EMERGENCY APPROACH AND LANDING

DESCRIPTION: This maneuver is designed to land the aircraft as safely and as soon as possible in the event of an emergency.

OBJECTIVE: The student should be confident to land the aircraft safely during an emergency using accuracy, sound judgment, planning, and good technique.

PROCEDURES:
Causes: Any situation which warrants a forced landing i.e. engine failure, electrical failure, partial power loss, system/equipment malfunction, etc... NTSB factors that may interfere with a pilot's ability to act promptly and properly when faced with an emergency:

1. Reluctance to accept emergency situation: Do not allow the emergency to paralyze your decision-making; maintain flying speed and choose a suitable landing field.
2. Desire to save airplane: There may be times that the airplane will have to be sacrificed so that you and your passengers can walk away.
3. Undo concern about getting hurt: Fear is a vital part of self-preservation, but it must not lead to panic. Maintain your composure at all times.

Airspeed and Aircraft Control

- The first job is to maintain control of the aircraft.
- Always trim for best glide speed, configure the aircraft for minimum drag configuration i.e. flaps up, gear up.
- Since power is no longer available airspeed must be controlled with pitch only.

Best Field

Picking a suitable forced landing field:

- Always be on the lookout.
- Ideal field is an airport or a hard packed, long, smooth field with no high obstacles at the approach end.
- Cultivated fields are acceptable if the landing is made parallel to the furrows.
- Private, paved or unpaved, landing fields.
- Roads should be used only as a last resort, there are usually power or phone lines which you may not be aware of, as well as auto traffic.
- The field must be within gliding distance.

Determine wind direction:

- Ways to determine the direction of the wind are by looking at trees, smoke, dust, and nearby lakes.
- Always try to land into the wind, this allows for a lower ground speed and a shorter ground roll.
- Sometimes it may not be preferable to land into the wind such as:
  a. Insufficient altitude to attempt to maneuver.
  b. Ground obstacles may shorten landing field.

EMERGENCY APPROACH AND LANDING (Cont.)

c. Distance from the field.
d. The best available field may be on a hill and at such an angle to the wind that a downwind landing uphill would be preferable and safer.

Flying the approach:

- Head straight to the field.
- If altitude permits go through engine restart emergency checklist (if engine failure occurs).
- Utilize any combination of normal gliding maneuvers.
- If over a field and altitude must be lost, execute spirals over the field down to pattern altitude.
- Fly the emergency approach as normal as possible since this is most familiar.
- At the key position determine your touchdown spot and select the most appropriate pattern to reach the spot.
- Landing gear up or down:
  a. If field has stumps, rocks, or other large obstacles, the gear down will better protect you and your passengers.
  b. If the field is soft, wet, or snow covered a gear up landing will normally be safer to eliminate the possibility of the airplane nosing over as a result of the wheels digging in.
- Altitude is the controlling factor in the accomplishment of a successful landing.
- Techniques to use to compensate for overshooting or undershooting are:
  a. Attempt to fly a base to final approach.
  b. For overshooting:
     - Lengthen base leg, if landing area permits.
     - Widen base leg by heading slightly away from the field.
     - Extend flaps.
     - Use a forward slip on final.

     For undershooting:
     - Shorten base leg.
     - Start turn toward the field to shorten the final approach.
     - Delay the use of flaps.
     - Do not raise nose to extend glide.
     - If equipped with a controllable prop, adjust prop control to high pitch, low RPM to extend glide.
     - If engine is lost on take off and below a safe maneuvering altitude, do not attempt a 180° turn to land on the departure end of the runway, it is better to land straight ahead.

Checklist

- If above 1000' AGL with sufficient altitude execute the emergency checklist.
- Should commit to memory important items such as; restart procedure if engine failure occurs.

EMERGENCY APPROACH AND LANDING (Cont.)

- When landing assured execute landing without power checklist especially make sure that any item that may cause a fire is secured. i.e. ignition, fuel, master switches.
- If altitude permits always verify tour emergency procedures with an actual written checklist.
- If below 1000' AGL and/or insufficient altitude concentrate on performing the landing.

Declare an Emergency

- Dial in 121.5 or appropriate ATC facility on the radio.
- Report an emergency ("Mayday, mayday") state your position, type of aircraft and number of people on board, problem, and intentions.
- Squawk 7700 on the transponder.

Engine Shutdown

- It is important to execute the **"In-flight engine failure checklist"** so as to make sure that all procedures are accomplished so that a fire will not occur once a landing is made.
- Go through a flow, start with the fuel then work your way to the electrical switches.
- These procedures are done so that if you incur an impact upon landing the chances of a fire occurring are minimal.

REFERENCES: Airplane Flying Handbook FAA-H-8083-3, FAA Private and Commercial Practical Test Standards.

EMERGENCY PROCEDURES- ENGINE FAILURE

DESCRIPTION: These procedures emphasize the various factors leading to and recovery from engine failures during takeoff, after lift-off, and enroute.

OBJECTIVE: After an engine failure, the pilot will know what altitude, airspeed, and airplane configuration must exist to permit the flight to continue or to land safely while maintaining directional control. The student will use the appropriate emergency checklist to prevent overlooking steps or performing incorrect procedures.

PROCEDURES:

NOTE: THE ENGINE FAILURE DURING TAKEOFF, BEFORE VMC WILL BE PERFORMED PRIOR TO THE AIRCRAFT REACHING AIRSPEED OF ½ VMC OR 28 KNOTS FOR THE PA-44. SINCE THIS SPEED IS NOT DEPICTED ON THE AIRSPEED INDICATOR, THE EXCERSISE SHOULD BE DONE BEFORE THE AIRSPEED INDICATOR BEGINS TO MOVE.

During takeoff, before Vmc:

- Utilizes the prescribed emergency procedure
- Promptly and smoothly closes the throttle when engine failure occurs. (before ½ Vmc.)
- Maintains directional control and remains on runway centerline while applying brakes as necessary.

After lift-off:

- Promptly recognizes engine failure.
- Maintains directional control and utilizes the prescribed emergency procedure.
- Identifies, verifies, and feathers the propeller of the failed engine while continuing to climb.
- Reduces drag by raising the gear and flaps, if utilized, when a positive rate of climb is established.
- Promptly and smoothly accelerates to Vyse.
- Follows the prescribed **"In-flight engine failure checklist"**.
- Establishes a bank toward the operating engine for best performance.
- Troubleshoots the engine malfunction (If time and altitude permits).
- Monitors the operating engine and updates decisions based on feedback.
- Returns for landing.

Enroute:

- Promptly recognizes engine failure.
- Pitches for Vyse.
- Maintains directional control and utilizes the prescribed emergency procedure.
- Identifies and verifies the failed engine.
- Determines if it is feasible to restart the affected engine; if so follows the appropriate restart procedure. Otherwise, feathers the propeller.

EMERGENCY PROCEDURES- ENGINE FAILURE (Cont.)

- Protects the good engine by applying appropriate manifold pressure and RPM on the operating engine (Seminole).
- If on a flight plan or flight following, notifies ATC of engine failure and asks for an appropriate landing site where repairs can be made (landing site based on aircraft performance).
- If not in contact with ATC, fly to a known airport where repairs can be made or contact ATC for possible assistance (landing site based on aircraft performance).
- Maintains sufficient altitude to continue flight to the point of intended landing.

REFERENCES: Pilot Operating Handbook, Seminole Emergency Checklist, Airplane Flying Handbook FAA-H-8083-3, FAA Private and Commercial Pilot Practical Test Standards.

PARTIAL PANEL FLIGHT

DESCRIPTION: This exercise teaches the student in coordinated flight when experiencing an instrument failure (i.e. vacuum failure = no A/I and H/I).

OBJECTIVE: The student will exhibit thorough knowledge of primary and secondary instruments and will be able to transition to partial panel when one or more instruments are inoperative.

PROCEDURES:

- Recognition of instrument failure and reports it to ATC.
- Maintains coordinated flight and aircraft control while partial panel
- Revises instrument scan and reassigning primary and supporting status to the operative instruments.

REFERENCES: Instrument Flying Handbook, FAA-H-8083-15, FAA Instrument Rating Practical Test Standards.

SOFT FIELD TAKEOFF AND CLIMB

DESCRIPTION: Getting the aircraft airborne as quickly as possible so as not to cause excessive wear on aircraft components.

OBJECTIVE: To develop the skill and proficiency necessary to get the aircraft off the ground as soon as possible after power is applied.

PROCEDURES:

1. Factors related to the transfer of airplane weight from the landing gear to the wings as rapidly as possible.
2. Review of wind conditions and takeoff surface.
3. Use of wing flaps as appropriate.
4. How to align the airplane with the takeoff path without stopping.
5. Initial positioning of flight controls.
6. Power application.
7. Directional control during acceleration on the surface.
8. Crosswind control technique during acceleration on the surface.
9. Lift-off attitude and airspeed.
10. Acceleration in ground effect to climb airspeed (Vy).
11. Track during climb.
12. Use of checklist.

REFERENCES: FAR and Aeronautical Information Manual, Airplane Flying Handbook FAA-H-8083-3.

SOFT FIELD APPROACH AND LANDING

DESCRIPTION: To develop the student's ability to exercise good planning and judgment in order to have the airplane in a position and rate of descent so as to touchdown as slow and as softly as possible.

OBJECTIVE: To develop the skill and proficiency necessary to execute a soft field approach and landing as well as techniques for taxiing after touchdown.

PROCEDURES:

1. How to determine landing performance and limitations.
2. Configuration and trim.
3. Obstructions and other hazards, which should be considered.
4. Effect of wind and landing surface.
5. Selection of a touchdown area.
6. A stabilized approach at the recommended airspeed to the selected touchdown area.
7. Coordination of flight controls.
8. A precise ground track.
9. Timing, judgment, and control technique during round out and touchdown.
10. Touchdown in a nose-high pitch attitude at minimum safe airspeed.
11. Proper use of power.
12. Directional control after touchdown.
13. Use of checklist.

REFERENCES: Private and Commercial Pilot Practical Test Standards, FAA-H-8083-3 Airplane Flying Handbook.

FORWARD SLIPS TO A LANDING

DESCRIPTION: The aircraft is configured so that the aircraft will lose altitude without loosing airspeed.

OBJECTIVE: To develop the skill and proficiency necessary to execute a forward slip to a landing. To provide understanding to the aerodynamics of the forward slip and it's relation to the performance of the aircraft.

PROCEDURES:

1. Configuration, power, and trim.
2. Obstructions and other hazards, which should be considered.
3. A stabilized slip at the appropriate airspeed to the selected touchdown area.
4. Possible airspeed indication errors.
5. Proper application of flight controls.
6. A precise ground track.
7. Wind shears and wake turbulence.
8. Timing, judgment, and control technique during transition from slip to touchdown.
9. Directional control after touchdown.
10. Use of brakes.
11. Use of checklist.

REFERENCES: FAA Private and Commercial Practical Test Standards, Airplane Flying Handbook FAA-H-8083-3.

TURNS AROUND A POINT

DESCRIPTION: Flying the aircraft in a constant radius turn around a point on the ground correcting for wind drift. To develop the pilot's ability to subconsciously control the airplane while dividing attention between the flight path and ground references, and scanning for other traffic.

OBJECTIVE: To develop the skill and proficiency necessary to correct for wind while referencing to the ground as well as dividing attention outside the plane looking for traffic. It's the building blocks for other maneuvers like S-turns along a road, Rectangular course and eight's on pylons.

PROCEDURES:

1. How to select a suitable altitude.
2. How to select a suitable ground reference point with suitable to emergency landing areas.
3. Orientation, division of attention, and planning.
4. Configuration and airspeed prior to entry.
5. Entry technique.
6. Wind drift correction.
7. How to maintain desired altitude, airspeed, and distance from reference point.
8. Coordination of flight controls.

REFERENCES: FAA Private and Commercial Pilot Practical Test Standards, Airplane Flying Handbook FAA-H-8083-3.

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S-TURNS ACROSS A ROAD

DESCRIPTION: Maneuvering the aircraft along a linear feature (road) consisting of two semi-circles of equal radii and an entry altitude is maintained (600-1000' AGL). The maneuver should be entered on the downwind.

OBJECTIVE: To develop the pilot's ability to compensate for drift during turns, orient the flight paths with ground references, and divide the pilot's attention.

PROCEDURES:

1. How to select a suitable altitude.
2. How to select a suitable ground reference line with suitable emergency landing areas.
3. Orientation, division of attention, and planning.
4. Configuration and airspeed prior to entry.
5. Entry technique.
6. Wind drift correction.
7. Tracking of semicircles of equal radii on either side of the selected ground reference line.
8. How to maintain desired altitude and airspeed.
9. Turn reversal over the ground reference line.
10. Coordination of flight controls.

REFERENCES: FAA Private and Commercial Pilot Practical Test Standards Airplane Flying Handbook FAA-H-8083-3.

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RECTANGULAR COURSE

DESCRIPTION: The aircraft is flown over a course consisting of four corners so as to resemble that of an airport traffic pattern.

OBJECTIVE: To develop division of attention between flight and ground paths while controlling the aircraft and scanning for traffic; develop recognition of drift; and continue to develop smoothness, coordination, and orientation.

PROCEDURES:

1. How to select a suitable altitude.
2. How to select a suitable ground reference with suitable emergency landing areas.
3. Orientation, division of attention, and planning.
4. Configuration and airspeed prior to entry.
5. Relationship of a rectangular course to an airport traffic pattern.
6. Wind drift correction.
7. How to maintain desired altitude, airspeed, and distance from ground reference boundaries.
8. Timing of turn entries and rollouts.
9. Coordination of flight controls.

REFERENCES: FAA Private and Commercial Practical Test Standards Airplane Flying Handbook FAA-H-8083-3.

OPERATION OF SYSTEMS

DESCRIPTION: The airplane and it's related systems and subsystems are discussed and a thorough understanding developed.

OBJECTIVE: Pilots must exhibit knowledge of the elements of related to the operation of systems on the airplane.

PROCEDURES:

1. Airplane systems information available
2. Placards, cautions and compliance
3. Operating directive, utilization / adherence
4. Avionics operating instructions
5. Checklist and schematic application
6. Maintenance requirements and validation
7. Utilization of charts, data, and warnings
8. Flight controls, functions and effects

REFERENCES: FAA Private and Commercial Practical Test Standards, Seminole POH, Seminole Checklist, Aircraft Maintenance logs.

EIGHTS ON PYLONS

DESCRIPTION: The aircraft is flown around two pylons and the pilot must ensure that the line-of-sight reference line remains on the pylon.

OBJECTIVE: To develop the skill and proficiency necessary to execute turns around pylons while maintaining aircraft control. The selected pylons must be far enough apart in order to permit at least 3-5 seconds of straight and level flight.

PROCEDURES:

1. Must divide attention inside and outside aircraft
2. Must anticipate and have good planning of action
3. Must exhibit good timing of turn entries and rollout
4. Pivotal altitude must be determined accurately
5. Minimum safe altitudes must be maintain
6. Selection of safe ground pylons must be selected

REFERENCES: FAA Commercial Rating Practical Test Standards, Airplane Flying Handbook FAA-H-8083-3

CHANDELLE

DESCRIPTION: The aircraft is under positive control at varying airspeeds and altitudes and while maneuvering the aircraft through turns of 180 degrees.

OBJECTIVE: To develop smoothness, coordination, orientation, division of attention, and control techniques while executing a maximum performance, climbing, and 180° degree turn.

PROCEDURES:

1. Exhibits knowledge of the elements related to performance factors associated with chandelles.
2. Selects an altitude that will allow the maneuver to be performed no lower than 1,500 feet AGL or the manufacturer's recommended altitude, whichever is higher.
3. Establishes the entry configuration at an airspeed no greater than the maximum entry speed recommended by the manufacturer (not to exceed Va).
4. Establishes approximately, but does not exceed, 30° of bank.
5. Simultaneously applies specified power and pitch to maintain a smooth, coordinated climbing turn with constant bank to the 90° point.
6. Begins a coordinated constant rate of rollout from the 90° point to the 180° point maintaining specified power and a constant pitch attitude that will result in a rollout within ±10° of desired heading and airspeed within +5 knots of power-on stall speed.
7. Reduces pitch attitude to resume straight-and-level flight at the final altitude attained, ±50 feet.

REFERENCES: FAA Commercial Practical Test Standards, Airplane Flying Handbook FAA-H-8083-3.

LAZY EIGHT

DESCRIPTION: The maneuver is one in which the performing airplane traces a flight path which is eight shaped in the vertical plane when viewed from the side, and S shaped when viewed from above.

OBJECTIVE: To develop smoothness, coordination, orientation, division of attention, and control techniques while executing maximum performance flight situations.

PROCEDURES:

1. Exhibits knowledge of the elements related to performance factors associated with lazy eights.
2. Selects an altitude that will allow the task to be performed no lower than 1,500 feet AGL or the manufacturer's recommended altitude, whichever is higher.
3. Selects a prominent 90° reference point in the distance.
4. Establishes the recommended entry power and airspeed.
5. Plans and remains oriented while maneuvering the airplane with positive, accurate control, and demonstrates mastery of the airplane.
6. Achieves the following throughout the task:
   - Constant change of pitch, bank, and turn rate.
   - Altitude and airspeed consistent at the 90° points, ±100 feet and ±10 knots respectively.
   - Through proper power setting, attains the starting altitude and airspeed at the completion of the maneuver, ±100 feet and ±10 knots respectively.
   - Heading tolerance ±10° at each 180° point.
7. Continues the task through at least two 180° circuits and resumes straight-and-level flight.

REFERENCES: FAA Commercial Practical Test Standards, Airplane Flying Handbook FAA-H-8083-3.

PERFORMANCE AND LIMITATIONS

DESCRIPTION: Determining the performance and limitations of the aircraft based on weather, runway, and type and duration of the flight.

OBJECTIVE: To develop the pilot's ability to determine aircraft performance and limitations. To develop the pilot's knowledge of adverse effects of exceeding aircraft limits. To develop the pilot's ability to make a competent decision on whether the performance is within the operating limits of the airplane.

PROCEDURES:

1. The student should be instructed on how to make weather decisions and to determine how atmospheric condition will affect aircraft performance.
2. The student should be knowledgeable with the aircraft capabilities and limitations.
3. The student will be instructed on the use of performance charts related the aircraft.
4. The student need to understand the importance of the go / no go decision based on all available data gathered for a particular flight.

REFERENCES: FAA Private and Commercial Practical Test Standards, Airplane Flying Handbook FAA-H-8083-3, POH, Aircraft Maintenance Logs.