Piper Archer
Training Supplement

ATPFlightSchool.com

Revised 2022-07-27

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.

To view recent changes to this supplement, visit:
atpflightschool.com/changes/supp-archer

Contents

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AIRCRAFT SYSTEMS

Engine

The Archer is equipped with a Lycoming, 4-cylinder, O-360 (opposed, 360 cubic inch) engine rated at 180 horsepower at 2700 RPM. The engine is direct drive (crankshaft connected directly to the propeller), horizontally opposed (pistons oppose each other), piston driven, and normally aspirated (no turbo or supercharging). Archers with model years prior to 2022 have carbureted engines, and those with model years from 2022 onwards have fuel-injected engines. Engine ignition is provided through the use of two engine-driven magnetos, which are independent of the aircraft's electrical system and each other. Each magneto powers one spark plug per cylinder (for redundancy and more complete combustion), for a total of 8 spark plugs.

- **L** Lycoming
- **H** Horizontally Opposed
- **A** Air Cooled
- **N** Normally Aspirated
- **D** Direct Drive

NOTE: Certain procedures, particularly those for engine starting, are substantially different between carbureted and fuel-injected engines. Be sure to use the correct checklist for each specific aircraft.

Carburetor Icing

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

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

From the Archer POH, 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."**

NOTE: Carburetor heat also serves as an alternate air source in case the engine's air intake is blocked. In lieu of carburetor heat, fuel-injected Archers have a similar "Alternate Air" control that provides heated, unfiltered air to the induction system.

Oil

Acceptable range for oil in the Archer is 6.5–8 quarts. Never depart with the oil indicating below 6 quarts.

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

Students are not permitted to add oil in ATP aircraft without their instructor verifying the oil level and verbally agreeing to the amount to be added.

Propeller

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

Landing Gear

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

Brakes

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

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

Flaps

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

ATP operations require flaps 25° for all landings except:

- Short and soft field, flaps 40°
- Precision approach, flaps 10°

Pitot Static

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

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

Fuel System

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

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

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

In carbureted aircraft, an electric engine priming system is provided to facilitate starting. The primer switch is located on the far left side of the overhead switch panel. For fuel-injected aircraft, priming is accomplished by turning the electric fuel pump on and briefly advancing the mixture control to RICH, then returning it to idle cutoff.

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

Fuel Management

Throughout operation, checklists will call for "Fuel Selector... Proper Tank." It is important to monitor fuel burn to maintain a balanced fuel load. The Archer POH does not provide a limitation on fuel imbalance. It is ATP'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 Archer is equipped with a 28-volt DC electrical system and a 24-volt lead-acid main battery. (Archers with Garmin G1000 avionics also have an isolated 24-volt emergency battery.) Electrical power is supplied by a 70-amp, engine-driven alternator. A voltage regulator maintains a constant 28-volt output from the alternator. An overvoltage relay is located on the forward left side of the fuselage behind the instrument panel. In aircraft equipped with Garmin G500 avionics, alternator output is displayed on a digital ammeter on the instrument panel. For Archers with G1000 avionics, electrical system parameters may be viewed on the Engine Indication System display on the MFD.

All Aircraft

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

CAUTION: Do not reset popped circuit breakers if smoke can be smelled.

Other electrical components include the standby attitude indicator (G500) or standby instrument (G1000), the starter, the electric fuel pump, electric engine primer (carbureted aircraft), the stall warning horn, the ammeter (G500), and the annunciator panel (G500).

Alternator Failure - G500 Aircraft

In the case of the "ALTERNATOR INOP" annunciator, follow the "ALT Annunciator Illuminated" checklist. The expanded procedure can be found in the Archer 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."

Once the battery is exhausted and complete electrical failure occurs, the G500 system will be rendered inoperative. In this situation, limited flight instrument information is available from the standby instrumentation (see page 8 for more information).

Alternator Failure - G1000 Aircraft

In the case of a red ALTR FAIL CAS message, follow the "Alternator Failure" checklist. The expanded procedure can be found in section 3.5d of the Archer POH. Following this checklist will attempt to reset the alternator; if this is unsuccessful, the aircraft's main battery will continue to provide power to the Essential Bus (see POH for details on equipment powered by this bus).

If the main battery can no longer provide adequate power, and the EMERG BATT switch is in the ARM position, the emergency battery will automatically begin providing power to the emergency bus. This is indicated by a black EMERG BATT ON CAS message. If this occurs, follow the "Complete Electrical Failure" checklist. The emergency battery will provide approximately 30 minutes of power to the PFD, COM/NAV 1, standby flight instrument, audio panel, and engine instruments. Land as soon as possible.

Once the emergency battery is exhausted, the G1000 system will be rendered inoperative. In this situation, limited flight instrument information is available from the standby instrumentation (see page 16 for more information).

Garmin G500

Some ATP Archers are equipped with the Garmin G500 electronic flight deck. The G500 powers on with the battery master switch.

G500 Components

The G500 is comprised of six main components:

- Primary Flight Display (PFD, left) and Multi-Function Display (MFD, right)
- Attitude Heading Reference System (AHRS)
- Air Data Computer (ADC)
- Magnetometer
- Temperature Probe
- Dual Garmin GNS 430 GPS

The PFD (left) shows primary flight information in place of traditional pitot-static and gyroscopic instruments, and also provides an HSI for navigation. **ATP procedures call for configuring the MFD (right) to display traffic information.**

The Attitude Heading Reference System (AHRS) contains tilt sensors, accelerometers, and rate sensors to provide attitude and heading information on the PFD.

The Air Data Computer (ADC) compiles information from the pitot-static system and an outside air temperature sensor to provide pressure altitude, airspeed, vertical speed, and outside air temperature on the PFD.

The magnetometer senses the earth's magnetic field and sends data to the AHRS for processing to determine magnetic heading.

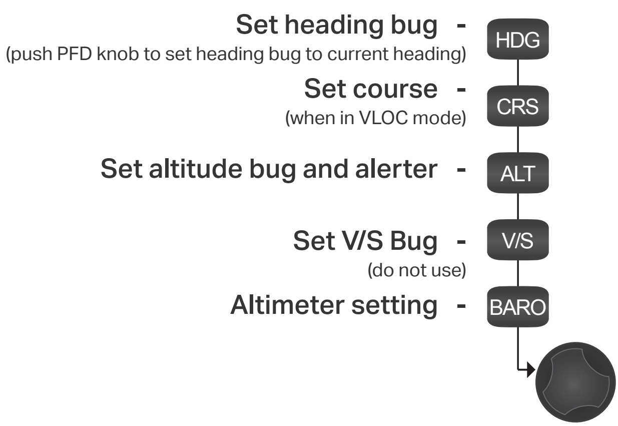
The temperature probe provides outside air temperature (OAT) data to the ADC.

The dual Garmin GNS 430 GPSs provide input to the AHRS and PFD/MFD.

CAUTION: The GNS 430 and G500 units each have their own databases. Navigation, terrain and map information on the G500 Multi-Function Display (MFD) may not be current and is not to be used for navigation. Use the G500 MFD for traffic information.

G500 PFD Functions

These buttons toggle the function of the PFD knob.



CDI needle color indicates NAV source: green for VLOC / magenta for GPS.

G500 equipped Archers do not have a conventional turn coordinator. A slip-skid indicator is located at the top of the attitude indicator. Step on the “brick” instead of the “ball”. Use the reference lines and the magenta line that appears above the heading indicator to identify a standard rate or half-standard rate turn.

Outside air temperature (OAT) displays on the PFD under the airspeed tape.

Ground track can be identified on the heading indicator by a small magenta diamond near the lubber line (only visible when ground track is different than heading).

The digital altitude and airspeed readouts are very sensitive and can cause some pilots to continuously make corrections for insignificant deviations. Do not overcorrect for deviations of a few feet. Crosscheck digital and analog standby instruments to avoid the tendency to overcorrect.

Refer to the complete G500 Pilot's Guide in the ATP Library, or in ForeFlight Documents.

G500 Standby Instrumentation

Because the G500 is electrically powered, electrical system failures (particularly alternator failures) risk leaving the pilot without critical flight instrument information. If an alternator failure or other electrical malfunction occurs while in instrument conditions, the pilot must immediately work to safely exit IMC and proceed to a landing under visual conditions. The Archer’s main battery will continue to power the G500 for a limited time, which can be extended by proper electrical load reduction. However, if the alternator malfunctions (and operation is not restored by completion of the appropriate checklist), assume that the G500 could cease operation at any point.

The Archer is equipped with limited standby instrumentation, in case the G500 stops operating while the pilot is still in IMC. This includes:

- An electrically-powered gyroscopic standby attitude indicator with an internal battery backup
- A conventional standby altimeter and standby airspeed indicator, connected to the pitot-static system
- A magnetic compass for heading reference

Standby Attitude Indicator Operation

During normal operations, the standby attitude indicator is powered and the internal battery is charged by the aircraft’s electrical system. An alternator failure will have no immediate effect on the standby attitude indicator, which will continue to draw power from the aircraft’s main battery. Once the main battery is eventually depleted and power to the standby attitude indicator is interrupted, it will automatically switch over to its internal battery and continue operation for approximately 60 seconds. During this time, an amber status LED will blink next to the STBY PWR button to alert the pilot that **action is required**. **Press and release the STBY PWR button once to continue operation of the standby attitude indicator.**

Following an alternator failure, the standby attitude indicator cannot switch to its internal battery until power from the main battery is interrupted, which may take 30 minutes or more. Do not press the STBY PWR button immediately. Keep the status LED in your scan, and press and release the button once it begins to blink. Do not press and hold the STBY button more than 4 seconds or the standby attitude indicator will revert to test mode.

If the STBY PWR button is not pressed while the amber LED is flashing, the unit will shut down and a red gyro warning flag will appear. At this point, the pilot can still press and release the STBY PWR button to activate the internal battery and resume use of the standby attitude indicator. However, it will take some time for the gyroscope to spin up and provide accurate attitude reference.

When fully charged, the internal battery should provide up to 1 hour of operation; however, a situation requiring use of the standby attitude indicator is an emergency. Exit IMC and land as soon as possible. Once the internal battery is depleted, the red gyro warning flag will appear.

Standby Attitude Indicator Battery Check

Prior to flight, the standby attitude indicator's internal battery must be tested. To accomplish the test, aircraft electrical power must be on (Battery Master ON) and the standby attitude indicator gyro must be fully operational with the red gyro flag out of view. Test the standby battery as called for by the Run Up Checklist:

- Press and hold the STBY PWR button for approximately four seconds. This puts the gyro in a one-minute battery test mode. The amber status LED will flash during the test sequence.
- A continuous green light illuminated beneath "TEST" during the full sequence indicates that the standby battery is good.
- A red light illuminated anytime during the test indicates that the battery is not charged and may require replacement. Contact maintenance.

Do not press and hold the STBY PWR button during flight. This would put the unit into the test mode. Except when testing the battery during run-up, press the button once and promptly release it.

Standby Attitude Indicator Shutdown

During a normal aircraft shutdown using the Shutdown Terminate checklist, the status LED will begin to blink once the battery master is turned off. When this occurs, do not press the STBY PWR button. Allow the LED to blink for approximately 60 seconds, at which point the red gyro warning flag will appear to indicate that the unit has powered down.

If the STBY PWR button is inadvertently pressed during aircraft shutdown, this will activate emergency operation and deplete the internal battery. To correct this, press the button again to deactivate the standby attitude indicator.

G500 Failures & Partial-Panel Approaches

For partial-panel training and checkrides, the two most common training scenarios are simulated AHRS failure and PFD failures.

Failure Condition	Simulated By	Instrument Approaches Available
AHRS Failure	Cover Attitude Indicator (ADI)	All precision and non-precision
PFD Failure	Dim PFD/MFD screens	Only GPS approach
Electrical Failure	No simulated failure available	None
ADC Failure	No simulated failure available	All precision and non-precision

Circuit breaker-simulated failures are prohibited in ATP aircraft. Piper and Garmin advise against pulling circuit breakers as a means of simulating failures on the Garmin G500 system. Pulling circuit breakers, or using them as switches, has the potential to weaken the circuit breaker to a point at which it may not perform its intended function. Also reference Advisory Circulars 120-80, 23-17B, and 43.13-1B.

Attitude & Heading Reference System (AHRS) Failure

Indications:

1. The sky/ground presentation is removed.
2. A red X appears across the Attitude Direction Indicator (ADI).
3. Yellow “ATTITUDE FAIL” and “HDG” alert messages appear on the PFD.
4. A “TRK” message appears to the right of the ground track at the top of the compass rose.
5. Rate-of-turn information is unavailable.
6. “HDG LOST”, “HDG FAULT”, and "TRK TRAFFIC” alert messages appear on the MFD.

AHRS Failure

The PFD continues displaying airspeed, altitude, vertical speed, compass rose and ground track. Ground track and compass rose indications are supplied by GPS, indicated by a "TRK" message. Any precision or non-precision approach is available using the HSI on the PFD.

Pilot Action

1. Use standby attitude indicator.
2. Continue using HSI on PFD. Verify track against magnetic compass heading.
3. Precision (ILS) and non-precision (GPS, localizer, and VOR) approaches can be accomplished.

PFD Failure

Indications

1. PFD screen is dark.

Pilot Action

1. Refer to the standby instruments.
2. Use the GPS CDI page for navigation and approaches.
   CLR - Press and hold for 3 seconds to return to default CDI page
3. Only GPS non-precision approaches can be accomplished.

During an MFD failure, with the PFD functioning normally, all approaches are available for use.

Electrical Failure

Indication

1. The G500 and GPS systems will be inoperative/dark.
2. The "STBY PWR" button on the standby attitude indicator will begin blinking.

Pilot Action

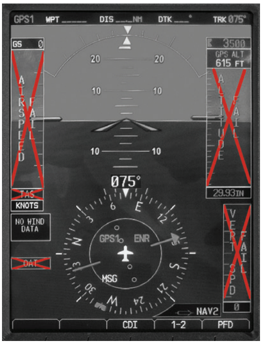
1. Use standby attitude indicator. Press the "STBY PWR" button right of the blinking LED to continue operating using its internal battery.
2. Use standby airspeed, altimeter, and compass.
3. Declare an emergency and exit IMC as soon as practicable. The manufacturer does not specify the endurance time of the integral emergency battery.

Air Data Computer (ADC) Failure

Indications

1. Loss of data accompanied by a red X and yellow alert messages occurs over:
   - Airspeed
   - Altitude
   - Vertical speed
   - True airspeed (TAS)
   - Outside air temperature (OAT)
2. Wind calculations are unavailable

Attitude and heading references will function normally on the PFD.



ADC Failure

Pilot Action

1. Use standby airspeed indicator and altimeter.

> There is no backup for the VSI, but known pitch attitudes using the attitude indicator, power settings, and airspeeds produce consistent rates.

Garmin G1000

Some Piper Archers are equipped with the Garmin G1000 electronic flight deck.

G1000 Components

The G1000 is comprised of several main components, called Line Replaceable Units (LRUs):

- Primary Flight Display (PFD)
- Multi Function Display (MFD)
- Integrated Avionics Units (2)
- Air Data, Attitude and Heading Reference System (ADAHRS)

- Engine/Airframe Unit
- Magnetometer
- Audio Panel
- Transponder

The PFD (left screen) shows primary flight information in place of traditional pitot-static and gyroscopic instruments, and also provides an HSI for navigation.

The MFD (right screen) provides a GPS-enabled moving map with traffic and weather information. It can also be used to display waypoint/airport information, flight plans, instrument procedures, trip planning utilities, and system setup/configuration information.

The Integrated Avionics Units each contain a WAAS-enabled GPS receiver, a VHF nav/comm radio, and a flight director. They also serve as communications hubs to relay information from the other LRUs to the PFD and MFD. For redundancy, one IAU is connected to each display, and they do not communicate with each other directly.

The Air Data, Attitude and Heading Reference System uses accelerometers and rate sensors, along with magnetic field readings from the magnetometer and GPS information from the IAUs, to provide aircraft attitude and heading information to the flight displays and IAUs. It also processes data from the pitot/static system as well as the OAT probe to provide pressure altitude, airspeed, vertical speed, and air temperature data to the system.

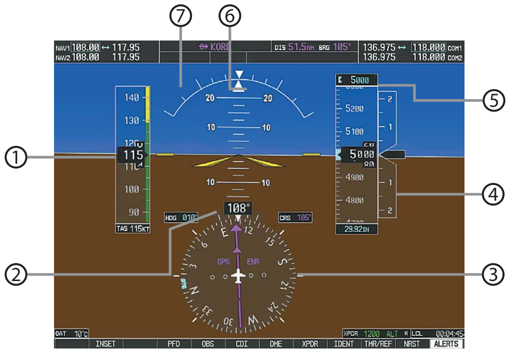
The Engine/Airframe Unit receives and processes signals from the engine and airframe sensors (engine RPM and temperatures, fuel quantity, etc.).

The magnetometer measures the local magnetic field and sends data to the AHRS to determine the aircraft's magnetic heading.

The audio panel is installed between the two display screens and integrates controls for the nav/com audio, intercom system, and marker beacon receiver. It also controls manual display reversionary mode (which can shift the primary flight instruments to the MFD).

The transponder is a Mode S device, controlled via the PFD, that also provides ADS-B In/Out capability.

G1000 Flight Instruments



Primary Flight Display (Default)

① Airspeed Indicator
② Turn Rate Indicator
③ Horizontal Situation Indicator (HSI)
④ Vertical Speed Indicator (VSI)
⑤ Altimeter
⑥ Slip/Skid Indicator
⑦ Attitude Indicator

The G1000 PFD displays the same flight information as the conventional "six-pack", but pilots should be aware of the following considerations.

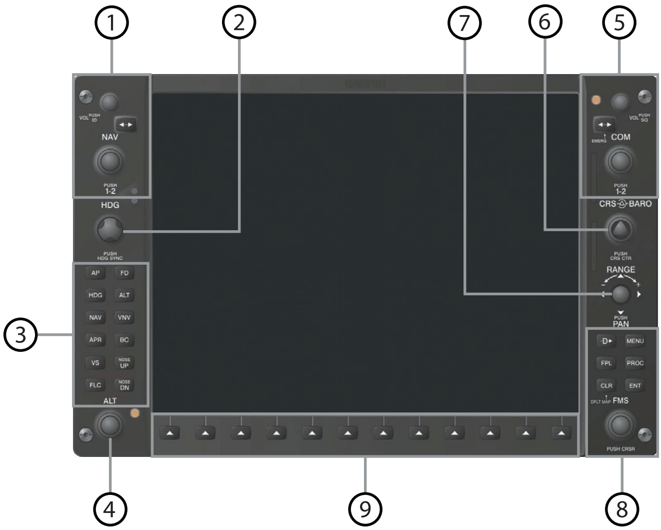
Airspeed and altitude information are displayed with moving tapes and a digital readout of the current airspeed and altitude to the nearest knot / 20 feet, respectively. This precision leads some pilots to overcontrol the aircraft, continuously making corrections for insignificant deviations. Be sure not to overcorrect for deviations of a few feet or knots.

The information traditionally displayed on the turn coordinator is split between two locations on the screen. The inclinometer ("ball") is replaced with a white "brick" under the pointer at the top of the attitude indicator. "Step on the brick" to center it and maintain coordinated flight. The rate of turn indication is provided by a magenta trend vector at the top of the HSI. Tick marks are provided for half-standard and standard rate turns.

On the HSI, a small magenta diamond indicates the aircraft's current ground track. (This diamond may not be visible if crosswinds are minimal and the track is nearly equal to the heading.) Also, pilots should note the color of the CDI needle to determine the current navigation source. Magenta needles indicate GPS, while green needles indicate VOR or LOC.

G1000 Controls

The G1000 has duplicate sets of controls on the PFD and MFD bezels. Using the controls towards the center of the aircraft (on the right side of the PFD and the left side of the MFD) helps to ensure that both student and instructor can see each other's inputs.



PFD/MFD Controls

Left Side - Top to Bottom

① NAV Radio Controls: Use the NAV knob, along with the frequency transfer key, to tune NAV receiver frequencies. Turn the VOL knob to control the volume, and press the knob to toggle the Morse code identifier on/off.

② HDG Knob: Sets the heading bug on the HSI.

③ AFCS Keys: Used to program the Garmin GFC 700 Automatic Flight Control System. (Not installed on all aircraft.)

④ ALT Knob: Sets the altitude bug on the altimeter.

Right Side - Top to Bottom

⑤ COM Radio Controls: Use the COM knob, along with the frequency transfer key, to tune COM receiver frequencies. Turn the VOL knob to control the volume, or press to turn the automatic squelch on or off.

⑥ CRS/BARO Knobs: Turn the outer, large knob to set the barometric pressure setting for the altimeter. Turn the small, inner knob to select a course on the HSI when in VOR or OBS mode.

⑦ RANGE Joystick: Turn to adjust map range. Press to activate the map pointer.

⑧ FMS Keys/Knob: Use these to program flight plans, enter waypoints, select instrument procedures, etc.

Bottom Edge

⑨ Softkeys: There are 12 softkeys along the bottom edge of each display with functions that vary depending on context.

Review the G1000 Pilot's Guide for your airplane for more information on the G1000's features. These are available in the ATP Library and in ForeFlight Documents.

Standby Instruments

G1000-equipped Piper Archers are also equipped with a standby flight instrument (either an Aspen Evolution Backup Display or a Garmin G5) mounted on the left side of the instrument panel. Both Garmin and Aspen units are fully digital, independent flight instrument displays providing attitude, barometric altitude, airspeed, heading, vertical speed, slip/skid, and turn rate indications. Should the G1000 fail (say, due to a failed display screen or ADAHRS), the pilot can control the aircraft using the standby instrument. If this occurs, exit and avoid IFR conditions as soon as practical.

G1000-equipped Archers do not have traditional magnetic compasses. Instead, the standby instruments provide a backup source of magnetic heading information. The Aspen EBD contains an internal magnetometer, while the Garmin G5 is accompanied by an external GMU 11 magnetometer unit.

The standby instrument can draw electrical power from a few different sources, to ensure the pilot has uninterrupted access to critical flight information:

- In normal operation, the standby instrument is powered by the engine-driven alternator via the Essential Bus.
- If the alternator fails, the primary battery will continue to power the standby instrument via the Essential Bus.

- Once the primary battery is depleted (or if the primary electrical system otherwise fails), the Archer's emergency battery will power the standby instrument via the Emergency Bus for approximately 30 minutes.
- If all electrical power to the standby instrument is removed, a backup internal battery in the unit will continue to power it for at least 30 minutes in the case of the Aspen EBD, or up to 4 hours in the case of the Garmin G5.

Prior to flight, the pilot must check the power level of the emergency battery using the procedures in the ATP Archer Checklists. With the alternator and battery master off, move the emergency battery switch to the ARM position. The PFD and standby instrument should both power on with all instrument indications functional, and the E VOLTS reading on the PFD must be at least 23.3 volts. If E VOLTS is low prior to engine start, check again following run up.

Activation of the emergency battery following electrical failure indicates an emergency situation. Land as soon as possible.

ATP

The standby instrument will not automatically switch to its internal battery if the aircraft is on the ground (inferred from low airspeed). This ensures the unit does not remain on after aircraft shutdown. However, if the Aspen EBD does not automatically turn off during aircraft shutdown, press and hold the red REV button on the upper right for up to 20 seconds until the "Shutdown in progress" message appears. The Garmin G5 can be turned off by pressing and holding the power button for five seconds.

G1000 Failures & Partial-Panel Approaches

Training Considerations

For partial-panel training and checkrides, the two most common training scenarios are PFD failures and ADAHRS failures.

- PFD Failure: Simulate by dimming the PFD screen. The student should respond by pushing the DISPLAY BACKUP button to activate reversionary mode and move the flight instrument displays to the MFD. All instrument procedures remain available. Use the Inset Map for situational awareness.
- ADAHRS Failure: The ADAHRS has various failure modes that can cause one or more instrument indications to become unavailable. To simulate a worst-case scenario in which all of the G1000's flight instruments are unusable, dim the PFD screen and do not activate reversionary mode. Then, fly the airplane using the standby instruments. The MFD should remain on the moving map screen for situational awareness. GPS approach procedures remain available. Set the MFD fields to TRK, DTK, XTK, and DIS to maintain situational awareness of your position relative to the intended track (in lieu of the CDI).

Other failure modes in which some (but not all) instruments are unavailable can be simulated using paper or foam cutouts that hang from the COM and NAV knobs and cover up particular areas of the PFD screen. ATP does not provide these cutouts.

The simulation of failures by pulling circuit breakers is **prohibited** in ATP aircraft. Piper, Garmin, and the FAA all advise against pulling circuit breakers as a means of simulating failures on the G1000 system. Pulling circuit breakers, or using them as switches, has the potential to weaken the circuit breaker to a point at which it may not perform its intended function.

LRU Failures

If an LRU or an LRU function fails, a red or amber X is displayed over the window(s) corresponding to the failed data. If this occurs, follow the appropriate emergency checklist. Generally, this involves checking the circuit breaker for the affected LRU, then (if the problem is not fixed by resetting the breaker) using the standby instruments to exit IFR conditions and land as soon as practical.

AHRS Failure

ADC Failure

AHRS Modes

The AHRS uses GPS, magnetometer, and air data to assist in attitude/heading calculations, in addition to the data from its internal sensors. Loss of this external data can affect the availability of attitude and heading information, even if the AHRS itself is functional. Either GPS or air data must be available for the AHRS to provide attitude information. Additionally, loss of magnetometer data will result in invalid heading information.

If the AHRS cannot provide valid heading information, the course pointer on the HSI will point straight up, effectively converting it into a standard, fixed-card course deviation indicator. As a result, pilots can still perform partial-panel instrument approach procedures following an AHRS failure. Cross-reference between heading information from the standby instrument and course information from the PFD.

Display Failures

If either display fails, the G1000 should automatically enter reversionary mode, in which important flight information is presented in a condensed format on the remaining display(s). Reversionary mode can also be activated manually by pressing the red DISPLAY BACKUP button on the audio panel. Engine Indication System readings appear on the left edge of the screen, and the inset map appears at lower right.

Reversionary Mode (Failed PFD)

Because the IAUs are not cross-linked, any functions handled by just one IAU will be lost if its corresponding display fails. If the PFD fails, NAV1, COM1, and GPS1 will be unavailable. If the MFD fails, NAV2, COM2, and GPS2 are unavailable. Other optional avionics may also become unavailable, depending on the particular avionics configuration.

Electrical Failure

If the alternator fails, a red "ALTR FAIL" CAS warning message will appear on the PFD. All G1000 equipment will initially remain on, powered by the main battery. Follow the appropriate emergency checklist to verify the failure and attempt to reset the alternator.

If the alternator is still failed, continue to the electrical load shedding portion of the checklist. Part of this procedure is to turn off the avionics master. This will disable the MFD and #2 IAU, along with optional avionics. The PFD will remain active and switch to reversionary mode.

Once the main battery is depleted, the emergency battery will activate and provide approximately 30 minutes of power to the emergency bus. This will maintain power to the PFD, but the transponder and the cooling fans will shut off. Declare an emergency, exit IMC, and land as soon as possible.

Standard Avionics Configurations

Automatic zoom must be disabled. Set ranges to view approximately a 2 NM radius in the traffic pattern or congested areas; a 6 NM radius for departure, arrival, and practice area operations; and a 12 NM radius for enroute VFR or IFR.

Garmin G1000

Taxiing

MFD: Map page with range set to airport diagram view.

Airport diagram may be expired, reference for situational awareness only.

Traffic Pattern Operations

PFD: Traffic map (INSET left).

MFD: Map page with traffic information active.

- ***NXi:*** Detail set to Detail-3
- ***Other:*** Declutter set to DCLTR-1

Enroute and Airwork

PFD: Active with appropriate nav source (needles) active.

MFD: Map page with traffic information active. Traffic inset should be included on the PFD for added traffic awareness.

- ***NXi:*** Detail set to Detail-3
- ***Other:*** Declutter set to DCLTR-1

Full Panel Approaches

PFD: Active NAV source on HSI/Traffic map (INSET left).

MFD: Map page with traffic information active and orientation set to track up.

- ***NXi:*** Detail set to Detail-3
- ***Other:*** Declutter set to DCLTR-1

G1000 Standard Configuration

Partial Panel Approaches

PFD: Dimmed or covered.

MFD: Reversionary Mode.

Map Overlay: On with Traffic Information active.

G1000 Partial Panel Configuration

ATP

Pilots can exercise PIC judgment to briefly switch to other pages or settings with information helpful to the safe, efficient conduct of the flight. After doing so, promptly switch back to the standard configurations.

Garmin G500 w/ Dual GNS430

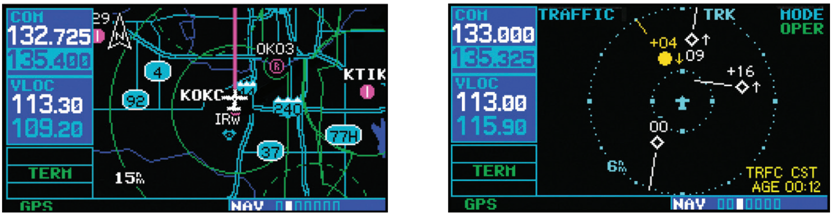
Taxi & Traffic Pattern Operations

MFD: Map page group, traffic map page (map page 3).

⚠ MFD databases are not regularly updated in G500-equipped aircraft. Use GNS430 for tasks requiring current database information (geographical location, airspace, airports and navaids, etc.)

COM/NAV 1: Nav page group, Moving map page (Nav page 2).

COM/NAV 2: Nav page group, Traffic information page (Nav page 3).



Dual Garmin GNS 430 GPS Configuration

Enroute, Airwork, and Full Panel Approaches

PFD: Active with appropriate nav source active on HSI.

MFD: Map page group, traffic Map page (Map page 3).

COM/NAV 1: Default Nav page (Nav page 1), page values set to DIS, GS, DTK, TRK, XTK, ETE.

VLOC Button: Selected to appropriate nav source.

COM/NAV 2: Moving Map page (Nav page 2), with traffic information active and orientation set to TRACK UP.

G500 w/ dual 430s - Enroute

Partial Panel Approaches:

PFD: Dimmed or covered. Use standby instruments.

MFD: If not dimmed, map page with traffic information active and orientation set to track up.

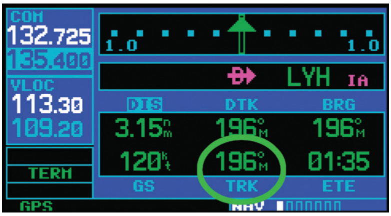
COM/NAV 1: Approach loaded, Default Nav page (Nav 1).

Default Nav page values: DIS, GS, DTK, TRK, XTK, ETE

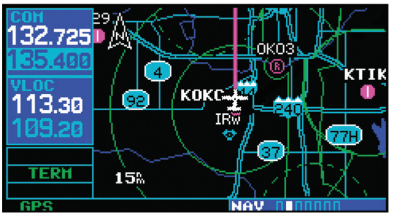
COM/NAV 2: Nav page group, Moving map page (Nav page 2), with traffic information active and orientation set to TRACK UP.

VLOC Button: Selected to appropriate nav source.

Course Guidance: TRK information (on GPS1).



GPS Approach with No HSI: Use GPS1 set to CDI page



GPS2 Set to Moving Map Page (Nav 2)

For PFD failures on the G500, the only approach option is a GPS approach, using the GPS CDI for course guidance.

GPS Setup for VFR Airwork & Maneuvers

When in a familiar area performing VFR maneuver training, or when remaining in the traffic pattern for takeoff/landing practice, at least one GPS unit should be selected to the Traffic page. If two units are present, one may be selected to the Moving Map page. To avoid redundant information, never have two systems on the same page.

Aircraft maneuvering will cause errors in the display. These errors primarily affect relative bearing information and traffic target track vector (it will lag). Traffic information is provided as an aid in visually acquiring traffic. **It is the responsibility of the pilot to see and maneuver to avoid traffic.**

List of Pilots Guides

- Aspen Evolution Backup Display Pilot's Guide
- Archer G1000 NXi Pilot's Guide
- Garmin G5 Standby Instrument's Pilot Guide
- G500 Pilot's Guide
- GNS430 Pilot's Guide

Heater

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

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

Stall Warning Horn

The Archer is equipped with an electric stall detector located on the leading edge of the left wing. The stall warning horn is activated between 5 and 10 knots above stall speed. In G500 Archers, the horn emits a continuous sound. In G1000 Archers, the warning is an aural annunciation (*"Stall... Stall... Stall..."*).

Additional aircraft systems information can be found in Section 7 of the Piper Archer Pilot's Operating Handbook, available in the ATP Training Library and ForeFlight Documents. ATP training videos reviewing this material are also available in the ATP Library.

SECTION 2
PERFORMANCE / WEIGHT & BALANCE

Piper Archer V-Speeds

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

V-Speed	KIAS	Description	Airspeed Indicator Marking
V_{SO}	45	Stall speed in landing configuration	Bottom of White Line
V_S	50	Stall speed with zero flaps	Bottom of Green Line
V_R	60	Rotation speed (start rotation)	
V_X	64	Best angle of climb	
V_Y	76	Best rate of climb	
V_G	76	Best glide speed at max weight	
V_{FE}	102	Maximum flap extension speed	Top of White Line
V_{NO}	125	Max Structural Cruising Speed	Top of Green Line
V_{NE}	154	Never exceed speed	Red Line
V_A	113	Maneuvering speed at 2,550 pounds	
V_A	89	Maneuvering speed at 1,634 pounds (G500 a/c)	
V_A	98	Maneuvering speed at 1,917 pounds (G1000 a/c)	

Maximum demonstrated crosswind 17 knots

ATP

NOTE: For technical reasons related to aircraft certification regulations, the POH and placards for G1000 Archers refer to maneuvering speed as V_O. For all practical purposes, this is identical to V_A.

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 (1.33 Gal.)	–	8	95.00	–	760
Takeoff Weight	=		CG CG = Moment / Weight	=	
Fuel Burn	–		95.00		
Landing Weight	=		CG CG = Moment / Weight		

Calculate the Following

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

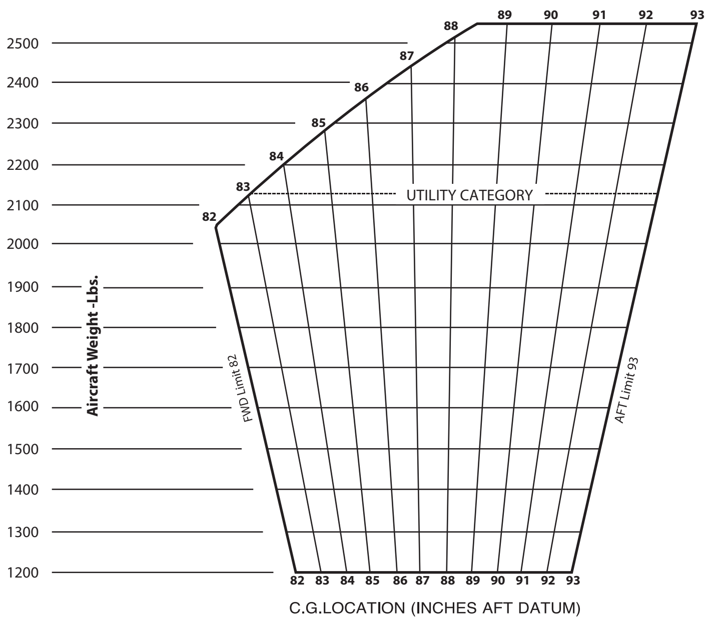
Plot Zero Fuel CG and Takeoff CG on the CG Envelope Graph below.

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

Formulas

- Weight × Arm = Moment
- Total Moment ÷ Total Weight = CG
- 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



SECTION 3
DEPARTURE PROCEDURES

Engine Failure Immediate Action and Off-Airport Landings

While a complete loss of engine power is a rare occurrence, it can happen. ATP pilots must know the emergency procedures from the POH and have a contingency plan in mind for the worst-case scenario.

General Guidelines:

- Know immediate action items
- Best glide speed & altitude = time
- Gliding distance 1000 ft. AGL = Approx 1.5 miles and 1 ½ minutes

The following chart comes from extracted POH data and shows the glide distance and time expected with an engine failure with no wind and at max gross weight. Aircraft performance may vary considerably based on wind conditions, airplane weight and bank angle.

PA-28 Best Glide Speed 76 KIAS

Altitude	Distance	Time
500	.75	40 sec
1000	1.7	1 min 15 sec
2000	3.0	2 min 30 sec
3000	4.5	3 min 45 sec

General Guidelines (continued):

- Engine failure in the pattern abeam the threshold will require a traffic pattern that is half the distance and half the time of a normal stabilized powered-approach pattern
- If absolutely no time available:
  - Mixture/Master/Fuel selector - OFF
    - Master off, shuts off fuel pump (if on)
    - Stall warning system is inoperative with the master off.
  - Magnetos off if possible
- Always use the greatest length of runway available for takeoff to achieve the highest altitude while in the airport area. Avoid intersection departures
- Review ATP airport supplements
- Comply with ATP policies re: minimum ceiling heights and avoid cross country routes with ceilings below 1000 ft. AGL
- Fly higher altitudes for night cross country
- Always maintain ATC contact at night
- Minimize over-water flying
- Maintain situational awareness of the wind direction

ForeFlight Usage:

- Maintain situational awareness, particularly of airport availability during cross-country flights
- Set up the glide advisor radius depiction
- Review 3D view for departure runway for additional landing options
- Synthetic vision assists with depicting terrain at night
- Note: some features require Pro Plus or Performance Plus subscription level

ATP uses the mnemonic of A, B, C, D, E to assist in handling this emergency situation.

A Airspeed
Pitch and trim for the best glide airspeed. Proper trimming will lighten your workload.

B Best Place to Land
Immediately find an airport or other landing spot within gliding distance and turn toward that spot. Consider the factors associated with landing on roads, fields, water, trees, etc. (Review Chapter 18 of the AFH for more information.) Use the Nearest page on the GPS, use ForeFlight's Glide Advisor, and remember the rule of thumb for glide distance: 1000 ft = 1.5 miles

C Checklist
Accomplish memory items and follow up with the checklist as time permits.

D Declare an Emergency
Let ATC know what is going on. Squawk 7700.

E ELT and Emergency Landing
Lock the seatbelt, unlatch the door, and review egress procedures

Watch the ATP Elevate Video titled **ATP Elevate: Emergency Approach and Landing** located in the ATP Library for additional information.

Below 800 Feet AGL

If the engine quits immediately after takeoff, there will not be sufficient time to attempt a restart; focus instead on flying the airplane and picking a landing spot. The following steps need to be memorized and rehearsed. There will be no time to refer to a checklist at low altitudes. Memorize the Engine Failure During Takeoff Roll, Engine Failure After Takeoff and the Power-Off Landing (Emergency Landing Without Power) checklists.

Power - Off Landing Emergency Landing Without Power

Immediately adjust from a nose-high takeoff pitch attitude by lowering the pitch attitude sufficiently to maintain airspeed, and trim for best glide speed.

1. Airspeed Best Glide (trim) .... **76 KIAS**
2. Landing Area .... **Select / Inspect**

When committed to emergency landing (Power-Off Landing Checklist)

3. Flaps.......... **As Desired (Full)**
   Deploying flaps allows the aircraft to touch down at the slowest possible airspeed. Any obstacles or rough terrain will do less damage at slower speeds.

⚠ It is critical to fight the tendency to pull back excessively on the yoke to avoid hitting something. Any increase in the angle of attack at this point will cause the airplane to stall. A stall prior to touchdown will increase the vertical descent rate, and cause much more damage to the airplane and occupants on board.

Steps needed to reduce the chance of fire are next. Always take steps to prevent a fire when landing off-airport. The fuel tank may rupture and spill fuel during the landing, and these steps will help reduce ignition sources.

4. Throttle .... **Close**
5. Mixture Control .... **Idle Cutoff**
   This will cut off the fuel flow to the engine.
6. Magnetos Switch .... **Off**
   This step will help prevent the spark plugs from firing.
7. Battery Master .... **Off**
   Turning off electrical power from the standby and main battery and the alternator will help reduce the chance of electrical spark, as well as turning off the fuel pumps if on, which could prevent a fire.
8. Alternator .... **Off**

9. Fuel Selector .... **Off**
   This step closes the fuel valve that is on the engine side of the firewall.
10. Cabin Door .... **Unlatch**
    Unlatching the cabin door can prevent the door from becoming wedged in the airframe. If a hard landing distorts the door frame, a stuck door can prevent the occupants from safely exiting the airplane.
11. Seat Belts & Shoulder Harness .... **Tightened**
12. Touchdown .... **Lowest Possible Airspeed**

⚠ Never land "off-airport" with electrical power or fuel turned on! At the very least ensure that the mixture, fuel selector, magnetos, and master battery are all turned to the off position.

If the engine fails after rotation but below 800' AGL, landing options are very limited. If there is runway remaining, transition to a landing configuration and touch down on the remaining runway. Using the entire runway (instead of an intersection departure or stop-and-go) lets the pilot obtain a higher altitude within the airport environment and provides more survivable landing options. Airspeed control is still vitally important; touch down at the slowest possible landing speed with full flaps. Mitigate the risk of running off the end of the runway and hitting obstructions by shutting down fuel and electrical sources by following the previously listed checklist items.

If the engine failure occurs below 800' AGL, there may be a temptation to try a 180° turn back to the runway. Accomplishing this turn successfully is very unlikely, and it should not be attempted. The **FAA Safety Team (FAASTeam) article "Impossible Turn"** discusses the dangers of attempting the 180° turn back to the runway.

The best option for survival with a complete loss of power below 800 feet AGL is to maneuver slightly, up to 30° left or right, toward the most suitable landing spot and follow the steps in the emergency checklist listed above. Chapter 18 in the Airplane Flying Handbook (AFH) is devoted to emergency procedures and is a great resource.

800 to 1500 Feet AGL

If an engine failure occurs after takeoff between 800' to 1500' AGL, there will be slightly more time for maneuvering, but a landing area must be selected immediately. Depending on the surface winds, a 180° return to the runway may be an option, but this should only be considered under favorable conditions. An analysis and preselection of off-airport landing sites near the traffic pattern area will assist in decision-making when the emergency occurs. The 3D view on ForeFlight or analysis of a satellite map of the area can reveal additional landing site options.

If time and altitude allow for an attempt at restoring power, perform the following steps.

- Maintain 76 KIAS Minimum
- Fuel Selector .... **Check Selected Tank**
  If fuel tank balancing procedures are not followed, it is possible to exhaust one tank while fuel remains in the other. Switch tanks every 30 minutes.
- Fuel Pump .... **Check On**
- Mixture .... **Check Rich**
- Carb Heat / Alternate Air .... **On**

If power is not restored, prepare for Power-Off Landing as detailed in the Engine Failure below 800 ft. AGL section.

(!) Fuel, Air, and Spark are the three things combustion engines require to function. In the event of an engine failure, always consider these as a guide for troubleshooting along with the checklist.

(!) Some ground reference maneuvers, like eights-on-pylons, are conducted within this altitude range. Always pre-select a forced landing area whenever conducting these low-level maneuvers, or whenever conducting maneuvers out of glide range of an airport.

Above 1500 Feet AGL

When an engine failure occurs above 1500′ AGL, there will be more time to troubleshoot the problem. Depending on the altitude where the failure occurs, there may be time to work on two separate checklists. First, slow to best glide and turn towards nearest airport then run the restart procedures in the Engine Power Loss In-flight checklist; if this does not restore power, proceed to the Power-Off Landing checklist. The Power-Off Landing checklist generally follows the outline of the checklist listed in this section of the supplement.

To assist with landing site selection, ForeFlight has a Glide Advisor which takes into account both terrain and wind effects. The pilot must program ForeFlight with the specific aircraft's glide ratio, which for the Archer is 10:1.

Engine Failure at Night

If the engine fails at night, pilots should still follow the steps of the A,B,C,D,E mnemonic. While the steps remain the same as in the daytime, there are a few additional actions required.

- It will be very difficult to select landing sites like fields or roads at night, so make a turn toward the nearest airport. Darker areas tend to be less populated, but they may also hide rough terrain and obstacles.

- If landing off-airport, complete all items on the emergency landing checklist **except** turning off the master battery switch prior to touchdown. This allows the pilot to use the landing light throughout the approach. Turn off the master battery switch immediately prior to or after touchdown.

Engine Failure in IMC

An engine failure in IMC is handled in much the same way as one in VMC. The obvious difference is being in the clouds during a portion of the descent, so pilots must be sure to continue their instrument scan and maintain aircraft control while troubleshooting the engine failure. Once the aircraft descends below the cloud bases, the pilot can then select a landing site and continue with the emergency procedures discussed above. Become familiar with the graphical area forecast to avoid overflying areas with visibility or ceilings that would not allow a safe landing under VMC. ATC will be able to help with local weather conditions like ceilings and winds for area airports to assist with decision-making.

If in cruise flight and within gliding distance of an airport, also consider using final approach courses of published instrument procedures as a guide towards the approach end of a runway. Once over the airport, circle down over the approach end of the runway (using the principles of a steep spiral) until in a position for a safe landing.

Engine Failure over Water

Although ATP avoids extended over-water operations, local procedures at coastal airports may require flights over water. To mitigate the risk of an engine failure over water and reduce the chance of ditching, consider choosing an altitude such that the shore remains within glide distance throughout the flight.

If ditching is required, page 18-7 in the Airplane Flying Handbook recommends using no more than an intermediate flap setting for a water landing in a low-wing airplane. Touching down at the slowest airspeed possible is important, but having flaps fully extended in a low-wing airplane may cause a more damaging impact with the water.

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

Departure Briefing

While the Pre-Takeoff Briefing reviews time-critical emergency procedures, the Departure Briefing covers the overall plan for the takeoff and departure. This should include (as applicable):

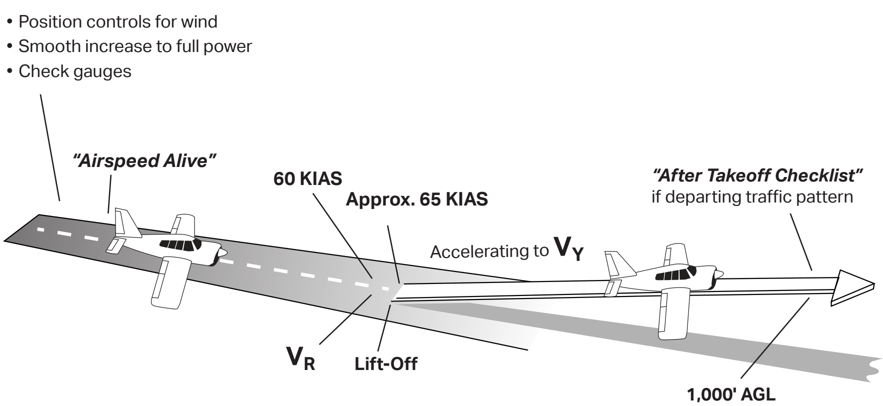
- Type of takeoff
- Runway in use and distance available
- Wind speed and direction
- Rotation and climb speed
- Initial heading and altitude
- ATC departure frequency
- Instrument departure procedure
- Abort criteria (expected RPM at full power and takeoff roll distance)

Normal Takeoff (Flaps 0°)

Do not delay on runway.

1. Approaching centerline, position controls for wind
2. Smoothly increase throttle to full power
3. Check engine gauges
4. *"Airspeed Alive"*
5. Start slow rotation at 60 KIAS
6. Pitch to V_Y sight picture and accelerate to 76 KIAS (V_Y)
7. *"After Takeoff Checklist"* out of 1,000' AGL

Normal Takeoff Profile

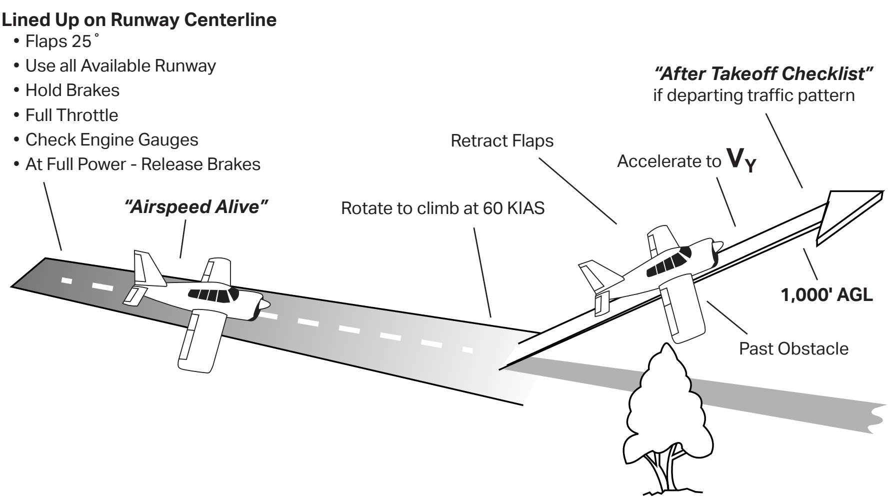


ATP Archers are equipped with traffic information. It is not to be used as a collision avoidance system and does not relieve the pilot of responsibility to "see and avoid" other aircraft.

Short-Field Takeoff & Climb (Flaps 25°)

1. Flaps 25°
2. Use all available runway
3. Hold brakes
4. Full throttle
5. Check engine gauges
6. At full power - Release brakes
7. *"Airspeed Alive"*
8. Begin rotation at 55 KIAS, then pitch to V_X sight picture and climb at 60 KIAS over a 50' obstacle
9. Once clear of obstacle, accelerate to V_X (64 KIAS) while slowly retracting flaps.
10. Decrease pitch to V_Y sight picture and accelerate and climb at 76 KIAS (V_Y)
11. *"After Takeoff Checklist"* out of 1,000' AGL

Short-Field Takeoff & Climb Profile

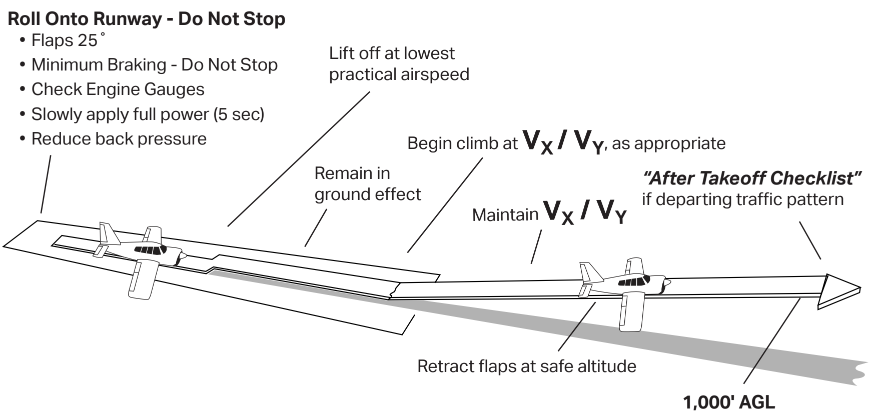


Use 60 KIAS (max weight speed) as the initial climb speed over the 50' obstacle, unless specified by the Examiner to use the computed speed for the aircraft's actual weight.

Soft-Field Takeoff & Climb (Flaps 25°)

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

Soft-Field Takeoff & Climb Profile



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

Do not deliberately hold the nose wheel off the runway during the takeoff roll, as this is not an ACS requirement.

SECTION 4
ARRIVAL PROCEDURES

Piper Archer Landing Criteria

- Plan and brief each landing carefully.
- Enter the traffic pattern at TPA trimmed for 90 KIAS in level flight. *(landing profiles depend on this)*
- Maintain a constant angle glidepath.
- Whenever possible, fly the traffic pattern at a distance from the airport that allows for a power off landing on a safe landing surface in the event of an engine failure.
- Maintain final approach speed until roundout (flare) at approximately 10' to 20' above the runway.
- Reduce throttle to touch down with the engine idling and the airplane at minimum controllable airspeed within the first third of the runway.
- Touch down on the main gear, with the wheels straddling the centerline.
- Manage the airplane’s energy so touchdown occurs at the designated touchdown point.
- Maintain a pitch attitude after touchdown that prevents the nosewheel from slamming down by increasing aft elevator as the airplane slows.
- Maintain centerline until taxi speed is reached and increase crosswind control inputs as airplane slows.
- Adjust crosswind control inputs as necessary during taxi after leaving the runway.

Good Planning = Good Landing

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

Approach Briefing – Verbalize the Plan

During the Approach Checklist, conduct an approach briefing. This organizes the plan and ensures effective communication between pilots. The briefing should be specific to each approach and landing, 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 on Runway 16. Field elevation 600 feet, pattern altitude 1,600 feet. Aiming at the 3rd stripe before the 1,000' markings, touching down on the 1,000' markings. Winds are 180 at 10, slight right crosswind. Final approach speed 70 knots. If the approach becomes unstable, we'll go around and expect left traffic."

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

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

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

Spoken Callouts on Approach

Callout	VFR or Visual Approach	Instrument Approach
"Before Landing Checklist"	Before descending below TPA (abeam touchdown point, for pattern work)	½ dot below GS intercept (precision) or at FAF (non-precision)
"1,000 to Go"	N/A	1,000' above MDA or DA
"Approaching Minimums"	N/A	100' above MDA or DA
"Minimums"	N/A	At MDA or DA
"Stabilized – Continuing" **or** *"Not Stabilized – Go Around"*	200 feet AGL **Mandatory go-around if not stabilized**	

Stabilized Approaches

The *Airplane Flying Handbook* defines a stabilized approach as "one in which the pilot establishes and maintains a constant-angle glide path towards a predetermined point on the landing runway. It is based on the pilot's judgment of certain visual clues and depends on maintaining a constant final descent airspeed and configuration." Stabilized approaches significantly reduce the chance of landing mishaps.

ATP requires a stabilized approach for all landings, both visual and instrument. Pilots should strive for a stabilized approach throughout their final descent to landing. However, each aircraft type also has a designated altitude by which it **must** be stabilized for the approach to continue to a landing. In the Piper Archer, the airplane must be stabilized by no lower than 200' AGL. If the approach is not stabilized by that point, or if it becomes unstable later, a go-around is required.

Conditions for a Stabilized Approach

- **Glidepath:** Constant angle glidepath. Proper descent angle and rate of descent to land in the first third of the runway (approximately 350 FPM) must be established and maintained. All available landing aids (ILS, VASI, PAPI, etc.) must be used.
- **Configuration:** Aircraft in landing configuration. Flaps and trim in final setting for landing.
- **Airspeed:** Airspeed stable and within ±5 knots of target speed (70 KIAS for normal landings, 66 KIAS for short-/soft-field landings).

These parameters are not merely targets, they are mandatory conditions and limits. Any deviation at or beyond the beginning of the stabilized approach corridor at 200' AGL requires a mandatory go-around.

Aiming Point versus Touchdown Point

The predetermined point on the runway that the constant-angle glide path leads to is called the aiming point. If the airplane continued the constant glide path and was not flared for landing, it would strike the ground at the aiming point. During an approach, this point can be visually identified by finding the spot on the runway that does not appear to move.

Because the pilot reduces the rate of descent during the flare, the aircraft will touch down some distance further down the runway from the aiming point. This distance depends on the airplane's speed, and proper speed control allows the pilot to anticipate the float distance. The pilot must choose an appropriate aiming point so that the airplane will touch down where desired, within the first third of the runway. Pilots should identify both the aiming and the touchdown point during the approach briefing.

Pitch & Power on a Stabilized Approach

Flying a stabilized approach requires careful control of pitch (with the elevator) and power (with the throttle). If the aircraft is near the constant-angle glidepath and the correct speed, make small corrections as follows to maintain the stabilized approach:

Pitch for Glidepath

Maintain the 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, pitch down, and if the aiming point moves higher, pitch up.

Power for Airspeed

Maintain the desired airspeed by making power adjustments. If the airspeed increases, reduce power, and if the airspeed decreases, add power.

TIP: If the airplane is properly trimmed, airspeed deviations will be small, and much of the pilot's attention can be on maintaining the constant-angle glidepath to the aiming point. Most of the pilot's scan should be outside the airplane, devoted to the aiming point and looking for traffic, with occasional instrument checks.

ATP teaches this method because it supports the stabilized approach concept. Changing pitch to correct airspeed deviations would take the airplane away from the constant-angle glidepath and destabilize the approach. Also, the same method can be used for both visual approaches and precision instrument approaches (during which the pilot uses pitch adjustments to keep the glideslope needle centered).

Fixing an Unstabilized Approach (above 200′ AGL)

Larger deviations from the desired airspeed and/or altitude may require a combination of pitch and power inputs to reach the stabilized approach path:

Control Input	Energy Effect	The airplane moves…
Increase throttle	More total energy	Higher and faster
Decrease throttle	Less total energy	Lower and slower
Forward elevator	Trade height for speed	Lower but faster
Aft elevator	Trade speed for height	Higher but slower

A single throttle or elevator input affects both speed and altitude, so to change only one of those at a time, a mix of both elevator and throttle input is required. For example, if the aircraft is high but at the correct speed, combine decreased throttle with forward elevator. Both inputs make the plane move lower, but one makes the plane slower while the other makes it faster. With the right blend of power and pitch, the speed effects will cancel out.

The size of the necessary corrections should get smaller as the aircraft descends. If the airplane is not on the stabilized approach path by 200′ AGL, a go-around is mandatory.

Evaluating the Stabilized Approach

On every approach, starting at 300′ AGL, the pilot must conduct a final stabilized approach check. This check, and the steps that follow, can be remembered with the acronym **G-CASH**:

- ☐ **Glidepath:** Is the airplane on a constant-angle glidepath to land in the first third of the runway?
- ☐ **Configuration:** Are final flaps and trim set?
- ☐ **Airspeed:** Is the airspeed within ±5 knots of the target speed?

If the answer to any of these questions is no, then call out *"Not stabilized - Go-around"* and execute a go-around no later than 200′ AGL. But, if the answer to all three questions is yes, then continue the approach, with the following two callouts:

- *"**S**tabilized - Continuing"*
- *"**H**eels on ground, toes off brakes"* - to ensure brakes are not applied at touchdown

ATP

Braking Technique

Slowing the aircraft has two phases: aerodynamic braking, followed by wheel braking.

Aerodynamic Braking

After touchdown, the aircraft will slow down from the effects of drag and friction with the runway. The pilot can increase this friction by applying back pressure to the flight controls (***without*** lifting the nosewheel off the runway). Raising the elevator applies downforce to the tail, effectively increasing the aircraft's weight and rolling resistance. This reduces the aircraft's speed and the rollout distance. As the aircraft slows down, maintain centerline with rudder and gradually increase back pressure until doing so no longer tends to raise the nose. At this point, aerodynamic braking has been exhausted, and the pilot can move on to wheel braking.

Wheel Braking

The pilot should shift their toes onto the top portion of the pedals, then ***gently*** apply the toe brakes. This application must be smooth and coordinated. Gradual brake application allows the pilot to feel how the airplane is responding and adjust inputs as necessary. Rapid or uneven brake application can cause excessive brake wear, damaged tires, or loss of aircraft control. Keep the aircraft on centerline with nosewheel steering. Once the aircraft has slowed to a safe taxi speed, apply taxi power and exit the runway at the next available taxiway.

The ABCs of Braking

As an easy-to-remember rule, under normal circumstances, do not apply wheel brakes after landing until ABC:

- **A**erodynamic **B**raking is no longer effective and elevator controls are neutralized, and
- The aircraft is on **C**enterline.

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

Go Around Philosophy

The decision to execute a go-around is both prudent and encouraged anytime the outcome of an approach or landing becomes uncertain. 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.

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

Attempting to salvage deficient landings by correcting floats, bounces, balloons, etc., rather than going around, is prohibited by ATP policy.

ATP

Instructors should vigilantly monitor student approaches and landings, and should command go-arounds if any of the stabilized approach conditions are not met. Instructors should make every effort to avoid allowing a student to take an unstabilized approach close to the ground, requiring the instructor to take the controls and initiate a go-around. Students must also be taught to evaluate their own approaches for the stabilized approach criteria and make the go-around call if necessary, as they alone will be responsible for this during solos, crew cross-country operations, and checkrides.

Gust Factor

Slightly higher approach speeds should be used under turbulent or gusty wind conditions. Add ½ the gust factor to the normal approach speed. For example, if the wind is reported 8 gusting to 18 knots, the gust factor is 10 knots. Add ½ the gust factor, 5 knots in this example, to the normal approach speed.

Seat Position

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

The fore-aft adjustment is correct when the heels are on the floor with the balls of the feet on the rudder pedals, not on the brakes. The feet should be at a 45° angle from the floor to the pedals and the pilot should be able apply full rudder inputs without shifting their body weight. When braking is required, lift the foot from the floor rather than keeping the leg suspended in the air or resting the feet on the upper portion of the pedals. The seat height should be adjusted so the pilot can see the curvature of the cowling, while still being able to see all flight instruments, for the best sight picture during landing.

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

Flap Setting

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

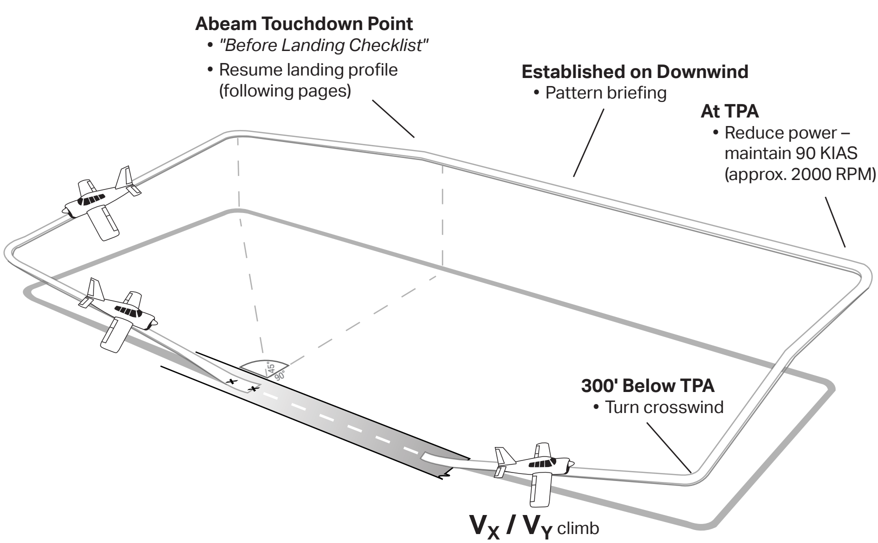
ATP students are trained to perform normal landings using flaps 25°, per the Normal Landing profile located on page 49. Short-field and soft-field landings require flaps 40°. Flap settings on power-off 180° approaches will vary depending on the current conditions.

Traffic Pattern Operations

Pattern Briefings should include:

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

Traffic Pattern Operations Profile



Normal Visual Approach & Landing

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

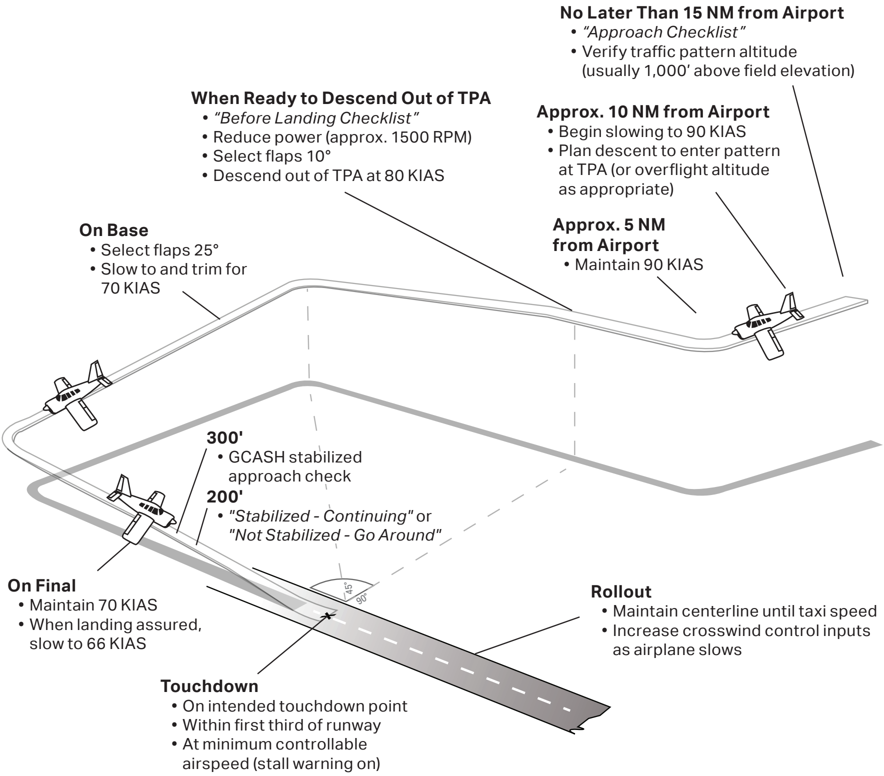
TIP: Getting ATIS, briefing the approach, and the Approach Checklist should be completed no later than 15 miles from the airport. Accomplishing these tasks as early as possible creates more time to focus on aircraft control and collision avoidance in the busy airport environment. During training flights when maneuvering near an airport, get ATIS, brief, and complete the Approach Checklist as soon as the decision is made to return to the airport.

Before Landing Checklist

Never Switch Fuel Tanks Below Pattern Altitude

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

Normal Visual Approach & Landing Profile



* See "Stabilized Approaches" section on page 42.

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

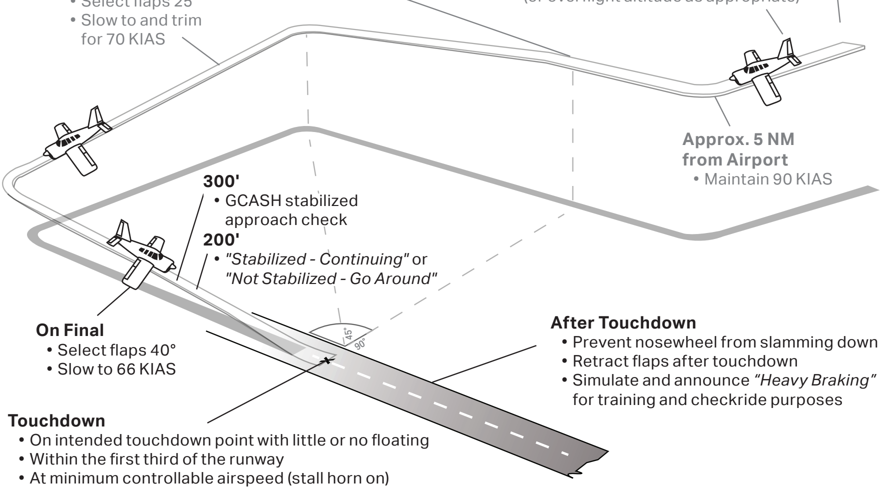
Short-Field Approach & Landing

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

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

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

Short-Field Approach & Landing Profile



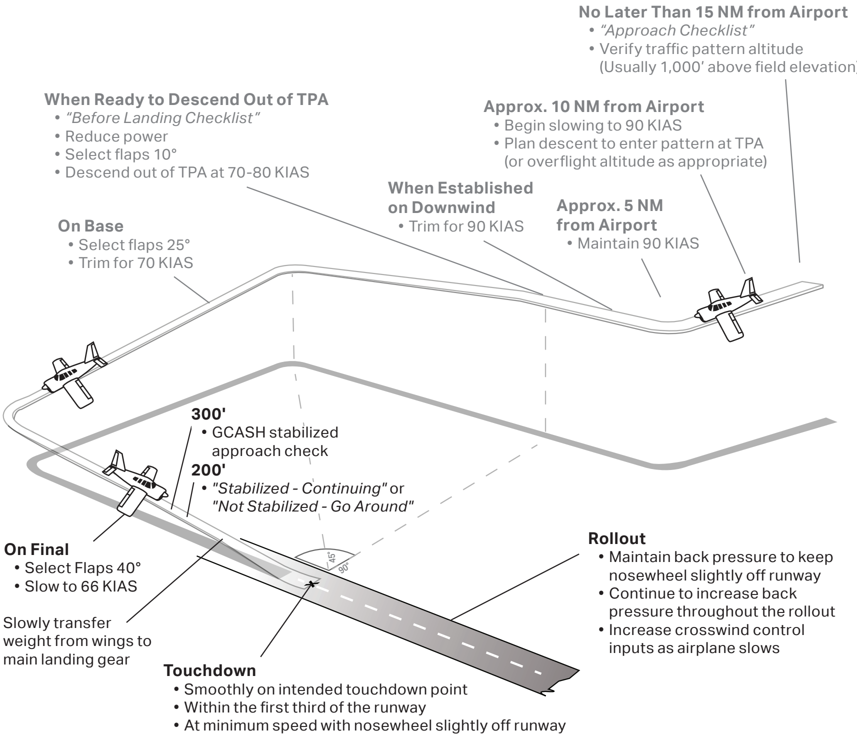
To maintain a margin of safety during training, select a touchdown point no earlier than the beginning of the second centerline marking.

Soft-Field Approach & Landing

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

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

Soft-Field Approach & Landing Profile



Power-Off 180° Accuracy Approach & Landing

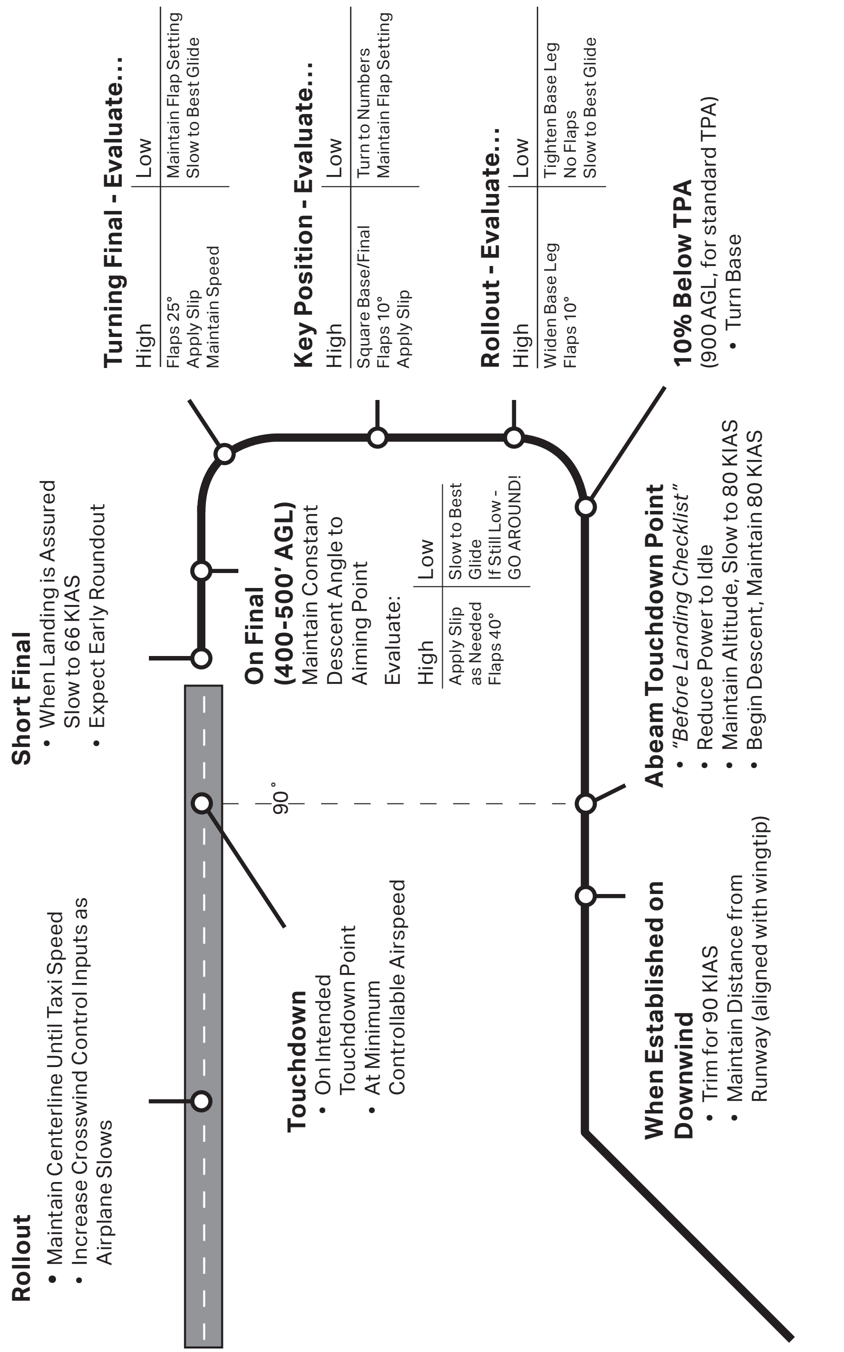
Steps 1-4 are identical to a normal approach and landing procedure.

5. Fly parallel to the runway, correcting for crosswind, at a distance that aligns the runway with the wingtip.
6. When abeam touchdown point, smoothly reduce power to idle.
7. Maintain altitude while slowing to 80 KIAS, then descend out of TPA.
8. At approximately 10% below TPA (100 feet, for the standard 1,000′ TPA), turn base.
9. Begin evaluating distance from runway and wind conditions. 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.

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

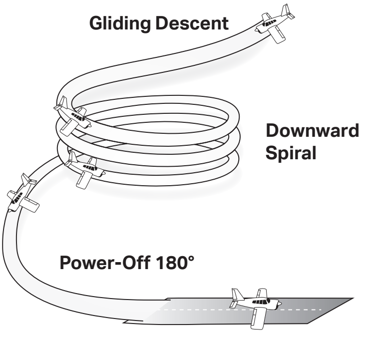
TIP: The aiming point and the touchdown point are NOT the same point. Aim about 200′ before the touchdown point to dissipate enough speed for a proper landing.

Power-Off 180° Accuracy Approach & Landing Profile



Emergency Approach & Landing (Simulated)

1. Reduce power to idle.
2. Pitch for and then trim to maintain best glide speed (76 KIAS)
3. Select an appropriate emergency landing site.
4. Begin flying directly towards landing site.
5. Complete Engine Power Loss In-Flight checklist.
6. Evaluate glide performance to confirm landing site can be reached.
7. Upon reaching landing site, spiral downwards at best glide.
8. Evaluate wind direction to determine best direction of approach.
9. Roll out of spiral heading downwind, abeam "midfield," at approximately 1,500′ AGL.
10. Pass abeam intended touchdown point at approximately 1,000′ AGL.
11. Execute Power-Off 180° Accuracy Approach and Landing procedure as previously described.
12. Simulate the "When Committed to Landing" items on the Power-Off Landing checklist.
13. If landing site is not an airport, or does not meet ATP runway requirements, add power and break off the approach no lower than 500′ AGL.



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

Crosswind Approach & Landing

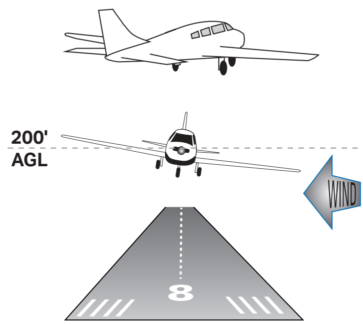
Carefully planned adjustments must be made to the normal approach and landing procedure to safely complete a crosswind approach and landing.

Planning

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

Ground Track

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



Control Technique

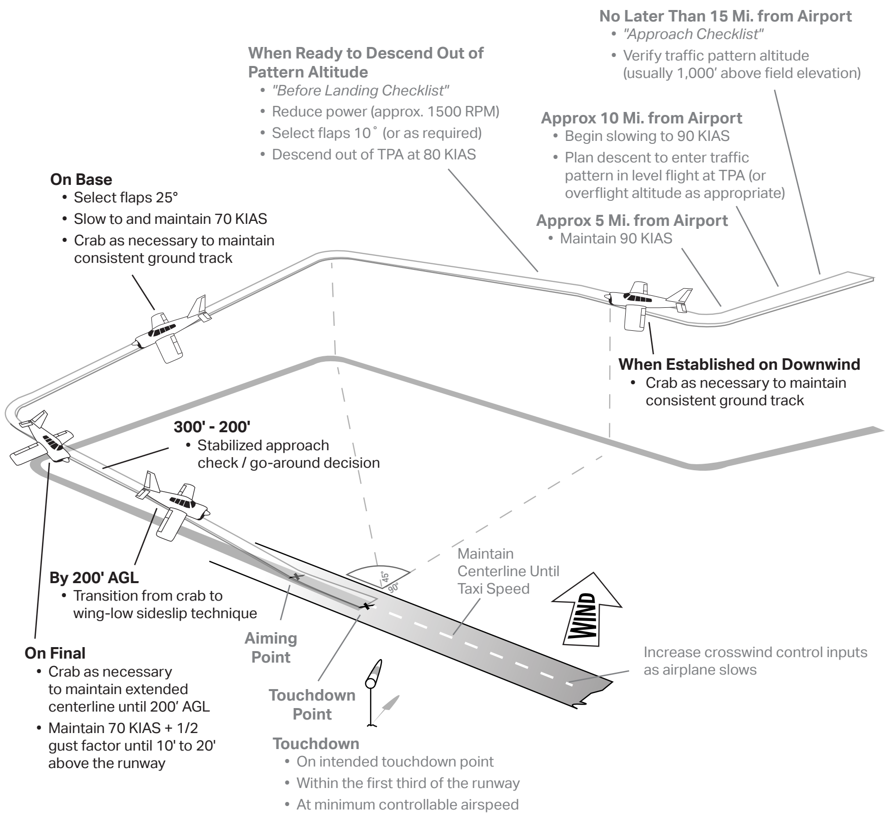
Establish a crab angle to maintain the proper ground track on final, then transition to the wing-low sideslip technique by no later than 200' AGL. Maintain the wing-low technique until touchdown and throughout the landing roll. After landing, increase aileron input into the wind as the airplane slows to prevent the upwind wing from rising, reduce side-loading tendencies on the landing gear, and minimize the risk of roll-over accidents due to the upwind wing lifting.

Judgment

The demonstrated crosswind component in the 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.

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

Crosswind Approach & Landing Profile



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

Go-Around Procedure

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

- Unstable approach path or airspeed.
- Improper runway alignment.
- Unexpected hazards on the runway or on final.
- Excessive floating past the touchdown point.
- Ballooning or bouncing.
- Anything that jeopardizes a safe approach and landing.

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

Missed Approach

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

Go-Around / Missed Approach Procedure

1. Throttle – full power.
2. Increase pitch to establish climb at V_X or V_Y as appropriate.
3. Retract flaps slowly when above V_X 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 (usually to the side, flying parallel to the runway).

Rejected or Balked Landing

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

Rejected or Balked Landing Procedure

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

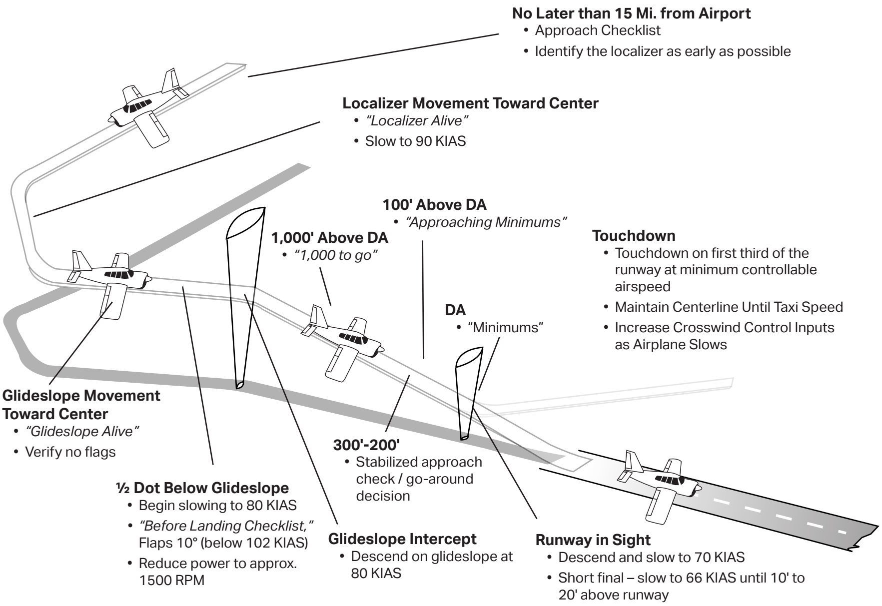
If the rejected landing is due to conflicting traffic, maneuver as necessary during the climb to clear and avoid conflicting traffic (usually to the side, flying parallel to the runway).

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

ATP 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. Announce *"Localizer Alive"* when localizer begins moving towards the center.
3. Slow to 90 KIAS when on final approach course inbound.
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: Slow to 80 KIAS and select flaps 10° (V_{FE} = 102 KIAS), *"Before Landing Checklist."*
7. Intercepting glideslope: Reduce power to approx. 1500 RPM.
8. Descend on glideslope at 80 KIAS.
9. Announce at 1,000' above DA: *"1,000 to go."*
10. Announce at 100' above DA: *"Approaching Minimums."*
11. *"Minimums."*
12. If runway is in sight: descend and slow to 70 KIAS.
13. On short final, slow to 66 KIAS until the roundout.

ILS Approach & Landing Profile



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

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

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

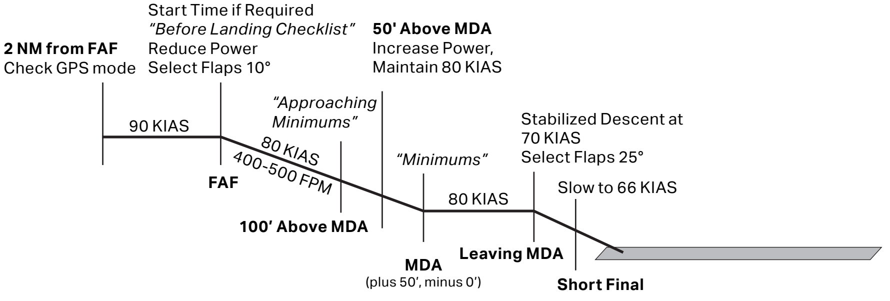
Within 30 NM of the airport, if flying an RNAV approach, the GPS will display "TERM."

2. When direct to the IAF or on vectors, set the desired course on the HSI.
3. Complete the *"Approach Checklist."*
4. Slow to 90 KIAS when on final approach course inbound.

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

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

Non-Precision Approach & Landing Profile



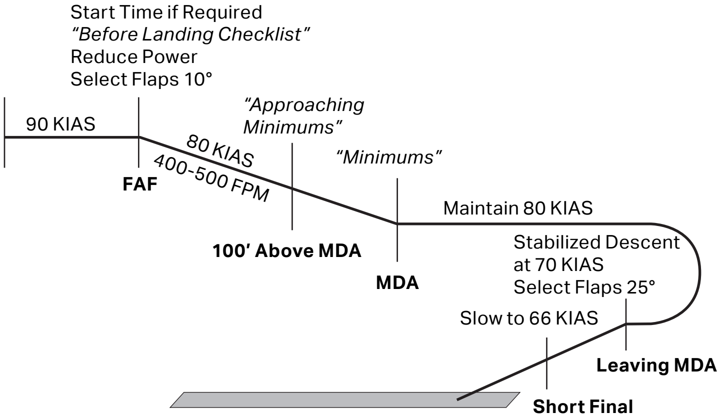
Circling Approach

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

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

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

Circling Approach Profile



Holding

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

SECTION 5

IN-FLIGHT MANEUVERS

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

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

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

Prior to every maneuver, the pilot should identify a suitable landing site in case of engine failure or other emergency. This is particularly important for ground reference maneuvers, due to their low altitude.

Clean Configuration Flow

1. Electric fuel pump – on
2. Fuel selector – proper tank
3. Mixture – enrichen
4. Flaps 0°

Landing Configuration Flow

1. Electric fuel pump – on
2. Fuel selector – proper tank
3. Mixture – enrichen
4. Flaps 40°

PVT / COM — Steep Turns

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

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

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

PVT / COM — Maneuvering During Slow Flight

Maneuvering during slow flight consists of flight (straight-and-level, climbs, turns, and descents) at an angle of attack just below that which will cause an aerodynamic buffet or stall warning. It teaches the pilot to understand the airplane's flight characteristics and flight control feel at high AOA and low airspeed. Complete the slow flight maneuver no lower than 1,500' AGL. During slow flight, establish and maintain an airspeed at which any further increase in angle of attack, increase in load factor, or reduction in power would result in a stall warning (e.g., airplane buffet, stall horn, etc.).

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

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

PVT COM Power-Off Stall

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

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

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

PVT COM Power-On Stall

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

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

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

PVT COM Emergency Descent

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

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

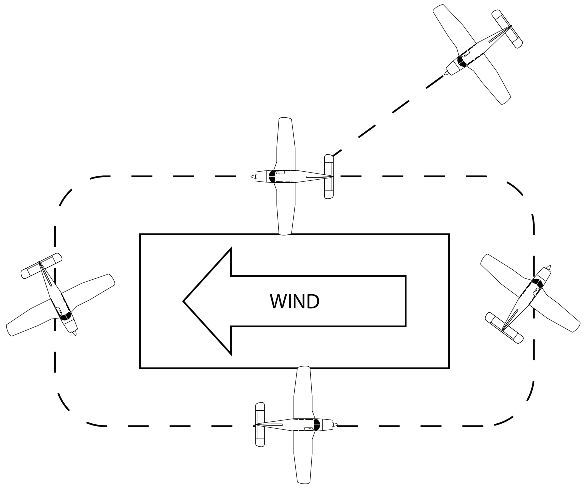
ACS	Airspeed	Altitude
	+0/-10 KIAS	±100'

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

PVT Rectangular Course

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

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

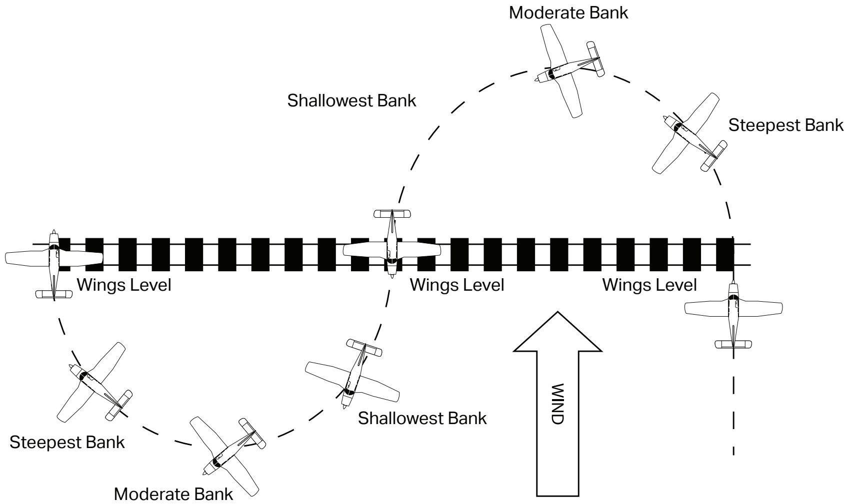


ACS	Airspeed	Altitude
	±10 KIAS	±100'

PVT S-Turns

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

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

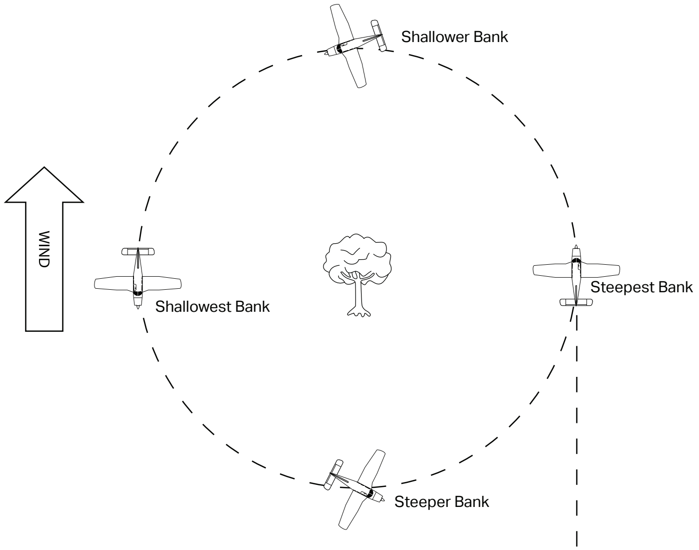


ACS	Airspeed	Altitude
	±10 KIAS	±100'

PVT Turns Around A Point

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

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

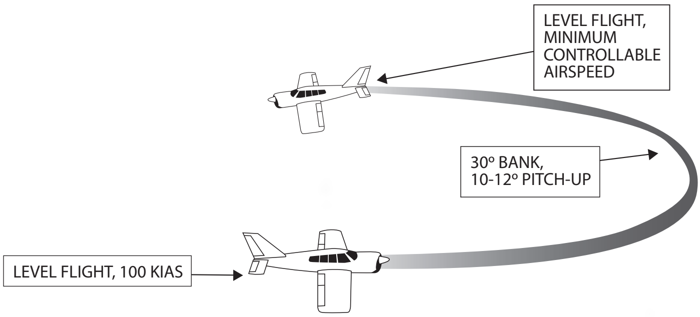


ACS	Airspeed	Altitude
	±10 KIAS	±100 feet

COM / Chandelles

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

1. Perform two 90° clearing turns
2. 100 KIAS (approx. 2300 RPM), maintain altitude
3. Clean configuration flow
4. Choose a reference point off wing
5. Establish / maintain 30° bank
6. Full throttle – gradually increase pitch to attain approx. 10-12° pitch up at 90° point
   1st 90° of turn – Bank = constant 30°, Pitch = increasing to 10-12° pitch up
7. 90° point – maintain pitch, gradually reduce bank angle to attain wings-level at 180° point
   2nd 90° of turn – Pitch = constant 10-12° pitch up, Bank = decreasing to level flight
8. 180° point – wings level, minimum controllable airspeed
9. Momentarily maintain an airspeed just above a stall
10. Accelerate to resume straight-and-level flight with minimum loss of altitude
11. *"Cruise Checklist."*

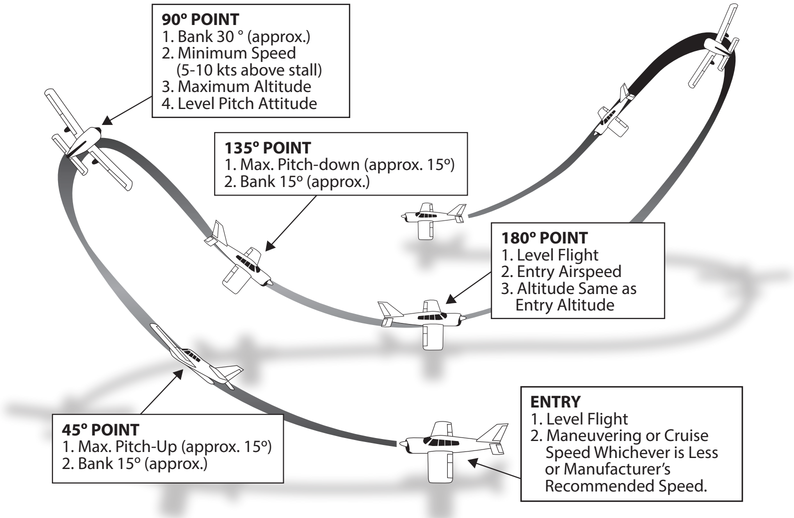


ACS	Airspeed	Heading
	Just above stall	Rollout at 180° point ±10°

COM Lazy Eights

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

1. Perform two 90° clearing turns
2. 100 KIAS (approx. 2300 RPM), maintain altitude
3. Clean configuration flow
4. Choose a reference point off of the wing
5. Simultaneously increase pitch and bank (slowly)
6. 45° point – 15° pitch up, 15° bank
7. Reduce pitch / increase bank
8. 90° point – level pitch, 30° bank - min. speed (5-10 knots above stall)
9. Continue reducing pitch and reduce bank
10. 135° point – 15° pitch down, 15° bank
11. 180° point – level flight, entry airspeed and altitude
12. Repeat in opposite direction
13. *"Cruise Checklist."*



ACS

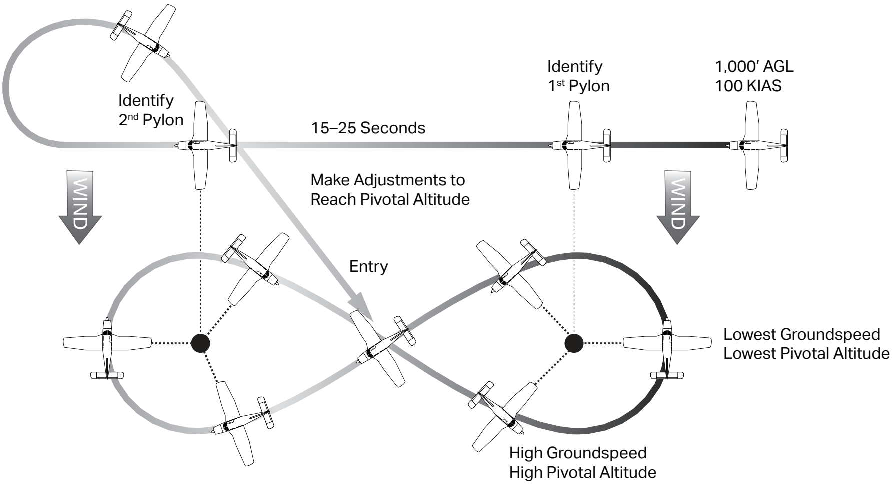
At 180° points:	Airspeed	Altitude	Heading
	±10 KIAS	±100'	±10°

Approx. 30° bank at steepest point
Constant change of pitch and roll rate and airspeed.

COM / Eights On Pylons

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

1. Perform two 90° clearing turns
2. Clean configuration flow
3. 100 KIAS, maintain 1,000' AGL on a heading such that wind is from the right
4. Identify first point off the left wing with emergency landing area nearby
5. Once abeam first point, count 15-25 seconds - identify second point
6. Perform right teardrop turn to heading that will split the pylons evenly on a downwind 45° entry
7. Check ground speed and make minor adjustments to achieve pivotal altitude before splitting pylons
8. Begin left turn around first pylon
9. Apply appropriate pitch corrections to compensate for changes in groundspeed and to maintain line of sight reference with the pylon (descend if the point moves forward and climb if the point moves back)
10. Begin rollout to allow the airplane to proceed diagonally between the pylons at a 45° angle (straight-and-level flight segment should last 3-5 seconds)
11. Begin second turn in the opposite direction of the first
12. Exit maneuver on entry heading
13. *"Cruise Checklist."*

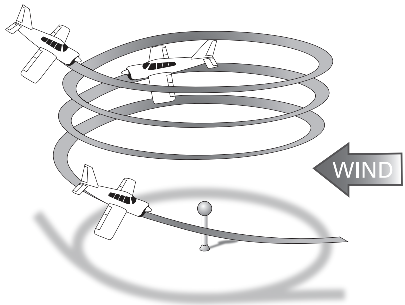


NOTE: Hold the pylon by changing altitude, **not** slipping or skidding.

COM | Steep Spirals

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

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



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

COM Accelerated Stall

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

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

CFI Secondary Stall *(Power-On)*

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

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

CFI — Secondary Stall *(Power-Off)*

1. Perform two 90° clearing turns
2. 1500 RPM (maintain altitude)
3. Landing configuration flow
4. Stabilized descent at 66 KIAS
5. Throttle idle (slowly)
6. Maintain altitude to induce stall
7. At stall, recover – reduce AOA and level wings (do not add power)
8. When stall horn silences, increase pitch to induce a secondary stall
9. At stall, recover – reduce AOA, level wings, and apply max power
10. Slowly retract flaps to 10˚
11. Increase pitch to arrest descent
12. Establish V_X or V_Y as appropriate
13. Retract flaps to 0˚ when accelerating through V_X
14. *"Cruise Checklist."*

CFI — Elevator Trim Stall

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

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

CFI Cross-Control Stall

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

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

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

SECTION 6
ORAL REVIEW

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 PA-28-181 engine.
   A. How many cylinders?
   B. Who is the manufacturer?
   C. What is the horsepower rating?
   D. Does it have fuel injectors or a carburetor?
   E. Is the engine turbo-charged or normally aspirated?
   F. How are the cylinders arranged?
   G. How is ignition provided?
   H. What are the minimum and maximum oil capacities?
4. Describe the propeller system.
   A. Who makes the propellers?
   B. How is propeller RPM adjusted?
   C. Define fixed pitch.
5. Describe the electrical system.
6. What are the indications of a failed alternator?
7. Will the engine continue to run with the alternator and battery master switches turned off?
8. Describe the stall warning system.
9. Describe the fuel system.
10. Explain how to change fuel tanks in cruise flight.
11. Describe the landing gear system.
    A. How is steering accomplished on the ground?

B. What is the range of travel on the nose wheel?

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

Questions Specific to G500-Equipped Aircraft

1. In the event of an electrical failure, what pilot actions are necessary to ensure continued operation of the standby attitude indicator?
2. If the standby power button on the attitude indicator is not pressed within one minute of electrical failure, what will happen?
3. How do you determine a standard rate turn on an aircraft with a G500 system?
4. In the event of an AHRS failure, which indications will no longer be displayed on the PFD? Which indications will still be visible on the PFD?
5. Which approaches can be accomplished with an AHRS failure?
6. What instrument approaches are available with the PFD inoperative? With the MFD inoperative? With a total PFD/MFD failure?
7. How long does the internal battery last when providing power to the standby attitude indicator? With the loss of the ADC, which lost instrument does not have a backup? What should you do to compensate for the lack of information?

Questions Specific to G1000-Equipped Aircraft

1. If electrical power is lost from the alternator, what other power sources will allow the avionics to continue providing flight instrument information?
2. What are the Line Replaceable Units (LRUs) that make up the G1000 system?
3. What feature of the G1000 should the pilot use in the event of a PFD screen failure?
4. What flight instrument indications would be lost in the event of an AHRS failure? An ADC failure?
5. How is the loss of a flight instrument indicated to the pilot?
6. What is the secondary / backup source of flight instrument information?
7. How are rate of turn and turn coordination displayed on the G1000?

APPENDIX A
172 & ARCHER DIFFERENCES

172 (180 HP R&S Models)		PA-28
Remains in "BOTH" throughout flight unless notable fuel imbalance encountered. Cessna 172 Training Supplement page 5	**Fuel Selector**	Must be switched to appropriate tank (L or R) every 30 minutes in flight, or when appropriate. Timer can be set on GNS 430 and transponder. POH does not provide a limitation on fuel imbalance. See the Piper Archer Training Supplement, page 4, for guidance and timing for fuel selector changes.
Flaps 10 on downwind, 20 on base, 30 on final Cessna 172 Training Supplement pages 44-45	**Landing Profile**	Flaps 10 on downwind as part of before landing checklist, 25 on base Piper Archer Training Supplement pages 48-49
GNS 430 have removable NavData cards. G1000 have Internal memory and must be updated with external SD card. Installed SD cards are Terrain database, are specific to the equipment by serial number and must not be removed. See guidance atpintra.net/NavData Terrain data is not updated.	**Database Updates**	GNS 430 have removable NavData cards. Do not remove the SD card from G500. The G500 SD card is not to be updated. NavData information displayed on the G500 resides on the GNS 430 card. See guidance atpintra.net/NavData Terrain data is not updated.
	Climb Performance	Noticeably lower. May affect ability to comply with DP
	Landing	Requires much less flare, closer to a Seminole
Fuel Injected Cessna 172 Training Supplement page 5	**Fuel System**	Most aircraft carbureted. Be aware of signs of carb ice. Piper Archer Training Supplement page 1
13 sumps Cessna 172 Training Supplement page 5		3 sumps Confirm closed and not leaking after sumping
Dark when off, lit when on	**Pitot Heat Annunciator**	"Pitot Heat Off/Inop" lit by default, goes dark when on
Cessna 172 Training Supplement page 20	**V-Speeds**	Piper Archer Training Supplement page 26
40 *(Bottom of white arc)*	V_{SO}	45 *(Bottom of white line)*
55	V_R	60
62	V_X	64
74	V_Y	76
90 *(1900 lbs)*	V_A	89 *(1634 lbs)*

172 (180 HP R&S Models)		PA-28
105 *(2550 lbs)*	V_A	113 *(2550 lbs)*
110 *(10 degrees)* 85 *(20-30 degrees)* *(Top of white arc)*	V_{FE}	102 *(Top of white line)*
129 *(Top of green arc)*	V_{NO}	125 *(Top of green line)*
163 *(Red line)*	V_{NE}	154 *(Red line)*
1690	**BEW**	1640
2558	**Max Ramp Weight**	2558
120	**Max Baggage Weight**	200
2550	**Max TOW**	2550
55	**Fuel Capacity**	50
53	**(Usable Fuel)**	48
10 GPH	**Approximate Fuel Burn**	10 GPH
Flaps 10 Cessna 172 Training Supplement page 33	**Short-Field Takeoff**	Flaps 25 Piper Archer Training Supplement page 38
Flaps 10 Cessna 172 Training Supplement page 34	**Soft-Field Takeoff**	Flaps 25 Piper Archer Training Supplement page 39
61	**Short-Field Approach Speed**	66
	General	Rudder Trim Installed
		Step only on non-skid surface when entering & exiting aircraft.
		Do not lean or hang on door, hinges will bend or break easily.
Most performance charts displayed as a table		Most performance charts displayed as graphs
Electrically actuated; 0°, 10°, 20° & 30°	**Flaps**	Manual; 0°, 10°, 25° & 40° Piper Archer Training Supplement page 3
When M BUS VOLTS falls below 20 volts, the standby battery system will automatically supply electrical power to the essential bus for at least 30 minutes. (172S NAV III Manual, pg 3-17)	**Standby Power**	The Standby Attitude Indicator will operate for approximately one hour with the internal battery, depending on battery condition at the time of power failure. (Piper Archer III Manual, pg 9-141) Piper Archer Training Supplement page 8
Altimeter & Airspeed Indicator - Pitot Static Attitude Indicator - Vacuum	**Standby Instruments**	Altimeter & Airspeed Indicator - Pitot Static Attitude Indicator - Standby Battery G1000 aircraft - fully digital, independent G5 or Aspen backup instrument Piper Archer Training Supplement pages 8-10
(55 Gallon Fuel Capacity) Approx 5.5 hrs with 45 Minute Reserve Endurance Profile 172S NAV III Manual, pg 5-23	**Endurance @ 55% Power** *(Note: Can be affected considerably by altitude, leaning, power setting, etc.)*	Approx 4.5 hrs with 45 Minute Reserve Endurance chart Piper Archer III Manual, pg 5-28

APPENDIX B
SAMPLE RADIO COMMUNICATIONS

Sample Communications Used at Non-Towered Airports

Always remember to listen to what others are saying on the radio. If you are a solo student, identify yourself as a solo student pilot on the radio. For more information, refer to AC 90-66 or the AIM Chapter 4.

The key to communicating at non-towered fields is the self-announcement. "Self-announce" is a procedure whereby pilots broadcast their aircraft call sign, position, altitude, and intended flight activity or ground operation on the designated Common Traffic Advisory Frequency, or CTAF. Stating "Traffic in the area, please advise" is not a recognized self-announce position and/or intention phrase, and this phrasing should not be used under any condition.

Note that all calls on the CTAF begin and end with the name of the airport, since multiple airports may share the same CTAF.

On The Ground, After Start Up, Ready to Taxi

- **Pilot:** Fernandina Traffic, Cessna 12345 is taxiing from the FBO to Runway two seven via taxiway Alpha, Fernandina. *(Wording may vary depending on your airport layout and intentions.)*

During Taxi

Be vigilant while taxiing, and state your position if you change taxiways or cross a runway.

- **Pilot:** Fernandina Traffic, Cessna 12345 is taxiing to runway two seven via taxiway Alpha, Fernandina.
- **Pilot:** Fernandina Traffic, Cessna 12345 is crossing the approach end of runway two two, for departure runway two seven, Fernandina.
- **Pilot:** Fernandina Traffic, Cessna 12345 is clear of the approach end of runway two two, Fernandina.

On The Ground, After Run-Up, Ready For Takeoff

When you have completed the Before Takeoff Checklist, you may taxi up to the runway hold-short line. Be mindful of other aircraft that are in front of you for departure. Keep track of how many others are departing before you, and listen to their plans for departure as well as those arriving into the airport area.

- **Pilot:** Fernandina Traffic, Cessna 12345, holding short of runway ___, number three for departure, Fernandina.
- **Pilot:** Fernandina Traffic, Cessna 12345 is departing runway two seven, departing to the ___ *(direction of flight, or "Remaining in the traffic pattern")*, Fernandina.

Outbound to Practice Area

Once you have established yourself into the practice area, ensure that you are broadcasting your position on the designated frequency for the practice area. Collaboration with other flight schools in the area will help to enhance the safety by ensuring that all training flights are on the same frequency.

- **Pilot:** North Practice Area traffic, Cessna 12345 is maneuvering over the lake area at three thousand five hundred feet, steep turns, North Practice Area.

Inbound to The Airport

Make your first position report on the CTAF 8 to 10 miles from the airport.

- **Pilot:** Fernandina Traffic, Cessna 12345 is ten miles to the North inbound for a full stop landing, Fernandina. Depending on traffic, you may need to make more calls to ensure that others know where you are as you approach the terminal area of the airport.

Joining The Pattern

Always state the runway number - at a non-towered airport, there is no one "active runway," and any runway may be used at any time.

- **Pilot:** Fernandina Traffic, Cessna 12345 is entering the left downwind for runway two seven, Fernandina.
- **Pilot:** Fernandina Traffic, Cessna 12345 is turning a left base for runway two seven, Fernandina.
- **Pilot:** Fernandina Traffic, Cessna 12345 is turning final for runway two seven, Fernandina.

After Landing

It is best practice to take the first available taxiway, once you have reached a safe speed. There may be others with no radio on final behind you, so spend as little time on the runway as possible.

- **Pilot:** Fernandina Traffic, Cessna 12345 is clearing runway two seven, at taxiway Alpha, Fernandina.

Note: Entire aircraft must be past the hold short line (double solid line with double dashed lines on top) in order to be clear.

Taxi to Parking

Before starting your taxi, ensure that you have the airport diagram available.

- **Pilot:** Fernandina Traffic, Cessna 12345 is clear of runway two seven, taxiing to the flight school via taxiway Alpha, Fernandina.

Other Services

Sometimes you may need to contact a business on the field. You can find their contact information and frequency in your ForeFlight application under the FBO tab.

- **Pilot:** Bent Wing Flying Services, Cessna 12345 *(then wait for a reply)*
  - **Pilot:** We will be overnighting with you, where would you like us to park?
  - **Pilot:** We need a quick turn, top off with 100LL please.

Sample Communications Used at Towered Airports

This guide uses Jacksonville Executive at Craig Airport (KCRG) as an example, but similar techniques work at most Class D airports. Class C airports may have additional calls to Clearance Delivery. Always read back the clearance received from the controller, followed by your call sign. If you are a solo student, identify yourself as a student pilot to the controller.

On The Ground, After Start Up, Ready to Taxi

- **Pilot:** Craig Ground, Cessna ___. *(Then wait for the controller's reply.)*
- **Pilot:** Craig Ground, Cessna ___ (Student Pilot) is at ATP, ready to taxi, departure to the ___ *(direction of flight, or "Remaining in the traffic pattern")* with information ___ (A, B, C...), requesting VFR Flight Following *(if in Class C Airspace)*.
- **Controller:** Cessna ___, Craig Ground, taxi to runway [*number*] via [*taxiways*], winds ___ *(direction)* at ___ *(speed in knots)*, altimeter ___ *(inches of mercury)*.

- **Pilot:** Taxi to runway [*number*], hold short of runway [*number*] at [*taxiway*], Cessna ___.

On The Ground, After Run-Up, Ready For Takeoff

When you have completed the Before Takeoff Checklist, you may taxi to the runway hold short line, and then switch to the tower frequency without contacting the Ground Controller.

- **Pilot:** Craig Tower, Cessna ___ holding short of runway [*number*] ready for departure to the ___ *(direction of flight, or "Remaining in the traffic pattern")*.
- **Controller:** Cessna ___, Craig Tower, runway [*number*], cleared for takeoff *(or "Line up and wait," etc.)*.
- **Pilot:** Cleared for takeoff runway [*number*], Cessna ___. *(Read back the entire instructions, and end your transmission with your aircraft call sign.)*

Handoff to Departure

- **Pilot:** Jacksonville Departure, Cessna ___ at ___ *(current altitude)* climbing ___ *(desired altitude)*.
- **Departure:** Cessna ___, ident. *(Press the "ident" button on the aircraft transponder, and wait for ATC's reply.)*
- **Departure:** Cessna ___, radar contact 2 miles east of the Craig Airport, I show you out of 1,700 feet.
- **Pilot:** Position checks, Cessna ___. *(This is letting ATC know that your position is correct.)*

Inbound to The Airport

If already speaking to ATC:

- **Pilot:** Approach, Cessna ___ would like to return to Craig, we have information ___ (A, B, C…).

If making initial call to Tower:

- **Pilot:** Craig Tower, Cessna ___, ___ miles ___ *(direction from airport - N/S/E/W)* at ___ feet *(present altitude)*, inbound for ___ *(state intentions: landing to a full stop, touch and go, etc.)* with information ___ (A, B, C…).
- **Controller:** Cessna ___, Craig Tower, enter the pattern on a *(right/left downwind, base, or final, etc.)* for runway [*number*], report ___ *(miles, or "midfield downwind')*.
- **Pilot:** Enter a ___ *(entry)* for Runway [*number*], report ___ *(position)*, Cessna ___. *(Read back clearance and end with your call sign.)*

After Landing

Once at a safe speed, exit via the first available taxiway if not prompted by the Tower, or if the Tower is busy with another aircraft. Otherwise, follow Tower's instructions - but do not allow them to rush you off the runway before you slow to a safe speed. You may not exit the runway onto another runway unless requested to do so by Tower. If ever in doubt, simply ask.

- **Controller:** Cessna ___, Craig Tower, turn ___ *(right/left)* on taxiway ___, contact Ground on [*frequency*] when clear.
- **Pilot:** Turn ___ *(right/left)* on taxiway ___, contact Ground [*frequency*] when clear. *Note: Entire aircraft must be past the hold short line (double solid line with double dashed lines on top) in order to be clear.*

Taxi to Parking

Remember: If you are unfamiliar with an airport, advise ground control and request a "progressive taxi."

- **Pilot:** Craig Ground, Cessna ___ is clear of runway [*number*] on taxiway [*letter*], request taxi to [*destination - ATP, FBO, etc.*].
- **Controller:** Cessna ___, Craig Ground, taxi to [*destination*] via [*taxiways*].
- **Pilot:** Taxi to [*destination*] via [*taxiways*], Cessna ___.

Other Services

Sometimes you may be prompted by Ground to contact the FBO for services or parking requests.

Communications

Communications in the air traffic system are basically the ability to speak and understand the English language. Yes, there are some new phrases that we must get acquainted with – but plain language will always work.

LISTEN - THINK - COMMUNICATE - LISTEN - RESPOND

These are the basics of good communication.

LISTEN – ensure that the frequency is available to talk; do not block another transmission

THINK – there is nothing worse than a keyed microphone and no one talking. This blocks the frequency unnecessarily. Know what you want to say before you key the mic - then SAY IT!

COMMUNICATE – Who you are calling, who you are, where you are, what you want.

LISTEN – This is the most important part of any communication. You must listen to the instruction to ensure that you have understood the reply given to you.

RESPOND – Acknowledge the receipt of the message briefly, or request a repeat if you did not understand the message.

WHO YOU'RE CALLING, WHO YOU ARE, WHERE YOU ARE, WHAT YOU WANT/ PLAN TO DO

ALL HOLD SHORT CLEARANCES MUST BE READ BACK VERBATIM!


NIGHT
PRESS
DAY
TO TEST
N616AD
GARMIN
TIS STANDBY
STANDBY
CLOCK
AIRSPEED
ALT
STBY 1200 PRESSURE ALT
RADIO MASTR
PITOT HEAT
OFF
SWITCH
PANEL
AVIONICS
DIMMING
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ATPFlightSchool.com
P.O. BOX 1784 • Ponte Vedra Beach, FL 32004-1784
(904) 595-7950 • Fax: (904) 273-2164