Piper Archer

Training Supplement

LearntoFlyPA.com

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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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Welcome to Innovative Aviation

Aircraft Systems

Engine

The Archer is equipped with a Lycoming, 4-cylinder, O-360 (opposed, 360 cubic inch) engine rated at 180 horsepower at 2700 RPM. The engine is direct drive (crankshaft connected directly to the propeller), horizontally opposed (pistons oppose each other), piston driven, carbureted and normally aspirated (no turbo or supercharging). Engine ignition is provided through the use of two engine-driven magnetos, which are independent of the aircraft's electrical system and each other. Each magneto powers one spark plug per cylinder (for redundancy and more complete combustion), for a total of 8 spark plugs.

L Lycoming

H Horizontally Opposed

A Air Cooled

N Normally Aspirated

D Direct Drive

Carburetor Icing

Under certain 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, 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 RPM. Carburetor heat should be selected on full if carburetor ice is encountered. Adjust mixture for maximum smoothness.

Partial carburetor heat may be worse than no heat at all, since it may melt part of the ice, which will refreeze in the intake system. Therefore, when using carburetor heat, always use full heat and when the ice is removed, return the control to the full cold position.

From the Archer POH, regarding carburetor heat usage during approach:

> "Carburetor heat should not be applied unless there is an indication of carburetor icing, since the use of carburetor heat causes a reduction in power which may be critical in case of a go-around. Full throttle operation with carburetor heat on is likely to cause detonation."

Oil

Acceptable range for oil in the Archer is 6–8 quarts. Never depart with the oil indicating below 6 quarts.

Innovative Aviation policy states any time a full quart of oil can be added to the Archer oil system, a full quart should be added. Never add less than a full quart; oil must only be added from full, unopened containers, and any oil not poured into the engine must be discarded.

Propeller

The Archer is equipped with a Sensenich two-bladed, fixed-pitch, metal propeller. Propeller diameter is 76 inches. Maximum RPM (red line) is 2700 RPM.

Landing Gear

The landing gear is a fixed, tricycle-type gear, with oleo (air/oil) struts providing shock absorption for all three wheels. The nose wheel contains a shimmy dampener, which damps nose wheel vibrations during ground operations and centers the nose wheel in the air. The nose wheel is linked to the rudder pedals by a steering mechanism which turns the nosewheel up to 20° each side of center.

Brakes

The Archer is equipped with hydraulically actuated disc brakes on the main landing gear wheels. Braking is accomplished by depressing the tops of the rudder pedals. Both toe brakes and the parking brake have separate braking cylinders but share a hydraulic reservoir. The brake fluid reservoir is installed on the top left front face of the firewall. To set the parking brake, pull back on the brake lever, depressing the knob attached to the left side of the handle, then release the brake lever. To disengage the parking brake, pull back on the brake lever to disengage the catch mechanism, then allow the handle to swing forward.

Flaps

The Archer is equipped with a manual flap system. The flaps are extended with a lever located between the two pilot seats. Flap settings are 0°, 10°, 25°, and 40°, and are spring-loaded to return to the 0 ° position.

Pitot Static

Pitot and static pressure are both received from a pitot head installed on the bottom of the left wing. An alternate static source is located inside the cabin under the left side of the instrument panel, for use in the event of static port blockage. When using the alternate static source, the storm window and cabin vents must be closed, and the cabin heater and defroster must be on. This will reduce the pressure differential between the cockpit and the atmosphere, reducing pitot-static error. The pitot-static instruments are the airspeed indicator, altimeter, and vertical speed indicator.

Both the pitot and static lines can be drained through separate drain valves located on the left lower side of the fuselage interior.

Fuel System

The Archer, which uses 100 low lead avgas (blue), is equipped with two 25-gallon fuel tanks. One gallon is unusable in each tank. There is one engine- driven and one electrically driven fuel pump. The electric fuel pump is used for all takeoffs and landings, and when switching tanks.

Use the electric fuel pump for all in-flight maneuvers.

The aircraft is equipped with a three-position fuel selector control. The positionsare “L”, “R”, and “OFF”.

The correct procedure for switching tanks in cruise flight is:

1. Electric fuel pump on
2. Fuel selector from “L” to “R” or from “R” to “L”
3. Check fuel pressure
4. Electric fuel pump off
5. Check fuel pressure
6.

An engine priming system is provided to facilitate starting. The primer switch is located on the left side of the throttle quadrant.

CAUTION: DO NOT OVER-PRIME. Over-priming washes lubrication from cylinder walls and increases fire risk. Always follow the checklist for primer usage.

Fuel Management

Throughout operation, checklists will call for "Fuel Selector... Proper Tank." It is important to monitor fuel burn to maintain a balanced fuel load. The Archer POH does not provide a limitation on fuel imbalance.

It is Innovative Aviation's policy that the fuel selector should not be changed during critical phases of flight, to include takeoff and operations below pattern altitude, unless called for on an emergency checklist.

During cruise flight and maneuvers, fuel load should be monitored, and the fuel selector should be selected to the fullest tank when a noticeable difference in fuel load occurs. 30 minutes of operation should result in a fuel load difference of several gallons and is a good guideline for fuel selector changes.

During pattern work operations, the fuel selector should only be changed while on the ground during a Full Stop/Taxi procedure. It is critical to follow the proper procedure for changing fuel tanks while on the ground, as well as while in flight. Failure to follow the proper fuel selector change procedure can lead to interruption in fuel flow, and engine failure, during a critical phase of flight.

Electrical System

The Archer is equipped a 14-volt, 60 amp alternator, a 12-volt battery, a voltage regulator, an overvoltage relay and a master switch relay. The battery is mounted in a stainless steel box immediately aft of the baggage compartment. The regulator and overvoltage relay are located on the forward left side of the fuselage behind the instrument panel.

All Aircraft

The main battery is used as a source of emergency electrical power and for engine starts. High drain items include the lights, vent fan, heater, radios. If an electrical problem arises, always check circuit breakers. If a circuit breaker is popped, reset only one time.

CAUTION: Do not reset popped circuit breakers if smoke is observed.

Heater

Heat for the cabin interior and the defroster system is provided by a heater shroud that routes fresh air past the exhaust manifold and directs it into the cabin. The amount of heat desired can be regulated with the controls located on the far-right side of the instrument panel.

CAUTION: When cabin heat is operated, the heat duct surface becomes hot. This could result in burns if arms or legs are placed too close to heat duct outlets or surface.

Stall Warning Horn

The Archer is equipped with an electric stall detector located on the leading edge of the left wing. The stall warning horn is activated between 5 and 10 knots above stall speed.

Additional aircraft systems information can be found within the Piper Archer Pilot's Operating Handbook.

Performance / Weight & Balance

Piper Archer V-Speeds

Speeds listed below are in Knots Indicated Airspeed (KIAS).

V-Speed	KIAS	Description	Airspeed Indicator Marking
V_{SO}	45	Stall speed in landing configuration	Bottom of White Line
V_S	50	Stall speed with zero flaps	Bottom of Green Line
V_R	60	Rotation speed (start rotation)	
V_X	64	Best angle of climb	
V_Y	76	Best rate of climb	
V_G	76	Best glide speed at max weight	
V_{FE}	102	Maximum flap extension speed	Top of White Line
V_{NO}	125	Max Structural Cruising Speed	Top of Green Line
V_{NE}	154	Never exceed speed	Red Line
V_A	113	Maneuvering speed at 2,550 pounds	
V_A	89	Maneuvering speed at 1,634 pounds	

Maximum demonstrated crosswind 17 knots

Sample Weight & Balance Problem

Complete the following sample weight and balance problem.

Conditions

Basic Empty Weight.. **1590.0 lbs.**

(Remember to use actual aircraft BEW for flight check.)

Front Pilots.. **350 lbs.**

Rear Passengers.. **50 lbs.**

Baggage.. **2 Bags @ 75 lbs.**

(May need to relocate some baggage to rear passenger seats.)

Max Ramp Weight.. **2,558 lbs.**

Max Takeoff/Landing Weight.. **2,550 lbs.**

Max Baggage Weight.. **200 lbs.**

Max Usable Fuel.. **48 gal.**

Fuel Burn.. **20 gal.**

		Weight ×	Arm	=	Moment
Basic Empty Weight			87.50		
Front Pilots	+		80.50	+	
Rear Passengers	+		118.10	+	
Baggage 200 lbs. Max	+		142.80	+	
Zero Fuel Weight	=		CG CG = Moment / Weight	=	
Usable Fuel	+		95.00	+	
Ramp Weight	=				
Taxi Fuel (2.65 Gal.)	–	8	95.00	–	760
Takeoff Weight	=		CG CG = Moment / Weight	=	
Fuel Burn	–		95.00		
Landing Weight	=		CG CG = Moment / Weight		

Calculate the Following

1. Zero Fuel Weight
2. Zero Fuel CG
3. Takeoff Weight
4. Takeoff CG
5. From comparing the Takeoff CG and Zero Fuel CG, which direction does the CG move as fuel is burned off?

Plot Zero Fuel CG and Takeoff CG on the CG Envelope Graph below.

Answers: (1) 2,140 lbs. (2) 90.95 (3) 2,420 lbs. (4) 91.45 (5) Forward

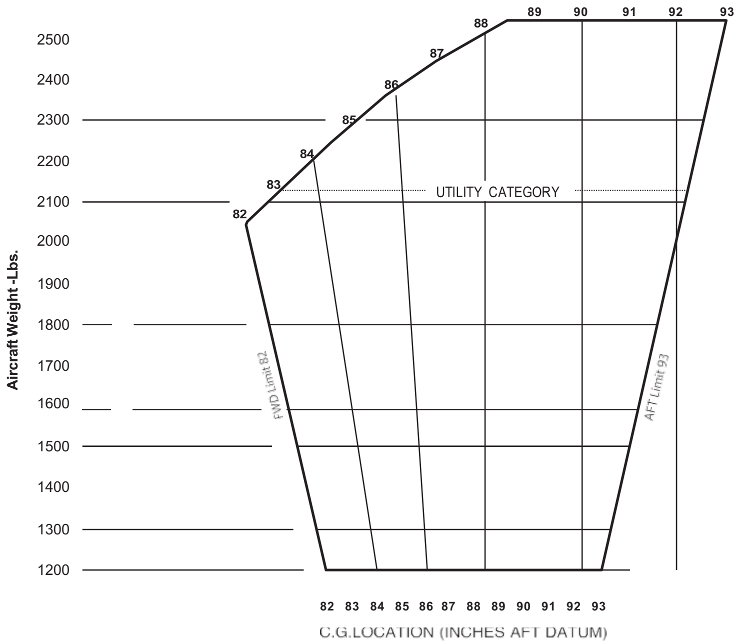
Formulas

- Weight × Arm = Moment
- Total Moment ÷ Total Weight = CG
- Fuel Weight ÷ 6 = Fuel Gallons
- Max Ramp Weight – Zero Fuel Weight = Usable Fuel Weight

Standard Weights

- 100 LL: 6 lbs./gal.
- Oil: 7.5 lbs./gal. (1.88 lbs/Quart)
- Water: 8.3 lbs/gal.
- 2 Gallons of unusable fuel and oil at full capacity are included in BasicEmpty Weight

CG Envelope Graph



Departure Procedures

Passenger Briefing

1. Safety Belt/Harness Usage
2. Cockpit Door Operation
3. Emergency Exit Operation
4. Fire Extinguisher Location/Usage
5. No Smoking
6. PIC Authority/Training/Checkride

Pre-Takeoff Briefing (Standard Procedures)

Engine failure or abnormality prior to rotation:

- Abort takeoff – throttle immediately closed
- Brake as required – stop straight Ahead, if not enough runway to stop
- Mixture to cutoff
- Fuel selector, magnetos, and battery master off
- Avoid obstacles

Engine failure after rotation with sufficient runway remaining for a completestop:

- Throttle immediately closed
- Land straight ahead, brake as required

Engine failure after rotation with no runway remaining:

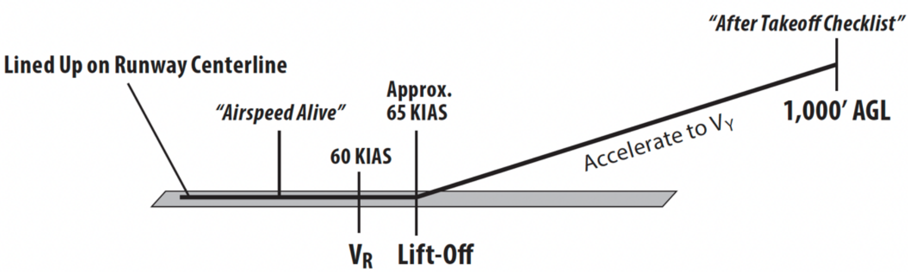
- Maintain control/pitch for best glide
- Only shallow turns to avoid obstacles
- Flaps as necessary for safe touchdown
- Throttle closed
- Mixture to cutoff
- Fuel selector, magnetos, and battery master off
- Touchdown at lowest speed possible

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 60 KIAS
9. Pitch to V_Y sight picture and accelerate to 76 KIAS (V_Y)
10. *"After Takeoff Checklist"* out of 1,000' AGL

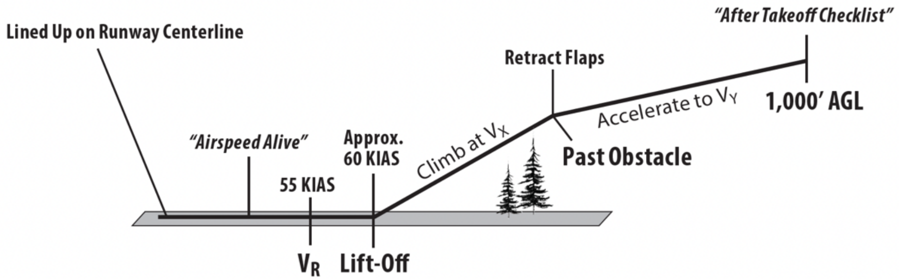
Normal Takeoff Profile



Short-Field Takeoff & Climb (Flaps 25°)

1. Flaps 25°
2. Use all available runway
3. Hold brakes
4. Full throttle
5. Check engine gauges
6. At full power - Release brakes
7. *"Airspeed Alive"*
8. Begin rotation at 55 KIAS, accelerate to Vx (64 KIAS)
9. Once clear of obstacle, retract flaps to 10 Degrees
10. Decrease pitch to V_Y sight picture, retract flaps fully, and accelerate and climb at76 KIAS (V_Y)
11. *"After Takeoff Checklist"* out of 1,000' AGL

Short-Field Takeoff & Climb Profile

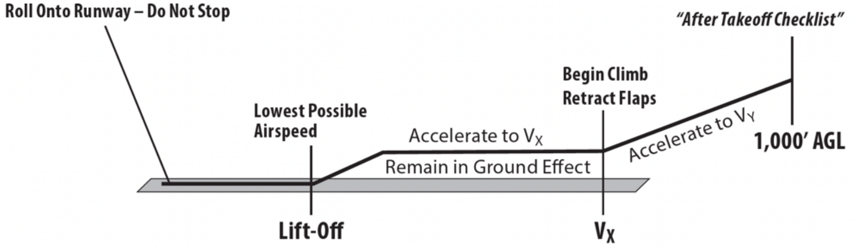


Use 60 KIAS (max weight speed) as the initial climb speed over the 50' obstacle, unless specified by the Examiner to use the computed speed for the aircraft's actual weight.

Soft-Field Takeoff & Climb (Flaps 25°)

1. Flaps 25°
2. Roll onto runway with aft yoke – minimum braking – do not stop
3. Check engine gauges, then direct complete attention outside of cockpit
4. Slowly add power. At approximately 50% power, begin reducing back pressure on yoke. Maintain less than full back pressure while increasing throttle to full power.
5. With back pressure reduced to avoid a tail strike, establish and maintaina pitch attitude that will transfer the weight of the airplane from the wheels to the wings as rapidly as practical
6. Lift off at lowest practical airspeed, then lower the nose to level offwhile remaining in ground effect
7. While in ground effect, accelerate to 64 KIAS (V_X) or 76 KIAS (V_Y) asappropriate for the climb
8. Pitch to V_X or V_Y sight picture and climb at V_X/V_Y
9. At safe altitude, retract flaps incrementally
10. *"After Takeoff Checklist"* out of 1,000' AGL

Soft-Field Takeoff & Climb Profile



Power should be increased from idle to full over approximately 5 seconds, to give the pilot time to adjust back pressure on the yoke as the airplane accelerates. This method will prevent tail strikes. It also keeps the aircraft from lifting off too abruptly andclimbing out of ground effect with insufficient airspeed.

Arrival Procedures

Piper Archer Landing Criteria

- Plan and brief each landing carefully.
- Enter the traffic pattern at TPA trimmed for 90 KIAS in level flight.
- Maintain a constant angle glidepath.
- 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 approximately 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 third 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. When planning an approach and landing, decide on the type of approach and landing (visual or instrument, short-field, soft-field, 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

During the Approach Checklist, conduct an approach briefing. This organizes the plan and ensures effective communication between pilots. The briefing should be specific to each approach and landing, and be presented in a standard format that makes sense to other pilots and instructors.

Approach Briefing

IFR	*VFR*
Field Elevation	Type of Approach & Landing
Type of Approach	Landing Runway
Frequencies	Field Elevation
Course	Pattern Altitude
Glideslope Intercept or FAF Altitude	Wind Direction & Speed
Minimums	Aiming & Touchdown Point
Missed Approach Procedure	Go-Around Criteria & Plan

Example VFR Briefing

Review the flap setting, aiming point, and touchdown point when established on downwind.

> "This will be a normal flaps 25° landing on Runway 16. Field elevation 600 feet, pattern altitude 1,600 feet. Winds are 180 at 10, slightright crosswind. Final approach speed 70 knots. If the approach becomes unstable, we'll go around and expect left traffic. Aiming at the 3rd stripe before the 1,000' markings, touching down on the 1,000' markings. "

This solidifies the plan between the student and instructor while visually identifying the aiming and touchdown points.

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

TIP: Do not allow briefing the approach to distract you from ATC calls and traffic reports. Pilots must maintain situational awareness of the position of all traffic in the pattern.

Announced Calls on Approach

"Before Landing Checklist"

- Visual: Prior to descending from Traffic Pattern Altitude (TPA)
- ILS: ½ dot below glideslope intercept
- Non-Precision: At FAF

"1,000 To Go"

- Instrument: 1,000' above MDA or DA

"Approaching Minimums"

- Instrument: 100' above MDA or DA

"Minimums"

- Instrument: at MDA or DA

"Stabilized"

- Visual or Instrument: At 200' AGL

If the approach is not stabilized, execute a go-around / missed approach.

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- 3B, p. 8-9).

A stabilized approach is required during visual and instrument approaches in all Innovative Aviation airplanes. The airplane must be stabilized by no lower than 200' AGL. At 300' AGL, begin a check that all stabilized approach conditions are met; if any condition is not met, go around at or before 200' AGL.

General Conditions for a Stabilized Approach

- Constant angle glidepath. Proper descent angle and rate of descent must be established and maintained. All available landing aids (ILS, VASI, PAPI, etc.) must be used. Non-precision approaches may require aslightly steeper angle until reaching MDA.
- Aircraft in landing configuration.
  (flaps set, trim set)
- Engine must be steady at the proper approach power setting.

- Airspeed must be stable and within range of target speed plus 10 KIAS.
- The aircraft will touch down in the first third of the landing runway. If this is not assured, a go-around must be executed.

Conditions for the Archer Stabilized Approach

- Final flap setting
- Power set approximately 1500 RPM
- Approximately 250 FPM descent
- Airspeed 70 KIAS (or 66 for short-/soft-field approach)

The procedures and parameters listed above are not merely targets, they are recommended conditions and limits. Any deviation occurring at or beyond the beginning of the stabilized approach corridor should result in a go-around.

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.

Innovative Aviation requires all landings to occur within the first third of the landing runway. When flying a visual approach and landing in an Archer, 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 one-third down the runway.

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.

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 maintaininga 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.

On a Stabilized Approach:

Power = Speed   Pitch = Altitude

"LANDING ASSURED" DEFINITION: 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.

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. Innovative Aviation 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.

Go-arounds are an essential part of normal flight operations, and a required maneuver in the Airman Certification Standards. They will be trained to proficiency early and reinforced often just like other required maneuvers. This applies to both new and experienced pilots.

Never attempting to salvage deficient landings by correcting floats, bounces, balloons, etc., simply transition to a go around.

Gust Factor

Slightly higher approach speeds should be used under turbulent or gusty wind conditions. Add ½ the gust factor to the normal approach speed. For example, if 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.

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, while still being able to see all flight instruments, for the best sight picture during landing.

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

Flap Setting

Students must be able to determine the best flap configuration and approach speed given the landing conditions. The Archer POH states that

> "*the amount of flap used during landings and the speed of the aircraft at contact with the runway should be varied according to the landing surface and conditions of wind and airplane loading. It is generally good practice to contact the ground at the minimum possible safe speed consistent with existing conditions. Normally, the best technique for short and slow landings is to use full flap... In high wind conditions, particularly in strong crosswinds, it may be desirable to approach the ground at higher than normal speeds with partial or no flaps.*"

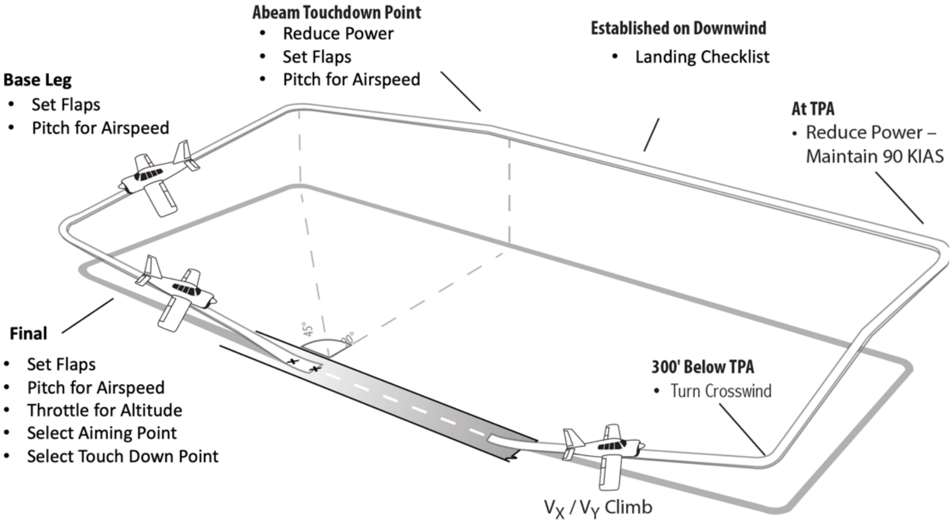
Innovative Aviation students are trained to perform normal landings using flaps 40°. Short-field and soft-field landings require flaps 40°. Flap settings on power-off 180° approaches will vary depending on the current conditions.

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

Traffic Pattern Operations Profile

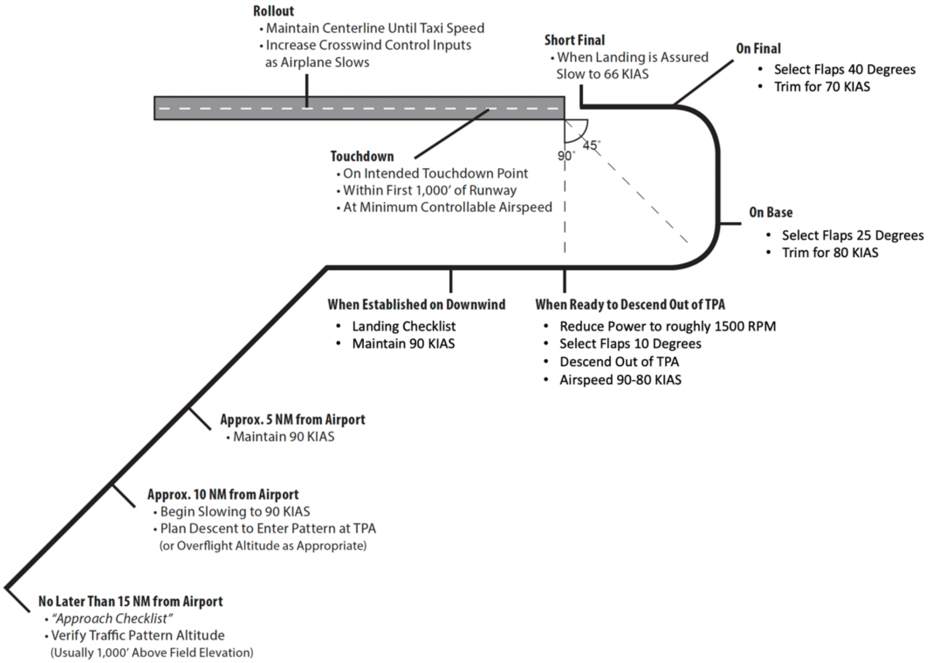


Normal Visual Approach & Landing

1. Complete the *"Approach Checklist"* before entering the airport traffic pattern; devote full attention to aircraft control and traffic avoidance.
2. Slow to 90 KIAS prior to entering downwind or traffic pattern.
3. Enter traffic pattern at published TPA (typically 1,000' AGL).
4. When established, complete the *"Landing Checklist"*
5. When abeam touchdown point, reduce power (approx. 1500 RPM) and select flaps 10°.
6. Descend out of TPA at 80 KIAS.
7. On base leg select flaps 25°, slow to and trim for 80 KIAS.
8. On Final, select flaps 40°
9. Maintain 70 KIAS until landing is assured, then slow to 66 KIAS until the roundout.
10. Make the stabilized approach vs. go-around decision no lower than 200' AGL.

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.

Normal Visual Approach & 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.

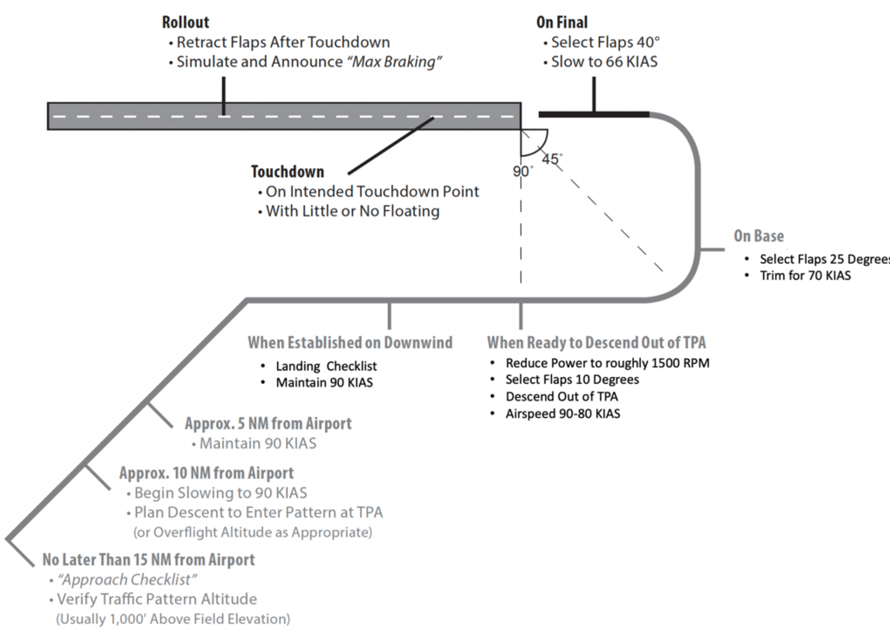
Short-Field Approach & Landing

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

8. Select flaps 40° and slow to 66 KIAS on final when landing is assured.
9. Make the stabilized approach vs. go-around decision no lower than 200' AGL.
10. Close throttle slowly during flare – touch down on intended touchdown point with little or no floating.
11. Prevent nosewheel from slamming onto the runway.
12. Retract the flaps after touchdown.
13. Simulate and announce *"Heavy Braking"* for training and checkride purposes (while applying braking as required)

TECHNIQUE: Fly proper speed and maintain some power for roundout, close throttle in flare.

Short-Field Approach & Landing Profile

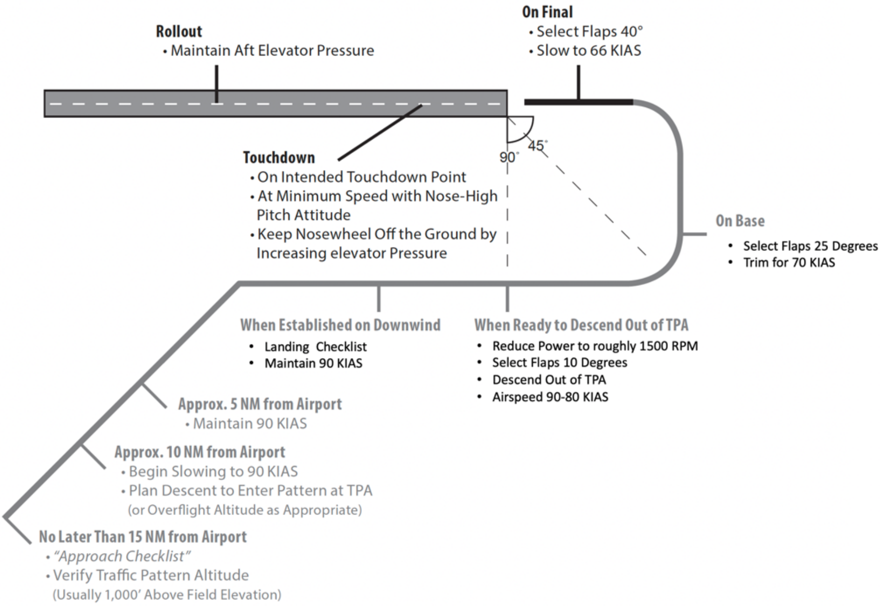


Soft-Field Approach & Landing

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

8. Select flaps FULL and slow to 66 KIAS on final when landing is assured.
9. Make the stabilized approach vs. go-around decision no lower than 200' AGL.
10. Upon roundout, slowly close the throttle while maintaining a few feet above the runway surface in ground effect.
11. Smoothly let the airplane settle from ground effect and touch downat minimum controllable airspeed (typically with the stall horn on). This allows for a slow transfer of weight from the wings to the main landing gear.
12. Maintain enough back pressure to keep the nose wheel slightly off the runway. (Excessive back pressure will result in an excessively nose- high attitude, which will cause a tail strike. The objective is to keep theweight off the nose wheel while slowing down.)
13. Continue to increase back pressure through the rollout while applyingminimal braking.

Soft-Field Approach & Landing Profile



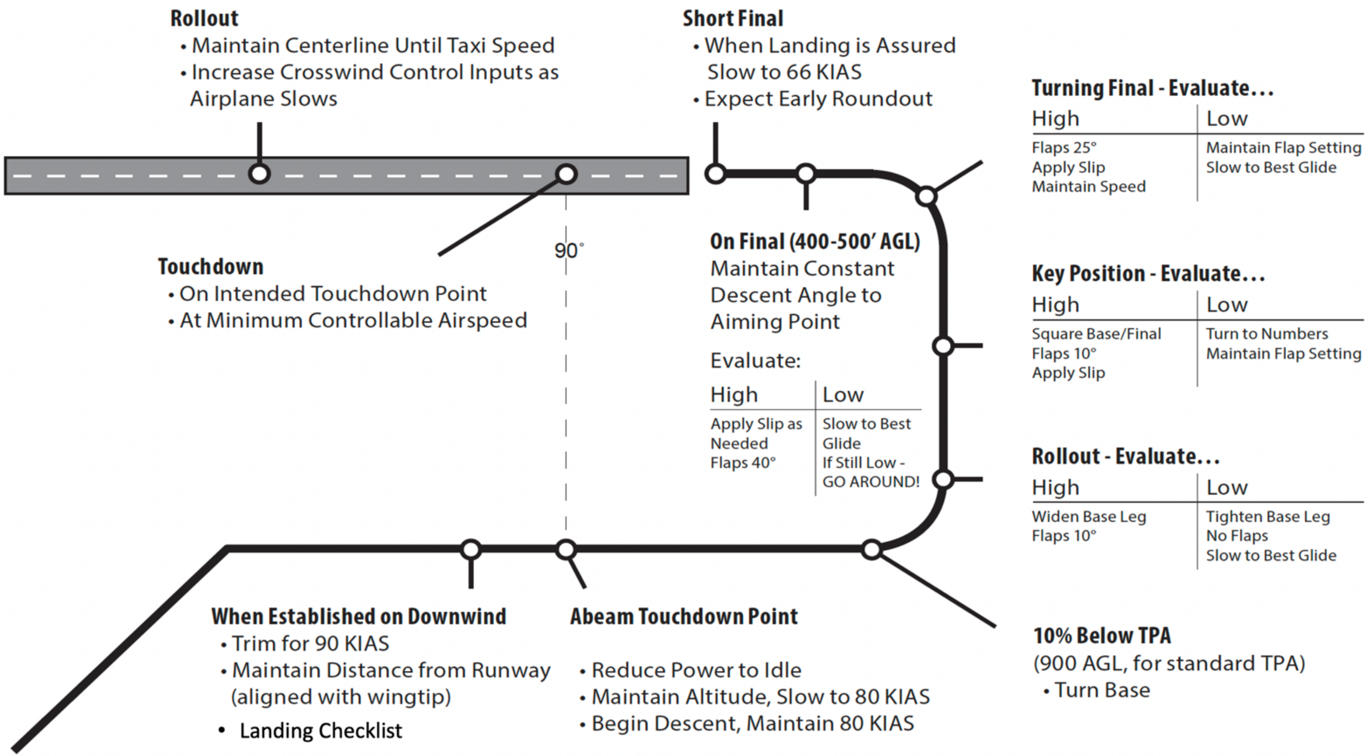
Power-Off 180° Accuracy Approach & Landing

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

5. Fly parallel to the runway, correcting for crosswind, at a distance that aligns the runway with the wingtip.
6. When abeam touchdown point, smoothly reduce power to idle.
7. Maintain altitude while slowing to 80 KIAS, then descend out of TPA.
8. At approximately 10% below TPA (100 feet, for the standard 1,000’ TPA),turn base.
9. Begin evaluating distance from runway and wind conditions. Dissipateenergy by:
   - A. Squaring the base-to-final turn / lengthening the ground track.
   - B. Increasing the flap setting.
   - C. Slipping the aircraft.
10. Aim to be aligned with the runway by around 400’ to 500’ AGL. Stronger headwinds on final will require this to occur closer to therunway.
11. On final, maintain a constant descent angle (which will be steeper thanfor a power-on approach) to the aiming point, and an appropriate speed based on the flap setting:
    - A. 0°: 80 KIAS.
    - B. 10° to 40°: 75 KIAS.
12. When landing is assured, slow to 66 KIAS until 10’ to 20’ above therunway.
    - A. Because the descent rate is higher than with power, begin theroundout slightly earlier to avoid hard landings.

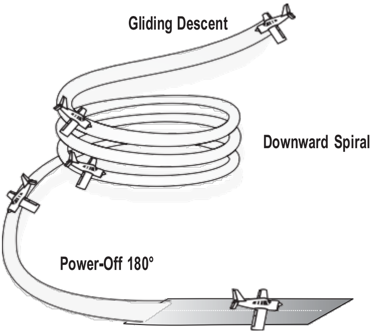
TIP: A slip can be increased or reduced throughout the approach to fine-tune the descent rate. By contrast, retracting flaps after they have been deployed is not recommended, as this often results in high sink rates as the lift the flaps generate is lost. When slipping, use aileron into the crosswind (if present), and monitor/maintain the desired airspeed.

TIP: The aiming point and the touchdown point are NOT the same point. Aim about 200’ before the touchdown point to dissipate enough speed for a proper landing.


Rollout
• Maintain Centerline Until Taxi Speed
• Increase Crosswind Control Inputs as Airplane Slows
Short Final
• When Landing is Assured Slow to 66 KIAS
• Expect Early Roundout
Turning Final - Evaluate...
High | Low
Flaps 25° Apply Slip Maintain Speed | Maintain Flap Setting Slow to Best Glide
Touchdown
• On Intended Touchdown Point
• At Minimum Controllable Airspeed
90°
On Final (400-500′ AGL)
Maintain Constant Descent Angle to Aiming Point
Evaluate:
High | Low
Apply Slip as Needed Flaps 40° | Slow to Best Glide If Still Low - GO AROUND!
Key Position - Evaluate...
High | Low
Square Base/Final Flaps 10° Apply Slip | Turn to Numbers Maintain Flap Setting
Rollout - Evaluate...
High | Low
Widen Base Leg Flaps 10° | Tighten Base Leg No Flaps Slow to Best Glide
When Established on Downwind
• Trim for 90 KIAS
• Maintain Distance from Runway (aligned with wingtip)
• Landing Checklist
Abeam Touchdown Point
• Reduce Power to Idle
• Maintain Altitude, Slow to 80 KIAS
• Begin Descent, Maintain 80 KIAS
10% Below TPA
(900 AGL, for standard TPA)
• Turn Base

Emergency Approach & Landing (Simulated)

1. Reduce power to idle.
2. Pitch for and then trim to maintain best glide speed (76 KIAS)
3. Select an appropriate emergency landing site.
4. Begin flying directly towards landing site.
5. Complete Engine Power Loss In-Flight checklist.
6. Evaluate glide performance to confirm landing site can be reached.
7. Upon reaching landing site, spiraldownwards at best glide.
8. Evaluate wind direction to determine best direction ofapproach.
9. Roll out of spiral heading downwind, abeam "midfield," atapproximately 1,500' AGL.
10. Pass abeam intended touchdown point at approximately 1,000' AGL.



11. Execute Power-Off 180° Accuracy Approach and Landing procedure aspreviously described.
12. Simulate the "When Committed to Landing" items on the Power-OffLanding checklist.
13. If landing site is not an airport, or does not meet requirements, add power and break off the approach no lower than 500' AGL.

TIP: Keep the engine warm and cleared by occasionally advancing the throttle. If the simulated emergency approach will be taken to a landing on a runway, ensure that either the instructor or the student has complete control of the throttle during the landing, should a go-around become necessary.

Crosswind Approach & 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.

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

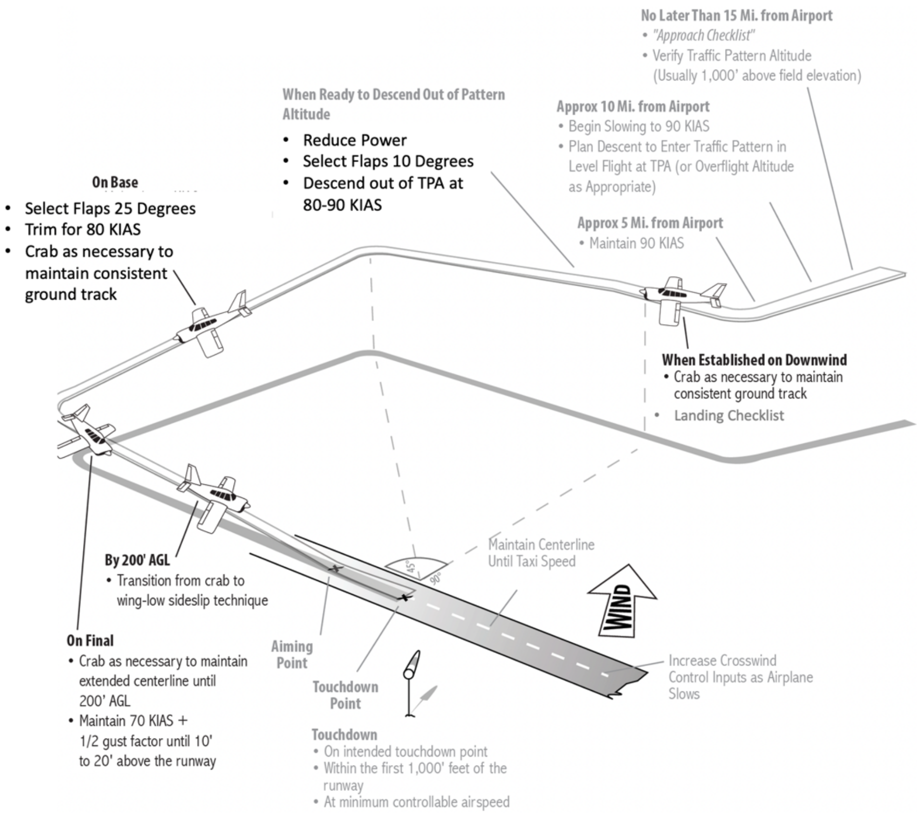
Establish a crab angle to maintain the proper ground track on final, then transition to the wing-low sideslip technique by no later than 200' AGL. Maintain the wing-low technique until touchdown and throughout the landing roll. After landing, increase aileron input into the wind as the airplane slows to prevent the upwind wing 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 PA-28 is 17 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 thebase turn early to remain the correct distance from the runway.

Crosswind Approach & 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 Procedure

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

- Unstable approach path or airspeed.
- Improper runway alignment.
- Unexpected hazards on the runway or on final.
- Excessive floating past the touchdown point.
- Ballooning or bouncing.
- 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 bemade 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. Throttle – full power.
2. Reversal of Trend on Instruments, Retract Flaps One Notch
3. Increase pitch to establish climb at V_X or V_Y as appropriate
4. Retract Flaps and additional notch.
5. Retract final flaps slowly when above V_X and clear of obstacles.
6. *“After Takeoff Checklist”* at pattern altitude or out of 1,000' AGL.

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 VX or VY 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. Throttle – full power.
2. Reversal of Trend on Instruments, Retract Flaps One Notch
3. Increase pitch to establish climb at V_X or V_Y as appropriate
4. Retract Flaps and additional notch.
5. Retract final flaps slowly when above V_X and clear of obstacles.
6. *"After Takeoff Checklist"* at pattern altitude or out of 1,000' AGL.

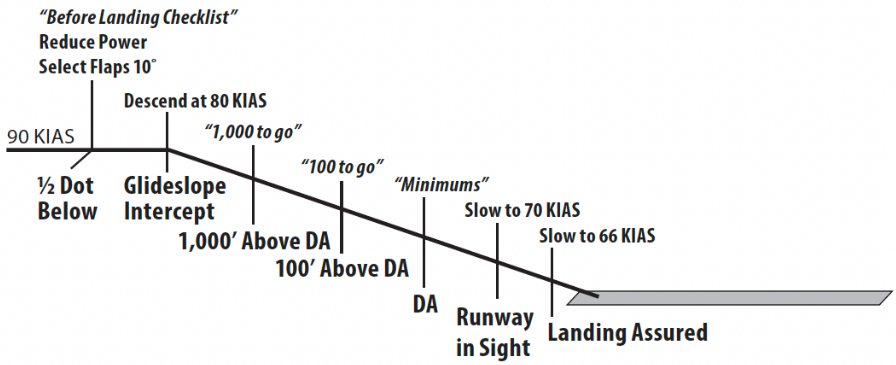
"After Takeoff Checklist" at pattern altitude or out of 1,000' AGL.If the rejected landing is due to conflicting traffic, maneuver as necessary during the climb to clear and avoid conflicting traffic (usually to the side, flying parallel to the runway).

Precision Approach (ILS Approach or RNAV Approach to LPV Minimums)

Innovative Aviation recommends setting flaps 10° at glideslope intercept for ILS precisionapproaches. Flaps 10° allows for a stabilized approach to touchdown.

1. Complete the *"Approach Checklist"* and identify the localizer as early as possible.
2. Slow to 90 KIAS on vectors or when on final approach course inbound.
3. Announce *"Localizer Alive"* when localizer begins moving towards thecenter.
4. Announce *"Glideslope Alive"* when glideslope begins moving towardsthe center.
5. Verify no flags at glideslope intercept altitude and marker.
6. ½ dot below glideslope intercept: Slow to 80 KIAS and select flaps 10° (V_{FE} = 102 KIAS), *"Before Landing Checklist."*
7. Intercepting glideslope: Reduce power to approx. 1500 RPM.
8. Descend on glideslope at 80 KIAS.
9. Announce at 1,000' above DA: *"1,000 to go."*
10. Announce at 100' above DA: *"Approaching Minimums."*
11. *"Minimums."*
12. If runway is in sight: descend and slow to 70 KIAS.
13. On short final, slow to 66 KIAS until the roundout.

ILS Approach & Landing Profile



Non-Precision Approach (VOR, LOC Approach; RNAV Approach to LNAV Minimums)

1. Load approach into the GPS, and select appropriate nav source, and frequency if required.

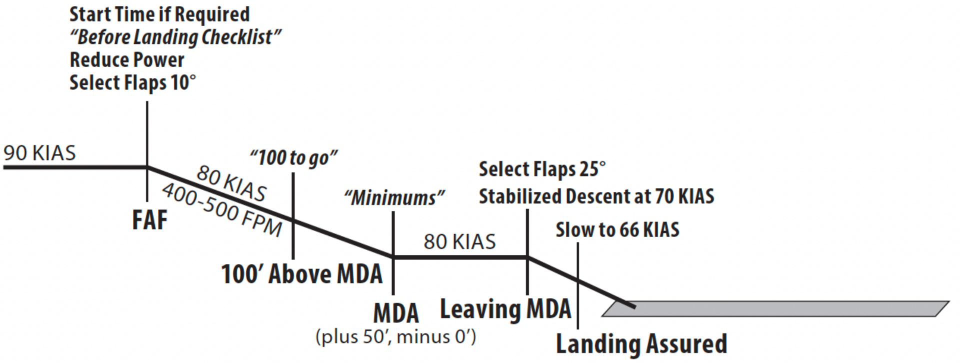
Within 30 NM of the airport, if flying an RNAV approach, the GPS will display "TERM."

2. When direct to the IAF or on vectors, set the desired course on the HSI.
3. Complete the *"Approach Checklist."*
4. Slow to 90 KIAS when on a published segment of the approach or if on vectors.

At 2 NM prior to the FAF, on an RNAV approach, verify the GPS has switched to an Approach mode. If it does not, DO NOT DESCEND at the FAF.

5. At FAF, complete *"Before Landing Checklist."* Slow to 80 KIAS and select flaps 10° (V_{FE} = 102 KIAS). Start time if required.
6. Descend at 400-500 FPM (unless steeper descent required) at 80 KIAS.
7. Announce at 100' above MDA: *"Approaching Minimums."*
8. Increase power 50' prior to reaching MDA to maintain 80 KIAS at level off.
9. *"Minimums."*
10. Maintain MDA (plus 50', minus 0').
11. Descend at predetermined VDP (if runway is in sight), or maintain MDA to MAP.
12. Do not leave MDA until landing can be accomplished using a stabilized descent angle and normal maneuvers.
13. When descending from MDA: set Flaps 25° (only select flaps 25° once established in a descent to prevent ballooning above MDA), slow to 70 KIAS.
14. On short final, slow to 66 KIAS until the roundout.

Non-Precision Approach & Landing Profile



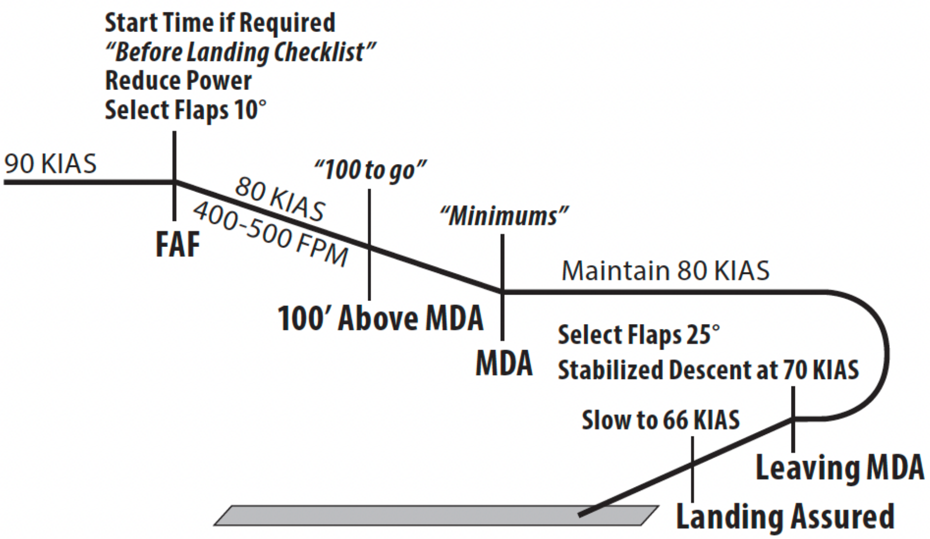
Circling Approach

When conducting a circling approach (precision or non-precision), fly the normal approach profile to the published circling minimums.

Maintain circling minimums at 80 KIAS, within 1.3 NM of the runway (the Category A circling radius), until in a position from which a normal landing may be made. Circling minimums are usually lower than traffic pattern altitude, so the descent will begin closer to the runway than in a standard traffic pattern.

When descending from MDA (circling minimums), select flaps 25° and slow to 70 KIAS. On short final, slow to 66 KIAS until 10' to 20' above the runway.

Circling Approach Profile



Holding

1. Slow to 90 KIAS holding speed 3 minutes prior to fix
2. Make proper entry
3. Report altitude and time at holding fix
4. Hold at 90 KIAS, with 1 minute leg to the inbound fix (unless otherwise specified)

In-Flight Maneuvers

Required maneuvers for the Private Pilot and Commercial Pilot Single-Engine checkride are performed the same with two exceptions:

- Commercial steep turns are accomplished with at least 50° of bank. Private steep turns are performed at 45° of bank.
- Stall recovery at the commercial level is performed either at the first indication of an impending stall or after a full stall has occurred, as specified by the evaluator. Private stalls must be continued to a full stall.

Commercial Pilot Single Engine completion standards allow for lower tolerances than Private Pilot standards on maneuvers. Refer to the ACS.

Clean Configuration Flow

1. Fuel selector – Managed
2. Electric fuel pump – on
3. Mixture – Full Rich
4. Flaps 0°

Landing Configuration Flow

1. Fuel selector – Managed
2. Electric fuel pump – on
3. Mixture – Full Rich
4. Flaps 40

PVT COM Steep Turns

Steep turns consist of two coordinated 360° turns, one in each direction, using a bank angle of 45-50°. They develop the pilot's skill in smooth and coordinated use of the flight controls, awareness of the airplane's orientation relative to outside references, and division of attention. Complete steep turns no lower than 1,500' AGL. Use a similar roll rate when rolling into and out of both turns.

1. Perform two 90° clearing turns
2. 100 KIAS (approx. 2300 RPM), maintain altitude
3. Cruise checklist
4. Perform a 360° turn with 45° (PVT) or 50° (COM) of bank
5. Maintain altitude and airspeed (add back pressure, add approx. 1-200 RPM)
6. Roll out ½ bank angle prior to entry heading
7. Look for traffic, then perform a 360° turn with 45° (PVT) or 50° (COM) of bank in the opposite direction
8. Roll out ½ bank angle prior to entry heading
9. *"Cruise Checklist."*

ACS	Airspeed	Altitude	Bank	Heading
	±10 KIAS	±100'	45° ±5° (PVT) 50° ±5° (COM)	±10°

PVT COM Maneuvering During Slow Flight

Maneuvering during slow flight consists of flight (straight-and-level, climbs, turns, and descents) at an angle of attack just below that which will cause an aerodynamic buffet or stall warning. It teaches the pilot to understand the airplane's flight characteristics and flight control feel at high AOA and low airspeed.

Complete the slow flight maneuver no lower than 1,500' AGL. During slow flight, establish and maintain an airspeed at which any further increase in angle of attack, increase in load factor, or reduction in power would result in a stall warning (e.g., airplane buffet, stall horn, etc.).

1. Perform two 90° clearing turns
2. 1500 RPM (maintain altitude)
3. Landing configuration flow
4. Maintain altitude – slow to just above stall warning activation (approximately 50-55 KIAS).
5. Power as required to maintain airspeed and altitude
6. Accomplish level flight, climbs, turns, and descents as required without activating a stall warning
   (Max 30° bank)
7. Recover – max power/maintain altitude/reduce flaps to 0°
8. Accelerate to 64 KIAS (V_X)
9. *"Cruise Checklist."*

ACS	Airspeed	Altitude	Bank	Heading
	+10/-0 KIAS (PVT) +5/-0 KIAS (COM)	±100' (PVT) ±50' (COM)	±10° (PVT) ±5° (COM)	±10°

PVT COM Power-Off Stall

The power-off stall consists of a stall from a stabilized descent in the landing configuration with the throttle at idle, simulating a stall during an approach to landing. It develops the pilot's ability to recognize and recover from an inadvertent stall in this phase of flight. Begin the power-off stall at an altitude that allows stall recovery to be completed no lower than 1,500' AGL.

1. Perform two 90° clearing turns
2. Approx. 1500 RPM (maintain altitude)
3. Landing configuration flow
4. Stabilized descent at 66 KIAS
5. Throttle idle (slowly)
6. Wings level or up to 20° bank as assigned
7. Raise nose to an attitude that induces a stall, and acknowledge cues of the impending stall
8. At full stall/first indication of impending stall (as required) recover – reduce AOA, level wings, apply max power
9. Slowly retract flaps to 10°
10. Increase pitch to arrest descent
11. Establish V_X or V_Y as appropriate
12. Retract flaps to 0° when accelerating through V_X
13. Return to specified altitude, heading, and airspeed.
14. *"Cruise Checklist."*

ACS	**Bank**	**Heading**
	±10° (PVT) ±5° (COM) *Not to exceed 20°*	±10°

PVT COM Power-On Stall

The power-on stall consists of a stall from a climb in the takeoff configuration with the throttle at full power, simulating a stall during a departure climb or go-around. It develops the pilot's ability to recognize and recover from an inadvertent stall in this phase of flight. Begin the power-on stall at an altitude that allows stall recovery to be completed no lower than 1,500' AGL.

1. Perform two 90° clearing turns
2. Approx. 1500 RPM (maintain altitude)
3. Clean configuration flow
4. At 70 KIAS, simultaneously increase pitch ***(slowly)*** and apply full power.
5. Slowly increase pitch to induce stall, and acknowledge cues of the impending stall
6. At full stall/first indication of impending stall (as required) recover – reduce AOA, level wings, apply max power
7. Return to specified altitude, heading, and airspeed
8. *"Cruise Checklist."*

ACS	***Bank***	***Heading***
	±10° *Not to exceed 20°*	±10°

PVT COM Emergency Descent

The emergency descent consists of a high-drag, high-airspeed, idle-power descent. It teaches the pilot how to descend rapidly and safely in emergency situations requiring an immediate landing. Pilots must maintain situational awareness, appropriate division of attention, and positive load factors throughout the descent.

1. Perform two 90° clearing turns
2. Clean configuration flow
3. Reduce throttle to idle
4. Initiate turning descent (bank angle 30°-45°), while clearing for traffic
5. Maintain 120 KIAS (in training - actual emergencies may require acceleration to V_{NO} or V_{NE}, as appropriate)
6. Notify ATC/Traffic as appropriate

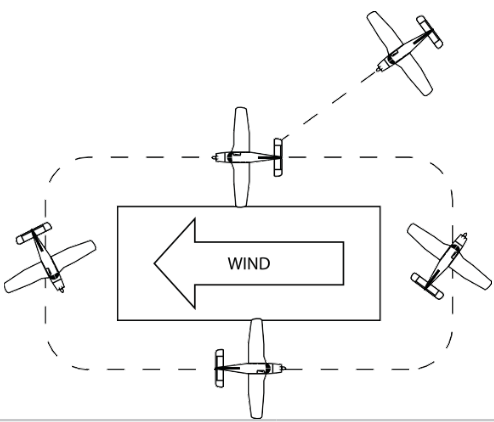
ACS	Airspeed	Altitude
	+0/-10 KIAS	±100'

NOTE: Emergency descents are often performed in response to a specific emergency (actual or simulated), such as smoke/fire, acute passenger illness, etc. In addition to the maneuver, be sure to complete the appropriate checklist for the emergency situation.

PVT Rectangular Course

The rectangular course consists of a pattern around a rectangular ground reference that maintains an equal distance from all sides of the reference. It develops the pilot's ability to maintain a specified ground track by applying wind drift correction in straight and turning flight. The maneuver also trains the pilot to correctly divide their attention between flightpath, ground references, control inputs, outside hazards, and instrument indications. Additionally, it prepares the pilot to fly accurate airport traffic patterns. Fly the rectangular course at an altitude between 600' AGL and 1,000' AGL.

1. Perform two 90° clearing turns
2. Select a suitable ground reference area
3. 90 KIAS (approx. 2000 RPM), maintain selected altitude
4. Clean configuration flow
5. Enter at a 45° angle to the downwind leg (right or left traffic)
6. Apply adequate wind-drift correction during straight and turning flight to maintain a constant ground track around a rectangular pattern. Remain 1/2 to 3/4 of a mile from the boundary of the reference area.
7. Maintain altitude and airspeed
8. Recover when re-established on downwind
9. *"Cruise Checklist."*

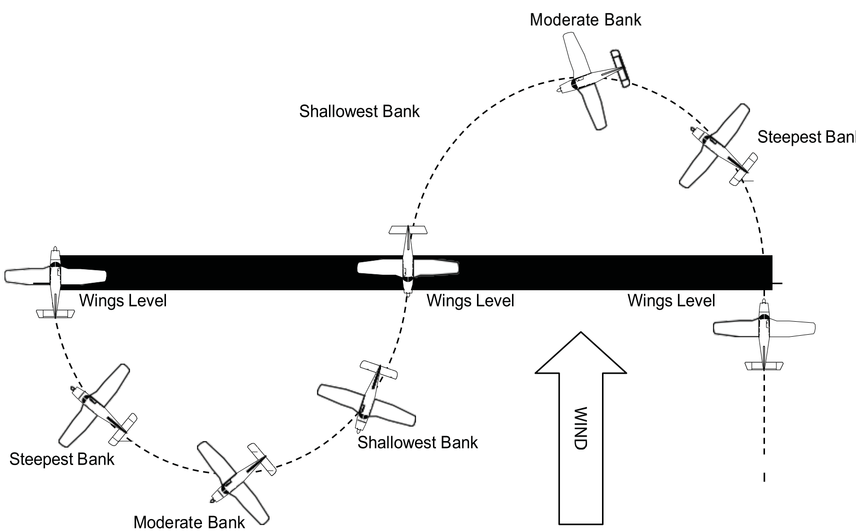


ACS	Airspeed	Altitude
	±10 KIAS	±100'

PVT S-Turns

S-turns consist of two half-circle turns, one in each direction, on either side of a straight-line ground reference. It develops the pilot's ability to apply wind-drift correction to fly constant-radius turns. The maneuver also trains the pilot to correctly divide their attention between flightpath, ground references, control inputs, outside hazards, and instrument indications. S-turns are flown at an altitude between 600' AGL and 1,000' AGL.

1. Perform two 90° clearing turns
2. Select a suitable ground-based reference line
3. 90 KIAS (approx. 2000 RPM), maintain selected altitude
4. Clean configuration flow
5. Enter on the downwind
6. Adjust bank angle throughout the turn to fly a constant radius turn
7. Maintain altitude and airspeed
8. Wings level crossing over reference line
9. Repeat in opposite direction
10. Recover once across the reference line again
11. *"Cruise Checklist."*

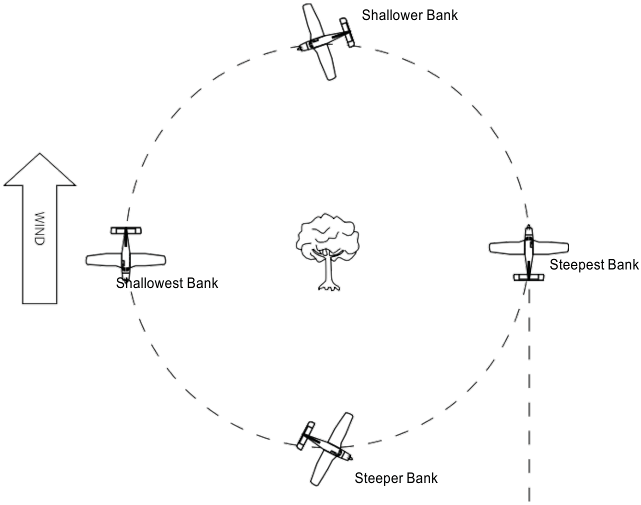


ACS	Airspeed	Altitude
	±10 KIAS	±100'

PVT | Turns Around A Point

Turns around a point consists of a 360° constant radius turn around a ground-based reference point. It develops the pilot's ability to apply wind-drift correction to fly a constant-radius turn, with the wind direction changing throughout the maneuver. The maneuver also trains the pilot to correctly divide their attention between flightpath, ground references, control inputs, outside hazards, and instrument indications. Turns around a point are flown at an altitude between 600' AGL and 1,000' AGL.

1. Perform two 90° clearing turns
2. Select a suitable ground-based reference point
3. 90 KIAS (approx. 2000 RPM), maintain selected altitude
4. Clean configuration flow
5. Enter on the downwind
6. Adjust bank angle to maintain a constant radius turn around chosen point
7. Maintain altitude and airspeed
8. Recover once 360° turn is complete
9. *"Cruise Checklist."*



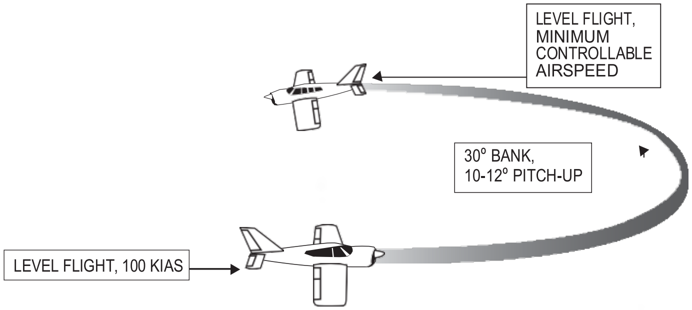
COM — Chandelles

Chandelles consist of a maximum performance, 180° climbing turn in which the pilot gains as much altitude as possible while reversing course, ending with the aircraft traveling just above stall speed. It develops the pilot's advanced airmanship skills, combining a precise, coordinated turn with a demonstration of energy management principles. Enter the chandelle no lower than 1,500' AGL.

1. Perform two 90° clearing turns
2. 100 KIAS (approx. 2300 RPM), maintain altitude
3. Clean configuration flow
4. Choose a reference point off wing
5. Establish / maintain 30° bank
6. Full throttle – gradually 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, gradually reduce bank angle to attain wings-level 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. Momentarily maintain an airspeed just above a stall
10. Accelerate to resume straight-and-level flight with minimum loss of altitude
11. *"Cruise Checklist."*



ACS

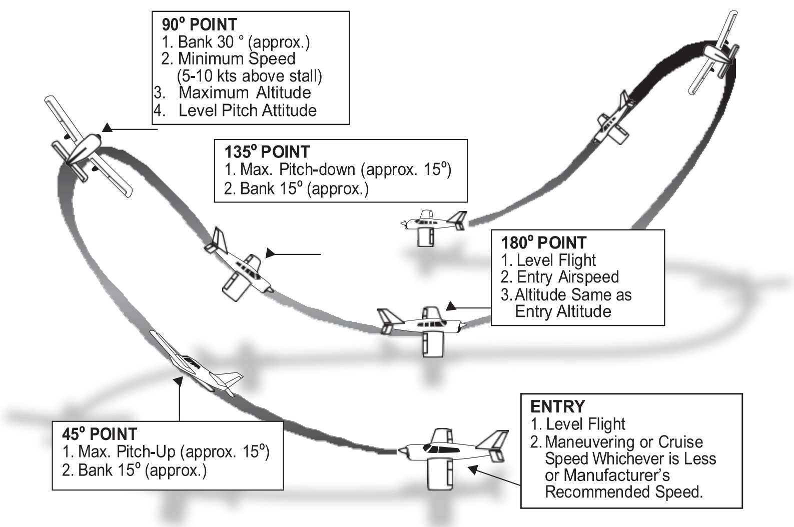
Airspeed	**Heading**
Just above stall	Rollout at 180° point ±10°

COM

Lazy Eights

Lazy eights consist of a pair of 180° turns where, during the first 90°, the pilot climbs while increasing bank angle, and during the second 90°, the pilot descends while decreasing bank angle. It is the only standard flight training maneuver in which no flight control pressure is ever held constant. As such, it develops the pilot's ability to maintain proper coordination of the flight controls across a wide range of airspeeds and attitudes. Enter the lazy eight no lower than 1,500' AGL.

1. Perform two 90° clearing turns
2. 100 KIAS (approx. 2300 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, 15° bank
7. Reduce pitch / increase bank
8. 90° point – level pitch, 30° bank - min. speed (5-10 knots above stall)
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."*



ACS

At 180° points:	*Airspeed*	*Altitude*	*Heading*
	±10 KIAS	±100'	±10°

Approx. 30° bank at steepest point

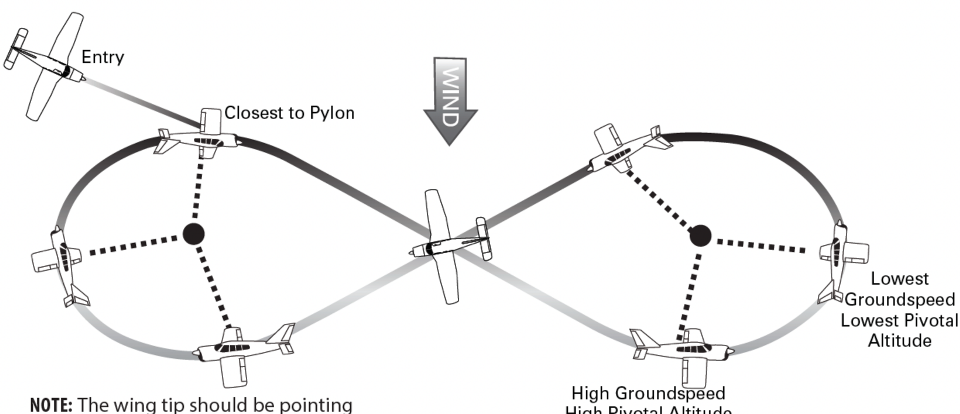
Constant change of pitch and roll rate and airspeed.

COM

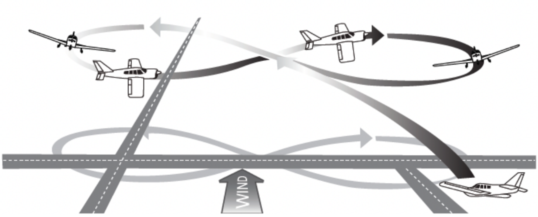
Eights On Pylons

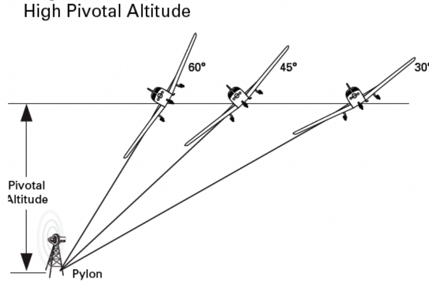
Eights on pylons consist of a figure-eight pattern flown around two ground reference points (or "pylons") such that the line of sight from the pilot's eyes, parallel to the airplane's lateral axis, remains fixed on the pylon. This develops the pilot's ability to maneuver the airplane accurately while dividing attention between the flightpath and the ground reference. To hold the pylon, the airplane must be flown at the pivotal altitude, found by squaring the groundspeed (in knots) and then dividing by 11.3. The pivotal altitude will change throughout the maneuver as groundspeed changes. Maintain a distance from the pylon such that the angle of bank at the steepest point is 30-40°.

1. Enter pivotal altitude (approx. 900’ AGL at 100 KIAS, approx. 2300 RPM)
2. Perform two 90° 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 to maintain line of sight reference with the pylon (pitch forward if point moves toward nose and pitch back if point moves toward tail)
7. Begin rollout to allow the airplane to proceed diagonally between the pylons at a 45° angle
8. Begin second turn in the opposite direction of the first
9. Exit maneuver on entry heading
10. *"Cruise Checklist."*



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

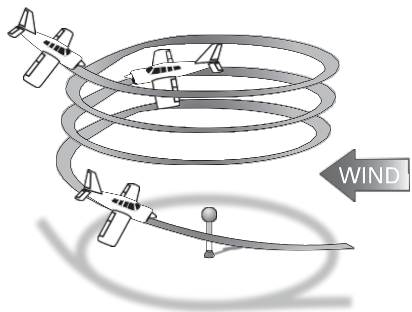




COM Steep Spirals

Steep spirals consist of a series of constant-radius gliding turns around a ground reference point. This trains similar skills as turns around a point, and also provides a way to lose altitude while remaining over a selected spot (as might be necessary in an emergency). Enter the maneuver high enough to execute three 360° turns and complete the maneuver no lower than 1,500' AGL (this will typically be at least 3,000' AGL).

1. Perform two 90° clearing turns
2. 90 KIAS (approx. 1800 RPM), maintain altitude. The AFH states a gliding speed, not best glide
3. Clean configuration flow
4. Choose visual reference point
5. Reduce throttle to idle
6. Track at least three constant radius circles around reference point
7. Airspeed – constant
8. Bank angle – adjust for winds to maintain radius, not to exceed 60°
9. Clear engine once every 360° turn
10. Recover – roll out on specified heading (or visual reference)
11. *"Cruise Checklist."*



ACS	***Airspeed***	***Heading***	***Bank***	***Turns***
	±10 KIAS	Rollout towards specified heading or point±10°	< 60°	3 full

COM Accelerated Stall

The accelerated stall consists of a stall from a steep turn. It allows the pilot to determine the stall characteristics of the airplane, experience stalls at speeds greater than the +1G stall speed, and develop the ability to instinctively recover at the onset of such stalls. Begin the accelerated stall at an altitude that allows stall recovery to be completed no lower than 3,000' AGL.

1. Perform two 90° clearing turns
2. Slow to approximately 80 KIAS (during clearing turns)
3. Clean configuration flow
4. Establish a coordinated 45° bank turn
5. Slowly reduce power to idle
6. Increase elevator back pressure to maintain altitude and induce stall
7. Recover at the first indication of an impending stall (e.g., aircraft buffet, stall horn, etc.)
8. Reduce AOA, level wings, and set max power
9. Return to specified altitude, heading, and airspeed.
10. *“Cruise Checklist.”*

CFI | Secondary Stall (Power-On)

The secondary stall demonstration consists of two stalls performed in sequence. The pilot first stalls the airplane (power-on or power-off); then, during stall recovery, they attempt to raise the nose too quickly, causing a second stall. This demonstrates the importance of proper stall recovery technique that focuses on reducing AOA and regaining flying speed, rather than minimizing altitude loss. Begin the secondary stall at an altitude that allows stall recovery to be completed no lower than 3,000' AGL.

1. Perform two 90° clearing turns
2. 1500 RPM (maintain altitude)
3. Clean configuration flow
4. At 70 KIAS, simultaneously increase pitch (slowly) and apply full power
5. Increase pitch attitude to induce stall
6. At stall, recover – reduce AOA, level wings, and apply max power
7. When stall warning silences, increase pitch to induce a secondary stall
8. At stall, recover – simultaneously reduce AOA, level wings, and apply max power
9. *"Cruise Checklist."*

CFI — Secondary Stall (Power-Off)

1. Perform two 90° clearing turns
2. 1500 RPM (maintain altitude)
3. Landing configuration flow
4. Stabilized descent at 66 KIAS
5. Throttle idle (slowly)
6. Maintain altitude to induce stall
7. At stall, recover – reduce AOA and level wings (do not add power)
8. When stall horn silences, increase pitch to induce a secondary stall
9. At stall, recover – reduce AOA, level wings, and apply max power
10. Slowly retract flaps to 10°
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."*

CFI Elevator Trim Stall

The elevator trim stall is a power-on stall induced by trimming the aircraft nose-up for a low-airspeed descent, then applying full power without retrimming or applying nose-down elevator. It demonstrates what can occur if the pilot fails to maintain positive aircraft control during a go-around. Begin the elevator trim stall at an altitude that allows stall recovery to be completed no lower than 3,000' AGL.

1. Perform two 90° clearing turns
2. 1500 RPM (maintain altitude)
3. Landing configuration flow
4. Trim for stabilized descent at 66 KIAS
5. Apply full power (slowly)
6. Allow the nose to rise and turn left
7. When stall is approaching (high AOA) recover – reduce AOA, level wings, apply max power
8. Slowly retract flaps to 10°
9. Eliminate stall warning, then return to normal climb attitude
10. Adjust trim while accelerating to V_Y
11. Retract flaps to 0° when accelerating through V_X
12. *"Cruise Checklist."*

CFI — Cross-Control Stall

The cross-control stall is a stall entered with the aircraft in a skidding, uncoordinated condition. It demonstrates the effects of uncoordinated flight on stall behavior and emphasizes the importance of maintaining coordinated flight while making turns. In particular, it shows the potential outcome of a poorly executed base-to-final turn in which the pilot attempts to tighten a turn by applying excessive rudder. Begin the cross-control stall at an altitude that allows recovery to be completed no lower than 3,000' AGL.

1. Perform two 90° clearing turns
2. 1500 RPM (maintain altitude)
3. Clean configuration flow
4. Stabilized descent at 66 KIAS
5. Establish a 30˚ banked turn
6. Smoothly apply excessive rudder pressure in the direction of the turn
7. As rudder pressure increases, opposite aileron will be necessary to maintain constant bank angle
8. Increase aft elevator pressure
9. At first indication of stall, recover – reduce AOA, remove excessive rudder input, level the wings, and apply max power
10. *“Cruise Checklist.”*

CAUTION: Cross-control stalls can lead to loss of control or spins. Recover at the first indication of the stall, and review spin recovery procedures.

Checklists

PREFLIGHT CHECKLISTS

Cabin

Airworthiness Certificate .... On Board
Registration Certificate .... On Board
Operating Limitation Placards .... Legible
Approved Flight Manual ....Available
Avionics POH .... Available
Weight & Balance Document .... On Board
Parking Brake ....Set
Tach / Hobbs ....Record
Battery Master .... On
Fuel Quantity ....Note
Beacon .... On, Check, Off
Position Lights .... On, Check, Off
Strobes .... On, Check, Off
Battery Master .... Off
Flaps .... Full
Rudder Trim ....Neutral
Elevator Trim ....Neutral

Right Wing

Flaps & Hinges ………………………………………………. Check
Aileron & Hinges ……………………………………………. Check
Wing Surface …………………………………………………. Check
Wing Tip & Lights ………………………………………….. Secure
Fuel Tank ……………………………………………………… Visual Quantity
Fuel Vent ……………………………………………………….Unobstructed
Fuel Drain(s) ………………………………………………….. Drain & Check
Landing Gear Strut …………………………………………. Check
Wheel & Strut Fairing ……………………………………… Check
Tire ………………………………………………………………. 24 PSI
Brake & Brake Line ………………………………………... Check
Chocks & Tiedown …………………………………………. Remove
Cabin Air Inlet ……………………………………………….. Unobstructed

Nose

Strut & Wheel Fairing …………………………………….. Check
Tire ……………………………………………………………….. 18 PSI
Tow Bar …………………………………………………………. Stow
Chocks ………………………………………………………….. Removed
Exhaust Pipes ………………………………………………… Check
Propellor & Spinner ………………………………………... Check
Air Inlets ………………………………………………………... Unobstructed
Alternator Belt ………………………………………………… Check
Landing Light ………………………………………………….. Check
Engine ……………………………………………………………. Check
Oil Level …………………………………………………………. 6-8Qts (2 Qts min)
Gascolator ……………………………………………………... Drain & Check
Cowling ………………………………………………………….. Secure
Windshield ……………………………………………………... Clean

Left Wing

Cabin Air Inlet .... Unobstructed
Wing Surface .... Check
Fuel Tank .... Visual Quantity
Fuel Vent ....Unobstructed
Fuel Drain(s) .... Drain & Check
Landing Gear Strut .... Check
Wheel & Strut Fairing .... Check
Tire .... 24 PSI
Brake & Brake Line .... Check
Chocks & Tiedown .... Remove
Stall Warning .... Check
Wing Tip & Lights .... Secure
Pitot-Static Tube .... Unobstructed
Aileron & Hinges .... Check
Flaps & Hinges .... Check

Fuselage

Skin & Antennas .... Check
Side & Rear Windows .... Check
Vertical Stabilizer & Rudder .... Check
Stabilator & Trim Tab .... Check
Tail Skid .... Check
Tiedown .... Remove
Baggage Door .... Closed

ENGINE START CHECKLISTS

Before Start

Preflight .... Complete
Weight & Balance .... Within Limits
Passengers .... Briefed
Baggage .... Secure
Flaps .... Retracted
Avionics .... Off
Electrical Equipment .... Off
Carburetor Heat .... Off
Primer .... Locked

Engine Start - Normal

Parking Break .... Set
Fuel Selector .... Fullest Tank
Prime .... As Required
BAT / ALT Master .... On
Beacon .... On
Mixture .... Full Rich
Fuel Pump .... On, Verify .5 PSI
Fuel Pump .... Off
Throttle .... ¼ Inch Open
Propeller Area .... Clear
Magnetos .... Start
Throttle .... 1000 RPM
Oil Pressure .... Check
Fuel Pressure .... Check
Avionics .... On
Ammeter .... Check
Heading Indicator .... Set
GPS .... Dates, Flags, Set
Radios .... Set
Weather .... Obtain

Before Taxi Checklist

Airport Diagram ……………………….…… Out / Available
Taxi Clearance / Route…..………..…… Obtain / Brief
Lights ……………....................…… As Required*
Taxi Area ……………….............…… Clear
Transponder ……………………………… Altitude; Code
ADS-B ………………………………..… Verify On

*Turn off your taxi or landing lights when stopped, yielding, or as a consideration to other pilots, drivers or ground personnel. Turn on ALL lights when crossing runways or have been cleared for departure.

Taxi Checklist

Parking Brake ……………………….……. Release
Brakes / Steering ………………….……. Check
Flight Instruments (TC) …………………… Check

RunUp Checklist

Parking Break ……………………………….…….. Set
Seat ……………………………………………. Secure in Tracks
Seat Belts & Harnesses ……………….…. On
Flight Controls ………………………….……. Free & Correct
Pitch Trim ……………………………………. Neutral
Rudder Trim …………………………………. Neutral
Mixture …………………………….………. Full Rich
Throttle ………………………………………. 2000 RPM
Carburetor Heat ………………………...…. Check
Magnetos ……………………………………. Left, Both, Right, Both
Oil Temperature & Pressure …………….. Check
Engine Instruments ……………………….. Check
Panel Warning Lights …………………………Test
Vacuum …………………………………….. 5.0 Inches Hg (+/- .1)
Ammeter ……………………………………. Check with Load
Idle Check ……………………………………. Throttle to Idle
Throttle ………………………………………... 1000 RPM
Flaps ……………………………………………. Cycle Flaps: 10, 25, 40
Avionics / Radios / GPS…………………..… Set

Before Takeoff Checklist

Takeoff & Departure Briefing …………………Briefed
Emergencies / Abnormalities ………………..Briefed
Flaps …………………………………………. As Required
Transponder ………………………………… Altitude; Code
Fuel Selector ………………………………… Managed
Fuel Pump …………………………………… On
Mixture …………………………………………Full Rich
Carburetor Heat ……………………………… Off
Door & Window ………………………………Closed & Latched
Vent Fan / Air Conditioner ………………….. Off
Lights ……………………………………………As Required
Time ……………………………………………Note
Parking Brake …………………………………Release

After Take Off Checklist

Airspeed ……………………..………… As Required
Flaps ………………………………..……… Up
Throttle ………………..…..………….…… Full
Mixture …………………..…...............…. Full Rich Below 3000' MSL

Approach Checklist

ATIS / AWOS …………………….……….. Obtain
Approach Briefing ……………………… Complete
Altimeter ………………………………….. Set
Heading Indicator to Compass ………... Set
Fuel Selector ……………………………. Managed
Lights ……………………………………. On

Landing Checklist

Fuel Selector …………………………….. Managed
Fuel Pump ………………………………. On
Landing Light …………………………… On
Mixture ……………………………….….... Full Rich
Carburetor Heat ………………………… Check
Seat Belts ………………………………. Latched / Secure

Review Questions

1. Recite the v-speeds.
2. What is the maximum demonstrated crosswind component?
3. Describe the PA-28-181 engine.
   A. How many cylinders?
   B. Who is the manufacturer?
   C. What is the horsepower rating?
   D. Does it have fuel injectors or a carburetor?
   E. Is the engine turbo-charged or normally aspirated?
   F. How are the cylinders arranged?
   G. How is ignition provided?
   H. What are the minimum and maximum oil capacities?

4. Describe the propeller system.
   A. Who makes the propellers?
   B. How is propeller RPM adjusted?
   C. Define fixed pitch.
5. Describe the electrical system.
6. What are the indications of a failed alternator?
7. Will the engine continue to run with the alternator and battery master switches turned off?
8. Describe the stall warning system.
9. Describe the fuel system
10. Explain how to change fuel tanks in cruise flight.
11. Describe the landing gear system.
    A. How is steering accomplished on the ground?
    B. What is the range of travel on the nose wheel?

12. What type of braking system is used by the Archer? Where is the brake fluid reservoir?
13. What type of flaps does the Archer have?
    A. What are the flap settings on the Archer?
14. What are the maximum taxi, takeoff, and landing weights?
15. What is the maximum baggage capacity?
16. Define V_X and V_Y.
17. What aircraft equipment checks are required under FAR Part 91?
18. What documents are required to be on the aircraft?
19. Explain lost communications procedures.
20. Explain the pitot-static system.
    A. Does the PA-28 have an alternate static source? If so, how is it activated and what actions are necessary to acquire the most accurate reading?
    B. What instruments are pitot-static?
    C. Where is the pitot-static port located?
21. What is the fuel capacity? How many gallons are unusable?
22. What grade fuel is to be used in the PA-28?
23. How many fuel pumps are on the aircraft?
24. When is the electric fuel pump to be used?
25. What are the various positions on the fuel selector control?
26. In the event of an electrical failure, what pilot actions are necessary to ensure continued operation?

SECTION 8

Appendix Items

Appendix A: ADS-B Operation

Appendix B: Pitot Static Cross Section

Appendix C: Wind Sock Debrief

Appendix A
ADS-B Out Operation

ADS-B turned OFF

ADS-B turned On

Appendix A
ADS-B Out Operation

PIPER AIRCRAFT
PA-28-181
AIRPLANE MAINTENANCE MANUAL

FLIGHT ENVIRONMENTAL DATA / PITOT STATIC

DESCRIPTION AND OPERATION (Refer to Figure 34-1)

The pitot air system consists of a pitot mast on the underside of the left wing with its related plumbing. Impact air pressure entering the pitot is transmitted from the pitot inlet through hose and tubing routed through the wing to airspeed indicator on the instrument panel. A partially or completely blocked pitot head will give erratic or zero instrument reading.

The static air system consists of interconnecte static ports on the underside and aft side of the (pitot) static mast. The ports are connected to airspeed indicator, altimeter, and vertical speed indicator by hose and tubing routed through the wing. An alternate static air source is below instrument panel in front of pitot. The alternate static source is part of the standard system and has a shutoff valve to close the port when not needed. Pitot and static lines are drained through separate drain valves on left lower side of fuselage interior.

Appendix C
Windsock Debriefed