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IN FLIGHT MANEUVERS AND OPERATING PROCEDURES C-172

Normal Cruise:

Straight and level flight should be with the airplane trimmed for level attitude and using 2200-2300 RPM. There should be no altitude gain or loss and heading should remain constant.

Slow Flight:

- Select an entry altitude for the maneuver that allows completion no lower than 1500 foot AGL or the recommended altitude whichever is high – Dean International altitude: 2000 ft.
- Start by making two 60 degree clearing turns, maintaining altitude.
- Upon completion, look and say heading, altitude and horizon.
- Complete the pre-maneuver checklist: fuel selector: both, flaps up, mixture rich, carburetor heat on; look and say …
- Gradually apply back pressure on the yoke to maintain altitude, slow to 85 knots using coordination (rudder) and maintain heading (looking outside)
- Lower 10 degrees of flaps, heading, altitude and horizon re-trim, adjust power and stabilize speed around 80 knots
- Lower 20 degrees of flaps, heading, altitude and horizon re-trim, adjust power and stabilize speed around 70 knots
- Lower full flaps, heading, altitude and horizon , re-trim, adjust power and stabilize speed at 60 knots (stabilize the airspeed at 1.2 V_{S1} +10/-5 knots
- Make necessary corrections for altitude using throttle adjustments and for speed using pitch adjustments (carburetor heat off above 2000 RPM).
- Recover to straight and level flight by adding full power; retract flaps in 10-increments resume normal cruise without gain or loss of altitude.

Go-Around Procedure

- Add full power – Nose to the horizon
- Turn the carburetor heat off.
- Retract 10 degrees of flaps
- Establish positive rate of climb
- Retract 10 degrees of flaps
- Establish positive rate of climb
- Retract 10 degrees of flaps

Approach to Landing Stall (Power off Stall)

- Select an entry altitude for the maneuver that allows completion no lower than 1500 ft. AGL or the recommended altitude whichever is higher – Dean International altitude: altitude 2000 ft
- Make two 90 degree clearing turns, maintaining altitude.
- Complete the pre-maneuver checklist: fuel selector: both, flaps up, mixture rich, carburetor heat on; look and say heading, altitude and horizon
- Gradually apply back pressure on the yoke to maintain altitude slow to 85 knots using coordination (rudder) and maintain heading (looking outside).
- Start lowering the flaps in 10 degree increments as specified in slow flight procedure.
- With the airplane trimmed to the normal approach speed for the landing configuration, reduce power to idle.
- Start gradually increasing angle of attack until the stall buffet is detected.
- Recover by lowering the nose to the horizon, adding full throttle and right rudder and level the wings as necessary, maintaining heading. As flying speed is regained adjust the pitch attitude to stop the descent and initiate a climb.
- Retract the flaps in 10 degree increments.
- Recovery should occur with minimum loss altitude.

Take-off and Departure

- Select an entry altitude for the maneuver that allows completion no lower than 1500 ft. AGL or the recommended altitude whichever is higher – Dean International altitude: altitude 2000 ft
- Make two 90 degree clearing turns, maintaining altitude.
- Complete the pre-maneuver checklist: fuel selector: both, flaps up, mixture full rich, carburetor heat: on, power: 1700 RPM and trim.
- Reduce speed to 70 knots (simulation take-off speed).
- Close the carburetor heat, add full throttle and gradually increase the angle of attack maintaining proper coordination of the flight controls (right rudder and heading).
- When the first stall buffet is detected, recover by smoothly lowering the nose to the horizon and level the wings as necessary (maintain right rudder).
- Establish V_X (best angle of climb speed) until a positive rate of climb is noted.
- Return to normal cruise

"S" Turns Across a Road

- Establish normal cruise at 1000 ft, AGL.
- Establish the airplane on a downwind heading and note the heading.
- Select a road or prominent straight line that runs crosswind.
- Enter downwind and perpendicular to the reference line.
- As the airplane crosses the reference line, enter a steep bank, because the ground speed is fastest at that point.
- The bank angle is gradually reduced as necessary to describe a ground track, which is a perfect half circle. As the roll out is completed, the airplane should be crossing the road perpendicular to it and headed upwind.

- Since the airplane is on the upwind side of the maneuver, a shallow bank should be started in the opposite direction to begin the second half of the “S”.
- The bank angle should be gradually increased as necessary to describe a headed downwind.
- Outside references: road – altitude – outside the traffic.

Turns Around a Point

- Establish a normal cruise at 1000 ft. AGL
- Establish the airplane on a downwind course and not the heading.
- Select a prominent reference point on the ground.
- Enter the maneuver flying downwind past the point at a distance equal to the desired radius of the turn.
- As you arrive exactly abeam the point, enter a medium banked turn toward track over the ground. Vary the bank from that point as necessary to fly in a perfect circle with constant radius around that point.
- When any wind exists, it will be necessary to enter the steepest bank immediately since the airplane is headed downwind. Thereafter, that bank should be shallowed gradually until the crosswind segments; crab technique must be utilized to maintain the desired track.
- Outside references: point – altitude – outside for traffic.

Rectangular Course

- Establish normal cruise at 1000 ft. AGL
- Select a reference rectangular course on the ground, big enough to fly outside its boundaries while maintaining the same distance from the sides.
- Enter the downwind, while making all necessary wind corrections.
- Turn crosswind by using a moderate to steep bank angle, depending on the wind to keep the airplane from drifting away from the rectangle and to join the crosswind side of the maneuver, maintaining the same distance from the side.
- Turn upwind by using a moderate to shallow bank angle in such a way that the same distance with the rectangle is maintained when the roll out is complete, and make all necessary wind corrections.

Steep Turns

- Select an altitude that will allow the maneuver to be performed no lower than 1500 ft. AGL – Dean International altitude: 2000 ft.
- Establish normal cruise speed.
- Make two 90 degree clearing turns.
- Smoothly roll into a 30 degree bank and apply some back elevator pressure. Upon reaching 45 degrees apply a little more back elevator pressure.
- Maintain a coordinated steep turn with a constant bank and roll out on the original heading after 360 degree of turn. It is important to maintain a constant altitude as well as constant bank. For commercial practice, the bank should be at 50 degrees.

Short Field Take-off

- Complete the before take-off checklist.
- Lineup for take-off utilizing all available runway, hold brakes, and smoothly apply full throttle, call out temperature-pressure and RPM; then release the brakes.
- Rotate at the recommended take-off speed and reach V_X (best angle of climb speed) 60 knots as soon as possible, maintain this speed until the obstacle is cleared (normally 50 ft. above the obstacle).
- Accelerate to V_Y (best rate of climb speed) 75 knots until reaching a safe altitude and establish normal climb.

Short Field Landing

- Enter downwind leg at normal cruise and perform pre-landing checklist.
- Reduce the power to 1700 RPM, trim off as required and start descent.
- Target speed during this phase should be 85 knots.
- Lower 10 degrees of flaps; target speed is 75 knots altitude 800 ft.
- When established on base leg, set the flaps to 20 degrees and the target speed should be 70 knots.
- Turn to final approach and set full flaps; target speed should be 60 knots.
- Make wind drift corrections as necessary.
- Touch down should be made in a full stall attitude with a minimum rate of descent; power is reduced during round out slowly to prevent the airplane from dropping.
- After the airplane is on the ground, retract the flaps and apply aerodynamic braking with power at idle.

Soft Field Take-off

- Complete the before take-off checklist, flaps 10 degrees
- Taxi into take-off position while pulling the elevator full up and do not stop the airplane.
- Apply full power, as nose comes up, release back pressure slightly to maintain an attitude where the nose wheel is clear of the runway, without dragging the tail looking at the far end of the runway.
- Maintain this attitude and life-off at the slowest possible airspeed.
- As soon as the airplane is off the ground, slightly lower the nose to remain in until crossing over the obstacle.
- After crossing the obstacle, lower the nose to obtain V_Y and retract the flaps. Resume normal climb at 75 knots.
- References – look at the end of the runway (look for trees, buildings, etc.)

Soft Field Landing

- Enter downwind at normal cruise and complete the pre-landing checklist.
- Opposite point of touchdown.
- Reduce the power to 1700 RPM, trim off as required and start descent.
- Target speed during this phase should be 85 knots.
- Lower 10 degrees of flaps, trim as required and establish 75 knots.

- Turn to base leg using the 45 degree reference from the runway and set the flaps to 20 degrees. Trim as necessary. Target speed should be 70 knots.
- Turn to final approach and set full flaps; speed should be 60 knots. Make wind drift correction as necessary.
- Keep reducing power during the descent – once the runway is made, there should be no power.
- Just before touchdown, add a little power so the airplane settles down as smooth as possible with nose up attitude (some power may be required during the landing roll to prevent the airplane from digging on the ground). Once the wheels touch the ground, cut the power completely. Full elevator up should be held in order to maintain the nose wheel off the ground as long as possible. Apply brakes only as required.

Lazy Eights

- Establish normal cruise.
- Make two 90 degree clearing turns.
- Lower the nose if necessary to accelerate to the maneuvering speed (V_A) of 97 knots.
- Begin to raise the nose, then immediately begin a turn with the pitch and the bank slowly increasing in a smooth, coordinated manner.
- The pitch should reach its maximum nose high attitude at the 45 degree point with the bank approximately half of the maximum bank angle used in the maneuver. The maximum bank used should not exceed 30 degrees.
- As the turn continues to the 90 degree point the nose should descend slowly to the level flight attitude with the bank gradually increasing to the maximum (not more than 30 degrees).
- Between 90 degrees and 135 degrees of turn the nose should reach its maximum nose down pitch attitude, which should equal the nose up pitch attitude of the first 45 degree turn. The bank should decrease gradually to a 15 degree bank or half the maximum bank used whichever is less.
- Between 135 and 180 degrees of turn the nose should return to the normal level attitude with the bank slowly shallowing to wings level and the airspeed returning to the maneuvering speed.
- Without stopping the maneuver the same process is then executed in the opposite direction.

Note: The Lazy Eight consists of two 180 degree turns directions with a symmetrical climb and dive performed during each of the turns. The airplane should be constantly rolled from one of climb to dive. The loops should be symmetrical with the segments above and below the horizon equal in size. At no time during the maneuver should the airplane attitude, control positions or control forces be held constant. Airspeed, attitude, altitude and direction should be constantly and very smoothly changing.

Chandelle

- Make two 90 degree clearing turns.
- Lower the nose slightly if necessary to accelerate to V_A.

- Establish a 30 degree bank and increase the back pressure smoothly, raise the nose to an attitude where the 90 degree point will produce a maximum performance climbing turn. Smoothly advance the power as the nose is raised. Power and pitch should be maximum at the 90 degree point of the turn.
- Begin a coordinated roll out after 90 degrees of turn while maintaining the pitch attitude. The 180 degree point should be reached as the wings level with the airspeed just above a stall.
- Hold the pitch attitude momentarily, then lower the nose to the level flight and normal cruise RPM.

Note: A chandelle is a maneuver wherein the pilot tires to accomplish a maximum gain of altitude during a 180 degree change of direction. Use of a 30 degree bank is the maximum bank allowable; however, a smaller bank may produce a better climb in lower performance aircraft. Determine what angle of bank gives the most climb for the aircraft and utilize that bank.

Eight on Pylons

- Before starting this maneuver calculate the pivotal altitude applicable for the C-172 and show how it is accomplished; KTAS squared divided by 11.5 knots or 15 MPH.
- Perform clearing turns.
- Complete pre-maneuver checklist: fuel selector: proper tank, mixture: rich, carburetor heat: off seat belts fastened.
- Determine wind direction and select 2 pylons which are located perpendicular to the wind.
- Select the appropriate pivotal altitude depending on the aircraft true airspeed.
- Start the maneuver by flying downwind between the pylons at a 45 degree angle of entry.
- Reach to the first pylon and roll in to a coordinated medium to steep bank so the airplanes lateral axis pivots on the pylon.
- Since the airplane is turning around the pylon there will be a point where it going to face the wind (upwind side of the maneuver). At this point, the ground speed is going to decrease which is evident by observing the pylon moving ahead of the reference point on the airplane; this needs to be corrected by lowering the nose and decreasing bank and for instance, building up more speed to “catch” the pylon.
- When the airplane is located between the pylons at 45 degree angle, the other pylon should be the target by flying momentarily straight and level until the airplane is exactly abeam.
- Since the airplane is flying in the downwind side of the maneuver, the ground speed is increasing so the pylon appears to be moving behind the airplane; bank to decrease ground speed, so the pylon “catches” the airplane.

Normal Traffic Patterns

- Once the clearance is obtained from the control tower, align the airplane to the runway centerline, smoothly add full power, check engine instruments, maintain directional control and rotate at 55-60 knots.
- Establish V_Y if no obstacles on the climb path.
- At 500 ft above the ground, turn to crossword leg, maintaining V_Y with full power and proper coordination.
- At 45 degrees from the departure the runway, turn downwind leg, maintaining proper coordination and continue climbing to the pattern altitude (1000 ft AGL).
- Reaching pattern altitude, level off by lowering the nose to the horizon, let the speed build up to cruise, reduce the power to 2200 RPM, trim as necessary.
- When established abeam the numbers for the landing runway, begin the pre-landing checklist: fuel selector: both, flaps: up, mixture: rich, carburetor heat: on, power 1700 RPM, trim as required and start a shallow descent. Target speed at this moment should be 85 knots.
- Lower 10 degrees of flaps, trim as necessary and establish 75 knots target altitude 800 ft.
- At 45 degrees from the landing runway, turn base and set 20 degrees of flaps, trim and obtain 70 knots.
- Using common sense, turn to final approach, so no overshoot or undershoot results, considering wings. Set flaps and establish a speed, which in any case should NOT be slower than 60 knots and make all necessary wind corrections. Touch down at the slowest possible speed with no drift and the airplane's longitudinal axis is aligned with the runway centerline.

NOTE: ALL COMMERCIAL PILOT MANEUVERS ALONG WITH THE PTS ARE IN THE JEPPESEN INSTRUMENT/COMMERCIAL MANUAL CHAPTER 14. PLEASE FOLLOW THESE GUIDELINES.