition the aircraft to the ground after a loss of power. The maneuver is designed to increase the student's ability to maintain aircraft control while performing the emergency checklist and judging aircraft gliding distance.

Procedure:

1. After determining a loss of power has occurred, establish best glide speed by maintaining a level pitch attitude as the airplane slows.
2. Select the most appropriate landing site and fly a modified traffic pattern to land at the selected site.
3. Complete the "Restarting Engine" emergency checklist.
4. If the "Restarting Engine" checklist is unsuccessful, maintain aircraft control and proceed to the "Securing Engine" checklist.
5. If the maneuver is being conducted in training, recover to a cruise climb before reaching 500' AGL.
6. If the engine failure occurs in instrument meteorological conditions (IMC), ask ATC for vectors to the nearest airport or away from high terrain, as appropriate.

STANDARDS: Private Pilot PTS, Area of Operation 10, Task A
Commercial Pilot PTS, Area of Operation 9, Task A
Flight Instructor PTS, Area of Operation 13, Task A

ENGINE FAILURE AFTER TAKE-OFF (DEMONSTRATION)

FAA-H-8083-3, page 12-2

Maneuver: An emergency approach and landing is used when the aircraft experiences engine power loss during any phase of flight. These can include during cruise, during climb, during descent, or during the traffic pattern. The procedures to follow an aircraft engine power loss during climb are similar to the ones used during other phases of flight, therefore, only the additional procedures for an engine failure during climb are presented here.

Objective: The objective of this maneuver is to safely transition the aircraft to the ground after a loss of engine power. The maneuver is designed to increase the student's ability to maintain aircraft control during a climb, while performing the emergency checklist and judging aircraft gliding distance.

Procedure:

1. Establish a climb using any one of the three take-off configurations.*
2. After determining a loss of power has occurred, maintain the climb pitch attitude and count to three.
3. Establish best glide speed by lowering the nose to a normal glide pitch attitude, in order to avoid a stalled condition.
4. Begin a 180-210 degree turn using a medium bank to simulate a turn back towards an airport, and note the altitude loss during the turn.
5. Select the most appropriate landing site ½ mile away and continue with the emergency approach and landing procedures.
6. After passing the ½ mile reference point, note the total altitude lost and initiate a go-around before reaching 500' AGL.

*Note: This procedure should be done above a minimum safe altitude of 2,000 feet AGL, and is for dual only demonstration purposes.

STANDARDS: Private Pilot PTS, Area of Operation 10, Task A
Commercial Pilot PTS, Area of Operation 9, Task A
Flight Instructor PTS, Area of Operation 13, Task A

EMERGENCY DESCENT (DEMONSTRATION)

FAA-H-8083-3, page 12-2

Maneuver: This is a maneuver for descending as rapidly as possible to a lower altitude or to the ground for an emergency landing. The need for an emergency descent may result from an in flight fire, a sudden loss of cabin pressure, or any situation requiring an immediate and rapid descent.

Objective: The objective is to descend as soon and as rapidly as possible, within the structural limitations of the airplane.

Procedure:

1. Reduce power to idle.
2. Slow to V_{FE} and extend flaps to 30 degrees.
3. Simultaneously pitch down and bank 30 to 45 degrees in the descent to clear the area and maintain positive load factor.
4. Stabilize the descent at V_{FE} .*

*Note: For training purposes, as soon as the descent is established and stabilized, terminate the maneuver to prevent shock cooling the engine.

STANDARDS: There are no specific standards for this maneuver.

NO-FLAP LANDING

FAA-8083-3, page 7-5

Maneuver: The no-flap landing demonstrates the airplane's handling and performance characteristics when approaching to land without wing flaps extended.

Objective: To develop the student's ability to safely land in a no-flap configuration.

Procedure:

1. Follow the normal traffic pattern operations procedure for arriving at a towered or non-towered airport.
2. Abeam the point of intended landing, reduce power to idle. Begin a gradual descent at 75 KIAS. Do not extend the flaps during the pattern.
3. At a point approximately 45 degrees from the approach end of the runway, begin a medium bank turn onto the base leg and slow to 70 KIAS.
4. While on the base leg, visually clear the final approach area.
5. Final approach:
 - Set an aiming point in order to land within the first 1/3 of the runway.
 - Flaps should remain retracted.
 - No-flap approach speed 65 KIAS.
6. Maintain aiming point with pitch and power corrections until approaching round out.
7. At the round out, reduce power to idle and continue the flare to touchdown on the main wheels first at approximately stalling speed.
8. Upon touchdown, hold the nose wheel off the runway as long as the elevator remains effective to provide aerodynamic braking, as appropriate.
9. Maintain directional control using rudder.
10. Do not initiate the after-landing checklist until clear of the runway.

*Note: The descent angle in a no-flap condition is much shallower than when using flaps. Also, landing distances will be increased due to the higher approach speed used.

STANDARDS: Private Pilot PTS, Area of Operation 10, Task B
Instrument Rating PTS, Area of Operation 9, Task B
Flight Instructor PTS, Area of Operation 13, Task B

RECOVERY FROM UNUSUAL ATTITUDES

FAA-H-8083-3, page 9-7

FAA-H-8083-15, page 5-32

Maneuver: An unusual attitude is an airplane attitude not normally required for instrument flight. Unusual attitudes may result from a number of conditions such as turbulence, disorientation, or instrument failure, etc.

Objective: To develop the student's ability to recognize and recover from unusual attitudes using visual and instrument references.

Procedure:

1. Nose-high attitudes.
Recognizing:
 - Airspeed decreasing.
 - Altitude increasing.
 - VSI shows a climb.**Recovery:**
 - Apply full power.
 - Simultaneously apply forward elevator pressure to lower the nose and use coordinated aileron and rudder pressure to level the wings.
 - Resume straight-and-level flight.
 - Return to assigned heading and altitude.
2. Nose-low attitudes.
Recognizing:
 - Airspeed increasing.
 - Altitude decreasing.
 - VSI shows a descent.**Recovery:**
 - Reduce power to idle.
 - Simultaneously correct the bank attitude with coordinated aileron and rudder pressure and apply smooth back-elevator pressure to raise the nose.
 - Resume straight-and-level flight.
 - Return to assigned heading and altitude.

*Note: The recovery from unusual attitudes should be accomplished using smooth control inputs in order to maintain a 1g flight load factor.

STANDARDS: Private Pilot PTS, Area of Operation 9, Task E
Instrument Rating PTS, Area of Operation 4, Task G
Flight Instructor PTS, Area of Operation 11, Task E

HOLDING PROCEDURES

FAA-H-8083-15, page 10-10
AIM 5-3-7

Maneuver: Holding patterns are used as a delaying action enroute for traffic or adverse weather. Holding is a maneuver which keeps the aircraft within a specified airspace while awaiting further clearance from ATC.

Objective: To develop the student's ability to determine the FAA recommended pattern entry and maneuver the aircraft over a predetermined point, while correcting for wind.

Procedure:

1. Tune and identify the appropriate navigational aids.
2. Check and set the heading indicator against the magnetic compass.
3. Determine holding pattern entry.
4. When within 3 minutes from the fix, start a speed reduction in order to cross the fix at or below the maximum holding speed.
5. Report to ATC the time and altitude reaching the holding fix.
6. Upon crossing the fix, execute the appropriate holding pattern entry procedure.
7. Start timing outbound when over or abeam the fix, whichever occurs later. If the abeam point cannot be determined, start time when the outbound turn is completed.
8. Adjust the heading and length of the outbound leg so as to intercept and track along the inbound course for 1 minute.*
9. Remain in the holding pattern until given a revised clearance, or if radio communication is lost, until the given EFC time.
10. Report departing the hold and resume normal cruise or remain at approach speed if applicable.

*Note: As a rule of thumb, apply 3 times the amount of wind correction outbound as needed to maintain the inbound course in the direction of the wind. Example: 10° of wind correction inbound would result in a 30° wind correction outbound.

STANDARDS: Instrument Rating PTS, Area of Operation 3, Task C

TRACKING VOR RADIALS

FAA-H-8083-15, page 7-11

Maneuver: Tracking a VOR radial allows a pilot to navigate directly to or from a Very-High Frequency Omni-directional Range (VOR). The process of tracking involves crabbing into the wind while maintaining the airplane's ground track constant.

Objective: To develop the student's ability to navigate a direct course either to or from a VOR.

Procedure:

1. Rotate the omni bearing selector (OBS) until a TO flag appears, then center the course deviation indicator (CDI).
2. Turn to the course indicated by the index and fly that heading.
3. If the CDI needle moves either left or right, initially turn 20 degrees in the direction that the needle deflects.*
4. When the CDI centers again, reduce the course correction by half.
5. If the CDI moves left or right now, it should do so much slower, and you can make a smaller heading correction. This is called "bracketing the course" until you've established a wind correction angle that will hold you on course.
6. To track a radial outbound, initially rotate the OBS until a FROM flag appears and repeat steps #2 thru #5.

*Note: To avoid reverse sensing, always fly to a VOR with a TO flag or away from a VOR with a FROM flag. This will allow you to always fly towards the direction that the CDI deflects and towards the course selected.

STANDARDS: Private Pilot PTS, Area of Operation 7, Task B
Instrument PTS, Area of Operation 5, Task A

INTERCEPTING VOR RADIALS

FAA-H-8083-15, page 7-11

Maneuver: Intercepting and tracking VOR radials can be used in order to fly the aircraft along a desired course, either to or from the VOR.

Objective: To develop the student's ability to orient themselves around the VOR and develop their skills at intercepting and tracking VOR Radials.

Procedure:

1. Tune and identify the appropriate VOR.
2. Check and set the heading indicator against the magnetic compass.
3. Determine which VOR radial the aircraft is currently located on.
4. Determine the difference between the aircraft's current radial and the radial to be intercepted.
5. Double the difference between the aircraft's current radial and its desired location to find the intercept angle.
6. Rotate the OBS to the desired radial/course.
7. Apply the intercept angle in the direction the Course Deviation Indicator (CDI) deflects.
8. Turn the aircraft to this heading.
9. Once the CDI moves from full scale deflection, determine the rate of turn to roll out on the appropriate radial.*
10. Apply wind drift correction and track along the desired radial.

*Note: When within 5 NM of a VOR station, use no greater than a 30-45 degree intercept angle, to avoid overshooting due to course sensitivity.

STANDARDS: Private Pilot PTS, Area of Operation 7, Task B
Instrument Rating PTS, Area of Operation 5, Task A

TRACKING NDB BEARINGS

FAA-H-8083-15, page 7-5

Maneuver: Tracking uses a heading that will maintain the desired track to or from a Non Directional Radio Beacon (NDB) station regardless of crosswind conditions. Interpretation of the heading indicator and ADF needle is done to maintain a constant magnetic bearing (MB) to or from the station.

Objective: To develop the student's ability to navigate a direct course either to or from an NDB.

Procedure:

1. To track inbound, turn to a heading that will produce a zero relative bearing.
2. Maintain this heading until off-course drift is indicated by displacement of the needle.
 - Needle moving left = wind from the left.
 - Needle moving right = wind from the right.
3. When there is a definite change in needle reading (2-5 degrees), double the number of degrees and turn in the direction of the needle to intercept the initial bearing.
4. Maintain the new heading until the angle of deflection equals the intercept angle.
5. Correction = deflection
6. Take out half of the intercept angle and maintain the new heading to track the course.
7. The aircraft is on course as long as the relative bearing remains the same number of degrees as the wind correction angle. If not, repeat steps #3 thru #5 using smaller angles called "bracketing."

*Note: To track outbound, the same principles apply as inbound. Wind correction is made towards the needle deflection. The only exception is that, while the turn to establish the wind correction angle is being made, the direction of the azimuth needle deflection is reversed. When tracking inbound, needle deflection decreases while turning to establish the wind correction angle, conversely, needle deflection increases when tracking outbound.

STANDARDS: Private Pilot PTS, Area of Operation 7, Task B
Instrument Pilot PTS, Area of Operation 5, Task A

INTERCEPTING NDB BEARINGS

FAA-H-8083-15, page 7-7

Maneuver: Intercepting and tracking NDB bearings can be used in order to fly the aircraft along a desired course, either to or from a Non-Directional Radio Beacon (NDB).

Objective: To develop the student's ability to orient themselves around the NDB and develop their skills at intercepting and tracking NDB bearings.

Procedure:

1. Tune and continuously identify the appropriate NDB.
2. Check and set the heading indicator against the magnetic compass.
3. Determine your position in relation to the station by turning to parallel the desired inbound bearing.*
4. Note whether the station is to the right or left of the nose position.
5. Determine the number of degrees of needle deflection from the zero position and double this amount for the interception angle.
6. Turn the aircraft toward the desired magnetic bearing the number of degrees determined for the interception.
7. Maintain the intercept heading until the ADF needle is deflected the same number of degrees from the zero position as the intercept angle, minus lead.
8. Apply wind drift correction and track along the desired bearing.

*Note: Interception of an outbound bearing can be accomplished by the same procedures as for the inbound intercept, except that it is necessary to substitute the 180 degree position for the zero position.

STANDARDS: Private Pilot PTS, Area of Operation 7, Task B
Instrument Rating PTS, Area of Operation 5, Task A
Commercial Pilot PTS, Area of Operation 7, Task B

INTERCEPTING AND TRACKING DME ARCS

FAA-H-8083-15, page 7-14

Maneuver: Intercepting and tracking DME Arcs can be used in order to fly the aircraft along a desired course to intercept the final approach course to a precision or non-precision instrument approach.

Objective: To develop the student's ability to track a DME arc at a specified distance.

Procedure:

1. Tune and identify the appropriate VOR and DME.*
2. Check and set the heading indicator against the magnetic compass.
3. Track the course to or away from the DME fix.
4. Determine the direction of turn from the heading indicator.
5. When .5 NM away from the DME fix, begin a 90° turn in the appropriate direction.
6. Use the OBS to monitor the aircraft's progress during the turn in 10 degree increments. If it appears the aircraft will fly past the DME fix, continue past the planned rollout heading. If the aircraft will not make it to the DME fix, roll out of the turn early.
7. Apply wind correction as necessary to maintain a constant DME distance from the VOR.
8. Set the OBS to monitor the aircraft's progress across the VOR in 10 degree increments.

IF TRACKING TO A FINAL APPROACH COURSE:

9. Select a lead-in radial approximately 5° before the final approach course, or as recommended by the approach plate.
10. Upon reaching the lead-in radial, turn to the final approach heading.

*Note: The #1 navigation receiver should be tuned and set to the desired instrument approach frequency. The #2 navigation receiver should be tuned and set to the navaid used for the DME arc using a FROM flag.

STANDARDS: Instrument Rating PTS, Area of Operation 5, Task A

NON-PRECISION APPROACH

FAA-H-8083-15, page 10-13

Maneuver: A non-precision approach provides horizontal guidance to the aircraft in order to land at an airport in instrument meteorological conditions (IMC).

Objective: The objective of this maneuver is to transition the aircraft from the enroute airspace structure to landing. Non-precision approaches are used to guide the aircraft horizontally through the air and use a series of step down fixes to guide the aircraft safely to the runway.

Procedure:

1. Study the selected approach plate and conduct the approach briefing.
2. Tune and identify the appropriate navigational facilities.
3. Check and set the heading indicator against the magnetic compass.
4. Prior to intercepting the final approach course inbound, slow to approach speed, complete the before landing checklist, and set flaps to 10 degrees.
5. Once the aircraft is established on the final approach segment and cleared for the approach, maintain course guidance and descend at 500 FPM, or as appropriate to the minimum descent altitude (MDA).
6. Once the runway environment is in sight, execute the normal approach or circling approach procedure, as appropriate.
7. Upon reaching the missed approach point (MAP) with the runway environment not in sight, execute the missed approach procedure.

STANDARDS: Instrument Rating PTS, Area of Operation 6, Task A

PRECISION ILS APPROACH

FAA-H-8083-15, page 7-27

FAR 91.175

Maneuver: A precision approach provides horizontal and vertical guidance to the aircraft in order to land at an airport in instrument meteorological conditions (IMC).

Objective: The objective of this maneuver is to transition the aircraft from the enroute airspace structure to landing. Precision approaches are used to guide the aircraft horizontally and vertically along the runway's extended centerline.

Procedure:

1. Study the selected approach plate and conduct the approach briefing.
2. Tune and identify the appropriate navigational facilities.
3. Check and set the heading indicator against the magnetic compass.
4. Prior to intercepting the final approach course slow to approach speed, complete the before landing checklist, and set flaps to 10 degrees.
5. Track the localizer and glide slope to the decision height (DH).
6. Upon reaching the decision altitude with the runway environment in sight, execute the normal approach and landing procedure while continuing to monitor the localizer and glideslope until touchdown.
7. Upon reaching the decision height with the runway environment not in sight, execute the missed approach procedure.

STANDARDS: Instrument Rating PTS, Area of Operation 6, Task B

MISSED APPROACH PROCEDURE

FAA-H-8083-15, page 10-22

Maneuver: A missed approach procedure is a flight path usually made on a course that most nearly approximates a continuation of the final approach course. A missed approach will be initiated at the point where the aircraft has descended to authorized landing minimums at a specified distance from the facility if visual contact has not been established, or when directed by ATC.

Objective: To develop the student's ability to safely and efficiently transition from the final approach segment of an instrument approach to the missed approach segment when landing minimums have not been met.

Procedure:

1. Study the approach plate to become familiar with the published missed approach flight path or the directions given by ATC, as appropriate.
2. Upon reaching the DH or MAP, if no visual contact is made with the runway environment, apply full power and establish a climb pitch attitude.
3. With a positive rate of climb, retract the flaps.
4. Proceed as directed along the appropriate missed approach path.
5. Notify ATC of the missed approach.

STANDARDS: Instrument Rating PTS, Area of Operation 6, Task C

CIRCLING APPROACH PROCEDURE

FAA-H-8083-15, page 10-20

Maneuver: A circling approach is used to transition the aircraft from one runway to another runway. It can be used to land on runways with more favorable winds or to conform to traffic pattern operations already in use at an airport.

Objective: To develop the student's ability to safely maneuver from one runway to another for landing when the runway is not aligned with the final approach course.

Procedure:

1. Descend to the circling minimums.*
2. Circle to the runway of intended landing using the appropriate circling approach traffic pattern and maneuver the shortest path to the base or downwind leg.
3. Once a landing on the appropriate runway is assured, descend from the circling minimums and complete the normal approach and landing procedure.
4. If visual contact with the runway is lost, make a climbing turn towards the original approach runway and execute the missed approach procedure.

*Note: If the ceiling allows it, fly at an altitude that more nearly approximates the VFR traffic pattern altitude.

STANDARDS: Instrument Rating PTS, Area of Operation 6, Task D

INSTRUMENT TAKEOFF

FAA-H-8083-15, page 5-33

Maneuver: An instrument takeoff will provide the proficiency and confidence necessary for the use of flight instruments during departures under conditions of low visibility, rain, low ceilings, or disorientation at night.

Objective: To develop the student's ability to use instruments rather than outside visual cues to maintain runway heading and execute a safe takeoff.

Procedure:

1. Taxi into takeoff position and carefully align the airplane with the centerline of the runway with the nosewheel straight. Hold the brakes firmly to prevent moving.
2. Set the heading indicator with the nose index on the 5 degree mark nearest the published runway heading, so heading changes can instantly be detected during the takeoff roll.
3. Apply partial power for rudder effectiveness, release the brakes, and smoothly apply takeoff power.
4. Check static RPM, approximately 2400 RPM, and verify airspeed rising.
5. Once the brakes are released, any deviation in heading must be corrected instantly with rudder pressure.
6. As flying speed is approached, approximately 15-25 KIAS below normal lift-off speed smoothly apply back-elevator pressure for the desired takeoff attitude on the attitude indicator.*
7. Maintain a rapid cross-check of the heading indicator and attitude indicator as the airplane leaves the ground. Do not pull it off; let it fly off while you hold the selected attitude constant.
8. Verify a positive rate of climb on the altimeter and vertical speed indicator and accelerate to V_x or V_Y , as appropriate.
9. At a safe altitude, approximately 100 feet AGL, if flaps were used they can be retracted in increments above V_x .
10. Continue normal climb-out at V_Y to 1,000 feet AGL, then transition to a cruise climb pitch attitude.
11. Throughout the instrument takeoff, cross-check and interpretation must be rapid, and control inputs positive and smooth.

*Note: For most small airplanes, use approximately a 2-bar width climb indication on the attitude indicator.

STANDARDS: There are no specific standards for this maneuver.