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Cessna 172

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IMPORTANT NOTICE

Refer to POH/AFM

Do not use procedures listed without referencing the full procedures described in the approved Owner's Manual, POH, or POH/AFM specific to the airplane you are flying. Endurance and fuel capacities may vary considerably depending on the specific model / serial number being flown and any modifications it may have.

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Version 8.1 • 04/17/2012

Configuration and throttle settings used throughout this manual are based on an 160 HP R-Model 172, which will vary depending on the specific airplane and prevailing conditions. Do not use procedures listed without referencing the full procedures described in the approved Operators Manual or POH/AFM specific to the airplane you are flying.

Early & Late Model Overview

IMPORTANT: Aircraft information can be obtained from the Owner's Manual, POH or POH-AFM (as appropriate for the model). Airplanes with engine modifications (and possibly increased gross weights) will have additional information in the Supplemental Airplane Flight Manual in Section 9. Refer to the official aircraft documents for ALL information.

ATP Cessna 172 aircraft models include R / S models ("Late Model") and K thru P models ("Early Model"). Over 75% of ATP's Cessna 172 fleet are Late Model.

R model Cessnas were introduced in 1996, and were the first to come factory equipped with fuel-injected engines. Starting procedures are substantially different between the earlier models with carbureted engines and the later models with injected engines. Review the engine start procedures by referencing the latest ATP 172 checklist for the 172 model you will be flying.

	Model Number	*Year of Production*
EARLY MODELS	**172 K**	**1969–70**
	172 L	**1971–72**
	172 M	**1973–76**
	172 N	**1977–80**
	172 P	**1981–86**
LATE MODELS	**172 R**	**1996–2009**
	172 S	**1998–Present**

NOTE: Some R Model aircraft have been modified with approved aircraft modifications. There is typically only one modification to the standard R model. This propeller modification, Cessna MK 172-72-01, provides for an increase in horsepower, which in turn increases fuel burn and maximum allowable takeoff weight.

ATP Cessna 172's have different combinations of engine horsepower and usable fuel. Some aircraft are equipped with only 38 gallons of useable fuel, and have been modified with a 180 horsepower engine. These airplanes have an increased fuel burn and a significantly reduced endurance of approximately 3 hours in the training environment — even with full tanks. **Calculate your fuel requirements carefully.** Reference the aircraft manuals and placards for the appropriate information.

Airworthiness and Registration certificates can be found on the forward lower left interior cabin wall. Weight and balance information can be found in the logbook.

Inoperative Instruments and Equipment per FAR 91.213

ATP aircraft do not operate under the guidance of a minimum equipment list (MEL). ATP aircraft operate in accordance with the following FAR 91.213 subpart. Because this is only an excerpt, the complete subpart should be referenced if necessary:

(3) The inoperative instruments and equipment are --

(i) Removed from the aircraft, the cockpit control placarded, and the maintenance recorded in accordance with §43.9 of this chapter; or

(ii) Deactivated and placarded "Inoperative." If deactivation of the inoperative instrument or equipment involves maintenance, it must be accomplished and recorded in accordance with part 43 of this chapter;

(4) A determination is made by a pilot, who is certificated and appropriately rated under part 61 of this chapter, or by a person, who is certificated and appropriately rated to perform maintenance on the aircraft, that the inoperative instrument or equipment does not constitute a hazard to the aircraft.

Aircraft Systems
Late Model (R&S)

System descriptions are given first for Late Model, and then differences only for Early Model.

Engine

The 172 R and S models are equipped with a Lycoming, 4 cylinder, normally aspirated, fuel injected, 360 cubic inch, horizontally opposed, air cooled, direct drive IO-360-L2A engine. The R model produces 160 HP @ 2400 RPM, and the S model and R Model with Cessna 72-01 engine modification produces 180 HP @ 2700 RPM. Ignition is provided by 2 magnetos on the back of engine which provide spark to 8 spark plugs (2 per cylinder). The engine has an 8 quart oil sump. ATP minimum oil quantity for takeoff is 6 quarts.

Propeller

The engine drives a McCauley, 75 inch (R- Model) 76 inch (S- Model and R with Modification), 2 blade, all metal, fixed pitch propeller.

Vacuum System

Two engine-driven vacuum pumps are located on the back of engine, providing vacuum to the attitude and heading gyros, and have a normal operating range 4.5-5.5 inches of mercury. Failure of a vacuum pump is indicated by an annunciator panel light. In most circumstances, failure of one pump alone will not cause the loss of any instruments because the remaining pump should handle the entire vacuum demand.

Landing Gear

The landing gear is a fixed, tricycle type gear consisting of tubular spring steel providing shock absorption for the main wheels, and an oleo (air/oil) strut providing shock absorption on the nose wheel. The nose strut extends in flight, locking it in place. The nose wheel contains a shimmy damper which damps nose wheel vibrations during ground operations at high speeds. The nose wheel is linked to the rudder pedals by a spring loaded steering bungee which turns the nose up to 10° each side of center. Differential braking allows for up to 30° of steering either side of center.

Brakes

Brakes are hydraulically actuated, main wheel single-disc brakes controlled by master cylinders attached to both pilots' rudder pedals. When the airplane is parked, the main wheel brakes may be set by the parking brake handle beneath the left side instrument panel. To apply the parking brake, set the brakes with the rudder pedals, pull the handle aft and rotate it 90 degrees down.

NOTE: The parking brake is not to be used in training or flight checks with ATP.

Flaps

The 172 has single slot type flaps driven electrically by a motor in the right wing. A flap position selector on the instrument panel has detents at the 0°, 10°, 20° and 30° positions.

Pitot Static

The Pitot Static system consists of a pitot tube on left wing providing ram air pressure to the airspeed indicator, and a static port on the left side of the fuselage providing static pressure to the Altimeter, Vertical Speed Indicator and Airspeed Indicator. The pitot tube is electrically heated and an alternate static source is located under the instrument panel.

Fuel System

The fuel system consists of 2 tanks in the wings with a total fuel capacity of 56 gallons, of which 53 is usable. Usable fuel quantity is placarded on fuel selector. Typically there are 13 Fuel sumps – 5 each wing and 3 under engine cowling. There are 3 Fuel vents – 1 under left wing and 1 in each fuel cap.

Fuel is gravity fed from wing tanks to the fuel selector valve labeled BOTH, RIGHT, and LEFT, and then to a reservoir tank. From the reservoir tank the fuel flows to an electrically driven auxiliary fuel pump, past the fuel shutoff valve, through the strainer and to an engine driven fuel pump. Fuel is then delivered to the fuel air control unit where it is metered and passed to a manifold where it is distributed to each cylinder. The auxiliary fuel pump is used for engine priming during cold engine starts. The auxiliary fuel pump is OFF for normal takeoff and landing operations. **Review the manual**.

NOTE: The fuel selector should remain in BOTH during normal operations with ATP.

The injected engines do not have carburetor heat like early model engines. Alternate air is provided with a spring-loaded alternate air door in the air box. If the air induction filter should become blocked, suction created by the engine will open the door and draw unfiltered air from inside the lower cowl area. An open alternate air door will result in an approximately 10% power loss at full throttle.

ATP **NOTE:** Do not over-prime fuel injected engines when conducting "warm" engine starts. Doing so washes away engine lubrication and causes cylinder wall damage.

Electrical System

The airplane is equipped with a 28 volt DC electrical system and a 24 volt 35 amp/hour battery. Electrical energy is supplied by a 60 amp alternator located on the front of the engine. An external power receptacle is located on the left side of engine cowl. Electrical power is distributed through electrical buses and circuit breakers. If an electrical problem arises, always check circuit breakers. "Essential" circuit breakers should be reset in flight only once, and only if there is no smoke or "burning smell", and only if the affected system and equipment is needed for the operational environment. Do not reset any non-essential circuit breakers in flight.

Exterior Lighting

Exterior lighting consists of navigation lights on the wing tips and top of the rudder, a dual landing (inboard) / taxi (outboard) light configuration located on the left wing leading edge, a flashing beacon mounted on the top of the vertical fin, and a strobe light on each wing tip.

Environmental

Cabin heat is provided by air ducted through the exhaust shroud and into the cabin and is controlled by a knob on the instrument panel. Air flow is controlled by a Cabin Air knob on the instrument panel and additionally by ventilators near the top corners of both left and right windshields.

Stall Warning

A pneumatic type stall warning system consists of an inlet on the left wing leading edge, which is ducted to a horn near the top left of the windshield. As the aircraft approaches a stall, the lower pressure on top of the wing shifts forward drawing air through horn resulting in an audible warning at 5 to 10 knots above the stall.

Aircraft Systems

Early Model (K-P) Differences

Early model Cessnas are generally characterized by their pre-1996 production date and carbureted engines.

Engine

The unmodified early model 172's are equipped with a 320 cubic inch, O-320-E2D engine. The engine produces 150 HP @ 2700 RPM. Several of the early model 172's have been modified with approved aircraft modifications. Modified engines can have up to 180 HP, increased fuel burn, and significantly reduced endurance. There are typically two modifications to the early models.

These are:

Penn Yan (Replacement engine with higher horsepower, which increases fuel burn and max allowable takeoff weight)

Air Planes (Replacement engine with higher horsepower, which increases fuel burn and max allowable takeoff weight)

Vacuum System

The system has 1 vacuum pump.

Flaps

Some early models have no detents for flap settings, and some have up to 40 degrees of flaps.

Fuel System

The fuel system has a total useable fuel capacity of as little as 38 gallons (useable fuel is placarded on fuel selector). Typically there are 3 fuel sumps (1 each wing and 1 under engine cowling). There is no electrically driven auxiliary fuel pump. There is no separate fuel shutoff valve. In lieu of a separate fuel shutoff valve, the fuel selector valve has an OFF position. Fuel is delivered to a carburetor.

Electrical system

The airplane is equipped with a 14 volt DC electrical system and a 12 volt 25 amp/hour battery.

External Lighting

A single or dual landing/taxi light configuration is located at the front of the engine cowl.

Carburetor Heat

Under certain moist atmospheric conditions at temperatures of 20˚ to 70˚ F (-5˚ to 20˚ C), it is possible for ice to form in the induction system, even in summer weather. This is due to the high air velocity through the carburetor venturi and the absorption of heat from this air by vaporization of the fuel. To avoid this, the carburetor heat is provided to replace the heat lost by vaporization. The initial signs of carburetor ice can include engine roughness and a drop in engine RPM. Operated by the knob next to the throttle control, carburetor heat should be selected on if carburetor ice is expected or encountered. Adjust mixture for maximum smoothness.

Performance & Limitations

V-speeds (KIAS) and Limitations for R and S Models

	R	S (and R w/ 72-01 Mod.)	Description	Airspeed Indicator Marking
Max Horsepower	160hp	180hp		
Max GTW (Normal)	2,450lbs	2,550lbs		
Max GTW (Utility)	2,100lbs	2,200lbs		
Max Ramp	2,457lbs	2,558lbs		
V_{SO}	33	40	Stall speed in landing configuration	Bottom of White Arc
V_S	44	48	Stall speed in clean configuration	Bottom of Green Arc
V_X	60	62	Best angle of climb	
V_Y	79	74	Best rate of climb	
V_A	82 @ 1,600lbs	90 @ 1,900lbs	Maneuvering speed	
	92 @ 2,000lbs	105 @ 2,550lbs		
	99 @ 2,450lbs			
V_R	55		Rotation speed	
V_{FE} **10°**	110		Maximum flap extension speed with 10° of flaps	
V_{FE} **20-30°**	85		Maximum flap extension speed with 20-30° of flaps	Top of White Arc
V_{NO}	129		Maximum structural cruising speed	Top of Green Arc
V_{NE}	163		Never exceed speed	Red Line
V_G	65	68	Best glide speed	
Max Demonstrated Crosswind	15 knots			

NOTE: Due to the diversity of the early models, it is not possible to have a condensed section of systems and V-speeds. Maximum GTW's range from 2,300 to 2,550, Max GTW's in the Utility category range from 2000-2100, and maximum horsepower ranges from 150 to 180 depending on model and modification. Pay close attention to the airspeed indicator as some are calibrated in both KIAS and MPH. Which indication is on the outer scale of the airspeed indicator varies by airplane.

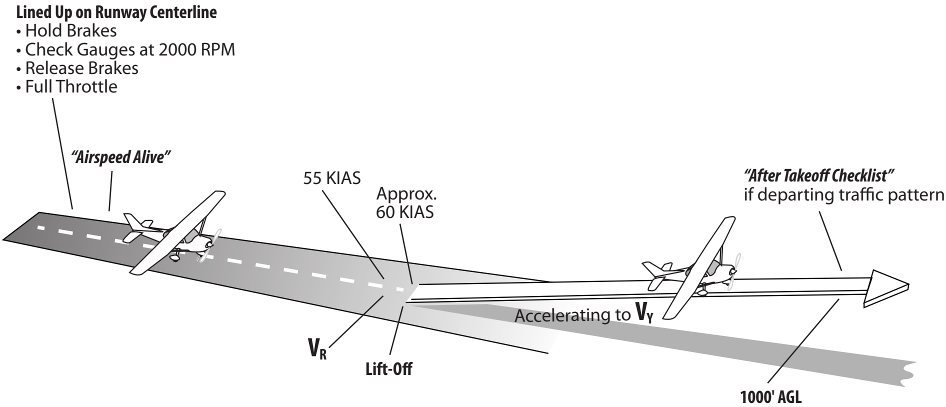
Takeoffs

Normal Takeoff (Flaps 0˚)

Do not delay on runway.

1. Line up on centerline positioning controls for wind.
2. Hold brakes.
3. Increase throttle to 2000 RPM.
4. Check engine gauges.
5. Release brakes.
6. Increase throttle to full power.
7. *"Airspeed Alive"*
8. Start slow rotation at 55 KIAS.
   (Main gear should lift off at approx. 60 KIAS. 55 KIAS is V_R, not V_{LOF})
9. Accelerate to 79 KIAS (V_Y)
   (V_Y may vary depending on model. Refer to POH/AFM.)
10. *"After Takeoff Checklist"* out of 1000' AGL.

Normal Takeoff Profile



Engine Failure Procedure

Engine Failure or Abnormality During Takeoff Roll

Immediately close throttle, stop straight ahead, and avoid obstacles. If not enough runway remains to stop:

MIXTURE .... CUTOFF
FUEL .... OFF
BATTERY MASTER SWITCH .... OFF
IGNITION SWITCH .... OFF
AVOID OBSTACLES

Engine Failure Immediately After Takeoff

Land on remaining runway, within 30° of centerline, and avoid obstacles. Do not attempt an 180° turn.

AIRSPEED .... LOWER NOSE & ESTABLISH PITCH FOR BEST GLIDE
FLAPS .... AS NECESSARY
POWER .... AS AVAILABLE
TIME PERMITTING .... DECLARE AN EMERGENCY
FUEL .... OFF
MIXTURE .... CUTOFF
IGNITION .... OFF
BATTERY MASTER SWITCH .... OFF

Landings

Cessna 172 Landing Criteria

- Plan and brief each landing carefully.
- Maintain a stabilized descent angle.
- Whenever possible, fly the traffic pattern at a distance from the airport that allows for a power off landing on a safe landing surface in the event of an engine failure.
- Maintain final approach speed until roundout (flare) at approx. 10' to 20' above the runway.
- Reduce throttle to touch down with the engine idling and the airplane at minimum controllable airspeed within the first 1000' of the runway.
- Touch down on the main gear, with the wheels straddling the centerline.
- Manage the airplane's energy so touchdown occurs at the designated touchdown point.
- Maintain a pitch attitude after touchdown that prevents the nosewheel from slamming down by increasing aft elevator as the airplane slows.
- Maintain centerline until taxi speed is reached and increase crosswind control inputs as airplane slows.
- Adjust crosswind control inputs as necessary during taxi after leaving the runway.

Good Planning = Good Landing

A good landing is a result of good planning. Before each approach and landing, decide on the type of approach and landing (visual or instrument, short-field, soft-field, crosswind, etc.) Decide on the flap setting, the final approach speed, the aiming point, and where the airplane will touch down on the runway surface.

Approach Briefing - Verbalize the Plan

Brief each plan out loud. This organizes the plan and ensures effective communication between pilots. The briefing should be specific to each approach and landing, but presented in a standard format that makes sense to other pilots and instructors.

Approach Briefings should include:
- Flap Setting
- Type of Approach & Landing (Visual, Instrument, Short-Field, Soft-Field)
- Landing Runway
- Field Elevation
- Traffic Pattern Altitude
- Winds (left or right crosswind? tailwind on downwind or base?)
- Final Approach Speed
- Aiming Point
- Touchdown Point

Example VFR Briefing

"This will be a flaps 20˚ visual approach and landing to runway 32. The field elevation is 41' MSL. I'll enter the traffic pattern at 1000' MSL and plan for a right crosswind, 360 at 8. Final approach speed will be 70 knots. My aiming point will be the runway centerline abeam taxiway echo, and my touchdown point will be the 1000' aiming point markings."

**Identify the aiming and touchdown point when they can be visually identified with the landing runway in sight.*

TIP: When approaching any airport for landing, have the airport diagram for available prior to landing and familiarize yourself with your taxi route based on your destination on the field and the landing runway.

Stabilized Approach

Definition: A stabilized approach is one in which the pilot establishes and maintains a constant angle glidepath towards a predetermined point on the landing runway. It is based on the pilot's judgment of certain visual cues, and depends on a constant final descent airspeed and configuration (FAA-H-8083-3A, p.8-7).

A stabilized approach is required during visual and instrument approaches in all ATP airplanes. The airplane must be stabilized by:

- 1000' AGL for an ILS Approach
- Descending from MDA for a Non-Precision Approach
- 500' AGL for a Visual Approach

General Conditions for a Stabilized Approach

- Airplane in landing configuration.
  (Gear Down, Flaps Set, Trim Set)
- Engine must be steady at the proper approach power setting.
- Proper descent angle and rate of descent must be established and maintained.
- Airspeed must be stable and within range of target speed plus 10 KIAS.
- The airplane will touch down on intended touchdown point within the first 1000' of the landing runway. If this is not assured, a go-around must be executed.

Go Around Philosophy

The decision to execute a go-around is both prudent and encouraged anytime the outcome of an approach or landing becomes uncertain. ATP considers the use of a go-around under such conditions as an indication of good judgement and cockpit discipline on the part of the pilot.

Managing Energy

Managing energy means the pilot controls the airplane's glidepath, speed, and power setting so that altitude and airspeed are depleted simultaneously on the intended touchdown point.

Aiming Point

The Airplane Flying Handbook defines aiming point as "the point on the ground at which, if the airplane maintains a constant glidepath, and was not flared for landing, it would contact the ground."

AIM 2-3-3 — The "Runway Aiming Point Markings" consist of a broad white stripe located on each side of the runway centerline, approximately 1,000' from the landing threshold.

ATP requires all landings to occur within the first 1000' of the landing runway. When flying a visual approach and landing in a C172, the (visual) aiming point chosen by the pilot is often an earlier point on the runway than the AIM defined "aiming point markings" to account for the flare. This technique ensures that the airplane touches down no farther than 1000' down the runway.

Pitch & Power

Pitch

Maintain a constant angle glidepath to the aiming point by making pitch adjustments to keep the point stationary in the windshield. If the aiming point moves lower in the windshield, lower the pitch until the aiming point is back in the correct, stationary position. If the aiming point moves toward the top of the windshield, increase the pitch until the aiming point is back in the correct, stationary position.

TIP: During a visual approach and landing, if the airplane is trimmed for the correct approach speed with the correct power set, much of the pilot's attention can be on maintaining a constant angle glidepath to the aiming point. A majority of the pilot's scan should be outside the airplane, devoted to the aiming point and looking for traffic, with periodic instrument checks.

Power

During a stabilized approach and landing, use power to control deviations from the desired approach speed while maintaining a constant angle glidepath to the aiming point. If the airspeed is fast, reduce power while maintaining the constant angle glidepath. If the airspeed is slow, add power while maintaining the constant angle glidepath.

Since a constant angle glidepath is a requirement for a stabilized approach, airspeed deviations should be corrected by adjusting power. Changing pitch to correct airspeed deviations during a stabilized approach will cause an excursion from the constant angle glidepath, resulting in an unstable approach.

Approach Speeds

For training and testing purposes, use the following approach speeds as a reference plus the appropriate gust factor until landing is assured.

Flaps 0° to 20°— 70 KIAS
Flaps 30° or greater — 65 KIAS (62 KIAS for short-field landing)

TIP: For training purposes landing is considered assured when the aircraft is lined up and will make the paved runway surface in the current configuration without power.

Gust Factor

Slightly higher approach speeds should be used under turbulent or gusty wind conditions. A good rule-of-thumb is to add ½ the gust factor to the normal approach speed. For example, it the wind is reported 8 gusting to 18 knots, the gust factor is 10 knots. Add ½ the gust factor, 5 knots in this example, to the normal approach speed.

Flap Setting

The C172 Operations Manual p. 4-32 states: "Normal landing approaches can be made with power on or power off with any flap setting desired. Surface winds and air turbulence are usually the primary factors in determining the most comfortable approach speeds."

Students must be able to determine the best flap configuration and approach speed given the landing conditions.

Seat Position

Correctly positioning the seat exactly the same for each flight improves landing performance and safety.

The fore-aft adjustment is correct when the heels are on the floor with the balls of the feet on the rudder pedals, not on the brakes. The feet should be at a 45˚ angle from the floor to the pedals and the pilot should be able apply full rudder inputs without shifting their body weight. When braking is required, lift the foot from the floor rather than keeping the leg suspended in the air or resting the feet on the upper portion of the pedals.

The seat height should be adjusted so the pilot can see the curvature of the cowling for the best sight picture during landing

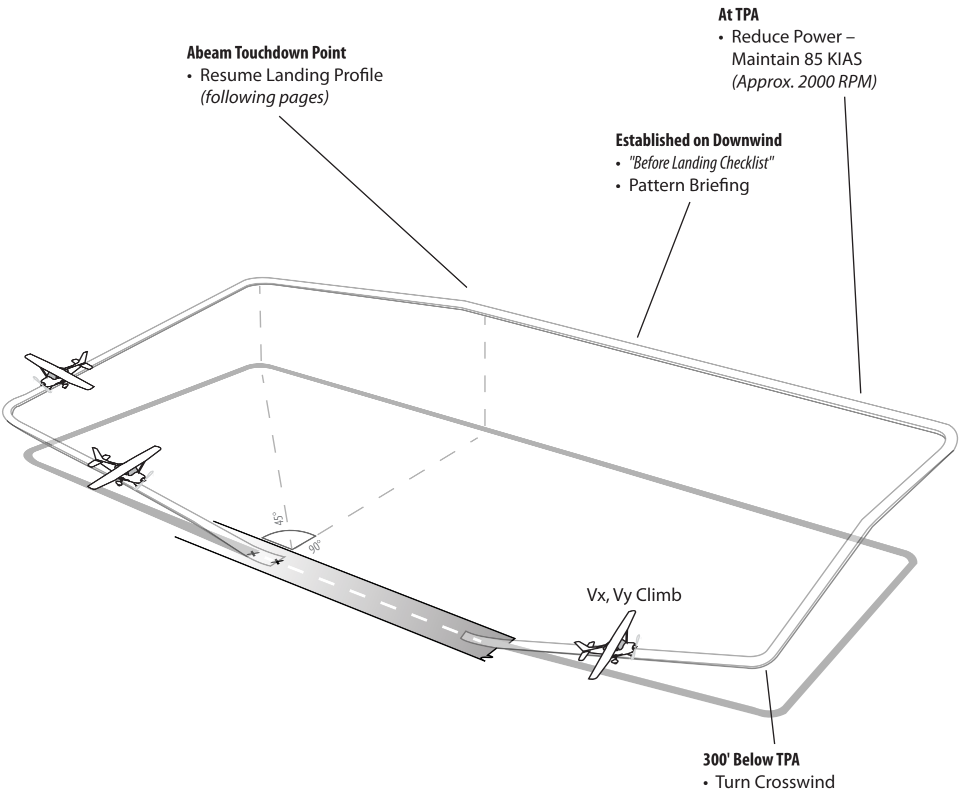
ATP **TIP:** Proper foot position helps prevent inadvertent brake application during landings and ground operations.

VIDEO: For more information about proper landing technique, watch *"Land Like a Pro"* available on the ATP Flight School iPad app.

Traffic Pattern Operations

Pattern Briefings should include:

- Flap Setting
- Type of Approach & Landing (Short-Field, Soft-Field, etc.)
- Final Approach Speed
- Aiming Point
- Touchdown Point



Normal Approach and Landing

1. Complete the *"Approach Checklist"* before entering the airport area; devote full attention to aircraft control and traffic avoidance.
2. Slow to 85 KIAS prior to entering downwind or traffic pattern.
3. Enter the traffic pattern at published TPA (typically 1000' AGL).
4. Complete the *"Before Landing Checklist"* when established on downwind.
5. When abeam touchdown point, on extended base, or on extended final (when ready to descend out of pattern altitude):

   Reduce power to approx. 1500 RPM and select flaps 10°.
6. Descend out of TPA at 75 KIAS.
7. Select flaps 20° and slow to 70 KIAS on base leg.
8. Select flaps 30° and slow to 65 KIAS on final when landing is assured.

ATP

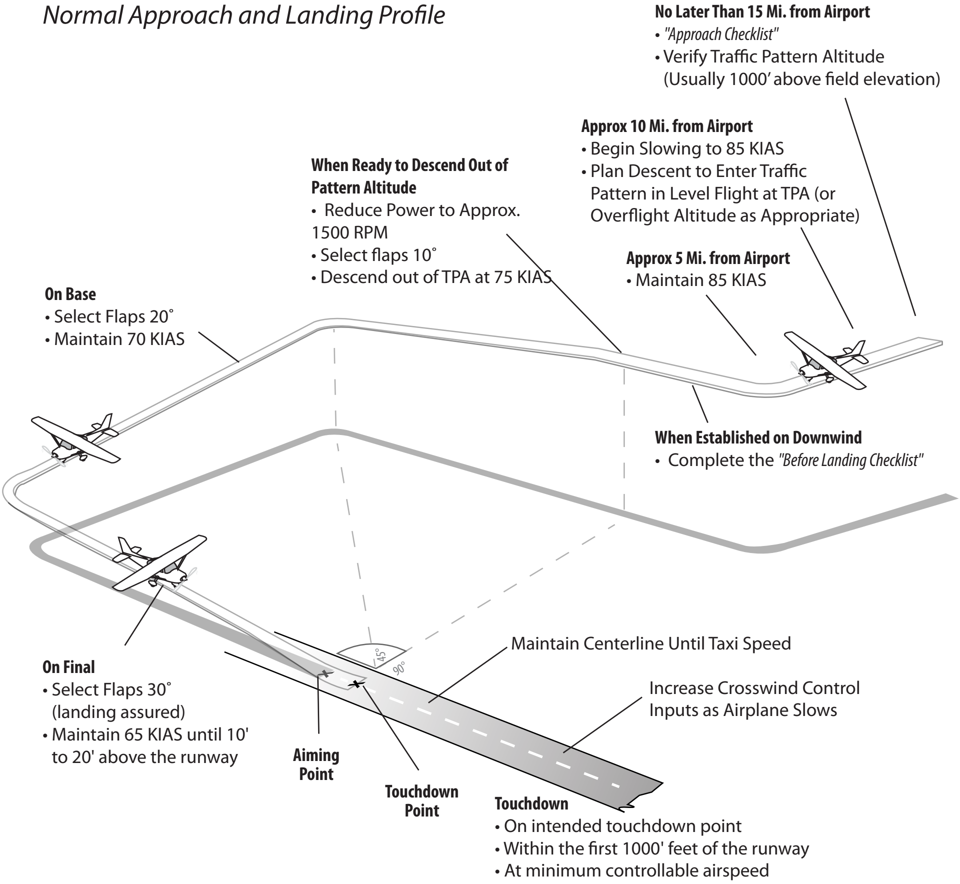
TIP: Getting ATIS, briefing the approach, and the Approach Checklist should be completed no later than 15 miles from the airport. Accomplishing these tasks as early as possible creates more time to focus on aircraft control and collision avoidance in the busy airport environment. During training flights when maneuvering near an airport, get ATIS, brief, and complete the Approach Checklist as soon as the decision is made to return to the airport. Don't wait!

Before Landing Checklist

SEATBELT & SHOULDER HARNESS.. ON
FUEL SELECTOR... BOTH
MIXTURE ....FWD
FLAPS .... AS REQUIRED

CHECKLIST COMPLETE

Normal Approach and Landing Profile



TIP: The power settings in this supplement are approximate and can change depending on prevailing conditions. A common mistake is to spend too much time trying to set exact power settings. This diverts the pilot's attention from more important things. During landings, limit attention to the gauges to a few seconds at a time so ample attention remains on flying the proper course and glidepath.

Flaps 20˚ Approach and Landing

A flaps 20˚ approach and landing will be accomplished the same as a normal (flaps 30˚) approach and landing with a few differences:

- Do not select flaps 30˚ (or greater) on final
- Maintain 70 KIAS until short final when landing is assured, then slow to 65 KIAS until 10' to 20' above the runway.

Flaps 10˚ Approach and Landing

A flaps 10˚ approach and landing will be accomplished the same as a normal (flaps 30˚) approach and landing with a few differences:

- Do not select flaps 20˚ on base or 30˚ (or greater) on final.
- Maintain 70 KIAS until final when landing is assured, then slow to 65 KIAS until 10' to 20' above the runway.

ATP

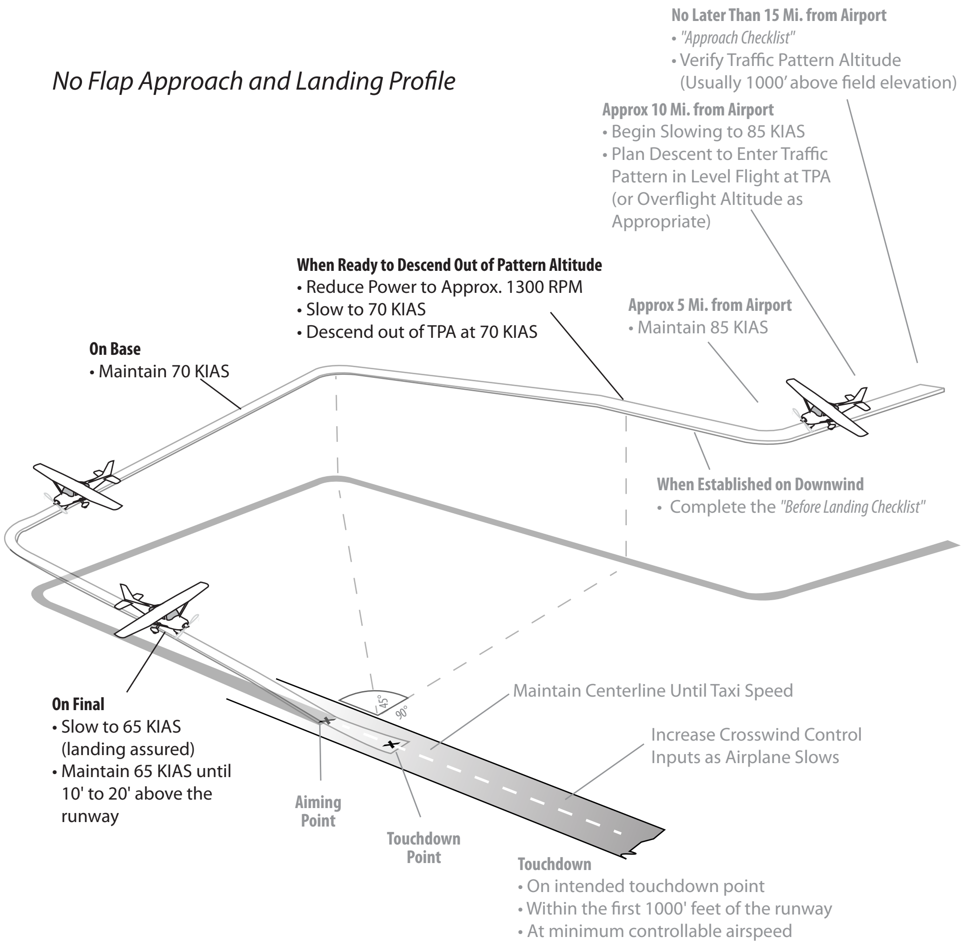
TIP: Under normal circumstances, avoid configuration changes below 400' AGL whenever possible.

No-Flap Approach and Landing

Steps 1-4 are identical to a normal approach and landing procedure.

5. When abeam touchdown point, on extended base, or on extended final (when ready to descend out of pattern altitude):
   Reduce power to approx. 1300 RPM.
6. Slow to 70 KIAS.
7. Descend out of TPA at 70 KIAS.
8. Slow to 65 KIAS on final when landing is assured.

No Flap Approach and Landing Profile



ATP

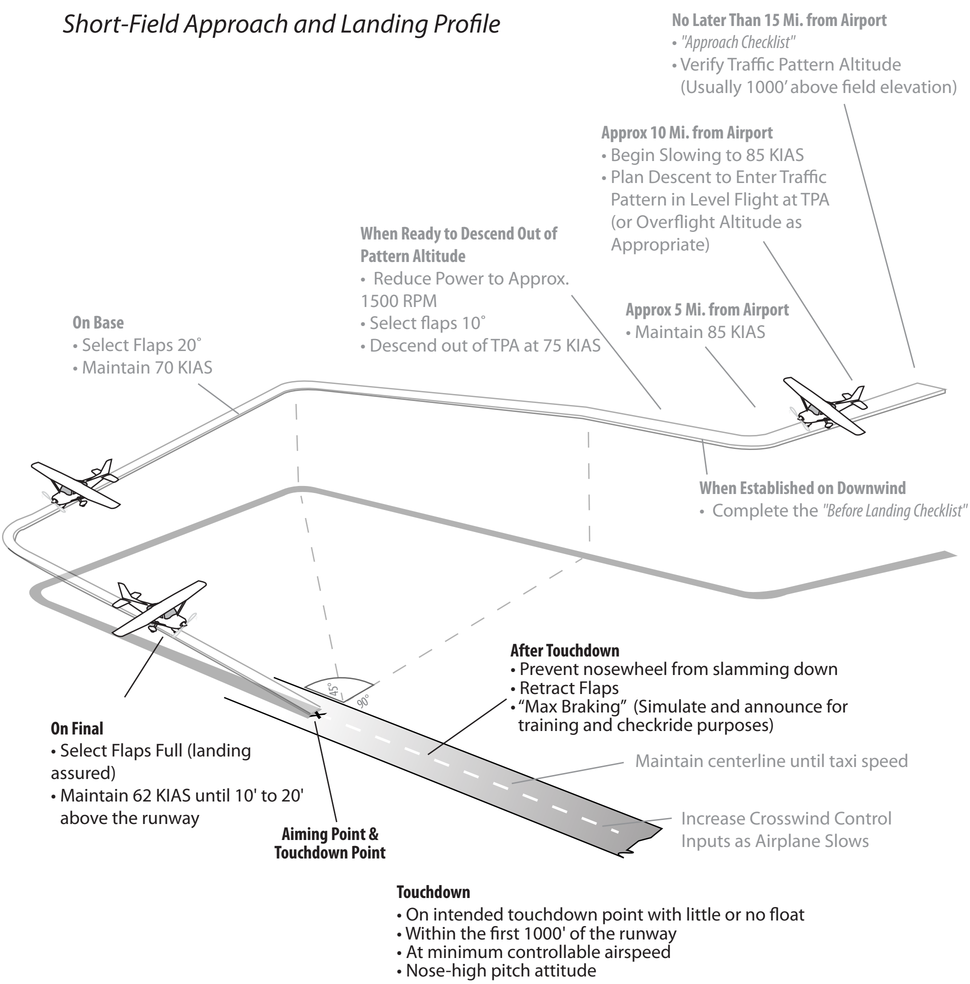
TIP: Reduced flap settings change the visual picture and result in a higher angle of attack during the approach and a greater distance between the aiming point and touchdown point.

Short-Field Approach and Landing

Steps 1-7 are identical to a normal approach and landing procedure.

8. Select flaps FULL and slow to 62 KIAS on final when landing is assured.
9. Close throttle slowly during flare – touch down on intended touchdown point with little or no floating.
10. Prevent the nosewheel from slamming onto the runway.
11. Retract the flaps after touchdown
12. Simulate and announce "Max Braking" for training and checkride purposes.

Short-Field Approach and Landing Profile

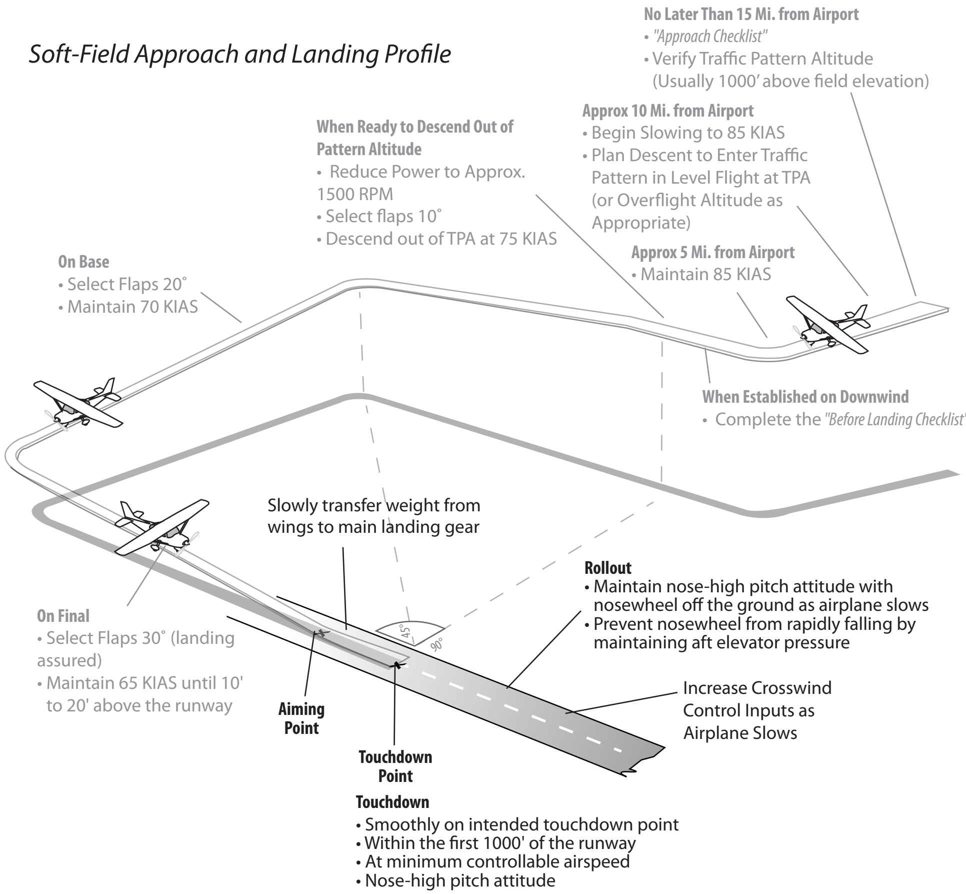


Soft-Field Approach and Landing

Steps 1-8 are identical to a normal approach and landing procedure.

9. Fly the airplane onto the ground, slowly transferring the weight from the wings to the main landing gear.
10. Touch down on intended touchdown point at minimum speed with a nose-high pitch attitude.
11. Keep the nosewheel off the ground as airplane slows by increasing elevator pressure.
12. Prevent nosewheel from rapidly falling by maintaining aft elevator pressure.

Soft-Field Approach and Landing Profile



Crosswind Approach and Landing

Carefully planned adjustments must be made to the normal approach and landing procedure to safely complete a crosswind approach and landing.

Planning

Before entering the traffic pattern, brief how your approach and landing will be different by acknowledging the wind direction, crosswind component, planned flap setting, and how your traffic pattern ground track will differ as a result of the winds.

Flap Setting

The Cessna POH/AFM recommends using the "minimum flap setting required for the field length. If flap settings greater than 20˚ are used in sideslips with full rudder deflection, some elevator oscillation may be felt at normal approach speeds." ATP standardized landing technique for the C172 and the C172 POH/AFM recommend the wing-low method for best control. It is highly recommended that flap settings be limited to 20˚ during crosswind operations.

Ground Track

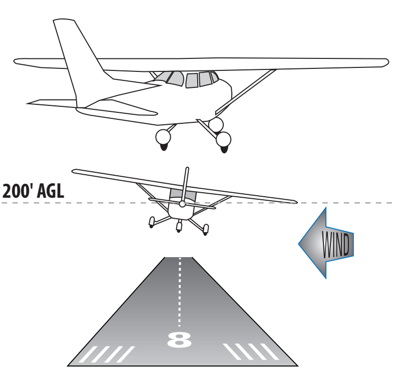
Plan a crab angle on downwind to maintain a uniform distance from the runway. Begin the base turn so the airplane is established on base at the appropriate distance from the runway. Do not allow the winds to blow the airplane off the intended ground track. Turning final, adjust for the winds to not over or undershoot the runway centerline.

Control Technique

ATP recommends a crab angle to maintain the proper ground track until 200' AGL, followed by a transition to the wing-low sideslip technique at 200' AGL and below. Maintain the wing-low technique until touchdown and throughout the landing roll. After landing, increase aileron input into the wind as the airplane slows to prevent the upwind wind from rising, reduce side-loading tendencies on the landing gear, and minimize the risk of roll-over accidents due to the upwind wing lifting.

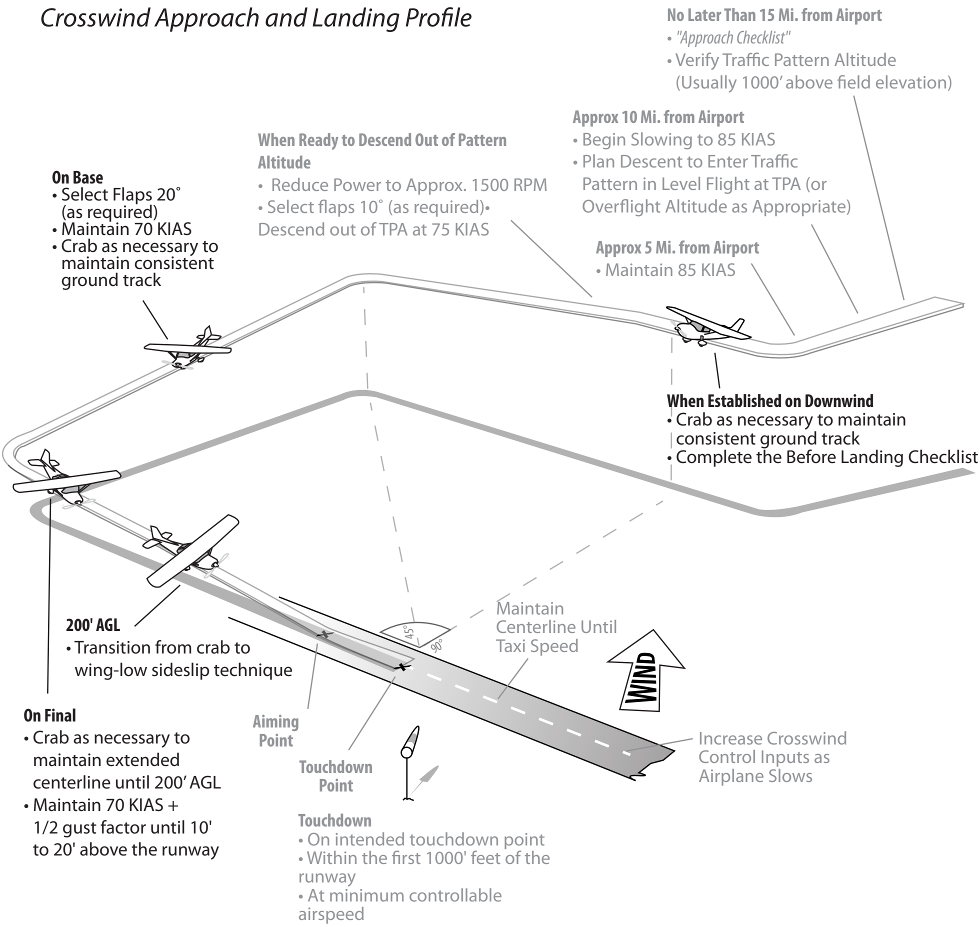
Judgment

The demonstrated crosswind component in the C172 is 15 Knots. Regardless of reported winds, if the required bank to maintain drift control is such that full opposite rudder is required to prevent a turn toward the bank, the wind is too strong to safely land the airplane. Select another runway or airport and go-around any time the outcome of an approach or landing becomes uncertain.



TIP: During windy conditions, adjust turns in the traffic pattern as necessary to maintain the correct ground track and distance from the runway. For example, a strong tailwind during the downwind leg will blow the airplane too far from the runway if the pilot waits until the 45° point to turn base. Instead, plan the base turn early to remain the correct distance from the runway.

Crosswind Approach and Landing Profile



TIP: Develop the habit of applying full, proper crosswind control inputs as the airplane slows during every landing rollout and all taxi operations, regardless of how light the winds. Resist the tendency to release the control inputs to neutral after touchdown.

Go-Around, Missed & Rejected

The terms go-around, missed approach, rejected landing, and balked landing are often used interchangeably, but there are differences.

Go-Around

A go-around procedure must be initiated any time the conditions for a safe approach and landing are not met. Some examples of unsatisfactory approach and landing conditions are:

- unstable approach path or airspeed
- improper runway alignment
- unexpected hazards on the runway or on final
- anything that jeopardizes a safe approach and landing

Any time unsafe or unsatisfactory conditions are encountered, a go-around must be immediately executed and another approach and landing should be made under more favorable conditions.

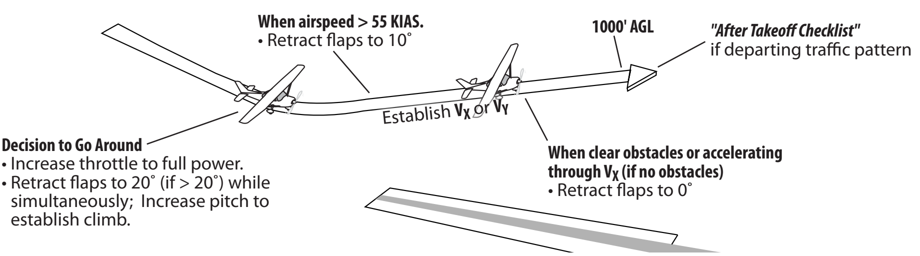
Missed Approach

A missed approach is a maneuver conducted by a pilot when an instrument approach cannot be completed to a landing. The pilot's initial actions when initiating a missed approach are the same as a go-around procedure.

Go-Around / Missed Approach Procedure

1. Increase throttle to full power.
2. Retract flaps to 20˚ (if > 20˚) while simultaneously;
3. Increase pitch to establish climb.
4. Retract flaps to 10˚ when airspeed is greater than 55 KIAS.
5. Establish V_X or V_Y as appropriate.
6. Retract flaps to 0˚ when clear obstacles or accelerating through V_X (if no obstacles)
7. *"After Takeoff Checklist"* out of 1000' AGL if departing the traffic pattern.

If the go-around or missed approach is due to conflicting traffic, maneuver as necessary during the climb to clear and avoid conflicting traffic (usually to the side, flying parallel to the runway).



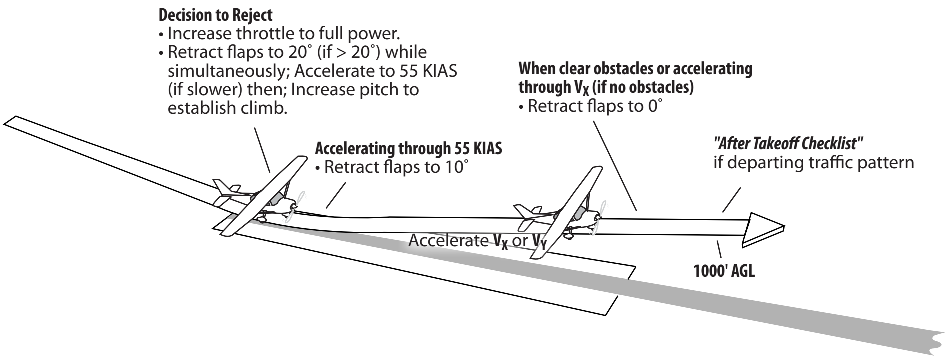
Rejected or Balked Landing

As a practical guide, a rejected or balked landing occurs when the airplane is very low to the ground and usually occurs after the roundout (flare) has begun. Airspeed may be very low — well below V_X or V_Y in some cases — and the pilot must be very careful to establish and maintain a safe airspeed during the transition to a climb. At slow airspeeds, retracting the flaps too early or abruptly can result in a significant loss of lift. The pilot must also factor in ground effect when initiating a rejected or balked landing close to the ground.

Rejected or Balked Landing Procedure

1. Increase throttle to full power
2. Retract flaps to 20˚ (if > 20˚) while simultaneously;
3. Accelerate to 55 KIAS (if slower) then;
4. Increase pitch to establish climb.
5. Retract flaps to 10˚ accelerating through 55 KIAS.
6. Accelerate to V_X or V_Y as appropriate.
7. Retract flaps to 0˚ when clear obstacles or accelerating through V_X (if no obstacles).
8. "*After Takeoff Checklist"* out of 1000' AGL if departing the traffic pattern.

If the rejected landing is due to conflicting traffic, maneuver as necessary during the climb to clear and avoid conflicting traffic (usually to the side, flying parallel to the runway).

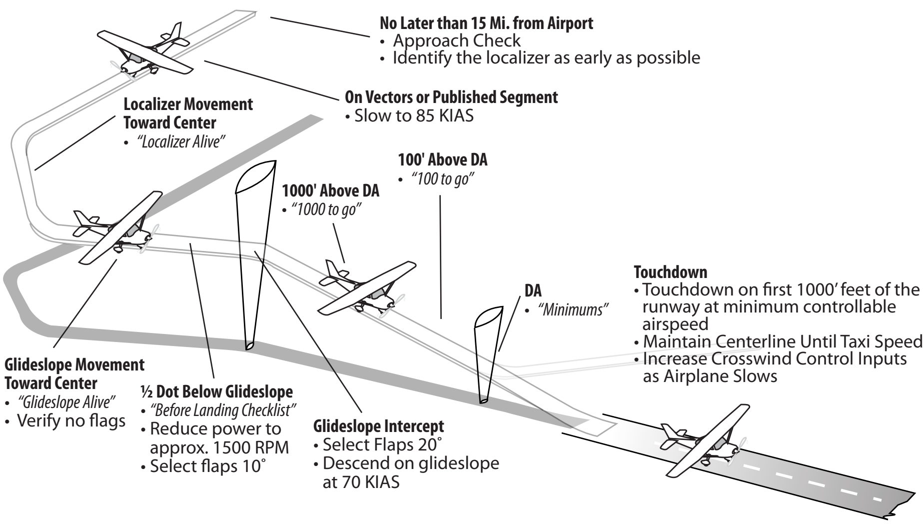


Instrument Procedures

Precision Approach (ILS Approach)

1. Complete the *"Approach Checklist"* and identify the localizer as early as possible.
2. Slow to 85 KIAS on vectors or established on a published segment of the approach.
3. Announce *"Localizer Alive"* when localizer begins moving toward center.
4. Announce *"Glideslope Alive"* when glideslope begins moving toward center.
5. Verify no flags at glideslope intercept altitude and marker.
6. ½ dot below glideslope intercept: *"Before Landing Checklist"*
   Reduce power to approx. 1500 RPM, and select flaps 10˚.
7. Select flaps 20˚ at glideslope intercept.
8. Descend on glideslope at 70 KIAS.
9. Announce at 1000' above DA: *"1000 to go."*
10. Announce at 100' above DA: *"100 To Go."*
11. *"Minimums."*

TIP: ATP recommends selecting a final flap setting of 20˚ at glideslope intercept to enable a stabilized approach and minimize workload during the final approach segment. Flaps 30˚ may be selected when landing is assured at the pilot's discretion, but it is not required.



TIP: The airplane is considered established inbound when the localizer is alive.

Private Pilot

Specific Tasks & Procedures

ATP

NOTE: Configuration and throttle settings used throughout the following procedures are based on an 160 HP R-Model 172 and will vary depending on the specific airplane and prevailing conditions.

Steep Turns

Steep turns are to be accomplished above 3000' AGL. Roll into one coordinated 360˚ turn, then follow with another coordinated 360˚ turn in the opposite direction, as specified by the Examiner. Roll into and out of turns at approximately the same rate. The applicant is required to maintain the entry altitude ±100 feet, airspeed ±10 knots, bank ±5°; and roll out on the entry heading ±10°.

1. Perform two 90º clearing turns
2. 90 KIAS (2000 RPM) maintain altitude
3. Cruise configuration flow
4. Perform a 360 turn with 45˚ of bank
5. Maintain altitude and airspeed (+ back pressure, + approx. 1-200 RPM)
6. Roll out ½ bank angle prior to entry heading
7. Clear traffic and perform a 360 turn with 45˚ of bank in the opposite direction
8. Roll out ½ bank angle prior to entry heading
9. Cruise checklist

Maneuvering During Slow Flight

Slow flight is to be accomplished at an entry altitude that will allow the task to be completed no lower than 1500' AGL. As specified by the Examiner, this maneuver may be accomplished in any configuration while demonstrating coordinated straight-and-level flight, climbs, turns, and descents. The airspeed selected is that at which any further increase in angle of attack, increase in load factor, or reduction in power, would result in an immediate stall. The applicant is required to maintain the specified altitude ±100 feet, specified heading ±10°, airspeed +10/-0 knots, and specified angle of bank ±10°.

1. Perform two 90º clearing turns
2. 1500 RPM (maintain altitude)
3. Landing configuration flow
4. Maintain altitude - slow to just above a stall
5. Power as required to maintain airspeed
6. Accomplish level flight, climbs, turns, and descents as required (ATP - max 30° bank)
7. Recover – full power/maintain altitude/reduce flaps
8. Above Vx, reduce flaps to 0°
9. Cruise checklist

Power-Off Stall

Stalls are to be accomplished at an entry altitude that will allow the task to be completed no lower than 1500' AGL. This maneuver is begun by first establishing a stabilized descent in either the approach or landing configuration, as specified by the Examiner. The applicant is required to maintain a specified heading ±10° in straight flight; or a specified angle of bank (not to exceed 20°) ±10°, in turning flight.

1. Perform two 90° clearing turns
2. 1500 RPM (maintain altitude)
3. Landing configuration flow
4. Stabilized descent at 65 KIAS
5. Throttle idle (Slowly)
6. Wings level or up to 20° bank as assigned
7. Pitch to maintain altitude (Slowly)
8. At stall/buffet (as required) recover – reduce AOA - full power
9. Retract flaps to 20° (immediately)
10. Retract flaps to 10° when airspeed is greater than 55 KIAS
11. Increase pitch to arrest descent
12. Establish V_X or V_Y as appropriate
13. Retract flaps to 0° when accelerating through V_x
14. Cruise checklist

Power-On Stall

Stalls are to be accomplished at an entry altitude that will allow the task to be completed no lower than 1500' AGL. The applicant is required to maintain a specified heading ±10° in straight flight; or a specified angle of bank (not to exceed 20°) ±10°, in turning flight.

1. Perform two 90° clearing turns
2. 1500 RPM (maintain altitude)
3. Clean configuration
4. At 60 KIAS, simultaneously increase pitch (Slowly) and apply full power
5. Slowly increase pitch to induce stall/buffet (approx 15°)
6. At stall/buffet (as required) recover – reduce AOA - full power
7. Cruise checklist

Commercial Pilot

Specific Tasks & Procedures

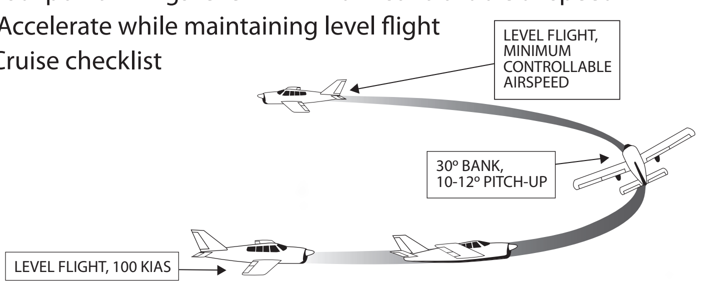
Required maneuvers for the Commercial Pilot Single-Engine Add-On are performed the same as those for Private Pilot, with exception of steep turns, which is accomplished with at least 50° of bank.

Commercial Pilot Single Engine Add-On completion standards allow for lower tolerances than Private Pilot standards on maneuvers. Refer to the PTS.

Chandelles

Chandelles are to be accomplished at an entry altitude that will allow the task to be completed no lower than 1500' AGL. Chandelles consist of one maximum performance climbing turn beginning from approximately straight-and-level flight, and ending at the completion of a precise 180° turn in a wings-level, nose-high attitude at the minimum controllable airspeed. The applicant is required to complete the rollout at the 180° point, ±10°, just above a stall airspeed, and maintain that airspeed, momentarily avoiding a stall.

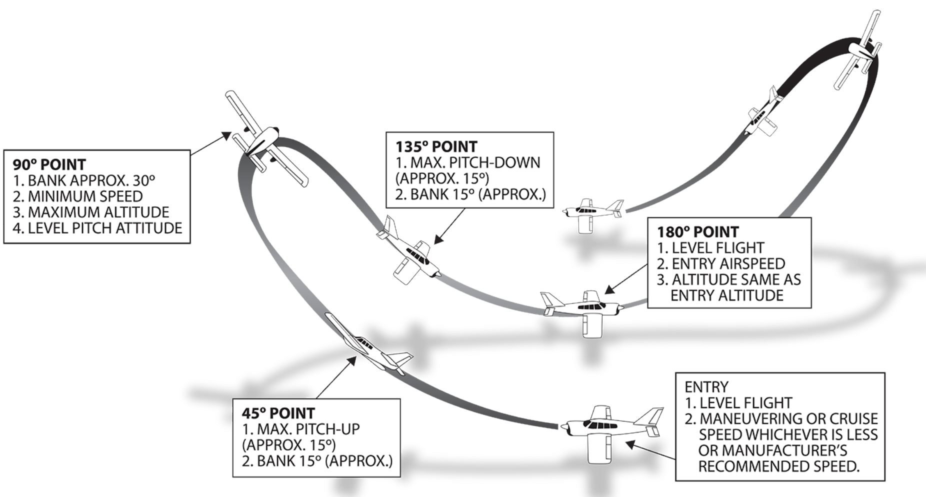
1. Perform two 90º clearing turns
2. 100 KIAS (2200 RPM) maintain altitude
3. Clean configuration flow
4. Choose a reference point off wing
5. Establish / maintain 30° bank
6. Full Throttle - Increase pitch to attain approx. 10-12˚ pitch up at 90° point
   1st 90° of turn, Bank = constant 30˚, Pitch = increasing to 10-12˚ pitch up
7. 90˚ point - maintain pitch - reduce bank angle to attain level flight at 180˚ point
   2nd 90° of turn, Pitch = constant 10-12˚ pitch up, Bank = decreasing to level flight
8. 180˚ point - wings level - minimum controllable airspeed
9. Accelerate while maintaining level flight
10. Cruise checklist



Lazy Eights

Lazy Eights are to be accomplished at an entry altitude that will allow the task to be completed no lower than 1500' AGL. The applicant is required to maintain coordinated flight throughout the maneuver, with a constant change of pitch and roll rate. The aircraft should be at approximately 30° bank at the steepest point and at the 180° points be at: entry altitude ±100', entry airspeed ±10 knots, and entry heading ±10°.

1. Perform two 90º clearing turns
2. 100 KIAS (2200 RPM) maintain altitude
3. Clean configuration flow
4. Choose a reference point off of the wing
5. Simultaneously increase pitch and bank (SLOWLY)
6. 45˚ point – 15˚ pitch up and 15˚ bank
7. Reduce pitch / increase bank
8. 90˚ point –level pitch - 30˚ bank
9. Continue reducing pitch and reduce bank
10. 135˚ point - 15˚ pitch down - 15˚ bank
11. 180˚ point – level flight – entry airspeed and altitude
12. Repeat in opposite direction
13. Cruise checklist

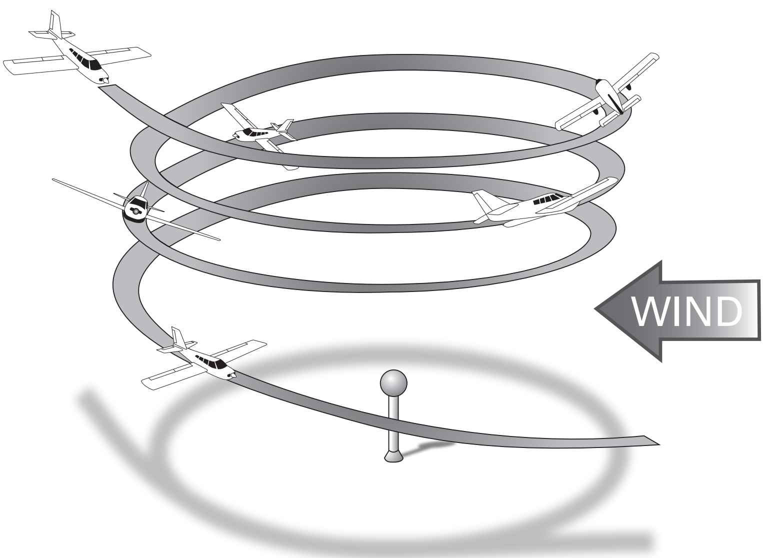


*pitch and bank reference numbers approximate

Steep Spirals

Steep Spirals must consist of at least three 360° turns. The applicant is required to maintain a specified airspeed ±10 knots and roll out toward a specified object or heading ±10°.

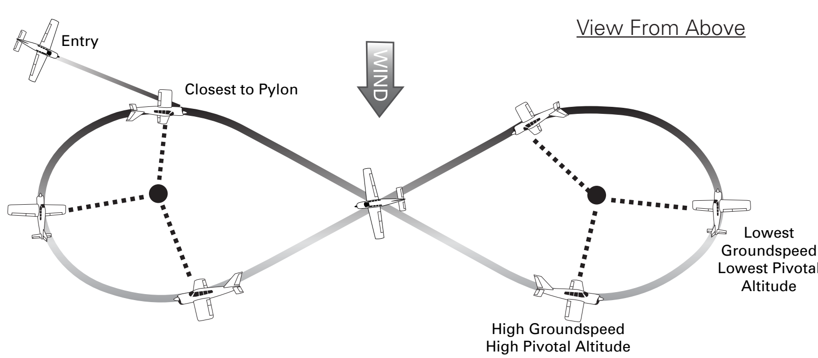
1. Altitude – at least 3000' AGL
2. Perform two 90º clearing turns
3. 80 KIAS (1700 RPM) maintain altitude
4. Clean configuration flow
5. Choose visual reference point
6. Reduce throttle to idle
7. Track at least three constant radius circles around reference point
8. Airspeed - constant
9. Bank angle – adjust for winds – not to exceed 60°
10. Clear engine once every 360° turn
11. Recover - roll out on specified heading (visual reference)
12. Adjust DG/HSI to compass
13. Cruise checklist



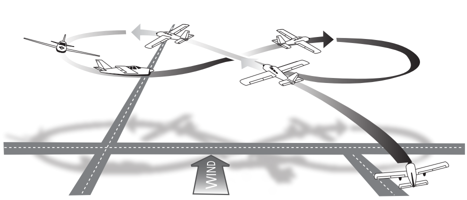
Eights on Pylons

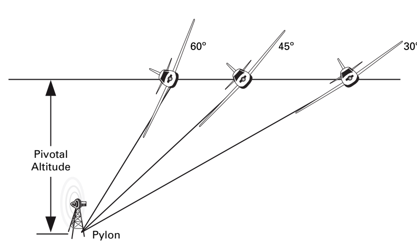
Eights on Pylons are to be accomplished at the appropriate pivotal altitude (groundspeed²/11.3), governed by the aircraft's groundspeed. The applicant is required to maintain coordinated flight while flying a figure eight pattern which holds the selected pylons using the appropriate pivotal altitude. At the steepest point, the angle of bank should be approximately 30-40°.

1. Enter pivotal altitude (Approx 900' AGL at 100 KIAS - 2200 RPM)
2. Perform two 90º clearing turns
3. Clean configuration flow
4. Select two pylons to allow for minimal time spent wings level between the two
5. Enter maneuver on a 45° midpoint downwind
6. Apply appropriate pitch corrections to compensate for changes in groundspeed and;
7. To maintain line of sight reference with the pylon (pitch forward if point moves toward nose and pitch back if point moves toward tail).
8. Begin rollout to allow the airplane to proceed diagonally between the pylons at a 45º angle.
9. Begin second turn in the opposite direction of the first
10. Exit maneuver on entry heading
11. Cruise checklist



NOTE: The wing tip should be pointing at the pylons throughout the turns.





Oral Review

1. (True/False) Engines on all ATP C172s are identical.

2. Identify the range of useable fuel (smallest to largest) available in the ATP C172 fleet.

3. Where (within the POH/AFM) can information on engine modifications be found?

4. Be able to identify the various engine sizes and specifications for the various model C172s.

5. What type of flaps does the C172 have?

6. Describe the C172 landing gear.

7. Describe the differences between early and late model electrical systems.

8. Describe the ignition system.

9. What type of stall warning system does the C172 have?

10. (True / False) There are different checklists for early and late model C172s.

11. Describe the differences between early and late model fuel systems.

12. By memory, be able to recite and write down all of the profiles contained in this supplement and on the C172 Maneuver Guide.

13. What is the first step in accomplishing a good landing?

14. Whenever possible, what distance should the traffic pattern be flown in a single-engine airplane?

15. For training and testing purposes, what speed should the airplane be flown on short final when landing is assured?

16. What is the typical approximate altitude above the landing surface to begin the roundout (flare)?

17. At what speed should the touchdown occur in a 172?

18. Define "managing energy".

19. After landing, how long should the centerline be maintained?

20. After touchdown, what should be done with the aileron controls as the airplane slows? Why?

21. What information should a visual approach briefing include?

22. What does an approach briefing accomplish?

23. Be able to articulate an example visual approach and landing briefing using the example provided in the Supplement.

24. Define stabilized approach according to the Airplane Flying Handbook.

25. What are the general conditions for a stabilized approach?

26. What should a pilot do if the general conditions for a stabilized approach don't exist during an approach? What if an instructor is on board?

27. What is, in your opinion, the most important part of a stabilized approach?

28. What action should be taken if a pilot at 1000' AGL maintaining a constant angle glidepath is 10 knots too fast?

29. While maintaining a stabilized approach, what control input should the pilot use to correct for airspeed deviations, change the pitch or change the power?

30. Define "aiming point" according to the airplane flying handbook.

31. While maintaining a stabilized approach, what control input should the pilot use to correct for the aiming point moving up in the windshield, change the pitch or change the power?

32. If the aiming point is moving up in the windshield, is the airplane moving lower or higher reference the constant angle glidepath?

33. What does it mean if a pilot flying in level flight has to physically keep the airplane from climbing by applying forward pressure on the yoke?

34. What does it mean if a pilot flying in level flight has to physically keep the airplane from descending by applying aft pressure on the yoke?

35. According to Cessna, what is the best flap setting for a normal landing a C172?

36. How should the approach speed be adjusted for gusty winds?

37. Calculate the correct approach speed until short final given the following conditions.

    - Flaps 20°
    - Winds 240 @ 8, gusting to 18

38. Why is correctly adjusting the seat position before each flight important?

39. When should the pilot get ATIS, brief the approach, and complete the Approach Checklist?

40. Are the power settings listed on the landing profiles exact or approximate?

41. Is the aiming point also the touchdown point? If not, what is the difference?

42. What is the maximum recommended flap setting for crosswinds?

43. Does ATP recommend the crab method or wing-low sideslip method during a crosswind approach and landing?

44. When using the wing-low sideslip technique, will left or right rudder be required during a strong right crosswind?

45. Which control surface, aileron or rudder, corrects for wind drift during a crosswind landing?

46. During crosswind landings, which control surface, aileron or rudder longitudinally aligns the airplane with the runway centerline?

47. What is the max demonstrated crosswind in the C172?

48. When flying the downwind leg with a strong tailwind, where should the turn to base be started?

    a. At the 45˚ angle to the intended touchdown point

    b. Plan the turn early so the base leg can be flown at the appropriate distance from the runway

    c. Plan the turn late so the base leg can be flown at the appropriate distance from the runway

49. What control inputs, if any, should the pilot apply after the airplane touches down?

50. What is the difference between a go-around/missed approach and a rejected landing?

51. During an ILS approach, when is the airplane considered established inbound?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