Faithful Guardian Aviation

Piper Warrior

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

Aircraft Systems

Engine

The Warrior is equipped with a Lycoming, 4-cylinder, O-360 (opposed, 360 cubic inch) engine rated at 160 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.

L Lycoming
H Horizontally Opposed
A Air Cooled
N Normally Aspirate
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.

Note: 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 Warrior POH, in regards to 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 can cause detonation."

Oil

Acceptable range for oil in the Warrior is 4-6 quarts. Never depart with the oil indicating below 4 quarts.

Propeller

The Warrior 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 Warrior 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 Warrior 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 Warrior, 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.

The aircraft is equipped with a three-position fuel selector control. The positions are “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

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 Warrior

POH does not provide a limitation on fuel imbalance. It is FGA'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 only 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 Back 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 Warrior is equipped with a 14-volt DC electrical system and a 12-volt lead-acid battery. Electrical power is supplied by a 60-amp, engine-driven alternator. A voltage regulator maintains a constant 14-volt output from the alternator. An overvoltage relay is located on the forward left side of the fuselage behind the instrument panel. Alternator output is displayed on a digital ammeter on the instrument panel.

Alternator Failure

In the case of the "ALTERNATOR INOP" annunciator, follow the "ALT Annunciator Illuminated" checklist. The expanded procedure can be found in the Warrior POH Section 3.25:

> "Loss of alternator output is detected through zero reading on the ammeter. Before executing the following procedure, ensure that the reading is zero and not merely low by actuating an electrically powered device, such as the landing light. If no increase in the ammeter reading is noted, alternator failure can be assumed. The

electrical load should be reduced as much as possible. Check the alternator circuit breakers for a popped circuit.

The next step is to attempt to reset the overvoltage relay. This is accomplished by moving the ALT switch to OFF for one second and then to ON. If the trouble was caused by a momentary overvoltage condition (30.5 volts and up) this procedure should return the ammeter to a normal reading.

Note: Low Bus Voltage Annunciator will be illuminated.

If the ammeter continues to indicate "0" output, or if the alternator will not remain reset, turn off the ALT switch, maintain minimum electrical load, and land as soon as practical. Anticipate complete electrical failure. Duration of battery power will be dependent on electrical load and battery condition prior to failure."

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

Other electrical components include the standby attitude indicator, the starter, the electric fuel pump, electric engine primer, the stall warning horn, the ammeter, and the annunciator panel.

SECTION 2

Performance / Weight & Balance

Piper Warrior 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

Performance Charts

All performance charts will be covered by the instructor and are not limited to the following:

- Flaps Up Takeoff Performance
- 25° Flaps Takeoff Performance
- Engine Performance
- Glide Range
- Landing Performance

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	-					
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?

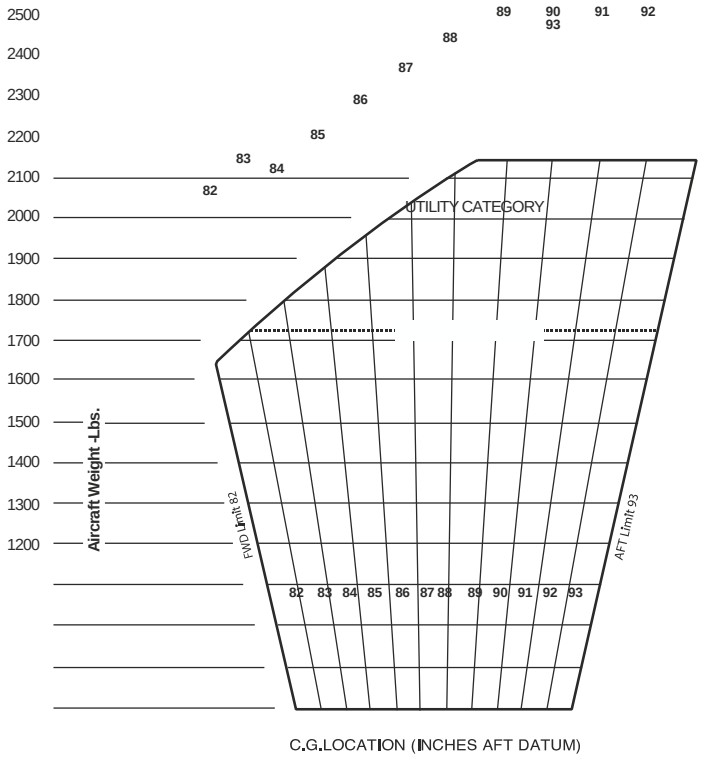
Plot Zero Fuel CG and Takeoff CG on the CG Envelope Graph below.

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
- 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.
- 2 Gallons of unusable fuel and oil at full capacity are included in Basic Empty 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 complete stop:

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

Engine failure after rotation with no runway remaining:

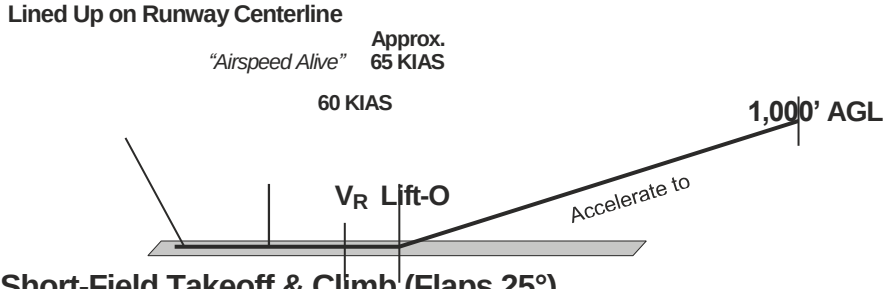
- Maintain control/pitch for best glide
- Only shallow turns to avoid obstacles
- Flaps as necessary for safe touchdown
- Throttle closed
- Mixture to cutoff
- Fuel selector, magnetos, and battery master off
- Touchdown at lowest speed possible

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. Accelerate to 76 KIAS (V_Y)
10. *"After Takeoff Checklist"* out of 1,000' AGL

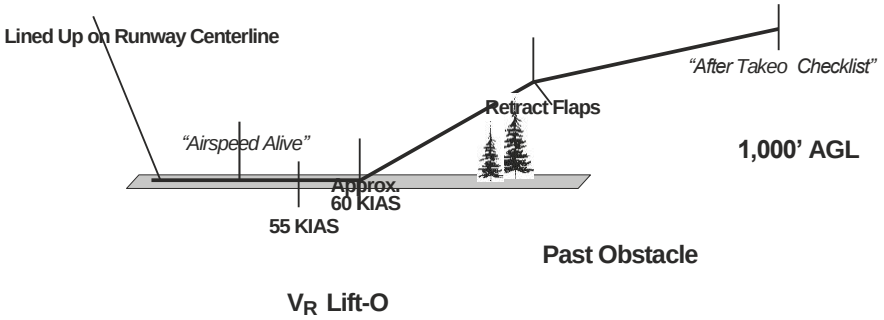
"After Takeoff Checklist"



Short-Field Takeoff & Climb (Flaps 25°)

1. Flaps 25°
2. Hold brakes at departure end of runway
3. Increase throttle to 2000 RPM
4. Check engine gauges
5. Increase throttle to full power
6. Release brakes
7. *"Airspeed Alive"*
8. Begin rotation at 55 KIAS to climb at 64 KIAS (V_X) over a 50' obstacle
9. At safe altitude, slowly retract flaps.
10. Accelerate and climb at 76 KIAS (V_Y) when clear of obstacles
11. *"After Takeoff Checklist"* out of 1,000' AGL

Short-Field Takeoff & Climb Profile

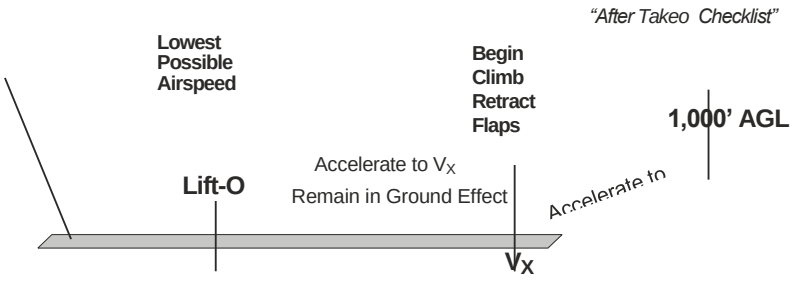


Soft-Field Takeoff & Climb (Flaps 25°)

1. Flaps 25°
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 64 KIAS (V_X) - begin climb
7. Retract flaps slowly when established at V_X and clear of obstacles.
8. Accelerate to 76 KIAS (V_Y)
9. *"After Takeoff Checklist"* out of 1,000' AGL

Soft-Field Takeoff & Climb Profile

Roll Onto Runway - Do Not Stop



SECTION 4

Arrival Procedures

Piper Warrior 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.
- 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.

Approach Briefing

IFR	*VFR*
Field Elevation	Type of Approach & Landing
Type of Approach	Landing Runway
NAV Frequency	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. 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.

Announced Calls on Approach

"Before Landing Checklist"

- Visual: Prior to descending from Traffic Pattern Altitude (TPA) *(abeam approach end on downwind)*
- ILS: ½ dot below glideslope intercept
- Non-Precision: At FAF

"1,000 To Go"

- Instrument: 1,000' above MDA or DA

"Stabilized"

- Visual or ILS: At 400' AGL
- Non-Precision: Descending from MDA

"100 To Go"

- Instrument: Prior to MDA or DA

"Minimums"

- Instrument: at MDA or DA

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).

The stabilized approach corridor is required during visual and instrument approaches in FGA aircraft. The aircraft must be stabilized by:

- 1,000' AGL for an ILS approach.
- Descending from MDA for a non-precision approach.
- 500' AGL for a visual approach.

General Conditions for a Stabilized Approach

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

Conditions for the Warrior Stabilized Approach

- Final flap setting
- Power set approximately 1500 RPM
- Approximately 350 FPM descent
- Airspeed 70 KIAS at 400' AGL or descending from MDA

The procedures and parameters listed above are not merely targets, they are mandatory conditions and limits. Any deviation occurring at or beyond the beginning of the stabilized approach corridor requires a mandatory 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.

FGA requires all landings to occur within the first 1,000' of the landing runway. When flying a visual approach and landing in an Warrior, 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.

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.

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.

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.

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.

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.

Flap Setting

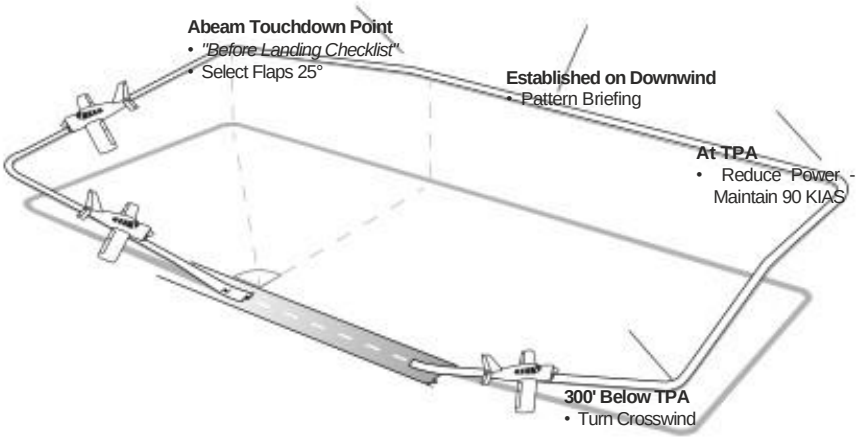
FGA students are trained to land using the Standardized Flaps 25° Landing profile. When conditions are necessary for a Soft-Field or Short-Field landing, those profiles should be used.

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



V_X / V_Y Climb

Normal Visual Approach & Landing

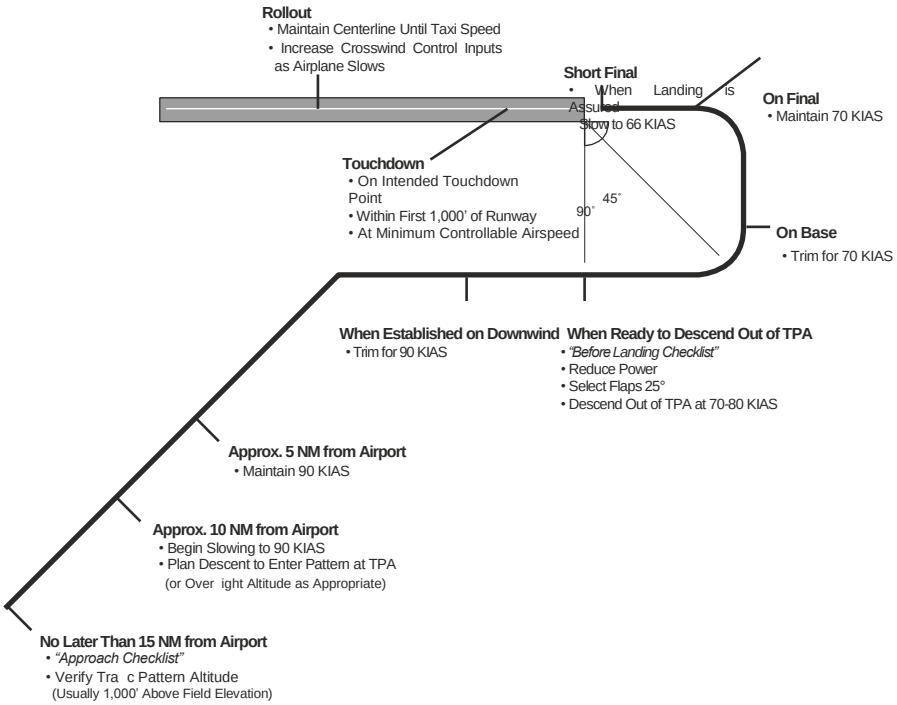
1. Complete the *"Approach Checklist"* before entering the airport traffic pattern; devote full attention to aircraft control and traffic avoidance.
2. Slow to 90 KIAS prior to entering downwind or traffic pattern.
3. Enter traffic pattern at published TPA (typically 1,000' AGL).
4. Complete the *"Before Landing Checklist"* when abeam the touchdown point.
5. When abeam touchdown point, on extended base, or on extended final (when ready to descend out of pattern altitude): Complete the Before Landing Checklist. Reduce power and select flaps 25°.
6. Descend out of TPA at 70-80 KIAS.
7. On base leg, slow to and trim for 70 KIAS.
8. Maintain 70 KIAS until short final when landing is assured, then slow to 66 KIAS until the roundout.

Before Landing Checklist

Never Switch Fuel Tanks Below Pattern Altitude

POWER ..... AS REQUIRED
FLAPS ..... (V_{FE} 102 KIAS) 25°
MIXTURE ..... FWD
FUEL PUMP ..... ON

Normal Visual Approach & Landing Profile



Short-Field Approach & Landing

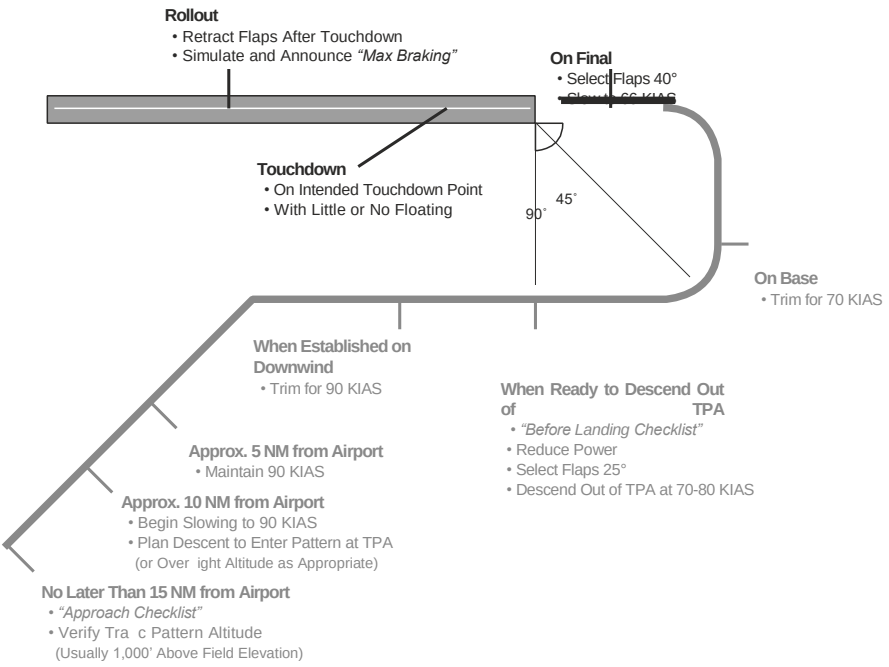
Steps 1-7 are identical to a normal approach and landing procedure.

8. Select flaps 40° and slow to 66 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 nosewheel from slamming onto the runway.
11. Retract the flaps after touchdown.
12. Simulate and announce *"Max Braking"* for training and checkride

Use 66 KIAS (max weight speed) on final as a minimum speed for training and flight checks, unless specified by the Examiner to use computed speed for actual weight.

Technique: Fly proper speed and maintain some power for round out, close throttle in flare.

Short-Field Approach & Landing Profile

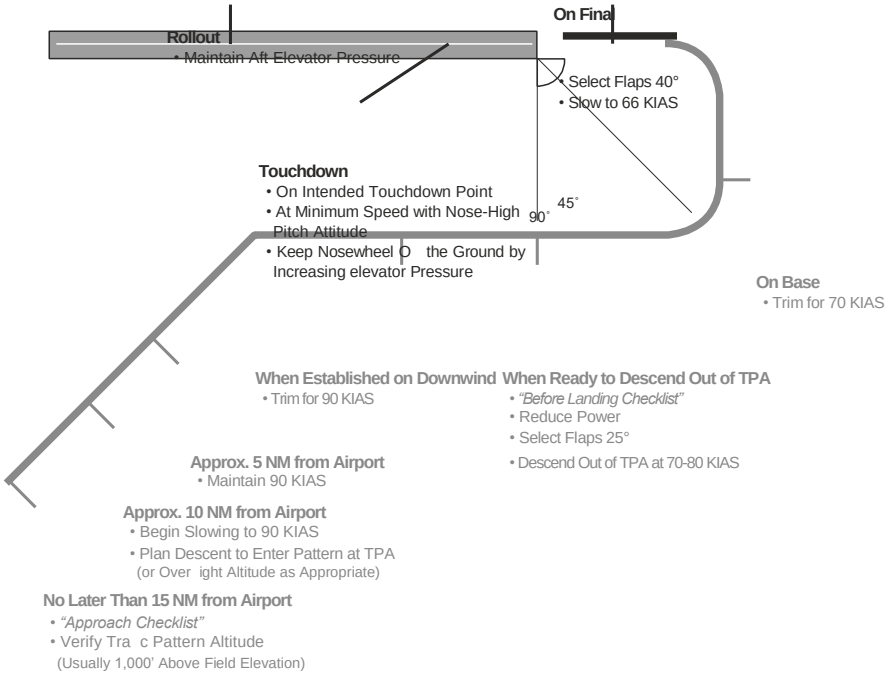


Soft-Field Approach & Landing

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 66 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



Power-Off 180° Accuracy Approach and 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 runway end, 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. Dissipate energy 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 the runway.
11. On final, maintain a constant descent angle (which will be steeper than for 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 the runway.
    A. Because the descent rate is higher than with power, begin the roundout slightly earlier to avoid hard landings.

Crosswind Approach & Landing

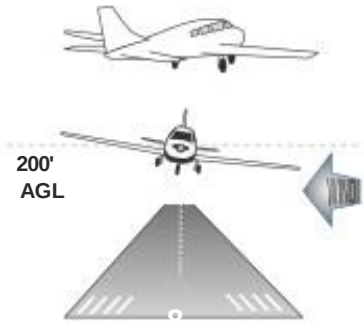
Carefully planned adjustments must be made to the normal approach and landing procedure to safely complete a crosswind approach and landing.

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 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 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 PA28 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.

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 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.

Go-Around / Missed Approach Procedure

1. Throttle - full power.
2. Increase pitch to establish climb at 76 KIAS (V_Y).
3. Retract flaps slowly when established at V_Y and clear of obstacles.
4. *"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.

Rejected or Balked Landing

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

Rejected or Balked Landing Procedure

1. Throttle - full power.
2. Carb heat - off.
3. Accelerate to 60 KIAS (if slower) then;
4. Increase pitch to establish climb at 64 KIAS (V_X).
5. Retract flaps slowly when established at V_X and clear of obstacles.
6. *"After Takeoff Checklist"* at pattern altitude or out of 1,000' AGL.

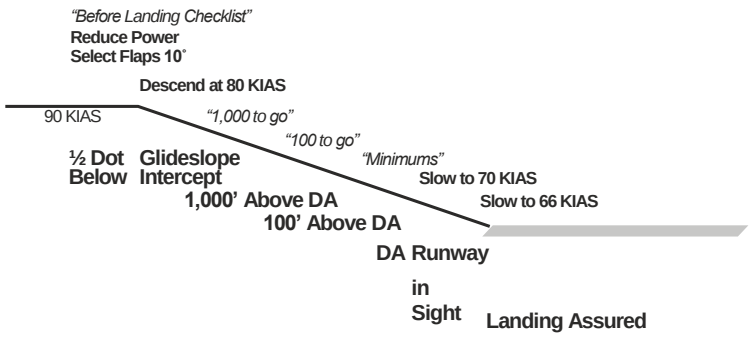
If the rejected landing is due to conflicting traffic, maneuver as necessary during the climb to clear and avoid conflicting traffic.

Precision Approach & Landing

FGA recommends setting flaps 10° at glideslope intercept for ILS precision approaches. 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 the center.
4. Announce *"Glideslope Alive"* when glideslope begins moving towards the center.
5. Verify no flags at glideslope intercept altitude and marker.
6. ½ dot below glideslope intercept: *"Before Landing Checklist."*
7. Reduce power, 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. When landing is assured, slow to 66 KIAS until the roundout.

ILS Approach & Landing Profile



Non-Precision Approach & Landing

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

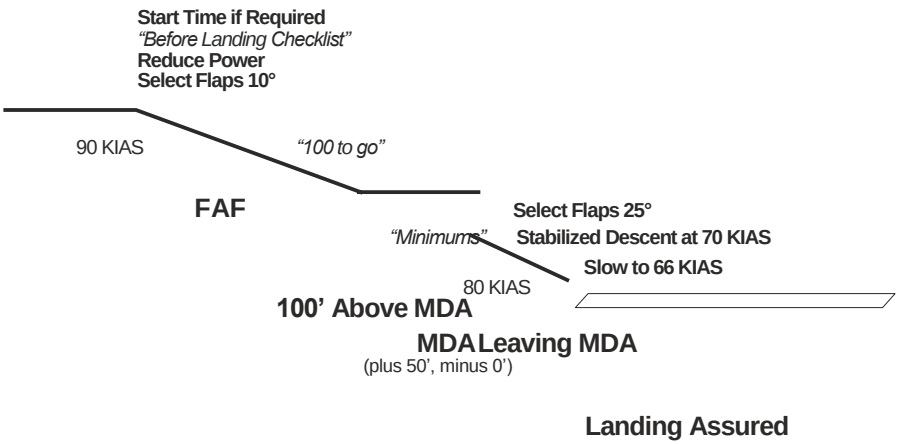
Within 30 NM of the airport, if flying a GPS approach, the GPS will display "TERM."

2. When Direct To IAF or on vectors, set the desired course on the CDI.
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 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.
6. At FAF: start time if required.
7. Descend at 400-500 FPM (unless steeper descent required) at 80 KIAS.
8. Announce at 100' above MDA: *"100 to go."*
9. Increase power 50' prior to reaching MDA to maintain 80 KIAS at level off.
10. *"Minimums."*
11. Maintain MDA (plus 50', minus 0').
12. Runway in sight: descend at predetermined VDP or maintain MDA to MAP.
13. Do not leave MDA until landing can be accomplished using a stabilized descent angle and normal maneuvers.
14. When descending from MDA: Flaps 25° - 70 KIAS.
15. When landing assured, slow to 66 KIAS until the roundout.

Non-Precision Approach & Landing Profile



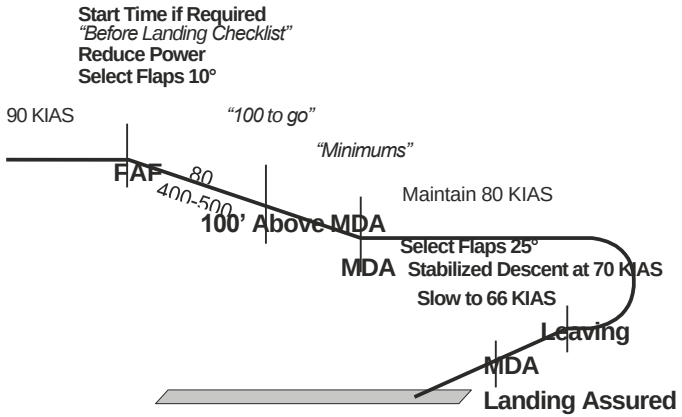
Circling Approach

When conducting a circling approach (precision or non-precision), execute the approach with the same speeds at flaps 10° to the published circling minimums.

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

When descending from MDA (circling minimums), select flaps 25° and slow to 70 KIAS. Slow to 66 KIAS when landing is assured.

Circling Approach Profile



Holding

1. Slow to 100 KIAS holding speed 3 minutes prior to fix
2. Make proper entry
3. Report altitude and time at holding fix
4. Hold at 100 KIAS, with 1 minute leg to the inbound fix (unless otherwise specified)

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. 100 KIAS (approx. 2300 RPM), maintain altitude
3. Cruise configuration flow
4. Roll into 45° 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 roll in opposite direction
8. Roll out ½ bank angle prior to entry heading
9. *"Cruise Checklist"*

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 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., aircraft 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
   (FGA - max 30° bank)
7. Recover - max power/maintain altitude/reduce flaps to 0°
8. Accelerate to 64 KIAS (V_X)
9. *"Cruise Checklist"*

Power off Stalls

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 the landing configuration.

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. Pitch to maintain altitude (slowly), and acknowledge cues of the impending stall
8. At stall/first indication of impending stall (as required) recover - simultaneously reduce AOA, max power, and level wings
9. Slowly retract flaps to 10°
10. Accelerate to 64 KIAS (V_X), positive rate
11. Retract flaps to 0°
12. *"Cruise Checklist"*

Power off Stalls

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. Approx. 1500 RPM (maintain altitude)
3. Clean configuration
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 stall/first indication of impending stall (as required) recover - simultaneously reduce AOA, max power, and level wings
7. Accelerate to 64 KIAS (V_X), positive rate
8. *"Cruise Checklist"*