Cessna 150

Training Supplement

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.

Contents

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SECTION 1

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 & Equipment per FAR 91.213

FGA aircraft do not operate under the guidance of a minimum equipment list (MEL). FGA 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.

Section II

DESCRIPTION AND OPERATING DETAILS

The following paragraphs describe the systems and equipment whose function and operation is not obvious when sitting in the airplane. This section also covers in somewhat greater detail some of the items listed in Check List form in Section I that require further explanation.

FUEL SYSTEM.

Fuel is supplied to the engine from two tanks, one in each wing. From these tanks, fuel flows by gravity through a fuel shutoff valve and fuel strainer to the carburetor.

Refer to figure 2-2 for fuel quantity data. For fuel system service information, refer to Lubrication and Servicing Procedures in Section IV.

FUEL STRAINER DRAIN KNOB.

Refer to fuel strainer servicing procedure, Section IV.

FUEL QUANTITY DATA (U.S. GALLONS)

TANKS	USABLE FUEL ALL FLIGHT CONDITIONS	UNUSABLE FUEL	TOTAL FUEL VOLUME
TWO, STANDARD WING (13 GAL. EACH)	22.5	3.5	26.0
TWO, LONG RANGE WING (19 GAL. EACH)	35.0	3.0	38.0

Figure 2-2.

ELECTRICAL SYSTEM.

Electrical energy is supplied by a 14-volt, direct-current system powered by an engine-driven alternator (see figure 2-4). A 12-volt battery is located on the right, forward side of the firewall just inside the cowl access door. Power is supplied through a single bus bar; a master switch controls this power to all circuits, except the engine ignition system, optional clock and optional flight hour recorder (operative only when the engine is operating).

AMMETER.

The ammeter indicates the flow of current, in amperes, from the alternator to the battery or from the battery to the aircraft electrical system. When the engine is operating and the master switch is "ON," the ammeter indicates the charging rate applied to the battery. In the event the alternator is not functioning or the electrical load exceeds the output of the alternator, the ammeter indicates the discharge rate of the battery.

FUSES AND CIRCUIT BREAKERS.

Fuses on the left lower portion of the instrument panel protect the majority of electrical circuits in the airplane. Labeling below each fuse retainer indicates the circuits protected by the fuses. Fuse capacity is shown on each fuse retainer cap. Fuses are removed by pressing the fuse retainers inward and rotating them counterclockwise until they disengage. The faulty fuse may then be lifted out and replaced. Spare fuses are held in a clip on the inside of the map compartment door.

NOTE

A special "SLO-BLO" fuse protects the wing flaps circuit. If this fuse is replaced, care should be taken to assure that the replacement fuse is of the proper type and capacity. A "SLO-BLO" fuse is identified by an integrally mounted spring encircling the fuse element.

Two additional fuses are located adjacent to the battery; one fuse protects the battery contactor closing circuit, and the other fuse protects the optional clock and optional flight hour recorder circuits.

The airplane utilizes three circuit-breakers for circuit protection. A "push-to-reset" circuit breaker (labeled "GEN") is located on the left side of the instrument near the fuses and protects the alternator circuit. The

alternator field and wiring is protected by an automatically resetting circuit breaker mounted behind the left side of the instrument panel. The cigar lighter has a manually reset type circuit breaker mounted directly on the back of the lighter behind the instrument panel.

CONTROL WHEEL MAP LIGHT (OPT).

A map light may be mounted on the bottom of the pilot's control wheel. The light illuminates the lower portion of the cabin just forward of the pilot and is helpful when checking maps and other flight data during night operations. To operate the light, first turn on the "NAV LIGHTS" switch, then adjust the map light's intensity with the knurled rheostat knob located at the bottom of the control wheel.

FLASHING BEACON (OPT).

The flashing beacon should not be used when flying through clouds or overcast; the flashing light reflected from water droplets or particles in the atmosphere, particularly at night, can produce vertigo and loss of orientation.

CABIN HEATING AND VENTILATING SYSTEM.

The temperature and volume of airflow into the cabin can be regulated to any degree desired by manipulation of the push-pull "CABIN HEAT" and "CABIN AIR" knobs.

Heated fresh air and outside air are blended in a cabin manifold just aft of the firewall by adjustment of the heat and air controls; this air is then vented into the cabin from outlets in the cabin manifold near the pilot's and passenger's feet. Windshield defrost air is also supplied by a duct leading from the manifold.

A separate adjustable ventilator near each upper corner of the windshield supplies additional outside air to the pilot and passenger.

PARKING BRAKE SYSTEM.

To set parking brake, pull out on the parking brake knob, apply and release toe pressure to the pedals, and then release the parking brake knob. To release the parking brake, apply and release toe pressure on the pedals while checking to see that the parking brake knob is full in.

Single Garmin GNS430

Enroute

GPS: Moving Map page (Nav 2), orientation set to TRACK UP.

VLOC Button: Selected to appropriate nav source.

Course Guidance: Nav 1 OBS or HSI, CDI Scaling - Auto.

Map Settings

MENU > Restore Defaults? > ENT
MENU Setup Map? > ENT
ORIENTATION Track up ENT
Push To Remove Cursor

CDI Scaling

AUX Chapter Page 3
CDI / Alarms > ENT
Selected CDI AUTO
ILS CDI AUTO
(This verifies that CDI scaling uses standard GPS ranges for all modes of flight.)

Full Panel Approaches:

GPS: Moving Map page (Nav 2), orientation set to TRACK UP.

VLOC Button: Selected to appropriate nav source.

Course Guidance: Nav 1 OBS or HSI.

Partial Panel Approaches:

GPS: CDI page (Nav 1).

VLOC Button: Selected to appropriate nav source.

Course Guidance:

C172 - Nav 1 OBS and TRK information

PA44 - VOR, LOC, ILS: Nav 2 OBS and TRK information
RNAV/GPS: GPS CDI and TRK information

Cessna 172 Partial Panel Configuration

SECTION 3

Performance / Weight & Balance

V-Speeds (KIAS) & Limitations for N models

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

Max Horsepower	100hp		
Max GTW (Normal)	1600lbs		
) Max Ramp	1600lbs		
VSO	48	Stall speed in landing configuration	Bottom of White Arc
VS	55	Stall speed in clean configuration	Bottom of Green Arc
VX	65	Best angle of climb	
VY	73	Best rate of climb	
VA	109	Maneuvering speed	
VR	50	Rotation speed	
VFE 10°	100	Maximum flap extension speed with 10° of flaps	
VFE 20-30°	85	Maximum flap extension speed with 20-30° of flaps	Top of White Arc
VNO	120	Maximum structural cruising speed	Top of Green Arc
VNE	162	Never exceed speed	Red Line
VG	65	Best glide speed	

Maximum demonstrated crosswind 15 knots

Sample Weight & Balance Problem

Complete the following sample weight and balance problem for an S model.

Conditions

Basic Empty Weight ..... **1,740.9 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..... **120 lbs.**
Max Usable Fuel .....**53 gal.**
Fuel Burn .....**10 gal.**

		Weight	×	*Arm*	=	*Moment*
Basic Empty Weight				41.57		
Front Pilots	+			37.00	+	
Rear Passengers	+			73.00	+	
Baggage 120 lbs. Max	+			142.00	+	
Zero Fuel Weight	=			CG	=	
				CG = Moment / Weight		
Usable Fuel	+			48.00	+	
Ramp Weight	=					
Taxi Fuel (2.65 Gal.)	-	8		48.00	-	384
Takeoff Weight	=			CG	=	
				CG = Moment / Weight		
Fuel Burn	-			48.00	-	
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?

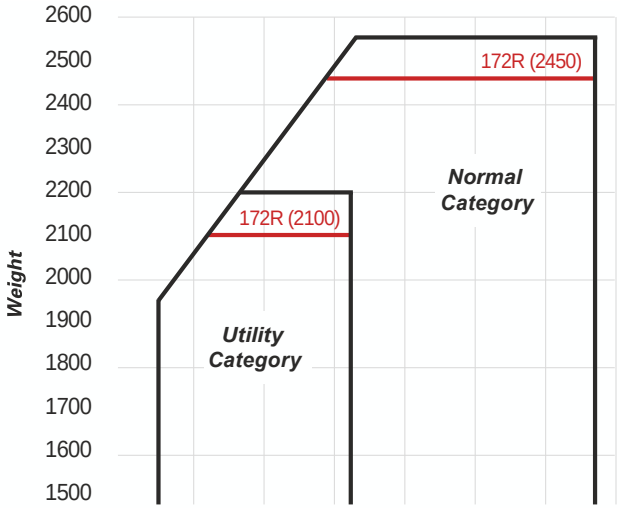
Plot Zero Fuel CG and Takeoff CG on the CG Envelope Graph Below.

Answers: (1)2,290.9 lbs. (2) 47.23 (3) 2,550 lbs. (4) 47.30 (5) Forward

Formulas

- Weight × Arm = Moment
- Total Moment ÷ Total Weight = CG
- Max Ramp Weight - Zero Fuel Weight = Usable Fuel Weight
- Fuel Weight ÷ 6 = Fuel Gallons
- 100 LL (Blue) Fuel Weighs 6 lbs./gal.; Oil Weighs 7.5 lbs./gal.
- 3 Gallons of unusable fuel and oil at full capacity are Included in Basic Empty Weight

CG Envelope Graph

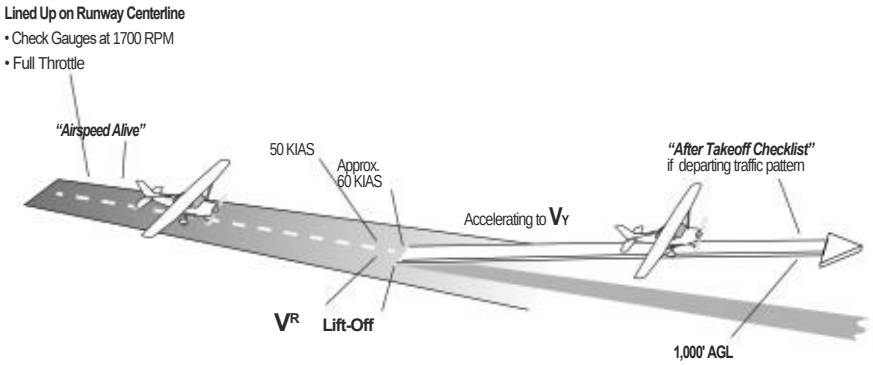


Normal Takeoff (Flaps 0˚)

Do not delay on runway.

1. Line up on centerline positioning controls for wind
3. Increase throttle to 1700 RPM
4. Check engine gauges
6. Increase throttle to full power
7. *"Airspeed Alive"*
8. Start slow rotation at 50 KIAS
   (Main gear should lift off at approx. 60 KIAS. 50 KIAS is V_R, not V_{LOF})
9. Accelerate to 73 (V_Y)
10. *"After Takeoff Checklist"* out of 1,000' AGL

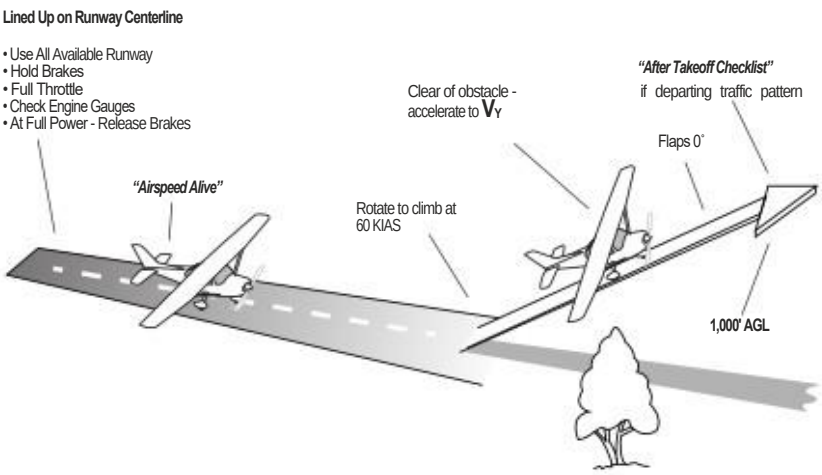
Normal Takeoff Profile



Short-Field Takeoff

1. Flaps 10°
2. Use all available runway
3. Hold brakes
4. Full throttle
5. Check engine gauges
6. At full power - release brakes
7. Rotate to climb at 63 over 50' obstacle
8. When clear of obstacle, accelerate V_Y
10. *"After Takeoff Checklist"* out of 1,000' AGL

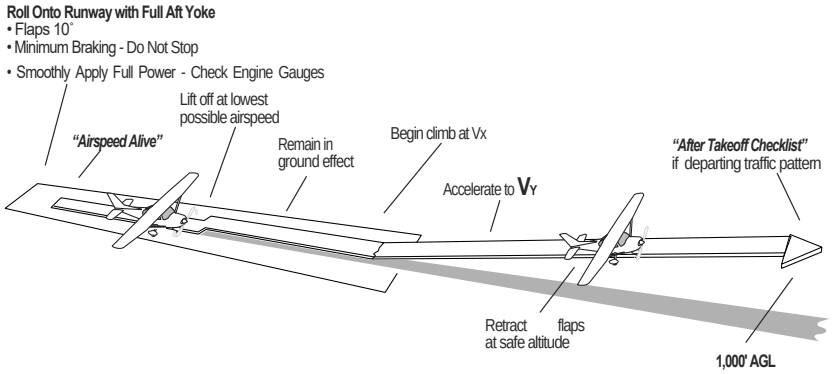
Short-Field Takeoff Profile



Soft-Field Takeoff

1. Flaps 10°
2. Roll onto runway with full aft yoke - minimum braking - do not stop
3. Smoothly apply full power - check engine gauges
4. As nose lifts off, ease back pressure
   (Nose wheel must remain off ground)
5. Lift off at lowest possible airspeed - remain in ground effect
6. In ground effect - accelerate to (V_X) - begin climb
7. Accelerate to (V_Y)
8. At safe altitude, retract flaps
9. *"After Takeoff Checklist"* out of 1,000' AGL

Soft-Field Takeoff Profile



Engine Failure or Abnormality During Takeoff Roll

THROTTLES ..... CLOSE
STOP STRAIGHT AHEAD & AVOID OBSTACLES

Insufficient Runway for Complete Stop

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

Engine Failure Immediately After Takeoff

MAINTAIN AIRCRAFT CONTROL
LAND ON REMAINING RUNWAY OR
WITHIN 30˚ OF CENTERLINE. AVOID OBSTACLES.
DO NOT ATTEMPT 180˚ TURN.
AIRSPEED.... LOWER NOSE & PITCH FOR BEST GLIDE
FLAPS ..... AS REQ
POWER ..... AS AVAILABLE
TIME PERMITTING ..... DECLARE AN EMERGENCY
FUEL SHUTOFF VALVE ..... PULL OUT / OFF
IGNITION SWITCH ..... OFF
FLAPS ..... (40˚ Recommended) AS REQ
MASTER SWITCH ..... OFF
DOORS ..... UNLATCH

Engine Failure During Flight

AIRSPEED ..... BEST GLIDE
NOTE WIND DIRECTION & SPEED
PICK & FLY TOWARDS LANDING SITE
FLAPS ..... UP
MIXTURE ..... RICH
FUEL SELECTOR VALVE ..... BOTH
FUEL SHUTOFF VALVE ..... PUSH IN / ON
AUX FUEL PUMP SWITCH ..... ON
MAGNETOS ..... CHECK ALL

If Prop Not Windmilling

IGNITION SWITCH ..... START

SECTION 5

Arrival Procedures

Cessna 150 Landing Criteria

- Plan and brief each landing carefully.
- Enter the traffic pattern at TPA trimmed for 90 KIAS in level flight. (Landing profiles depend on this.)
- 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 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 1,000’ 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 but presented in a standard format that makes sense to other pilots and instructors.

Planning considerations:

- 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

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

> "This will be a normal flaps 20° landing. 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 indenting the aiming and touchdown points.

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 FGA airplanes. The airplane must be stabilized by:

- 1,000' AGL for an ILS Approach
- Descending from MDA for a Non-Precision Approach

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 a slightly steeper angle until reaching MDA.
- Aircraft in final landing configuration (gear down and final flaps set).
- Airspeed must be stable and within range of target speed plus 10 KIAS.
- The aircraft will touch down in the first 1,000' of the landing runway. If this is not assured, a go-around must be executed.

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.

FGA requires all landings to occur within the first 1,000' 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 1,000' 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 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.

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.

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. FGA 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.

Instructors should vigilantly monitor student approaches and landing, and should command go-arounds if any of the stabilized approach conditions are not met. Instructors should make every effort to avoid allowing a student to take an unstabilized approach close to the ground, requiring the instructor to take the controls and initiate 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, 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 C150 Operations Manual: “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.

At FGA, students are trained to land using the Standardized Flaps 20° Landing profile. When conditions are necessary for soft-field or short-field landing practice, those profiles should be used.

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.

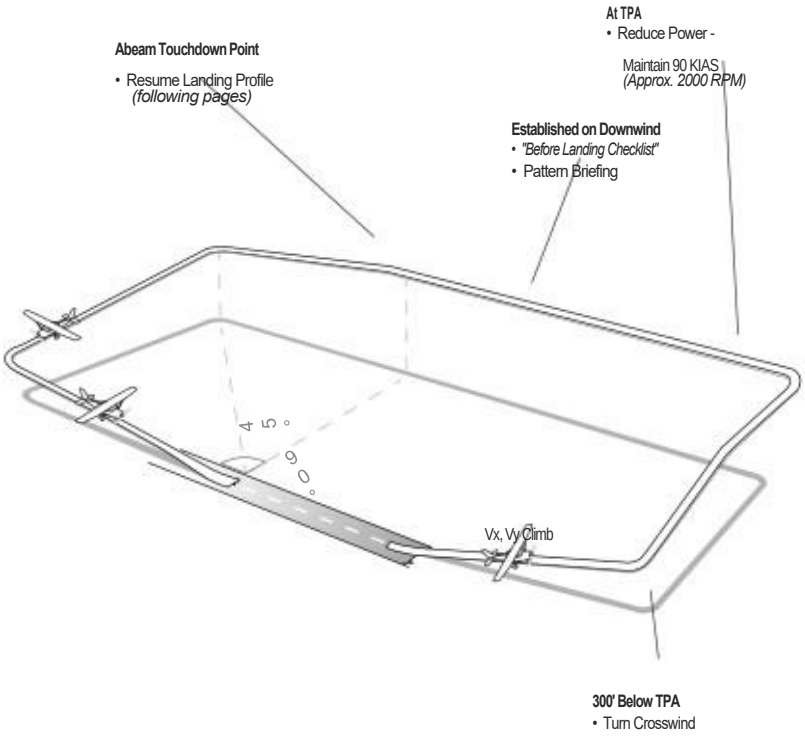
The seat height should be adjusted so the pilot can see the curvature of the cowling for the best sight picture during landing.

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

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



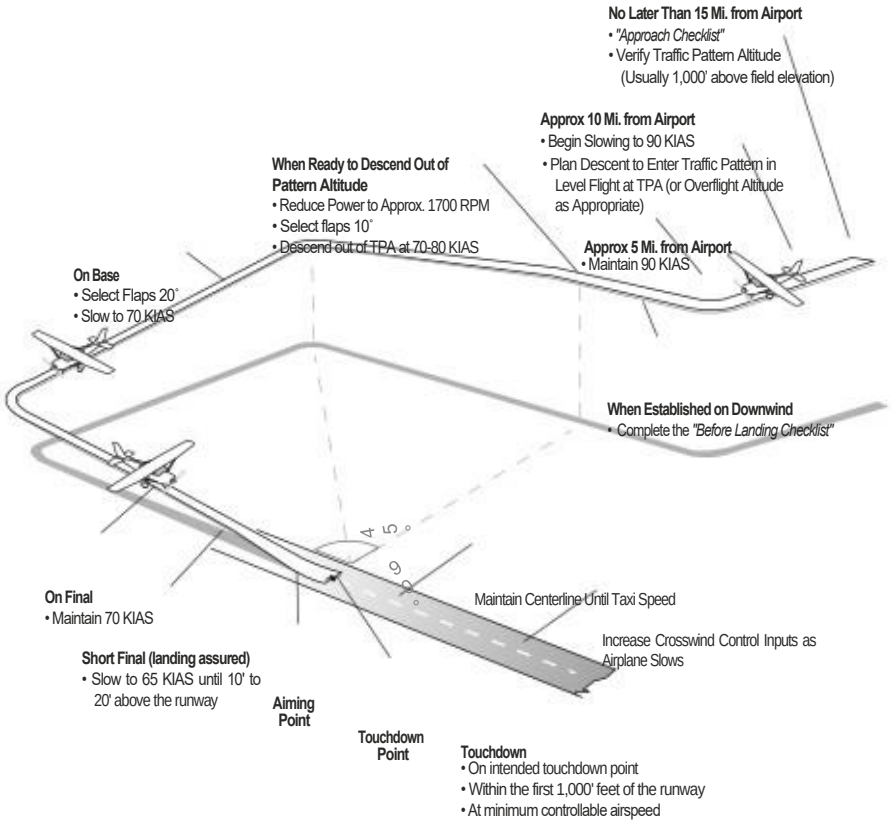
Standardized Flaps 20° Approach & Landing

1. Complete the "*Approach Checklist*" before entering the airport area; devote full attention to aircraft control and traffic avoidance
2. Slow to 90 KIAS prior to entering downwind or traffic pattern
3. Enter the traffic pattern at published TPA (typically 1,000' 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. 1700 RPM and select flaps 10˚
6. Descend out of TPA at 70-80 KIAS
7. On base leg, select flaps 20° and slow to 70 KIAS
8. Maintain 70 KIAS until short final when landing is assured, then slow to 65 KIAS until 10' to 20' above the runway

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!

FUEL SELECTOR ..... ON
MIXTURE ..... FWD
CARB HEAT (carbureted models) ..... ON

Standardized 20˚ Flap Setting for C150 Landings 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 10˚ Approach & Landing (ILS Approach)

A flaps 10° approach and landing will be accomplished the same as a standardized flaps 20° approach and landing with a few differences:

- Slow to 70 KIAS on base. Do not select flaps 20°.
- Maintain 70 KIAS until final when landing is assured, then slow to 65 KIAS until 10' to 20' above the runway.

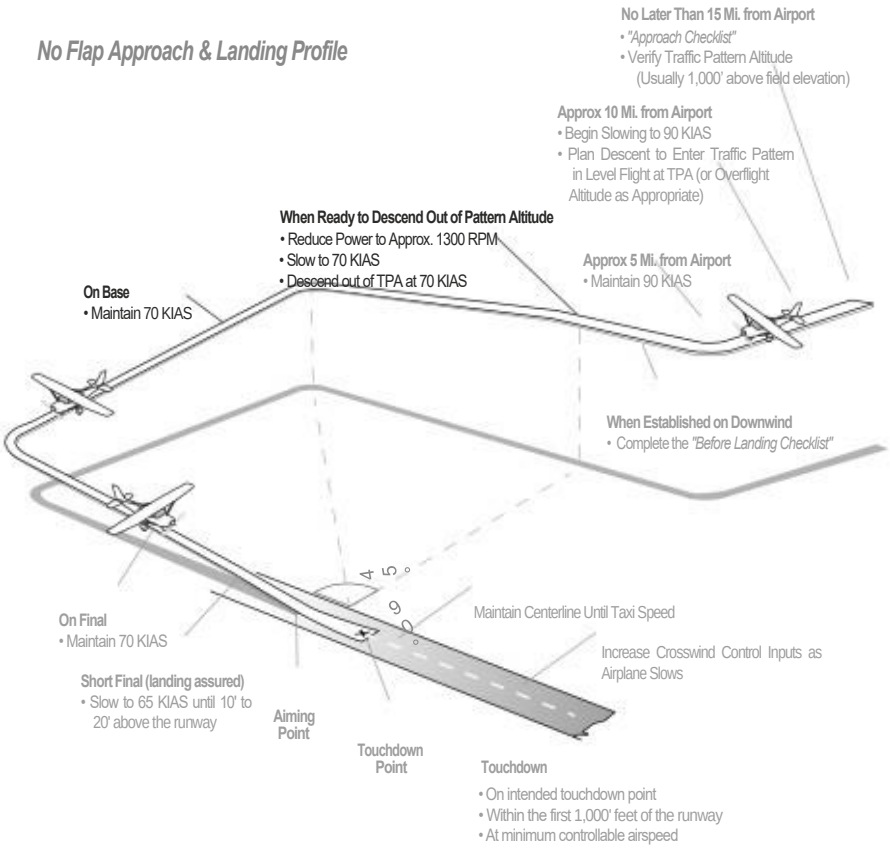
TIP: Under normal circumstances, avoid configuration changes below 400' AGL whenever possible.

No-Flap Approach & 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. Maintain 70 KIAS until landing is assured, then slow to 65 KIAS until 10' to 20' above the runway

No Flap Approach & Landing Profile



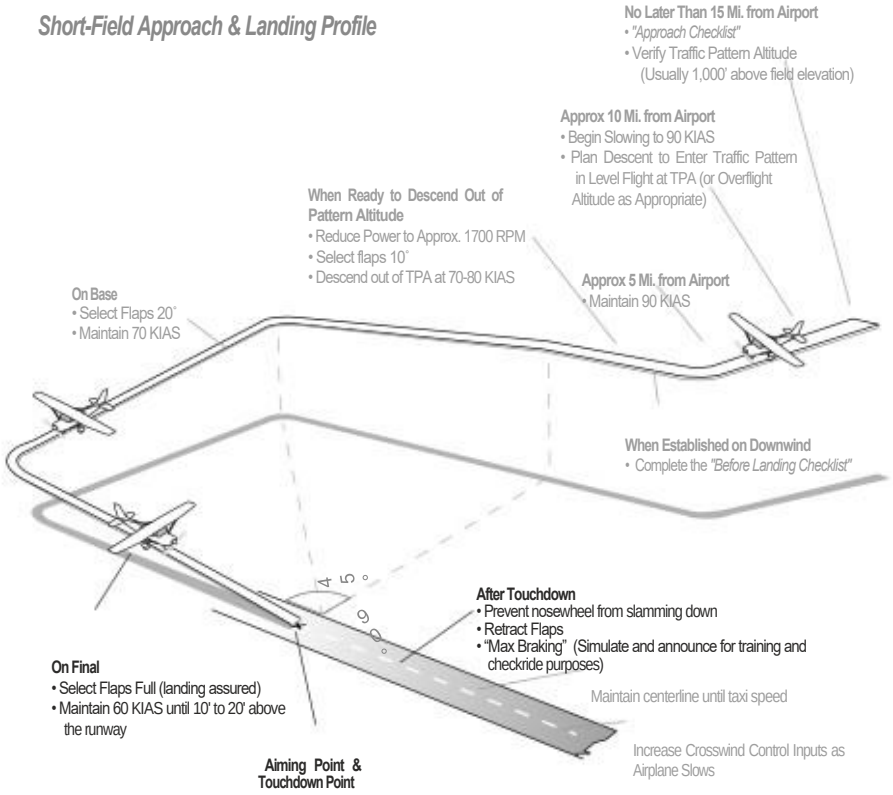
TIP: A no-flap approach has a different sight picture than a

Short-Field Approach & Landing

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

8. Select flaps FULL and slow to 60 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 & Landing Profile

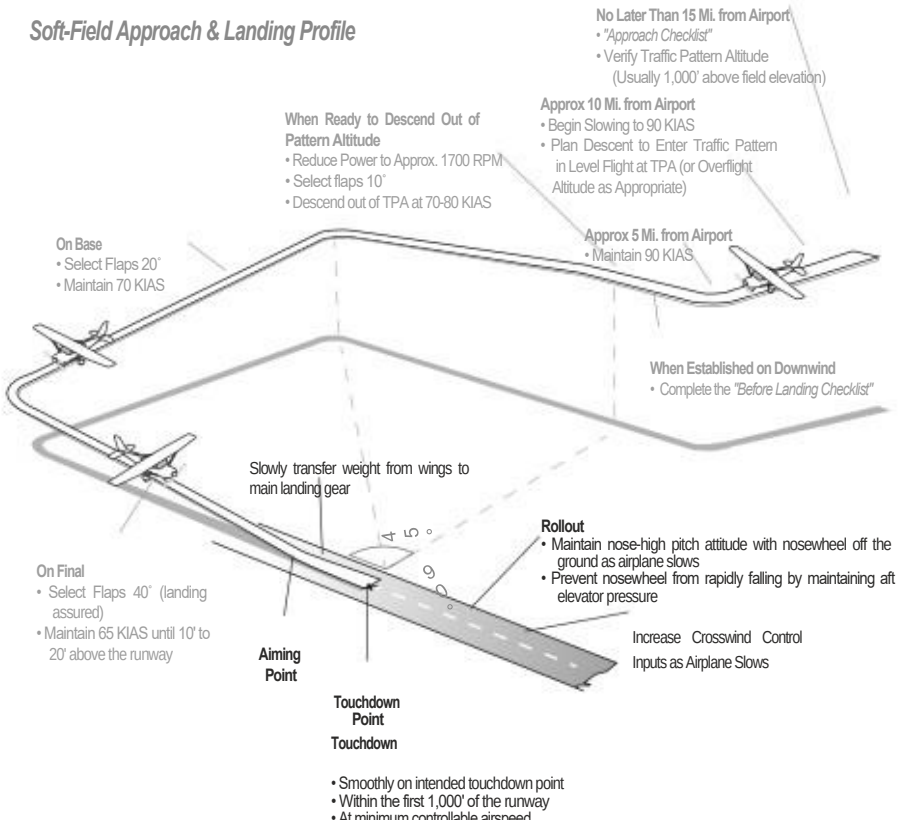


Soft-Field Approach & Landing

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

8. On short final when landing is assured, select flaps 40° and slow to 65 KIAS
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 & Landing Profile



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.

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.” FGA standardized landing technique for the C150 and the C150 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.

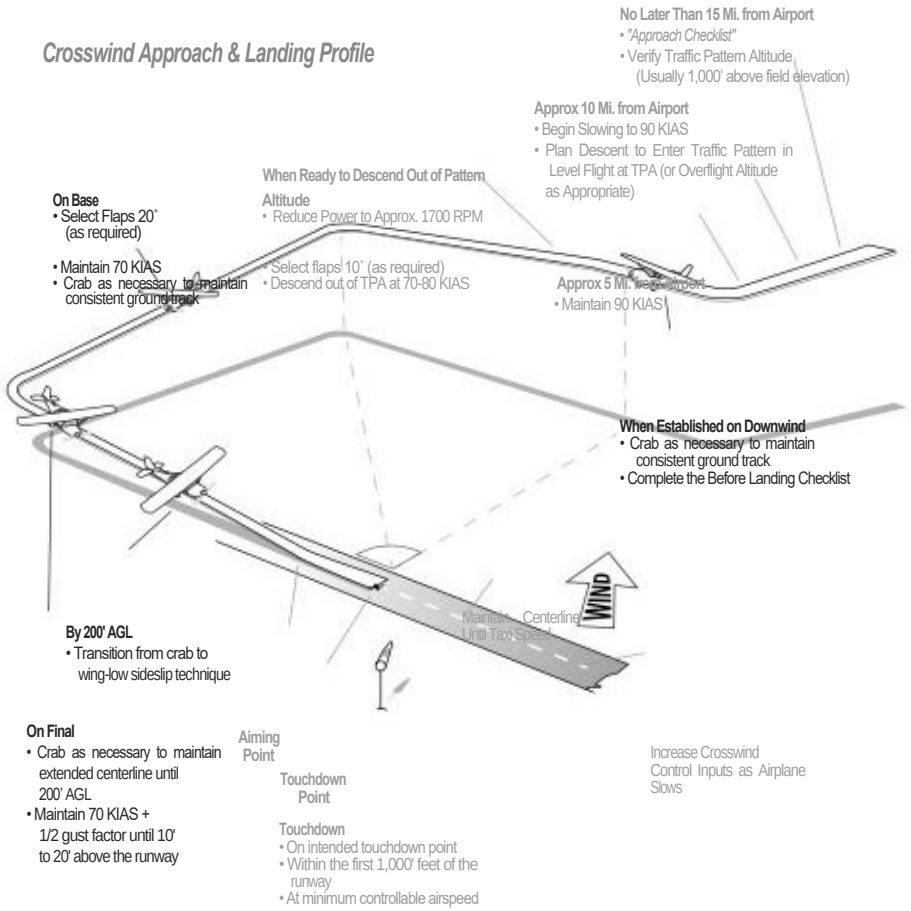
Control Technique

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 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 C150 is 15 knots. Regardless of reported winds, if the required bank to maintain drift control is such that full

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.




45°
90°

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.

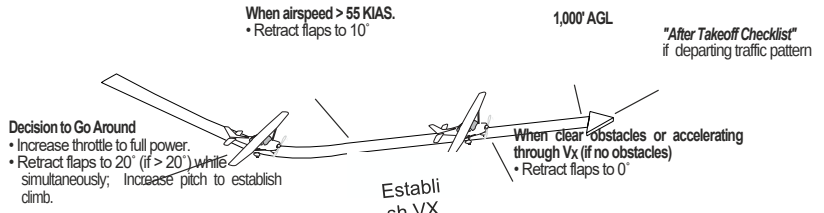
Missed Approach

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° at 65 KIAS and clear of obstacles *(if no obstacles)*
7. *"After Takeoff Checklist"* out of 1,000' 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).



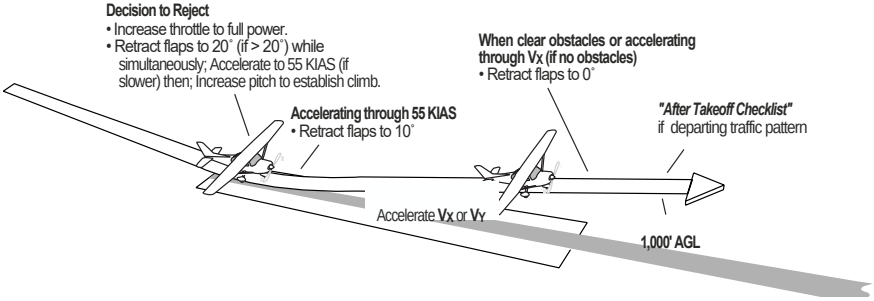
Rejected or Balked Landing

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

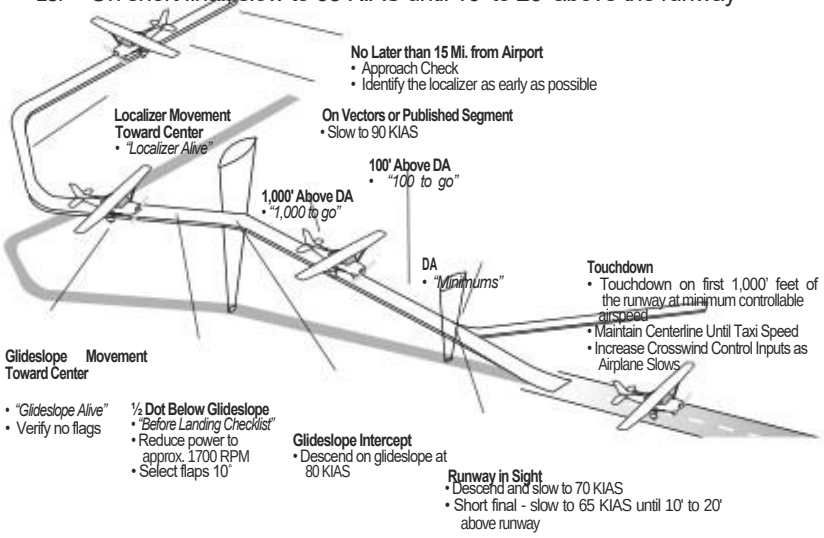
1. Increase throttle to full power
2. Retract flaps to 20° (if > 20°) while simultaneously;
3. Accelerate to 55 KIAS (if slower) then;
4. Increase pitch to establish climb
5. Retract flaps to 10° accelerating through 55 KIAS
6. Accelerate to V_X or V_Y as appropriate
7. Retract flaps to 0˚ when clear obstacles or accelerating through V_X *(if no obstacles)*
8. *"After Takeoff Checklist"* out of 1,000' 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.



Precision Approach (ILS Approach)

1. Complete the *"Approach Checklist"* and identify the localizer as early as possible
2. Slow to 90 KIAS on vectors or when final approach course inbound
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 ½
6. dot below glideslope intercept: *"Before Landing Checklist"*
7. Reduce power to approx. 1700 RPM, and select flaps 10°.
8. Descend on glideslope at 80 KIAS.
9. Announce at 1,000' above DA: *"1,000 to go"*
10. Announce at 100' above DA: *"100 to go"*
11. *"Minimums"*
12. Runway in sight: descend and slow to 70 KIAS
13. On short final, slow to 65 KIAS until 10' to 20' above the runway



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

Non-Precision Approach (GPS, VOR, LOC Approach)

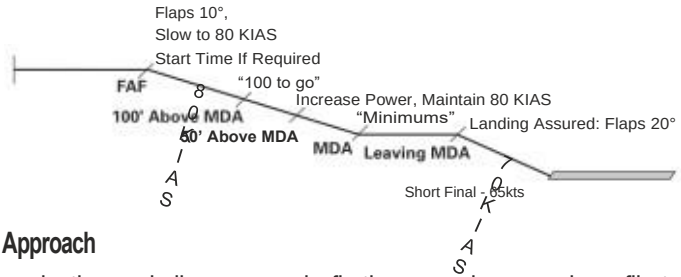
1. Load the approach into the GPS, and select appropriate nav source, and frequency if required.

Within 30 NM of the airport, if flying a GPS approach, the GPS will display "Apch Arm" or “TERM.”

2. Set the desired course on the Nav 1 OBS.
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 a GPS approach, verify green APCH ACTV or APCH flag on GPS. If no flag appears, DO NOT DESCEND at the FAF.

5. At FAF, complete *"Before Landing Checklist"* - Flaps 10° - Slow to 80 KIAS. Start time if required.
6. Descend at 400-500 FPM (unless steeper descent required) at 80 KIAS.
7. Announce at 100' above minimums: "100 to go."
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. Runway in sight: descend at predetermined VDP or maintain MDA to MAP.
12. Do not leave MDA until landing is assured.
13. When descending from MDA: Flaps 20° - 70 KIAS.
14. On short final, slow to 65 KIAS until 10’ to 20’ above the runway.



Circling Approach

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

Maintain circling minimums at 80 KIAS until in a position from which a normal landing can be made.

SECTION 6

In-Flight Maneuvers

Required maneuvers for the Commercial Pilot Single-Engine Add-On are performed the same as those for Private Pilot, with two exceptions:

Commercial steep turns are accomplished with at least 50° of bank.

- Commercial slow flight is performed at an airspeed at which any further increase in angle of attack, increase in load factor, or reduction in power, would result in an immediate stall.

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

Clean Configuration Flow

1. Fuel selector - both
2. Mixture - enrichen
3. Flaps 0°

Landing Configuration Flow

1. Fuel selector - both
2. Mixture - enrichen
3. Carburetor heat - on (carbureted models)
4. Flaps full

GROUND USE ONLY

PVT Steep Turns

Steep turns are to be accomplished above 3,000' AGL. Roll into one coordinated 360˚ turn, then follow with another coordinated 360˚ turn in the opposite direction. Roll into and out of turns at approximately the same rate.

1. Perform two 90° 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"*

PRACTICAL TEST	Airspeed	Altitude	Bank	Heading
	±10 KIAS	±100'	45° ±5°	±10°

[illegible] Slow Flight

Slow flight is to be accomplished at an entry altitude that will allow completion above 1,500' AGL. Establish and maintain an airspeed, approximately 5-10 knots above the 1G stall speed, at which the airplane is capable of maintaining controlled flight without activating a stall warning.

1. Perform two 90° clearing turns
2. 1700 RPM (maintain altitude)
3. Landing configuration flow
4. Maintain altitude - slow to 5-10 knots above 1G stall speed (approximately 45-50 KIAS). Avoid stall warning activation.
5. Power as required to maintain airspeed
6. Accomplish level flight, climbs, turns, and descents as required
   FGA - max 30° bank
7. Recover - max power/maintain altitude/reduce flaps.
8. Above V_X, retract flaps to 0°
9. *"Cruise Checklist."*

PVT Power-Off Stall

Stalls are to be accomplished at an entry altitude that will allow completion no lower than 1,500' AGL. This maneuver is begun by first establishing a stabilized descent in either the approach or landing configuration.

1. Perform two 90° clearing turns
2. 1700 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. Maintain altitude to induce stall
8. Recover - simultaneously reduce AOA, max power, and level wings
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."*

	Bank	Heading
PRACTICAL TEST	±10° *Not to exceed 20°*	±10°

PVT Power-On Stall

Stalls are to be accomplished at an entry altitude that will allow completion no lower than 1,500' AGL.

1. Perform two 90° clearing turns
2. 1700 RPM (maintain altitude)
3. Clean configuration flow
4. At 60 KIAS, simultaneously increase pitch (slowly) and apply full power
5. Increase pitch attitude to induce stall
6. At stall/buffet (as required) recover - simultaneously reduce AOA, max power, and level wings
7. *"Cruise Checklist"*

PVT

Emergency Descent

During a simulated emergency descent, the applicant must be able to recognize situations requiring an emergency descent, such as cockpit smoke and/or fire. Situational awareness, appropriate division of attention, and positive load factors should be maintained during the maneuver and descent.

1. Perform two 90° clearing turns
2. Clean configuration flow
3. Reduce throttle to idle
4. Initiate turning descent, while clearing for traffic
5. Maintain (training) 120 KIAS
6. Notify ATC/Traffic as appropriate

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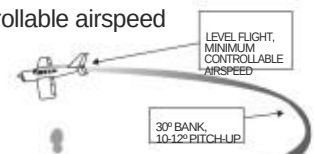
Chandelles

Chandelles are to be accomplished at an entry altitude that will allow completion no lower than 1,500' AGL, and consist of one maximum performance climbing turn beginning from 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.

1. Perform two 90° 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"*



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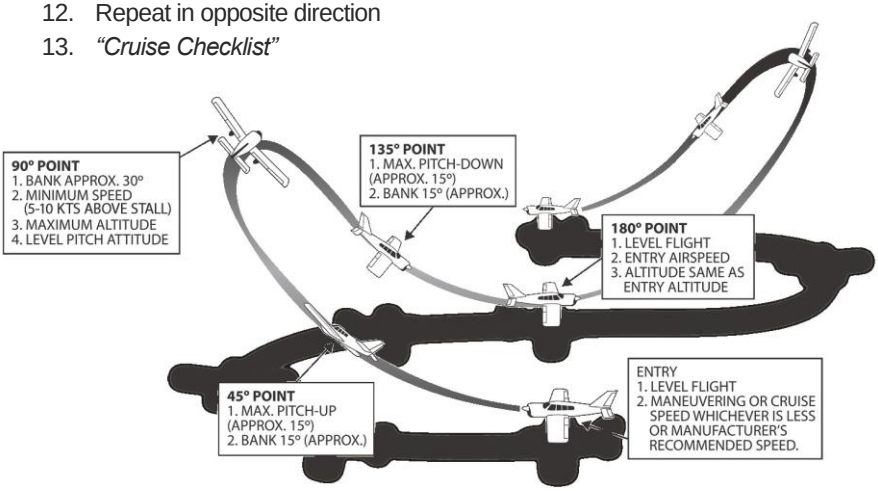
Lazy Eights

Lazy Eights are to be accomplished at an entry altitude that will allow the task to be completed no lower than 1,500' AGL. The applicant is required to maintain coordinated flight throughout the maneuver, with a constant change of pitch and roll rate.

1. Perform two 90° 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 - 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"*



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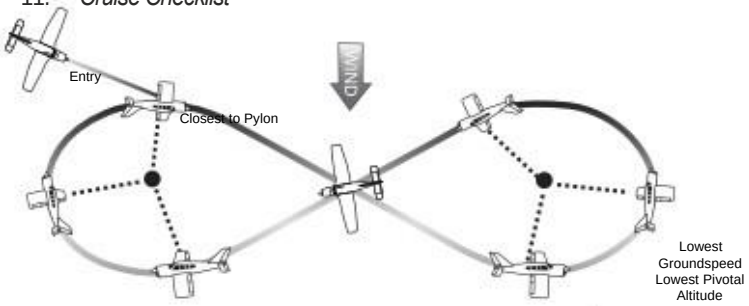
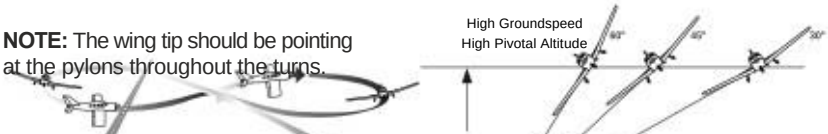
Eights On Pylons

Eights on Pylons are to be accomplished at the appropriate pivotal altitude (groundspeed^2/11.3), 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 (approximately 900' AGL at 100 KIAS - 2200 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;
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 45° angle
9. Begin second turn in the opposite direction of the first
10. Exit maneuver on entry heading
11. *"Cruise Checklist"*

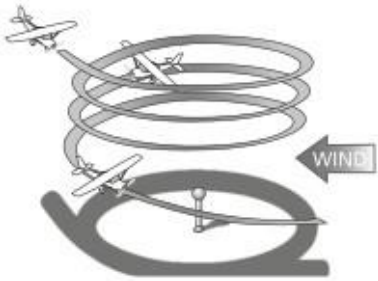


NOTE: The wing tip should be pointing at the pylons throughout the turns.



Steep Spirals

1. Altitude - at least 3,000' AGL
2. Perform two 90° 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"*



	Airspeed	Heading
PRACTICAL TEST	±10 KIAS	Rollout towards specified heading or point±10°

Accelerated Stalls

Accelerated stalls are accomplished at an altitude that allows completion no lower than 3,000 feet AGL. A smooth transition should be made from cruise attitude to a bank angle of 45°, maintaining coordinated turning flight, while increasing elevator back pressure steadily to induce the stall.

1. Perform two 90° clearing turns
2. Slow to approximately 60 KIAS (during clearing turns)
3. Clean configuration flow
4. Establish a coordinated 45° bank turn

CFI Secondary Stall *(Power-On)*

Secondary Stalls are to be accomplished above 3,000 AGL. The purpose is to demonstrate the effect of attempting to hasten the completion of a stall recovery before the airplane has regained sufficient flying speed. Demonstrate and simultaneously explain secondary stalls from an instructional standpoint.

1. Perform two 90 clearing turns
2. 1700 RPM (maintain altitude)
3. Clean configuration flow
4. At 60 KIAS, simultaneously increase pitch (slowly) and apply full power
5. Increase pitch attitude to induce stall
6. At stall, recover - simultaneously reduce AOA, max power, and level wings
7. When stall horn silences, increase pitch to induce a secondary stall
8. At stall, recover - simultaneously reduce AOA, max power, and level wings
9. *"Cruise Checklist"*

CFI Secondary Stall *(Power-Off)*

Secondary Stalls are to be accomplished above 3,000 AGL. The purpose is to demonstrate the effect of attempting to hasten the completion of a stall recovery before the airplane has regained sufficient flying speed. Demonstrate and simultaneously explain secondary stalls from an instructional standpoint.

1. Perform two 90 clearing turns
2. 1700 RPM (maintain altitude)
3. Landing configuration flow
4. Stabilized descent at 65 KIAS
5. Throttle idle (slowly)
6. Maintain altitude to induce stall
7. At stall, recover - simultaneously 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 - simultaneously reduce AOA, max power, and level wings
10. Retract flaps to 20˚ (immediately)
11. Retract flaps to 10° when airspeed is greater than 55 KIAS
12. Increase pitch to arrest descent
13. Establish V_X or V_Y as appropriate.

CFI Elevator Trim Stall

Elevator Trim Stalls are to be accomplished above 3,000 AGL. The purpose is to demonstrate what can happen when full power is applied for a go-around and positive control of the airplane is not maintained. Demonstrate and simultaneously explain elevator trim stalls from an instructional standpoint.

1. Perform two 90 clearing turns
2. 1700 RPM (maintain altitude)
3. Landing configuration flow
4. Trim for stabilized descent at 65 KIAS
5. Apply full power (slowly)
6. Allow the nose to rise and turn left
7. When stall is approaching (high AOA) recover - simultaneously reduce AOA, max power, and level wings
8. Adjust trim while accelerating to V_Y
9. Retract flaps to 0˚ at 65 KIAS
10. *"Cruise Checklist"*

CFI Cross-Control Stall

Cross-Control Stalls are to be accomplished above 3,000 AGL. The purpose is to demonstrate the effect of improper control technique and to emphasize the importance of using coordinated control pressures whenever making turns. This demonstration shows what can happen during poorly executed base-to-final turn where too much rudder is applied in the direction of the turn. Demonstrate and simultaneously explain cross-control stalls from an instructional standpoint.

1. Perform two 90 clearing turns
2. 1700 RPM (maintain altitude)
3. Clean configuration flow
4. Stabilized descent at 65 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 - simultaneously reduce AOA, max power, and level wings

SECTION 7

Oral Review

Lost Comm Procedure (FAR 91.185)

If in VFR conditions, or if VFR conditions are encountered, squawk 7600, remain VFR and land as soon as practicable.

If in IFR conditions, squawk 7600 and Fly:

Route *(First that applies)*	***Altitude*** *(Whichever is highest until descent is required for landing)*
Assigned	**M**inimum IFR Altitude
Vectored	**E**xpected
Expected	**A**ssigned
Filed	

FAR Review

1. To maintain instrument currency, a pilot must have made six approaches and demonstrated proper holding procedures as well as radial and bearing tracking in the last six months.

2. An alternate is not required if the weather at your destination is forecast to be at least a 2,000' ceiling and visibility of at least three miles. The forecast must be from one hour before to one hour after your estimated time of arrival.

3. If an alternate airport is needed, forecasted weather at ETA must be at least 600' ceiling and 2 miles visibility for a precision approach; an alternate airport that offers only a non-precision approach must be at least 800' ceiling and 2 miles visibility. An alternate cannot be based on a GPS approach.

4. Reserve fuel of 45 minutes is required for IFR flights; 30 minutes for VFR day flights; and 45 minutes for VFR night flights. This reserve is required in addition to the fuel required to fly to your destination and alternate.

5. VOR limits: 4 degrees for VOT, ground checkpoint and dual check. 6 degrees for an airborne check.

6. VOR equipment must be checked every 30 days.

7. Transponders must be checked every 24 calendar months.

8. Pitot static systems must be checked every 24 calendar months.

9. ELT equipment must be checked every 12 months, after half of the battery life, or after 1 hour of cumulative use.

10. An aircraft used for hire must have a 100 hour and an annual inspection.

11. In order to descend below the DH or MDA, all of the following conditions must exist:
    A. The required flight visibility is met.
    B. The aircraft is in a normal position to land.
    C. (1) The runway environment is in sight - descend to land.
    (2) Approach lights in sight - descend to 100' above touch down zone until runway environment is in sight.
    (3) Descend and land if red terminating bars or red side row bars are in sight.

12. The minimum equipment list includes a list of equipment that may be inoperative for a particular phase of flight. If not required to have a MEL, comply with the minimum equipment prescribed by the FAR's.

13. Standard Traffic Pattern Altitude (TPA) is 1,000' AGL.