Echo Bravo Flight Training

SOPM

VERSION 1.0
JULY 2025

Revisions

Revision Number	Pages Revised	Date
1.0	Original	7-3-2025

Introduction

This manual is a compilation of standard flight training maneuvers and procedures for use in the Cessna 172. It is designed to provide standardized procedures for flight maneuvers required in the FAA Airman Certification Standards (ACS) and to help pilots understand how to fly a particular maneuver.

The pitch attitudes and power settings are approximate and some changes may be required to get the expected performance from each specific aircraft. This manual also contains information to help a pilot expand their knowledge.

During visual maneuvers, the pitch attitude sight pictures referenced are not intended to be used in conjunction with the attitude indicator. During instrument meteorological maneuvers, the pilots are expected to set the pitch attitude in reference to the attitude indicator.

Flight instructors are required to show the students the referenced pitch attitude using the natural horizon and all students are expected to use outside referenced sight pictures. Collision avoidance during all maneuvers is of the utmost importance.

Pilots must use a combination of the Standardization Manual, Standard Operating Procedures, FAA flight training handbooks, Pilots Operating Handbook, and the FAA Airman Certification Standards to fully develop a complete understanding of each maneuver.

Revisions

Recommended changes to this document should be submitted to EB Flight Management. It is strongly encouraged that flight instructors provide suggestions to improve the quality of this document as well as the training experience at EB Flight Training. Any recommendation must be submitted in writing, and should include a complete description of how the item should be changed.

To suggest a recommendation, complete the feedback form located at:

https://ebflight.com/feedback

References

Aeronautical Information Manual; Federal Aviation Regulations; FAA-H-8023-25B Pilot's Handbook of Aeronautical Knowledge; FAA-H-8083-9B Aviation Instructor's Handbook; FAA-H-8083-15B Instrument Flying Handbook; FAA-S-ACS-6B Private Pilot ACS; FAA-S-ACS-7A Commercial Pilot ACS; FAA-S-ACS-75 Flight Instructor ACS; FAA-S-8081-9E Flight Instructor Instrument PTS.

Section 1 Ground Operations

1.1 Preflight Planning

Once properly instructed in the fundamentals of pre-flight preparation, the pilot should:

1. Arrive at EB Flight Training at least 15 minutes prior to a scheduled activity.

2. Verify the assigned aircraft from Dispatch for correct weight and balance computations.

3. Obtain a Standard or Abbreviated Briefing from FSS (1-800 WX-BRIEF) or other authorized provider, as appropriate to the flight: Local, Cross-country VFR or Cross-country IFR.

4. If the flight is a cross-country, complete the Navigation Log (Navlog). Detailed Navlog planning must be completed well in advance of the departure time, except for the addition/correction of winds, ground speeds, times, fuel consumption, etc.
   NOTE: The pilot must have all Navlog items completed by the start of the scheduled activity time. Arriving sufficiently early to finalize all Navlog items is the student's responsibility.

5. File a flight plan, if applicable.

6. Complete the Flight Manifest including weight and balance and aircraft performance calculations.
   NOTE: The steps above may be accomplished prior to dispatching the aircraft using Flight Schedule Pro.

7. Prior to dispatching the aircraft, check for aircraft discrepancies and verify aircraft airworthiness.

1.2 Preflight Inspection

Check the general condition of the aircraft upon arrival in accordance with the Approved Flight Manual (AFM) by following the EB Flight Training "***Preflight Inspection***" checklist.

After entering the aircraft, the pilot should first ensure all necessary equipment, documents, and navigation charts are onboard. Verify the fuel status and oil quantity and, if needed, add more fuel/oil. If there is ***ever any doubt***, always refill fuel/oil**.**

Fuel caps and oil dipsticks must never be left unsecured. Always replace a fuel cap or oil dipstick when stepping away. As a general rule, if the item is not in your hand or within your immediate reach, secure the item.

Equipment such as headsets, navigation clipboards, and pencils should ***not*** be placed on top of the instrument panel. Over time, this will scratch the windscreen and reduce forward visibility. ***Only*** the ignition key is to be placed on top of the instrument panel.

When conducting a preflight inspection, it is imperative for the pilot to question anything that is not as it should be or is in anyway different from what is expected to be seen. Any questions or concerns should be brought to the attention of the flight instructor and/or maintenance.

In accordance with FAR 91 and the POH, some instruments and equipment may be inoperative and it is still legal and acceptable to fly the aircraft, subject to the pilot-in-command's (PIC) discretion. Should it become apparent during the preflight or *prior to takeoff* that some instrument, equipment or component is not operating correctly, the PIC must determine if the flight can still be accomplished without it through the following steps:

1. Reviewing the comprehensive equipment list in the POH to locate the equipment. If the item is not listed in the comprehensive equipment list,

2. The PIC must then consider 91.205, 91.207 and 91.215. If the item is not listed in these FARs,

3. Then the equipment *may* be required by Type Design or by an Airworthiness Directive (AD). Since both these references are not normally accessible to the PIC, the flight must be postponed and authorized maintenance personnel consulted.

It should be noted that all Airframe, Powerplant and major system components (e.g., fuel pumps, control surfaces, riveting and securing screws, etc.) are generally required. These components must be determined by the PIC to be fully functional and/or in a safe condition prior to flight. Should one of these components be found inoperative, the PIC must assume it is required and consult maintenance **before** continuing.

NOTE: Any operation with inoperative equipment must be conducted in accordance with FAR 91.213.

1.3 Cockpit Management

Regardless of what materials and/or equipment are to be used, they must be neatly organized and accessible. For students engaging in local VFR operations, the following items are always required:

- iPad or kneeboard with scratch paper for note taking
- The aircraft's checklist and POH
- ForeFlight charts or VFR Sectional chart

The VFR Sectional is necessary even for short, local VFR flights. The physical chart itself should be sized and folded appropriately to show the intended area(s) of operations without being too large. It is recommended that clips be used to keep the chart shape. The Sectional charts on ForeFlight can be used to substitute.

Flights leaving the local area including cross-country flights and flights less than 50nm distance should have a navigation log (Navlog) to and from that airport. Flights to unfamiliar airports, whether local or distant should also have an airport diagram or airport sketch of the runways for orientation.

Flights requiring the use of a Navlog will also necessitate the use of a flight computer. The flight computer may be manual or electronic. Should the flight require this resource, it must be accessible to the pilot. The recommended locations are in the bottom-left pocket or in the bottom-right central pedestal.

1.4 Adjusting the Pilot's Seat

Always adjust the seat so the knees are slightly bent and the ***balls of the feet are placed on the bottom of the rudder pedals with heels on the floor.*** When seated in the cockpit, the pilot must be able to see inside and outside references ***without*** straining. Poor visibility not only causes apprehension, but may also impact a pilot's ability to control the aircraft, ***especially*** during landings.

If the seat cannot be positioned for proper pilot visibility and aircraft control, cushions ***must*** be used. Do not use books or other materials to properly position sitting height. Purchasing an appropriate seat cushion is a good investment and may accelerate the student's ability to learn. Students are able to use the spare seat cushion available in the back of some airplanes; however, there is a very limited quantity available. The seat may be cranked up or down to adjust vision height. The seat back has a tab which moves the seat back forward and backwards

Ensure the seat is locked in position. Acceleration or deceleration during takeoffs and landings may cause the seat to move out of position causing controllability problems if not properly locked.

NOTE: In general, the seat elevation (seat height) needs to be such that the pilot can see the top cowling surface when sitting upright and looking forward out the windshield. It is common that the pilot must sit with his/her back straight and "tilting" the head backward slightly to see the cowling clearly. The pilot ***must clearly see*** the riveting line extending forward and downward on the cowling, as this is used for many sight pictures during maneuvers and landings.

1.5 Engine Starting

Engine starting is accomplished using the appropriate “***Before Start***” and “***Engine Start***” checklists.

If the engine is “cold” (has not be running recently), it will be necessary to prime the engine. This is referred to as a Cold Start. The priming procedure for fuel injected engines such as N536HF is:

- Throttle Open 1/4”
- Select the Aux Fuel Pump ON
- Advance Mixture to full RICH for 3 – 5 seconds
- Mixture to Cutoff Position
- Turn Aux Fuel Pump OFF

The priming procedure for carbureted engines such as N3735F and N733KC is:

- Unlock Primer
- Pull Primer Fully Out
- Push Primer Fully In
- Repeat that Process 1-2 Times in Warm Air and up to 3 Times in Cold Air (most times priming is not necessary)
- Lock Primer

NOTE: First flight of the day may require 8-12 seconds of priming (fuel-injected engines)

If the engine is “warm” (has been running recently), it will be necessary to clear or “flush” the fuel lines prior to start. A warm engine is referred to as a Hot Start, and does not need to be primed. However, when the engine was shutdown on the previous flight, the residual heat from the engine “warms” the fuel lines, causing the fuel to vaporize (vapor lock). In order for the engine to start smoothly, this fuel vapor must be flushed out. The clearing procedure is:

- Select the Aux Fuel Pump ON ***for 1 second and*** smoothly and quickly advance Mixture to RICH and then immediately to Cutoff as you turn the Aux Fuel Pump OFF

- Throttle 1⁄4 inch open

- Set Mixture to 1/3-rich prior to cranking the engine

This procedure will clear the fuel lines of vapor, allowing a hot engine to begin running easily.

When ready to start, the pilot should clear the area in all directions to ensure nothing is in the immediate vicinity of the aircraft or the propeller. As an added precaution, shout "Clear Prop!" before starting engine, and be sure to wait 3 – 5 seconds so anyone potentially ***nearby can clear*** the prop area. For all dual flight activities, the instructor must be seated with safety harness fastened.

NOTE: It is not acceptable for any occupant, including the instructor, to enter or exit the aircraft with the engine running.

Twisting the ignition key to "Start" (or by pressing and holding the Start button) will engage the starter motor and rotate the crankshaft. Usually, during the first 2 – 3 seconds, the engine will be rotating at a very low RPM by the starter, and very soon after should begin to "kick" and produce power on its own. As soon as this "kick" is observed (when the engine is beginning to produce its own power, evident by a sudden increase of RPM and the beginning of engine combustion sounds) advance the mixture to rich and **the starter must be released. *Never*** hold the starter engaged when the engine is producing its own power.

If the engine does not continue the run, and additional attempts at starting are required, the pilot must observe the starter motor duty cycle. This allows starter cooling.

As soon as the engine is operating smoothly, check the engine instruments for proper indications; shut down the engine immediately if the instruments are not indicating normally. It is imperative to verify oil pressure in the green arc within 30 seconds during warm weather or 60 seconds during very cold weather. If you do not see oil pressure within these times, shut down the engine by pulling the mixture all the way out and inform maintenance.

After turning on the Avionics Switch, in accordance with the checklist, verify the headset, intercom, and volume are functioning properly by stating: “How do you hear” and wait for “Loud and clear, how do you hear me” from the second pilot/passenger/instructor. This verbal exchange should continue until the PIC has verified that all headsets are operational.

1.6 Leaning for Ground Operations

For all ground operations, after starting the engine and when the engine is running smoothly:

1. Set the throttle control to 1200 RPM.
2. Lean the mixture for maximum RPM.
3. Set the throttle control to an RPM appropriate for ground operations

(800 to 1000 RPM)

When subsequent leanings are required for example the run-up procedure, during taxi-back operations, etc. the pilot may visually approximate the mixture setting based on the initial leaning.

NOTE: Do not leave the mixture full-rich when on the ground. **This will drastically increase the potential for fouled spark plugs.**

1.7 Taxiing

After adjusting the seat properly for a proper visual sight picture, your right hand controls the throttle. The knob of the throttle should fit in the palm of the pilot's hand. The right index finger should be extended with the tip of the finger resting on the throttle friction lock. This gives the pilot a measuring device on how much throttle (RPM) the pilot is moving the throttle. Left hand on the yoke.

The rudder pedals are the primary means of directional control during taxi. When leaving the ramp, the brakes should be properly tested as follows:

Taxi with the ***heels of the feet resting on the floor*** and the balls of the feet on the bottom of the rudder pedals. With some back pressure on the yoke and a ***small*** amount of throttle, let the aircraft just start to roll and ***gently*** depress the ***right*** brake and then the ***left*** brake brakes to ensure that both brakes work.

This is the correct way to have your feet on the rudder pedals while taxiing, take-off or landing. Should you need to use the toe brakes, lift your feet till the toes are at the top of the rudder pedal and gently press the brakes. Remember; the aircraft has individual braking. The right brakes stops the right wheel and the left pedal stops the left wheel. Both applied together, stops the airplane straight ahead.

This is how your feet should look on the rudder pedals. The balls of your feet (where the toes meet the feet) should be on the bottom bar of the rudder pedal. When you scrunch your toes, you should feel the rudder pedal bar.

This is how your feet should ***not look*** on the rudder pedals as you are taxiing, take-off or landing. If you develop this habit, you will land with the brakes on and you will be extremely surprised. Start out with good taxi habits.

1. ***Smoothly*** apply the brakes with the toes and bring the airplane to a full stop. A sudden brake application causes the airplane to jerk to a stop and rock on the nose wheel.

2. If the flight is a dual flight, the controls will be transferred to the other pilot through a positive exchange of controls (See Section 3.3). Once the other set of brakes have been tested, return the controls to the initial pilot using positive exchange of controls

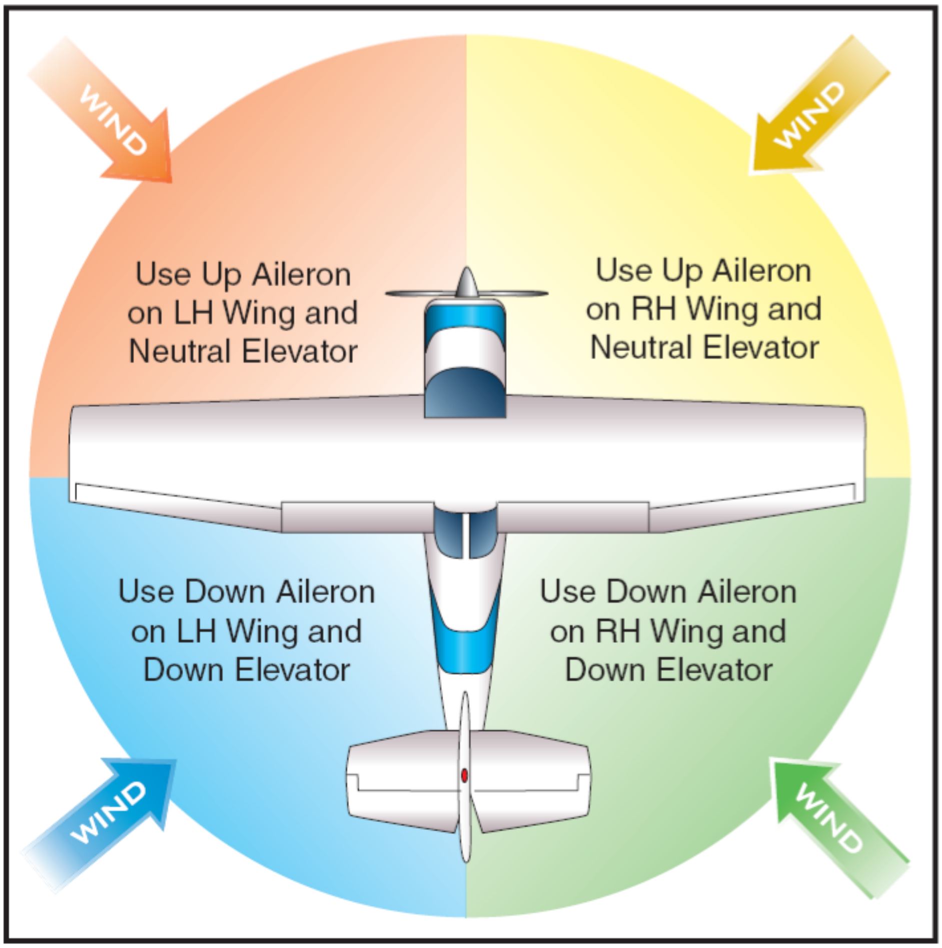
NOTE: The Cessna 172 has interconnected brake pedals to only one set of brake cylinders located on the ***pilot's side.***

Taxi speed will be controlled using engine power ***NOT the BRAKES*** and should provide the ability to stop or turn where and when it is required. The speed should always be such that when the throttle is closed the aircraft can be promptly stopped. Taxiing speed should not be controlled with brakes unless the strong wind is from behind pushing the aircraft to a faster speed than comfortable. Taxi speed around other aircraft should be at a SLOW walk speed. Away from other aircraft, the taxi speed should be that of a brisk walk.

When braking is required, ***first*** reduce the power to IDLE, and ***then*** smoothly apply brake pressure. Do not attempt to reduce or regulate taxi speed using the brakes with the power other than IDLE.

Obstruction clearance must be maintained during taxi. If there is any doubt regarding clearance, stop and seek assistance. ***Do not proceed if obstruction clearance is questionable or in doubt.***

When taxiing the aircraft, controls must be positioned relative to the wind direction in accordance with the manufacturer's Pilot's Operating Handbook (POH).



For quartering headwinds, position the ailerons into the direction of the wind with neutral elevator.

For quartering tailwinds, position the ailerons *with* the direction of the wind with down elevator. (Remember for tailwinds, "dive")

1.8 Runway Incursion Avoidance

Runway incursions must be proactively prevented by the pilot. Only through deliberate, intentional preventative measures can an accidental runway incursion be consistently avoided. Following are the recommended practices:

Pre-Flight Planning

1. Review and understand airfield signage and markings.
2. Review the appropriate airport diagrams.
3. Review any Hot Spots identified on the diagram.
4. Have a ***current*** a copy for use in the cockpit.
5. Review airfield NOTAMS and current ATIS for any taxiway closures, runway closures, construction activity, or other airfield specific risks.

During Taxi

1. Have the airport diagram out and available for immediate reference during taxi.

2. During radio transmissions, use correct ***terminology and proper voice*** cadence.

NOTE: Aeronautical Information Manual (AIM) Chapter 4-section 2. Use correct phraseology and terminology and a suitable voice cadence. This can help reduce errors. Always use “to-the-point” radio calls. Remove superfluous language. There is ***no need*** to repeat ATC’s every word. Be sure to speak in a steady manner at a moderate tempo.

3. Copy the taxi clearance and use the airport diagram to review the taxi route to the assigned runway prior to releasing brakes and beginning taxi.

4. Eliminate distractions while taxiing in the operational area.

5. Focus attention and have your “eyes out” of the cockpit when taxiing.

6. Maintain appropriate taxi speed.

7. Be alert to aircraft similar call signs.

8. **STOP** the aircraft on the taxiway and request ATC clarification if there is any confusion regarding aircraft position or ATC taxi clearance.

9. Prior to crossing any runway during taxi, ensure you have a clearance to cross.

10. Visually check to ensure there is no conflicting traffic prior to crossing the runway.

11. Call out "Clear left, clear right, cleared to cross runway [runway number]."

1.9 Engine Run-Up Checks

Allow the aircraft to roll forward slightly so that the ***nose wheel is straight*** before stopping (the rudder pedals should be even.

Complete the "***Engine Run-Up***" checklist. Prior to increasing the RPM to perform the engine check, verify the area directly behind the aircraft is clear. If another aircraft is about to taxi behind, wait until that aircraft has passed to avoid any prop blast damage caused by the high RPM.

During engine run-up get in the habit of using your peripheral vision to detect aircraft "creep". That is the aircraft moving ahead slightly even with the parking brake applied. Watch for this ***especially at night.***

1.10 Autopilot Test

In accordance with the POH and POH Supplement, aircraft with an operable autopilot must be tested on the ground prior to use in flight.

The FAA has placed special emphasis on Automation Management during FAA practical exams.

Due to this emphasis, the autopilot should always be considered a resource in the aircraft for proper SRM and therefore should be tested each flight.

The only plane in our fleet currently with autopilot enabled is N3735F. Pilots must be familiar with the general test procedures required:

1. Activating/verifying the autopilot ON
2. Checking the elevator/trim/pitch control (both up and down)
3. Checking the aileron/roll control (both left and right)
4. Verifying yoke A/P TRIM DISC switch works
5. Verifying disconnect override of the autopilot

1.11 Departure Briefings:

Airspace Awareness:

KDAB is located in class C airspace. The outer ring of the Charlie starts at 1200' with KOMN's Delta under the Charlie ring to the north and KEVB under the Charlie ring to the South. Delta under Charlie. Remain in contact with Daytona Departure until outside of the airspace and do not re-enter without contacting Daytona Approach.

Wake Turbulence Avoidance:

Being an international airport, we have many large aircraft that land and depart at KDAB every day.

If departing after a larger airplane or helicopter, wait at least 3 minutes after that aircraft's rotation before attempting to takeoff.

If landing behind a bigger airplane or helicopter, stay above his glide-path and land beyond his landing point.

Engine failure or Abnormality:
NOTE: Critical abnormality ***threatens*** flight. Non-critical abnormality ***does*** not threaten flight

1. Prior to rotation, complete memory items: close throttle apply brakes and stop on the runway

2. After rotation but ***with*** runway remaining:

    - Critical abnormality: close throttle, lower nose to maintain airspeed and land on the runway.

    - Non-critical abnormality: close throttle, lower nose to maintain airspeed and land on the runway.

3. After rotation ***with no*** runway remaining below TPA:

    - Engine Failure: lower nose to maintain flying speed and pick point out ahead in expanding cone to land. Complete memory items from "***Engine Failure Immediately After Takeoff***" checklist.
      Turn back possible from x-wind leg if above 500' AGL.

    - Critical abnormality: (rough running engine, failing power etc.) Advise tower, climb straight ahead to safe altitude – at least 500 feet – and return to runway. Do NOT start turn-back below 500 feet! If engine fails, land ahead per above.

• Non-critical abnormality: (instrument issue, warning lights etc.) Continue a normal climb to return via normal pattern.

4. Above TPA:

- Engine Failure or Critical abnormality: return to closest runway at airport or other suitable landing spot. Complete memory items from “***Engine Failure During Flight***” checklist.

- Non-critical abnormality: return and join the pattern.

1.12 Engine Shutdown and Parking

After completing the flight activity, return the aircraft to an appropriate parking location. Shut the aircraft down using the **"Shutdown"** and **"Secure"** checklist. The pilot must ensure to record both the Hobbs and Tach time. All tie downs must be used as well as chocks (if applicable) when securing aircraft on the ramp.

High winds, thunderstorms and jet blast may damage the aircraft if not securely tied down.

Make a final check of the cockpit; verify the ***mixture***, ***master*** switch and ***magnetos*** (the 3 Ms) are in the "OFF" position and the parking brake is ***not set***, it is released after tie down.

Remove ***all*** trash, equipment, and baggage. Ensure all doors, windows and vents are closed to prevent water damage.

Complete the post flight inspection with a walk-around inspection. Check the general condition of the aircraft, look for oil leaks, damage, etc. Report any discrepancies to the CFI or EB Management so that maintenance can be contacted immediately.

If there is any doubt that the aircraft is not secured properly, management must be notified immediately using the emergency phone numbers listed on Flight Schedule Pro (FSP).

Section 2 Takeoffs and Landings

2.1 Traffic Patterns

Objective:

To develop safe and efficient airport arrival and departure procedures for both controlled and uncontrolled airports. AIM Chapter 4.

Standards:

Makes appropriate advisory calls over the CTAF; Joins the traffic pattern for the correct runway; Enters to the downwind leg at the midfield point at a 45-degree angle; Maintains altitude ±100 feet, airspeed ±10 knots.

Description:

Uncontrolled Traffic Pattern Procedures:

1. After lift-off, maintain proper runway alignment and appropriate climb airspeed, V_X or V_Y. Ensure flaps are retracted and trim for the climb speed.

2. Climb to TPA at V_Y. Prior to turning the crosswind leg, pick a point off the wing tip (90 degrees) in the direction of the turn as an outside, visual reference point to roll out on or making a wind correction. This should be completed at an altitude ***not less than*** 300 feet below TPA.

3. Rollout on the crosswind leg ***with a crab into*** the wind to maintain the correct ground track. Make traffic advisory call.

4. Once established at pattern altitude, maintain 95 KIAS unless traffic separation dictates otherwise.

5. Turn the aircraft to the downwind leg at a distance not to exceed power off gliding distance (Runway should cut the wing strut ~ 1⁄2 to 3⁄4 way up the strut from the active runway). Make traffic advisory call.

6. Continue in the pattern until reaching the appropriate location to turn to the base leg. Make traffic advisory call.

7. Continue in the pattern until reaching the appropriate location to turn to the final leg. Make traffic advisory call.

NOTE: Do not over-fly airports with parachute activities. Such as Deland.

Joining the Traffic Pattern:

NOTE: At a towered airport, follow ATC instructions. The Control Tower will specify the position of the pattern to join and, if necessary, a distance value (e.g., “Join 2nm left-base Runway 25”). If tower is closed or at an uncontrolled airport, proceed as for an Uncontrolled Airport.

1. Determine the active runway. If the active runway cannot be determined prior to arrival, over-fly the airport at the TPA + 500 feet and in a position to view the windsock from above. ***DO NOT DESCEND*** until well clear of the downwind leg.

2. Establish the aircraft on a 45-degree ground track toward the midpoint of the downwind leg. Establish pattern altitude and 95 KIAS (RPM as specified by POH) approximately 2 miles out. Make appropriate traffic advisory call. (Do not attempt to join the pattern from the 45-deg position less than 2 miles out. The reason is to allow the pilot some time to look for other traffic in the pattern. Attempting to join too close may cause undue hazard.)

3. Communicate exactly where you are. Example: “45 Degree entry for Runway 5 Deland”, “Left Downwind Runway 18 Massey”. This keeps everyone informed and able to have “Situation Awareness” of aircraft around them.

NOTE**:** Using an AIRPORT DIAGRAM, orientating the diagram to NORTH, knowing the direction they are coming from, will help a pilot visualize the directions of the runway and assist the ENTRY. Bugging the runway heading into the heading indicator and programming a visual approach into the gps will help build situational awareness.

Controlled Traffic Pattern Procedures:

1. Accomplish “***Before Landing***” checklist prior to arriving abeam the touchdown point.

2. By mid-field on the downwind leg, unless a clearance or other instruction has been received from Control Tower, report mid-field downwind.

3. Abeam the touchdown point, reduce the power to 1500 RPM (maintain the altitude by slowly increasing pitch as airspeed slows). Ensure airspeed is below V_{FE}10°, (85 Knots) call out "Flaps 10," set flaps to 10° and establish a 75-80 KIAS decent (~ 500 FPM).

4. Commence a turn to the base leg when approximately 45° (Left Pattern, look over your left shoulder back toward the runway) from the approach end of the runway unless otherwise dictated by traffic or ATC.

5. Prior to making the turn to base leg, pick a visual reference point off the wing tip (90 Degrees) for your roll out point. These points may be used to correct for winds.

6. On the base leg, ensure airspeed is below V_{FE}20°, call out "Flaps 20," and adjust flaps to 20°. Coordinate pitch and power to maintain 70-75 KIAS and appropriate approach angle.

7. Visually clear the final approach path prior to commencing the turn to final. Make the turn to final so as to rollout with the aircraft aligned with the runway centerline.

8. On final with 20 degrees of flaps a speed of 70 KIAS should be used. Then set the flaps as necessary (normally 30°) by 300' AGL and with landing assured. Call-out "Flaps 30". Coordinate the pitch and power to maintain the desired airspeed (65 KIAS + 1⁄2 gust factor as needed) and approach path angle for the appropriate landing procedure.
   NOTE: In strong, gusty wind conditions, flaps 20° may be used for landing. Additionally, expect to perform a landing with some "power-on".

9. Ensure you have received landing clearance.

2.2 Normal and Crosswind Takeoff and Climb

Objective:

To develop proficiency in conducting various takeoff and climb profiles.

Standards:

Private: V_Y +10/-5 knots on climb out.

Commercial: V_Y ±5 knots on climb out.

Description:

1. Ensure "***Before Takeoff***" checklist has been completed.
2. Visually check for traffic on final for the active runway or approaching other runways.
3. Visually look at WIND SOCK to obtain the latest information about the wind prior to take-off.
4. Communicate as appropriate: at an uncontrolled airport make appropriate traffic advisory call (situation awareness for all pilots); at a controlled airport, request take-off and read back the clearance.
5. Taxi the aircraft into position, centered on the runway with the nose wheel straight, as close to the approach end of the runway as practical. Position the flight controls for existing wind conditions.
6. Verify that the HSI heading and magnetic compass heading approximately match the runway heading to confirm proper runway, as assigned or selected.
7. Smoothly and continuously advance the throttle to full power with heels on the floor to prevent accidentally touching the brakes. Call out "Full Power." Keep a hand on the throttle in the event an abort becomes necessary.
8. Check the engine instruments (verify RPM per POH, all other engine instruments in the green) and call out "engine instruments in the green."
9. Check airspeed tape and announce "Airspeed alive."

10. At 55 KIAS, call out "Rotate." Rotate by pitching the nose up until the top of the engine cowling makes the trees disappear. At this point, the pilot's eyes should move over to the left between the Instrument panel and the window frame to keep visual reference to the horizon. This sight picture keeps the pilot from pitching too high and constant visual contact with the horizon, ground and obstacles.

NOTE: If *significant* crosswind exists, use Flaps-10 and rotate *briskly* at 55 KIAS. Use prompt, firm back pressure so the aircraft lifts off swiftly. This will prevent resettling and skidding if a gust of wind causes the airplane to re-contact the runway.

This sight picture area - Between the Instrument panel and the Window Frame will be referenced many times throughout this manual. Anytime the nose of the aircraft rises above the horizon and forward visibility is no longer possible, it is imperative the pilot's eyes move to the left to keep a visual Sight Picture of the horizon.

Clearing Airspace – After take-off and climbing away from the airport, it is smart to create a habit (Safety) of dropping the nose of the aircraft once in a while in a climb to clear the airspace in front of your aircraft as the nose of the aircraft is high and forward visibility is limited.

2.3 Short-Field Takeoff and Climb

Objective:

To develop proficiency in conducting short field takeoff and climb profiles.

Standards:

Private: Obstacle Clearance Speed, if published, or V_X +10/-5 knots until obstacle is cleared or until at least 50' above the surface, then V_Y +10/-5 knots.

Commercial: Obstacle Clearance Speed, if published, or V_X +5/-0 knots until obstacle is cleared or until at least 50' above the surface, then V_Y ±5 knots.

NOTE: For training purposes, simulate an obstacle height of 200' AGL unless otherwise instructed.

Description:

1. Ensure the "Before Takeoff" checklist has been completed AFTER receiving takeoff clearance or a line up and wait clearance with flaps set to 10°. Ensure that both flaps are down equally.

2. Visually check for traffic on final for the active runway and for other traffic approaching other runways.

3. Visually look at WIND SOCK to obtain the latest information about the wind prior to take-off.

4. Communicate as appropriate: at uncontrolled airport make appropriate traffic advisory call indicating your intention of a "Short Delay"; at a controlled airport, request a "Short Delay" before the take-off roll is performed and read back the takeoff clearance.

5. Taxi the aircraft into position utilizing *or* simulating maximum runway available. If maximum runway available is not to be used, call out "Simulating maximum runway available" and taxi directly to the centerline

of the runway. Do not curve onto centerline unless instructed to do so. The Pilot needs to show that they would use the maximum amount of runway available by their action or verbally.

6. Center on the runway with as little forward movement as possible while ensuring the nose wheel is straight and bring the aircraft to a complete stop. Position the flight controls for existing wind conditions.

7. Verify that the HSI heading and Magnetic Compass heading approximately match the runway heading to confirm proper runway.

8. Hold the brakes firmly, preventing any movement of the aircraft.

9. Smoothly apply full power. Call out "Full Power."

10. Check the engine instruments verify at or above static rpm for that aircraft, all other engine instruments in the green. Call out "Engine instruments in the green."

REFER TO THE AIRCRAFT POH FOR SPECIFIC STATIC RPM.

11. Immediately release the brakes, allowing the aircraft to accelerate as quickly as possible. Do not reapply the brakes unless an abort is necessary.

12. The PIC will keep a hand on the throttle in the event an abort becomes necessary.

13. Check airspeed tape and announce "Airspeed alive."

14. At Vr announce "Rotate" and establish a climb attitude (approx. 13°). Maintain appropriate speed for weight until clear of obstacles.

15. Upon rotation of the aircraft and the nose of the aircraft makes the trees disappear, the pilot's eyes should move over to the left between the Instrument Panel and the window frame to keep visual reference to the horizon and visually see the obstacle.

NOTE: Review the Cessna 172 POH for recommended rotation and obstacle clearance speeds.

16. After clearing obstacles, establish V_Y pitch attitude (~10°).

17. Above 65 KIAS and with a positive rate of climb, announce "Positive Rate, Flaps Up," and retract the flaps; climb out at V_Y.

18. Refer to Section 2.1 for appropriate procedures once airborne.

NOTE: When operating at a controlled airport, the student or instructor must request a "short delay" when calling the Control Tower for the takeoff clearance. Normally, ATC is not expecting the pause prior to the takeoff roll, and failure to obtain approval may result in a loss of aircraft separation.

2.4 Soft-Field Takeoff and Climb

Objective:

To develop proficiency in soft field takeoff and climb profiles and procedures.

Standards:

Private: Accelerates in ground effect to the Obstacle Clearance Speed, if published, or V_X +10/-5 knots until obstacle is cleared or until at least 50' above the surface, then V_Y +10/-5 knots. If no obstacle, accelerates to V_Y +10/-5 knots.

Commercial: Accelerates in ground effect to the Obstacle Clearance Speed, if published, or V_X +5/-0 knots until obstacle is cleared or until at least 50' above the surface, then V_Y ±5 knots. If no obstacle, accelerates to V_Y ±5 knots.

NOTE: For training purposes, simulate an obstacle height of 200 feet AGL if instructed. However, if **no obstacle** exists or if not simulating an obstacle, a V_Y climb out should be performed.

Description:

1. Ensure the "*Before Takeoff*" checklist has been completed with flaps set to 10° and ensure that both flaps are down equally.

2. Maintain the yoke full aft while taxiing at all times. For training purposes, the "soft field" is assumed to begin from the hold short line.

3. Visually look at WIND SOCK to obtain the latest information about the wind prior to take-off.

4. Visually check for traffic on final for the active runway and for other traffic patterns.

5. Communicate as appropriate: at uncontrolled airport make appropriate traffic advisory call; at a controlled airport, request take-off and read-back the clearance.

6. Taxi the aircraft into position, centered on the runway with the nose wheel straight. Attempt to minimize brake use and do not stop the airplane. Position the flight controls for existing wind conditions.

7. Verify that the HSI heading and magnetic compass heading approximately match the runway heading to confirm proper runway, as assigned or selected.

8. Keep the aircraft moving at a brisk pace while taxiing into position for takeoff.

9. *Smoothly* apply full power, with heels on the floor so as not to hold brakes. Call out "full power." Keep a hand on the throttle in the event an abort becomes necessary.

NOTE: The increased prop wash over the elevator may result in a sudden nose-up tendency if full power is rapidly applied. Ensure smooth application of power is used and carefully adjust the necessary amount of elevator back pressure and prevent a tail strike. Additionally, be prepared for the left-turning tendencies.

10. Check the engine instruments (engine instruments in the green) and call out "engine instruments in the green."

11. Check airspeed tape and call out "airspeed alive."

12. Continue to apply back pressure until the nose wheel comes off the runway. Forward visibility will become minimal. At this point it is important for the pilot to move their eyes toward the left between the instrument panel and the window frame to keep visual sight picture and the aircraft from drifting off the runway. Adjust back pressure to maintain the nose wheel clear of the runway until the aircraft lifts off. At this point, the aircraft is at a minimum flying speed. The pilot needs to slowly adjust pitch downward to accelerate the aircrafts speed and remain in ground effect.

13. If no obstacle:
    a. Establish V_Y pitch attitude (~10°).
    b. Above 65 KIAS, with a positive rate of climb and a safe altitude, announce "Positive Rate, Flaps Up," and retract the flaps.

    c. Climb out at V_Y.

14. To clear obstacle:
    a. Establish a climb attitude (~13°).
    b. Maintain until clear of obstacles.
    c. Once obstacle is cleared, establish V_Y.
    d. Above 65 KIAS, with a positive rate of climb, call out "Positive Rate, Flaps Up," and retract the flaps.

15. Once stabilized in a climb out at V_Y, refer to Section 2.1 for appropriate procedures once airborne.

2.5 Rejected (Aborted) Takeoff

Objective:

To develop recognition of the situations requiring an aborted takeoff and the proficiency to safely perform the maneuver.

Standards:

No ACS specified. Promptly aborts when any engine abnormality or unsafe condition becomes apparent during the takeoff. This may be complete loss of power or partial loss of power (Reduced RPM's). Memory items are rote.

NOTE: Review the Pre-Flight Briefing 1.11 in this manual and Refer to the appropriate Emergency/Abnormal Checklists and be familiar with these ***PRIOR*** to takeoff.

Description:

1. A takeoff shall be rejected any time critical abnormalities are noticed in engine indications, or if any other problem develops that may affect safety of flight.

2. Call out "Abort, Abort" and the nature of the problem: "engine failure", "engine fire," etc.

3. Memory Items:
   • Immediately reduce throttle to idle.
   • Apply braking (as appropriate for the amount of remaining runway ahead) while maintaining directional control with the rudder and continue to apply appropriate aileron for crosswind conditions.

4. Stop the aircraft as soon as possible.

5. When the aircraft is well under control, notify ATC or, if at uncontrolled airport, make the appropriate traffic advisory call.

6. Once the aircraft has stopped complete any appropriate emergency checklist, or the "***After Landing***" checklist, as needed.

7. For training purposes (e.g., aircraft on fire), the following memory items may be *simulated*:
   • Mixture – IDLE CUT-OFF
   • Fuel Selector – OFF
   • Magnetos Switch – OFF
   • Master Switch (ALT and BAT) – OFF • Evacuate the aircraft

2.6 Normal Approach and Landing

Objective:

To gain proficiency in conducting landings under normal conditions.

Standards:

Private: Approach Airspeed +10/-5 knots and landing within 400’ beyond specified point.

Commercial: Approach Airspeed ±5 knots and landing within 200’ beyond specified point.

Description:

1. Verify “***Arrival***” and “***Before Landing***” checklists are complete.
2. Refer to Section 2.1 “Traffic Patterns.”
3. Visually look at Wind Sock to obtain latest wind information.
4. Keep a hand on the throttle throughout the approach and landing in the

event immediate application of power is necessary (e.g., for go-around).

5. Prior to 300’ AGL on final approach, stabilize the airplane on the extended centerline with the final flap setting (30 degrees).
6. Coordinate pitch and power to maintain 65 KIAS and the desired approach angle that will permit landing within the designated area. Slightly higher approach speeds should be used under turbulent air conditions. If gusty conditions are present, increase final approach speed by one half the gust factor.

7. At the appropriate flare altitude (approximately 10-20 feet), slow the descent by raising the pitch attitude and smoothly reducing power to idle so that the airplane settles onto the runway on the main gear.

8. Maintain back pressure on the yoke throughout the landing roll to keep the nose wheel off the runway as long as possible for maximum aerodynamic braking.

9. Slow the airplane to normal taxi speed before leaving the runway centerline. Clear at the first safe taxiway intersection.

NOTE: Always clear at an intersection that will not impose significant side load on the gear (e.g., prevent skidding, losing directional control, etc.). If unable to slow sufficiently and turn, continue on the runway to the next intersection. Never exit onto another runway unless instructed to do so by ATC.

10. Once the airplane is clear of the active runway and stopped, perform the "After Landing" checklist.

PHASES OF LANDING

A safe and successful landing starts with

PHASE 1 – Stabilized Approach

A stabilized approach refers to properly maintaining an angle of descent that will maintain your final approach speed of 65 KIAS. A pilot needs to have the outside "Sight Picture" of this speed with Full Flaps. Should the airspeed become too low, the pilot should make a slight downward pitch adjustment on the horizon to increase their airspeed back to 65 KIAS. Airspeed too fast, a slight upward pitch adjustment on the horizon to decrease the airspeed back to 65 KIAS.

The Aiming Point is how a pilot keeps the approach stable and refers to a preselected visual point on the runway by the pilot to be able to maintain an angle of descent all the way down toward that aiming point. Should the aiming point move upward, the aircraft is becoming too low and the pilot should add some power. Should the aiming point get lower, the aircraft is becoming too high and less power is needed. A pilot should make small power adjustments.

Remember: As the power is added or subtracted, the pitch of the aircraft will also need to be slightly adjusted. A pilot's hands move in two different directions. As power is pushed in (Increased power) with the Right hand, the yoke in the left should pull back. If the power is pulled back (Decreased power) with the Right hand, the yoke in the left should push down. This will help the pilot to maintain a constant airspeed. All movement is slow, methodical and measured on the horizon.

Phase 2 – Round out

Round out refers to the transition from a descent to Straight and Level flight over the runway approximately when the runway starts to expand in your peripheral vision (Half way down tree top level) over the runway and the pilot's selected aim point.

Phase 3 – Round out to Flare

It is during the flare that the aircraft transitions from the straight and level round out attitude to the nose high landing attitude. Remember that during the flare the airspeed is slowing so there is less airflow across the flight controls, so they are becoming slowly less and less effective. The goal here is to transition from a level attitude to a nose high attitude and transfer the weight of the aircraft from the wings to the wheels at the slowest possible speed.

Phase 4 – Touchdown / Go Around

As the aircraft begins its descent from 20 feet above the runway, the pilot eases the yoke back as the aircraft descends. As the plane gets lower, the more backpressure (Elevator) needed until the main landing gear touches down. Conducting a Go-Around from the Flare is called a Balked landing. This procedure should be practiced from the very first landings and regularly for the rest of a pilots training and career. A pilot should ALWAYS plan on the possibility of a Balked landing and always be prepared to conduct this procedure and Go-Around. A Balked landing is an energy management maneuver close to the ground. The pilot is transitioning the aircraft from low airspeed and low power settings in a slow descent to a full power condition at climb airspeed and a climb. The procedure for this is found in the POH Chapter 4.

- Full power
- Flaps retract to 20
- Pitch for 60 KIAS
  From this point the pilot will transition to a normal climb raising flaps to 10 only after the aircraft has demonstrated a positive rate of climb with airspeed increasing past 65. The climb transition will continue to flaps up and Vy airspeed or adapted for any specific climb out situation.

2.7 Crosswind Approach and Landing

Objective:
To develop proficiency in conducting approaches and landings under crosswind conditions.
Standards:
Private: Approach Airspeed +10/-5 knots and landing within 400’ beyond specified point.
Commercial: Approach Airspeed ±5 knots and landing within 200’ beyond specified point.
Description:

1. Refer to Section 2.1 and 2.6 for “Pattern Approach” and “Normal Approach and Landing.”

2. Visually look at Wind Sock to obtain the latest wind information.

NOTE: In strong, gusty wind conditions, flaps 20° may be used for landing. Additionally, expect to perform a “power-on” landing.

3. Coordinate pitch and power so as to maintain 65 KIAS and the desired approach angle that will permit landing within the designated area. Slightly higher approach speeds should be used under turbulent air conditions. If gusty conditions are present, increase final approach speed by one half the gust factor.

4. Use the Wind Correction Angle (crab) method of crosswind correction on final to maintain the extended runway centerline.

5. Use the sideslip method for crosswind correction (See Figure C/D) before transition from approach to round-out. The proper technique will result in a touchdown on the upwind main wheel first, followed by the downwind main wheel and finally the nose wheel with the airplane’s longitudinal axis aligned with the runway. The decision of when to begin the sideslip will depend on the level of proficiency of the pilot. AILERON into the wind controls the aircraft from drifting off the runway. Opposite RUDDER keeps the aircraft’s longitudinal axis parallel with the centerline of the runway. As

the aircraft’s speed slows, controls become less effective so the more controls need to be applied.

6. At the appropriate flare altitude (approximately 10-20 feet), slow the descent by raising the pitch attitude and smoothly reducing power as required for the wind conditions, so that the airplane settles onto the runway on the upwind main wheel first. Continue to move eyes from front to 45-degrees to the left for depth perception.

7. Maintain back pressure on the yoke throughout the landing roll to keep the nose wheel off the runway as long as possible for maximum aerodynamic braking.

8. Maintain crosswind control corrections as necessary to maintain alignment with the runway centerline and prevent lifting of the upwind wing. As the airplane slows down, apply increasing crosswind control (aileron) corrections to overcome the loss of control effectiveness.

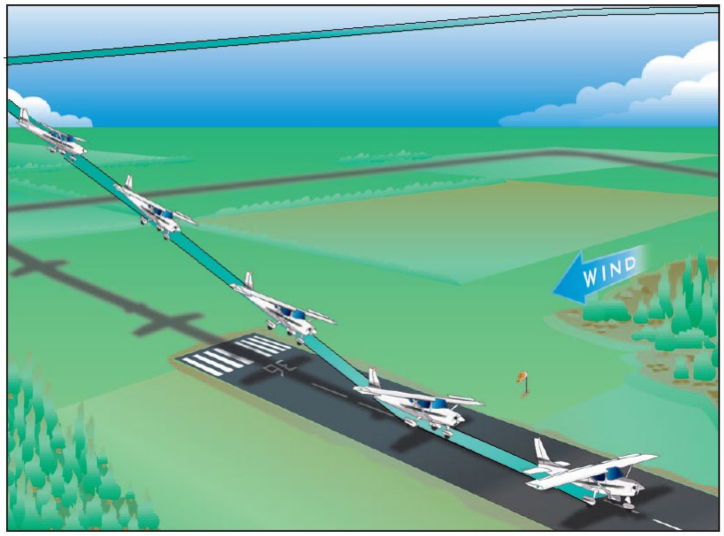
9. Slow the airplane to normal taxi speed before leaving the runway centerline. Clear at the first safe taxiway intersection.

10. Once the airplane is clear of the active runway and stopped, perform the “After Landing Checklist.”

NOTE:
If unable, always clear at an intersection that will not impose significant side load to slow sufficiently and turn, continue on the runway to the next intersection. Never exit onto another runway unless instructed to do so by ATC.

Side slip to Right

Side slip to Left



MANEUVER NOTES

The side slip technique on short final, where the wing is “dipped” into the crosswind and the airplane longitudinal axis is aligned with the runway centerline (using rudder). This is accomplished by holding sufficient aileron pressure to maintain the bank into the wind and *opposite* rudder pressure to keep the nose aligned with the runway.

During the flare, the sideslip is held constant so the upwind wheel touches down first. After this, the next main gear wheel touches down, and finally the nose wheel.

In order to achieve consistency with this maneuver, landing in a “power- on” configuration (approx. 200 RPM above IDLE) will allow the pilot to meter the final touchdown while keeping the aircraft in sideslip. At ~65 KIAS (Vapp).

2.8 Short-Field Approach and Landing

Objective:

To develop proficiency in conducting approaches and landings to short runways, with and without obstacles. Refr: FAA-H 8083-3B Chapter 8

Standards:
Private: Approach Airspeed +10/-5 knots and landing within 200 feet beyond specified point.

Commercial: Approach Airspeed ±5 knots and landing within 100 feet beyond specified point.

Description:

1. A longer final approach is recommended for any short field. This allows the pilot more time to setup, stabilize and control the descent. A final of 1.5 nm or more is recommended for the C172.

2. Visually look at Wind Sock to obtain the latest wind information.

3. Ensure flaps 30° and establish recommended short field landing speed on final approximately 1⁄2 mile from the runway. Slightly higher approach speeds should be used under turbulent air conditions. If gusty conditions are present, increase final approach speed by one half the gust factor.

NOTE: Refer to POH for airplane specific approach speed

4. Adjust pitch and power for the desired airspeed and approach angle that will permit landing within the designated area.

5. Upon obstruction clearance, initiate a power reduction (Remember when power is reduced, the nose must be lowered to maintain a constant airspeed). Start the round out and flare so as to arrive at the power-off stall attitude with the throttle reaching idle just prior to touchdown.

6. Immediately upon touchdown, throttle closed, retract the flaps and apply brakes to minimize the after-landing roll. Stop the airplane within the shortest possible distance consistent with safety and controllability.

NOTE: Brakes must **only** be applied after the flaps have begun retracting. At initial touchdown, the weight of the aircraft is being supported by the wings not on the wheels. Therefore, as the weight transfer to the wheels, brake application must start soft and then gradually increase to moderate and then firm brake pressure to prevent from locking up the tires. Applying firm brakes too soon will result in skidding the aircraft. A pilot should always evaluate how much remaining runway is available and brake accordingly.

7. Maintain directional control and crosswind correction with appropriate rudder and aileron input.

8. Once the airplane is clear of the active runway and stopped, perform the "After Landing" checklist.

MANEUVER NOTES

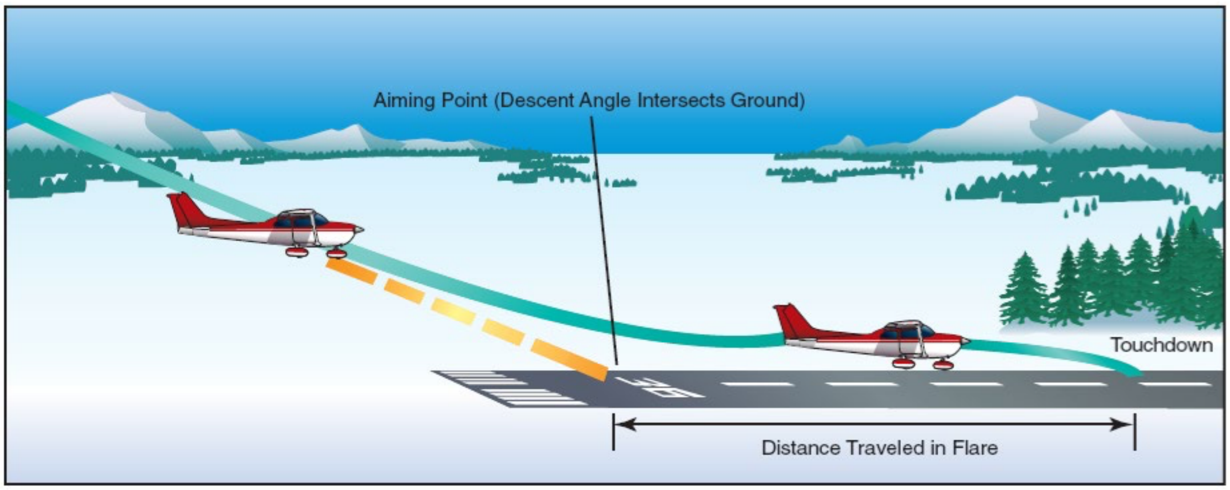
The **"Aiming Point" technique** calls for the pilot to plan the approach to a specific **aiming point** on the runway understanding that a certain amount of float will occur during round out and flare and that the aircraft will touchdown on the runway at some undetermined point beyond the aiming point. With this technique the pilot knows an approximate float distance and that there is plenty of runway available beyond the aiming point.

The **"Landing Point" technique** calls for the pilot to plan the approach to a specific touchdown or **landing point** on the runway understanding that a certain amount of float will occur during round out and flare and so as a result the aiming point must be moved to a point in the approach path ***prior*** to the spot of touchdown. With this technique the pilot knows an approximate float distance and so moves the aiming point that far ahead of the touchdown or Landing point.

On every round out, flare, and landing, the aircraft will experience some "float" in ground effect as depicted above. To touchdown on a specific point, the pilot will need to aim at another point sufficiently **prior** to the desired landing point to compensate for this float.

All conditions being equal (descent angle correct and on the proper approach speed), the biggest factor that will determine how far an airplane will float is the headwind component. *Higher* headwind components will result in a *shorter* float distance. *Lower* headwind components will result in a *longer* float distance.

The pilot must select a suitable aiming point **before** the desired landing point commensurate with the headwind component. Proper application of the "Landing Point" technique will allow the airplane to land safely at the proper flare attitude on or just beyond the desired landing point.



NOTE: While conditions and pilot technique will vary, the following values can be used as references when determining how far prior from the landing point the aiming point should be.

"Light" headwind component (0 – 5 knots) → Aim 300 feet before "Moderate" headwind component (5 – 15 knots) → Aim 200 feet before "Strong" headwind component (more than 15 knots) → Aim 100 feet before

2.9 Soft-Field Approach and Landing

Objective:

To develop proficiency in conducting approaches and landings on soft runways, with or without obstacles and touching down at slowest possible speed. FAA-H 8083-3B Chapter 8

Standards:

Private: Approach Airspeed +10/-5 knots

Commercial: Approach Airspeed ±5 knots

Description:

1. Refer to Section 2.1 “Pattern Approach” and 2.6 “Normal Approach and Landing.”

2. Visually look at Wind Sock to obtain the latest wind information.

3. Ensure full flaps (30°) and establish 65 KIAS on final approximately 1⁄2 mile from the runway. Slightly higher approach speeds should be used under turbulent air conditions. Wind conditions may warrant the use of a lower flap setting. If gusty conditions are present, increase final approach speed by one half the gust factor.

4. Adjust pitch and power for the desired airspeed and approach angle.

5. Use power as necessary throughout the flare so as to touchdown at minimum speed, in a nose-high pitch attitude. Approximately 200 RPM above IDLE is recommended to help control the final touchdown.

NOTE: The aircraft should land in a “power-on” condition, unless otherwise required for safety or performance at **slowest possible speed**. This power, approx. 200 RPM above IDLE, is to help the pilot meter the final touchdown. The final approach speed of 65 KIAS is to help minimize the float which will be experienced by landing with power slightly above IDLE.

At normal approach speeds, IDLE is approximately 1000 RPM, thus expect to use 1100 to 1200 RPM as the reference for this power setting.

6. During the landing roll-out, maintain back pressure on the yoke to keep the nose wheel off the ground until it can no longer aerodynamically be held off the field surface; at that time, it should be gently lowered.

7. Maintain directional control and crosswind correction with appropriate rudder and aileron input.

8. Avoid the use of brakes, and use power, if necessary, when taxiing on soft fields.

9. Slow the airplane to normal taxi speed before leaving the runway.

10. Once the airplane is clear of the active runway and stopped, perform the "After Landing" checklist.

11. Maintain full back elevator at all times the airplane is moving or taxiing on soft fields.

MANEUVER NOTES

The use of approximately 200 RPM of power is to allow the aircraft to gently lower onto the runway at a slower rate of descent at the slowest possible speed.

As the nose is raised on the landing, forward visual references will be reduced. It becomes even more important for the pilot to move their eyes from the front to the 45-degree point between the instrument panel and the window frame. This gives the pilot better depth perception.

After the main gear touchdown, holding the nose wheel up off the runway is very important to keep the weight of the aircraft on the wings and the nose from digging into the soft runway. As the aircraft slows down, the elevator control becomes less effective so the pilot needs to slowly pull the yoke back till hitting the stops and the nose will slowly go down. As the aircraft slows, the weight of the aircraft will come off the wings and onto the wheels.

Do your best not to stop on a soft filed as it becomes difficult to get the aircraft moving again. Momentum is your friend when taxiing on a soft field.

On an actual Soft Field during take-off roll or landing roll, the pilot will hear a lot of noise the gear makes against the uneven ground. This is something not experienced on a paved runway practicing Soft Field procedures. On an actual Soft Field the pilot will hear when the airplane is airborne as well as the feel the difference in the aircraft once airborne.

2.10 No-Flap Approach and Landing

Objective:

A No-Flap approach and landing is not an explicit maneuver required pursuant to the Private Pilot PTS. Many Designated Pilot Examiners require demonstration of a No-Flap approach and landing as the logical result of “Systems and Equipment Malfunctions” outlined in the appropriate ACS. Remember, when the aircraft is operating on the “Essential Bus”, the Flaps are ***not on*** the “Essential Bus”.

Standards:

No specific ACS prescribed. The following will be used as the general guideline:

Private: Approach Airspeed +10/-5 knots, touchdown within first 1/3 (one-third) of runway

Commercial: Approach Airspeed ±5 knots, touchdown within first 1/3 (one-third) of runway

Description:

1. Ensure “Descent” and “Before Landing” checklists are complete.
2. Refer to Section 2.1 for appropriate pattern entry.
3. Visually look at Wind Sock to obtain the latest wind information.
4. Abeam the touchdown point, reduce the power to approximately 1300 RPM and establish an 85 KIAS decent.

NOTE: Approximately 200 RPM less than the normal power setting of 1500 RPM is necessary due to the lack of drag produced by extended flaps.

5. Commence a turn to the base leg when approximately 45° from the approach end of the runway (unless otherwise dictated by traffic or ATC). Make appropriate traffic advisory call (uncontrolled airport).
6. On the base leg, coordinate pitch and power to continue descending at approximately 75 KIAS and the desired approach angle.

7. Visually clear the final approach path prior to commencing the turn to final, and then commence your turn so as to rollout on final with the aircraft aligned with the landing runway centerline. Make appropriate traffic advisory call (uncontrolled airport).

8. On final, coordinate the pitch and power to maintain the desired airspeed (70 KIAS + 1⁄2 gust factor, as needed) and approach path angle.

9. During a No-Flap approach, the pitch attitude will be closer to level, pilots say “flatter”, than during a full flap approach where the pitch attitude is 2 to 5 degrees down. This is due to change in chord line.

10. The fully developed flare attitude immediately before touch down **is the same** as with flaps.

11. The approach angle to the runway **is the same** as with flaps.

12. Prior to 300’ AGL on final approach, stabilize the airplane on the extended centerline.

13. At the appropriate flare altitude (approximately 10-20 feet), slow the descent by raising the pitch attitude and smoothly reducing power to idle so that the airplane settles onto the runway on the main gear.

14. Maintain back pressure on the yoke throughout the landing roll to keep the nose wheel off the runway as long as possible for maximum aerodynamic braking.

15. Slow the airplane to normal taxi speed before leaving the runway centerline.

16. Once the airplane is clear of the active runway and stopped, perform the “After Landing” checklist.

2.11 Go-Around/Rejected Landing

Objective:

To develop proficiency in determining situations warranting a go-around and timely, prompt execution.

Standards:

Private: Initially V_X or V_Y (as appropriate) +10/-5 knots, then V_Y during climb-out +10/-5 knots

Commercial: Initially V_X or V_Y (as appropriate) +10/-5 knots, then V_Y during climb-out ±5 knots

Description:

1. Upon making a go-around decision, simultaneously apply takeoff power (full power), call out "Go-Around, Full Power" and establish a V_Y pitch up attitude Sight Picture. (approx. 10°).
2. When a positive rate of climb is established, call out "Positive Rate, Flaps 20," and retract (or confirm) wing flaps to 20°.
3. Pitch for 60 KIAS.
4. Inform ATC of the Go-Around or at a non-towered airport, make appropriate traffic advisory call.
5. At a safe altitude, retract the remaining flaps in two separate 10° increments as follows:

    A. Confirm airspeed above 60 KIAS call out "Above 60, Flaps 10," and set flaps to 10°

    B. Continue climbing, confirm airspeed above 65 KIAS, call out "Above 65, Flaps Up," and set flaps to 0°

6. Establish and maintain V_Y Sight Picture, and refer to Section 2.1 to commence appropriate traffic pattern.

7. If no other aircraft is on the runway or taking off, climb straight-out while tracking the runway centerline. If an aircraft is on the runway or taking off, alter course to the right while climbing (or as directed by ATC if at an airport with an operating control tower). Keep the departing aircraft in sight at all times, maneuvering to remain clear.

NOTE: When operating at an airport with parallel runways, **do not** alter course toward the parallel runway unless authorized by ATC to do so.

2.12 Emergency Approach and Landing (Engine failure in the traffic pattern)

Objective:

To develop proficiency in maneuvering the aircraft for landing with complete loss of engine power from the downwind position of the traffic pattern.

Standards:

Best glide airspeed ±10 knots. Establish appropriate track to manage descent to runway, and touches down within first 1/3 (one-third) of available runway. Memory items must be rote.

Description:

The engine failure is simulated by retarding the throttle to IDLE abeam the intended touchdown point in the traffic pattern.

1. Establish best glide attitude and airspeed. Use nose-up trim to assist. Maintain altitude if airspeed is above best glide speed (V_{BG}) when engine is simulated failed with propeller windmilling. This will allow the aircraft to slow to its minimum drag airspeed, V_{BG}, and preserve altitude at the same time.

NOTE: The rule of thumb for adjusting glide speed is V_{BG} + 50% of Headwind Component.
For Example: The pilot determines there is approximately 15kts of headwind on the final approach. The glide speed used will be 65 + 7 = 72 KIAS.

2. See the figure on the next page. Begin the turn to a modified base taking into account:

- Wind speed and direction
- Altitude
- Distance from runway

NOTE: A modified base is defined as the turn prior to the final approach but having a non-standard angle or distance from the runway. This term ("modified base") is used to describe a base leg that is altered from the standard base leg technique so the aircraft can glide to the runway.

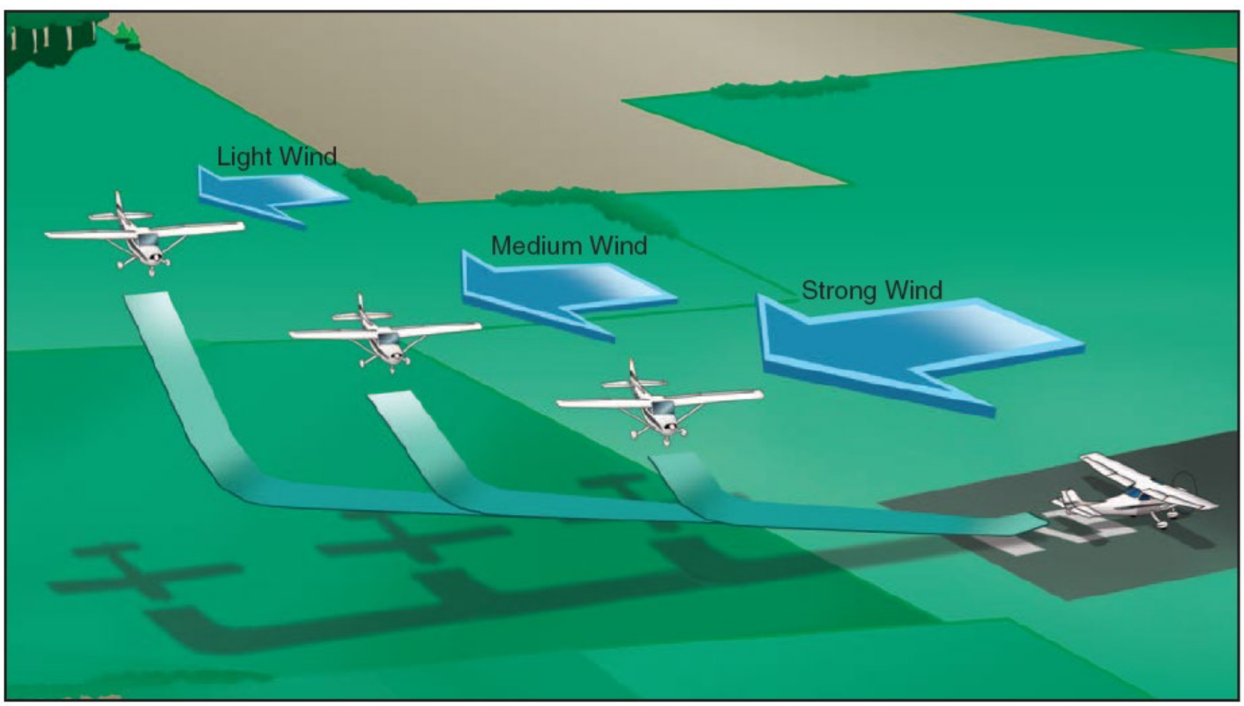
3. Once established on a modified base, evaluate the position and altitude of the aircraft and adjust the ground track and aircraft configuration (flaps and forward slip, as necessary) to manage descent.

4. If low, proceed directly to the runway without extending flaps.

5. If high, extend flaps before attempting a forward slip.

6. When the landing is assured, extend the flaps as desired and conduct a normal landing.

NOTE: When operating at a controlled airport, the student or instructor needs to request a "Short Approach" with sufficient notice to ATC when performing this maneuver. This request is recommended *prior* to the downwind leg.



MANEUVER NOTES:

Plan a modified base leg for the existing wind. Assuming a normal pattern distance and altitude:
With light winds, turn base slightly later to allow more distance for the descent.

With stronger wings, turn early or immediately after establishing V_G because the headwind on final will drastically reduce the glide distance.

Once the landing is **assured**, extend flaps as appropriate.

The intended glide speed should be adjusted for the strength of the headwind component on the final. Stronger headwinds will require an increase in V_G to compensate for the slower groundspeed, whereas light headwinds will require little or no increase in V_G.

The turn to the modified base should also be initiated based upon the headwinds on the final. Stronger headwinds will require an early turn, whereas light or calm winds will require a slightly delayed turn. It must be noted that the **turn is always sooner** than the normal base leg turn

2.13 Forward Slips to Landing

Objective:

To develop the ability to dissipate altitude without increasing airspeed.

Standards:
No specific ACS prescribed. The following will be used as the general guideline:

Private & Commercial: Approach Airspeed +10/-5 knots, touchdown within 400 feet of a specified point.

Description:

1. Visually look at the Wind Sock to obtain the latest wind information.
2. Establish final approach speed and configuration + 10 knots.
3. Reduce the power to idle.
4. Lower the appropriate wing (***into*** the wind if a crosswind exists) simultaneously yawing the airplane in the opposite direction with ***full*** rudder using the fuselage to create a lot of drag.
5. In the C172 any flap setting from 0 to 30 is acceptable and is at the discretion of the pilot based upon conditions.
6. Maintain the flight path down the runway centerline or extended centerline throughout the slip by use of aileron.
7. Adjust pitch to maintain airspeed. Airspeed will indicate higher than actual when slipping away from the static source and lower than actual when slipping towards the static source. For simplicity sake, maintain a ***minimum*** indicated airspeed of 60 KIAS during this maneuver.
8. Discontinue the forward slip by leveling the wings and simultaneously returning rudder to neutral. Realign the longitudinal axis of the airplane with the centerline of the runway.
9. Adjust the pitch to maintain the normal glide attitude towards the runway.

NOTE: If the forward slip was specifically requested, this should be performed to a normal landing unless otherwise instructed. If the forward slip was necessary to salvage a very high descent angle, plan to perform the landing originally requested (i.e. short-field landing, soft-field landing, no- flap landing, etc.) If the landing cannot be completed safely, perform a go- around.

Section 3 Flight Maneuvers

3.1 Before Maneuver Checklist ("ABC Checklist")

Objective:

To ensure that the airplane is properly configured and the area is clear of traffic for safe operation prior to any maneuvering.

Standards:

This checklist must be accomplished prior to the start of ***any*** maneuver.

Description:

1. **A**ltitude: Select an appropriate altitude that will allow recovery as designated in ACS. Establish **A**irspeed if needed for maneuver.

2. **B**efore Maneuver Checklist: Ensure that the airplane is properly configured for safe operation.

    A. Verify that the Fuel Selector Valve is in the BOTH position.

    B. Verify Mixture Control set as appropriate for the altitude.

NOTE: The Cessna 172 POH recommends performing flight maneuvers with the mixture leaned appropriately. This will result in 5% or better fuel consumption savings and will help **prevent spark plug fouling**.

c. Verify that the beacon and strobe lights are ON.

NOTE: In accordance with the FAA's "Operation: Lights On" program, turn on the landing/taxi/nav lights to enhance see-and-avoid in the practice area.

- Ensure seat belts and shoulder harness secured.
- Ensure that you have a suitable off airport landing site in mind if needed.
- **B**efore Maneuver set up. Properly set up the maneuver before beginning.

3. **C**learing Turns: Determine the airspace immediately surrounding the aircraft is clear of other traffic.

a. Make appropriate advisory radio **C**all.

NOTE: When performing maneuvers in the South Practice Area, announce position/intentions on 123.5 periodically. If maneuvering in the North Practice Area, announce position/intentions on 122.85. See EB Flight Training's Flight Operations Manual (FOM) for additional information on designated practice areas.

3.2 Clearing Turns

Objective:
To determine the airspace immediately surrounding the aircraft is clear of other traffic before the start of any maneuver.

Standards:
Must be executed before maneuvering if the area has not been confirmed clear.

Description:
Clearing Turns are a series of Two 90 Degree turns. Visually scan the area to the left, right and behind where the aircraft will be during the execution of the training maneuver.

NOTE: The most important place to clear is the area that will ***be behind you*** during the procedure of the maneuver. You cannot see behind you during the maneuver.

1. Establish an airspeed of 95 KIAS.

2. Pick a Reference Point off the Wing Tip (landmark) in order to turn 90 Degrees.

3. Slightly raise the wing of the intended turn direction before turning.

4. Enter a medium banked turn in either direction. Use approximately 30° to ensure a manageable turn radius.
   (When the strut is parallel to the ground, an approximate 30-degree bank has been obtained).

5. Continuously scan the area above, below, and ahead of the flight path during the turn.

6. Roll to wings level (on the reference point) after a 90° turn has been completed. Remember to now clear the area that will be behind you prior to beginning second turn.

7. Begin the Second turn by Picking a Reference Point (landmark) off the Wing Tip and repeat the process.

8. During the Second turn, should the maneuver require a Power Reduction (such as Stalls, Slow Flight), this Power Reduction should be made during the Second Turn to set up the reduced speed for the upcoming maneuver.

9. Upon completing the turns and determining that the airspace is clear, immediately begin the specified maneuver.

NOTE: Student pilots who are “Acting-as-PIC” or actual-PIC must initiate clearing turns, when appropriate, without the specific request of the DPE or instructor. Only omit a clearing turn if the instructor or DPE specifically requests.

3.3 Positive Exchange of Flight Controls

Objective:

To provide guidance for all pilots, especially student pilots and flight instructors, on the procedure to be used for positive exchange of flight controls between pilots when operating an aircraft.

Standards:

This procedure must be executed anytime the flight controls are exchanged between pilots.

Description:

1. Anytime there is to be an exchange in flight controls:

- The pilot operating the flight controls will state "You have the flight controls."
- The pilot taking control will respond with "I have the flight controls."
- The pilot giving up control of the aircraft will confirm: "You have the flight controls."
- The pilot giving up control of the aircraft will then **visually verify** the other pilot has physically taken the flight controls.

2. During any flight there must always be a clear understanding between the pilots of who has control of the aircraft. Prior to a flight, a briefing should be conducted that includes the procedure for the exchange of flight controls. During this procedure, a visual check is recommended to see that the other person actually has the flight controls. There should never be any doubt as to who is flying the aircraft.

NOTE: If an instructor or DPE takes control of the aircraft for any reason, he will initiate the acquisition of controls by saying, "My flight controls." In this case, steps "a" through "d" above still apply.

3.4 Maneuvering During Slow Flight

Objective:

To recognize the changes in aircraft flight characteristics and control effectiveness at critically slow airspeeds in various configurations.

Standards:

Private: Stall Horn +10/-0 knots; Altitude ±100 feet of specified altitude; Heading ±10° of specified heading; Bank ±10° of specified bank angle.

Commercial: Stall Horn +5/-0 knots; Altitude ±50 feet of specified altitude; Heading ±10° of specified heading; Bank ±5° of specified bank angle.

NOTE: For training purposes, since the stall warning horn is "designed to sound 5-10 knots above a STALL in all conditions" as per Cessna 172 POH, this maneuver should be executed just above the stall warning horn. Should the stall warning go off, the nose of the aircraft should be lowered.

Description:

Clean Configuration "Slow Flight Clean"

1. 1. Perform the "A–B–C" checklist (See Section 3.1) and select at altitude that would allow recovery no lower than 1,500 AGL:
2. Entering the last 90 degree clearing turn, reduce power to 1500 RPM and smoothly increase pitch to maintain altitude as airspeed decreases.
3. Maintain Heading and Altitude as the airspeed decreases.
4. Decrease airspeed until the stall warning horn sounds, adjust power for level flight. Maintain 2 knots above the stall warning horn airspeed.
5. Avoid abrupt changes in pitch, bank and power.
6. ***Perform straight and level, turns, climbs and descents using relatively shallow bank angles while maintaining 2 knots above the stall warning horn. Unless otherwise specified, use 10° - 15° of bank.***

7. Initiate recovery by smoothly applying full power, and adjusting the pitch to maintain altitude as airspeed increases.

8. Throughout the recovery re-trim as necessary to compensate for changes in control pressures.

9. Resume normal cruise (RPM to maintain 95 KIAS), or specified airspeed.

Landing Configuration “Slow Flight Dirty”

1. Perform the “A–B–C” checklist (See Section 3.1) and select an altitude that would allow recovery no lower than 1,500 AGL

2. Entering the last 90 degree clearing turn, reduce power to 1500 RPM and smoothly increase pitch to maintain altitude as airspeed decreases.

3. Maintain Heading and Altitude as the airspeed decreases

4. As airspeed decreases to the flap operating range (V_{FE10°,V_{FE20°, V_{FE30°), extend flaps in increments of 10° to full flaps, or as specified. Re-trim as necessary to compensate for changes in control pressures.

5. Decrease airspeed until the stall warning horn sounds, adjust power for level flight. Maintain 2 knots above the stall warning horn airspeed.

6. Avoid abrupt changes in pitch, bank, and power.

7. Perform straight and level, turns, climbs and descents using bank angles of 10 - 15° while maintaining airspeed.

8. Initiate recovery by smoothly applying full power and retracting the flaps to 20° while adjusting the pitch to maintain altitude.

9. As airspeed increases above 60, set flaps to 10° and establish a pitch attitude to maintain altitude.

10. Above 65 KIAS retract flaps to the full up position.

11. Throughout the recovery re-trim as necessary to compensate for changes in control pressures.

12. Resume normal cruise airspeed specified.

If at any point during the slow flight maneuver the stall warning horn activates, immediately lower the nose just enough to accelerate the aircraft until the warning horn silences.

NOTE: The DPE may request the student to *transition* from Slow Flight “Clean” into the Power-On Stall or from Slow Flight “Dirty” into the Power- Off Stall maneuver to expedite the examination. Students should therefore practice these transitions.

MANEUVER NOTES:

As the airspeed of the aircraft is reduced, the airflow over the Flight Controls is also reduced. Additional amount of aileron control movement is necessary to move the aircraft left or right.

The elevator and rudder are also slow to move the aircraft. The aircraft seems to waddle through the sky in this configuration. Remember, the Sight Picture and feel of this aircraft in slow flight is the way the aircraft will feel when touching down on landing.

The forward visibility will be at a minimum so the pilot needs to look 45 degrees to the left between the instrument panel and window frame to keep reference to the horizon and maintain a good sight picture. Climb or descents are made by adding or subtracting power.

3.5 Power-On Stalls; Imminent and Full

Objective:

To recognize the indications of an imminent or full stall during a power-on situation [takeoff/departure (short field takeoff) scenario] and to make prompt, positive recoveries with minimum loss of altitude while maintaining coordinated flight.

Standards:

Demonstrates proper recovery procedure; Maintains coordinated flight; Avoids secondary stalls and spins; Recovers with minimal altitude loss.

Private: Proceed to a fully developed stall. Heading ±10° or specified bank ≤20° within ±10°;

Commercial: Recover at the first indication of a stall (Stall Warning, Buffet), or a fully developed stall as specified by the check pilot or DPE. This stall may be performed with <65% Power to make sure the pilot will increase the power to full upon recovery. Heading ±10° or specified bank ≤20° within ±10°;

Description:

1. Perform the“A–B–C”checklist (see Section3.1) and select at altitude that would allow recovery no lower than 1,500 AGL

2. Reduce power to 1500 RPM and smoothly increase pitch to maintain altitude as airspeed decreases.

3. Maintain Heading and Altitude as the airspeed decreases. As the nose is raised and forward visibility is reduced, a pilot’s eyes need to move 45 degrees to the left (between the instrument panel and window frame). Pick a reference point and keep that point in one place with the rudder unless making a turning stall.

4. As airspeed approaches normal liftoff speed (~55KIAS), smoothly apply full power while increasing the pitch. Establish a bank angle up to 20°, if designated, in either direction. The DPE will specify level or a turning stall. If performing a turning stall, do not exceed 20° bank.

5. Announce the on set of the stall (Call out "Stalling") and initiate recovery when:

   A. Imminent stall: The first buffet or rapid decay of control effectiveness is experienced.
   NOTE: A stalled aircraft will roll in the direction of the rudder. Control aircraft roll by proper use of the rudder.

   B. Full Stall: The aircraft elevators are held full aft against the control stops and the built in longitudinal stability of the aircraft pitches the nose down.

NOTE: The C172 has wing washout so the ailerons are minimally effective at high angles of attack. AILERONS should be neutral as you stall the aircraft.

6. Recover by simultaneously verifying full power, promptly decreasing the angle of attack (Sight picture should be at or slightly below the horizon), and leveling the wings (opposite Rudder), if appropriate.

7. Establish a pitch attitude to minimize altitude loss (~V_X attitude) and establish a positive rate of climb.

8. When a positive rate of climb has been established, accelerate to V_X (with simulated obstacles) or V_Y (without simulated obstacles), or as specified.

9. Level off at assigned/desired altitude. Resume normal cruise.

MANEUVER NOTES:

Power-On Stall – As you can see, the forward visibility has no visual reference, so the pilot's eyes need to be moved between the Instrument Panel and Window Frame to keep visual reference to the Horizon.

Sometimes, a pilot is told to look at a cloud straight ahead (WRONG)! There are not always clouds in the sky, but there is always a reference to the left, looking at the horizon.

Teach yourself, anytime the nose is high, and forward visibility is greatly reduced, look to the left between the instrument panel and window frame to maintain your sight picture.

3.6 Power-Off Stalls; Imminent and Full

Objective:

To recognize the indications of an imminent or full stall during a power off situation (approach/landing scenario) and to make prompt, positive recoveries with minimum loss of altitude while maintaining coordinated flight.

Standards:

Private: Heading ±10° or specified bank ≤20° within ±10°; Demonstrates proper recovery procedure; Maintains coordinated flight; Avoids secondary stalls/spins; Recovers with minimal altitude loss.

Commercial: Heading ±10° or specified bank ≤20° within ±5°; Demonstrates proper recovery procedure; Maintains coordinated flight; Avoids secondary stalls/spins; Recovers with minimal altitude loss.

Description:

1. 1. Perform the “A–B–C” checklist (See Section 3.1) and select at altitude that would allow recovery no lower than 1,500 AGL:
2. Reduce power to 1500 RPM and smoothly increase pitch to maintain altitude as airspeed decreases.
3. Maintain Heading and Altitude as the airspeed decreases. As the nose is raised and forward visibility is reduced, a pilot’s eyes need to move 45 degrees to the left (between the instrument panel and window frame). Pick a reference point and keep that point in one place with the rudder unless making a turning stall.
4. As the airspeed decreases, set flaps to 10° below V_{FE10°, and then incrementally flaps to 30° below V_{FE20°/V_{FE30°.
5. Maintain altitude until reaching 65 KIAS; then establish a trimmed descent at 65 KIAS to simulate a final approach to a landing runway.
6. After commencing a normal approach descent, descend approximately 100 feet or to an assigned altitude. Then reduce power to idle and continuously

increase the pitch as required to maintain altitude (simulation of round-out/ flare).

7. Announce onset of the stall (Call out "Stalling") and initiate recovery when:

- Imminent stall: The first buffet or rapid decay of control effectiveness is experienced.

NOTE: A stalled aircraft will roll in the direction of the rudder. Control aircraft roll by proper use of the rudder.

NOTE: The C172 has wing washout so the ailerons are minimally effective at high angles of attack. AILERONS should be neutral as you stall the aircraft.

- Full Stall: The aircraft elevators are held full aft against the control stops and the built-in longitudinal stability of the aircraft pitches the nose down.

8. Recover by promptly decreasing the angle of attack (to or SLIGHTLY below the horizon), leveling the wings (use Opposite RUDDER to keep wings level), if appropriate, and applying full throttle while attempting to minimize loss of altitude.

9. After full power is established with an appropriate pitch attitude, set flaps 20°.

NOTE: The pitch attitude should not be excessively low in order to minimize altitude loss. Level attitude or slightly below the horizon is all that should be required to recover from the stall.

10. Establish a pitch attitude to begin a controlled climb.

11. With a positive rate of climb, set flaps 10° and maintain positive pitch attitude to a safe altitude.

12. Above 65 KIAS retract flaps and return to altitude, heading, and airspeed specified.

13. Resume normal cruise, or as specified.

MANEUVER NOTES:

Power-Off Stall – As you can see, forward visibility has no visual reference, so the pilot's eyes need to be moved between the Instrument Panel and Window Frame to keep visual reference to the Horizon.

Sometimes, a pilot is told to look at a cloud straight ahead (WRONG)!

There are not always clouds in the sky, but there is always a reference to the left, looking at the horizon.

3.7 Steep Turns

Objective:

To develop smoothness, coordination, orientation, division of attention, and control techniques while executing high performance turns. To allow the pilot to feel the requirement for opposite aileron and the feeling of higher g-loads in high performance turns.

Standards:
Private: Airspeed ±10 knots; Altitude ±100 feet; Bank 45° ±5°; Heading ±10° of entry heading.

Commercial: Airspeed ±10 knots; Altitude ±100 feet; Bank 50° ±5°; Heading ±10° of entry heading.

NOTE: Always select an airspeed below V_A appropriate to the aircraft's weight. The Cessna 172 POH specifies 95 KIAS for Steep Turns in the Normal and Utility Categories.

Description:

1. Perform the "A–B–C" checklist (Section 3.1) and select at altitude that would allow recovery no lower than 1,500 AGL.

2. *Stabilize the aircraft in level cruise flight at 95 KIAS (approximately 2200 RPM, depending on aircraft). Select a **prominent** visual reference point.*

3. Smoothly roll the aircraft into a Coordinated 45° bank turn (50° for Commercial).

4. As the bank steepens, adjust back pressure to maintain constant altitude (increase pitch ~1-3°) and apply power to maintain airspeed of 90 KIAS.

NOTE: If desired, trim the pressure off your hand to assist with elevator control. In the Cessna 172, under most flight conditions ~2 turns of trim are recommended to maintain pitch attitude in the bank. Always trim to feel!

5. Maintain constant bank angle, altitude and airspeed during the turn.

6. This is a visual maneuver. Maintain a constant vigilance for traffic and continue to clear the area for the second turn.

7. Roll-out:
   a. Before the desired heading/reference point (~20° prior), initiate a smooth, coordinated roll-out to level flight.
   b. Relax back pressure used to maintain altitude during turns. If using trim, smoothly take out the same amount of trim to prevent the nose from rising rapidly or apply firm forward pressure to maintain level flight.
   c. Reduce power setting to entry setting

8. After clearing the airspace during rollout, immediately initiate a 360° turn in the opposite direction or as specified.

NOTE: Private applicants are permitted to complete the first turn, re- stabilize in level flight and then proceed with the second turn. Commercial applicants must transition immediately to the second turn.

9. After completion of the second turn, roll-out as described in step 7 above.

10. Return to straight and level at cruise.

MANEUVER NOTES:

If a pilot learns to keep the Longitudinal or Roll Axis (Runs from the Tail of the aircraft, to the Nose Spinner) on the Horizon, a pilot will be able to do perfect Steep Turns in any aircraft (172, Seminole, 737). In the pilot's mind, the Longitudinal Axis needs to be extended from the spinner of the aircraft out to the Horizon, like a Laser Beam making a RED DOT on the horizon. The pilot needs to imagine that red dot moving up when the pilot pulls up the nose, or goes down below the horizon when the pilot relaxes the back pressure too much.

As the pilot starts a coordinated turn to the left (Left Aileron-Left Rudder), control that imaginary RED DOT, keeping it on the horizon during the roll. Around 30 degrees of bank (Wing Strut parallel with the ground), a pilot will find a need for back pressure on the yoke (Elevator) to keep the nose from dropping. (Some pilots like to trim the aircraft at this point, but remember, the more you trim back, the more forward pressure a pilot will need when they roll the aircraft back to straight and level).

ROLL OUT – Approximately 20 Degrees (half the angle of bank), the pilot needs to begin their roll out of this maneuver. Their eyes should be focused on the visual point they picked on the horizon when they rolled in. Remember, the pilot has a lot of back pressure (elevator) so as the roll out begins, the pilot needs to keep that RED DOT on the horizon by adding forward pressure on the roll out. The more a pilot trims the nose up, the more forward pressure is required.

Imagine a RED DOT on the horizon like a Laser Beam coming off the Longitudinal Axis (Roll Axis). Control that red dot, keeping it on the horizon and a pilot's steep turns will be successful.

Remember: in this picture, the pilot is sitting below the horizon as the aircraft rotates on the Longitudinal Axis, which is the reference point (Red Dot) should be on the horizon.

3.8 Emergency Descent

Objective:

To develop the awareness of situations requiring a rapid loss of altitude and the smooth, safe execution of an emergency descent while maintaining positive load factors.

Standards:

Private: Establishes appropriate configuration and descent airspeed, use bank angle between 30 and 45 degrees to maintain at all times positive load factors. Airspeed +0/-10 Knots, level off at specified altitude ±100 feet.

Commercial: Establishes appropriate configuration and descent airspeed, use bank angle between 40 and 45 degrees to maintain at all times positive load factor. Airspeed +0/-10 knots, and levels off at specified altitude ±100 feet.

NOTE: Recovery altitude will be specified by the DPE or Check Ride Examiner. Be sure you know the altitude prior to beginning this maneuver

Description:

1. Simultaneously reduce throttle to IDLE and roll the aircraft using 45° bank toward a reference point to the left or right, approximately off the wingtip.

2. As bank increases, allow nose to drop. Use -5° pitch as an initial reference. Maintain a positive load factor.

3. Roll out towards the reference point, keeping the nose low to establish and maintain 95 KIAS.

4. As appropriate, perform shallow S-turns to scan for traffic ahead of and below the aircraft.

5. Recovery: If simulating engine fire:
   When the simulated fire is “extinguished” (by the instructor or DPE verbally announcing it) (or approximately 1,000’ AGL), begin a smooth level off for landing procedures.

- Hold the present altitude and allow airspeed to bleed off to V_G. Trim the aircraft to help maintain best glide speed.

- Execute a forced landing. Refer to Section 3. Emergency Approach and Landing (Engine failure in cruise flight) maneuver.

If descending to a specified altitude (not simulating a fire)

a. Approximately 100 – 200 feet above the specified altitude, begin a smooth level off to maintain the altitude.
b. Add power to normal cruise, to maintain 95 KIAS, or as specified.

MANEUVER NOTES:
There are THREE **primary scenarios** for an emergency descent in the Cessna 172:

First, to lose altitude to get beneath a cloud deck. Getting beneath the cloud deck does not necessarily require an immediate landing.

Second, an in-flight fire. A fire in flight does imply the need to plan for an immediate landing.

Third, to descend in the case of a passenger becomes hypoxic. This rapid descent will allow for more oxygen rich air to enter the cabin and treat the hypoxia.

Private and Commercial ACS **do not specifically** require the applicant to perform an Emergency Descent to a forced landing (Emergency Approach and Landing). However, applicants should be prepared to continue from an Emergency Descent to the Emergency Approach and Landing. If the instructor or DPE wishes to combine these maneuvers, the initial starting altitude should be high enough to allow time to transition from one to the other.

If simulating a descent to a specific altitude, recovery should be no lower than 1500’ AGL.

If simulating an off-airport landing, simulated fire should be out prior to the Low Key Point to begin the landing sequence. Simulated Off-Airport Landings should not go below 500’ AGL. Remember to ***CONTINUOUSLY CLEAR*** the engine (short burst of power with the throttle) during this power off descent.

3.9 Emergency Approach and Landing – Off Airport Landing

Objective:

To develop proficiency in maneuvering the aircraft for landing with complete loss of engine power from cruise flight. FAA-H 8083-3B Chapter 17. **Standards:** Best glide airspeed ±10 knots and corrected for headwind or tailwind; Identifies suitable landing site; Manages aircraft's energy to make a controlled approach and landing without undershooting or overshoot the selected landing site; Performs appropriate checklists.

Description:

The engine failure shall be simulated by pulling the throttle to IDLE.

1. Establish best glide attitude and airspeed, maintaining altitude if airspeed is above best glide speed (65 KIAS). Use nose-up trim to maintain best glide speed. (Trim to feel)

2. Locate a suitable landing site. Consider the distance, the size of the landing site, the wind direction and any large hazards/obstacles.

3. Maneuver the aircraft toward the High Key Point (over top of the desired landing point), and simulate performing the "**Engine Failure During Flight**" checklist. ***This procedure must be performed from memory.***

4. If the engine is simulated failed to start, then simulate conducting the "**Emergency Landing Without Power**" checklist. ***This portion of the checklist may be done using the checklist.***

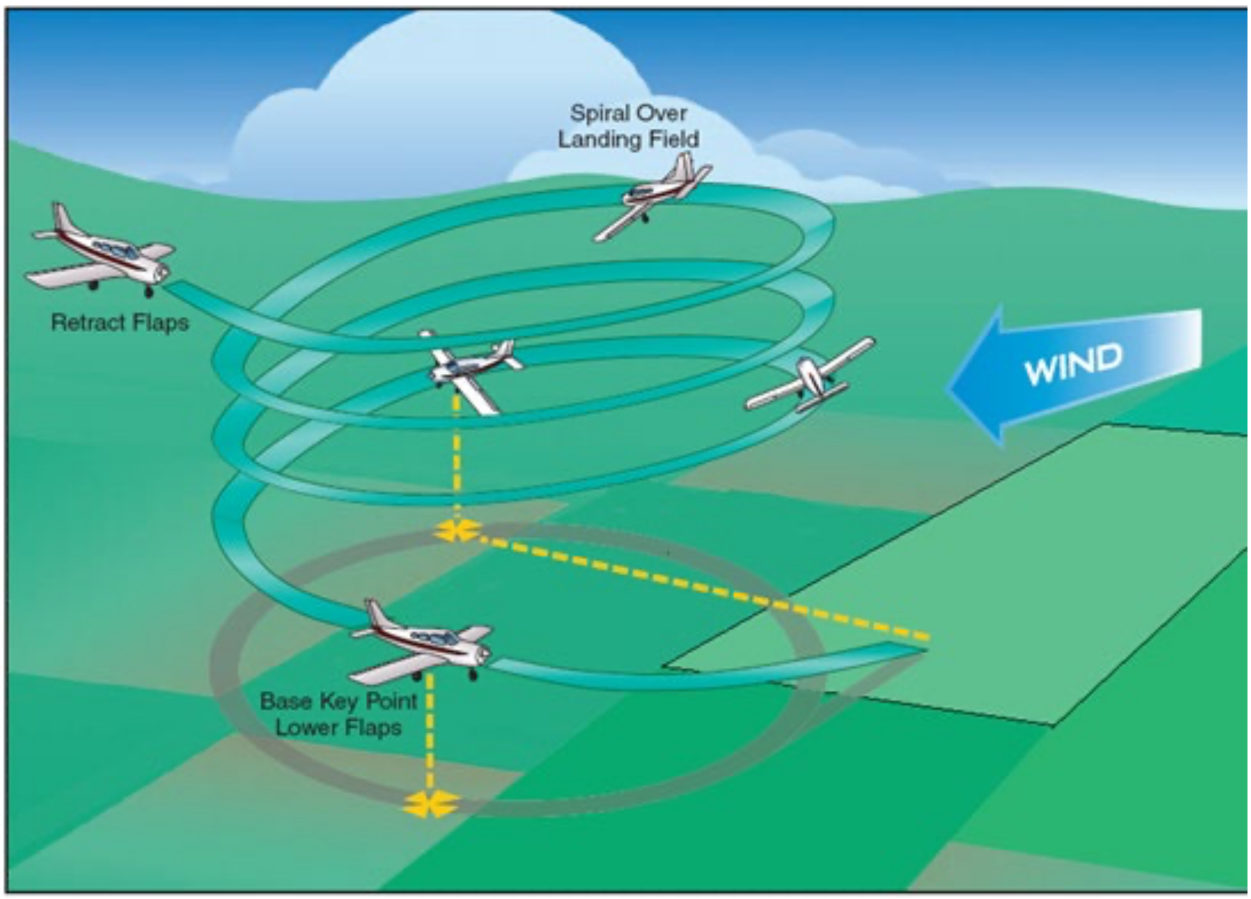
5. Upon arriving over the High Key Point and if above 1000 feet AGL, begin circling to dissipate altitude to arrive at the Low Key Point.

6. Leave the Low Key Point (abeam the point of intended landing) as close to 800 ft AGL as possible and perform a moderate bank turn towards the Base Key Point (400 to 500 ft AGL on a close in Base Leg position). Take into consideration the wind speed.

7. Continue the turn to final, extending the flaps as desired to make the landing site. When landing is assured, fully extend flaps to ensure the aircraft

touches down at the slowest practical airspeed.
NOW Complete the memory portion of the "**Emergency Landing Without Power**" checklist. When landing is assured - ***This portion of the checklist must be performed from memory.***

8. If performing the "Emergency Approach and Landing" to an authorized airfield, plan to continue the descent and perform a landing. Otherwise, be prepared to initiate the go-around when instructed to do so or by 500 feet AGL, whichever occurs first.



MANEUVER NOTES:

During an OFF-AIRPORT Emergency Landing, a pilot needs to evaluate their landing site. If the aircraft is at a higher altitude and the best landing area is directly below, a pilot should pick the field, the aiming spot and make plans to land into the wind.

The pilot should circle right above the point they intended landing area. As the aircraft circles, the pilot should evaluate their landing area.

First examine is the way the furrows run. Always land with the furrows and **not** against.

Next, evaluate for tree stumps, rocks, fence lines, power lines, small rivers or ditches. All of this needs to be evaluated on this descent.

During the descent REMEMBER to contact a nearby ATC facility and broadcast a MayDay or if none are nearby then use the Emergency Frequency 121.5 and set your Transponder to 7700.

As the arrives at the low key point abeam the point of intended landing, the aircraft should be around 800 to 1000' AGL.

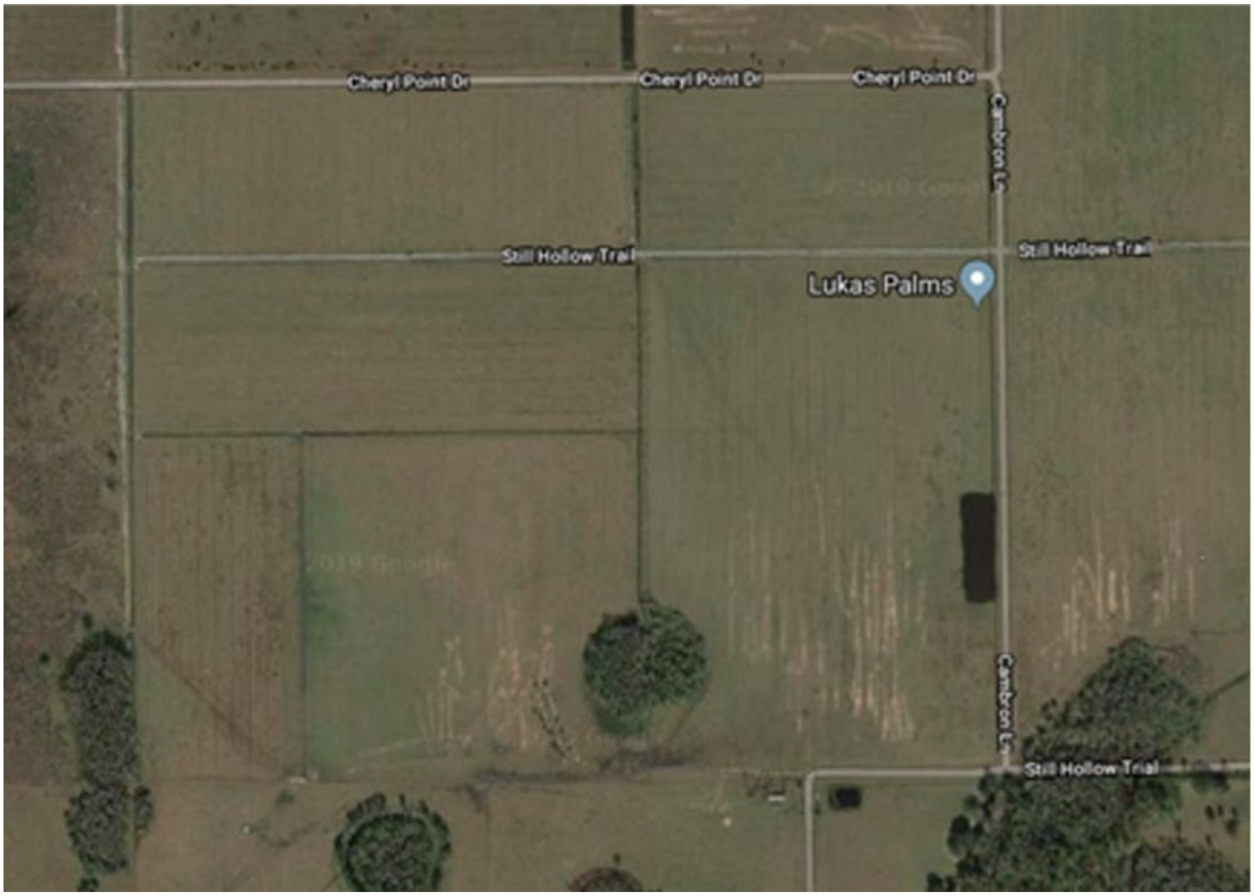
1. High Key Point – Abeam the landing site on a downwind position.

2. Low Key Point – Approximately 800 to 1000 feet AGL abeam the landing site on a downwind position.

3. Base Key Point – Approximately 400 to 500 feet AGL in a close-in base leg position.

NOTE: Managing the aircraft's altitude from the High Key Point can be roughly approximated by the bank angle used to perform the 360° circles. *Less* bank results in a lower rate of turn, causing the circle to be larger, thus *more altitude* will be lost per circle. *More* bank results in a higher rate of turn, causing the circle to be tighter, thus *less altitude* will be lost per circle.

For example (values are approximate):
40° bank at V_G would result in ~400 feet altitude loss per 360° circle 30° bank at V_G would result in ~600 feet altitude loss per 360° circle 20° bank at V_G would result in ~800 feet altitude loss per 360° circle



FURROWS: The way the land is plowed. Notice some of these field’s furrows run up and down (north and south). Others run left and right (east and west). Always land with these furrows and not against. Landing against may flip the aircraft. If necessary, it is better to land with a crosswind than across the furrows.

Section 4
Ground Reference Maneuvers

4.1 Rectangular Course

Objective:

To develop the pilot's ability to maneuver the airplane while compensating for drift during turns, and orient the flight path with ground references while dividing attention inside and outside the airplane.

Standards:

Private: Altitude ±100 feet; Airspeed ±10 knots; Bank: As necessary, however limit bank angles to no more than 45°.

Commercial: N/A

REMEMBER: The Rectangular Course builds upon two previous basic maneuvers: the Wind Drift Circle and Flight Along a Road. The Rectangular course is four "flight along a road" and four 1⁄4 turns from "Wind Drift Circle" simply put together. See chapter 8 of this manual, 8.5 and 8.6.

NOTE: Proper execution of the maneuver at the recommended airspeed of 95 KIAS under even strong wind conditions should not require more than 45° bank. If more than 45° is necessary to achieve the desired ground track, it is usually due to poor execution.

Description:

1. Perform "Before Maneuver Checklist" and select an altitude 600' AGL to 1000' AGL. A–B–C

2. Select a prominent rectangular field bounded by four section lines whose sides are approximately equal to typical traffic pattern. The major axis of the rectangle should be approximately parallel to wind direction at flight altitude. The field should also be close to a suitable place to land in case of an emergency.

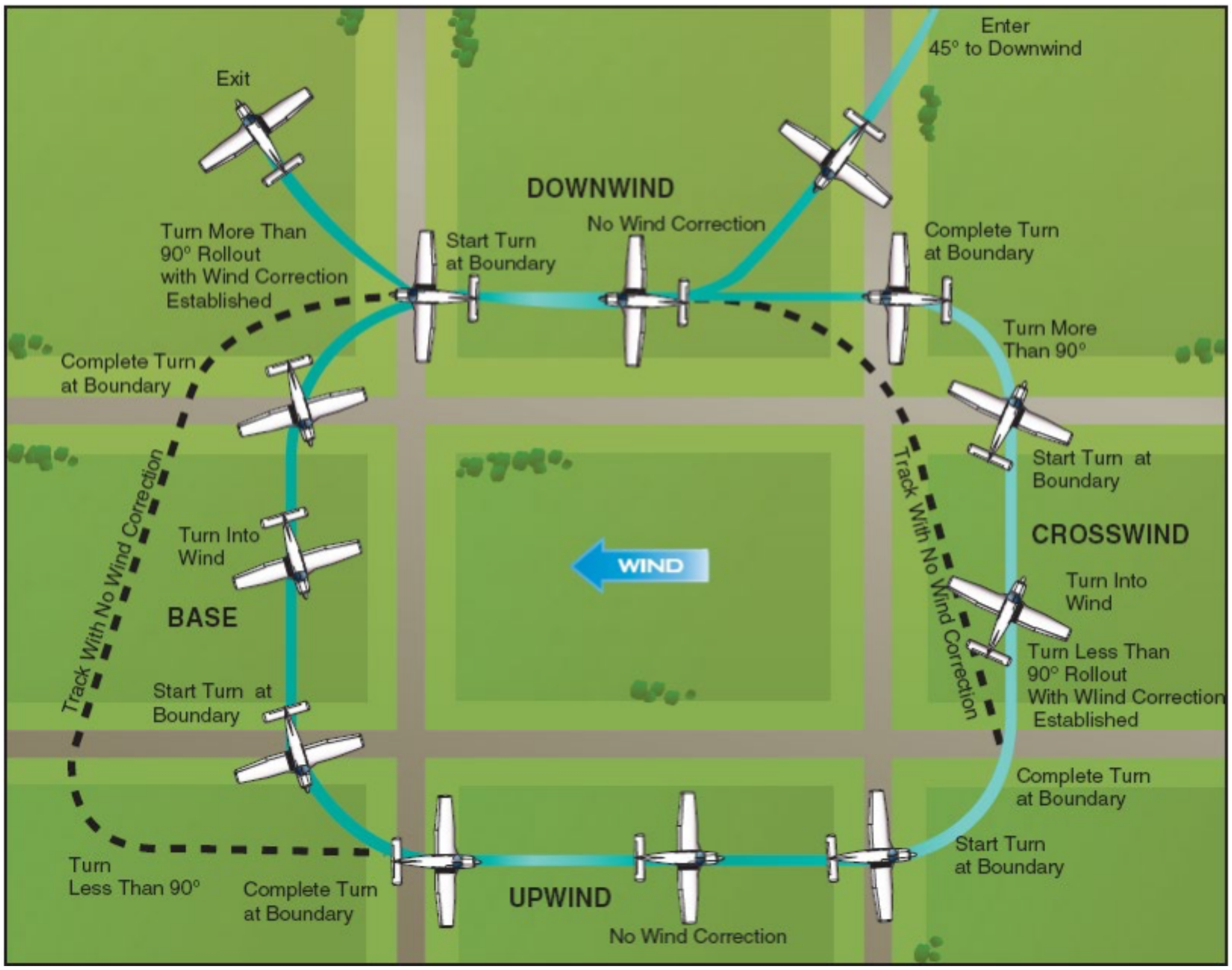
3. Establish 95 KIAS and enter the maneuver 45° to the downwind, unless otherwise instructed, simulating joining the pattern at an uncontrolled field.

4. Establish the proper Wind Correction Angle (WCA or crab angle) to maintain a uniform distance from the field boundaries.

5. Commence and complete turns abeam the field boundaries.

6. Vary the bank angle (not to exceed 45°) to maintain a constant radius during the turns.

7. Exit the maneuver 45° off the downwind leg or as directed.



4.2 S-Turns

Objective:

To develop the ability to maneuver the airplane while compensating for drift during turns and orient the flight path ground references while dividing attention inside and outside the aircraft.

Standards:

Private: Altitude ±100 feet; Airspeed ±10 knots; Bank: As necessary, however limit bank angles to no more than 45°.

Commercial: N/A

Description:

1. Perform "Before Maneuvers Checklist" and select an altitude 600' AGL to 1000' AGL. A–B–C
2. Select a road or other straight reference line (e.g., railroad tracks, power lines, etc.) running approximately perpendicular to the wind. The reference line should be close to a suitable place to land in case of an emergency.
3. Establish 95 KIAS, enter the maneuver downwind, and plan to make the first turn to the left.
4. At a point directly over the reference line, initiate the Steepest Band angle (Fastest Ground Speed) to the left. After around 45 Degrees of heading change, begin decreasing the bank while scanning the distance from the reference line. Continue decreasing the bank angle as necessary to arrive over the reference line perpendicular to the road with wings just rolling to wings level position.
5. Immediately upon completion of the first turn, begin a Shallow Bank (Slowest Ground Speed) to the Right. Allow the aircraft to move somewhat away from the reference line as the wind is trying to push the aircraft back toward the road. Slowly increase the angle of bank and "Crab Angle" while looking at the reference line (Road) to keep the same distance away as in the first turn.

Continue to increase the bank to keep the equal radius and you will have your Steepest Bank again as the wind is behind you, just before you roll wings level over the reference line.

6. Bank and WCA (crab angle) should be adjusted, as necessary, throughout the maneuver to achieve two complete semicircles of equal radius.

7. Exit in straight and level flight after passing over the reference line.

MANEUVER NOTES:

The S-Turn is simply the Rectangular Course but now with the four straight “Flight Along a Road” portions ***removed***.

Continuous decrease in bank. The first semi circle when entering downwind is at the fastest ground speed. Therefore you begin with the steepest bank and slowly reduce the angle of bank as the aircraft becomes perpendicular to the road.

Continuous increase in bank. The second semi circle begins upwind and slowest ground speed, therefore a shallow bank is used to begin and a constant increase in bank continues till the aircraft is over the road and back to straight and level.

The aircraft should not be flown with sudden increase in bank, then shallow, then steep, then shallow then steep.

The goal is to make a smooth semi circle, not half a STOP sign.

Proper execution of the maneuver at the recommended airspeed (95 KIAS) under even strong wind conditions should not require more than 45° bank. If more than 45° is necessary to achieve the desired ground track, it is usually due to poor execution.

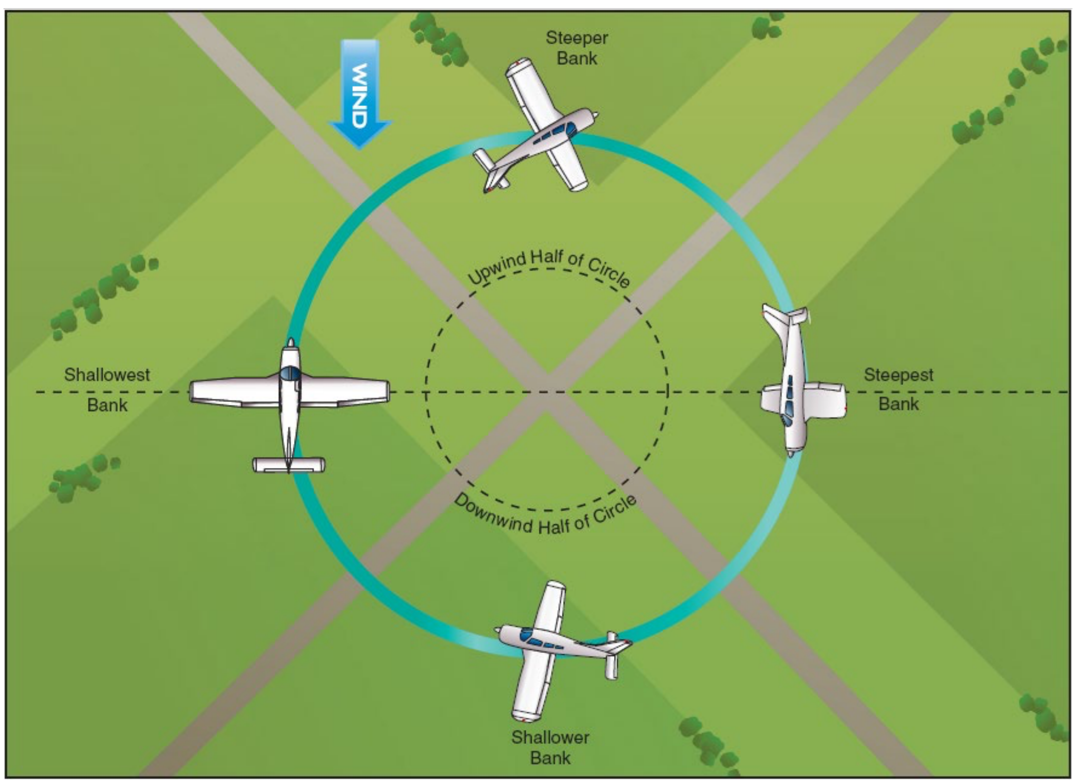
Due to the higher groundspeed of the aircraft caused by the tailwind component, begin promptly over the reference line with the steepest bank angle.

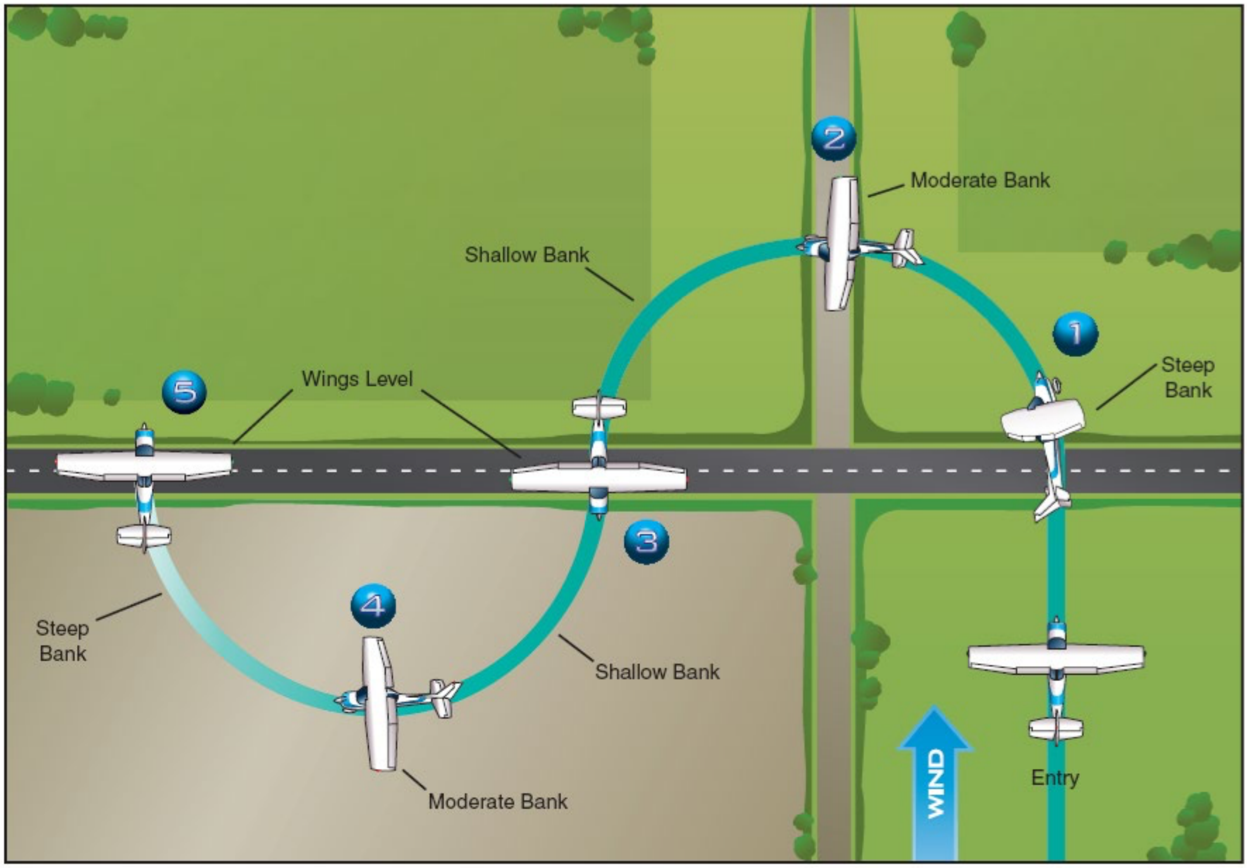
At the 90° point in the first turn, the bank angle should decrease to a moderate amount with the aircraft crabbing towards the reference line; more than 90-degrees of turn.

Approaching the 180° point, the bank should become shallower to allow the aircraft to cross the line wings level and perpendicular to the reference line; less than 90-degrees of turn.

Reversing direction, begin with a shallow bank angle due to the lower groundspeed of the aircraft caused by the headwind component, increasing the bank to a moderate value at the 90° point of the second turn. The aircraft should be crabbing away from the reference line; less than 90-degrees of turn.

Turning back towards the reference line, continue to increase to the steepest bank to allow the aircraft to cross the line wings level and perpendicular to the reference line; more than 90-degrees of turn. Exit on this downwind direction.





Approximate Bank Angles (Reference only)

The angle of bank used for S-Turns will vary primarily with the wind strength. These are “general” bank angles to give the pilot an idea to help them perform this maneuver. It is the wind strength which will determine the bank angle and the summitry of the two half circles.

4.3 Turns Around a Point

Objective:

To develop the ability to maneuver the airplane while compensating for drift during turns, and orient the flight path with ground references while dividing attention inside and outside the airplane.

Standards:

Private: Altitude ±100 feet; Airspeed ±10 knots; Bank: As necessary, however limit bank angles to no more than 45°.

Commercial: N/A

NOTE: Proper execution of the maneuver at the recommended airspeed (95 KIAS) under even strong wind conditions should not require more than 45° bank. If more than 45° is necessary to achieve the desired ground track, it is usually due to poor execution.

Description:

1. Perform "Before Maneuvers Checklist" and select an altitude between 600 AGL and 1000 AGL. A–B–C

2. Select a small but prominent reference point that is close to a suitable place to land in case of emergency. It is best to use intersecting lines such as two roads crossing perpendicular to each other, or crossing section or fence lines.

3. Establish 95KIAS, enter the maneuver downwind (Fastest Ground Speed requires Steepest Bank), and make the turn to the left to keep the point on the student's side.

4. The initial roll in bank will be the steepest bank as the groundspeed is the fastest. The first half of the Turn About a Point requires a slow reduction of bank. Adjust bank angle and WCA (crab angle) as necessary, to correct for the effects of wind and to maintain a constant radius around the reference point. Once the aircraft is upwind (Slowest Groundspeed) requires the

Shallowest Bank. As the second half of this maneuver continues, the bank is slowly increased all during this half of the Turn About a Point till reaching the Steepest bank with the aircraft is again, downwind.

5. Depart on the entry heading after two completed circles, unless otherwise instructed.

6. Remember, a pilot needs to divert their attention to flying the aircraft, looking for traffic, holding a constant altitude while performing this maneuver.

MANEUVER NOTES:

The Decrease in bank and the increase in bank should gradual and not steep then shallow, then steep, then shallow. This will make the Turn About A Point look like a STOP sign and not a circle.

All Ground Reference Maneuvers are designed to teach a student how to compensate for the wind while maneuvering. A pilot must anticipate how the aircraft will track across the ground. A pilot must always know where the wind is moving and how it effects their aircraft.

Although this picture depicts the turns to the right, it is best for the turns be completed to the left so the pilot has the best view of the point.

The downwind half of the circle has a slight crab angle toward the point and into the wind. The stronger the wind, the more crab angle will be required to keep the aircraft from being blown too far from the point.

The downwind half of the circle starts out with the fastest Ground Speed and requires the steepest bank angle. The bank should slowly be shallowed to a medium bank angle downwind of the point and continue to be shallowed until the aircraft is upwind and at its slowest Ground Speed with the shallowest bank angle. At no time should the aircraft wings ever become level.

The upwind half of the circle has a slight crab angle away from the point and into the wind. The stronger the wind, the more crab angle will be required to keep the aircraft from being blown into the point.

The upwind half of the circle starts with the slowest Ground Speed and requires the shallowest bank angle. The bank should slowly be steepened to a medium bank angle upwind of the point and continue to be steepened until the aircraft is downwind and at its fastest Ground Speed. At no time should the aircraft winds ever become level.

Sight-Pictures for WCA in Turns Around a Point

The pilot should refer to the relationship between the wingtip and ground reference point to determine the amount of crab towards or away from that point. By using the leading and trailing edges, the pilot can visually approximate a crab toward or away from the point in the turn. Using this method, the maneuver simply consists of moving the ground reference point ahead of or behind the wingtip to maintain the constant radius.

Section 5 COMMERCIAL FLIGHT MANEUVERS

5.1 Accelerated Stalls

Objective:

To recognize the indications of a stall during high load factors and the correct recovery while maintaining coordinated flight.

Standards:

Private: N/A

Commercial: Uses approximately 45° bank, begins below V_A and at least 20

knots above unaccelerated V_S, recovers promptly at the stall buffet

Description:

1. Perform the A–B–C checklist (Section 3.1) and select at altitude that would allow recovery no lower than 3,000 AGL.
2. Entering the last 90 degree clearing turn, reduce power to 1500 RPM and smoothly increase pitch to maintain altitude as airspeed decreases.
3. Maintain Heading and Altitude as the airspeed decreases.
4. Maintain altitude until reaching V_{S1} + 20 knots
5. Roll into a Coordinated 45° bank (either direction), increasing back pressure to maintain altitude. Allow airspeed to bleed off in the level turn to induce the stall. Keep power set to ~1500 RPM.
6. At the first indication of the Impending stall (Aircraft buffet, Stall Horn), initiate recovery by promptly ***decreasing*** the angle of attack, applying Aileron and Rudder ***together*** to level the wings and applying full throttle while attempting to minimize loss of altitude.
   NOTE: Minimum altitude loss is desirable however fly the airplane first. ***Aviate – Navigate - Communicate*** and recover from the stall by decreasing the angle of attack before attempting to minimize altitude loss.

7. Establish a pitch attitude (sight picture) to begin a controlled climb (~V_X attitude).

8. Climb to safe altitude then Vy to the specified altitude.

9. Resume normal cruise, or as specified.

5.2 Steep Spiral

Objective:

Provide a flight maneuver for rapidly dissipating substantial amounts of altitude while remaining over a selected point. This maneuver is especially effective for emergency descents and/or emergency landings.

Standards:

Private: NA
Commercial: Airspeed ±10 Knots; Roll out heading ±10° of entry heading;

Recover no lower than 1,500' AGL; Bank not to exceed 60 Degrees. Maneuver to be done to the left ***and*** to the right.

Description:

1. Perform the A–B–C checklist (Section 3.1) and select an altitude where recovery will occur no lower than 1500' AGL and will allow at least three (3) full 360-deg circles. More than three turns is acceptable.

2. Select a suitable reference point, usually near an airfield or suitable landing site, and position the airplane for a downwind entry.

3. Although no downwind entry is specified or required, planning a downwind entry will help standardize the maneuver to the conventional ground reference maneuvers where the pilot begins with a tailwind. Like the Turn-About-A-Point, the fastest Ground Speed requires the steepest bank angle.

4. Approaching abeam the reference point (generally, 3-5 seconds lead), reduce power to IDLE as the main wheel approaches over top of the selected point. Establish 80 KIAS. 80 KIAS is recommended to allow an increased margin above stall speed when turning up to 60° of bank

5. Abeam the point, roll smoothly and crisply into a 45-60° bank. Once turned upwind, reduce bank as appropriate given the wind conditions. The time spent on the downwind portion of the maneuver will be smaller than the time spent on the upwind portion.

6. Throttle and mixture. Clear the engine on the upwind leg by smoothly advancing the throttle 1⁄2 way and smoothly back to idle. Enrich the mixture one full turn for each 360 degree circle.

7. Repeat the maneuver for three complete circles, more than three is acceptable as needed. Alternate between 45-60° bank on the downwind half of the circle and shallower banks on the upwind side of the circle (much like a Turn-About-A-Point) to account for changing ground speed.

8. Recover after a minimum of three full circles are completed or at the floor altitude (not below 1500’ AGL) if one was specified. Be prepared to transition from the steep spiral to a forced landing.

MANEUVER NOTES

Wind

One of the challenges with this maneuver is that the winds and wind speed change with altitude as you descend.

Picking a Key Point

When picking a Key Point to circle around, be sure it includes a place to land in case the instructor or DPE turns this maneuver into a Simulated Emergency Landing Procedure. A good point to pick and easy to see is an intersection of two roads or section lines. By having these intersecting lines, it is easier to see and maintain circling around section lines than a tree or house in the middle of a field.

Roll in procedures

As you look out the left window, keep your left main tire over the section you are paralleling. Just before the main tire approaches the crossing section line, reduce the power to Idle and immediately roll into the left-hand turn bank. This bank should be the steepest bank as you entered downwind at your fastest ground speed. (Review Turns-About-A-Point 4-3. This is the same procedure only descending at a steeper bank angle with changing winds.)

Trim

The trim is your friend. Your attention will be deviated toward the point, looking for traffic, clearing the engine and so on. By trimming the pressure off your hand

and trimming the aircraft for 80 KIAS lowers the chance of the aircraft's pitch attitude becoming too low and airspeed too fast.

5.3 Chandelles

Objective:

Complete a maximum performance 180 degree climbing turn maintaining coordination and not stalling. The goal is to gain the most altitude possible for a given bank angle and power setting.

Standards:

Private: N/A
Commercial: Rollout: ±10° of the 180 Degree point. Airspeed: Just above a

stall speed, and maintain that airspeed momentarily avoiding a stall.

Description:

1. A–B–C Entry airspeed 105 KIAS.

2. Select a suitable reference point. Position this point off the left/right wing, according to the direction of the turn

3. Roll briskly to 30-deg coordinated bank (The Wing Strut will be parallel with the ground) in the direction of the reference point. Smoothly raise the pitch and as the RPM begin to decrease, Increase power to FULL. First BANK – then PITCH and POWER.

4. Maintain constant bank (approx. 30-deg bank) while continuously increasing the pitch attitude. Time the back pressure to achieve a nose-up attitude (Know Sight Picture) and the highest pitch at the 90-degree reference point ~20°.

5. Passing the 90-deg point (when the lateral axis is oriented directly 90° to the reference point), continue to increase back pressure as airspeed bleeds, and begin the rollout to maintain that sight picture.

6. Do not rollout too quickly at the 90-deg point. If the rollout is too quick the airplane will not complete the turn prior to reaching slow flight.

7. Maintain a constant pitch (sight picture) during the second 90-deg segment. This will require ***continually increasing*** back pressure.

8. Time the coordinated rollout to be wings-level with the point off the opposite wing. As airspeed decreases, continuously apply more back pressure to maintain a constant pitch attitude (sight picture). Ensure the airplane is approaching slow flight as the maneuver nears completion.

9. Once on the reciprocal heading, keeping the nose at the predetermined sight picture, hold the airplane in that state, demonstrating control for a couple seconds (generally, 2-3 seconds). Do not stall the airplane

10. Initiate a deliberate, smooth recovery. Do not lose altitude as the airplane is allowed to accelerate to normal cruise flight.

11. At 95 KIAS, Perform Cruise Checklist.

MANEUVER NOTES

Reference Point

A VISUAL Point is needed off the wing tip in the direction the pilot will be turning. It is also extremely helpful to have a long straight REFERENCE LINE under the aircraft, such as an Interstate Highway, Beach, River, or Section Line. This will enable the pilot to be able to look down and see how far they have turned the aircraft. Remember, at the 90 degree point the pilot will not be able to see the Reference point as the nose is at its highest point.

Bank Angle

In the Cessna 172, when the wing strut parallels the surface of the earth, the aircraft bank is around 30 degrees. (Outside Reference)

Sequence

When you are ready to roll in, the sequence should be BANK 30 Degrees, then PITCH up. Now as the propeller begins to load up, the RPM’s will begin to decrease, POWER to Full. First BANK – then PITCH and POWER.

Coordination

Coordination is extremely important in this maneuver. Both Torque and “P” Factor play an important factor in this maneuver. As the nose goes up, “P” factor’s left turning tendencies now take effect. As the Airspeed slows, the left turning tendencies of “Torque” increased. These must be compensated with the use of RIGHT RUDDER.

Chandelle to the LEFT

When rolling to a coordinated left 30-degree bank, Left Aileron and Left Rudder is required. As the Pitch is raised, “P” factor comes into effect and the use of slight right rudder is needed. As the aircraft approaches the 90- degree point, the airspeed is slowing, slightly more right rudder is needed because of “P” Factor and Torque. After the 90-degree point, the aircraft needs to slowly begin a roll out to the Right. Therefore, a pilot now has 3 factors effecting the aircraft. “P” Factor, Torque and rolling the aircraft out to the right. The pilot needs to use a lot of RIGHT RUDDER to roll the aircraft out in a coordinated method. A slight amount of opposite AILERON may be necessary to control the roll out rate as to reach the 180-degree point. Most of the roll out is controlled by the RUDDER.

Chandelle to the RIGHT

When rolling to a coordinated Right 30-degree bank, Right Aileron and Right Rudder is required. As the Pitch is raised, “P” Factor comes into effect and the use of slight right rudder is needed. As the Aircraft approaches the 90- degree point, the airspeed is slowing, slightly more right rudder is needed because of “P” factor and Torque. After the 90-degree point, the aircraft needs to slowly begin a roll out to the left. The pilot at this point should have their maximum amount of Right Rudder compensating for the left turning tendencies. As the roll out begins, the use of left aileron is needed to control the roll out rate. The Right Rudder which was at the maximum needs to be easily be relaxed to keep the aircraft coordinated.

Review

The Chandelle to the Left requires more Right Rudder than a Chandelle to the Right on roll out.

Sight Pictures

Are so important to set up in this maneuver. A pilot’s head needs to be moving all the time to keep these sight pictures. A pilot needs to have a sight picture of what the aircraft’s pitch attitude looks like just above a stall and transfer that information to the highest pitch at the 90-degree point as that Sight Picture needs to be maintained from the 90 to the 180-degree point.

5.4 Lazy Eights

Objective:

This is a coordination and energy management maneuver. Flight control pressures are constantly moving. Inscribe an "8" laying down on the Horizon with the Longitudinal axis of the aircraft. The reason it is called a "Lazy 8" is because the "8" is resting laterally on the horizon.

Standards;

Private: N/A

Commercial: Altitude ±100 feet from entry altitude; Airspeed ±10 Knots from entry speed; Heading ±10° at 180 degree points.

Description:

1. A–B–C Entry airspeed 95-100 KIAS.
2. Select prominent reference points at45-90-135 far in the distance as references for the maneuver. Position the points off the left/right wing, according to the direction of the first turn
3. Begin by pitching first, then adding ***very slight*** bank in the direction of the reference point. The statement *"Pitch, Pitch, Bank"* is a reminder when developing this entry.
4. Time the back pressure to achieve the highest pitch (~20° nose up attitude) at the 45-deg point, with approximately 15° of bank. The stall horn should sound. The longitudinal axis should make an upward arc across the sky.
5. Passing the 45-deg point, release some of the back pressure, allowing nose (Longitudinal Axis) to fall smoothly through the 90-degree reference point, to a zero-pitch attitude when facing the reference point itself. During this downward arc slowly increase the bank so that the aircraft is level at 30 degree bank at the 90-deg point.

6. Passing the 90-deg point when the pilot is oriented directly at the reference point, continue to release the back pressure and allow the nose to sink further, typically to the lowest pitch (-10° pitch) by the 135-deg point.

7. Bank should slowly decrease from 30° until near the 135-deg point in this downward arc the bank is approximately 15 degrees.

8. Passing the 135-deg point, begin pitching up and leveling the wings smoothly, timing the pitch and rollout to reach wing levels and pitch level simultaneously with the reference point off the opposite wing.

9. Maintain level-flight for a minimum amount of time (generally, less than 2-3 seconds) before beginning with a turn the opposite direction.

10. Repeat all previous steps.

MANEUVER NOTES:

Reference Points

Three distant visual points need to be picked off the wing tip (90- degrees) as well as a 45-degree point and a 135-degree point, in the direction a pilot will be turning. It is also extremely helpful to have a long **straight reference line under the aircraft,** such as an Interstate highway, beach, power-line or a section line. This will enable a pilot to be able to look down and see the different angles as aircraft turns. Sight pictures are **very important** to this maneuver.

Bank Angle

In the Cessna 172, when the wing strut parallels the surface of the earth, the aircraft bank is around 30 degrees.

Controls

Flight Controls should be moved slowly, but remain in constant change. If they stop, the aircraft is no long making an arc.

Coordination

Is extremely important in this maneuver. Both Torque and “P” Factor play an important factor in this maneuver. As the nose goes up, “P” factor’s left turning tendencies now take effect. As the Airspeed slows, the left turning tendencies of "Torque" increased. These must be compensated with the use of RIGHT RUDDER.

Lazy 8 to the Left

If starting the first half of the lazy 8 is to the left, Power and Airspeed set, cross perpendicular to your long reference line under the aircraft. As the pilot raises the pitch, a slight amount of Left Aileron and left rudder is used to bank the aircraft to the left and begin the arc. As the nose rises, "P" factor is in effect and as the airspeed lowers, torque becomes a factor, so Right Rudder is needed even though using left aileron. As the nose reaches the highest pitch at the 45 (half bank 15-degrees), the aircraft stall warning may sound. Allow the aircraft's nose (Longitudinal Axis) begin to Arc down toward the 90-degree point. At this point, opposite (Right) aileron may be necessary to keep the aircraft from over banking the 30-degree bank. The nose should slice through the 90-degree point, and as it slices through, the nose is going below the horizon, so no more "P" Factor, the need for right rudder is not needed, relax the rudder. However, you will need the same aileron (left) to keep the aircraft from rolling out to quickly. As the aircraft reaches the lowest pitch (135 point) the pilot needs to plan their pitch and roll out as to reach straight and level at the same time. Remember – With the pitch low, the airspeed increased and the nose of aircraft aerodynamically want move upward. The pilot may need forward pressure to allow the nose to rise slowly. All during this maneuver the pilot should be looking for their reference points, their reference line under the aircraft and plan each step along with way.

Lazy 8 to the Right

To finish up the second half of the lazy 8, after reaching straight and level the pilot needs to raise the nose and use a slight amount of right aileron and rudder. As the nose rises (arcs) toward the 45 point, more rudder is needed to compensate for "P" factor and torque. As the highest pitch is reached (Half bank 15-degrees) the stall warning may sound. The aircraft then needs to arc toward the 90-degree point as the bank is increased toward 30- degrees and the nose falls through the 90-degree point some opposite aileron (left) may be necessary to keep the aircraft from exceeding 30- degrees. As the nose falls below the horizon, there is no need for right rudder (No "P" factor), there may be some need for the same aileron to be used (right) to keep the aircraft from trying to roll out on its own. As the aircraft reaches the lowest pitch (135 point) the pilot needs to plan their pitch and roll out as to reach straight and level at the same time.

Remember – with the pitch low, the airspeed increased and the nose of the aircraft aerodynamically wants to move upward. The pilot may need forward pressure to allow the nose to rise slowly timed with the roll out of the bank.

Imagine

Visualize, the number “8” laying down sideways. Half the loops of the “8” above the horizon, the other half below. If the pilot could put a paintbrush on the nose of the aircraft (Longitudinal Axis) and maneuver the aircraft to paint that “Lazy 8” on the horizon.

5.5 Eights on Pylons

Objective:

To maneuver the airplane over a predetermined ground path at Pivotal Altitude while dividing attention inside and outside the plane and developing an intuitive control without slipping or skiding.

Standards:

Private: N/A

Commercial: Bank – Not to exceed 40-degrees. Maintain Pivotal Altitude without slipping or skiding.

Description:

1. A–B–C Airspeed should be cruise 90 KIAS.

2. Select two prominent reference points that are close to a suitable place to land in case of emergency. Ensure that the spacing between points is suitable. Approximately 15-20 seconds flying time between the points will be 1⁄2 to 3⁄4 nautical miles. Also, estimate the center of the two points as this is where you will enter the maneuver.

3. Entry and Altitude. Plan to enter the maneuver on a 30 to 45-degree diagonal downwind mid way between the two points. This should cause you to enter with a quartering tailwind. Pre-Plan your highest and lowest Pivotal altitude based on this downwind ground speed and your anticipated upwind groundspeed. These will not be exact but they will be close and help you roll smoothly into the maneuver.

4. At the position where the pylon appears to be just ahead of a line extending from the pilot's eye and parallel to the airplanes's lateral axis (directly off the wingtip), lower the wing to place the **pilot's line of sight,** known as the Projected Reference Line or PRL, **on** the pylon.

5. As the turn begins, the groundspeed of the airplane will decrease as the wind changes from a quartering tailwind to a crosswind. This will **lower** the

groundspeed and **lower** the pivital altitude. To keep the pylon on the projected reference reference line, the pilot must lower the pitch to descend.

6. As the airplane continues to turn, the wind changes to a headwind, ground speed continues to decrease requiring a even lower pivital altitude to maintain the reference line on the pylon. Again the pilot must lower the pitch to desend.

7. As the airplane turns toward the second pylon the headwind will change to a crosswind and then a quartering tailwind and the ground speed will increase. To keep the pylon on the reference line, the pilot must increase pitch to climb.

8. Plan the roll out with the second pylon in sight to maintain 30 to 45-degree diagonal ground track across the center of the two points or pylons. Be sure to include a WCA at this point to maintain the desired ground track over the center point.

9. Plan on a straight and level segment of no more than 5 seconds. If you are wings level more than 5 seconds your reference points (pylons) are too far apart.

10. Lead the roll in on the second pylon as you did with the first pylon and maintain the reference point with necessary pitch changes to continue the maneuver.

11. Divide your attention throughout the maneuver to continue collision avoidance as well as inside the airplane to check flight instruments for accuracy and engine instruments for proper operation.

12. You may make several circuits maintaining Pivotal Altitude before exiting the maneuver.

13. Plan to exit the maneuver on the entry heading a 30 to 45-degree diagonal downwind after completing a single circle at each point, or at a 30 to 45-degree diagonal downwind or upwind diagonal after completing multiple circles.

MANEUVER NOTES:

Picking Pylons:

When picking reference points, it is a good idea to use section lines, cross roads, fence lines, etc. This enables a pilot to see angles for entry and exit toward the second point.
Also, a center point half way between the two pivotal points should be used to assist the pilot in determine where to cross midway between those two points.

As the end of the first turn is near, the pilot should be looking toward that second pylon to enable the aircraft to fly halfway between the pylons.

Calculating Pivotal Altitude:

Use this formula to calculate Pivotal Altitude.

$$Pivotal\ Altitude = \frac{Groundspeed^2}{11.3} + Elevation$$

**Groundspeed in knots. For miles-per-hour, divide by 15, instead of 11.3.*

Sight picture

The sight picture on the reference point should be mid wing. Some pilots use the rivet line going down the center of the wind, others have used the light cap on the wingtip of the Cessna 172 as a guide. Either is fine as long as these are just references to aid the pilot in keeping the pilot's line of sight, **the PRL**, pivoting on the pylon. **The PRL is the line to the pylon. Any point on the aircraft is NOT the line to the pylon.**

Pylon Movement

The pylon does not actually move, it is a fixed point on the ground. What is moving is the pilot's line of sight, or the Airplane Flying Handbook refers to it as the ***"Projected Reference Line" or PRL.***

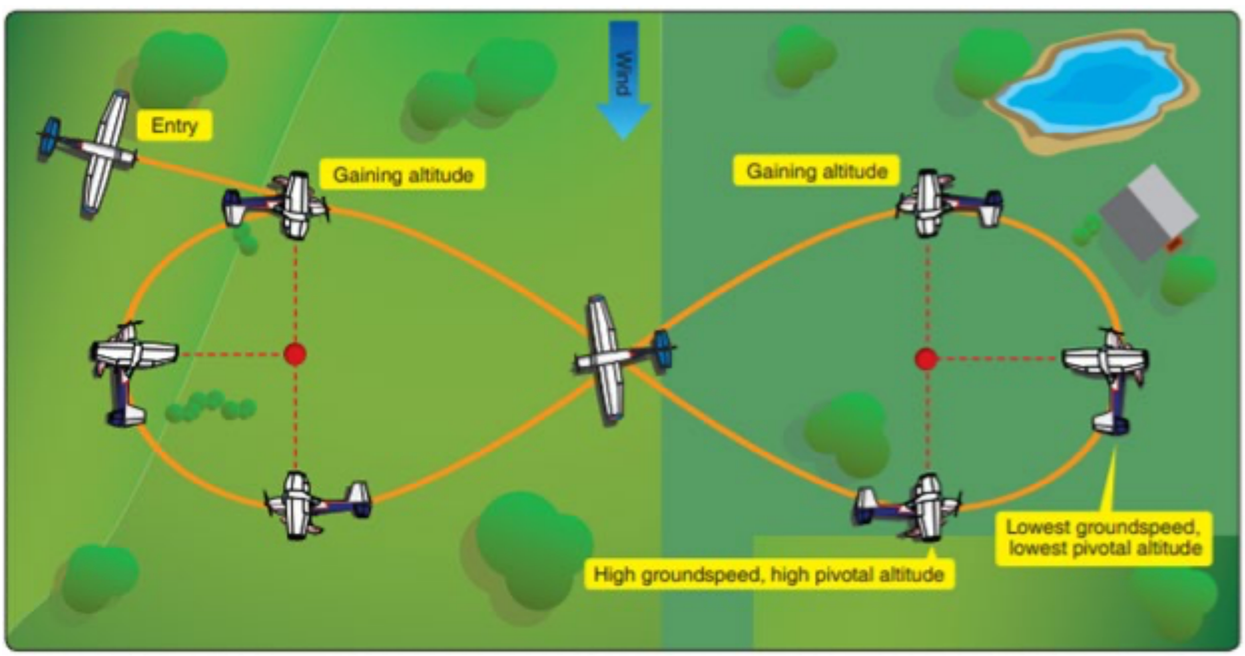
When the aircraft is ABOVE the pivotal altitude, the PRL is BEHIND the pylon so the pylon appears FORWARD of the wing tip. In this case the pilot needs to **descend** to get to the pivotal altitude.

When the aircraft is BELOW the pivotal altitude, the PRL is AHEAD the pylon so the pylon appears AFT of the wing tip. In this case the pilot needs to **climb** to get to the pivotal altitude.

As with many things when flying the airplane, it is sometimes simpler and easier to refer to the relative motion of the ground object as viewed from the pilot's seat in the cockpit. With that understanding look at flying the maneuver like this:

When the Pylon moves forward on the wing tip, the pilot needs to lower their pivotal altitude. Slight forward pressure on the elevator is necessary to lower the aircraft's altitude.

When the Pylon moves aft on the wing tip, the pilot needs to raise their pivotal altitude. Slight back pressure on the elevator is necessary to raise the aircraft's altitude.



A Method to help find suitable pylons

Locate a prominent ground object away from any congested area and near a suitable emergency landing site. Overfly that object which will be pylon 1 with the wind off the right side of your aircraft on a ground track perpendicular to the wind. Start a timer. Of course you will have the suitable WCA to maintain a ground track perpendicular to the wind.

Fly for 15 to 20 seconds and locate a second suitable object that will be pylon 2. While you are on this leg locate an object to identify the halfway point between your two pylons.

Upon reaching your second pylon, turn upwind for another 15 to 20 seconds. Now you are in a position to enter the maneuver.

Simply make a right turn downwind toward your first pylon and roll out so that you are aiming toward the object you identified halfway between your two pylons. You now have a quartering tailwind so add half the actual wind speed to your KIAS and use this ground speed to calculate your downwind P.A.

5.6 Power-Off 180 Accuracy Approach and Landing

Objective:

To demonstrate the judgement, technique, and skill necessary for accurately flying the airplane without power, to a safe landing on a predetermined spot.

Standards:

Private: N/A
Commercial: Touchdown within 200’ beyond touchdown point and not before.

Proper landing, no side load.

1. On Downwind at TPA, Cruise Power (cruise RPM), Cruise Airspeed (95 KIAS)

2. Use the “Landing Point” technique. (See 2.8 Short Field Landing). Consider the existing wind conditions by looking at the windsock. Identify the landing point ***and*** a suitable aiming point based on the wind conditions.

3. It is recommended to use the “1000’ Aiming Markers” if present or a point sufficiently down the runway as the landing point. These 1000’ markers, if present, are 150 feet long. A runway stripe is 120 feet long. Selecting a point too close to the beginning of the runway does not give the pilot the opportunity to salvage a low approach, usually due to obstacles, an unsafe decrease in safety margins. Select a point sufficiently down the runway so that there is always “pavement” beneath the airplane during the round out and flare.

4. Passing abeam the ***point of intended landing***, smoothly reduce the power to idle, slow to and maintain 80-85 KIAS. Use flaps as needed when approaching your point.
NOTE: Best Glide speed is ***not necessary*** at this point.

5. Next, at a point appropriate for the wind conditions, initiate the turn to base leg. The turn to base should be ***prior to*** the 45-degree reference point in ***any*** wind condition.

6. On Base leg, consider runway position, altitude, rate of descent, airspeed and wind conditions
    - If aircraft appears low or far, continue turn towards point of intended landings
    - If aircraft appears high or close, square off base leg and consider adding flaps
    - An altitude of 450 feet on base in the C172 is ideal
7. Turning final. Evaluate aircraft altitude and position and trim as necessary.
8. Altitude adjustment. Addition of flaps, a forward slip or shallow S- Turns may be used to help the aircraft descend if approaching the runway too high.
9. Slowing the airspeed to 68 KIAS by raising the nose will allow the ***longest glide*** because you are at minimum drag.
10. Slowing down the airspeed to 61 KIAS by raising the nose will create a ***faster sink*** rate by increasing drag.
11. When landing is assured by judging the ***aiming point***, begin reducing airspeed for the round out. If not already at 61 KIAS, reduce to 61 KIAS ***as*** you initiate the round out and go into in ground effect for the flare.
12. Plan the ***float and flare*** to touch down ***on the*** intended landing point on centerline. The “1000’ Aiming Markers” if present, will give you a 150 foot target. You may float ***no more than*** 200 feet beyond your identified touchdown point.
13. After touchdown, initiate smooth application of the brakes, increasing back pressure as airspeed decreases. With brake application, increase back pressure on the control wheel to maximize aerodynamic braking.
14. Maintain directional control throughout the rollout, slowing sufficiently before turning onto a taxiway.

NOTE: Vg, maximum glide speed, only results in maximum distance when there is zero wind. Adjust accordingly.

AIMING POINT ADJUSTMENT

Using the "Landing Point" technique (see 2.8 Short Field Landing) and select an aiming point that is **before** the landing point. The following values can be used as guidelines when determining how far before the landing point the aiming point should be.

"Light" headwind component (0 – 5 knots) → Aim 300 feet before

"Moderate" headwind component (5 – 15 knots) → Aim 200 feet before

"Strong" headwind component (more than 15 knots) → Aim 100 feet before

Section 6
Cross Country Procedures

6.1 Performance and VFR Navigation Log Overview

Objective:

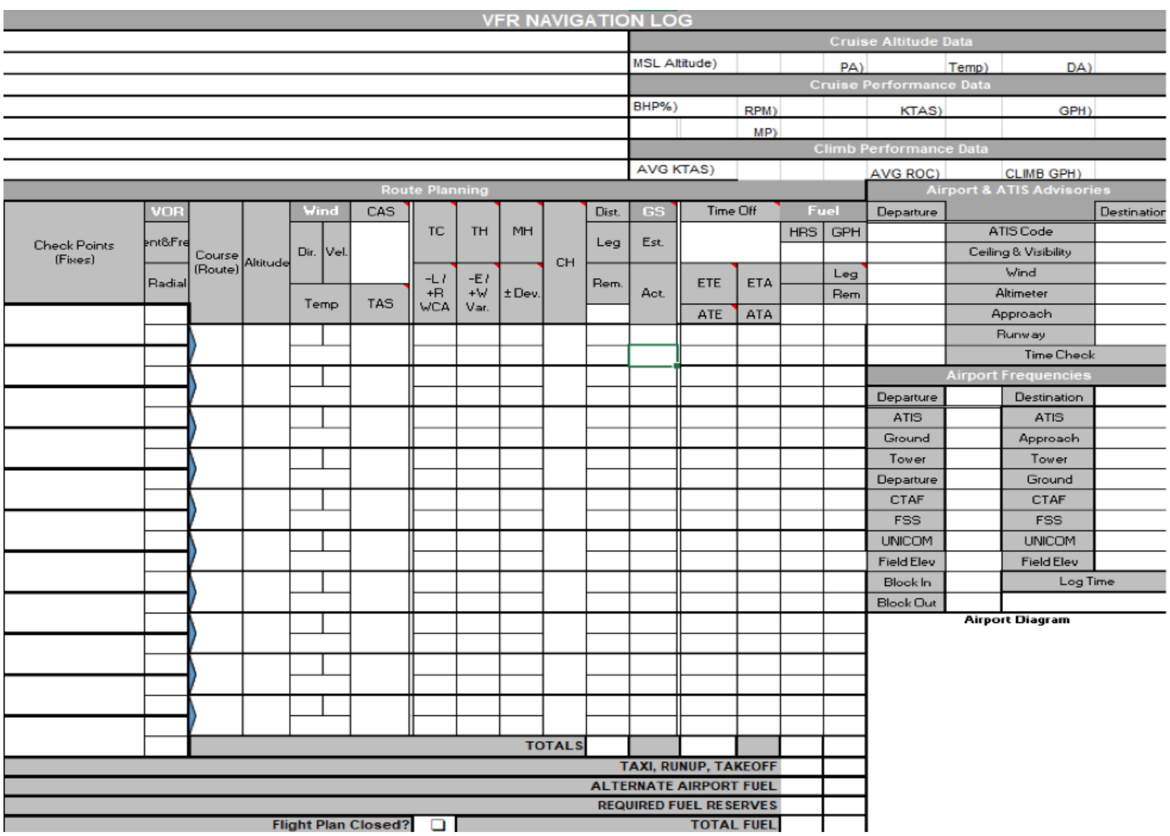
To develop an understanding of EB Flight Training's VFR performance and navigation log.

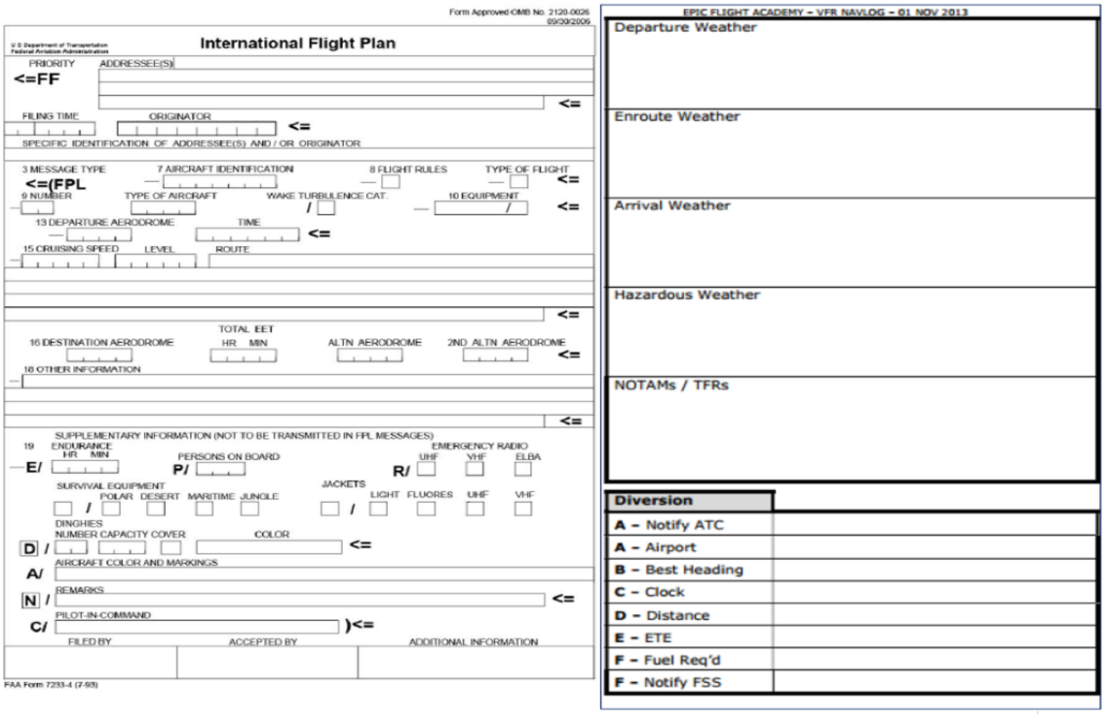
Overview:

While following this Navlog students should be filling in actual data and performance.

The front side of the Navlog contains all Navigation, performance, and airport information and calculations.

The backside of the Navlog contains additional information areas such as ICAO Flight Plan and Weather information.




Form Approved OMB No. 2120-0026 09/30/2006

U.S. Department of Transportation Federal Aviation Administration

International Flight Plan

PRIORITY ADDRESSEE(S)
<=FF <=
FILING TIME ORIGINATOR <=
SPECIFIC IDENTIFICATION OF ADDRESSEE(S) AND / OR ORIGINATOR
3 MESSAGE TYPE 7 AIRCRAFT IDENTIFICATION 8 FLIGHT RULES TYPE OF FLIGHT
<=(FPL <=
9 NUMBER TYPE OF AIRCRAFT WAKE TURBULENCE CAT. 10 EQUIPMENT <=
13 DEPARTURE AERODROME TIME <=
15 CRUISING SPEED LEVEL ROUTE
<=
TOTAL EET
16 DESTINATION AERODROME HR MIN ALTN AERODROME 2ND ALTN AERODROME <=
18 OTHER INFORMATION
<=
SUPPLEMENTARY INFORMATION (NOT TO BE TRANSMITTED IN FPL MESSAGES)
19 ENDURANCE HR MIN PERSONS ON BOARD EMERGENCY RADIO UHF VHF ELBA
E/ P/ R/
SURVIVAL EQUIPMENT POLAR DESERT MARITIME JUNGLE JACKETS LIGHT FLUORES UHF VHF
DINGHIES NUMBER CAPACITY COVER COLOR
D / <=
A/ AIRCRAFT COLOR AND MARKINGS
N / REMARKS <=
C/ PILOT-IN-COMMAND)<=
FILED BY ACCEPTED BY ADDITIONAL INFORMATION
FAA Form 7233-4 (7-93)

EPIC FLIGHT ACADEMY – VFR NAVLOG – 01 NOV 2013

Departure Weather

Enroute Weather

Arrival Weather

Hazardous Weather

NOTAMs / TFRs

Diversion	
A – Notify ATC	
A – Airport	
B – Best Heading	
C – Clock	
D – Distance	
E – ETE	
F – Fuel Req'd	
F – Notify FSS	

Students should use this form for all training, Prog checks, End of Course checks and checkrides (if required). Route for checkrides will be assigned by DPE.

Students should fill out all required or applicable boxes with appropriate information/data. Be sure to be able to explain all data inserted into the Navlog. Filling out the Navlog to completion will help with understanding all aspects of navigation planning.

Students should write clearly in each field of the Navlog. Sloppy or poor handwriting should be avoided so any prog pilot or DPE can be able to read and understand. It is recommended that students use a sharp pencil so any errors can be corrected easily by being erased.

1. Sections of the Navlog

- Cruise altitude and performance data are the performance numbers to be used for the desired altitude for the flight. If needed for additional altitudes use blank areas on the Navlog for extra performance data. Use the C172 POH for cruise performance data.

- Climb performance is the average performance from sea level until our desired altitude. Typically, in the C172 climb will be done in a Vy configuration. Use the C172 POH for climb performance data. Performance data should be filled out as follows:

- The route planning portion of the Navlog should be used for all route information including time, distance, speed, fuel consumption, and headings.

- The next column over should be for VOR identifiers and frequencies that you will use along your route as a navigational aid. These VOR identifiers can help by verifying the aircraft location along a route or if you get lost VORs can be used to pinpoint a location. VOR morse code can be included in the notes section of the Navlog.

- The third and fourth columns is the route or heading in which you will fly to your next checkpoint and altitude in which the aircraft will be at in different legs. When climbing during a leg the altitude cell should be filled out with “climb” and when descending “decent”.

- For the wind column use the winds aloft at the altitude selected and interpolate either to the nearest winds aloft station or between two.

Cruise Altitude Data								
MSL Altitude)		6500		PA)	6418	Temp) 16°	DA	7996
Cruise Performance Data								
BHP%)	50	RPM)	2300		KTAS)	98	GPH)	7.2
		MP)						
Climb Performance Data								
AVG KTAS)		89			AVG ROC)	484	CLIMB GPH)	15

For example, if you wish to fly at 4500 and the winds aloft are 160@15 at 3000’ and 190@5 you could interpolate to 175@10.

- Column 7-10 are the True Course corrected for wind which gives us True Heading corrected for variation which is Magnetic Heading corrected for deviation which gives us compass heading.

- The last 6 columns are time distance fuel and speed calculations that relate to your performance. These numbers will be calculated based on distance, GPH and groundspeed.

- Reserve fuel is the emergency fuel onboard in accordance with FAR Part 91. An operator may require more reserve but not less than the FAR. Epic requires a 1 hour fuel reserve for any flight.

- Contingency fuel is at the pilot's discretion and will vary with circumstances **but will always be in addition to the fuel reserve.** Examples of where a pilot may want to include contingency fuel include: expecting extended taxi delays, PIREPs show winds stronger than the winds aloft forecast, pilot is unsure of how much vectoring or holding may be required at a busy destination even when VFR, etc.
Consider the BIG picture of the flight and plan contingency fuel accordingly.

2. Performance Calculations

Cruise Altitude Data							
MSL Altitude)	6500		PA)	6418	Temp) 16°	DA	7996
Cruise Performance Data							
BHP%)	50	RPM)	2300	KTAS)	98	GPH)	7.2
		MP)					
Climb Performance Data							
AVG KTAS)	89		AVG ROC)	484	CLIMB GPH)	15	

• Cruise Altitude Data- The two things calculated in the Cruise Altitude Data is Pressure Altitude (PA) and Density Altitude (DA).

(1) The first box starts with the MSL Altitude at which you will be cruising. Next, correct the MSL Altitude for non-standard pressure which gives us the PA. The formula is (29.92 - current pressure) *1000 + elevation. So, for example, it would be (29.92-30.01) *1000+6500=6410.   way to do this is by imputing this into the "Altitude" function of the CX3 flight computer.

(2) Then we get the temperature at SL and using the Standard Lapse Rate of 2°/ 1000' get the temperature at altitude.

(3) We use this temperature in the CX3 to get out DA or we can use the DA formula (OAT-standard temperature) *120+PA. So, in this case it would be (162)*120+6410=8090.

(4) Remember with different methods of finding PA and DA you will get different answers. This is to be expected. NOTE: ***All methods render results sufficiently*** accurate.

- To get the cruise performance data look into the C172 POH page 5-20 and 5-21. Looking at this chart we choose the PA in which is closest to our current PA at cruise. In this scenario 2300rpm was chosen to be used as our cruise rpm. Because standard temperature at 6500 feet is 2°C and in this scenario, it is 16°C we are 14°C above standard temperature. So, we should interpolate between Standard temperature and 20° above standard temperature to get 50%MCP, 98KTAS and 7.2GPH.

- Climb performance Data- To get climb performance data in feet per minute use the chart in Chapter 5 of the POH titled "Maximum Rate of Climb at 2550 pounds".

3. Determining Climb and Descent Performance

STEP 1 – Determine Avg KTAS Cessna 172

- (1) POH/AFM recommends 85 KIAS
- (2) 85 KIAS corrects to approximately 83 KCAS
- (3) At the departure airport field elevation, compute the KTAS using the local pressure and temperature observations (Ex: 84 KTAS)
- (4) For the intended cruise altitude, compute the KTAS again using the pressure and temperature aloft (Ex: 90 KTAS)
- (5) Average these two figures for the average KTAS (Ex: 87 KTAS averaged climb speed)

STEP 2 – Determine the Avg ROC

Cessna 172

- (1) Using the local pressure and temperature observations, determine the VY rate-of-climb at the departure airport's field elevation (Ex: 710fpm)
- (2) For the intended cruise altitude, find the VY rate-of-climb using the pressure and temperature aloft (Ex: 405fpm)
- (3) Average these two figures to find the average ROC in the climb (Ex: 557fpm)
- (4) Degrade the figure by approximately 20% to compensate for cruise climb airspeed (Ex: 557 x 0.80 = 445fpm)

STEP 3 – Fuel Burn at Climb Power

- (1) The IO-360 and O-360 engines should burn approx. 15 GPH at Full Power. For the C172, the Time multiplied by 15 GPH will give the fuel burn (Ex: 19:19 times 15 GPH equals 4.8 Gal burned).

STEP 4 – Descent planning

- Figuring out how many ***miles you are traveling each minute*** is really the key. Here are some examples that will help you. Remember; these speeds are ***ground speed***. When it comes to figuring out your miles per minute (MPM), ground speed is the only speed that matters.
    - 60knots=1MPM
    - 90 knots = 1.5 MPM
    - 120 knots = 2 MPM
    - 150 knots = 2.5 MPM
    - 180 knots = 3 MPM

Now that we have the miles-per-minute stuff out of the way, let's get back to the descent planning question.
Say we had to descend from 5,000' to pattern altitude at 2,000', for a total of 3,000' of descent. We planned to descend at 500 FPM. And we need to figure out how many miles out from the airport we need to start that descent.

- First, we need to figure out how many minutes it's going to take us to descend, and that's pretty straight forward. If we need to descend 3,000' and we're doing it at 500 FPM, we divide 3,000 by 500, and we get 6 (3000/500=6). **It will take us 6 minutes to descend to pattern altitude.**

Next, we need to figure out how many miles away from the airport we need to start that descent.

Since we're traveling at 90 knots ground speed, it means we're traveling 1.5 miles per minute (MPM). Now all we need to do is multiply our MPM, which is 1.5, by the number of minutes we need to descend, which was 6, which gives us 9 NM. 1.5 x 6 = 9

We need to start our descent 9 NM out to make it to 2,000' at the airport.

Keep in mind, doing a calculation like this would put you at 2,000' ***right over the top*** of the airport. Chances are, you want to get patter altitude at lease a mile or two before the airport, so you can make a pattern entry and not have to 'chop and drop'.

To do that, simply add a mile or two to your calculation. In this example, if you started your 500 FPM descent 11 miles from the airport, you'd reach pattern altitude 2 miles prior to the airport, which would probably work out well.

4. Route Planning

- Starting from the left side, the first column is for visual checkpoints that should be easy to see, identify and use for navigation. Checkpoints should be approximately 20 to 30nm apart that way one will always be insight.

- Checkpoints can be closer if necessary, on low visibility days but should not be further. Remember checkpoints do not have to be over the point, they can be off the wing.

- Checkpoint selection will be different for night flights. Points on the ground easily seen during the day may not be visible at night. Plan checkpoint selection accordingly for night flights.

Route Planning

Check Points (Fixes)	VOR nt&Freq / Radial	Course (Route)	Altitude	Wind Dir. / Temp	Wind Vel.	CAS / TAS	TC / -L / +R WCA	TH / -E / +W Var.	MH / ± Dev.	CH	Dist. Leg / Rem.	GS Est. / Act.	Time Off ETE / ATE	ETA / ATA	Fuel GPH / Leg / Rem	HRS
						83							11:00am EST		15	2.37
KEVB	OMN										88				17.06	2.37
	112.6	230	Climb	180	5	89	230	227	234	234	11	85	7:42		1.93	0.27
Lake Ashby	OMN			16			-3	7	0		77				15.13	2.10
	112.6	280	Climb	180	5	89	280	276	283	283	8	89	5:20		1.34	0.19
TOC	OMN			16			-4	7	0		69				13.79	1.92
	112.6	280	6500	180	5	98	280	277	284	284	6	99	3:38		0.44	0.06
ER (west of tov	OMN			16			-3	7	0		63				13.35	1.85
	112.6	265	6500	180	5	98	265	262	268	268	16	97	9:51		1.18	0.16
X23	OCF			16			-3	6	0		47				12.17	1.69
	113.7	265	6500	180	5	98	265	262	268	268	14	98	8:37		1.03	0.14
Lake Weir (Right Wing)	OCF			16			-3	6	0		33				11.14	1.55
	113.7	260	6500	180	5	98	260	257	263	263	17	97	10:30		1.26	0.18
TOD	OCF			16			-3	6	0		16				9.88	1.37
	113.7	260	Decent	180	5	90	260	257	263	263	3	89	2:01		0.24	0.03
KINF (Left wing	OCF			16			-3	6	0		13				9.64	1.34
	113.7	270	decent	180	5	90	270	267	273	273	13	90	8:40		1.04	0.14
KCGC	OCF			16			-3	6	0		0				8.60	1.19
	113.7															
										TOTALS	88		57.00		8.46	
													TAXI, RUNUP, TAKEOFF		1.4	
													ALTERNATE AIRPORT FUEL		3.6	
													REQUIRED FUEL RESERVES		3.6	
					Flight Plan Closed? ❑								TOTAL FUEL		17.06	

- By using the plan function of the CX3 enter information to get wind correction angle, true heading, magnetic heading, ground speed estimated time enroute and fuel consumption for each leg.

- Next, total up time and distance and put it at the bottom of the Navlog in the "totals" row.

5. Fuel Planning - Pilot Operating Handbook (POH) Chapter 5

- Taxi, Runup and Takeoff Fuel - 1.1 gals of fuel is required for taxi, runup an takeoff. Be sure to add this in the Taxi, Runup and takeoff cell.

- Alternate airport or Contingency Fuel. This fuel can be added at the pilot's discretion but is not required. If bringing a full tank on a flight put the remainder of the fuel in the contingency cell to be totaled.

- Required Fuel Reserves- Required Fuel Reserves should be the amount of fuel required per the FAR, no more and no less. Any other fuel wanted as reserve should be added as contingency fuel.

- Fuel in time- To calculate fuel in time take total amount of fuel on board and divide by the GPH at cruise setting. Remember anytime we are talking about fuel remaining, or fuel in time, we are referring to fuel burn in cruise setting.
  So, if there is a total of 19.27gals on board, take 19.27/7.2 to get a total of 2.68 hours of fuel on board ***at the cruise power setting.***
  6. ICAO Flight Plan

• The ICAO flight plan is an International flight plan (Form 7233-4).

Form Approved OMB No. 2120-0026
09/30/2006

U S Department of Transportation
Federal Aviation Administration

International Flight Plan

PRIORITY <=FF

ADDRESSEE(S) <=

FILING TIME

ORIGINATOR <=

SPECIFIC IDENTIFICATION OF ADDRESSEE(S) AND / OR ORIGINATOR

3 MESSAGE TYPE <=(FPL

7 AIRCRAFT IDENTIFICATION —

8 FLIGHT RULES —

TYPE OF FLIGHT — <=

9 NUMBER —

TYPE OF AIRCRAFT

WAKE TURBULENCE CAT. /

10 EQUIPMENT — / <=

13 DEPARTURE AERODROME —

TIME <=

15 CRUISING SPEED —

LEVEL

ROUTE

<=

16 DESTINATION AERODROME

TOTAL EET HR MIN

ALTN AERODROME

2ND ALTN AERODROME <=

18 OTHER INFORMATION —

<=

19 SUPPLEMENTARY INFORMATION (NOT TO BE TRANSMITTED IN FPL MESSAGES)

ENDURANCE HR MIN — E/

PERSONS ON BOARD P/

EMERGENCY RADIO R/ UHF VHF ELBA

SURVIVAL EQUIPMENT / POLAR DESERT MARITIME JUNGLE

JACKETS / LIGHT FLUORES UHF VHF

DINGHIES

NUMBER CAPACITY COVER COLOR

D / <=

A/ AIRCRAFT COLOR AND MARKINGS

N / REMARKS <=

C/ PILOT-IN-COMMAND)<=

FILED BY

ACCEPTED BY

ADDITIONAL INFORMATION

FAA Form 7233-4 (7-93)

- Flight Rules- This should be VFR or IFR
- Type of flight- All EB flights are to be flown in general
- Type of Aircraft - C172
- Wake Turbulence Category- all wake turbulence is determined by Maximum Certified Takeoff Weight
  - Heavy- MTO of 300,000lbs or more Equipment
  - Medium- MTO of less than 300,000lbs but more than 15,500lbs
  - Light- MTO of 15,500lbs or less

EB Flight Training

ICAO Flight Plan Filing Codes

Model	Tail Number	Year	Serial Number	Tx Type	ADS	Item 10a (Nav, Com, App)	Item 10b (Surveillance)	Item 18 PBN/	Item 18 NAV/	Item 18 PER/	Item 18 REG/	Item 18 CODE/	Item 18 SUR/
C172H	N3735F	1966	17255230	GNX 375 (Built in)	ADB Out+ In	S,B,G,R	E,B2	B2,C2,D2,O2, S2	SBAS	A	N3735F	A6C76C	260B
C172R	N536HF	2000	17280954	Stratus ESG	ADB Out	S,B,G,R	E,B1	B2,C2,D2,O2, S2	SBAS	A	N536H F	AA441FD	260B
C172N	N733KC	1978	17268344	GNX 375 (Built in)	ADB Out+ In	S,B,G,R	E,B2	B2,C2,D2,O2, S2	SBAS	A	N733KC	AA9D714	260B
C172R	N596CS	1997	17280050	Stratus ESG	ADB Out	S,B,G,R	E,B1	B2,C2,D2,O2, S2	SBAS	A	N596C S	A51731764	260B
C172R	N671MA	1999	17280732	Stratus ESG	ADB Out	S,B,G,R	E,B1	B2,C2,D2,O2, S2	SBAS	A	N671M A	AA8E083	260B

- When selecting the equipment box, find the aircraft equipment in the C172 that you are flying.
- Departure Aerodrome- Airport identifier in which you depart from
- Time- Time of departure

- Cruising Speed- True airspeed of the aircraft in the Cruise configuration
- Level- Cruise altitude, for example A045 would be 4,500’ or FL360 would be 36,000’
- Route- The route in which you plan to fly to get to your destination
- Destination Aerodrome- The destination airport identifier
- Total EET- Estimated enroute time, for example 1 hour and 45 mins would be 0145
- Altn Aerodrome- would be the airport you choose as an alternate
- Other information- Could be used for notes such as desired approaches or type of landings
- Endurance- how much fuel in time you have, for example 5 hours and 30 mins of fuel would be 0530
- Persons on Board- Number of people you have total on board including pilots.
- Emergency radio- the Cessna 172 has VHF
- Aircraft color and markings- easily identifiable plane colors should be put here
- Pilot in command- Name and Contact information of the Pilot in Command

6.2 Departure Procedures

Objective:
To develop the ability to properly establish the aircraft on a cross-country route after leaving the departure airport.

Standards:
Follows the pre-planned course by visual reference to landmarks. Identifies landmarks by relating surface features to chart symbols. Navigates by means of pre-computed headings, groundspeed, and elapsed time. Combines pilotage and dead reckoning;

Private: Altitude ±200 feet; Heading ±15°; Verifies position within ±3NM of the flight planned route at all times. Arrives at enroute checkpoints within 5 minutes if computed ETA.

Commercial: Altitude ±100 feet; Heading ±10°; Verifies position within ±2NM of the flight planned route at all times. Arrives at enroute checkpoints within 3 minutes if computed ETA.

Description:

1. NOTE takeoff departure time.
2. Upon appropriate departure from the traffic pattern, fly an appropriate heading to intercept the plotted course.

NOTE: While the heading to intercept the plotted course is at the discretion of the Private/Commercial applicant, it is expected that the intercept angle be appropriate to the aircraft’s current position. It should not excessively add time/ distance to the route unless necessary for traffic, airspace or ATC reasons.

3. Establish position using pilotage, dead reckoning and electronic navigation. The Sectional Chart should be on the pilot’s lab not long after leaving the Airport Traffic Area for visual navigation.

4. Contact Flight Service Station (FSS) to open flight plan.

5. Obtain ATC Flight Following services, if applicable.

6. Level off at selected altitude.

7. Complete the “Cruise” checklist.

8. Calculate the Estimated Times of Arrival (ETA) to the next checkpoint.

9. Maintain course by the use of pilotage, dead reckoning, and radio navigation, as appropriate.

NOTE: If not actually conducting a cross-country flight (for training or FAA Checkride purposes), only simulate contacting FSS and ATC by verbally briefing the facility/frequencies and proper phraseology.

6.3 Diversion to an Alternate under VFR

Objective:
To develop the ability to plot courses in flight to alternate destinations when continuation of the flight to the original destination is impractical or unsafe.

Standards:

Selects an appropriate airport and route. Diverts promptly toward the alternate airport. Makes a reasonable estimate of heading, groundspeed, arrival time, and fuel consumption to the alternate airport; --

Private: Altitude ±200 feet; Heading ±15°.

Commercial: Altitude ±100 feet; Heading ±10°.

Can you make it T H A T F A R? Turn, Heading, Altitude, Time Fuel, Airspace, Radios.

Use the THATFAR acronym and ***fly*** the airplane ***first***!

AVIATE

1. Determine present position and the desired alternate. Then **TURN** to an approximate heading and note the TIME in your log.
2. Once headed toward your selected alternate, determine a precise **HEADING** to your destination.
3. As you pick up your precise heading determine if an **ALTITUDE** change is required for the hemispherical rule, obstructions, airspace, etc.

NAVIGATE

1. Now measure the distance to your new destination and estimate your new ground speed (because your ground speed likely changed with your new heading). With the new distance and approximated ground speed complete a simple Time/Speed/Distance calculation and determine how much **TIME** it will take to make your new destination.

2. With your new time estimate re-calculate your fuel requirement and ensure that you have adequate **FUEL** on board. If not, return to step one and select a new alternate destination!

3. Now safely enroute to your new destination, examine **AIRSPACE** that you will encounter along the way and at your destination and plan ahead accordingly.

COMMUNICATE

Now consider your **RADIO** communication and navigation in priority order. For example, you may communicate with Flight Following or various Approach controls. Also, depending upon the airspace at your destination there may be a control tower, ATIS, etc. Time permitting and with everything well in hand, give a call to flight service and let them know of your change of plans. Use your RADIOs as necessary. Determine NavAids that can be turned along the way to assist your new route. Determine approach NavAids can be tuned in at the new destination – even though you are making a visual approach VFR – to assure you arrive at the correct runway.

6.4 Lost Procedures

Objective:
To develop the ability (Aviation Decision Making (ADM)) to explain and execute lost procedures.

Standards:

Visual prominent landmarks. Uses navigation systems/facilities, as appropriate.

Description:

1. First **Confess** to yourself that you re lost so you can begin your ADM and make good decisions. Maintain aircraft **control** at all times. Remain **Calm** and step by step use ADM to guide your thoughts.

2. Verify heading indicator matches the magnetic **compass**. Reset heading indicator as necessary or note the error.

3. Maintain the original heading or **circle** present position over a prominent landmark.

4. If at a low altitude, **climb** to a higher altitude, if possible.

5. Using the sectional **chart**, attempt to locate and identify any prominent landmark(s);
   a. Turn the sectional chart to match your heading. b. Look outside to find prominent references.
   c. Match landmarks to the chart

6. Use available Navaids (VORs) to determine position by triangulation. Use GPS as appropriate.
   a. VOR use:

- Tune and identify two separate stations in NAV1 and NAV2.

  - Center the CDI on NAV1 with a FROM indication (the head of the needle is the radial from the station).

  - Perform the same procedure on NAV2 using FROM indication.

- Draw the radials extending from each VOR on the Sectional Chart to find the intersection point. Where these radials cross is your location.

b. GPS use:

- Reference moving-map display, or
- Check the “Nearest” page for nearby airport locations, or
- Program “Direct to” (Đ) and check bearing and distance

7. If location is determined, return to the original course or proceed with the flight.
8. If unable to determine position, complete the 5-C’s checklist.
   - Confess – admit you are lost, accept that you need help.
   - Climb – increase altitude for better Navaid/ATC signal reception, terrain clearance and Landmark visibility.
   - Conserve – Select a power/mixture setting that will result in low fuel consumption.
   - Communicate – contact an ATC facility for assistance (such as radar vectoring and/or DF services).
   - Comply – follow any ATC instructions, fuel permitting.
9. If unable to determine a facility frequency, broadcast on 121.5 for assistance. If unable to establish any contact, select 7700 in the transponder.
10. Plan a precautionary landing if deteriorating weather and/or fuel exhaustion is imminent. Transmit your situation on frequency 121.5.

NOTE: Broadcasting on 121.5 should ONLY be done in the event of an actual emergency AND unable to determine an ATC facility frequency.

Section 7
Private Pilot BAI
(Basic Instrument Maneuvers)

7.1 Basic Attitude Instrument Flying (BAIF)

Objective:

Pilots need to develop Instrument skills when visual references outside the cockpit are no longer there. It is important for these skills develop in a way so the pilot is able to fly the aircraft with sole references to the instrument. Understanding and development of these skills are paramount.

Terms:

Primary Instrument – Every instrument flight maneuver has 3 primary instruments. One for Pitch, One for Bank, One for Power. A primary instrument is the instrument which will give a pilot the most information about a flight maneuver and will remain most constant throughout that maneuver.

Secondary Instrument – There may be more than 1 secondary instrument to back up the Primary. The information from a secondary instrument is to confirm the information is correct on the primary instrument. Never rely on the information of one instrument, always back with the secondary instrument.

Control Performance – There are two control instruments: Attitude Indicator and Power Indicator. In the C172 the only power indicator is the engine RPM because the aircraft has a fixed pitch propeller.
All other instruments are Performance Instruments because they verify the aircraft performance based upon inputs to the two Control Instruments. The Control Performance technique uses a simple and easy to remember formula for aircraft control. Pitch (by this we mean Attitude Indicator information including bank as appropriate) PLUS Power EQUALS Performance.
Pitch + Power = Performance.

Skills to be developed:

Scan – The development of a pilot scan is extremely important. Scanning are the eyes moving across each instrument to read the information the instrument is relating to the pilot brain concerning the attitude of the aircraft. Special attention should be made on each primary instrument for each flight maneuver being achieved. REMEMBER – when away from instrument flying for a long time, the first skill lost is the pilot's ability to scan. Pilot's will normally find themselves fixated on one instrument, so the pilot needs to force themselves to scan. The development of a proper scan is a very important skill for a pilot to have.

Cross Check – Every primary instrument for the flight maneuver being completed has one or more secondary instrument. The secondary instrument backs up the information the primary instrument is giving a pilot. This will reinforce the correct information concerning the attitude of the aircraft.

Interpretation – A pilot's brain has to take the information their scanning eyes are getting from the instruments and digest this information as to the attitude of the aircraft. After digesting this information and determining the attitude of the aircraft, the brain then needs to tell the pilot the correct adjustment the pilot needs to make to control their aircraft.

Aircraft Control – Once a pilot's brain has processed all the information and data given to them, it is time for the pilot to make the proper corrections of the aircraft in the form of – Pitch – Bank – Power.

REMEMBER: In instrument conditions with no outside references, a pilot should always rely on their aircraft instruments for the correct information as to the flight condition of the aircraft. Never believe the body, it will give false information to the pilot's brain.

Transition Instrument – The Attitude Indicator is used as a Primary "Transition" Instrument between flight maneuvers. Example: In straight and level wanting to transition into a climb. The pilot would use the attitude indicator to pitch up (like 8 degrees), allow the airspeed to decrease, then add power and continue scan to check the primary instruments for an airspeed climb. Transition is the only time the Attitude Instrument is a primary instrument.

7.2 Straight-and-Level Flight

Objective:

To develop smoothness, coordination, orientation, division of attention and control techniques while flying straight-and-level using instrument references only.

Standards:

Private: Altitude ±200 feet; Heading ±20°; Airspeed ±10 knots.

Description:

1. Adjust pitch attitude using the attitude indicator (Transition Instrument) by positioning the miniature airplane/yellow chevron on the horizon bar/horizon line.

2. Select power for level flight.

3. Re-adjust pitch attitude as necessary to remain in level flight (~ 2° pitch).

4. Hold attitude and allow the airplane to stabilize on the proper airspeed and altitude.

5. Set elevator trim for “hands off” pressure after straight and level flight is achieved.

6. To increase airspeed:

    - Add power (usually to full to allow timely acceleration) and simultaneously apply slight forward pressure on the control wheel, coordinating with rudder.

    - Lower the pitch attitude smoothly to avoid climbing.

    - Set power when desired airspeed is achieved.

    - Set elevator trim for “hands off” pressure.

7. To decrease airspeed:

    - Reduce power (usually 1500 RPM for timely deceleration) and simultaneously apply light back pressure on control wheel, coordinating with rudder.
    - Increase the pitch attitude to avoid descending.
    - Adjust power when desired airspeed is achieved.
    - Set elevator trim for “hands off” pressure.

8. To correct for variations in altitude:

    - Make small pitch changes using the attitude indicator.
    - Monitor the altimeter and hold the altitude within acceptable limits.
    - Pitch corrections should be 1° or 2° at most.

9. To correct for variations indirection/heading:

    - Make a small bank angle change in the direction of deviation using the attitude indicator/roll pointer. Use a bank angle of one- half the heading variation but not to exceed standard rate (i.e., if the heading is off 10° use a bank angle of no more than 5° to correct).

10. Monitor the heading indicator and roll out after achieving the desired heading.

11. Hold the heading with coordinated rudder and bank angle.

7.3 Constant Airspeed Climbs

Objective:

To develop smoothness, coordination, orientation, division of attention and control techniques while executing constant airspeed climbs using instrument references only.

Standards:

Private: Levels off and maintains Altitude ±200 feet; Heading ±20°; Airspeed ±10 knots.

Description:

Establishing and maintaining a Climb

1. Raise the nose to the desired pitch attitude (See Table 3) using the attitude indicator (Transition Instrument) then increase the throttle to full RPM.
2. Hold the new attitude as the airspeed decreases to the desired climb speed. (Airspeed Indicator Primary Pitch Instrument) This will require additional back pressure as airspeed decreases.
3. Monitor the airspeed indicator/airspeed tape for the desired airspeed.
   a. If slower than the desired climb airspeed, *reduce* the pitch attitude slightly to increase the airspeed (use not more than a ~2° pitch adjustment).
   b. If higher than the desired climb airspeed, *increase* the pitch attitude slightly to decrease the airspeed (use not more than a ~2° pitch adjustment).
4. Set elevator trim for "hands off" pressure after the desired airspeed is established.
5. Make minor pitch attitude adjustments to achieve and maintain the desired climb airspeed.

Leveling Off from a Climb

1. Smoothly lower the nose to begin leveling off using the attitude indicator (Transition Instrument). When leveling off from a climb, use a lead of

approximately 10% of the rate of climb (i.e., at 500-fpm rate of climb, begin leveling off 50 feet prior to reaching the desired altitude).

2. Allow the speed to increase towards cruise airspeed.

3. Reaching cruise airspeed, reduce the throttle to cruise power setting.

4. Set elevator trim for “hands off” pressure after cruise altitude and airspeed is obtained.

5. Make small pitch attitude and/or power adjustments to maintain both the desired cruise altitude and airspeed.

7.4 Constant Airspeed Descents

Objective:

To develop smoothness, coordination, orientation, division of attention and control techniques while executing constant airspeed descents using instrument references only.

Standards:

Private: Levels off and maintains Altitude ±200 feet; Heading ±20°; Airspeed ±10 knots.

Description:

Establishing and Maintaining a Descent

1. Reduce throttle, as appropriate (normal descent power 1800 – 2000 RPM). Maintain level altitude (back pressure required) as the airspeed reduces.

2. At the desired descent airspeed, lower the nose attitude using the attitude indicator (Transition Instrument) to the approximate descent attitude (use approx. -1° pitch as the initial reference).

3. Hold the approximate descent attitude until the descent airspeed (Primary Pitch Instrument) is stabilized.

NOTE: The rate of descent should be commensurate with the desired descent angle.

4. Monitor the airspeed indicator/airspeed tape for the desired airspeed.

    - If slower than the desired climb airspeed, *reduce* the pitch attitude slightly to increase airspeed (use not more than a ~2° pitch adjustment).

    - If higher than the desired climb airspeed, *increase* the pitch attitude slightly to decrease the airspeed (use not more than a ~2° pitch adjustment).

5. Make minor pitch changes to achieve and maintain the desired rate of descent and descent airspeed.

* Normal descent angles are approximately 3.00°. This usually requires 500- fpm, plus or minus for a given tailwind or headwind, respectively.

NOTE: Approximate values rounded to nearest 50-fpm for simplicity. These numbers are approximate depending on Gross Weight and DA. Slight adjustments may be required, but these numbers should be close.

Leveling Off from a Descent

1. Smoothly raise the nose to begin leveling off using the Attitude Indicator (Transition Instrument) while simultaneously increase power to cruise flight setting (cruise RPM).
2. When leveling off from a descent lead by approximately 10% of the rate of descent. (i.e., at 500-fpm rate of descent, begin leveling off 50 feet prior to reaching the desired altitude).
3. Set elevator trim for “hands off” pressure after cruise altitude and airspeed is obtained.

7.5 Turns to Headings

Objective:

To develop smoothness, coordination, orientation, division of attention and control techniques during turns using instrument references only.

Standards:

Private: Altitude ±200 feet; Bank as required to maintain standard rate of turn; Roll out on assigned Heading ±10°; Airspeed ±10 knots.

Description:

Entering and maintaining a turn:

1. Roll into the turn using the attitude indicator (Transition Instrument) with coordinated aileron and rudder pressure to approximately 15 degrees of bank.

2. The necessary bank angle for Standard Rate depends upon the aircrafts airspeed.

NOTE: The required bank angle for a standard rate turn can be determined by taking the airspeed and dividing by 10, then adding 5 to the result.

Examples:
100 KIAS divided by 10 equals 10, plus 5 equals 15° bank 80 KIAS divided by 10 equals 8, plus 5 equals 13° bank

3. Maintain a constant bank angle and standard rate of turn (3° per second), (Primary Bank Turn Coordinator)

4. Monitor the altimeter and hold the required back pressure on the elevator to compensate for the loss in vertical component of lift.

Rolling out from the turn on desired heading

1. Begin the recovery from the turn with the appropriate lead prior to reaching the desired heading using the attitude indicator (Primary Transition). Lead the roll out from the turn by approximately 1⁄2 of the bank angle.

2. Roll wings level using coordinated aileron and rudder control.

3. Lower the pitch attitude slightly to maintain altitude.

7.6 Recovery from Unusual Flight Attitudes

Objective:

To develop proficiency in recovery from unusual attitudes that may be encountered during flight in instrument meteorological conditions.

Standards:

Recognizes unusual flight attitudes solely by reference to instruments; recovers promptly and smoothly to a stabilized level flight attitude using the correct sequence of control inputs.

Description:

Recovery from nose high attitude:

1. Recognize nose high unusual attitude:
    - Initially, observe the ***airspeed trend***. Rapid decrease in airspeed is the first indication of abnormal nose high attitude.
    - Confirm nose attitude by referencing attitude indicator and increasing altitude on the altimeter.
2. Recover by:
    - Applying full power.
    - Applying forward elevator pressure to lower the nose towards the horizon line.
    - Leveling the wings using coordinated aileron and rudder pressure.
3. Adjust to maintain level flight when:
    - Airspeed indicator trend begins reversing direction.
    - Altimeter tape/needle stops movement
    - Vertical speed indicator/needle reverses direction.
    - Check flight instruments for any malfunctions

- Return to and resume assigned altitude and heading.

Recovery from nose low attitude

1. Recognize nose low unusual attitude:

    - Initially, observe the ***airspeed trend.*** Rapid increase in airspeed is the first indication of abnormal nose low attitude.

    - Confirm nose attitude by referencing attitude indicator and decreasing altitude on the altimeter.

2. Recover in the following order:

    - Reducing power to idle.

    - Leveling the wings using coordinated aileron and rudder pressure.

    - Applying aft elevator pressure to increase the pitch attitude

NOTE: The power adjustment must always be made first. In the case of a nose down attitude, wings must be brought to level before pitching up. This is to limit the load factor.

3. Adjust to level flight when:

    - Airspeed indicator trend reverses direction.

    - Altimeter tape/needle stops movement.

    - Vertical speed indicator/needle reverses direction.

    - Check flight instruments for any malfunctions

4. Return to and resume assigned altitude and heading.

NOTE: The objective of this maneuver is to avoid a critically high airspeed and load factor, as well as preventing major loss of altitude. Recoveries must be prompt yet smooth.

Section 8
Basic Flying Skills Development

8.1 Four Fundamentals

1. Straight and Level

How does a pilot know the aircraft is Straight and Level? Simple: Prevent it from pitching and prevent it from banking. How is this accomplished?
Look at the Wing Tips of the aircraft. If the Leading Edge (Front of the wing) to the Trailing Edge (Back of the wind) are ***level with the horizon***, the aircraft is not Climbing nor Descending – Level Flight.

If the Horizon is ***equal distance*** between it and the wing on both sides, the aircraft is not banked.

This is the SIGHT PICTURE for Straight and Level and the pilot needs to become familiar with this configuration and sight picture.

Normal power setting depends on the aircraft being flown. Airspeed 95-100 KIAS.

If the pilot cannot see the horizon because the wing is in the way, that wing is too low and the aircraft is turning.

2. Climbs

A. To make an airplane climb from Straight and level, pitch the nose up, as the forward horizon disappears, the pilot's eyes should transfer to the LEFT SIDE of the Instrument Panel to obtain the proper sight picture for that AOA (Angle of Attack). Remember, when the nose is high, you cannot see the horizon in front of you so therefore your brain needs to keep track of the horizon and looking to the left between the instrument panel and windshield support will give your brain the proper information. (Sight Picture)

The pilot's eyes should also look at the Wing Tip and they should see the Leading Edge of the wing higher that the trailing edge which indicates the climb.

B. As the load on the propeller increases, the RPM will decrease. At this point, smoothly increase power to full.

C. Remember, with a positive AOA, Right Rudder is necessary to compensate for "P" Factor. The Right Rudder will also compensate for the Torque of the Engine as the power is increased and the airspeed is reduced.

D. Make small adjustments with the pitch to obtain desired airspeed and sight picture.

E. The climb may be practiced at different airspeeds. However, the majority of beginning student practice should be at 75 KIAS so the Pilot gets use to this Sight Picture.

Transition into Straight and Level from a climb

A. Approximately 50 feet before the desired altitude, push forward on the control yoke (Elevator) until the proper sight picture is obtained for Straight and Level.
B. Allow the aircraft's speed to increase. As the speed approaches 95 KIAS, reduce power.

Leading Edge (Front of Wing) Higher than the Trailing Edge - CLIMB

3. Descents

To make a proper descent from straight and level and getting ready for the Traffic Pattern, a descent should begin with;

A. Reduce the power to 1500 RPM. (Remember, when the power is reduced, the nose wants to go down) The pilot should maintain the same forward sight picture of level flight by adding back pressure (elevator) until the airspeed approaches 80 KIAS. Then allow the nose to drop slightly to maintain the descent, the sight picture and airspeed of 80 KIAS.

The pilot should also look at the wing tip and should see the Leading edge slightly lower that the trailing edge, indicating the aircraft is in a descent.

B. Properly trim the aircraft by taking the pressure off the fingers on the yoke so the aircraft maintains the same sight picture and airspeed.

Transition into Straight and Level from a Descent

A. Approximately 50 feet before the desired altitude, ease the nose up with back pressure on the yoke (elevator) until the proper sight picture is obtained for Straight and Level.

B. At the same time the one hand is easing back (elevator) to level the aircraft (sight picture), the other hand should be increasing the power to cruise RPM to allow the aircraft begin moving to the normal cruise sight picture.

4. Turns

To learn how to make a proper turn in an aircraft, the pilot must learn there are 3 controls that make an aircraft turn in level flight. There are 2 controls that make it roll. ***First***, use the Ailerons to start the aircraft rolling. When you do this you will introduce drag on the high wing which will yaw the aircraft away from the turn so now, ***secondly*** you must now apply Rudder in the direction of the turn. Finally, additional lift in a horizontal direction is required to cause the aircraft to turn so, ***thirdly*** you must now apply elevator just enough to maintain altitude. This provides horizontal lift to turn the aircraft.

Now let's review the three controls individually and how the pilot needs to develop a feel for an aircraft and make the airplane an extension of their body.

Ailerons – At altitude; to FEEL the aircraft and what the ailerons do, the pilot should place their feet flat on the floor, off of the rudders. Pick a point on the nose in front of the aircraft. As you make your turn to the left, you will see the nose first move to the right and then back around to the left. Neutralize the control yoke (straight across-no pressure) and allow the aircraft to roll. (Remember – when the strut of the 172 is parallel to the earth surface, the aircraft is in a 30-degree bank). The pilot will see with the controls neutralized, the aircraft will continue rolling and maintain the same bank however it starts a slight descent. As the pilot wants to roll the aircraft back to straight and level, Right Aileron (opposite of the turn) will be used. As the aileron is used, the pilot will see the nose continue to move to the left and then, back to the right.

FEEL THE AIRCRAFT – What was just described is the wrong way to make a turn and if the pilot listens to their body (the pilot will FEEL the wrong). The pilot will FEEL this in the butt. The butt has 2 bones under each cheek. When making this Left turn with no rudder, the bone on the left cheek will dig harder into the seat than the right side. (The opposite is true for the Right Turn). If the pilot moves the ailerons left and right, the pilots butt will squirm back and forth. Using just the Ailerons is the wrong way to make a turn and you will FEEL it in the SEAT OF YOUR PANTS!

RUDDER – At altitude; to FEEL the effects of the rudder, trim the aircraft to straight and level. Place your feet properly on the rudder pedals (balls of the feet on the bottom) and remove hands from the ailerons. The pilot needs to watch the nose of the aircraft as they push on the Left Rudder. The nose of the aircraft will Slide across the sky to the left (Yaw) and then bank to the left. Once in a bank, neutralize the rudder (relax the feet) and the aircraft will maintain that bank. To roll back out of this bank, the pilot needs to apply opposite rudder (Right) and watching the nose of the aircraft, the nose will slide (yaw) across the sky to the right as the aircraft rolls out to level.

FEEL THE AIRCRAFT - The pilot will FEEL this motion with their Upper Torso, shoulders area. As the pilot applies the rudder, the pilot will feel the upper part of their body move in the opposite direction. Step on left rudder, the torso moves to the Right. If the pilot moves the rudder left then right, the pilot will feel the movement in their upper torso. Just using the is the wrong way to make a turn and you will FEEL it in your upper body.

Elevator – The aircraft is turned in level flight by vectoring some of its lift in a horizontal direction. To gain the extra lift to account for the lift being vectored, the pilot must now apply elevator just enough to maintain altitude. This provides horizontal lift to turn the aircraft.

A proper turn – To make a proper turn, a pilot needs to move the Aileron and the Rudder together in the same direction to roll the aircraft with no yaw motion inside or outside of the turn. If the ailerons move fast, the rudder moves fast. If a pilot uses a lot of aileron, the pilot needs to use a lot of rudder. If too much aileron is used and not enough rudder, the pilot will FEEL it in the seat of their pants. If the pilot uses too much rudder, the pilot will FEEL it in their upper torso. The sight picture of a proper turn is for a pilot to look to the front, when applying left aileron and left rudder properly, the nose of the aircraft will begin rolling left the same time the wings begin to bank.

At this point the pilot must create additional horizontal lift to turn the airplane or it will start a descent. Smoothly apply a slight amount of backward pressure on the yoke. Gently pull it toward you, this is called “back pressure”. This allows the wing to create more lift, some of which is vectored horizontally and the aircraft makes a level turn.

Aileron to initiate a roll, rudder to correct the yaw and elevator to create more lift. Three controls, a proper level turn.

FEEL THE AIRCRAFT – Make it an extension of your body!

8.2 Trimming the Aircraft

The Cessna 172 has an Elevator Trim. The trim is used to ASSIST a pilot while flying. A nose up attitude may be necessary for a long distance. A pilot may trim the nose up to maintain the pitch attitude. Then the pilot may be doing straight and level, the elevator trim may be set to hold that attitude.

The pilot needs to FEEL the elevator pressure in their hand. If the pilot wants to do Straight and Level and once the sight picture is established and the power is set, should the pilot feel yoke pressure on their hand, the aircraft needs to be "Trimmed Out". If the yoke pressure is against the Palm of the hand and the pilot is pushing slightly forward, the "Trim Wheel" needs to be slowly rolled forward till there is no pressure on the hand. If the yoke pressure is on the fingers and the pilot is pulling back, the "Trim Wheel" needs to be slowly rolled backwards till there is no pressure on the hand.

The aircraft may be "trimmed out" for Straight and Level, Climbs or Descents.

8.3 Pitch – Power Relationship

Pilots need to be able to Slow an aircraft down or speed it up and maintain the same altitude. There is a direct relationship between the Pitch of the aircraft (AOA) and Power needed to keep the aircraft's altitude. These skills will be tested when flying the traffic pattern.

In straight and level flight, in the Cessna 172, the pilot will use recommended RPM and the aircraft will have an airspeed around 95 KIAS. However, suppose the pilot needed to slow the aircraft down to 75 KIAS and maintain the same altitude. This will require a decrease in power (1500 RPM to start). When the power is reduced, the positive stability in this aircraft will make the nose go down. The pilot needs to maintain the same level sight picture by increasing the back pressure on the elevator. Eventually, the nose will need to rise above the horizon as the airspeed approaches 75 KIAS. At this point, power should be increased (approx. 2000 RPM) and the aircraft should be properly trimmed. Should the airspeed be to slow, increase the power 100-200 RPM's and slightly lower the pitch.

8.4 Effect of the Flaps

A pilot needs to know what effect flaps make on the aircraft. If the aircraft is in level flight at 80 KIAS, (see Pitch-Power relationship), the pilot can lower 10-degees of flaps. The pilot will see the nose rise above the horizon. If the pilot removes the flaps (back to 0-degrees), the nose will drop below the horizon.

As a pilot needs flaps, the nose of the aircraft must be controlled. When a pilot is ready to add flaps, (for a flight maneuver or coming in for landing) the pilot needs to look at the sight picture they desire to maintain. As the flaps are lowered, the pilot needs to push the control yoke forward and maintain the same sight picture. Should another “Notch” of flaps be needed, the same sight picture is maintained as the flaps lower and the pilot eases the yoke forward again. “Trim” may become necessary to relieve the pressure on a pilot’s hand.

As the flaps are raised, the aircraft will feel like it wants to “sink”. The pilot will need to ease the yoke backward to keep the aircraft from sinking. At this point, normally the aircraft has full power to stabilize the airplane and sink becomes minimal.

8.5 Wind Drift Circle

Not required in ACS.

This maneuver is used for a pilot to figure out what the direction of the wind is moving the airplane.

1. Find a reference point (Cross road, Section lines crossing, etc.) The pilot Should also have a place to land in case of emergency.

2. Altitude for this maneuver should be approximately 800' AGL.

3. Fly the aircraft right over the reference point at cruise power and airspeed.

4. Roll into a left 30-degree bank (Wing strut parallel to the ground)

5. Do not vary the bank and continue 360 degrees around and roll out. The key here is to maintain a ***constant bank.***

6. Visually look at the intersection (Reference point) and the pilot will be Looking into the wind.

8.6 Flight Along a Road

Not required in ACS.

The flight along a road is used to help a Pilot understand how the wind effects the aircraft as it tracks over the ground. A pilot needs to learn about WCA (Wind Correction Angle) also known as “Crab Angle”

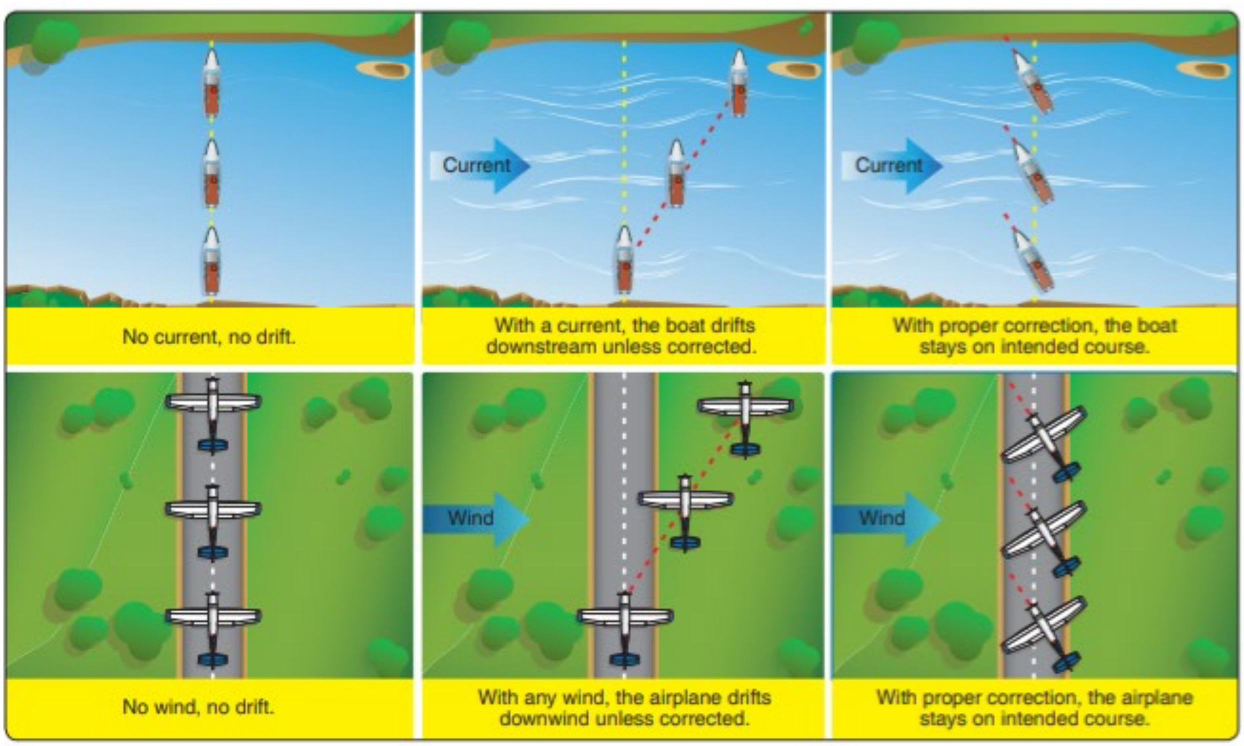
1. After completing the Wind Drift Circle, the pilot then knows what direction the wind is coming from. Pick a long road or reference line PERPENDICULAR to the wind.

2. Cruise power, Cruise airspeed, 800’ AGL. (Remember, always have a place to land in case of emergency).

3. First, keep the longitudinal axis parallel with the road. The aircraft will Begin to drift downwind of the road.

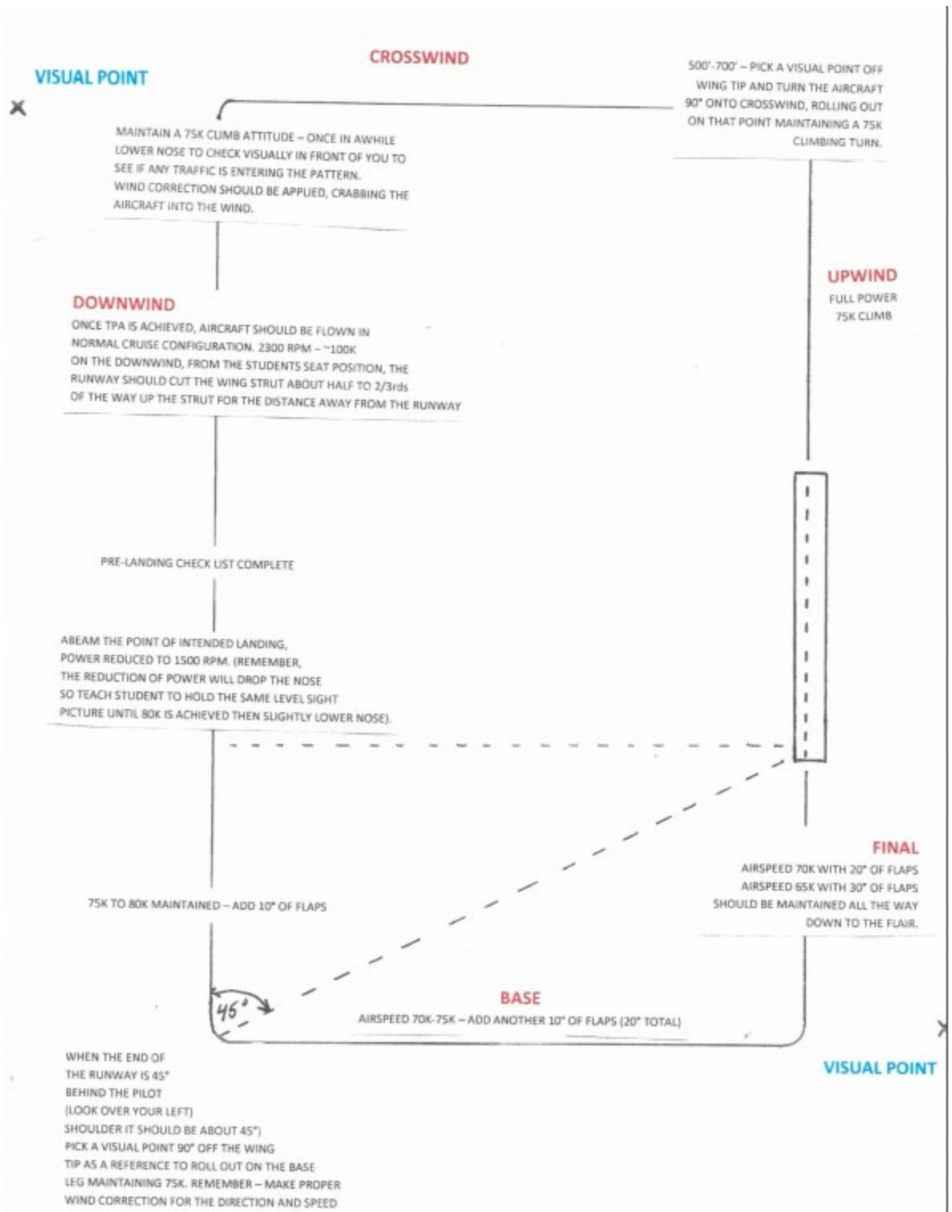
4. Turn the aircraft around 180 degrees and place it back over the road, however, this time make a slight heading adjustment into the wind “Crab Angle: to keep the aircraft over the road. Not enough “Crab Angle”

the aircraft will drift downwind of the road. Too much, the aircraft will drift upwind of the road. Pilots need to figure out what would be just right.

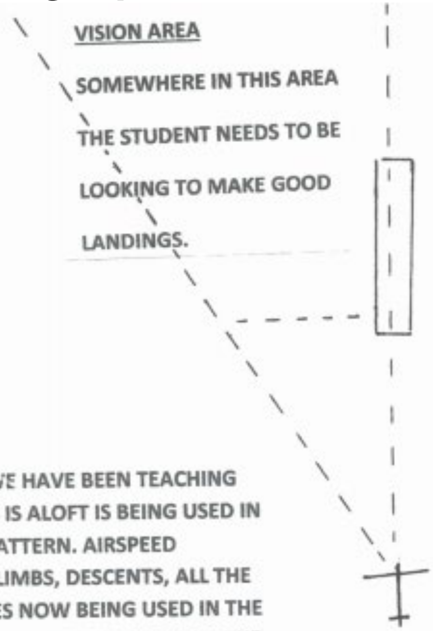


8.7 Traffic Pattern Tips

Be aware that at a towered airport there are 6 legs in the traffic pattern. See the AIM Chapter 4. The departure leg begins at lift-off and ends at 300 feet below TPA or 1⁄2 mile past the end of the departure runway, whichever occurs first.



8.8 Landing Tips



STUDENT EYE MOVEMENT

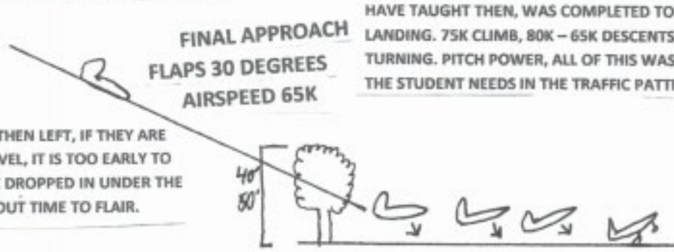
WHEN THE AIRCRAFT IS ON FINAL APPROACH TO THE RUNWAY, INSTRUCTORS NEED TO TEACH EYE MOVEMENT. STUDENT NEEDS TO LOOK OUT STRAIGHT AHEAD AS POSSIBLE, AND BRING THEIR EYES BACK IN CLOSER. THEY MOVE THEM TO THE LEFT BETWEEN THE WINDSHIELD POST AND INSTRUMENT PANEL, THEN MOVE THEM CLOSER. THIS NEED TO BE CONTINUOUS BUT FAST. THE BRAIN NEEDS TIME TO ABSORB THE INFORMATION. I KEEP REMINDING THEM, "FORWARD – SIDE, FORWARD – SIDE, FORWARD – SIDE" UNTIL YOU CAN SEE IN THEIR EYES THIS MOVEMENT.

EVERYTHING WE HAVE BEEN TEACHING THE STUDENTS IS ALOFT IS BEING USED IN THE TRAFFIC PATTERN. AIRSPEED CONTROL IN CLIMBS, DESCENTS, ALL THE SIGHT PICTURES NOW BEING USED IN THE TRAFFIC PATTERN. THE FINAL PART IS THE EYE MOVEMENT WHICH YOU HAVE BEEN TEACHING DURING STALLS, SLOW FLIGHT, ETC. NOW IS WHEN ALL THIS TRAINING STARTS TO PAY OFF.

DESCENT – FLAIR – LANDING

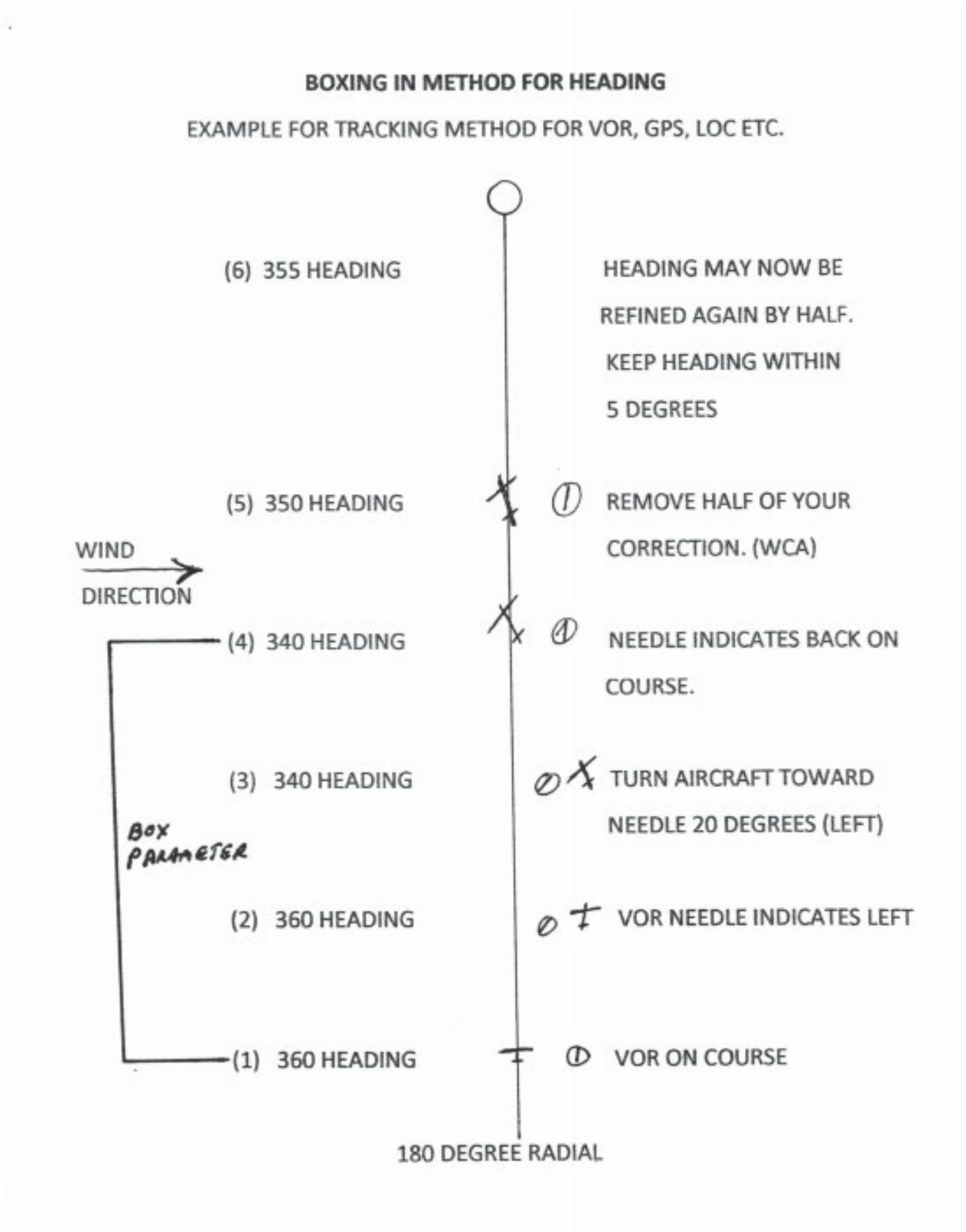
A GOOD LANDING IS NOT MADE IN THE LAST 15 SECONDS OF TOUCHDOWN. A GO LANDING HAPPENS BECAUSE OF A SOUND TRAFFIC PATTER BEING FLOWN. MAINTAINING AIRSPEEDS, SIGHT PICTURES AND PROCEDURES. EVERYTHING YOU HAVE TAUGHT THEN, WAS COMPLETED TO GET THEM TO THE TRAFFIC PATTERN A LANDING. 75K CLIMB, 80K – 65K DESCENTS, CLIMBING THEN LEVEL OFF WHILE TURNING. PITCH POWER, ALL OF THIS WAS DONE TO DEVELOP THE SIGHT PICTURE THE STUDENT NEEDS IN THE TRAFFIC PATTERN.

THE FLAIR SHOULD BE STARTED AROUND 20-25 FEET ABOVE THE RUNWAY. TO HELP THE STUDENT ESTIMATE THIS ALTITUDE, WE USE THE TREES, HANGARS, ETC. TREES ARE APPROXIMATELY 40-50 FEET TALL. SO, AS THE STUDENT IS ON FINAL, AS THEY LOOK TO THE LEFT, THEN FRONT, THEN LEFT, IF THEY ARE ABOVE TREE TOP LEVEL, IT IS TOO EARLY TO FLAIR. IF THEY HAVE DROPPED IN UNDER THE TREE TOPS, IT IS ABOUT TIME TO FLAIR.



ONCE THE FLAIR IS ACCOMPLISHED AND THE AIRCRAFT IS IN LEVEL FLIGHT ABOUT 10 FEET ABOVE RUNWAY, THE AIRCRAFT IS TOO FAST TO LAND. IT NEEDS TIME TO SLOW DOWN. AS THE AIRPLANE SLOWS DOWN, IT WANTS TO SINK TOWARD THE RUNWAY. THIS MEANS THE PILOT NEEDS TO INCREASE THEIR BACK PRESSURE ENOUGH TO KEEP THE PLANE 10 FEET ABOVE THE RUNWAY. THE AIRPLANE SLOWS DOWN, THE PLANE WANTS TO DROP, MORE BACK PRESSURE ON ELEVATOR TO MAINTAIN ALTITUDE. AS THE AIRPLANE SLOWS DOWN, THE PLANE WANTS TO DROP, MORE BACK PRESSURE ON ELEVATOR TILL THE MAIN GEAR TOUCHES DOWN AND THE NOSE GEAR IS IN THE AIR. A PERFECT LANDING IS WHEN THE STALL WARNING GOES OFF WHEN THE MAIN WHEELS TOUCH THE GROUND. THE PLANE IS DONE FLYING.

8.9 VOR – GPS Tracking Procedures



Section 9 Appendices

9.1 Single-Pilot Resource Management (SRM)

Define the term "single-pilot resource management."

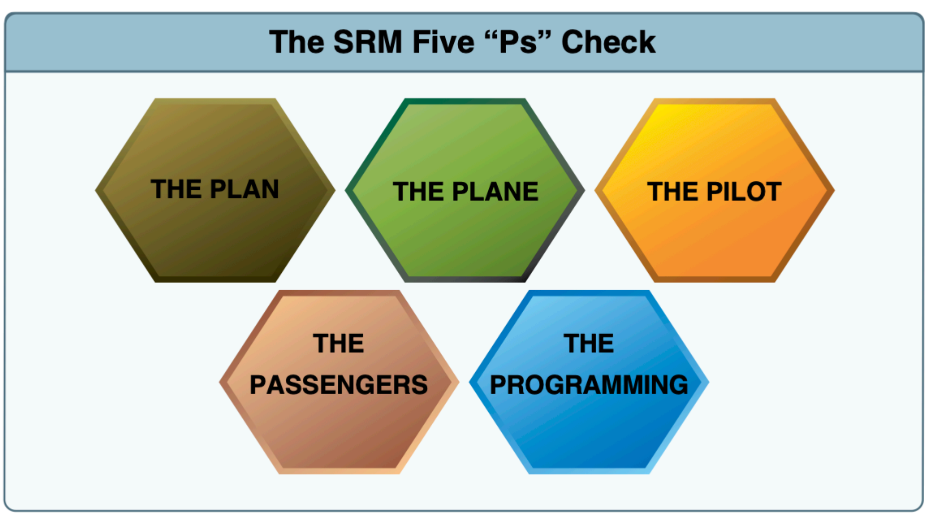
SRM is the act of managing all the resources (both onboard the aircraft and from outside sources) available to a single pilot (prior to and during flight) to ensure the successful outcome of the flight.

What are the primary examples of resources available inside and outside the aircraft?

Inside the aircraft a pilot may have access to advanced avionics (GPS/FMS systems, moving map displays, onboard databases containing publications and frequencies, and Automated Flight Control Systems) and passengers who may perform a function for the pilot. Outside the aircraft a pilot may utilize ATC services, FSS and EFAS, and company (dispatch) personnel to confer with.

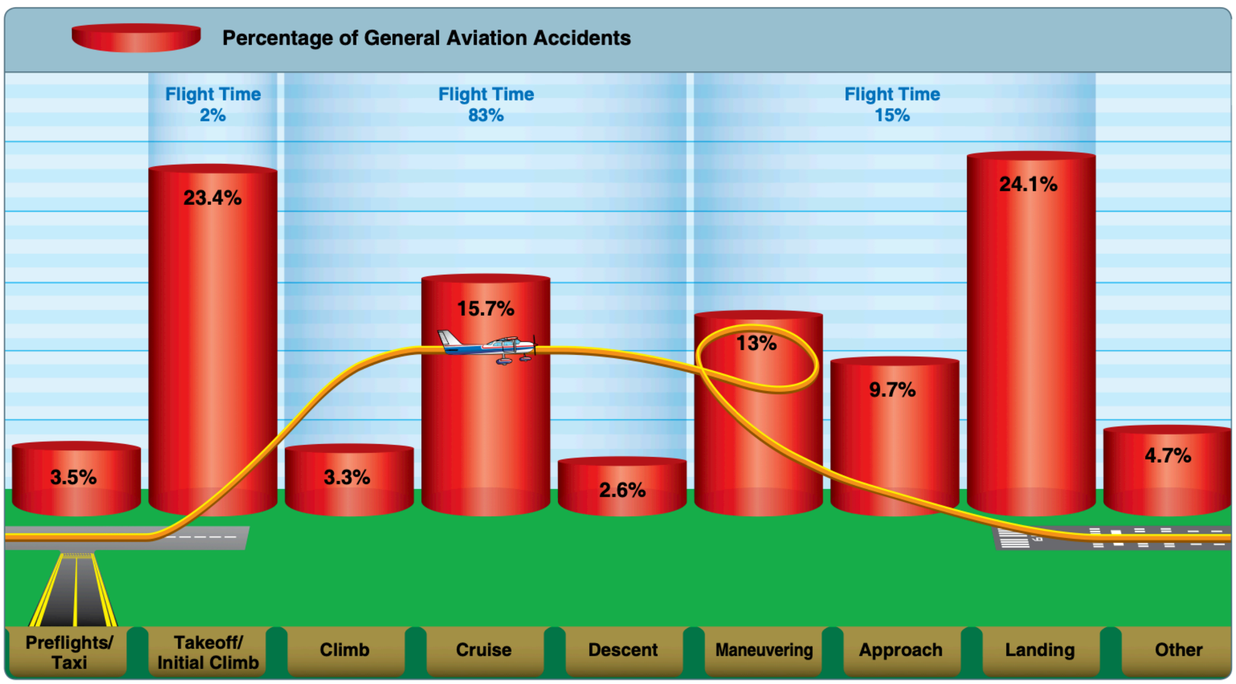
What practical application provides a pilot with an effective method to practice SRM?

The "Five P" (5P) checklist consists of the Plan, the Plane, the Pilot, the Passengers, and the Programming. It is based on the idea that the pilot has essentially five variables that impact his or her environment that may expose a risk. It also represents five key areas where the single-pilot may derive "resources" to fully exercise SRM. This 5P check should be performed periodically (such as pre-takeoff, climb, midpoint in flight, pre-descent, and prior to FAF/entering traffic pattern).

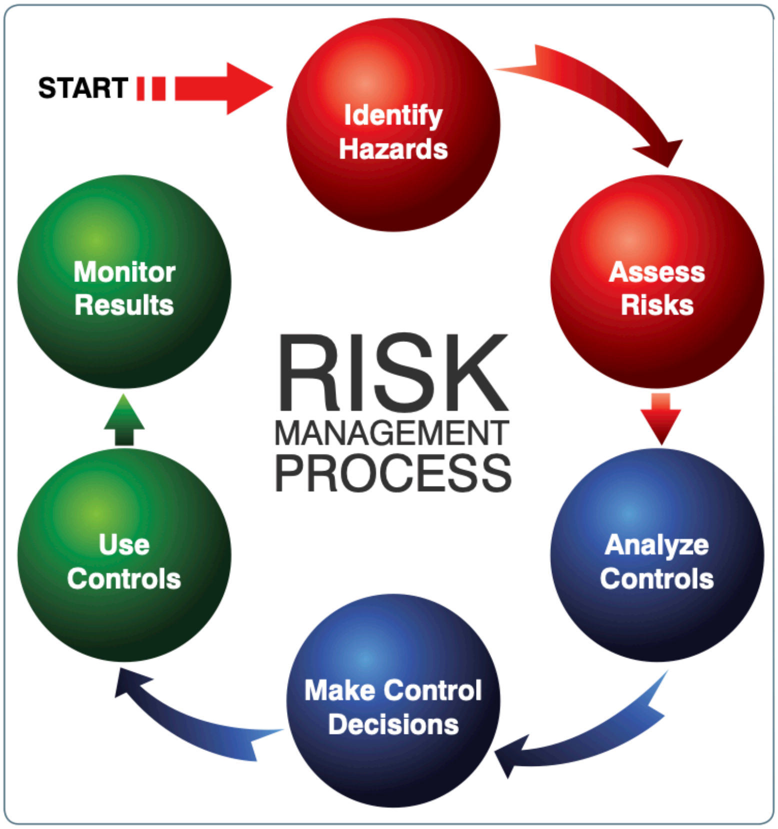


9.2 Aeronautical Decision Making and Risk Management (ADM/RM)

The importance of learning and understanding effective ADM skills cannot be overemphasized. While progress is continually being made in the advancement of pilot training methods, aircraft equipment and systems, and services for pilots, accidents still occur. Despite all the changes in technology to improve flight safety, one factor remains the same: the human factor which leads to errors. It is estimated that approximately 80 percent of all aviation accidents are related to human factors and the vast majority of these accidents occur during landing (24.1 percent) and takeoff (23.4 percent).



The goal of risk management is to proactively identify safety-related hazards and mitigate the associated risks. Risk management is an important component of ADM. When a pilot follows good decision-making practices, the inherent risk in a flight is reduced or even eliminated. The ability to make good decisions is based upon direct or indirect experience and education. The formal risk management decision-making process involves six steps.



As you work through the ADM cycle, it is important to remember the four fundamental principles of risk management.

1. Accept no unnecessary risk. Flying is not possible without risk, but unnecessary risk comes without a corresponding return. If you are flying a new airplane for the first time, you might determine that the risk of making that flight in low visibility conditions is unnecessary.

2. Make risk decisions at the appropriate level. Risk decisions should be made by the person who can develop and implement risk controls. Remember that you are pilot-in-command, so never let anyone else—not ATC and not your passengers—make risk decisions for you.

3. Accept risk when benefits outweigh dangers (costs). In any flying activity, it is necessary to accept some degree of risk. A day with good weather, for example, is a much better time to fly an unfamiliar airplane for the first time than a day with low IFR conditions.

4. Integrate risk management into planning at all levels. Because risk is an unavoidable part of every flight, safety requires the use of appropriate and effective risk management not just in the preflight planning stage, but in all stages of the flight.

A way to mitigate risk is to perceive hazards is by incorporating the PAVE checklist into preflight planning, the pilot divides the risks of flight into four categories: Pilot-in-command (PIC), Aircraft, enVironment, and External pressures (PAVE) which form part of a pilot's decision- making process. With the PAVE checklist, pilots have a simple way to remember each category to examine for risk prior to each flight.

Once a pilot identifies the risks of a flight, he or she needs to decide whether the risk, or combination of risks, can be managed safely and successfully. If not, make the decision to cancel the flight. If the pilot decides to continue with the flight, he or she should develop strategies to mitigate the risks. One way a pilot can control the risks is to set personal minimums for items in each risk category. These are limits unique to that individual pilot's current level of experience and proficiency.

Pilot

A pilot must continually make decisions about competency, condition of health, mental and emotional state, level of fatigue, and many other variables. For example, a pilot may be called early in the morning to make a long flight. If a pilot has had only a few hours of sleep and is concerned that the congestion being experienced could be the onset of a cold, it would be prudent to consider if the flight could be accomplished safely.

A pilot had only 4 hours of sleep the night before being asked by the boss to fly to a meeting in a city 750 miles away. The reported weather was marginal and not expected to improve. After assessing fitness as a pilot, it was decided that it would not be wise to make the flight. The boss was initially unhappy, but later convinced by the pilot that the risks involved were unacceptable.

Environment

This encompasses many elements not pilot or airplane related. It can include such factors as weather, air traffic control, navigational aids (NAVAIDS), terrain, takeoff and landing areas, and surrounding obstacles. Weather is one element that can change drastically over time and distance.

A pilot was landing a small airplane just after a heavy jet had departed a parallel runway. The pilot assumed that wake turbulence would not be a problem since landings had been performed under similar circumstances. Due to a combination of prevailing winds and wake turbulence from the heavy jet drifting across the landing runway, the airplane made a hard landing. The pilot made an error when assessing the flight environment.

Aircraft

A pilot will frequently base decisions on the evaluations of the aircraft, such as performance, equipment, or airworthiness.

During a preflight, a pilot noticed a small amount of oil dripping from the bottom of the cowling. Although the quantity of oil seemed insignificant at the time, the pilot decided to delay the takeoff and have a mechanic check the source of the oil. The pilot's good judgment was confirmed when the mechanic found that one of the oil cooler hose fittings was loose.

External pressures

The interaction between the pilot, airplane, and the environment is greatly influenced by the purpose of each flight operation. The pilot must evaluate the three previous areas to decide on the desirability of undertaking or continuing the flight as planned. It is worth asking why the flight is being made, how critical is it to maintain the schedule, and is the trip worth the risks?

On a ferry flight to deliver an airplane from the factory, in marginal weather conditions, the pilot calculated the groundspeed and determined that the airplane would arrive at the destination with only 10 minutes of fuel remaining. The pilot was determined to keep on schedule by trying to "stretch" the fuel supply instead of landing to refuel. After landing with low fuel state, the pilot realized that this could have easily resulted in an emergency landing in deteriorating weather conditions. This was a chance that was not worth taking to keep the planned schedule.

9.3 Safety Risk Definitions

During each flight, the single pilot makes many decisions under hazardous conditions. To fly safely, the pilot needs to assess the degree of risk and determine the best course of action to mitigate the risk.

Likelihood of an Event

Likelihood is nothing more than taking a situation and determining the probability of its occurrence. It is rated as probable, occasional, remote, or improbable. For example, a pilot is flying from point A to point B (50 miles) in marginal visual flight rules (MVFR) conditions. The likelihood of encountering potential instrument meteorological conditions (IMC) is the first question the pilot needs to answer. The experiences of other pilots, coupled with the forecast, might cause the pilot to assign “occasional” to determine the probability of encountering IMC.

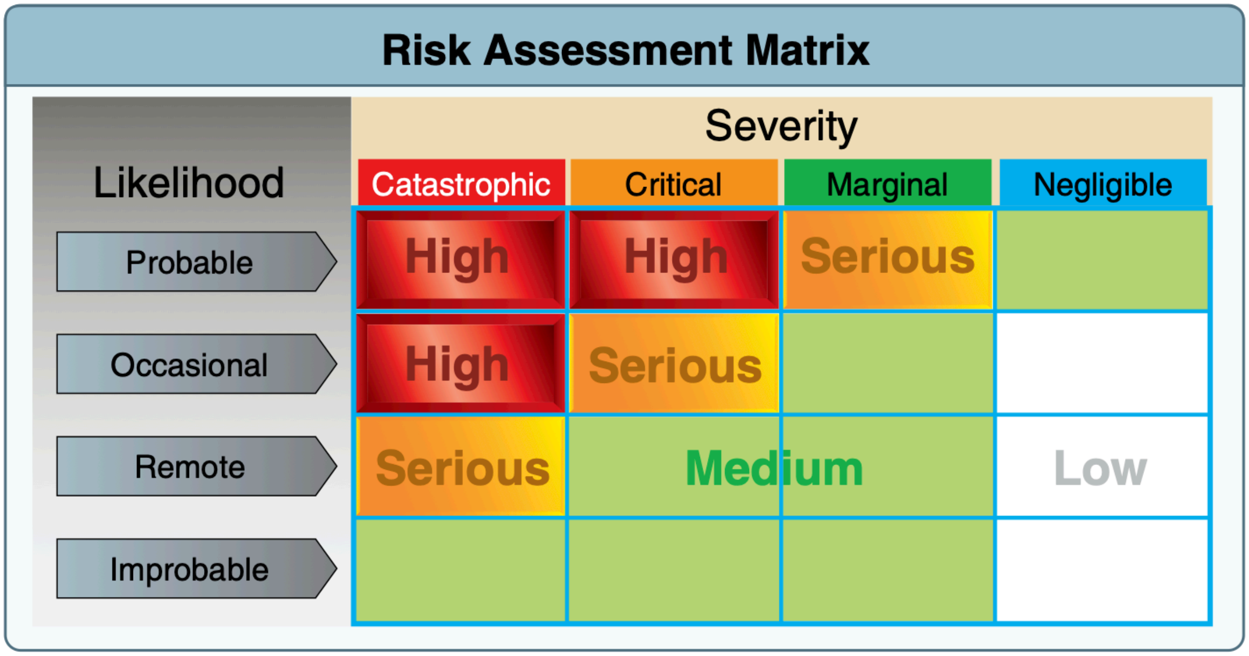
Severity of an Event

The next element is the severity or consequence of a pilot’s action(s). It can relate to injury and/or damage. If the individual in the example above is not an instrument rated pilot, what are the consequences of him or her encountering inadvertent IMC conditions? In this case, because the pilot is not IFR rated, the consequences are catastrophic.

The following are guidelines for making assignments:

- Probable—an event will occur several times
- Occasional—an event will probably occur sometime
- Remote—an event is unlikely to occur, but is possible
- Improbable—an event is highly unlikely to occur
- Catastrophic—results in fatalities, total loss
- Critical—severe injury, major damage
- Marginal—minor injury, minor damage
- Negligible—less than minor injury, less than minor system damage

9.4 Safety Risk Matrix



9.5 Determining Aircraft Airworthiness

FAR §91.7 requires the PIC to ensure the aircraft is airworthy prior to each flight. Airworthiness is defined as an aircraft that is safe and legal to fly.

9.6 Inoperative Instrument/Equipment Decision Making Sequence – Applying FAR § 91.213(d)

(NOTE: This is the non-MEL procedure. If using an MEL, the pilot must refer to the approved MEL for inoperative equipment)

During preflight inspection, the pilot recognizes inoperative instruments and/or equipment

Is the equipment required by the aircraft's Kinds of Operations Equipment List (KOEL)? *(Located in the AFM, Section 2 – Limitations. NOTE: Some "Kinds of Operations" lists only refer the pilot to the applicable part of Part 91 or Part 135)*	→	If **YES,** the aircraft is unairworthy and maintenance is required

If **NO,** is the equipment required by FAR §§ 91.205, 91.207, 91.215? *(Verify VFR/IFR day/night operation requirements in §91.205, ELT requirements in §91.207 and transponder requirements in §91.215)*	→	If **YES,** the aircraft is unairworthy and maintenance is required

If **NO,** is the equipment required by an AD? *(Sometimes a specific piece of equipment was added after the aircraft's Type Certification through an AD. Generally, only referring to a qualified maintenance person can this be easily determined)*	→	If **YES,** the aircraft is unairworthy and maintenance is required

If **NO,** is the equipment required by the VFR-day Type Certificate requirements? *(These requirements are summarized in the Type Certificate Data Sheet* for the specific aircraft)*	→	If **YES,** the aircraft is unairworthy and maintenance is required

If **NO,** the inoperative equipment must be removed from the aircraft		

At this point the pilot shall make a final determination to confirm that the inoperative instrument/equipment does not constitute a hazard under the anticipated operational conditions. If in the opinion of the PIC no hazard exists, the flight may now continue.

* The Type Certificate Data Sheet (TCDS) outlines the technical requirements for each type of aircraft certificated by the FAA. It details the operating limitations (which are printed in the AFM/POH) and also references the applicable parts of FAR 23. Generally, pilots do not readily have access to this, so conservatively evaluate any component/equipment that is not listed in the KOEL/FARs as *required for flight.*

Essentially, all major airframe, powerplant and electrical components are *required* by the VFR-day Type Certificate, plus basic VFR-day instruments/equipment as prescribed in §91.205.