

Maneuver Guide

Cessna 172

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PRIVATE PILOT MANEUVERS

STRAIGHT AND LEVEL FLIGHT

1. While established in a climb, note the vertical speed
2. Determine the desired target altitude at which to level off
3. Multiply .10 x vertical speed to determine the number of feet to begin the level off before the desired altitude. Example 500 FPM x .10 = 50 feet
4. Begin level off at calculated altitude before target altitude
5. Lower pitch attitude until the cowling is @ 3 inches below the horizon
6. Verify that the altimeter is at the target altitude and not moving
7. Observe that the wing tips are parallel to the horizon and each one is the same distance above the horizon
8. Set the throttle for 2200 RPM
9. Observe if the airplane is yawing and correct with appropriate rudder input
10. Verify that the heading indicator is not moving
11. Verify that the inclinometer has the ball in the middle
12. Remove control pressure with trim

NOTES:

NORMAL CLIMB

1. Clear the area. Identify emergency landing areas
2. Determine desired climb airspeed
3. Apply full throttle
4. Apply elevator back pressure
 - a. Cowling on the horizon
5. Level wings with aileron
6. Stop yaw with appropriate rudder
7. Establish desired airspeed
 - a. Adjust airspeed with pitch
8. Eliminate control pressure with trim

NOTES:

DESCENTS

1. Clear the area. Identify emergency landing areas
2. Reduce throttle to 1500 RPM
 - a. Apply carb heat if equipped
3. Reduce pitch attitude
4. Establish a 90 KIAS airspeed descent
5. Note the decent rate with the vertical speed indicator
6. Trim off control pressures
7. Identify the point in the windscreen that is not moving
8. Return to level flight at an identified altitude
9. Increase throttle to full power
10. Apply elevator back pressure to achieve level flight
11. Retract flaps, if applied, in stages to avoid loss of lift
12. As airspeed reaches cruise speed, reduce throttle to 2100 RPM
13. Eliminate control pressures with trim

NOTES:

MEDIUM BANK TURNS

1. Clear the area. Identify emergency landing areas
2. 2200 RPM 100 KIAS
3. Begin turn with coordinated aileron and rudder inputs
4. Use aileron to establish desired bank angle
5. Use elevator to maintain altitude
6. Use rudder to eliminate adverse yaw
7. Apply throttle to maintain airspeed
8. Lead the roll out by $\frac{1}{2}$ of the bank angle used
9. Roll out of the turn using coordinated aileron and rudder
10. Use elevator to maintain altitude
11. Adjust throttle to maintain airspeed

NOTES:

SLOW FLIGHT

1. Clear the area. Identify emergency landing areas
2. Reduce power to 1500 PRM
3. Maintain altitude with elevator back pressure
4. Slow airplane to 50 KIAS
5. Lower landing gear (if equipped). Anticipate necessary elevator pressure changes
6. Lower flaps in stages. Anticipate necessary elevator pressure changes
7. Apply necessary throttle input to maintain 50 KIAS
8. Maintain a constant heading straight ahead
9. Perform a level 90-degree turn to the left. Additional throttle will be required to maintain altitude
10. Perform a level 90-degree turn to the right.
11. Re-establish straight and level flight
12. Apply full power
13. As airspeed increases, retract flaps in stages
14. Retract landing gear (if equipped)

NOTES:

POWER OFF STALLS

1. Clear the area. Identify emergency landing areas
2. Begin maneuver at 3000 feet AGL minimum
3. 1700 RPM. 80 KIAS
4. Carburetor heat on (if equipped)
5. Select a reference point in front of the airplane
6. Apply flaps incrementally
7. Trim airplane for level flight
8. Throttle to idle
9. Begin slowly applying elevator back pressure
10. Continue applying back pressure until symptoms of a stall appear
11. Allow airplane to fully stall before recovery (private pilot)
12. Begin stall recovery when stall symptoms appear (commercial pilot)
13. Recover from the stall by releasing elevator back pressure and lowering the angle of attack
14. Apply full throttle
15. Carburetor heat off (if equipped)
16. Retract flaps to 20 degrees
17. Observe a positive rate of climb
18. Retract remaining flaps incrementally
19. Return to normal cruise configuration

NOTES:

POWER ON STALLS

1. Clear the area. Identify emergency landing areas
2. 1700 RPM. 80 KIAS
3. 3000 feet AGL minimum altitude
4. Apply full throttle
5. Pitch up to climb attitude by applying elevator back pressure
6. Maintain coordination with increased right rudder pressure
7. Continue to apply increasing elevator back pressure
8. Maintain wings level and coordination
9. Recognize and announce the symptoms of an approaching stall
10. Elevator control full back
11. After nose pitches down, release elevator back pressure
12. Maintain wings level with coordinated rudder and aileron
13. Resume normal flight attitude, power, and airspeed with a minimum loss of altitude

NOTES:

ACCELERATED STALLS

1. Clear the area. Identify emergency landing areas
2. 1500 RPM (Carburetor heat, if equipped)
3. Slow to 60 KIAS in straight and level flight
4. Establish a coordinated 45 degree bank turn
5. Smoothly and firmly increase elevator back pressure to induce stall
6. At stall onset (commercial) or developed stall (private) use elevator to un-stall the wing
7. Apply full throttle
8. Return airplane to level flight using coordinated aileron and rudder
9. Establish cruise flight
10. 2200 RPM. 90 KIAS

NOTES:

RECTANGULAR COURSE

1. Clear the airspace. Identify emergency landing areas
2. 2000 RPM, 95 KIAS, between 600-1000AGL
3. Enter the course at a left 45 on the downwind leg
4. Stay $\frac{1}{4}$ - $\frac{1}{2}$ mile from the course boundary
5. Base turn: highest groundspeed, greatest bank angle, more than 90 degree turn
6. Base leg: crabbed to the inside of the course
7. Upwind turn: medium bank becoming shallow, slowest ground speed, less than 90 degree turn
8. Upwind leg: into the wind, little correction, maintain distance
9. Crosswind turn: Shallow turn becoming medium bank, prevent drift by crabbing, less than a 90 degree turn
10. Cross wind leg: continue crab, nose away from the course line, into wind
11. Downwind turn: medium bank turn becoming steep, ground speed will increase
12. Exit the course on a 45

NOTES:

S-TURNS ACROSS A ROAD

1. Clear the airspace. Identify emergency landing areas
2. Select a straight line reference at least 1 ½ miles in length that is perpendicular to the wind
3. Establish an altitude between 600-1000 AGL
4. RPM 2000, 95 KIAS (below Va)
5. Enter down wind
6. First turn: Steep bank angle and high roll rate. Fastest ground speed
7. Establish appropriate wind correction angle
8. Bank will become more shallow as the turn progresses
9. Time arrival over the road so that wings are level
10. Second turn: Begin a shallow turn in the opposite direction
11. Establish the appropriate wind correction angle
12. Bank angle will steepen as the turn progresses due to increased ground speed
13. Exit maneuver down wind

NOTES:

TURNS AROUND A POINT

1. Select an obvious point on the ground (Water tower, intersection, etc.)
2. Clear the airspace Identify emergency landing areas
3. Establish an altitude between 600-1000 AGL
4. RPM 2000, 95 KIAS (below V_a)
5. Enter downwind, $\frac{1}{2}$ mile away and abeam the pylon
6. Turn begins, steep bank angle, highest ground speed
7. Base turn segment, medium bank, nose crabbed inside of the circle, wing behind the pylon
8. Down wind turn segment, shallowest bank, lowest ground speed
9. Cross wind turn segment, medium bank, nose crabbed outside the circle, wing in front of the pylon
10. Exit maneuver on the down wind

NOTES:

NORMAL TAKE OFF

1. Configure aircraft for normal takeoff
 - a. Flaps up, proper trim, elevator neutral
2. Line up on runway centerline
3. Apply power smoothly and fully
4. Confirm proper engine operation
5. Begin rotation at $V_r = 55$ KIAS
6. Compensate for torque with right aileron and P factor with right rudder
7. Climb out at 80 KIAS
8. Adjust for drift

NOTES:

NORMAL APPROACH AND LANDING

1. Enter traffic pattern at TPA, RPM to 1700, slow to 85 KIAS
2. Landing Checklist
3. 85 KIAS on Downwind, 10 degrees of flaps
4. 70 KIAS on Base, 20 degrees of flaps
5. 65 KIAS on Final, 30 degrees of flaps
6. Visualize touchdown point
7. Maintain stabilized approach
8. Round out
9. Power slowly to idle
10. Flare
11. Keep airplane off the runway with elevator back pressure
12. Nose high attitude
13. Touchdown
14. Braking as necessary
15. Depart runway at a safe speed
16. After landing checklist

NOTES:

CROSSWIND TAKE OFF

1. Complete appropriate checklist
2. Line up on runway centerline
3. Select reference point down range on runway center
4. Deflect ailerons fully into the wind
5. Smoothly apply throttle
6. Track runway centerline with appropriate rudder input
7. Confirm proper engine operation
8. Use enough aileron to avoid skidding and keep upwind wing down
9. Rotate at $V_r = 55$ KIAS
10. Confirm positive rate of climb
11. Turn airplane into the wind and maintain track toward reference point.
12. Climb out at 80 KIAS

NOTES:

CROSSWIND LANDING

1. Enter traffic pattern at TPA, RPM to 1700, slow to 85 KIAS
2. Landing Checklist
3. Estimate the amount of crosswind while on downwind leg
4. Make base turn based on crosswind estimate
5. Compensate for crosswind when making the turn to final
6. Determine final approach speed based on gust factor (65 KIAS + $\frac{1}{2}$ gust speed)
7. Input appropriate crab angle to maintain ground track alignment with runway
8. At approximately 300' AGL, transition from the crab to a sideslip
9. Maintain power and fly the airplane to onto the runway
10. Touchdown with the upwind wheel first
11. Smoothly close throttle
12. Allow the other wheels to settle onto the runway
13. Maintain appropriate control deflections while on roll out, exit from runway, and taxi

NOTES:

SHORT FIELD TAKE OFF

1. Consult POH for short field take off performance
2. Configure the airplane as recommended in the POH
3. Flaps 10 degrees
4. Taxi onto the end of runway and stop.
5. Line up as close to the end of the runway as possible, allowing the greatest amount of runway length to be available for takeoff
6. Apply full brakes
7. Apply full throttle
8. When maximum power is reached, release the brakes and begin takeoff roll
9. Rotate at V_x , 57 KIAS and maintain this airspeed until at an altitude of 50 feet
10. With a positive rate of climb, retract the flaps
11. Accelerate to V_y , 74 KIAS
12. Continue climb to desired altitude

NOTES:

SHORT FIELD LANDING

1. Devote full attention to airplane control and traffic avoidance
2. Slow to 85 KIAS prior to entering the downwind leg of the traffic pattern
3. Complete before landing checklist
4. Enter the traffic pattern at TPA
5. When ready to descend from TPA, reduce throttle to 1500 RPM
6. On downwind leg, select 10 degrees of flaps.
7. Establish a pitch attitude to maintain 75 KIAS and trim off control pressures
8. On base leg, select 20 degrees of flaps
9. Establish a pitch attitude to maintain 70 KIAS and trim off control pressures
10. On final approach when runway is assured, select 30 degrees of flaps
11. Establish a pitch attitude to maintain 62 KIAS and trim off control pressures
12. Close throttle slowly during flare
13. Touchdown at the intended touchdown point with little or no floating
14. Retract the flaps
15. Maintain a nose high attitude with elevator back pressure
16. Do not allow the nosewheel to slam down onto the runway
17. Use maximum braking as necessary to stop in desired distance

NOTES:

SOFT FIELD TAKE OFF

1. Complete appropriate checklists
2. Flaps 10 degrees
3. Yoke full aft
4. Roll onto runway with minimal braking. Do not stop
5. Smoothly apply full power when lined up on centerline of runway
6. As nose lifts, ease off of yoke back pressure
7. Keep nose wheel off the ground
8. Lift off at slowest possible airspeed
9. When lift off is achieved, adjust pitch attitude to remain in ground effect
10. Accelerate airplane to 60 KIAS
11. Begin climb
12. Accelerate to V_y , 79 KIAS
13. At 400 feet AGL and a positive rate of climb, retract the flaps
14. Continue climb to desired altitude
15. Complete appropriate checklist

NOTES:

SOFT FIELD LANDING

1. Devote full attention to airplane control and traffic avoidance
2. Slow to 85 KIAS before entering traffic pattern
3. Enter the traffic pattern at published TPA
4. Complete before landing checklist
5. When ready to descend out of TPA, reduce throttle to 1500 RPM
6. Select 10 degrees of flaps and establish a pitch attitude for a 75 KIAS descent.
7. Trim off control pressures
8. On the base leg, select 20 degrees of flaps and establish a pitch attitude for 70 KIAS
9. On final, select 30 degrees of flaps and establish a pitch attitude for 65 KIAS, once landing is assured
10. Fly the airplane onto the ground, slowly transferring the weight from the wings to the main landing gear
11. Touchdown at the intended touchdown point at minimum speed and a nose high attitude
12. Keep the nose wheel off the ground as long as possible as the airplane slows by maintaining full aft elevator backpressure
13. Maintain elevator backpressure while taxiing off the runway
14. Perform appropriate checklist

NOTES:

EMERGENCY APPROACH AND LANDING

1. Clear the area. Identify emergency landing areas
2. Establish best glide speed V_g 68 KIAS
3. Determine gliding distance limitations
4. Select a suitable landing area
 - a. Size, shape, surface, slope, surroundings
5. Determine wind direction
6. Set up to arrive over the landing area at the high key position
7. Arrive at the high key position (crosswind) at 2000-1500 feet AGL
8. Arrive at the normal key position (touchdown point abeam) at 1000 feet AGL
9. Configure airplane for landing, as appropriate for conditions
10. Consult appropriate checklist as time allows

NOTES:

STEEP SPIRALS

1. Clear the area. Identify emergency landing areas
2. Select a prominent point on the ground
3. Identify the wind direction, if possible
4. 80 KIAS 1700 RPM
5. Enter the maneuver and reduce the throttle to idle
6. Note the heading. Select a visual reference inline with the front of the airplane
7. Begin the turn and maintain $\frac{1}{4}$ mile radius around the selected point
8. Compensate for wind drift with bank angle
9. Maintain airspeed with pitch attitude
10. Clear engine once during each 360 degree turn, when upwind, by momentarily increasing the throttle to cruise RPM, then reducing the throttle back to idle
11. After the third 360 degree turn, roll out on the previously noted heading
12. Momentarily maintain straight and level flight at 80 KIAS

NOTES:

STEEP TURNS

1. Clear the airspace and identify emergency landing areas
2. 2100 RPM, 95 KIAS
3. Altitude no lower than 1500 feet AGL
4. Identify a reference point in front of the aircraft or note the heading
5. Roll into a 45 - 50 degree bank turn
6. Maintain bank, altitude, and airspeed
7. Elevator will maintain altitude, throttle will maintain airspeed
8. Remain coordinated
9. Begin the roll out 25 degrees before the 360 degree point
10. Wings level at entry airspeed and altitude at the 360 degree point
11. Slight decrease in throttle
12. Roll into a 45 - 50 degree bank turn in the opposite direction
13. Repeat maneuver in the opposite direction.

NOTES:

UNUSUAL ATTITUDES

1. Clear the area. Identify emergency landing areas
2. 2200 RPM. 100 KIAS
3. Recognize and evaluate unusual attitude
 - a. Instructor will place airplane in unusual attitude
4. Evaluate airspeed indicator
5. Determine if airplane is gaining airspeed or losing airspeed
6. Evaluate attitude indicator
7. Determine if airplane is nose down or nose up
8. Determine if and/or how the airplane is banked
9. Gaining airspeed:
 - a. Throttle to idle, level the wings, raise the pitch attitude
10. Losing airspeed:
 - a. Throttle to full power, lower the pitch attitude, level the wings
11. Return airplane to straight and level flight
12. Return throttle to cruise configuration, 2200 RPM at 100KIAS

NOTES:

Commercial Maneuvers

CHANDELLES

- Clear the airspace. Identify emergency landing areas
- 2100 RPM, 95 KIAS
- Minimum altitude 1500 feet AGL
- Select a reference point off the wing
- Establish a 30 degree bank, turning toward the reference point
- Simultaneously add full power and begin to increase pitch
- First 90 degrees of turn: Constant bank at 30 degrees, increasing pitch to 10-12 degrees
- At 90 degree point: begin to decrease bank angle, maintain pitch,
- Second 90 degrees of turn: Bank is decreasing, pitch remains constant
- At the 180 degree point: bank angle at 0 degrees, pitch held constant at 10-12 degrees
- Momentarily hold wings level and climbing pitch attitude
- Airspeed should be +/- 10 KIAS Vs
- Full power, return to cruise flight without losing altitude

NOTES:

LAZY EIGHTS

1. Clear the airspace and identify emergency landing areas
2. 2200 RPM 100 KIAS
3. Minimum 1500 feet AGL
4. Identify reference points at 45, 90 and 135 degrees of proposed turns
5. Entry: simultaneously but slowly increase bank and pitch
6. By the 45 degree point: Bank 15 degrees, pitch up 15 degrees
7. Continue increasing bank angle, begin to decrease pitch
8. By the 90 degree point: Bank angle 30 degrees, pitch 0 degrees
9. Decrease bank angle, decrease pitch
10. By 135 degree point: Bank angle 15 degrees, pitch 15 degrees down
11. Continue decreasing bank angle, begin increasing pitch
12. By 180 degree point: level flight at entry speed and altitude
13. Repeat with turn in opposite direction

NOTES:

EIGHTS ON PYLONS

1. Clear the area. Identify emergency landing areas
2. Select appropriate pylons
3. Identify wind direction
4. 2200 RPM. 100 KIAS
5. Determine pivotal altitude (885 feet)
6. Select a point on the wing to use as a reference when sights the pylons
7. Enter the maneuver diagonally at the mid point between the pylons, with a rear quartering tailwind
8. Roll into a left turn, keeping the reference line on the pylon
9. Adjust pylon position fore and aft with pitch
10. Adjust pylon position up and down with bank
11. Roll out of the turn and track to the mid point between pylons
12. Use appropriate crab angle to maintain ground track
13. Roll into a left turn around the opposite pylon.
14. Maintain pylon position relative to reference line
15. Exit the maneuver on entry heading

NOTES:

POWER OFF 180

- Landing checklist
- Altitude approximately 1000-1200 ft. AGL
- Close throttle at downwind key position, abeam of the touchdown point
- Slow to 70 KIAS
- Base turn, begin to judge wind in relation to crab angle
- Evaluate progress at base key position. Altitude @ 800 ft. AGL
- Consider timing of flaps and slips
- Turn to final. Altitude @ 300 ft. AGL
- Consider flaps or slips to maintain glidepath to touchdown point
- Landing procedures as required

NOTES: