



Flight Maneuvers Standardization Guide

GT Aviation

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Acknowledgements



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- ▶ Thanks are also owed to those of you embrace the intent set out in this manual and commit to achieving its goals.
- ▶ Larry James
- ▶ GT Aviation
- ▶ Chief Flight Instructor



Flight Maneuvers Standardization Guide

- ▶ This maneuvers guide provides an outline of techniques and standardized procedures for instruction in the Private and Commercial curriculum at GT Aviation.
- ▶ CFIs are encouraged to follow these techniques although modification may be desirable in some circumstances.
- ▶ Students should always follow the guidance of their CFI.
- ▶ CFIs are required to possess the latest edition of the FMSG.
- ▶ Upon receipt of revisions to the FMSG, insert the new information into your guide.



Why Standardization?

- To ensure the integration of best teaching practices and procedures with operational guidelines outlined in the GT Aviation CFI Indoctrination Guide and Pilot/Student Manual.
- By using these techniques and procedures we will be living up to our responsibility to ensure safety while maximizing value to all those who come to us for flight training.
- Instructors need to become familiar with the contents of this guide and reference its contents frequently when conducting training.
- Students should do the same.



General

- ▶ The procedures specified in this guide are derived the FAA approved Pilot's Operating Handbooks (POHs) and Airplane Flight Manuals (AFMs).
- ▶ Every effort has been made to ensure these procedures agree with those contained in the POH. If there is any disagreement, *the Pilot's Operating Handbook or Airplane Flight Manual is the final authority.*



Contents



- This guide is composed of four main sections. The first three are VFR maneuvers for:
 - 1. Cessna C172P Skyhawk
 - 2. Piper PA-28R-200 Arrow.
 - 3. Diamond DA40 Diamond Start
- 4. The fourth section establishes Instrument Flight Procedures which should be used in the kind of light General Aviation aircraft which make up the GT Aviation flight line.



Premise

- ▶ The outline for the C-172 section generally follows a standard private pilot training sortie or aircraft checkout profile (departing VKX, flying to the practice area for maneuvers, then to 2W5 for pattern work).



Checklists and Flows

- ▶ Since the use of checklists is a 'special emphasis area' during FAA private and commercial check-rides checklist usage is a priority but there are times when using a "flow" is advantageous.
- ▶ A checklist should be thought of as an actual *list* of items to check, or do, in sequence.
- ▶ A flow is a pattern of movement across the aircraft controls (switches, dials, etc.) which will accomplish some subset of the items on a checklist.
- ▶ Checklists and flows are closely related, complimentary tools that are used together. Follow a flow pattern, then verify the required items have been completed by using the checklist when time and circumstances allow.



CESSNA-172P

SHORT FIELD TAKE OFF

- ▶ (All takeoffs from Potomac will use short field procedures)
- ▶ Line up on runway as close to the end of the pavement as possible (this is especially important when temperatures and/or density altitude are high or when more than two people are in the aircraft).
- ▶ Reconfirm short field takeoff configuration using pre-takeoff flow (Fuel valve-Both; Flaps-10°; Mixture-Rich; Carb heat-Cold (in)).
- ▶ Hold brakes and apply full power. Check RPMs over 2300 and engine instruments (oil pressure and temperature) in the green.
- ▶ Release brakes, place toes on bottom of rudder pedals, apply right pedal pressure to correct for tendency of nose to pull left. (Be careful not to touch the brakes.)
- ▶ Track runway centerline and accelerate to 55KIAS, then call "Vr, rotate."
- ▶ Firmly raise the pitch to climb attitude (about 7-8 degrees nose high). Climb at 56 KIAS until reaching 500ft MSL and clear of obstacles.
- ▶ When clear of obstacles, lower pitch to normal climb attitude, raise flaps to zero, and climb at 80-90 KIAS to cruise altitude.
- ▶ Complete climb checklist / flow.



Level Off

- ▶ Approximately 50 feet before reaching desired altitude, begin to slowly reduce pitch to level attitude (increasing forward yoke pressure) so that level attitude is reached as desired altitude is reached.
- ▶ Leave in full power and accelerate to 100 KIAS while keeping a level attitude (and altitude).
- ▶ Adjust trim as speed increases
- ▶ After reaching cruise airspeed, reduce power to 2300 RPM (throttle back).
- ▶ Fine tune trim.
- ▶ Complete cruise checklist.



Level Turn

- ▶ Lift wing and check for other aircraft in direction of turn.
- ▶ Roll into a normal 30-degree bank turn by smoothly applying aileron and rudder pressure in direction of turn. (Note 1: Left turns usually require less rudder pressure than right turns. Note 2: Rudder pressure should be neutralized when established in the turn and bank angle is no longer changing).
- ▶ As airplane banks, apply slight elevator back-pressure proportional to steepness of bank, to hold altitude.
- ▶ When proper bank angle is established – neutralize ailerons and rudder pressure to maintain bank and coordinated turn. Trim if desired.



Level Turn - cont'd

- ▶ Use glare shield to horizon as primary reference for level turn.
- ▶ Crosscheck instruments (attitude indicator, altimeter, VSI, turn/slip indicator) and correct errors as quickly as detected.
- ▶ About 10 degrees before the desired heading, begin to apply ailerons and rudder pressure to roll out of the turn, simultaneously reduce elevator backpressure, and level wings.
- ▶ Check heading and correct for minor errors.



Steep Turns

- ▶ Ask instructor/examiner/passengers to help look for traffic.
- ▶ Climb to safe altitude – 3000' MSL.
- ▶ Make clearing turns, one 180 degree or two 90 degree turns to check for other aircraft.
- ▶ Accomplish clean configuration flow.
- ▶ Fuel selector-Both
- ▶ Flaps - 0°
- ▶ Mixture - Rich.
- ▶ Roll into a 45-degree bank turn by smoothly applying aileron and rudder pressure in direction of turn. (Note 1: Left turns usually require less rudder pressure than right turns. Note 2: Rudder pressure should be neutralized when established in the turn and bank angle is no longer changing.)
- ▶ As airplane banks, apply elevator back-pressure proportional to steepness of bank. Technique: apply 2 turns of nose up trim.



Steep Turns – cont'd

- ▶ When the 45° bank angle is established, neutralize ailerons and rudder pressure to maintain bank and coordinated turn.
- ▶ Use glare shield to horizon as primary reference for level turn.
- ▶ Crosscheck instruments (attitude indicator, altimeter, VSI, turn/slip indicator) and correct errors as quickly as detected.
- ▶ About 20 degrees before the desired heading, begin to apply ailerons and rudder pressure to roll out of the turn, simultaneously reduce elevator backpressure, and level wings.
- ▶ Check heading and correct for minor errors.



Slow Flight

- ▶ Verify aircraft is at a safe altitude and area is clear.
- ▶ Slow the aircraft and accomplish the landing configuration flow –
- ▶ Fuel selector-Both;
- ▶ Flaps-10° (when below 110 KIAS);
- ▶ Throttle-1500rpm;
- ▶ Carb Heat-On;
- ▶ Flaps-Full (when below 85 KIAS)
- ▶ Hold altitude with backpressure and trim (three turns) while decelerating.



Slow Flight – cont'd

- ▶ At 55 KIAS, slowly adjust throttle to ~1900-2000rpm, then adjust pitch and trim for 50 KIAS level flight.
- ▶ Adjust altitude with power and maintain 50 KIAS* with pitch. REMEMBER: In slow flight, pitch controls airspeed and power controls altitude.
- ▶ *NOTE: FAA-S- ACS-6B specifies the applicant for a private pilot certificate must accomplish coordinated straight-and-level flight, turns, climbs, and descents with the airplane configured as specified by the evaluator *without a stall warning (e.g., airplane buffet, stall horn, etc.)*.
- ▶ Maintain altitude while making shallow (10°-15° bank) left and right turns.
- ▶ For climbs, add full power. For descents, reduce power to ~1500 rpm.



Landing (Power-off Stall)

- ▶ Note: This maneuver is designed to simulate an approach to landing stall where the pilot overshoots the turn to final and/or gets too slow on the approach. The maneuver should be practiced as if the aircraft were close to the ground where quick recovery and minimum altitude loss is critical.
- ▶ OPTIONAL - TRANSITION FROM SLOW FLIGHT TO LANDING (POWER OFF) STALL
 - ▶ Smoothly add full power and forward elevator pressure to hold altitude.
 - ▶ Apply right rudder to stay in coordinated flight.
 - ▶ Accelerate to 65 KIAS, then lower nose and adjust power to 1500rpm, and establish a 65 KIAS descent (simulating approach to landing).
 - ▶ Trim aircraft for 65 KIAS descent.



Landing (Power-Off) Stall – cont'd

- ▶ 1. Accomplish clearing turns / check area for other aircraft.
- ▶ 2. Slow the aircraft and accomplish the landing configuration flow –
 - ▶ Fuel selector-Both;
 - ▶ Flaps-10° (when below 110 KIAS);
 - ▶ Throttle-1500rpm;
 - ▶ Carb Heat-On;
 - ▶ Flaps-Full (when below 85 KIAS)
- ▶ 3. Trim aircraft and enter 65 KIAS descent.
- ▶ 4. If simulating a turn to final, enter a shallow bank turn. If simulating a stall o final, continue straight ahead.
- ▶ 5. Simultaneously reduce power to idle and level off by holding altitude with pitch. Airspeed will decrease.



Landing (Power-Off) Stall – cont'd

- ▶ 6. When the wing stalls, simultaneously: add full power; push carb heat in; reduce angle of attack by lowering the nose (just below the horizon), level the wings; retract flaps to 20°.
- ▶ 7. Cross-check airspeed indicator and turn/slip indicator. Apply right rudder pressure as needed to keep ball centered.
- ▶ 8. As airspeed increases to 55 KIAS, begin to raise the nose just above the horizon to stop the descent and begin a climb; retract flaps to 10°.
- ▶ 9. Ensure both altimeter and VSI show climb and airspeed is increasing. Verbally call out "positive rate climb; airspeed increasing" while continue to climb and accelerate.
- ▶ 10. Passing 60 KIAS, retract flaps and accelerate to V_y (76 KIAS).
- ▶ 11. Terminate maneuver by leveling off and accelerating to cruise airspeed or by transitioning to takeoff (power on) stall.



Takeoff (Power-On) Stall

- ▶ (Straight ahead and turning)
- ▶ Note: This maneuver is designed to simulate a situation where the critical angle of attack is exceeded on takeoff or climb with full power applied. It may help a student pilot to imagine taking off with obstacles ahead and raising the nose too high and getting too slow while attempting to climb over the obstacles. The maneuver should be practiced as if the aircraft were close to the ground where quick recovery and minimum altitude loss is critical.
- ▶ Accomplish clearing turns / check area for other aircraft.
- ▶ Slow aircraft to 55 KIAS by pulling out carb heat, reducing power to 1500rpm, and maintaining level flight.
- ▶ Reaching 55 KIAS, apply full power and push carb heat in (off).



Takeoff (Power-On) Stall – cont'd

- ▶ 1. Apply right rudder as needed to maintain coordinated flight (ball centered).
- ▶ 2. Gradually increase pitch (simulating trying to climb over approaching obstacle).
- ▶ 3. As wing stalls the nose will drop, lower nose to slightly below the horizon to reduce angle of attack and gain airspeed.
- ▶ 4. When reaching ~55 KIAS, smoothly increase pitch to climb attitude (~7°-8° nose high) to stop descent and begin climb. Verbally call out “positive rate of climb; airspeed increasing.”
- ▶ 5. Set pitch to climb attitude at V_x (60 KIAS).
- ▶ 6. Terminate maneuver by leveling off and accelerating to cruise airspeed.



Takeoff (Power-On) Stall- cont'd

- ▶ 7. Apply right rudder as needed to maintain coordinated flight (ball centered).
- ▶ 8. Gradually increase pitch (simulating trying to climb over approaching obstacle).
- ▶ 9. As wing stalls the nose will drop, lower nose to slightly below the horizon to reduce angle of attack and gain airspeed.
- ▶ 10. When reaching ~55 KIAS, smoothly increase pitch to climb attitude (~7°-8° nose high) to stop descent and begin climb. Verbally call out "positive rate of climb; airspeed increasing."
- ▶ 11. Set pitch to climb attitude at V_x (60 KIAS).
- ▶ 12. Terminate maneuver by leveling off and accelerating to cruise airspeed.



Rectangular Course

- Ref: FAA-H-8083-3A (Airplane Flying Handbook)
-
- Objective: To maneuver the airplane over a predetermined ground path while dividing attention inside and outside the airplane.
-
- 1. Complete the pre-maneuver checklist.
- 2. Determine the wind direction.
- 3. Perform Clearings turns and plan to execute the maneuver between 600-1000 feet AGL.
- 4. Select a forced landing area.
- 5. Establish and maintain a speed below VA about 2100 rpm, trim as necessary.
- 6. Enter either left or right pattern on a 45° angle to the mid-field downwind leg.
- 7. Establish a crab angle as necessary to maintain a uniform distance from the area boundaries for each leg of the maneuver.



Rectangular Course – cont'd

- ▶ The airplane should be flown parallel to and at a uniform distance $\frac{1}{4}$ to $\frac{1}{2}$ mile away from the field boundaries
- ▶ 8. Begin the turn to next leg when airplane is abeam the corner of the area boundary
- ▶ 9. Vary the bank angle (not to exceed a 45° bank) to maintain a constant radius during the turns
- ▶ 10. Depart on a 45° from the downwind at the downwind turn boundary
- ▶ 11. Return to cruise flight
- ▶ 12. Perform cruise checklist

- ▶ Standards:
- ▶ Private: Airspeed ± 10 KIAS, Altitude ± 100



S-Turns Across a Road

- ▶ Ref: FAA-H-8083-3A (Airplane Flying Handbook)
- ▶
- ▶ Objective: To teach the student to maneuver the airplane over a predetermined ground path while dividing attention inside and outside the airplane

- ▶ 1. Complete the pre-maneuver checklist.
- ▶ 2. Determine the wind direction.
- ▶ 3. Perform clearing turns and maneuver must be executed between 600-1000 feet AGL.
- ▶ 4. Pick an area that includes an emergency landing field.
- ▶ 5. Establish and maintain a speed below V_A about 2300 rpm, trim as necessary.
- ▶ 6. Enter on a downwind heading.



S-Turns Across a Road – cont'd

- 7. When directly over a reference line or road (highest groundspeed), roll into the steepest bank (not to exceed 45°) to initiate and maintaining a constant radius.
- 8. As the turn continues (groundspeed decreases), begin to shallow the bank as necessary to continue maintaining a constant radius.
- 9. Level the wings when crossing the reference point (lowest groundspeed) and immediately begin a turn back in the opposite direction.
- 10. As the turn continues (groundspeed increases), begin to steepen the bank as necessary to continue maintaining a constant radius.
- 11. Level the wings when crossing the reference point (highest groundspeed).
- NOTE: The rollouts must be timed in order to be straight and level directly over and perpendicular to the reference line or road
- 12. Return to cruise flight.
- 13. Perform cruise checklist.
- Standards: Private: Airspeed ± 10 K., Altitude ± 100 ft.



Turns Around a Point

- ▶ Ref: FAA-H-8083-3A (Airplane Flying Handbook)
- ▶
- ▶ Objective: To maneuver the airplane over a predetermined ground path while dividing attention inside and outside the airplane.
- ▶ 1. Complete the pre-maneuver checklist.
- ▶ 2. Determine the wind direction.
- ▶ 3. Perform Clearings turns and plan to execute the maneuver between 600-1000 feet AGL
- ▶ 4. Select a forced landing area.
- ▶ 5. Establish and maintain a speed below VA about 2300 rpm, trim as necessary
- ▶ 6. Enter the maneuver at cruise speed on downwind to one side of the selected reference point at a distance equal to the desired radius of turn.



Turns Around a Point – cont'd

- 7. On entry downwind (highest groundspeed) and abeam the reference point, roll into the steepest bank (not to exceed 45°) to initiate and maintain a constant radius.
- 8. As the turn continues (groundspeed decreases), begin to shallow the bank as necessary to continue maintaining a constant radius.
- 9. Directly upwind (lowest groundspeed), the bank should be at its shallowest.
- 10. As the turn continues (ground speed increases), begin to steepen the bank as necessary to continue maintaining a constant radius.
- 11. Complete two complete circles, or as directed, and depart on the entry heading.
- 12. Return to cruise flight.
- 13. Perform cruise checklist.
- Standards:
- Private: Airspeed ± 10 K., Altitude ± 100 ft.



Emergency Landing (A-B-C-D-E)

- ▶ Airspeed – Adjust pitch with 3 turns nose up trim to hold 65KIAS.
- ▶ Best place to land – select best site considering length, obstructions, surface, wind direction. If high, spiral down over approach end. If not, fly modified pattern.
- ▶ Checklist –
 - ▶ Fuel shutoff valve – ON
 - ▶ Mixture – RICH
 - ▶ Throttle – OPEN
 - ▶ Carb Heat – ON
 - ▶ Mags – CHECK BOTH, then LEFT AND RIGHT
 - ▶ Primer – CHECK IN and LOCKED



Emergency Landing (A-B-C-D-E) cont'd

- ▶ Declare – Transponder – 7700, Current frequency or 121.5, Mayday X 3.
- ▶ Exit – Just prior to landing –
- ▶ Fuel shutoff Valve – OFF Mixture – IDLE CUTOFF Mags – OFF
- ▶ Master switch – OFF (after flaps are down)
- ▶ Doors – UNLATCH / OPEN.
- ▶ Execute soft field landing.



Normal Descent

- ▶ 1. Carb heat on.
- ▶ 2. Reduce power to 1900 RPM (throttle back).
- ▶ 3. Allow the cowling to lower and stabilize.
- ▶ 4. Adjust pitch for 90 KIAS and 500ft per min descent.
- ▶ 5. At 50 feet above desired altitude, increase power back to 2400RPM.



Normal Landing

- ▶ 1. On downwind establish 90 KIAS, about 2100 RPM - abeam the landing spot, accomplish before landing check/flow. State: "Before landing check" and then:
 - ▶ Check - Fuel selector - Both.
 - ▶ Carb heat cold.
 - ▶ Power - 1500rpm.
 - ▶ Mixture - Rich.
 - ▶ Flaps - 10.
 - ▶ Seatbelts and shoulder harness - Secure
 - ▶ State: "Before landing check complete"
- ▶ 2. Hold altitude with pitch until reaching 75 KIAS, then set pitch to hold 75 KIAS and trim to maintain. (Note: Wings on attitude indicator should be just slightly below horizon).
- ▶ 3. When runway threshold is 45 degrees behind A/C (~700ft AGL), turn base and apply 20 degrees of flaps. Set speed to 70 KIAS with pitch and trim.
- ▶ 4. Make radio call and adjust power to compensate for winds (~1600rpm if headwind and ~1400rpm if tailwind).
- ▶ 5. Check extended final approach course for traffic and turn final (~500ft AGL).
- ▶ 6. Roll out on extended centerline with wind correction angle and make radio call.



Normal Landing – cont'd

- ▶ 7. Note aim point reference on windscreen. (Note: common technique is to keep runway numbers in lower half of windscreen for a 3-4 degree glide slope).
- ▶ 8. Add full flaps, pitch for 65 KIAS, then adjust power to compensate for winds if needed. (Note: 1500rpm will normally hold 65 KIAS on normal glide angle with full flaps and zero wind).
- ▶ 9. Hold aim point on windscreen until ~15ft AGL, then begin level off with wheels 2-3 ft above runway. (Note: Eyes looking at end of runway to increase use of peripheral vision to sense rate of descent and height above runway.)
- ▶ 10. Hold A/C off runway as long as possible and touch down smoothly while continuing to apply wind correction with ailerons and using rudder to track down center of runway.
- ▶ 11. For touch and go, first raise flaps to zero, apply full power (gradually, taking about 2-3 seconds to push throttle all the way forward), and push carb heat in (off). Rotate at 55 KIAS and accomplish a normal takeoff and climb.



Normal Take-Off and Climb

- ▶ 1. Flaps at 0 degrees.
- ▶ 2. Ailerons into the wind (as needed).
- ▶ 3. Apply full power; check for at least 2300 RPMs and oil temperature and pressure in the green.
- ▶ 4. Maintain runway alignment with rudder (mostly right).
- ▶ 5. Slowly decrease aileron deflection for crosswind (if applicable) as the airplane accelerates.
- ▶ 6. Track runway centerline, accelerate to 55KIAS, then call "V_r, rotate." Pull nosewheel off the ground and place the top edge of the cowling on the horizon.
- ▶ Establish a crab / wind correction angle to stay over the runway.
- ▶ Keep top of the cowling on the horizon and the wings level; climb at 76-85 KIAS.



Soft Field Takeoff

- ▶ 1. Taxi with elevator full aft; keep aircraft moving to avoid getting stuck in mud/soft ground.
- ▶ 2. Line up on runway centerline and smoothly apply full power.
- ▶ 3. Hold elevator backpressure to keep nose wheel just off the ground.
- ▶ 4. When main gear leaves the ground, reduce backpressure to hold A/C in ground effect (~10' AGL).
- ▶ 5. Remain in ground effect and accelerate to 60 KIAS (V_x), then begin climb.
- ▶ 6. Accelerate to 76 KIAS (V_y), then raise flaps and continue with normal climb.



Soft Field Landing

- ▶ 1. Fly approach and landing as a normal landing.
- ▶ 2. Plan for the main gear wheels to touch down as softly as possible to avoid digging in to any mud/soft ground. (As a technique, a little power can be added in the landing flair to soften the landing.) Nose gear remains clear of runway while elevator authority remains effective.
- ▶ 3. At main wheel touch down, ensure power is at idle and hold nose wheel off as long as possible (until full aft elevator is reached).



Short Field Landing

- ▶ Ref: FAA-H-8083-3A (Airplane Flying Handbook)
- ▶ Objective: To safely and accurately establish and maintain a stabilized approach to a landing, obtaining maximum performance by stopping in a minimum distance.
- ▶ 1. Complete the approach checklist before entering the airport area.
- ▶ 2. Slow to 90 KIAS prior to entering downwind leg (power setting ~ 2100 rpm).
- ▶ 3. Complete the before landing checklist on downwind.
- ▶ 4. Fly a normal approach with a slightly extended downwind leg.
- ▶ 5. On final, set full flaps and add power to hold 61 KIAS (until flare).
- ▶ 6. Reduce power to idle after clearing obstacles and attempt to get the main wheels on the runway as soon as possible.
- ▶ 7. Immediately after touchdown retract flaps and apply brakes while holding back pressure on the yoke to keep weight off the nose wheel. (Use caution. Too much back pressure could cause wheels them to lock up and skid which could cause one or both tires to blow.)



Short Field Landing – cont'd

- ▶ The approach must be stabilized by 200 feet. If not, execute a go-around.
- ▶ NOTE: Avoid closing the throttle rapidly, which may result in an immediate increase in the rate of descent and a hard landing.

- ▶ Standards:
 - ▶ Private: Airspeed +10/-5 KIAS. Within 200 ft. of intended landing point
 - ▶ Commercial: Airspeed ± 5 KIAS. Within 100 ft. of intended landing point



C-172P v Speeds

- ▶ BEST GLIDE SPEED 65 KIAS
- ▶ Stall in landing configuration V_{so} 33 KIAS
- ▶ Stall in cruise configuration V_{s1} 44 KIAS
- ▶ Rotate Speed V_r 55 KIAS
- ▶ Best angle of climb V_x 60 KIAS
- ▶ Best rate of climb V_y 76 KIAS



C-172P Limitations

- ▶ Max Demonstrated Crosswind Component 15 Knots [sin x (wind)]
- ▶ Max Gross Weight 2100
- ▶ Standard Empty Weight 1427
- ▶ Engine Manufacturer Lycoming Model O-320
- ▶ Horsepower 160 HP @2700 RPM
- ▶ Oil Max 7 qts Min 5 qts
- ▶ Prop Length 75 Inches
- ▶ Wing Span. 36 Feet
- ▶ Fuel Grade. 100LL (Blue)
- ▶ Quantity 40 Gal. Usable \ 3 Gal. Unusable
- ▶ Tire Pressure Main... 28 PSI Nose... 34 PSI



C172 Data

- ▶ Electrical System
- ▶ Battery 28 Volt
- ▶ Alternator 28 Volt's; 60 Amps
- ▶ There is an ammeter that measures the electrical load on the alternator.

And Now For Something Completely Different





What's that you say?

- ▶ FAA's Pilot Controller Glossary
 - ▶ 120 pages with definitions provided for most terms used on the radio.
- 



I've Got a Preposition for you

- ▶ "N123AB climbing through 1,000 feet *FOR* 2,000 feet."
- ▶ Saying "for" sounds a whole lot like the number "four." Instead, simplify your call by saying "N123AB 1,000 climbing 2,000."



Numbers/Letters

- ▶ "N123AB turning TO 300."
- ▶ Like the number four, saying "to" sounds a lot like the number "two." Try your hardest to leave confusing words like that out of your radio vocabulary when they aren't necessary.



Stepping on top of others.

- ▶ Before you make a radio call, listen on the frequency to see if anyone else is in the middle of a transmission. And **ALWAYS** wait a few seconds if you've changed frequencies before transmitting, to make sure you don't step on someone else.



Talking before thinking.

- ▶ Have an idea of what your radio call or request will be before you make a transmission. If you need to, write down some notes about what you're trying to accomplish.



With You

- ▶ "Potomac Approach, Cardinal 34150 *WITH YOU* at 4,500 feet."
- ▶ Keeping yourself concise on the radio means taking out un-needed words like "with you." If you're talking to them, they know you're "with them." Simply let the controller know who you are, where you are, and what you want. It'll allow your controller more time to do their job.



Request It

- ▶ "Potomac approach, N123AB *LOOKING FOR* the VOR runway 33 approach at Stafford airport."
- ▶ Are you "looking for" the approach, or requesting the approach?



Clear, Concise and Efficient

- You don't have to be perfect just strive to be clear, concise, and efficient on the radios.
- 



No Jargon

- Got him on the Fish Finder.
- Lookin' for traffic.
- No Joy.
- Tally Ho!
- Any traffic in the area please advise.
- N34150 taking runway 24 for departure VFR to the south.
- With You
- Bumfo Traffic N34150 departing the area to the south.
Last call.



What the FAA says

- ▶ Ref: Radio Communications Phraseology and Techniques - P-8740-47
- ▶ The single most important concept in pilot-controller communications is understanding.
- ▶ Brevity is important.
- ▶ Transmissions should be as concise as possible while still ensuring that the controller understands what you want to do.



FAA Tips for Good Radio Techniques

- ▶ Initial Contact
- ▶ Who - Part 1 - State the name of facility you are calling (e.g., "Miami Center").
- ▶ Who - Part 2 - State your full aircraft identification (as filed in the flight plan) (e.g., "Skylane 54321")
- ▶ Where - State your position (e.g., "Over XYZ VOR").
- ▶ What - State your request (e.g., "Request clearance into Class B airspace.")



Time Critical Instructions

- ▶ There are times when we need to be brief. Use these words.
- ▶ *Wilco*,, which means "I will comply."
- ▶ *Roger*, which means "I have received and understood your last transmission."
- ▶ *Affirmative*, which means "Yes"
- ▶ *Negative*, which means "No" or
- ▶ *Other appropriate remark*



Aircraft Call Signs

- ▶ State aircraft type, model or manufacturer's name followed by the digits/letters of the registration number.
- ▶ When the aircraft manufacturer's name or model is stated, the prefix "N" is dropped (e.g. Aztec Two Four Six Four Alpha).
- ▶ Aircraft with similar call signs may be on the same frequency, and improper use of call signs can result in one pilot executing a clearance intended for another aircraft.
- ▶ Never abbreviate your call sign on an initial contact, or at any time when other aircraft call signs you hear on the frequency have similar numbers/sounds or identical letters/numbers to those of your own aircraft (e.g., Cessna 6132F, Cessna 1622F, Baron 123F, Cherokee 7732F, etc.).



Figures

- 500 - "five hundred"
- 4500 - "four thousand five hundred"
- 10,000 - "one zero thousand"
- 13,500 - "one three thousand five hundred"
- V12 - "Victor twelve"
- J533 - "J five thirty-three"
- 10 - "one zero"
- 122.1 - "one two two point one"



https://www.faaafety.gov/gslac/alc/libview_normal.aspx?id=17272

