PREFLIGHT OPERATION

USE THE PROPER CHECKLIST

The correct checklist should be used for the aircraft flown. The preflight inspection should be performed in accordance with the printed checklist provided by the aircraft manufacturer. Owner's manual should be used for proper sequence of the preflight if company checklists are not available.

The aircraft general appearance should be noted during a visual walk-around inspection. Bear in mind that a preflight is primarily an airframe check. Negligence to inspect even small items may have serious adverse effect on flight condition. The general condition of the airplane should be checked for signs of damage and for fuel, oil, and hydraulic fluid leaks.

Discrepancies should be noted and written down on company's discrepancy sheets. Any questions on aircraft airworthy condition should be brought to the attention of the Chief Pilot or the Assistant Chief Pilot.

Common Items Missed On Most Preflight:

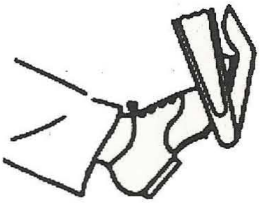
*Cotter Pins	-	Rusted, not properly fastened
*Drain Holes	-	Not checked for clear passage in the belly of the aircraft
*Aileron Weights	-	Fastened tight, note the location
*Control Counter Weights		
*Tire Hub Cotter Pin	-	Installed
*Cowl Fasteners	-	Secured

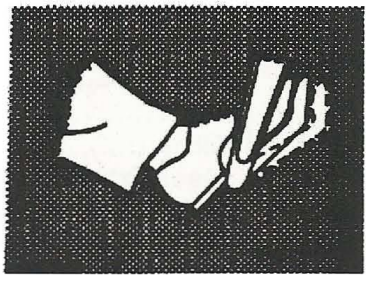
TAXIING

To begin taxi, it may take additional power to get the aircraft moving along the ground, once moving, retard the throttle to prevent excessive acceleration. The aircraft brakes should be checked by smoothly applying brakes after leaving the appropriate tie down spot; if the braking action is unacceptable, the engine should be shut down immediately. Wing tip clearance should be monitored continuously while taxiing. The pilot's eyes should always be looking outside the airplane, to the sides, as well as the front. The pilot should always be aware of the entire area around the airplane to ensure that the aircraft will clear all obstructions and other aircraft. When the yellow centerlines are provided, they should be observed unless necessary to clear airplanes or obstructions. If requested by Sanford ATC, all aircraft taxi on the right side of the taxiways.

The primary requirements for safe taxiing are positive control, and the ability to recognize potential hazards in time to avoid them, and the ability to stop or turn where and when desired, without undue reliance on the brakes. The speed at which to taxi should the rate at which the airplane is dependent on the throttle – slow enough so when the throttle is close the airplane can be stopped promptly.

Be aware of foot position, DO NOT rest the balls of your feet on the brakes when taxiing, be sure the balls of your feet are resting on the rudder portion of the pedal.; using the brakes only when necessary.





When taxiing, slow down before attempting a turn, sharp high speed turns place undue side loads on the landing gear. Steering is accomplished with rudder pedals and brakes. To turn the airplane on the ground, the pilot should apply rudder in the desired direction of turn and use whatever power or brake is necessary to control the taxi speed. The rudder pedal should be help in the direction of the turn until just short of the point where the turn is to be stopped. Rudder pressure is then released or opposite pressure is applied as needed.

NOTE: Do not taxi over ropes, caulks, or any object, which may hit or be picked up by the propeller.

TAXIING DIAGRAM

In very windy conditions on the ground the pilot should exercise extreme caution while taxiing the aircraft. Keep in mind that an airplane is meant to fly- maneuvering around on the ground is a necessary evil. The lighter the aircraft, obviously the greater the chance of the wind having an effect on your airplane while you are on the ground.

In addition, high wing aircraft are more likely to be affected than low wing aircraft. Airplanes can be moved sideways or even tipped over by strong winds while they are operating on the ground. Use the following diagram to help avoid the winds' affect on your taxiing aircraft.

NOTE: The diagram is based on the use of a tricycle gear aircraft. If a tail dragger is being used, the elevator should be in the "up" position with a wind from in front of the aircraft.

On Hard-Surface Runways

Quartering Headwind from the Left:
Turn your aileron into the wind-in other words,
Turn your yoke left-and keep your elevator in the neutral position.

Quartering Headwind from the Right:
Turn your aileron into the wind-in other words,
Turn your yoke right-and keep your elevator in the neutral position.

Quartering Tailwind from the Left:
Turn your aileron out of the wind-in other words,
Turn your yoke right-and push your elevator in the down position.

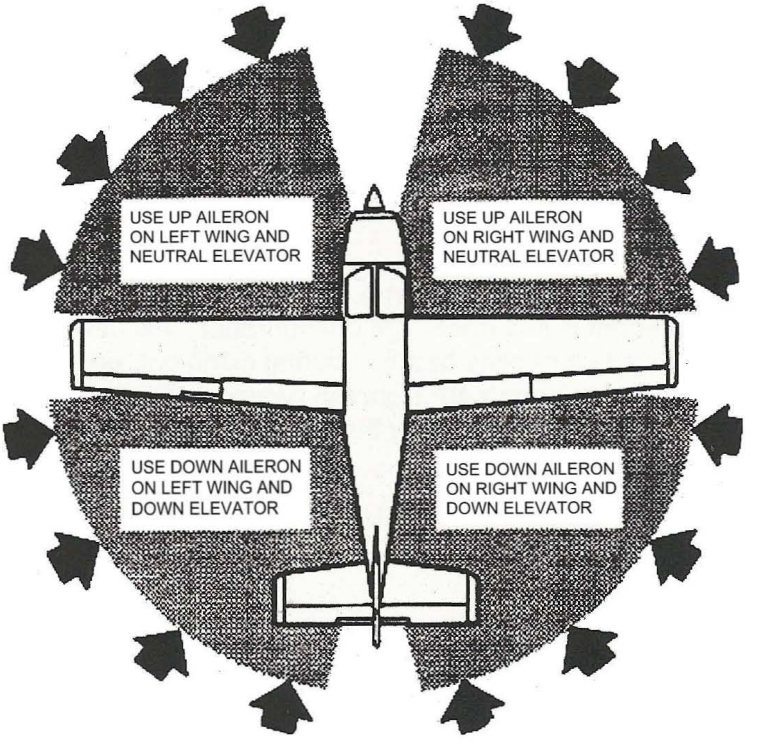
Quartering Tailwind from the Right:
Turn your aileron out of the wind-in other words,
Turn your yoke left-and push your elevator in the down position.

On Grass Runways

On "soft field" runways, your aileron deflection will remain the same as above. However, because it is a soft field, you will NOT push your elevator in the down position, even with a tailwind. On grass strips, you are to keep your elevator in the FULL BACK position at any time while taxiing, with your ailerons set as required.. If you have a very strong tailwind you may put the elevator in the neutral position, but never in the down position.

When taxiing during moderate to high-wind conditions the following aileron and elevator control positions should be maintained:

CODE
WIND DIRECTION



NOTE: Strong quartering tail winds requires caution. Avoid sudden bursts of the throttle and sharp braking when the airplane is in this attitude. Use the nose wheel and rudder to maintain direction.

RUN-UP

During the engine run-up, the surface under the airplane should be firm (a smooth, paved, surface if possible) and free of debris. Otherwise, the propeller may pick up pebbles, dirt, mud, sand or other loose objects and hurl them backwards, which could cause damage to the prop or the tail surface. If possible, point the aircraft so that it is headed as nearly as possible into the wind to prevent overheating of the engine.

Always be sure the tail of the aircraft is pointed away from other aircraft, hangars, buildings etc. It is recommended that you do your run-up at the far side of the ramp, with the tail of the aircraft pointed towards the grass regardless of the wind direction. Please be sure not to block the taxiway while doing your run-up.

Each aircraft run-up procedure is different; therefore, the checklist should be used and followed for the particular aircraft flown. The largest mistake on aircraft run-up is not taking one's time - *Take your time!*

NORMAL TAKE-OFF

Align the aircraft on the center of the runway (Centerline) using the rudders, making sure the aircraft is positioned into the wind. The nose wheel should be straight and centered. After releasing the brakes, the throttle should be advanced smoothly and continuously to full power. Abrupt application of the throttle will cause the engine to sputter momentarily and will also cause the aircraft to yaw sharply to the left because of torque effects, correct with right rudder.

Maintain directional control using the rudder pedals, the pilot should be aware that the balls of their feet should be on the rudder portion of the pedals, not the brake portion. During the takeoff roll, check to be sure the engine instruments are all in the green and if not, abort the takeoff. Check to see that the airspeed needle comes alive and if not, abort the takeoff.

Forcing the aircraft off the runway before the desired airspeed is reached using too much back pressure is considered an unsafe practice and may cause the aircraft to reach an unsafe angle of attack causing the aircraft to settle back down on the runway or even stall. Too little backpressure or lowering the nose before sufficient airspeed is reached may also cause the aircraft to settle back down on the runway. It is important to maintain the correct attitude constant after rotation or lift off. This is obtained by moving your eyes to the left after rotation to see the tree line and/or horizon. Learn the proper angle for climb out with outside visual references on either side. Looking straight over the cowling after rotation does not give the pilot the proper sight picture.

While accelerating, gently apply enough backpressure to rotate and lift off at Vr (___). Adjust pitch attitude for Vx (___) after lift off until all obstacles are cleared; then accelerate to Vy (___) and continue to climb out.

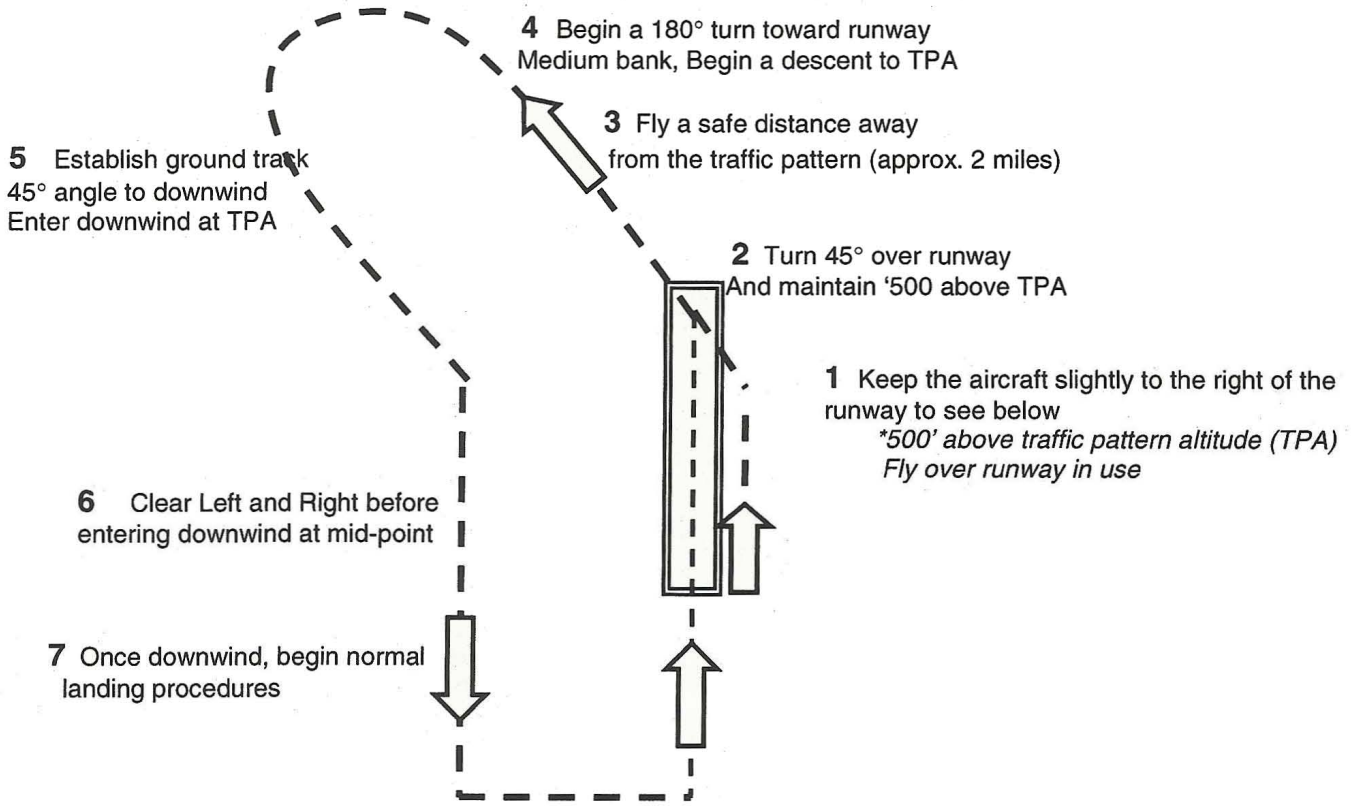
After liftoff, establish a crab (correction) into the wind to maintain the extended runway centerline and note your heading. During the climb, the application of right rudder is still necessary for coordinated flight. Since the aircraft is in a nose high configuration, it is necessary to move the nose down periodically to see other aircraft. Maintain your wind-corrected heading during climb out, until reaching 500' AGL (or within 300' of traffic pattern altitude).

UNCONTROLLED AIRPORT TRAFFIC PATTERN ENTRY

All pilots should exercise strict collision avoidance maneuvers while in the vicinity of any airport by providing adequate spacing from other aircraft and applying professional techniques and courtesy.

A. Determine the runway in use by appropriate method; radio Unicom, other aircraft, over fly runway at 500' above traffic pattern altitude and visually check the windsock. Unless otherwise indicated, all normal traffic patterns are to the left.
B. Maintaining an altitude of 500' above the traffic pattern altitude, fly over and parallel the runway in use.
C. At the departure end of the runway, turn the aircraft in the direction of the traffic pattern, to maintain flight path 45 degrees to the runway (Remember to crab into the wind if necessary).
D. After reaching a safe distance from the airport and outside of the traffic pattern. Visually clear the area and begin a descending turn toward the airport. Descend to traffic patter altitude and turn the aircraft to a heading that will maintain ground track 45 degrees toward the center of the airport runway.
E. Clearing the traffic pattern (both ahead and behind your aircraft) enter the pattern at midpoint downwind, and turn the aircraft to a heading which will maintain a parallel flight path to the runway.

REMEMBER!!! Always compensate for the wind direction. The stronger the wind, the more the crab-angle will be required to maintain the proper flight path over the ground.

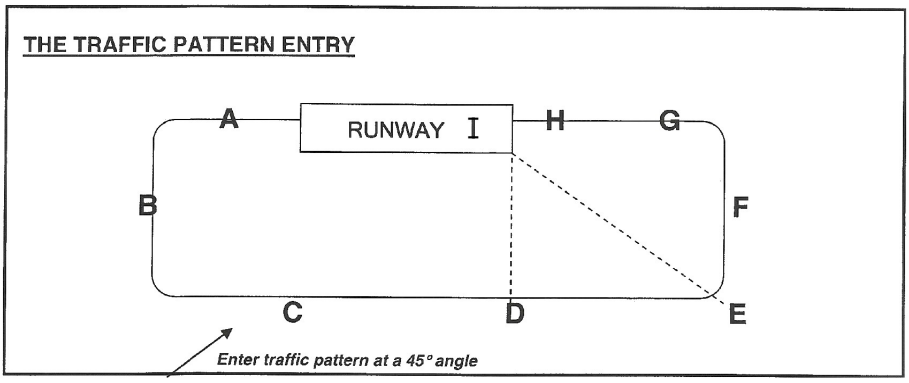


NOTE: Be sure to visually clear all around you at all times! The greatest amount of aircraft will be around the airport – keep your eyes moving!!

STANDARD TRAFFIC PATTERN

The traffic pattern was established to maintain an orderly manner into and out of the traffic pattern.
Unless otherwise indicated in the Airport/Facility Directory, all patterns are to the left, 1,000' AGL (Above Ground Level). There are some important details to remember when flying a traffic pattern:

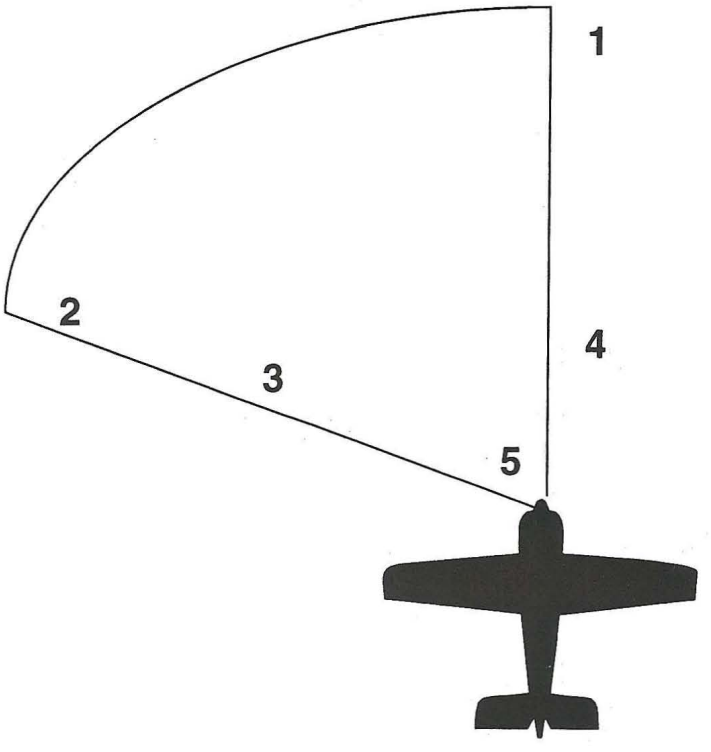
1. **Keep the pattern tight** - Fly the pattern close to the airport. You want to be in a position so that in the *event* of an engine failure, you could safely glide to the runway. On downwind, the runway should be halfway up the strut (applies to high-wing aircraft only).
2. **Keep it consistent and precise** - "Fly the numbers," Good habit patterns should be developed from the start; speed, flap settings, carb heat, and power reduction should all be made in the same position in the traffic pattern as possible.
3. **Maintain positive control** - A lot can happen in the pattern and it usually happens *very* quickly, always "fly the airplane," keep positive control *over* your airplane.
4. **Be aware** - Keep in mind, you are not the only one in the pattern, be aware of other aircraft around you, maintain situational awareness, and listen to the radio for position calls.
5. Maintain separation - Keep yourself at a safe distance from other aircraft in the pattern.



A = UPWIND
After takeoff establish a positive rate of climb and proper pitch up attitude. If applicable, retract flaps and landing gear. Execute a full power climb at Vy (____) to at least 500' AGL (preferably 300' below pattern alt.) before turning. Maintain extended runway centerline.
B = CROSSWIND
At 500'+ AGL, start your turn from upwind to crosswind. Reduce power in a high performance airplane or continue climbing at full power for most trainer aircraft. In most light single-engine airplanes in light wind conditions, the crosswind leg will be 4 to 5 seconds wings level before starting the turn to downwind (longer or shorter as necessary to correct for wind).
C = DOWNWIND
Start turning so that you join the downwind leg about ½ mile from the runway centerline. Level off at pattern altitude and maintain an airspeed of 1.6 to 1.8 Vso (____). Look out for aircraft entering the pattern on the downwind leg at a 45 degree angle.
D = DOWNWIND (abeam the approach numbers)
Here you perform the pre-landing checklist. A commonly used checklist is CGUMPS (carb heat on, gas on both/fullest, undercarriage down and locked, mixture rich, props/power, seatbelts). Take power out to a reduced setting (such as half-way between low cruise and idle) and simultaneously pull back on the control wheel/stick to maintain altitude and reduce airspeed to 1.5 Vso (____). Put in the first notch of flaps re-trim as necessary. Use pitch to adjust airspeed, but NEVER pitch the nose above the horizon during final approach.
E = DOWNWIND TO BASE
When the runway's threshold is halfway between the wing and the tail (at a 45 degree angle), start your turn to base. Remember that when you turn you have to pitch down to maintain airspeed.
F = BASE
On base reduce your airspeed to 1.4 Vso (____). Check your position and altitude relative to the runway. If you are high, add another notch of flaps and keep the same power setting (unless you are extremely high, then you also take out some power). If you are low, DO NOT add flaps but DO increase the power momentarily until you are back on altitude. **Remember that every time you bank the airplane, increase flaps, or decrease power, you have to pitch down to maintain your approach airspeed.**
G = FINAL
Turn so that the airplane lines up on the runway centerline. Assess your height relative to a normal glidepath to the runway. If you are slightly high, add another notch of flaps. If you are very high, add flaps and reduce power (don't forget to pitch down). If you are low, add power and pitch the nose to level until you are back on the glide path. The goal here is to adjust your descent using flaps as a first resort, and power as your next. DO NOT retract any flaps unless executing a go-around and full power has already been applied.
H = SHORT FINAL
Within half a mile from the approach end of the runway, adjust pitch/power to slow the aircraft to no less than 1.3 Vso (____) or use the manufacturers recommended landing speed (____). Add the final increment of flaps and re-trim.
I = FLARE
At this point, eye movement is very important. Eyes should move in a scan pattern as depicted on the following page.

NORMAL LANDING

(I) DEPTH PERCEPTION DEVELOPMENT

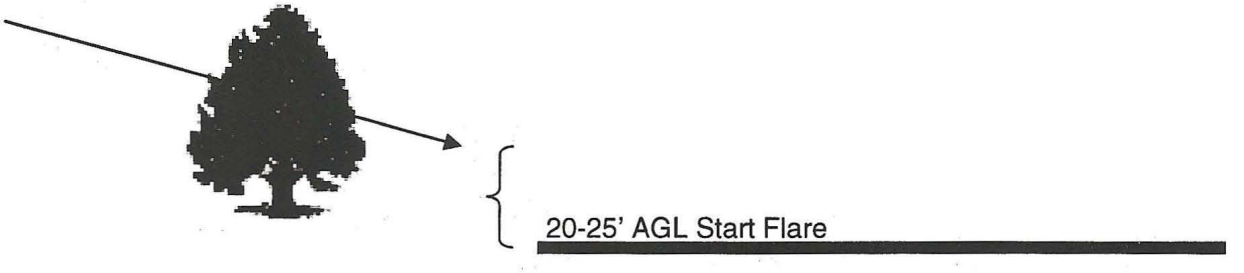


OUTSIDE SCAN UPON LANDING

1. Look as far our in front as you can see
2. Move eyes, 45° to the left, as far as you can see
3. Bring field of vision in closer
4. In front, bring eyes in a little closer, then return to "1"
5. Once in a while on your scan, check the engine instruments

NOTE: The reason for moving your scan to the side is to improve your depth perception. You will find your most comfortable place to look within that triangle

Flare – The flare should begin around 20' to 25' AGL. The majority of trees are 40-50' high. During your scan (Read I), look at the trees. You should begin your flare about half way down tree level. If you are above the trees, do not start your flare!



As the airspeed decreases, the aircraft will start to descend. Ease back on the yoke to increase your pitch:

Aircraft Descends	→	Increase Pitch
Aircraft Levels Off	→	Pitch Remains the Same
Aircraft Altitude Increases	→	Slightly Lower the Nose

**Keep the nose of the airplane (longitudinal axis) centered with the runway by using the rudder.

CROSSWIND TAKEOFF

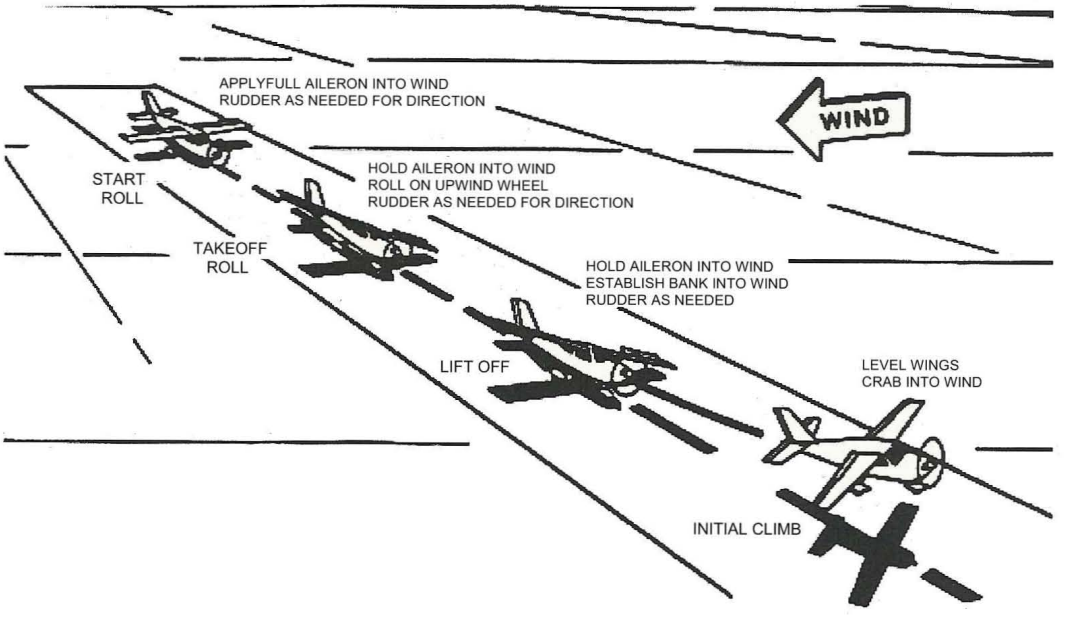
Understanding the proper crosswind takeoff technique will help you maintain runway alignment on the centerline without excessive side loads or drifting on the runway. Use of the Crosswind Component Chart from the Owner's Manual should be used to determine aircraft capabilities when conditions are questionable. Pilot and Aircraft Limitations should not be overlooked!

The technique used during the initial takeoff roll in a crosswind is generally the same as used in a normal takeoff, except that the aileron control must be held INTO the crosswind. This raises the aileron on the upwind wing to impose a downward force on the wing to counteract the lifting force of the crosswind, and prevents that wing from rising.

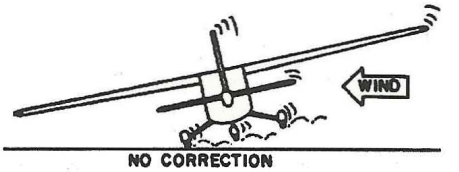
As the airplane is taxied into takeoff position, it is essential that the windsock and other wind direction indicators be checked so that the presence of a crosswind may be recognized and anticipated. If a crosswind is indicated, FULL aileron should be held into the wind as the takeoff roll is started. This control position should be maintained while the airplane is accelerating until the ailerons start becoming sufficiently effective for maneuvering the airplane about its longitudinal axis.

1. Align the aircraft with the runway centerline.
2. Use full deflection of the aileron INTO the wind.
3. Elevator should be in the neutral position
4. Full Power applied smoothly while engine instruments are crosschecked.
5. While the aircraft accelerates, aileron deflection is slowly reduced as necessary to prevent side load.
6. Use rudder as necessary to keep nose straight.
7. Upon reaching Vr (_____kts), ailerons should be approximately neutral or slightly into the wind.
8. After rotation, maintain runway alignment by applying a crab angle into the wind, and pitch for desired climb our airspeed (_____kts).

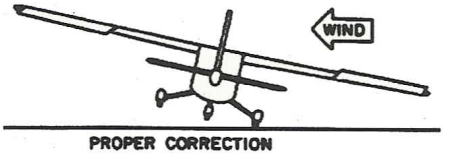
NOTE: Vr should be increase for excessive crosswind.



If the upwind wing rises, thus exposing more surfaces to the crosswind, a "skipping" action may result. This is usually indicated by a series of very small bounces, caused by the airplane attempting to fly and then settling back onto the runway. During these bounces, the crosswind also tends to move the airplane sideways, and these bounces will develop into side skipping. This side skipping imposes severe side stresses on the landing gear and could result in structural failure.



NO CORRECTION



PROPER CORRECTION

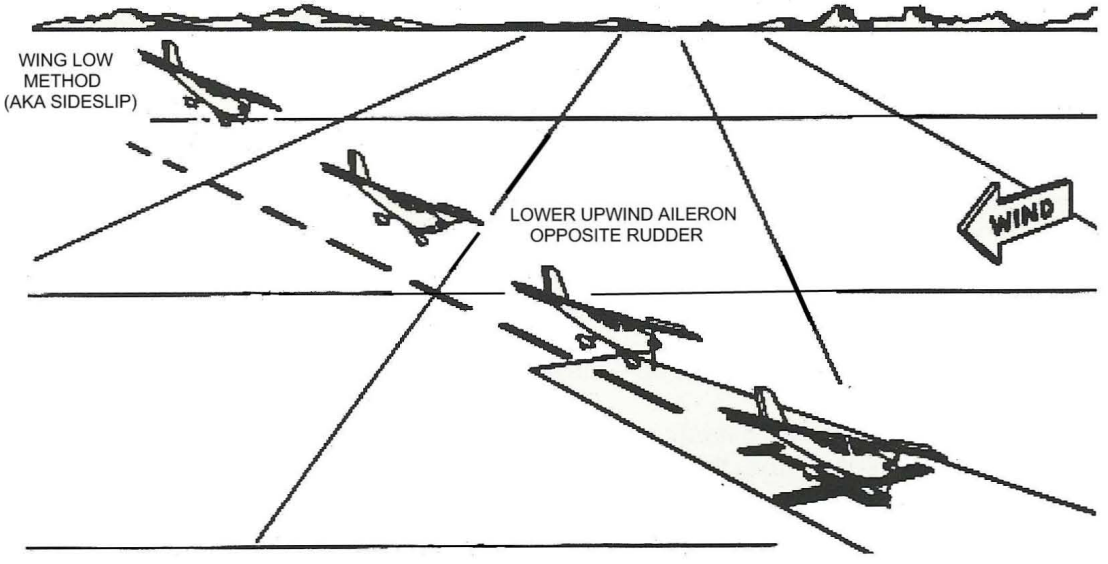
CROSSWIND APPROACH AND LANDING

Understanding proper crosswind landing technique will help maintain a straight ground track during the approach, landing, and roll out phase of the flight without lateral drift or excessive side loads being placed on the aircraft.

To use the wing low method, you should align the airplane's heading with the centerline of the runway, note the rate and direction of drift, and then you should promptly apply drift correction by lowering the upwind wing. The amount the wing must be lowered depends on the rate of drift. When the wing is lowered, the airplane will tend to turn in that direction. It is necessary, then, to simultaneously apply sufficient opposite rudder pressure to prevent the turn and keep the airplane's longitudinal axis aligned with the runway.

In other words, the drift is controlled with aileron, and the heading with rudder

1. Establish the aircraft on final approach
2. Maintain runway alignment by use of appropriate crab angle
3. Final flap settings and airspeed as necessary for current conditions
4. Once ground effect is encountered, application of rudder to align longitudinal axis with runway centerline is applied. Upwind wing (wing into the wind) should be lowered simultaneously to maintain coordination and stop drift across the runway.
   ***Aileron controls drift; rudder keeps the nose straight*
5. Normal roundout and flare should be exercised, causing the upwind wheel to settle down first followed by the downwind wheel and finally the nose wheel
6. Aileron deflection will be increased into the wind as the aircraft speed slows down to reduce drift and excessive side load.
7. Upon landing, keep the aileron pointed into the wind.



Flaps can and should be used during most approaches since they tend to have a stabilizing effect on the airplane. However, the degree to which flaps should be extended will vary with the airplane's handling characteristics, as well as the wind velocity. Full flaps may be used so long as the crosswind component is not in excess of the airplane's capability or unless the manufacturer recommends otherwise.

GO-AROUND PROCEDURES

Several reasons may exist that a landing may not be possible such as, extremely low base to final turns, overshot or low final approaches, the unexpected appearance of hazards on the runway, wake turbulence from a preceding airplane, or overtaking another airplane on the approach. In the event that a landing cannot be made on the appropriate runway, an aborted landing or go-around may be executed:

1. Full-Power - Stop descent by increasing pitch to slightly below Vx attitude
2. Carburetor Heat - Off (Cold)
3. Flaps – Retract in increments up to 10°
4. Accelerate to Vx (___ kts)
5. Once obstacles are cleared and a positive rate of climb is established, retract flaps and establish a Vy Attitude (___ kts)
6. When time permits - announce the go-around over radio.

**Remember - Never be embarrassed to go-around.
If you are not comfortable - if something doesn't seem right. GO-AROUND!!!!
***NOTE: During go-around procedures - most importantly - Keep the Aircraft Under Control!*

CLEARING TURNS

Not only is it important to maintain your scan, but also before starting any maneuver, you must clear the airspace around your aircraft*. Clearing turns consist two 90° turns in either direction. This allows you to see areas blocked by blind spots and make it easier to see other aircraft in the area. It also makes you more visible because other aircraft are more likely to see your wings when you are turning.

1. Pick a reference point off (Left or Right) wing tip
2. Execute a 90° medium bank turn toward the reference point while looking for traffic
3. Pick another reference point off (Left or Right) wing tip
4. Complete a second 90° medium bank turn toward your reference point.

NOTE: Be sure to clear left - clear right - clear up - clear down - clear all around.

[*Most mid-air aircraft accidents are because an aircraft suddenly slows and the aircraft approaching from behind doesn't notice the change in airspeed from the plane in front. Therefore, it is especially important to clear the area behind your aircraft before starting your maneuver.]

SLOW FLIGHT

The objective of maneuvering at minimum controllable airspeed is to develop the pilot's sense of feel and ability to use the controls correctly, and to improve proficiency in performing maneuvers in which very low airspeeds are required.

Entry:
1. Execute clearing turns
2. Mixture Rich
3. Carburetor Heat On (Hot)
4. Throttle reduce to 1500 RPM (or as required for type of aircraft)
5. Gear down (if applicable)
6. As the airspeed decreases maintain altitude by **increasing back pressure** on the yoke
7. Lower the flaps in increments to 30°
8. As airspeed approaches **Vso** (Stall Speed Landing Configuration) **+5 kts (___ kts),** increase power to approximately **2000 RPM** (or as required for type of aircraft) to maintain altitude.
9. Adjust *pitch for airspeed* and *power for altitude* and maintain heading

Recovery
1. Increase power to full
2. Carburetor Heat Off (Cold)
3. **Decrease pitch** to increase airspeed
4. Raise flaps in increments
5. Establish cruise configuration at the same altitude at which you started

NOTE: Minimum Controllable Airspeed is not a set figure; it will vary with loading, configuration, power setting, and pilot technique.

****

NORMAL STALL

Entry
1. Execute clearing turns
2. Mixture - **Rich**
3. Carburetor - **On** (Hot)
4. Throttle - Reduce to **1500 RPM** (or as required for type of aircraft)
5. As the airspeed decreases maintain altitude by **slowly increasing back pressure** on the yoke
6. Reduce power to idle and increase pitch until stall indication occurs

Recovery
1. Decrease pitch to the horizon or slightly below
2. Fly the aircraft out of stall
3. Return to straight and level flight

NOTE: This maneuver should be the first stall taught to students. Teach them to fly the aircraft out of stall by lowering pitch to gain aircraft control.

POWER-OFF STALL

Entry:
1. Execute Clearing Turns
2. Mixture - Rich
3. Carburetor Heat - On (Hot)
4. Throttle - Reduce to 1500 RPM (or as required for your type aircraft)
5. Maintain altitude - Increase pitch as airspeed is reduced
6. Airspeed below VFE (___ kts) - Full flaps
7. At approach speed (___ kts) - Power back to idle
8. Establish best glide speed (___ kts)
9. Increase pitch until stall indication occurs (Buffet) - Then recover (see below)

Recover:
1. Decrease pitch – At or slightly below the horizon (while...)
2. Increase Power - to Full
3. Carburetor Heat - Off (Cold)
4. Flaps - Up to 10°
5. Establish Vx (___ kts) - Climb Attitude
6. Climb Established - (Positive Rate of Climb) - Flaps Up
7. Climb out at Vy (___ kts)
8. Level Off
9. Establish Cruise Configuration

NOTE: A loss of altitude will occur during this maneuver

NOTE: For Approach to Landing Stalls with a bank (Turing Stalls) - use up to a 30° bank after glide is established

POWER-ON STALL

Entry:
1. Execute Clearing Turns
2. Mixture - Full Rich
3. Carburetor Heat - On (Hot)
4. Throttle - Reduce to 1500 RPM (or as required for your type aircraft)
5. Maintain Altitude - Increase pitch as airspeed is reduced
6. Airspeed - Reduced to Vr (___ kts) - Add Full Throttle
7. Carburetor Heat - Off (Cold)
8. Increase pitch until stall indication (buffet) occurs

Recovery:
1. Decrease pitch – At or slightly below horizon (while...)
2. Establish Vx (___ kts) - Climb attitude
5. Once obstacles are cleared - establish climb at Vy (___ kts)
6. Level Off
7. Establish cruise configuration

NOTE: A gain in altitude will occur during this maneuver.

NOTE: For take-off and departure stalls with a stall (turning stalls) -use a 15° bank after the straight climb is established.

REMEMBER: The proper use of right rudder is very important. Look outside at the horizon and make sure the aircraft is not changing heading. If your nose moves to the left - more right rudder is needed. Nose moves to the right - too much rudder is applied. Only allow the nose to turn when you are executing a turning stall.

ACCELERATED STALLS

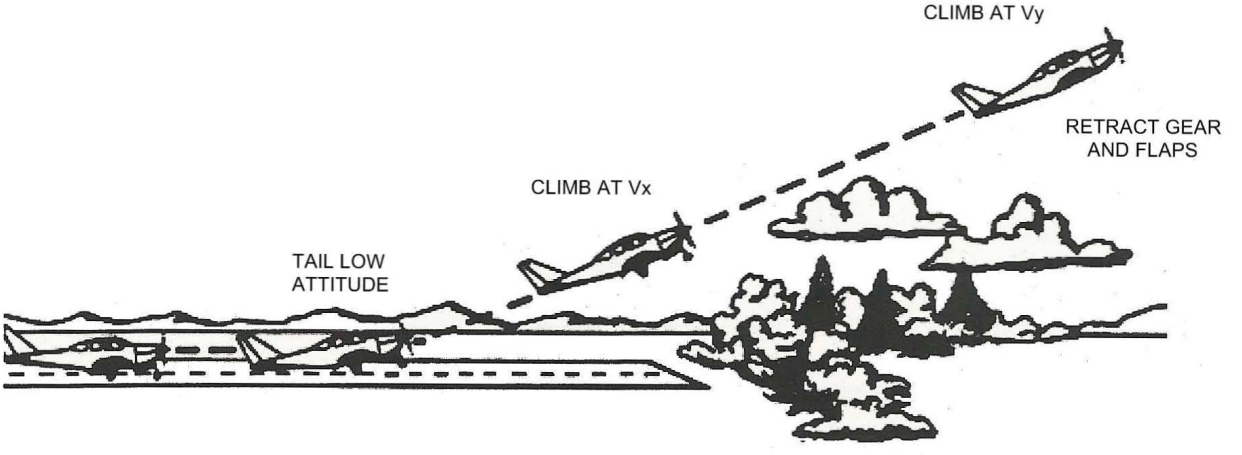
Entry
1. Execute clearing turns
2. Mixture rich
3. Carburetor Heat On (Hot)
4. Throttle - Reduce to 1500 RPM (or as required for your type aircraft)
5. Maintain altitude - Increase pitch as airspeed is reduced
6. Establish approach airspeed **(___ kts)**
7. Bank - Increase (quickly) to *45°*
8. Pitch - Increase back pressure until stall indication occurs (buffet)
9. Recover

NOTE: *As pitch (back pressure) is increased, the aircraft will want to over-bank. Opposite aileron will be necessary to maintain the 45 ₀ of bank.*

Recovery
1. Decrease pitch to slightly below the horizon (while ...)
2. Level wings - using opposite rudder
3. Power - Full
4. Carburetor Heat - Off (Cold)
5. Establish Climb Attitude - **Vx (kts)**
6. Flaps - Confirm Up
7. Obstacles Cleared Climb Out **Vy (kts)**
8. Level off
9. Establish cruise configuration

SOFT FIELD TAKEOFF

1. Flaps - 10° (Confirm Owner's Manual)
2. Maintain full back pressure on yoke while taxiing
3. Continue rolling – do not stop the aircraft
4. Throttle - Full
5. Accelerate the A/C (**Note:** The aircraft will lift first, reduce back pressure to maintain nose high attitude without hitting the tail)
6. After liftoff – Remain in ground effect; approximately **15'** until reaching **Vx (_____kts)**
7. Begin Climb out
8. After clearing obstacles, climb out **Vy (_____kts)**
9. Flaps Retract



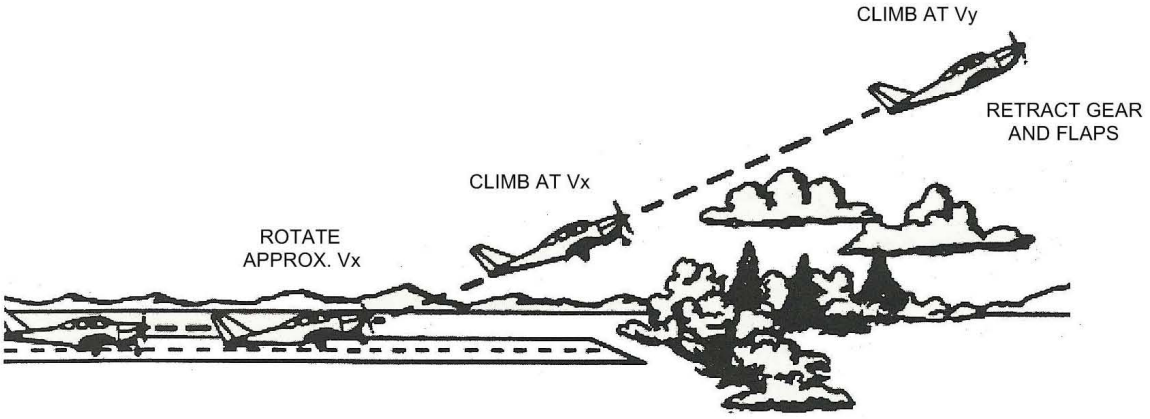
SOFT FIELD LANDING

1. Continue normal Traffic Pattern
2. Maintain appropriate approach speed….._____**kts**
3. Begin roundout with a power setting of 1200 to 1300 RPM
4. Throughout the flare, continue to increase the pitch as the speed dissipates and hold aircraft off as long as possible.
5. After touchdown hold back pressure on the yoke as long as possible, allowing the nose to come down gently
6. Continue to hold back pressure on nose and do not let the aircraft stop until necessary

NOTE: The higher the wind velocity, the less power needed

SHORT FIELD TAKE-OFF

1. Using all available runway, taxi into position and hold
2. Set Flaps to desired position..... _____ **Degrees (see Owner's Manual)**
3. While holding brakes..... **Perform a static run-up (Note RPM for maximum performance)**
4. Check all engine instruments..... **In the Green**
5. Release brakes
6. Rotate..... **Vx (_____kts)**
7. Maintain **Vx** until clear of all obstacles
8. Establish **Vy** and retract flaps in increments to reduce the loss of lift and settling of the aircraft
9. Do not retract landing gear until well clear of all obstacles and **Vy** has been established (see Owner's Manual)



SHORT FIELD LANDING (with Obstacle)

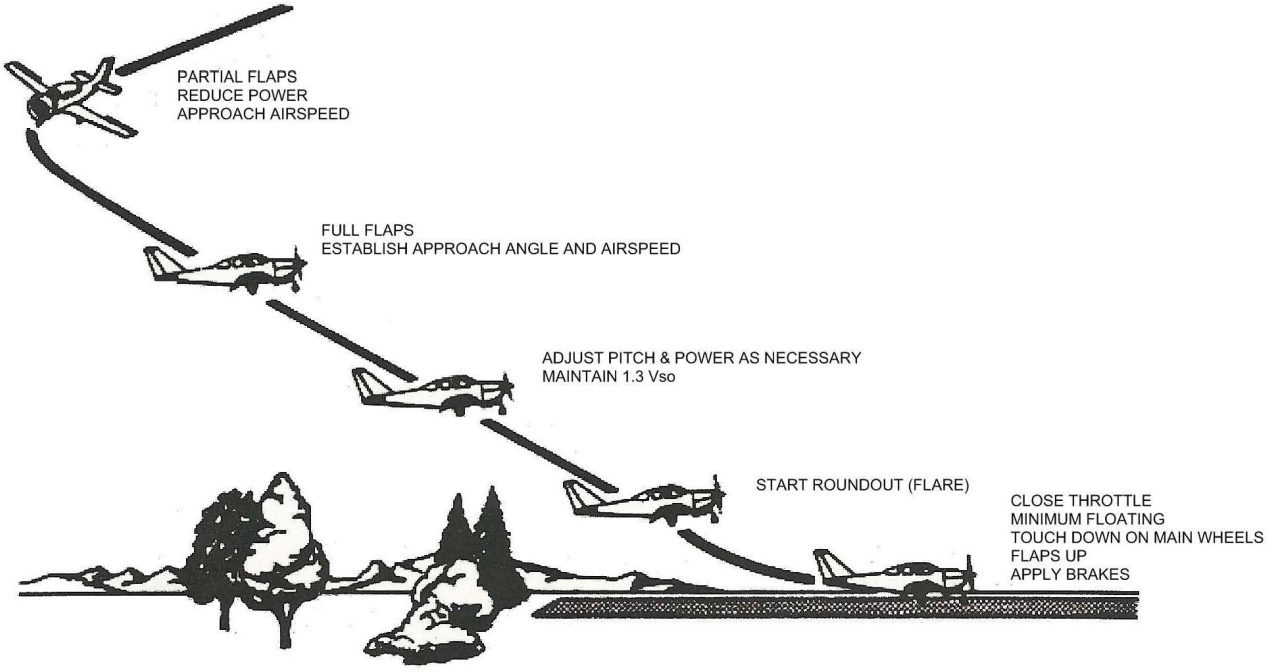
1. Maintain normal traffic pattern
2. Determine if there is an obstacle
3. Set up normal approach speed _____**Kts** add full flaps
4. Approach should be stabilized by **300' AGL**
5. Obstacle should be cleared by **50'**
6. As flare is initiated, throttle is gradually reduced and pitch increased to reach a full stall attitude with power off, as the aircraft contacts the runway with little or no float
7. Upon touchdown, brakes should be applied with smooth pumping motion
8. Increase back pressure on yoke
9. After taxiing clear of active – perform "After Landing Check"

Short Field performance whether taking-off or landing is directly related to Density Altitude, aircraft, and runway condition. Keep in mind that performance specifications found in Owner's Manual may not indicate actual performance of aircraft.

*****Do not hesitate to exercise good judgment on an aborted takeoff or landing when aircraft performance is below what is necessary.***

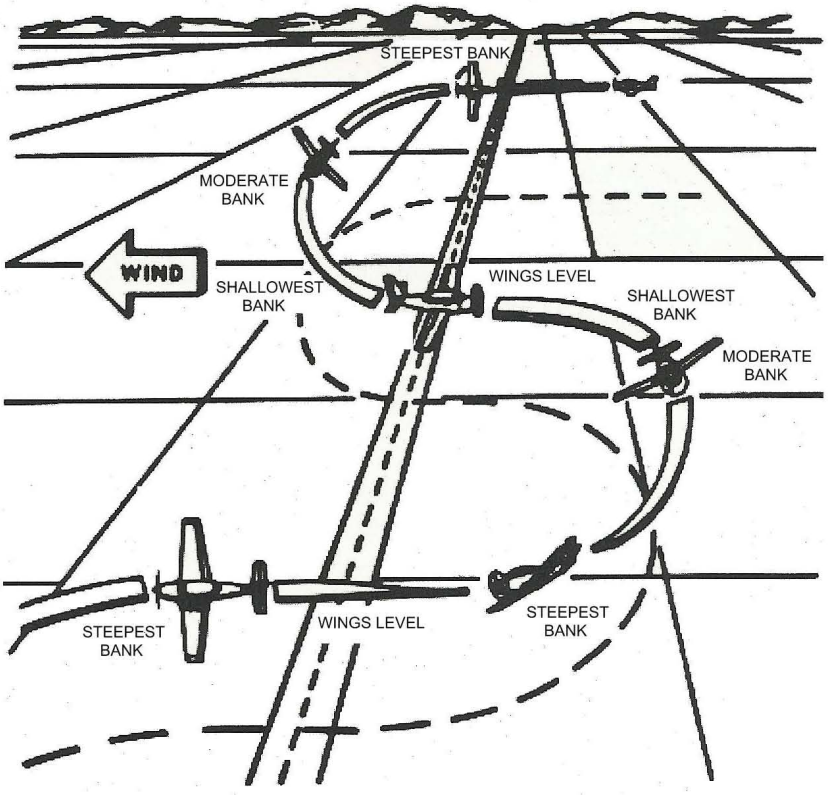
Diagram on next page…

Short Field Landing (cont.)



"S" TURNS ACROSS A ROAD

1. Clear the area; remember to also check for towers since you will be low to the ground.
2. Select a reference line, perpendicular to the wind direction
3. Enter the maneuver downwind, perpendicular to the reference line at **800' AGL** (Cruise configuration)
4. Initiate a 180° constant radius turn, changing bank as necessary to compensate for wind.
5. Aircraft should be wings level and perpendicular over the reference line at the completion of the first 180° turn.
6. Immediately initiate a turn in the opposite direction (See #3)
7. Each 180° turn should be constant radius, ending the maneuver over the reference line.
8. Bank should not exceed 45°.

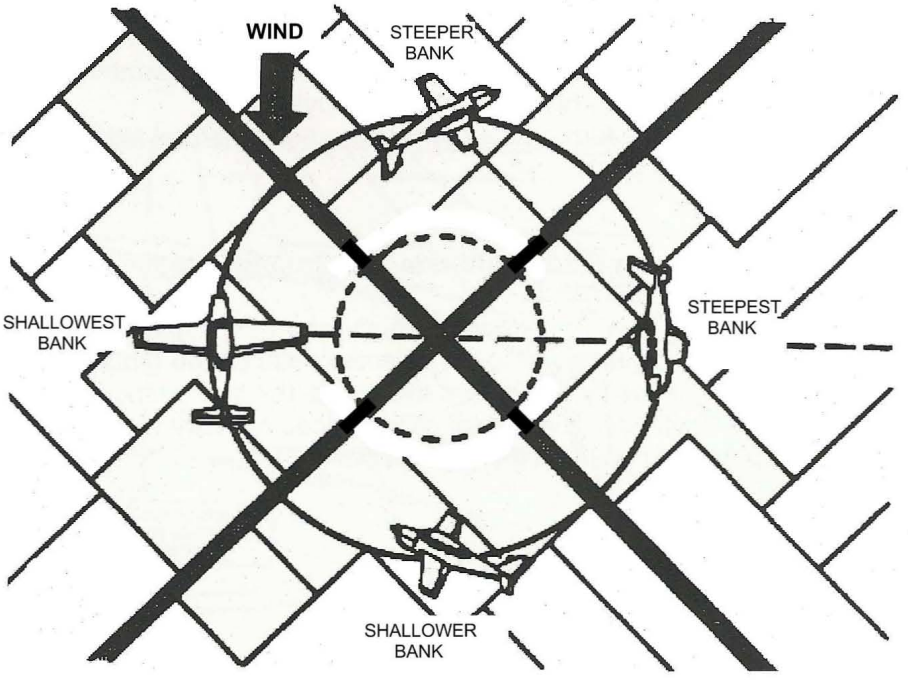


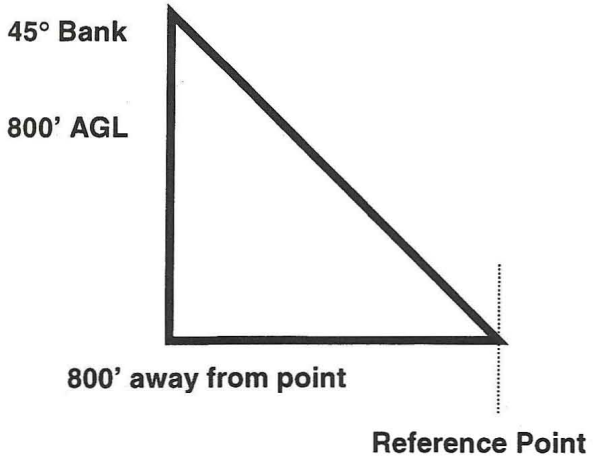
REMEMBER:
Steepest bank occurs at the fastest ground speed

Shallowest bank occurs at the slowest ground speed.

TURNS AROUND A POINT

1. Select a reference point – visually clear the area
   a. Note: It is better to pick two crossing reference lines (Railroad etc.), be cautious not to pick a point in a congested area.
2. Enter the maneuver downwind at 800' AGL and approximately 800' (+/- 200') away from the point; cruise configuration
3. Coordinate bank and rudder as appropriate to maintain constant radius around the point
4. The steepest bank will be downwind (Fastest ground speed)
5. Shallowest bank will be up-wind (Slowest ground speed)
6. Bank should not exceed 45°
7. Maintain collision avoidance and altitude
8. Depart the same direction as entry.





NOTE: The angle of bank should be changed slowly. A smooth, steady decrease of bank should be occurring on the downwind (of the point) portion of this maneuver. A smooth, steady increase of the bank should occur on the upwind (of the point) portion of this maneuver. The pilot should be careful not to increase or decrease too much as to create a situation where you are chasing the altitude.

EMERGENCY LANDING

- To simulate an emergency landing, a reduction in throttle to idle will be used.
- ***No one should ever use the mixture at cut off to simulate an emergency!***
- No simulated emergency landing should ever go below 500' AGL, unless over a runway.
- Be sure to clear the engine every 500' loss in altitude
- Be clear who has control of the aircraft in event of an actual emergency

UPON SIMULATED ENGINE FAILURE

The following three procedures are completed simultaneously

1. **Carburetor Heat ON** (Keep in mind, the engine is going to cool off quickly. *If there is carb ice, the best chance of clearing it is right after the engine stops*)
2. Establish and trim to maintain **best glide** for that aircraft (if necessary flaps & gear up)
3. Look for a **place to land** within gliding distance

IF ALTITUDE PERMITS – begin trouble shooting the reason for the engine failure.

1. Fuel Selector fullest tank or **On**
2. Mixture **Rich**
3. Fuel pumps **On**
4. Magnetos – Check, try restart
5. Primer In and Locked
6. 121.5 Emergency frequency – Unless already on freq with another controlling agency
7. 7700 in the transponder

IF TIME PERMITS - back up memory items with checklist

1. Fuel **Off**
2. Mixture **Off**
3. Magnetos **Off**
4. Fuel Pump **Off**
5. Lower Landing Gear at appropriate altitude
6. At a point when a safe landing is assured, set Flaps
7. Seat belts On
8. Door ajar, lock in the Open Position
9. Time Permitting – back up with checklist

Remember: The most important procedure the pilot can accomplish during an emergency is to keep the aircraft under control. As long as the aircraft is flying under pilot control, the better chance of walking away.

Lose control + Stall = Only Fate Will Tell

Maintain Positive Control At All Times!

MAGNETIC COMPASS TURNS

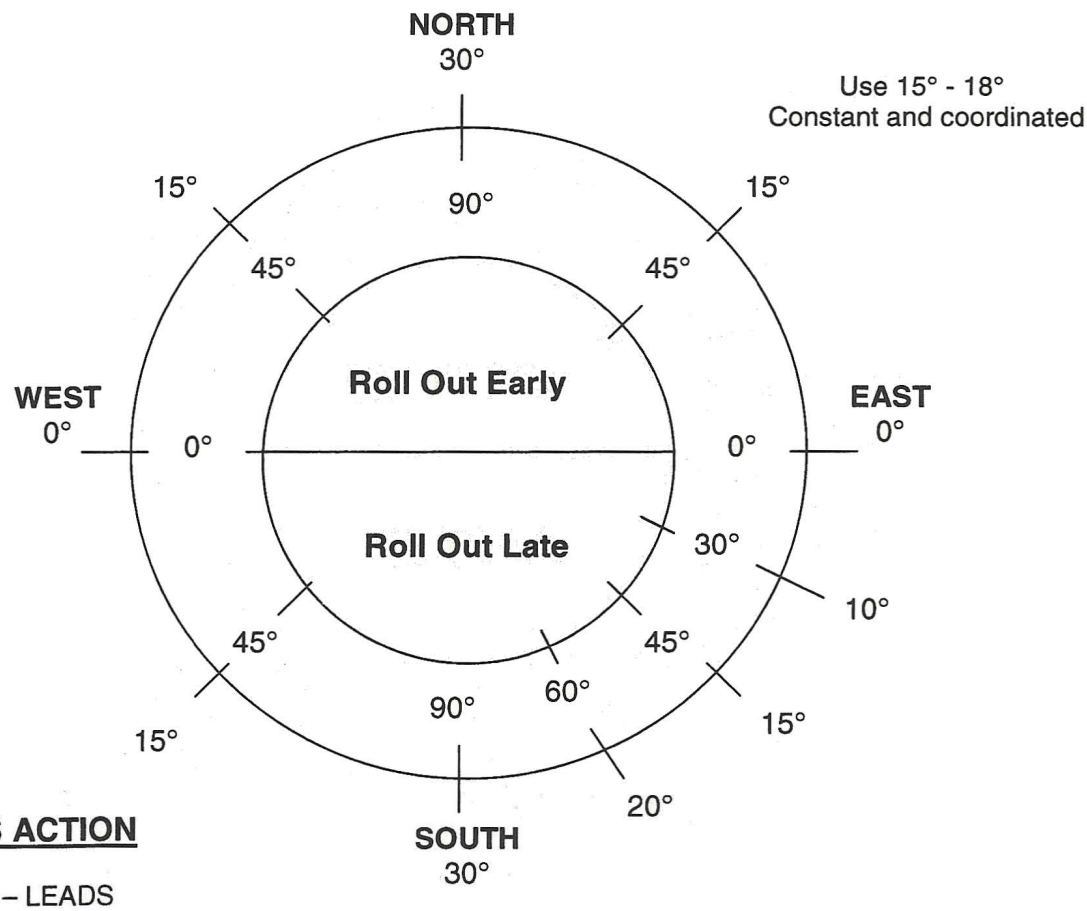
Be sure to read about compass errors before undertaking this section.

The accompanying illustration shows a method of computing latitude error during compass turns. Turns terminating in North or South involve the maximum error, in this case 30° (Florida)

Since the compass turns slower than the aircraft when turning through North *from* East or West, and faster than the aircraft when turning through South, the effect cancels and no appreciable error is present at East or West. Therefore, latitude error is determined by the number of degrees the heading varies from the zero (East or West) reference point. To simplify the computation, use the following procedure:

1. Determine the angular difference between East or West as appropriate and the desired heading.
2. Since 30° of error is involved in 90° of turn (1° of error for each 3° of turn), divide the degree of angular difference by 3 to determine the latitude error.
3. Allow 7° (½ the angle of bank) to compensate for banking error (Additional amount of turn accomplished during rollout)
4. In turns terminating in Northerly quadrant, roll out early. The amount of latitude error plus the 7° bank lead. For Southerly quadrant, roll out late (or after turning past the desired heading), the amount of latitude error minus the 7° bank lead.

Inner numbers = degree of angular difference
Outer numbers = latitude error



PILOT'S ACTION

NORTH – LEADS
SOUTH - LAGS

VOR TRACKING (Course Following)

To follow a desired course inbound or outbound with wind unknown, use this procedure:

1. Set OBS to desired course. When the desired course has been intercepted, with the CDI centered, maintain a heading corresponding to the OBS.
2. When definite off course position is indicated by the CDI, turn 20° in the direction of the CDI. Maintain this heading until needles re-centers
3. When the needle centers, turn 10° towards course selected on OBS. This establishes a 10° wind correction angle. If the CDI remains centered, maintain heading. Wind correction angle is correct.
4. If the CDI again indications off course position in the same direction, wind correction angle is insufficient. Turn to the same heading used in the 20° correction. When the needle re-centers, turn 5° in the opposite direction. This establishes a 15° wind correction angle.
5. Conversely, if the CDI deflects opposite to the initial deflection, the 10° wind correction angle is too great. In this case, parallel the course. When the aircraft has drifted back on course, CDI centered, establish a 5° wind correction angle
6. After heading is established in accord with step or steps 3, 4, 5, as required, heading corrections of 5° are normally adequate to keep the CDI centered. To obtain the ultimate accuracy, heading corrections of less than 5° are required.

IMPORTANT

If the first 20° change of heading toward the course fails to re-center the CDI within a reasonable period of time, another 20° heading should be made toward the CDI to accumulate a correction of 40°. (A strong crosswind is indicated) When the CDI re-centers, establish a 20° wind correction angle. Correct this angle as necessary, using the same technique as above.

AIDS TO COURSE FOLLOWING:

Following a VOR radial is a trial and error process in which a series of headings are used to determine the desired course. Finding this course depends on each successive trial heading based on the results of previous headings. A new trial heading should not be established until the results of the previous trial heading have been determined.

When flying toward a VOR and the CDI retains a constant off course indication, that heading will cause the aircraft to intercept the course at the station. This causes the aircraft to converge on the course. In this situation, the aircraft should be turned 5° toward the course and this correction maintained until the CDI re-centers. Then turn back to the heading that held the CDI in a constant position.

CAUTION:

When the OBS heading and the aircraft heading are reciprocals, a condition commonly referred to as "reverse sensing occurs.

Example: An aircraft flying to or from a VOR on a heading of 090° with the OBS set to 270°. If the aircraft is to the left of the course, the CDI will be deflected left, and if the aircraft is right of the course, the CDI will be deflected to the right. In this situation, turns must be made away from the needle in order to intercept the course. This is the opposite of the procedure normally used in course following, thus the term "reverse sensing.

This is why we:

Track toward a VOR with a "TO" indication
Track away from a VOR with a "FROM" indication

VOR COURSE INTERCEPTION PROCEDURES

These procedures are used when it is desired to intercept a course that does not coincide with the present location of the aircraft.

To Intercept a Course "TO" A VOR Facility:

1. **Tune** in and **Identify** the desired facility, then turn volume down
2. Turn the aircraft to a heading **Parallel** to the desired course
3. **Center the CDI** with "TO" indication if tracking Inbound or "From" if tracking Outbound
4. **Determine the difference** between the centered CDI and your desired course.
   a. If course is Less than 30° difference use a 45° intercept
   b. If course is More than 30° difference use a 90° intercept
5. **Turn OBS** to desired course. ***Note:*** The CDI will indicate the proper direction to turn the aircraft.
6. **Turn the aircraft** – 45° or 90° toward the needle (CDI)

VOR TIME CHECK

This is an expanded explanation of the wing tip bearing changes (90°) method of execution of VOR time check as shown in the FAA Instrument Flying Handbook AC 61-27.

The formula solution is applied to the elapsed time for a predetermined change in azimuth from the aircraft to a station located at 90° from the aircraft heading.

Execution:

1. Tune in and Identify with the desired VOR station
2. Center the CDI with the OBS with a "TO" Indication
3. Turn the aircraft to heading corresponding to the course indicated on the OBS. (The radius of this turn may take the aircraft slightly off the original inbound course indicated on the OBS, therefore, step 4 follows)
4. Re-center CDI with OBS (still with a "TO" reading) and correct heading to correspond with this reading. The nose of the aircraft is pointed at the station.
5. Turn the aircraft 80° to the right of the inbound heading assumed in Step 4. Turn the course selector 10° counterclockwise. (Opposite the direction of turn, CDI needle will be deflected right – the same as the direction of the turn)
6. Maintain heading. When the CDI centers, note the time.
7. Maintain heading. Rotate the OBS 10° counterclockwise. (The CDI needle will again be deflected right)
8. When CDI again centers, note time and compute elapsed time from Step 6.
9. Turn the aircraft to track to the station.
10. As the turn in Step 9 is initiated, compute time to station, using one of the following formulas:

$$\textit{Time to Station (In minutes)} = \frac{\textbf{60 x Minutes Flown for Bearing Change}}{\textbf{Degrees of Bearing Change}}$$

By analysis of the above formula we derive the following:

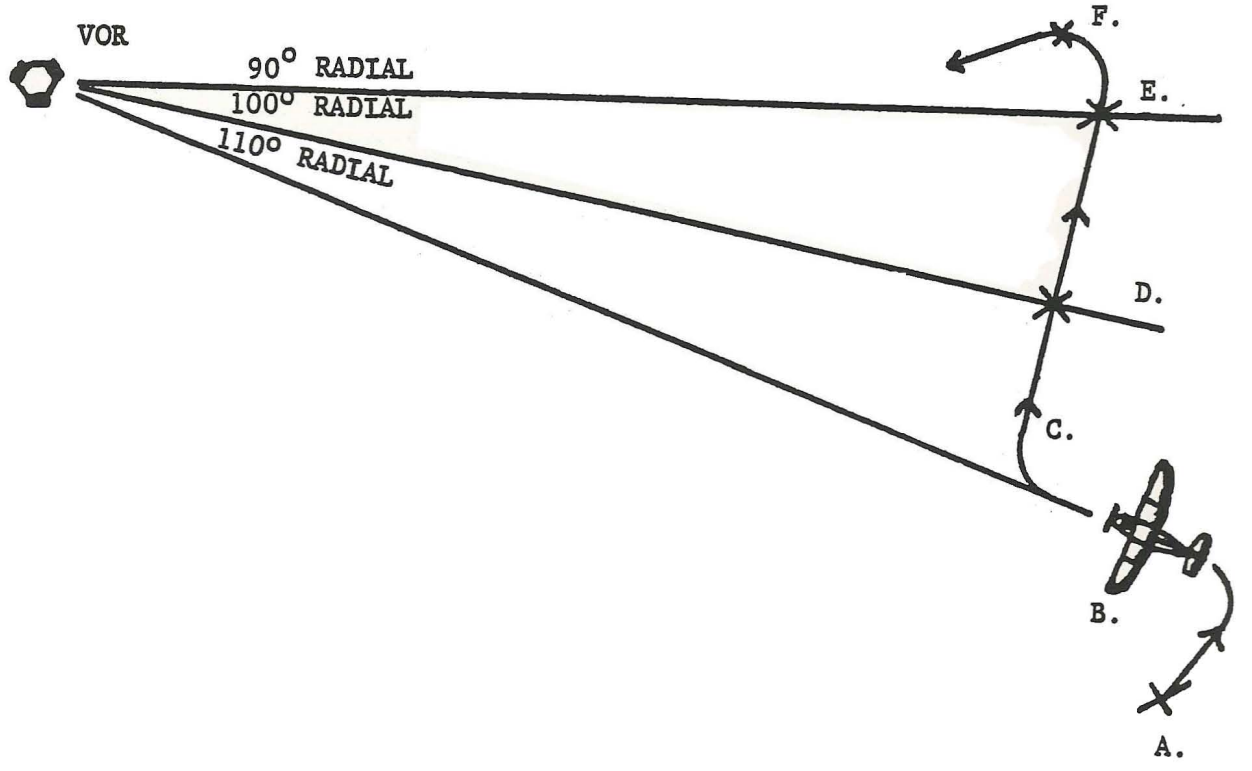
Time to station in minutes equals minutes flown to obtain 10° bearing change multiplied by 6.

$$\textit{Time to Station (In minutes)} = \frac{\textit{Time Flown in Seconds}}{\textit{Degrees of Bearing Change}}$$

By analysis of the above formula, we note that the time to station in minutes equals 1/10 of the time flown in seconds for 10° bearing change. For example, if a 10° wing tip bearing change takes 80 seconds, time to station is 8 minutes.

NOTE: The turn indicated in Step 5 of the foregoing procedure may in practice be made either right or left, keeping in mind that the OBS is turned counterclockwise in case of a right turn and clockwise for a left turn. However, to simplify standardization it is recommended that during initial training this turn be made to the right.

Illustration



Steps Indicated in Above Illustration

1 Center CDI with "TO" and turn to heading same as course shown on OBS
2 Re-center CDI and correct heading to agree with OBS.
   - *OBS 290°, Heading 290°*
3 Turn aircraft 80° right, OBS 10° counterclockwise
   - *OBS 280°, Heading 010°*
4 CDI centers, start time, then turn OBS 10° further counterclockwise
   - *OBS 270°, Heading 010°*
5 CDI centers, stop time, start turn toward station and compute time to station
6 Give estimate to station