



## Introduction

Thank you for choosing ATP for your flight program.

ATP flies over 11,000 hours per month to provide over 4,500 FAA certificates each year. ATP is committed to providing you low prices; efficient, standardized, and effective flight programs; and—most importantly—the highest level of safety.

To maximize the effectiveness of your flight program, ATP's *Piper Seminole Training Supplement* contains a condensed overview of multi-engine aerodynamics, portions of the Piper Seminole POH, and flight procedures. You must have a complete knowledge of all information contained in this supplement prior to the start of your program. This information will assist you with your training and flight check.

It is critical that you **memorize** the following:

- Emergency Engine Failure Checklists.
- V-Speeds.
- Answers to all questions contained in the "Oral Review" section in the back of the supplement.

The information in this supplement is highly condensed and serves as a good quick reference, but it must not be used as a substitute for the FAA-approved pilot's operating handbook required for safe operation of the airplane.

Thank you for giving ATP an opportunity to serve you.

# Contents

Version 6.6 (4/29/2009)

<b>Engine-Out Aerodynamics.....</b>	<b>1</b>	Approach Briefing .....	22
Aerodynamic Effects of an Engine Failure ..	1	Announced Calls on Approach .....	22
Approximate Drag Factors .....	2	Stabilized Approach Corridor .....	23
Airspeeds for Max SE Performance.....	2	Go Around Philosophy.....	23
Sideslip Versus Zero Sideslip .....	3	Normal Landing.....	24
Single-Engine Service Ceiling.....	4	Normal Visual Approach and Landing.....	24
Single-Engine Absolute Ceiling.....	4	ILS Approach One or Two Engines.....	26
Climb Performance Factors .....	4	Non-Precision Straight-In Approach .....	27
Critical Engine.....	4	Circle to Land Approaches Two Engine.....	28
V <sub>MC</sub> .....	6	Go Around / Missed Approach .....	29
<b>Aircraft Systems .....</b>	<b>8</b>	Holding .....	29
Engines.....	8	Approach, PT & Holding Power Settings...	29
Propellers.....	8	In-Flight Maneuvers.....	30
Landing Gear .....	10	Clearing Turns for In-Flight Maneuvers .....	30
Brakes.....	10	V <sub>MC</sub> Demonstration .....	31
Flaps.....	11	Maneuvering w/One Engine Inoperative ...	32
Vacuum Pumps.....	11	Example SE Drift Down Scenario .....	32
Pitot Static.....	11	Airstart Procedure .....	34
Fuel System .....	12	Emergency Descent.....	35
Electrical System .....	12	Recovery from Unusual Attitudes .....	35
Heater .....	13	Spin Awareness.....	35
Stall Warning Horn.....	13	<b>Airline Transport Pilot .....</b>	<b>37</b>
Emergency Exit.....	14	Steep Turns .....	37
Inoperative Instruments and Equipment...	14	Approach to Stall in Approach Config .....	37
Differences in '79 & '00 Seminoles.....	15	Approach to Stall in Landing Config.....	38
<b>Performance / Weight &amp; Balance</b>	<b>16</b>	<b>Commercial ME Add-On .....</b>	<b>39</b>
Piper Seminole V-Speeds .....	16	Steep Turns .....	39
Performance Charts .....	17	Maneuvering During Slow Flight.....	39
Sample Weight & Balance Problem .....	17	Power-Off Stall .....	40
Formulas .....	18	Power-On Stall.....	41
CG Envelope Graph.....	18	Short Field Visual Approach and Landing.	42
<b>Flight Check Tasks &amp; Procedures</b>	<b>19</b>	Short Field Takeoff and Climb (Flaps 0°) ..	43
Passenger Briefing .....	19	<b>CFI Multi-Engine Add-On .....</b>	<b>44</b>
Pre-Takeoff Briefing.....	19	Airspeed Drag Demonstration .....	44
Normal Takeoff .....	20	<b>Private Pilot ME Add-On .....</b>	<b>45</b>
Engine Failure Procedure.....	21	<b>Oral Review.....</b>	<b>46</b>

Copyright © 2009 Airline Transport Professionals, Inc.

The content of this manual is furnished for informational use only, and is subject to change without notice. Airline Transport Professionals, Inc. assumes no responsibility or liability for any errors or inaccuracies that may appear in this manual. This manual does not replace the Piper Seminole Pilot Operating Handbook, FAA Airplane Flying Handbook, or Practical Test Standards. Nothing in this manual shall be interpreted as a substitute for the exercise of sound judgement.

No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means electronic, mechanical or otherwise, without the prior written permission of Airline Transport Professionals, Inc.

**800-ALL-ATPS**

# Engine-Out Aerodynamics

## Aerodynamic Effects of an Engine Failure

When an engine failure occurs in a multi-engine aircraft, asymmetric thrust and drag cause the following effects on the aircraft's axes of rotation:

### *Pitch Down (Lateral Axis)*

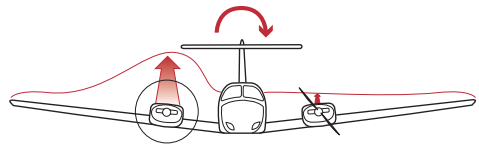
Loss of accelerated slipstream over the horizontal stabilizer causes it to produce less negative lift, causing the aircraft to pitch down. To compensate for the pitch down effect, additional back pressure is required.



The Seminole has a lesser pitch-down effect than most light twins because the T-tail configuration removes the horizontal stabilizer from the accelerated slipstream.

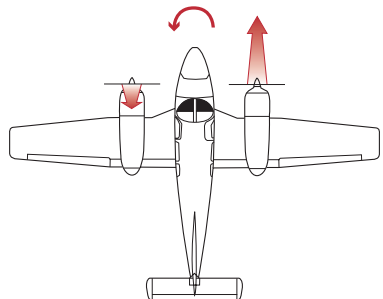
### *Roll Toward the Failed Engine (Longitudinal Axis)*

The wing produces less lift on the side of the failed engine due to the loss of accelerated slipstream. Reduced lift causes a roll toward the failed engine and requires additional aileron deflection into the operating engine.



### *Yaw Toward the Dead Engine (Vertical Axis)*

Loss of thrust and increased drag from the windmilling propeller cause the aircraft to yaw toward the failed engine. This requires additional rudder pressure on the side of the operating engine. "Dead foot, dead engine."



## Engine Inoperative Climb Performance

Climb performance depends on the excess power needed to overcome drag. When a multi-engine airplane loses an engine, the airplane loses 50% of its available power. This power loss results in a loss of approximately 80% of the aircraft's excess power and climb performance. Drag is a major factor relative to the amount of excess power available. An increase in drag (such as the loss of one engine) must be offset by additional power. This additional power is now taken from the excess power, making it unavailable to aid the aircraft in climb. When an engine is lost, maximize thrust (full power) and minimize drag (flaps and gear up, prop feathered, etc.) in order to achieve optimum single-engine climb performance.

### Approximate Drag Factors per the Piper Seminole POH

1. Flaps 25° -240 FPM
2. Flaps 40° -275 FPM
3. Windmilling Prop -200 FPM
4. Gear Extended -250 FPM



ATP, Inc.'s experience indicates more than -200 FPM drag from the windmilling prop.

---

#### *Under FAR Part 23:*

The FAA does not require multi-engine airplanes that weigh less than 6000 pounds or have a  $V_{S0}$  speed under 61 knots to meet any specified single-engine performance criteria. No single engine climb performance is required. Actual climb performance is documented by the manufacturer.



The Seminole's max TOW is 3800 pounds and  $V_{S0}$  speed is 55 KIAS. Review the POH for single-engine climb performance for specific conditions.

---

## Airspeeds for Max Single-Engine Performance

$V_{XSE}$

The airspeed for the steepest angle of climb on single-engine.

$V_{YSE}$

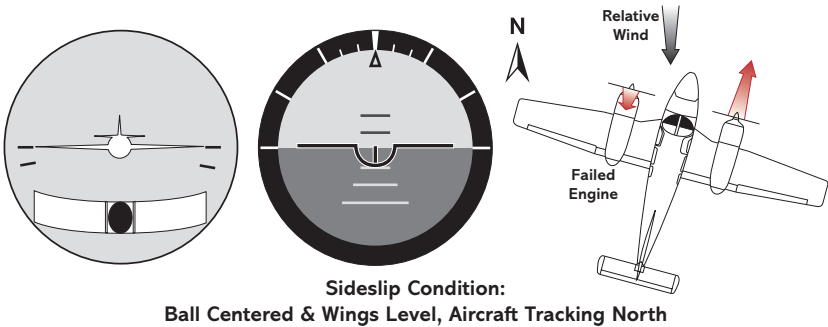
The airspeed for the best rate of climb on single-engine. (Or for the slowest loss of altitude on drift-down.) Blue line is the marking on the airspeed indicator corresponding to  $V_{YSE}$  at max weight.

## Sideslip Versus Zero Sideslip

During flight with one engine inoperative, proper pilot technique is required to maximize aircraft performance. An important technique is to establish a Zero Sideslip Condition.

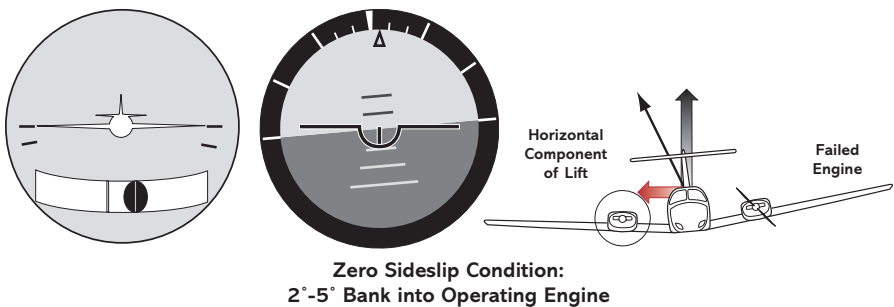
### *Sideslip Condition (Undesirable)*

When an engine failure occurs, thrust from the operating engine yaws the aircraft. To maintain aircraft heading with the wings level, rudder must be applied toward the operating engine. This rudder force results in the sideslip condition by moving the nose of the aircraft in a direction resulting in the misalignment of the fuselage and the relative wind. This condition usually allows the pilot to maintain aircraft heading; however, it produces a high drag condition that significantly reduces aircraft performance.



### *Zero Sideslip Condition (Best Performance)*

The solution to maintaining aircraft heading and reducing drag to improve performance is the Zero Sideslip Condition. When the aircraft is banked into the operating engine (usually  $2^{\circ}$  -  $5^{\circ}$ ), the bank angle creates a horizontal component of lift. The horizontal lift component aids in counteracting the turning moment of the operating engine, minimizing the rudder deflection required to align the longitudinal axis of the aircraft to the relative wind. In addition to banking into the operating engine, the appropriate amount of rudder required is indicated by the inclinometer ball being "split" towards the operating engine side. The Zero Sideslip Condition aligns the fuselage with the relative wind to minimize drag and must be flown for optimum aircraft performance.



## Single-Engine Service Ceiling

Single-engine service ceiling is the maximum density altitude at which the single-engine best rate of climb airspeed ( $V_{YSE}$ ) will produce a 50 FPM rate of climb with the critical engine inoperative.

## Single-Engine Absolute Ceiling

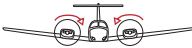
Single-engine absolute ceiling is the maximum density altitude that an aircraft can attain or maintain with the critical engine inoperative.  $V_{YSE}$  and  $V_{XSE}$  are equal at this altitude. The aircraft drifts down to this altitude when an engine fails.

## Climb Performance Depends on Four Factors

- **Airspeed:** Too little or too much will decrease climb performance.
- **Drag:** Gear, Flaps, Cowl Flaps, Flight Control Deflection, Prop, and Sideslip.
- **Power:** Amount available in excess of that needed for level flight.  
(Engines may require leaning due to altitude for max engine performance.)
- **Weight:** Passengers, baggage, and fuel load greatly affect climb performance.

## Critical Engine

The critical engine is the engine that, when it fails, most adversely affects the performance and handling qualities of the airplane.



The Seminole is equipped with a counter-rotating propeller on the right engine. The failure of either engine has the same effects on performance. This is why the Seminole does not have a critical engine.

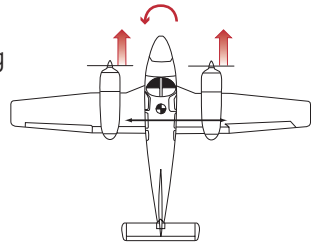
---

On most multi-engine aircraft, both propellers rotate clockwise as viewed from the cockpit. By understanding the following factors when flying an aircraft that has both propellers rotating clockwise, it will be apparent that a left-engine failure makes the aircraft more difficult to fly than a right-engine failure. The clockwise rotation of the props contributes to the following factors that cause the left engine to be critical:

- |          |                        |
|----------|------------------------|
| <b>P</b> | P-Factor               |
| <b>A</b> | Accelerated Slipstream |
| <b>S</b> | Spiraling Slipstream   |
| <b>T</b> | Torque                 |

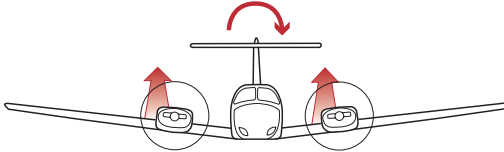
### *P-Factor (Yaw)*

Both propellers turn clockwise as viewed from the cockpit. At low airspeeds and high angles of attack, the descending blade produces more thrust than the ascending blade due to its increased angle of attack. Though both propellers produce the same overall thrust, the descending blade on the right engine has a longer arm from the CG (or greater leverage) than the descending blade on the left engine. The left engine produces the thrust closest to center line. The yaw produced by the loss of the left engine will be greater than the yaw produced by the loss of the right engine, making the left engine critical.



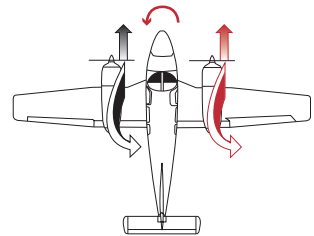
### *Accelerated Slipstream (Roll and Pitch)*

P-Factor causes more thrust to be produced on the right side of the propeller. This yields a center of lift that is closer to the aircraft's longitudinal axis on the left engine and further from the longitudinal axis on the right engine and also results in less negative lift on the tail. Because of this, the roll produced by the loss of the left engine will be greater than the roll produced by the loss of the right engine, making the left engine critical.



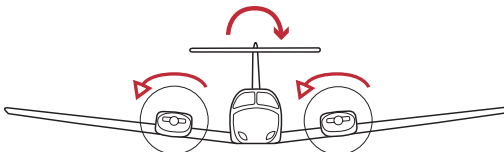
### *Spiraling Slipstream (Yaw)*

A spiraling slipstream from the left engine hits the vertical stabilizer from the left, helping to counteract the yaw produced by the loss of the right engine. However, with a left engine failure, slipstream from the right engine does not counteract the yaw toward the dead engine because it spirals away from the tail, making the left engine critical.



### *Torque (Roll)*

For every action, there is an equal and opposite reaction. Since the propellers rotate clockwise, the aircraft will tend to roll counterclockwise. When the right engine is lost, the aircraft will roll to the right. The right rolling tendency, however, is reduced by the torque created by the left engine. When the left engine is lost, the aircraft will roll to the left, and the torque produced by the right engine will add to the left rolling tendency requiring more aileron input, which increases drag, making the left engine critical.



## Summary

On most light multi-engine aircraft when the critical engine is inoperative, both directional control and performance suffer more than when the non-critical engine is inoperative.

## $V_{MC}$

$V_{MC}$  is the minimum airspeed at which directional control can be maintained with the critical engine inoperative.  $V_{MC}$  speed is marked on the airspeed indicator by a red radial line. Aircraft manufacturers determine  $V_{MC}$  speed based on conditions set by the FAA under FAR §23.149:

1. Most Unfavorable Weight and Center of Gravity
2. Standard Day Conditions at Sea Level (Max Engine Power)
3. Maximum Power on the Operating Engine (Max Yaw)
4. Critical Engine Prop Windmilling (Max Drag)
5. Flaps Takeoff Position, Landing Gear Up, Trimmed for Takeoff (Least Stability)
6. Up to 5° of Bank into the Operating Engine

Any change to the above conditions changes  $V_{MC}$  speed, possibly significantly. The following summarizes how  $V_{MC}$  may be affected by the above conditions:

### *1. Most Unfavorable Weight and Center of Gravity*

The certification test allows up to 5° bank into the operating engine. In a given bank, the heavier the aircraft, the greater the horizontal component of lift that adds to the rudder force. As weight increases, the horizontal component of lift increases, which added to the rudder, decreases  $V_{MC}$ . As the center of gravity moves forward, the moment arm between the rudder and the CG is lengthened, increasing the leverage of the rudder. This increased leverage increases the rudder's effectiveness and results in a lower  $V_{MC}$  speed.

### *2. Standard Day Sea Level*

Standard conditions yield high air density that allows the engine to develop maximum power. An increase in altitude or temperature (a decrease in air density) will result in reduced engine performance and prop efficiency. This decreases the adverse yaw effect.  $V_{MC}$  speed decreases as altitude increases.

### *3. Maximum Power On The Operating Engine*

When the operating engine develops maximum power, adverse yaw is increased toward the inoperative engine. The pilot must overcome this yaw to maintain directional control. Any condition that increases power on the operating engine will increase  $V_{MC}$  speed. Any



condition that decreases power on the operating engine (such as power reduction by the pilot, an increase in altitude, temperature, low density, or aging engine) will decrease  $V_{MC}$ .

#### **4. Critical Engine Prop Windmilling**

When the propeller is in a low pitch position (unfeathered), it presents a large area of resistance to the relative wind. This resistance causes the engine to “windmill.” The windmilling creates a large amount of drag and results in a yawing moment into the dead engine. When the propeller is “feathered,” the blades are in a high pitch position, which aligns them with the relative wind, minimizing drag. A feathered prop will decrease drag and lower  $V_{MC}$ .

#### **5. Flaps Takeoff Position, Landing Gear Up, Trimmed for Takeoff**

When the gear is extended, the gear and gear doors have a keel effect, reducing the yawing tendency and decreasing the  $V_{MC}$  speed. Extended flaps have a stabilizing effect that may reduce  $V_{MC}$  speed.

#### **6. Up to 5° Bank into the Operating Engine**

When the wings are level, only the rudder is used to stop the yaw produced by the operating engine (sideslip condition). Banking into the operating engine creates a horizontal component of lift which aids the rudder force. With this horizontal component of lift and full rudder deflection,  $V_{MC}$  is at the lowest speed.  $V_{MC}$  increases with decreasing bank by a factor of approximately 3 knots per degree of bank angle.



At  $V_{MC}$ , the rudder pedal force required to maintain control must not exceed 150 pounds and it must not be necessary to reduce power of the operative engine(s). During the maneuver, the airplane must not assume any dangerous attitude and it must be possible to prevent a heading change of more than 20°.

---



Piper determined  $V_{MC}$  for the Seminole at 1,500' MSL with a weight of 2,730 Lbs. and 5° bank into the operating engine. The test results were then computed to sea level conditions.

Note: Each aircraft is different and may be subject to different handling qualities than discussed here. Recovery from loss of directional control should always follow the guidelines of the POH and FAA Airplane Flying Handbook.

---

# Aircraft Systems

## Engines

The Seminole is equipped with two Lycoming, 4-cylinder, O-360 (opposed, 360 cubic inch) engines rated at 180 horsepower at 2700 RPM. The right engine is designated as an LO-360 due to the fact that it rotates to the left. The engines are 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 engine-driven magnetos which are independent of the aircraft's electrical system and each other.

<b>L</b>	Lycoming
<b>H</b>	Horizontally Opposed
<b>A</b>	Air Cooled
<b>N</b>	Normally Aspirated
<b>D</b>	Direct Drive

### *Carburetor Icing*

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

## Propellers

The Seminole is equipped with Hartzell two-bladed, controllable pitch, constant speed, full feathering metal propellers.

### ***Controllable Pitch***

Controllable pitch is the ability to control engine RPM by varying the pitch of the propeller blades. When the blue propeller control handle is moved forward, oil pressure, regulated by a propeller governor, drives a piston, which moves the blades to a low pitch–high RPM (unfeathered) position. When the blue propeller control handle is moved aft, oil pressure is reduced by the propeller governor. This allows a nitrogen-charged cylinder, spring, and centrifugal counterweights to drive the blades to a high pitch–low RPM (feathered) position.

### ***Constant Speed***

After RPM setting is selected with the blue propeller control handles, the propeller governor will automatically vary oil pressure inside the propeller hub to change the propeller blade pitch in order to maintain a constant engine RPM. Because of this, changes in power setting (manifold pressure) and flight attitude will not cause a change in RPM.

### ***Full Feathering***

When the propeller blades are in alignment with the relative wind, they are feathered. Feathered propeller blades reduce the drag caused by the blade area exposed to the relative wind. Feathering the propeller blades on the Seminole is accomplished by moving the blue propeller control handle fully aft past the low RPM detent, into the “FEATHER” position. The propeller takes approximately six seconds to feather. When feathering the propeller, the mixture should be placed to cutoff to stop engine combustion and power production.

The Seminole is equipped with a centrifugal stop pin that prevents propeller feathering below 950 RPM. The purpose of this is to allow the propeller blades to remain in a low pitch upon engine shutdown. This will prevent excessive loads on the engine starter during the next engine start.

Regardless of the Prop Lever position, if oil pressure is lost, the propeller will feather when the RPM is above 950 RPM. Typically, RPM will be above 950 in flight and on takeoff roll and landing roll due to airflow over the propeller.

### ***Propeller Overspeed***

Propeller overspeed is usually caused by a malfunction in the propeller governor which allows the propeller blades to rotate to full low pitch. If propeller overspeed should occur, retard the throttle. The propeller control should be moved to full “DECREASE RPM” and then set if any control is available. Airspeed should be reduced and throttle used to maintain a maximum of 2700 RPM.

## Landing Gear

The Seminole is equipped with hydraulically actuated, fully retractable, tricycle-type landing gear. Hydraulic pressure for gear operation is provided by an electrically powered, reversible hydraulic pump. The gear is held in the up position solely by hydraulic pressure. Springs assist in gear extension and in locking the gear in the down position. After the gear is down and the downlock hooks engage, springs maintain force on each hook to keep it locked until it is released by applying hydraulic pressure with the gear selector.

A gear warning system is activated under any of the following conditions:

1. The gear is not locked down with the throttle lever positioned below approximately 15" manifold pressure (MP) on one or both engines.
2. The gear is not locked down with wing flaps selected to 25° or 40°.
3. The gear handle is in the up position on the ground (tested only by authorized maintenance personnel).

Gear retraction on the ground is prevented by a squat switch located on the left main landing gear. On the ground, the switch is open, preventing electrical current from reaching the hydraulic pump. Once airborne, the strut becomes fully extended, closing the switch that allows current to reach the hydraulic pump.

In the event of a hydraulic malfunction, the landing gear may be extended by the use of the red emergency gear extension knob. After placing the gear selector in the down position, pulling the red emergency gear extension knob releases the hydraulic pressure which is holding the gear in the up position and allows the gear to free-fall down. The positive gear down indication is 3 green lights. Emergency gear extension is limited to a maximum of 100 KIAS due to air-load on the nose gear. When dealing with a suspected landing gear problem, it is important to verify the position of the navigation light switch. This switch will cause the green lights to be dimmed and, in some cases, make them impossible to see during the day. As with any emergency or abnormality, always refer to the appropriate checklist.

Note: If hydraulic pressure is lost with gear retracted, the gear will free-fall.

The nose wheel is steered through the use of the rudder pedals and is steerable 30 degrees either side of center.

## Brakes

The Seminole is equipped with hydraulically actuated disk brakes on the main landing gear wheels. Braking is accomplished by depressing the tops of the rudder pedals. The

hydraulic system for the brakes is independent of that for the landing gear. The brake fluid reservoir for servicing is located in the nose cone. To set the parking brake, hold the brakes and pull the black parking brake knob.



ATP Seminole are equipped with heavy duty brakes. Refer to the POH to make the required adjustment to performance calculations.

The parking brake is *not* to be used in training or flight checks with ATP, Inc.

All ATP Seminole have heavy duty brakes installed.

---

## Flaps

The Seminole 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.



ATP, Inc. operations require Flaps 25° for all landings except the short field, which requires Flaps 40°. Flaps 25° causes a gear warning indication if the gear is not down.

---

## Vacuum Pumps

The Seminole is equipped with two engine-driven vacuum pumps. The vacuum system operates the attitude gyro and, on aircraft without slaving mechanisms installed, the HSI. Suction limits are 4.8 to 5.2 inches of mercury at 2000 RPM. The failure of a vacuum pump is indicated by an annunciator panel light and a red, pump inoperative indicator on the vacuum gauge. In most circumstances, the failure of one pump alone will not cause the loss of any instruments because the remaining pump should handle the entire vacuum demand.

## Pitot Static

The heated pitot tube and static port are located underneath 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 heater and defroster must be turned 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 VSI.

## Fuel System

The Seminole, which uses 100 low lead avgas (blue), is equipped with two 55-gallon bladder nacelle tanks. One gallon is unusable in each tank.

There are two engine-driven and two electrically driven fuel pumps. The electric fuel pumps are used for engine start, takeoff, landing, and fuel selector changes.



ATP, Inc. uses the electric fuel pumps for in-flight maneuvers, except for steep turns.

---

The aircraft is equipped with a three-position fuel selector for each engine. The positions are "ON", "OFF", and "X-FEED" (cross feed). The fuel selectors remain in the "ON" position during normal operations, and each engine draws fuel from the tank on the same side as the engine. When "X-FEED" is selected, the engine draws fuel from the tank on the opposite side. Fuel cannot be transferred from tank to tank. Crossfeed operation is limited to straight and level flight only.

The correct procedure for crossfeed operations to supply the left engine with fuel from the right tank is:

1. Left engine electric boost pump on.
2. Left fuel selector selected to "X-FEED."
3. Check left fuel pressure.
4. Left engine electric boost pump off.
5. Check fuel pressure.

## Electrical System

The Seminole is equipped with a 14-volt electrical system which utilizes push-pull type circuit breakers; a 12-volt, 35 amp hour battery; and two 70-amp, engine-driven alternators. Voltage regulators maintain constant 14-volt output from each alternator at varying engine RPMs, effectively sharing the electrical load. Loss of one alternator is indicated by an annunciator light and a zero indication on the loadmeter. The remaining alternator will normally provide adequate electrical power.

Over-voltage protection is provided if system voltage exceeds 17 volts. If an over-voltage occurs the battery is then the sole source of electrical power. The battery is used as a source of emergency electrical power and for engine starts. High drain items include the lights, vent fan, heater, gear hydraulic pump, and radios. If an electrical problem arises, always check circuit breakers. If a circuit breaker is popped, reset only one time.

## Heater

Heat to the cabin is supplied by a Janitrol gas combustion heater located in the nose compartment. Air from the heater is distributed by a manifold to the ducts along the cabin floor to outlets at each seat and to the defroster outlet. Operation of the heater is controlled by a three-position switch located on the instrument panel labeled “CABIN HEAT”, “OFF”, and “FAN.” Airflow and temperature are regulated by the three levers to the right of the switch: “AIR INTAKE”, “TEMP”, and “DEF.”

For cabin heat, the “AIR INTAKE” lever must be fully open and the “CABIN HEAT” switch on. This simultaneously starts fuel flow and ignites heater. During ground operation, it also activates the ventilation blower. When cabin air reaches the temperature selected on the “TEMP” lever, ignition of the heater cycles automatically to maintain the selected temperature.

Two safety switches activated by the intake valve and located aft of the heater unit prevent both fan and heater operation when the air intake lever is in the closed position. A micro switch, which actuates when the landing gear is retracted, turns off the ventilation blower so that in flight the cabin air is circulated by ram air pressure only.

An overheat switch in the heater acts as a safety device to render the heater inoperative if a malfunction should occur. Should the switch deactivate the heater, the red “HEATER OVER TEMP” annunciator light on the instrument panel will illuminate. The overheat switch is located on the aft inboard end of the heater vent jacket. A red reset button is located on the heater shroud in the nose cone compartment.

To prevent activation of the overheat switch upon normal heater shutdown during ground operation, turn the three-position switch to “FAN” for two minutes with the air intake lever in the open position before turning the switch off. During flight, leave the air intake open for a minimum of 15 seconds after turning the switch to off.

Fuel is supplied to the heater at a rate of ½ gallon per hour from downstream of the left fuel selector and filter.

To introduce outside, *unheated* air into the cabin during flight, the “AIR INTAKE” lever should be open and the “CABIN HEAT” off. A fresh air blower is installed to provide airflow during ground operation. It is operated by a high/low blower fan switch.

## Stall Warning Horn

The Seminole is equipped with two electric stall detectors located on the left wing. The inboard detector provides stall warning at flaps 25° or 40° and the outboard at flaps 0°

or 10°. The purpose of the two tabs is to provide adequate stall warning at varied angles of attack. The electric stall tabs are deactivated on the ground through the use of the squat switch on the left main landing gear.

## **Emergency Exit**

The emergency exit is the pilot's left side window. Use this when emergency egress becomes necessary on the ground and the main entry door is unavailable due to fire, etc. The emergency exit release handle is located beneath the thermoplastic cover on the vertical post between the first and second left side windows. To exit the aircraft, remove the thermoplastic cover, pull the release handle forward and then push the window out. The window then will fall free from the fuselage.

## **Inoperative Instruments and Equipment per FAR 91.213**

ATP, Inc.'s aircraft do not operate under the guidance of a minimum equipment list (MEL). ATP's aircraft operate in accordance with the following FAR 91.213 subpart. Because this is only an excerpt, the complete subpart should be referred to 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.



## Notable Differences in 1979/80 & 2000/01 Seminole

	1979/80	2000/01
<b>Engines</b>	Left: O-360-E1A6D Right: LO-360-E1A6D	Left: O-360-A1H6 Right: LO-360-A1H6
<b>Oil Capacity</b>	<ul style="list-style-type: none"> <li>• 4 to 6 Quarts</li> <li>• ATP Minimum 4.5 Quarts</li> </ul>	<ul style="list-style-type: none"> <li>• 6 to 8 Quarts</li> <li>• ATP Minimum 6.5 Quarts</li> </ul>
<b>Minimum Oil Pressure</b>	15 PSI	25 PSI
<b>Landing Gear Mute Switch</b>	N/A	Do not use.
<b>Primer</b>	<ul style="list-style-type: none"> <li>• Manual/Plunger</li> <li>• Ports Fuel Into Cylinders 1, 2 &amp; 4</li> </ul>	<ul style="list-style-type: none"> <li>• Button/Electric</li> <li>• Electric Fuel Pump Must be On</li> <li>• Press Primer Button 2-3 Sec. before Starting Cold Engine</li> <li>• Ports Fuel Into Cylinders 1, 2 &amp; 4</li> </ul>
<b>Recognition Lights</b>	N/A	<ul style="list-style-type: none"> <li>• Located on Each Wingtip</li> <li>• Used Instead of Landing Light for Recognition</li> <li>• Saves Landing Light for Night Landing/Takeoff</li> </ul>
<b>Fin Strobe &amp; Strobe Light Rocker Switch</b>	Anti-Collision Lights Only (Strobes)	<ul style="list-style-type: none"> <li>• Rocker Switch Down for Ground Use (Fin Strobe / Rotating Beacon)</li> <li>• Rocker Switch Up Before Takeoff / Flight Use (Strobes)</li> </ul>
<b>“LO BUS” Annunciator Light</b>	N/A	Illuminates Red when Alternators not Providing 14 V DC to the tie bus, and bus voltage drops to battery voltage, 12 V DC
<b>Unfeathering Accumulators</b>	N/A	<ul style="list-style-type: none"> <li>• Stores Engine Oil Under Pressure for Air-Starting the Engine</li> <li>• Releases Stored Pressure Back to Prop Governor when Prop Lever Moved Forward</li> <li>• Oil Pressure Drives the Blades from the Feathered Position Toward Low-Pitch (Windmilling)</li> <li>• Windmilling Prop with Addition of Fuel and Ignition will Allow the Engine to Start</li> </ul>
<b>Airstart</b>	<ul style="list-style-type: none"> <li>• Starter Only</li> <li>• Be Sure to Only Engage the Proper Side of the Rocker Start Switch</li> <li>• Pressing the Wrong Side will Cause Engine Damage to the Operating Engine</li> </ul>	<ul style="list-style-type: none"> <li>• Unfeathering Accumulator</li> </ul> <p>The 2000 Seminole utilizes a prop unfeathering accumulator which stores engine oil under pressure for airstarting the engine. The stored pressure is released back to the prop governor when the prop lever is moved forward. Oil pressure drives the blades from the feathered position toward low-pitch windmilling. When the prop is windmilling, the addition of fuel and ignition will allow the engine to start.</p>

# Performance / Weight & Balance

## Piper Seminole V-Speeds

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

V-Speed	KIAS	Description	Airspeed Indicator Marking
V <sub>SO</sub>	55	Stall speed in landing configuration	Bottom of White Arc
V <sub>MC</sub>	56	Minimum controllable airspeed	Red Line
V <sub>S</sub>	57	Stall speed with zero flaps	Bottom of Green Arc
V <sub>R</sub>	75	Rotation speed (start rotation)	
V <sub>X</sub>	82	Best angle of climb	
V <sub>XSE</sub>	82	Best angle of climb single-engine	
V <sub>SSE</sub>	82	Safe speed for intentional engine failure	
V <sub>Y</sub>	88	Best rate of climb	
V <sub>YSE</sub>	88	Best rate of climb single-engine	Blue Line
V <sub>FE</sub>	111	Maximum flap extension speed	Top of White Arc
V <sub>LO</sub> (Up)	109	Maximum gear retraction speed	
V <sub>LO</sub> (Down)	140	Maximum gear extension speed	
V <sub>LE</sub>	140	Maximum speed with gear extended	
V <sub>NO</sub>	169	Max Structural Cruising Speed	Top of Green Arc
V <sub>NE</sub>	202	Never exceed speed	Red Line
V <sub>A</sub>	135	Maneuvering speed at 3800 pounds	
V <sub>A</sub>	112	Maneuvering speed at 2700 pounds	
Maximum demonstrated crosswind 17			

## Performance Charts

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

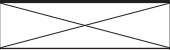
- Takeoff Distance to Clear a 50' Obstacle
- Accelerate Stop Distance (Piper does not provide an Accelerate Stop Distance chart for 2000/2001 models.)
- Single Engine Rate of Climb
- Single Engine Service Ceiling
- Landing Distance

## Sample Weight & Balance Problem

Complete the following sample weight and balance problem.

### Conditions

Basic Empty Weight:..... 2,540.5 lbs.  
 (Remember to use actual aircraft BEW for flight check.)  
 Front Pilots: ..... 370 lbs.  
 Rear Passengers: ..... 170 lbs.  
 Baggage: ..... 3 Bags @ 75 lbs. and 2 Bags @ 50 lbs.  
 (May need to relocate some baggage to rear passenger seats.)  
 Max Ramp Weight:..... 3,816 lbs.  
 Max Takeoff/Landing Weight: ..... 3800 lbs.  
 Max Baggage Weight: ..... 200 lbs.  
 Max Usable Fuel:..... 108 gal.

	<b>Weight</b>	<b>× Arm</b>	<b>= Moment</b>
Basic Empty Weight		86.13	
Front Pilots	+	80.5	+
Rear Passengers	+	118.1	+
Baggage 200 lbs. Max	+	142.8	+
<b>Zero Fuel Weight</b>	=	CG CG = Moment / Weight	=
Usable Fuel	+	95.0	+
<b>Ramp Weight</b>	=		
Taxi Fuel (2.65 Gal.)	–	16 95.0	– 1520
<b>Takeoff Weight</b>	=	CG CG = Moment / Weight	=

### Calculate the Following

1. Zero Fuel CG
2. Usable Fuel
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?

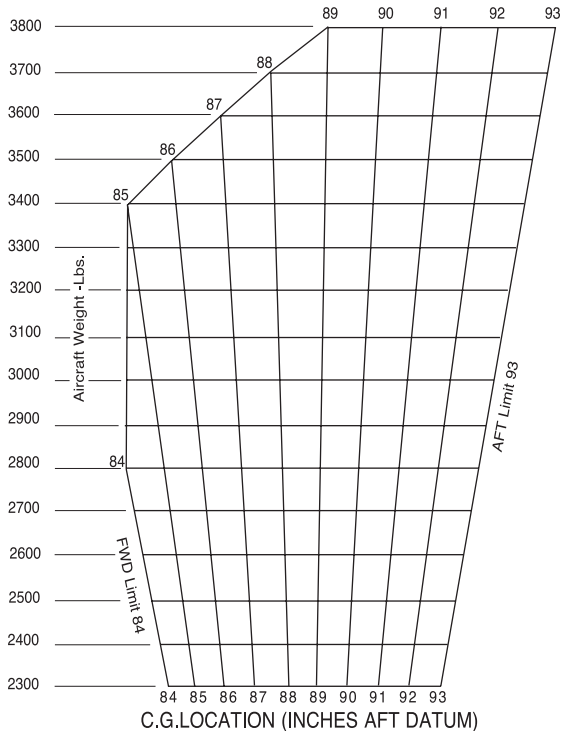
Plot Zero Fuel CG and Takeoff CG on the CG Envelope Graph Below

Answers: (1) 91.6 (2) 68.4 Gal. (3) 3800 Lbs. (4) 91.9 (5) Forward

### Formulas

- $\text{Weight} \times \text{Arm} = \text{Moment}$
- $\text{Total Moment} \div \text{Total Weight} = \text{CG}$
- $\text{Max Ramp Weight} - \text{Zero Fuel Weight} = \text{Usable Fuel Weight}$
- $\text{Fuel Weight} \div 6 = \text{Fuel Gallons}$
- 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



---

# Flight Check Tasks & 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 - Throttles immediately closed
- Brake as required - Stop straight ahead

If not enough runway to stop:

- Mixture to cutoff
- Fuel selectors, Magnetos, & Battery Master Off
- Maintain directional control, avoid obstacles

Engine failure after rotation with gear down & sufficient runway remains for a complete stop:

- Maintain directional control
- Throttles immediately closed
- Land straight ahead, brake as required

Engine failure after rotation with gear up and decision made to continue:

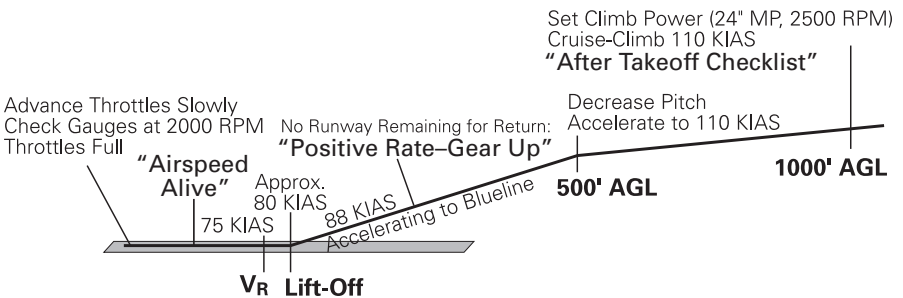
- Maintain directional control/Pitch Attitude/Airspeed
- Mixtures, Props, Throttles Full Forward
- Flaps and Gear Up
- Identify with dead foot, Verify by closing the throttle
- Feather Prop
- Mixture to cutoff
- Climb at 88 KIAS/Blueline
- Declare an Emergency and Land

## Normal Takeoff (Flaps 0°)

Do not delay on runway.

1. Increase throttles to 2000 RPM.
2. Check engine gauges.
3. Increase throttles to full power.
4. "Airspeed Alive."
5. Start slow rotation at 75 KIAS.  
(Main gear should lift off at approximately 80 KIAS. 75 KIAS is  $V_R$ , not  $V_{LOF}$ .)
6. Accelerate to 88 KIAS/Blueline ( $V_Y$ ).
7. Establish a positive rate of climb and retract the gear if no runway remains.  
(When taking off from runways 4000' or less, no runway usually remains after a positive rate of climb has been established.)
8. Climb at 88 KIAS/Blueline ( $V_Y$ ) until 500' AGL.
9. Climb at 110 KIAS after passing through 500' AGL.  
(100-110 KIAS provides better visibility and engine cooling. Density altitude, terrain, obstacles, etc. may require a climb speed from 82-100 KIAS.)
10. Reduce throttles to 24" MP, 2500 RPM at 1000' AGL.
11. "After Takeoff Checklist" out of 1000' AGL.

### Normal Takeoff Profile



## Engine Failure Procedure

### *After Takeoff with No Runway Remaining and Gear Up*

Should an engine failure occur after takeoff and gear-up in a light twin, the following three second, step-by-step technique is suggested. For liability purposes, the following procedure does not cover all situations due to aircraft weight, OAT, density altitude, and aircraft performance. Refer to aircraft POH for additional information.

Engine Failure Occurs- Perform the following in 3 seconds.

**One Thousand One:** Decrease pitch attitude to horizon or slightly above – approximately 1° on AI. (If the Seminole is trimmed flying out at 88 KIAS and engine failure occurs, the airplane nose will drop towards the horizon due to loss of lift.)

**One Thousand Two:** Input aileron to bank 2° to 5° into the operating engine. This will assist in directional control and assist in stopping the torque roll effect.

**One Thousand Three:** Input rudder towards the operating engine. Inputting the rudder after accomplishing the above steps in the first two seconds will help alleviate stomping on the wrong rudder, creating a situation of directional control loss, airspeed loss, and possible altitude loss. Immediately accomplish memory items on “In-Flight Engine Failure” checklist.

### ***In-Flight Engine Failure*** ***(After Takeoff)***

(For ATP, Inc. training and checkrides only perform Troubleshoot Checklist at or above 3000' AGL. If an actual engine failure occurs, perform Troubleshoot Checklist only if altitude permits.)

#### **MAINTAIN DIRECTIONAL CONTROL / PITCH ATTITUDE / AIRSPEED**

MIXTURES.....	FULL FORWARD
PROPS.....	FULL FORWARD
THROTTLES.....	FULL FORWARD
FLAPS .....	UP
GEAR.....	UP
IDENTIFY .....	DEAD FOOT
VERIFY/THROTTLE.....	CLOSE
PROP INOP ENG .....	FEATHER
MIXTURE INOP ENG .....	CUTOFF
CLIMB* .....	88 KIAS/BLUELINE
<b>DECLARE AN EMERGENCY WITH ATC</b>	
<b>LAND AT NEAREST SUITABLE AIRPORT</b>	

**EMERGENCY**

# Approach Briefing

## IFR

Field Elevation  
Type of Approach  
NAV Frequency  
Course  
Glideslope Intercept or FAF Altitude  
Minimums  
Missed Approach Procedure

## VFR

Field Elevation  
Pattern Altitude  
Type of Landing  
Brief 400' AGL altitude for  
"Gear Down—Stabilized" call

## Announced Calls on Approach

*"Gear Down 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 or just prior to FAF.

*"Blueline—GUMP." "Gas, Undercarriage, Mixtures, Props."*

- Visual: On base or turning final.
- Instrument: Descending through 1000' AGL.



The GUMP check is a backup before landing checklist that must be demonstrated to insure pilots are familiar with its use when flying light complex aircraft.

---

*"Gear Down—Stabilized."*

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

*"100 To Go."*

- Instrument: Prior to MDA or DH.

*"Minimums."*

- Instrument: at MDA or DH.



## Stabilized Approach Corridor

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

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

A “*Gear Down–Stabilized*” call and verification are required for all approaches at 400' AGL or when descending from MDA.

### *General Conditions for a Stabilized Approach*

- Aircraft in landing configuration. (Gear down and final flaps set.)
- Engines 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 1/3 of the landing runway. If this is not assured, a go-around must be executed.

### *Conditions for a Seminole Stabilized Approach (Normal & Single-Engine)*

- Gear Down, Flaps 25°.
- Power Set Approx. 15" MP (2-engine) or 20" MP (1-engine).
- Approx. 500 FPM Descent.
- Airspeed 88 KIAS at 400' AGL or Descending from MDA.
- “*Gear Down–Stabilized*” Announced & Verified.

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.

***A go-around must be accomplished if at 400' AGL the aircraft is not stabilized with gear down.***

## Go Around Philosophy

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

## Normal Landing

- Verify and announce at 400' AGL: *“Gear Down–Stabilized.”*
- Maintain a stabilized descent angle.
- Reduce throttles slowly over approach end, slow to 80 KIAS
- Touch down at approx. 75 KIAS on centerline within the first 1/3 of the runway.
- Maintain back pressure on control wheel to prevent slamming the nose wheel onto the runway.

### Flap Setting

ATP, Inc. always recommends landing with flaps 25°. The approach speeds used for flaps 25° are the same as flaps 40° for normal landings. Flaps 25° places the airplane in the best configuration for go-arounds and crosswind landings. Note: Flaps 25° also introduces a secondary gear warning. Use pilot discretion for situations requiring a different setting, such as short field landings, single-engine maneuvering or high winds. The revised PA-44-180 operation manual, section 4.31a states: “landing may be made with any flap setting.”

## Normal Visual Approach and Landing

1. Complete the *“Approach Checklist”* before entering the traffic pattern; devote full attention to aircraft control and traffic avoidance.
2. Slow to 100 KIAS prior to entering downwind or traffic pattern.
3. Enter traffic pattern at published TPA (typically 1000' AGL).
4. Announce when abeam approach end, on extended base, or on extended final (When ready to descend out of pattern altitude):  
*“Gear Down Before Landing Checklist.”*
5. Extend flaps 25°.
6. Descend out of TPA at 88 KIAS/Blueline.
7. Announce on base leg or turning final: *“Blueline–GUMP.”*  
*“Gas, Undercarriage, Mixtures, Props.”*
8. Maintain 88 KIAS/Blueline with flaps 25° on base and final.
9. Announce at 400' AGL: *“Gear Down–Stabilized.”*



Whenever leaving TPA you should verify that the *“Gear Down Before Landing Checklist”* has been accomplished.

---

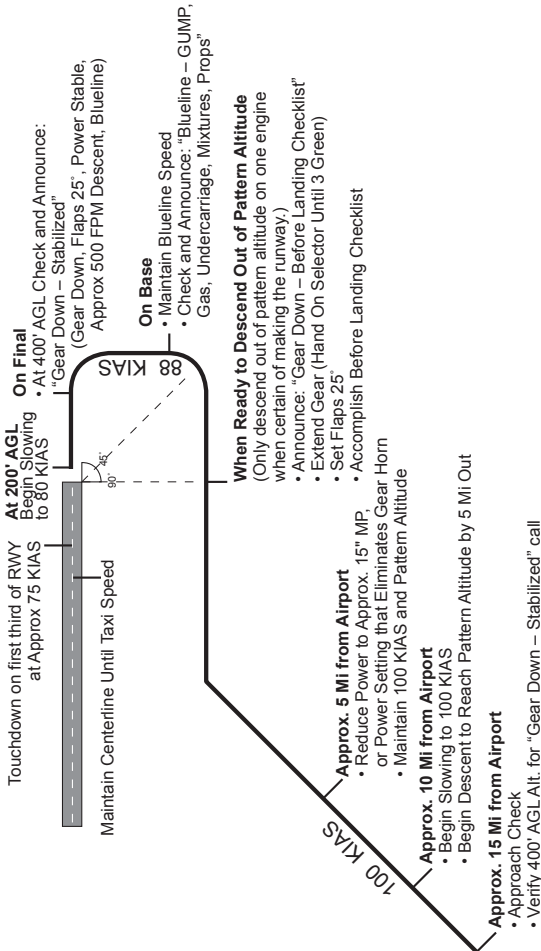
## Gear Down Before Landing Checklist

(ATP, Inc. Max Gear Speed 120 KIAS)

GEAR..... (Hand on Selector Until) **3 GREEN**  
 FUEL SELECTORS.....**ON**  
 FLAPS ..... (Vfe 111 KIAS) **25°**  
 MIXTURES..... **FWD**  
 PROPS..... **FWD**  
 FUEL PUMPS..... **ON**

Checklist Complete

### Normal Visual Approach and Landing Profile

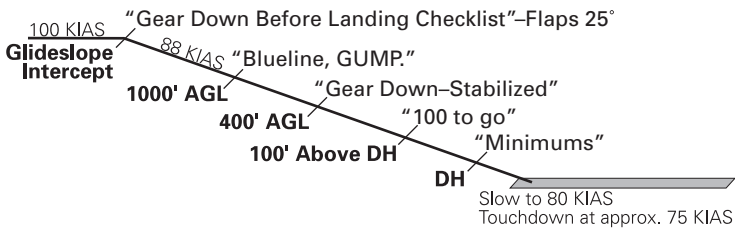


## ILS Approach One or Two Engines

ATP, Inc. recommends initially setting flaps 25° at glideslope intercept for both one and two-engine ILS precision approaches. When conducting a one-engine ILS down to minimums it is assumed that a landing is assured. Flaps 25° allows for a stabilized approach to touchdown for both one and two-engine operations. ATP, Inc. does not recommend a one-engine go around below 400' AGL.

1. Complete the *“Approach Checklist”* and identify localizer when able.
2. Set the published inbound course on the HSI.
3. The aircraft is considered established inbound when the course is alive.
4. Check for flags at glideslope intercept altitude and marker.
5. Maintain 100 KIAS until glideslope intercept.
6. ½ dot below glideslope intercept: *“Gear Down Before Landing Checklist.”*
7. Extend flaps 25°.
8. Descend on glideslope at 88 KIAS/Blue line (or 100 KIAS considering traffic).
9. Announce out of 1000' AGL: *“Blue line–GUMP.”*  
*“Gas, Undercarriage, Mixtures, Props.”*
10. Maintain 88 KIAS/Blue line from 1000' AGL inbound.
11. Announce at 400' AGL: *“Gear Down–Stabilized.”*
12. Announce at 100' above minimums: *“100 To Go.”*
13. *“Minimums.”*

### ILS Approach One or Two Engines Profile



## Non-Precision Straight-In Approach One or Two Engines

For simulated single-engine non-precision straight-in approach: *“Gear Down Before Landing Checklist”* at FAF; Maintain 100 KIAS approach speed and flaps 0°; Flaps 25° descending from MDA, followed by the *“Gear Down–Stabilized”* call. If the airplane will not maintain MDA on a simulated one-engine approach with full power on the operating engine, terminate the approach and use both engines.

## Non-Precision Straight-In Approach One or Two Engines



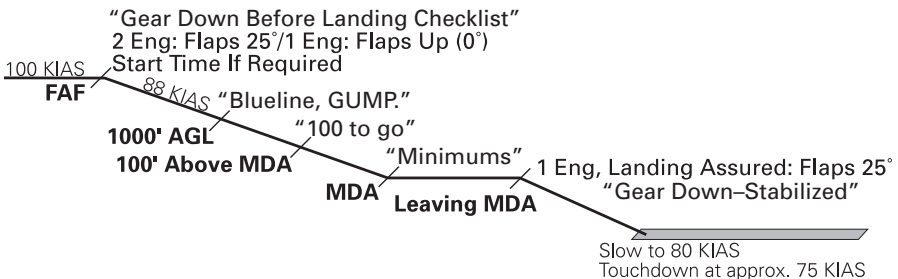
During simulated single-engine training ATP prohibits gear retraction at MDA unless a missed approach is being demonstrated. With an actual engine failure, you may be required to retract the gear to maintain MDA.

1. Complete the *“Approach Checklist”* and identify the NAV aid when able.
2. Maintain 100 KIAS clean (gear up, flaps up) during procedure turn outbound and inbound to the FAF.
3. Set the published inbound course on the HSI.
4. The aircraft is considered established inbound when the course is alive.
5. Check for flags.

Note: On two-engine non-precision approaches it is recommended that the Gear Down Before Landing Checklist is accomplished while inbound just prior (approx. 2 miles) to the FAF. Single-engine non-precision approaches require the gear to be extended no earlier than the FAF due to the drag introduced.

6. At FAF: Start time, *“Gear Down Before Landing Checklist.”*
7. Flaps 0° (one engine) Flaps 25° (two engines).
8. Descend at 88-100 KIAS.
9. Descend at 600-800 FPM at 88 KIAS/Blueline.
10. Announce out of 1000' AGL: *“Blueline–GUMP.”*  
*“Gas, Undercarriage, Mixtures, Props.”*
11. Maintain 88 KIAS/Blueline from 1000' AGL inbound.
12. Announce at 100' above minimums: *“100 To Go.”*
13. *“Minimums.”*
14. Maintain MDA (plus 50' minus 0').
15. Runway in sight: descend at predetermined VDP or maintain MDA to MAP.
16. Do not leave MDA until landing is assured.
17. When descending from MDA:  
Flaps 25° (single-engine), verify and announce: *“Gear Down–Stabilized.”*

### Non-Precision Straight-In Approach One or Two Engines Profile



## Circle to Land Approaches Two Engine

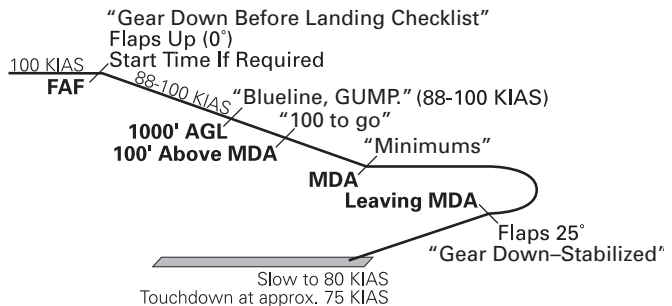


ATP, Inc. prohibits engine-out (actual or simulated) circle to land approaches in the training environment.

ATP requires 88 to 100 KIAS approach speed and flaps 0° for circle to land approaches. Unlike straight-in approaches, maintain 88 to 100 KIAS out of 1000' AGL, descending to MDA. Approach category B is used for minimums. Category B speed ranges from 91 KIAS to 120 KIAS. When leaving MDA, set flaps 25° and verify and announce "Gear Down—Stabilized." Do not exceed 111 KIAS ( $V_{FE}$ ) during approach.

1. Complete the approach checklist and identify the NAV aid when able.
2. Maintain 100 KIAS clean (gear up, flaps up) during procedure turn outbound and inbound to the FAF.
3. Set the published inbound course on the HSI.
4. The aircraft is considered established inbound when the course is alive.
5. Check for flags.
6. At FAF: Start time, "Gear Down Before Landing Checklist."
7. Flaps 0°.
8. Descend at 88-100 KIAS.
9. Descend at 600-800 FPM at 88-100 KIAS.
10. Announce out of 1000' AGL: "Blueline—GUMP."  
"Gas, Undercarriage, Mixtures, Props."  
(You may maintain up to 100 KIAS for circle maneuver at MDA.)
11. Announce at 100' above minimums: "100 To Go."
12. "Minimums."
13. Maintain MDA during circling maneuver (plus 50' minus 0').
14. When turning onto final and descending from MDA:  
Flaps 25°, verify and announce: "Gear Down—Stabilized."

### Circle to Land Approaches Two Engine



## Go Around / Missed Approach

1. Increase throttles to full power.
2. Increase pitch to establish climb.
3. Retract flaps *slowly* to 0°.  
(Slowly to preclude excessive sink.)
4. Retract landing gear upon acquiring positive rate of climb.
5. Climb at 88 KIAS/Blueline ( $V_Y$ ) until 500' AGL.
6. Climb at 110 KIAS after passing through 500' AGL (provides better visibility and engine cooling) unless  $V_X$  or  $V_Y$  is needed for obstacle clearance.
7. Reduce power to 24" MP, 2500 RPM at 1000' AGL.
8. Announce and perform "After Takeoff Checklist" out of 1000' AGL.

## Holding

Max speeds:

Up to 6000' MSL	200 KIAS
6001' to 14,000' MSL	230 KIAS

1. Slow to 100 KIAS holding speed 3 minutes prior to fix.
2. Acquire EFC.
3. Hold at 100 KIAS, with 1 minute leg to the inbound fix once established.
4. Report altitude and time at holding fix.
5. Make proper entry.

## Approach, Procedure Turn & Holding Power Settings

The following suggested power settings are approximations only.

	<b>Speed</b>	<b>2-Eng.</b>	<b>1-Eng.</b>
<b>ILS</b>	88 KIAS (Configured)	15"	20"
<b>Non-Precision</b>	88 KIAS (Configured)	13"	15" (600-800 FPM Descent)
<b>Level at MDA</b>	88 KIAS (Configured)	20"	Full or As Necessary
<b>Holding/PT</b>	100 KIAS (Clean)	18"	Full or As Necessary
<b>Traffic Pattern</b>	100 KIAS (Clean)	18"	Full or As Necessary

## In-Flight Maneuvers

The following maneuvers (except for the  $V_{MC}$  Demo unless CLT restricted) are required for all ratings. Additional procedures required for the specific rating sought are listed in the following sections for Airline Transport Pilot, Commercial Multi-Engine Add-On, CFI Multi-Engine Add-On and Private Multi-Engine Add-On.

### Clearing Turns for In-Flight Maneuvers

1. Maintain selected altitude.
2. Set bug to entry heading.
3. Perform 90° clearing turn to left or right.
4. Reduce power to approximately 15" MP or just above the gear horn sounding to slow airplane. (A higher MP setting may be required so the gear horn will not sound during the clearing turn.)
5. Perform 90° clearing turn back to original heading.



When slowing to 100 KIAS for maneuvers or approaches, maintain a power setting that eliminates the gear horn. This may increase the 100 KIAS target speed to maintain gear horn silence.

---



## V<sub>MC</sub> Demonstration

Not required for ATP rating, unless CLT restricted. The V<sub>MC</sub> Demo is to be accomplished at or above 4000' AGL, or as specified by Examiner.

In the Piper Seminole, V<sub>MC</sub> occurs at a lower airspeed than stall speed. The Seminole will lose power as altitude increases because of the reduced density of the air entering the induction system of the engine. Increase the pitch attitude slowly to reduce the airspeed at approximately 1 knot per second while applying rudder pressure to maintain directional control until full rudder is applied. As the speed decreases, additional aileron input will be required to maintain a maximum of 5° bank toward the operating engine. Recover at the first indication of loss of directional control, stall horn, or buffet.

1. Clearing turns
2. Clean configuration: Mixtures—Enrichen, Props—Fwd, Fuel Pumps—On.
3. Close left throttle while maintaining heading and altitude.
4. Slow to 100 KIAS.
5. Increase right throttle (operating engine) to full power, maintain heading and up to 5° of bank towards the operating engine.
6. Increase pitch attitude slowly, decrease airspeed at approximately 1 knot per second until full rudder is applied to maintain directional control.
7. Recover at first sign of:
  - A) Loss of directional control.
  - B) First indication of stall (stall horn or buffet).
8. Recover promptly by simultaneously reducing power sufficiently on the operating engine while decreasing the angle of attack as necessary to regain directional control within 20° of entry heading.
9. Continue recovery by increasing power slowly on operating engine while maintaining an AOA that allows for airspeed to increase to a point where directional control can be maintained with a minimum loss of altitude.
10. Accelerate to 82-88 KIAS.
11. Bring throttles slowly together to 20" MP.
12. "Cruise Checklist."

Recovery shall not be attempted by increasing the power on the simulated failed engine for demonstration.



During the VMC Demo, the gear horn will sound due to the left throttle being closed. Do not confuse the gear horn, which beeps at 90 cycles per minute, with the steady stall warning horn—typically the first indication of a stall at which to begin recovery.

---

## Maneuvering with One Engine Inoperative

The maneuver shall be performed above 3000' AGL and in a position where a safe landing at an airport can be accomplished in the event the engine cannot be restarted. Maintain altitude  $\pm 100'$  unless a minimum sink is required due to airspeed at blue line and extremely high density altitude.



For this training scenario, ATP shuts down the left engine on both the 1979 and 2000 Seminole. A high-torque starter is located on the left engine of the 1979 Seminole to assist in the airstart. ATP also shuts down the left engine on the 2000 Seminole to maintain standardization.

---

## Example Single-Engine Drift Down Scenario

Inoperative Engine at 8000' MSL, 20° C, and 3400 lbs. (This is the approximate weight for two people, bags, and half fuel.) The following computations are based on the "Climb Performance - One Engine Operating - Gear Up" chart in the Seminole POH.

Associated Conditions: Flaps 0°, Operating Engine Cowl Flap Open, Inoperative Engine Cowl Flap Closed, Landing Gear Up, Mixture Full Rich, Inoperative Engine Prop Feathered, Full Throttle, 2700 RPM, 88 KIAS/Blue line. (To achieve maximum single-engine performance, the operating engine mixture should be adjusted.)

Altitude (Feet MSL)	Temp (°C) / (°F)	Rate of Climb (FPM)	Distance at 88 KIAS/Blue line (Approx. 1.5 NM per minute)
8,000	20 / 68	-120	From 8,000 to 7,000: 13 NM
7,000	22 / 72	-80	From 7,000 to 6,000: 19 NM
6,000	24 / 75	-40	From 6,000 to 5,000: 37 NM
5,000	26 / 79	0	Single Engine Absolute Ceiling
4,000	28 / 82	50	Single Engine Service Ceiling

All figures are approximate.



Below 3000' AGL, engine failures may be simulated with the throttle only. At 3000' AGL or higher, engine failures may also be simulated with the mixture. *Never should the fuel selector be used to simulate an engine failure.*

EMERGENCY

***In-Flight Engine Failure***

MAINTAIN DIRECTIONAL CONTROL / PITCH ATTITUDE / AIRSPEED  
 MIXTURES..... FULL FORWARD  
 PROPS..... FULL FORWARD  
 THROTTLES..... FULL FORWARD  
 FLAPS ..... UP  
 GEAR..... UP  
 IDENTIFY ..... DEAD FOOT  
 VERIFY/THROTTLE..... CLOSE

***Troubleshoot Checklist***

THROTTLE ..... 1/4"  
 FUEL PUMPS ..... ON  
 MAGNETOS ..... ON/CHECK  
 FUEL SELECTORS ..... ON  
 PRIMERS ..... LOCKED  
 CARB HEAT ..... ON, CHECK, OFF  
 FUEL QTY/PRESSURE ..... CHECK  
 OIL PRESSURE/TEMP..... CHECK  
 (If engine inop continue In-Flight Engine Failure  
 Checklist & Engine Failure Secure.)

PROP INOP ENG ..... FEATHER  
 MIXTURE INOP ENG ..... CUTOFF

***Engine Failure Secure***

TRIM..... AS REQUIRED  
 INOP ENG MAGNETOS ..... OFF  
 INOP ENG FUEL PUMP ..... OFF  
 INOP ENG ALTERNATOR ..... OFF  
 INOP ENG FUEL SELECTOR ..... OFF  
 INOP ENG COWL FLAP ..... CLOSED  
 FRESH AIR FAN..... OFF



# Airstart Procedure

The airstart procedure varies between the 1979 and 2000 model Seminoles since the 2000 models are equipped with an unfeathering accumulator.

## 1979 Model Seminole

<b>Airstart</b>		<b>EMERGENCY</b>
INOP ENG FUEL SELECTOR .....	ON	
INOP ENG CARB HEAT .....	OFF	
INOP ENG MIXTURE .....	FULL FORWARD	
INOP ENG PROP .....	FULL FORWARD	
INOP ENG FUEL PUMP .....	ON	
INOP ENG ALTERNATOR .....	ON	
INOP ENG MAGNETOS .....	ON	
AVIONICS MASTER .....	(If Conditions Permit) OFF	
INOP ENG THROTTLE .....	TWO FULL STROKES	
INOP ENG THROTTLE .....	1/4" OPEN	
INOP ENG STARTER.....	(ATP 8 Seconds Max) ENGAGE	
<b>Prop Windmilling</b>		
INOP ENG STARTER.....	RELEASE	
<b>When Engine Begins to Run</b>		
THROTTLE .....	INCREASE SLOWLY TO 15" MP	
MAINTAIN 15" MP UNTIL CHT GREEN		
AVIONICS MASTER .....	ON	
PERFORM CRUISE CHECKLIST (Next Page)		

## 2000 Model Seminole

<b>Airstart</b>		<b>EMERGENCY</b>
INOP ENG THROTTLE .....	CLOSED	
INOP ENG FUEL SELECTOR .....	ON	
INOP ENG CARB HEAT .....	OFF	
INOP ENG MAGNETOS .....	ON	
INOP ENG FUEL PUMP .....	ON	
INOP ENG ALTERNATOR .....	ON	
INOP ENG MIXTURE .....	FULL FORWARD	
INOP ENG PROP .....	FULL FORWARD	
AIRSPPEED .....	(Suggested) 120 KIAS	
INOP ENG THROTTLE .....	1/4" OPEN	
<p>(The prop may not easily come out of feather unless airspeed is at least 100 KIAS. It may take up to 20 seconds for prop to windmill.                      If prop does not windmill verify that there is no prop movement, then engage starter for 2 seconds.)</p>		
<b>When Engine Begins to Run</b>		
THROTTLE .....	INCREASE SLOWLY TO 15" MP	
MAINTAIN 15" MP UNTIL CHT GREEN		
PERFORM CRUISE CHECKLIST		

## Emergency Descent

1. Throttles—Close.
2. Props—Full Forward.
3. Mixtures—Adjust.
4. Gear—Down, accelerate up to a max speed of 140 KIAS (For training at ATP use 120 KIAS unless specified by examiner to go up to the max of 140 KIAS.)
5. Cowl Flaps—As Required.
6. Maintain 140 KIAS (ATP 120 KIAS) during descent.
7. Notify ATC as appropriate.



When recovering from the Emergency Descent, verify airspeed at or below 109 KIAS (maximum gear retraction speed) before retracting the gear.

---

## Recovery from Unusual Attitudes

### *Nose High—Climbing*

(Airspeed Decreasing)

1. Increase power.
2. Pitch level.
3. Bank 0°.
4. “Cruise Checklist.”

### *Nose Low—Descending*

(Airspeed Increasing)

1. Reduce power.
2. Bank 0°.
3. Pitch smoothly level.
4. “Cruise Checklist.”

## Spin Awareness

### *Aerodynamic Factors*

All spins are preceded by a stall on at least part of the wing. The primary cause of an inadvertent spin is exceeding the critical AOA while applying excessive or insufficient rudder and, to a lesser extent, aileron. Asymmetrical power could aggravate the precipitation of a spin.

### *Flight Situations when Unintentional Spins may Occur*

- During a  $V_{MC}$  Demonstration, when at the point of reaching both  $V_{MC}$  and stall simultaneously.
- It may also occur while maneuvering during slow flight.

### *Procedure for Recovery from Unintentional Spins*

This procedure is taken directly from the Piper Seminole Information Manual.

1. Throttles—Retard to idle.
2. Rudder—Full opposite to direction of spin.
3. Control Wheel—Release back pressure.
4. Control Wheel—Full forward if nose does not drop.
5. Ailerons—Neutral.
6. Rudder—Neutralize when rotation stops.
7. Control Wheel—Smooth back pressure to recover from dive.



Intentional spins are prohibited in multi-engine aircraft. For further reference concerning stall and spin awareness, consult AC 61-67C.

---

# Airline Transport Pilot

## Specific Tasks & Procedures

### Steep Turns

Steep turns are to be accomplished above 3000' AGL and may be performed with two 180° turns or one 360° turn. Roll into a coordinated 45°-bank steep turn. Roll into and out of turns at approximately the same rate.

1. Clearing turns as specified by the Examiner.
2. Set power 20" MP, 2300 RPM.
3. Set bug to entry heading.
4. Maintain selected altitude  $\pm 100'$ .
5. Maintain 120 KIAS or a safe airspeed not to exceed  $V_A$ .
6. Adjust power as necessary.
7. Perform 180° turn to the left maintaining 45° bank  $\pm 5^\circ$ .
8. Roll out at 180° point  $\pm 10^\circ$ .
9. Perform 180° turn to the right maintaining 45° bank  $\pm 5^\circ$ .
10. Roll out on entry heading  $\pm 10^\circ$ .

### Approach to Stall in Approach Configuration (Clean)

Stalls are to be accomplished above 3000' AGL. ATP rating requires the pilot to announce the first indication of an impending stall (stall horn). As specified by the Examiner, this stall may be accomplished on a selected heading  $\pm 5^\circ$  or in a 15 to 30°-bank turn.

1. Clearing turns.
2. Clean configuration: Mixtures—Enrichen, Props—Fwd, Fuel Pumps—On.
3. Pitch to maintain altitude.
4. Maintain selected heading, or establish a 20°-bank turn as specified by Examiner.
5. Announce first indication of impending stall (stall horn).
6. Initiate recovery using max power or as specified by Examiner.
7. Recover and maintain selected altitude (and heading if selected).
8. "Cruise Checklist."

## Approach to Stall in Landing Configuration

Stalls are to be accomplished above 3000' AGL. ATP rating requires the pilot to announce the first indication of an impending stall (stall horn). As specified by the Examiner, this stall may be accomplished on a selected heading  $\pm 5^\circ$  or in a 15 to 30°-bank turn.

1. Clearing turns.
2. *“Gear Down Before Landing Checklist.”*
3. Set Flaps 40°.
4. Pitch to maintain altitude.
5. Maintain selected heading, or establish a 20°-bank turn as specified by Examiner.
6. Announce first indication of impending stall (stall horn).
7. Initiate recovery using max power or as specified by Examiner.
8. Recover and maintain selected altitude (and heading if selected).
9. Retract flaps **slowly** to 0°.
10. Accelerate to 82 KIAS ( $V_X$ ).
11. Retract gear, accelerate to 88 KIAS ( $V_Y$ ).
12. *“Cruise Checklist.”*



When recovering with max power advance throttles slowly, taking about 3 seconds from idle to full power.

---



# Commercial Multi-Engine Add-On

## Specific Tasks & Procedures

### Steep Turns

Steep turns are to be accomplished above 3000' AGL. Roll into a coordinated 360° steep turn with at least 50° of bank.

1. Clearing turns as specified by the Examiner.
2. Set power 20" MP, 2300 RPM.
3. Set bug to entry heading.
4. Maintain selected altitude  $\pm 100'$ .
5. Maintain 120 KIAS or a safe airspeed not to exceed  $V_A$ .
6. Adjust power as necessary during maneuver.
7. Perform 360° turn to the left maintaining at least 50° bank  $\pm 5^\circ$ .
8. Roll out on entry heading  $\pm 10^\circ$ .
9. Perform 360° turn to the right maintaining at least 50° bank  $\pm 5^\circ$ .
10. Roll out on entry heading  $\pm 10^\circ$ .

### Maneuvering During Slow Flight

Slow flight is to be accomplished above 3000' AGL. As specified by the Examiner, this maneuver may be accomplished in any configuration while demonstrating coordinated straight-and-level flight, climbs, turns, and descents. The airspeed selected is that at which any further increase in angle of attack, increase in load factor, or reduction in power would result in an immediate stall. The applicant is required to maintain selected altitude  $\pm 50'$ , heading  $\pm 10^\circ$ , airspeed  $+5/-0$  KIAS, and bank angle  $\pm 5^\circ$ .

1. Clearing turns.
2. *"Gear Down Before Landing Checklist."*
3. Extend full flaps 40°.
4. Slow to just above stall (approximately 60 KIAS).
5. Adjust power as necessary (approximately 20" MP) to maintain airspeed while maneuvering.

6. Accomplish straight-and-level flight, climbs, turns, and descents as required.
7. Recover with max power.
8. Retract flaps **slowly** to 0°.
9. Accelerate to 82 KIAS ( $V_X$ ), maintain altitude or climb as specified by Examiner.
10. Retract gear, accelerate to 88 KIAS ( $V_Y$ ).
11. "Cruise Checklist."

## Power-Off Stall

Stalls are to be accomplished above 3000' AGL. Commercial requires prompt recovery as the stall occurs. As specified by the Examiner, this stall may be accomplished on a selected heading  $\pm 5^\circ$  or in a 15°-bank turn (Max bank 20°).



*Idle* power is throttles to approximately 12" MP (not full closed).  
This aids in engine preservation.

---

1. Clearing turns.
2. "Gear Down Before Landing Checklist."
3. Extend full flaps 40°.
4. Establish a stabilized descent at 75 KIAS.
5. Maintain selected heading, or establish 15°-bank turn as specified by Examiner.
6. Transition smoothly to 12° pitch-up while reducing power to 12" MP.
7. As the stall buffet occurs, recover promptly with minimum loss of altitude.
8. Simultaneously reduce angle-of-attack, set max power, and level wings.
9. Retract flaps **slowly** to 0°.
10. Accelerate to 82 KIAS ( $V_X$ ), establish a positive rate of climb.
11. Retract gear, accelerate to 88 KIAS ( $V_Y$ ).
12. "Cruise Checklist."

## Power-On Stall

Stalls are to be accomplished above 3000' AGL. Commercial requires recovery as stall occurs. As specified by the Examiner, this stall may be accomplished in the takeoff configuration (Gear Down, Flaps 0°) or the departure configuration (Gear Up, Flaps 0°) while on a selected heading  $\pm 5^\circ$  or in a 15°-bank turn (Max bank 20°).

1. Clearing turns
2. Set takeoff or departure configuration as specified by the Examiner:  
Takeoff configuration (Gear Down, Flaps 0°).  
Departure configuration (Gear Up, Flaps 0°).
3. Mixtures—Enrichen, Props—Fwd, Fuel Pumps—On.
4. Slow to 80 KIAS, liftoff speed.
5. Maintain selected heading or establish a 15°-bank turn, as specified by the Examiner.
6. Transition smoothly to 15° pitch-up while increasing power to 18" MP.
7. As the stall buffet occurs, recover promptly with minimum loss of altitude.
8. Simultaneously reduce angle-of-attack, set max power, and level wings.
9. Accelerate to 82 KIAS ( $V_X$ ), establish a positive rate of climb.
10. Retract gear (if extended), accelerate to 88 KIAS ( $V_Y$ ).
11. "*Cruise Checklist.*"

## Short Field Visual Approach and Landing

1. Complete the *“Approach Checklist”* before entering the traffic pattern; devote full attention to aircraft control and traffic avoidance.
2. Slow to 100 KIAS prior to entering downwind or traffic pattern.
3. Enter traffic pattern at published TPA.
4. Announce when abeam approach end, on extended base, or on extended final (When ready to descend out of pattern altitude):  
*“Gear Down Before Landing Checklist Short Field.”*
5. Extend flaps 25°.
6. Descend out of TPA at 88 KIAS/Blueline.
7. Announce: (On Base Leg or Turning to Final) *“Blueline–GUMP.”*  
*“Gas, Undercarriage, Mixtures, Props.”*
8. On final, extend flaps 40°.
9. Reduce airspeed to speed per Landing Distance Over 50 Ft. Obstacle Short Field Effort Chart (POH section 5) for actual weight. Maintain constant power, airspeed, and angle of descent.
10. Announce at 400' AGL: *“Gear Down–Stabilized.”*
11. Close throttles slowly in the flare – touch down with little or no floating.
12. Maintain back pressure on control wheel to prevent slamming the nose wheel onto the runway.
13. Retract flaps after touchdown.
14. Simulate and announce *“max braking”* for training and checkride purposes.



Use 75 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.

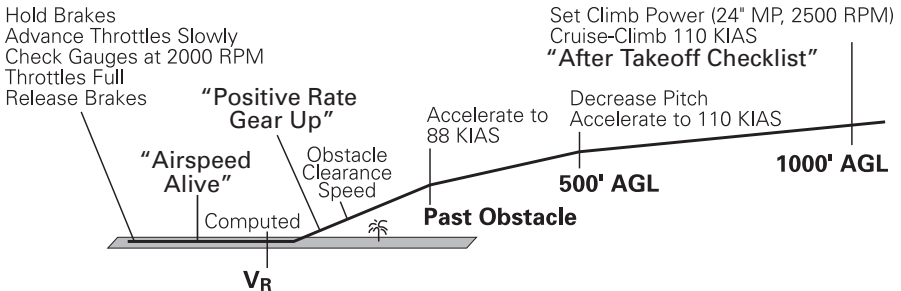
Technique: Fly proper speed and maintain some power for round out, close throttles in flare.

---

## Short Field Takeoff and Climb (Flaps 0°)

1. Hold brakes at departure end of runway.
2. Increase throttles to 2000 RPM.
3. Check engine gauges.
4. Increase throttles to full power.
5. Release brakes.
6. "Airspeed Alive."
7. Rotate at speed per Short Field Effort Chart (POH section 5) for Flaps 0° and actual weight.
8. Climb through obstacle height at speed per Short Field Effort Chart (POH section 5) for Flaps 0° and actual weight.
9. Establish a positive rate of climb and retract the gear.
10. Climb at 88 KIAS/Blueline ( $V_y$ ) when clear of obstacles until 500' AGL.
12. Climb at 110 KIAS after passing through 500' AGL.
13. Reduce power to 24" MP, 2500 RPM at 1000' AGL.
14. "After Takeoff Checklist" out of 1000' AGL.

### Short Field Takeoff and Climb Profile



# CFI Multi-Engine Add-On

## Specific Tasks & Procedures

Required maneuvers for the CFI Multi-Engine Add-On are the same as for the Commercial Add-On except for the addition of the Airspeed Drag Demonstration.

### Airspeed Drag Demonstration

Note power required for each drag item and VSI changes throughout each step.

1. Clearing turns.
2. Clean configuration: Mixtures—Enrichen, Props—Fwd, Fuel Pumps—On.
3. Slow to 88 KIAS/Blueline.
4. Extend gear.
5. Add power to maintain 88 KIAS and altitude.
6. Extend flaps 25°.
7. Add power to maintain 88 KIAS and altitude.
8. Extend flaps 40°.
9. Add power to maintain 88 KIAS and altitude.

---

Above steps are for knowledge of drag to required-power relationships

---

#### PTS-Required Tasks Below

10. Close left throttle. (Windmilling prop)
11. Add max power on right engine, **maintain 88 KIAS** and heading. (Note VSI.)
12. Left Cowl Flap—As Required.
13. Flaps up, maintain 88 KIAS. (Note VSI.)
14. Gear up, maintain 88 KIAS. (Note VSI.)
15. Left throttle to 12" MP simulated feather power, maintain 88 KIAS. (Note VSI.)
16. Pitch for 82 KIAS. (Note VSI.)
17. Pitch for 100 KIAS. (Note VSI.)
18. Bring throttles slowly together to 20" MP.
19. Left cowl flap: open or as required.
20. "Cruise Checklist."

---

# Private Pilot Multi-Engine Add-On

## Specific Tasks & Procedures

Required maneuvers for the Private Pilot Multi-Engine Add-On are the same as for the Commercial Add-On except for the steep turn, which is accomplished with 45° bank.

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

# 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:

<b>Route</b> (First that Applies)	<b>Altitude</b> (Whichever is highest until descent is required for landing.)
<b>A</b> ssigned	<b>M</b> inimum IFR Altitude
<b>V</b> ectored	<b>E</b> xpected
<b>E</b> xpected	<b>A</b> ssigned
<b>F</b> iled	

## 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 2000' 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. Multi-engine aircraft with a  $V_{SO}$  of 61 knots or less, or a gross weight under 6000 pounds do not have to demonstrate positive single-engine climb performance per FAR 23.
13. 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.
14. Standard Traffic Pattern Altitude (TPA) for multi-engine aircraft is 1000' AGL.

## Answer The Following Sample Oral Questions Prior To Arriving For Training

1. Recite the V speeds.
2. What is the maximum demonstrated crosswind component?
3. Describe the Seminole PA-44-180 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. Why is the right engine labeled LO-360?
  - G. How are the cylinders arranged?
  - H. How is ignition provided?
  - I. What are the minimum and maximum oil capacities in the 1979 and 2000 model Seminoles?
4. Describe the propeller system.
  - A. Who makes the propellers?
  - B. What does oil pressure do to the propeller?
  - C. Which lever manipulates oil pressure to the propeller?
  - D. Which unit regulates oil pressure to the propeller?
  - E. What is the function of the nitrogen cylinder?
  - F. What is the purpose of the spring in the prop dome?
  - G. Define constant speed.
  - H. What unit adjusts the propeller to maintain a constant RPM and how does it do it?
  - I. Define full feathering.
  - J. Will the propeller always feather?
  - K. What are centrifugal stop pins?
  - L. What is the true purpose of the centrifugal stop pins?
5. What is the correct action for a propeller overspeed?
6. Describe the electrical system.
7. What are the indications of a failed alternator?
8. Will the engines continue to run with the alternator and battery master switches turned off?
9. Describe the vacuum system.
  - A. Which instruments are vacuum operated?
  - B. What are the normal vacuum operating limits?

- C. How many vacuum pumps does the PA-44 have?  
 D. What indications would occur in the event of a vacuum pump failure?
10. Describe the stall warning system.
  11. Describe the fuel system.
  12. Explain how to cross feed fuel.
  13. Describe the landing gear system.
    - A. How is the landing gear actuated? Describe the pump.
    - B. What keeps the gear in the up position?
    - C. What keeps the gear in the down position?
    - D. If Hydraulic pressure is suddenly lost in flight, what indication, if any, would you have?
    - E. In what three situations will the landing gear horn activate?
    - F. What unit will not allow the gear to be retracted on the ground?
    - G. What is the procedure to extend the gear manually (Emergency Gear Extension)?
    - H. What airspeed is of importance during manual gear extension?
    - I. Are the brake and the landing gear hydraulics interconnected?
    - J. If you lose gear hydraulics, will you still have brakes?
    - K. What indicates that the gear is in transit and the hydraulic pump is activated?
  14. What type of braking system is used by the Seminole? Where is the brake fluid serviced?
  15. What type of flaps does the Seminole have?
    - A. What are the flap settings on the Seminole?
  16. What are the maximum taxi, takeoff, and landing weights?
  17. What is the maximum baggage capacity?
  18. Define  $V_{SSE}$ .
  19. What are the drag factors on light twins?
  20. Who determines  $V_{MC}$  for a particular aircraft?
  21. Define  $V_{MC}$ .
  22. Why is an aft CG used in determining  $V_{MC}$ ?
  23. What are the factors in determining  $V_{MC}$ ?
  24. Define critical engine and list the factors used to determine it.
  25. What causes an aircraft to sideslip with the loss of an engine, and what action is required to correct this?

26. How much climb performance is lost when an engine fails?
27. What aircraft equipment checks are required under FAR part 91?
28. Define absolute and single-engine service ceiling.
29. What documents are required to be on the aircraft?
30. Explain lost communications procedures.
31. Will the propeller feather below 950 RPM. Why or why not?
32. Explain the pitot static system.
  - A. Does the PA-44 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?
33. How do you prevent a heater overheat?
34. What is the fuel capacity? How many gallons are unusable?
35. What grade fuel is to be used in the PA-44?
36. How many fuel pumps are on the aircraft?
37. When are the electric fuel pumps to be used?
38. What are the various positions on the fuel selector control?
39. Explain the procedure for cross feeding fuel when operating the right engine from the left tank.
40. If an engine failure occurred at 5000' MSL, or a high density altitude, what would you do to get max performance from the operating engine after performing the In-Flight Engine Failure Checklist?
41. If the cylinder head temp and oil temp approach the caution range, what can be done to assist in cooling?
42. Why does manifold pressure decrease approximately 1" every 1000' during climb?
43. When an engine is inoperative or feathered, what indication will be observed on the manifold pressure gauge?
44. Why is the manifold pressure gauge not necessarily a good indicator in determining an inoperative engine?