

COPA to AirVenture (C2A)

Standard Operating Procedures

Revision 5



These standard operating procedures provide brevity for briefing and predictability while flying. If everyone knows them, the briefer can skip details by stating "per SOP". Unless otherwise briefed by the Flight Lead and/or Pilot-in-Command, adhere to the SOPs to facilitate understanding, predictability and safety.

Chapter 1

PRE-MISSION, BRIEF, AND DEBRIEF

1.1. Pre-mission: Pilots will coordinate prior to the brief to discuss training requirements and determine which seat each pilot will occupy and confirm weight and balance. The Flight Lead will be designated and will lead the flight brief and debrief (an exception can be made during training events as directed by the Flight Lead). Flight Lead can be shortened to "Lead" with a capital L for brevity (not the same as the lead aircraft).

1.2. Formation Admin: The person designated as Flight Lead will have overall responsibility for the briefing and conduct of the flight *regardless of the position flown*. Do not confuse the lead aircraft, or "#1" with the overall Flight Lead. During the sortie, the Flight Lead may place any wingman into the #1 position via a position change. The new #1 (or lead) is responsible for conducting all remaining portions of the profile as detailed in the brief. In 4-ship formations, the second element lead is the deputy flight lead.

1.3. Brief: At a minimum, the Flight Lead will brief utilizing the C2A brief sheet. Additional aids (white boards, PowerPoint slides) are often useful to maximize briefing effectiveness and understanding. If numerous elements are included in a larger formation flight, time must be allocated (~20 minutes) to allow individual elements to conduct internal briefs.

1.3.1 Planning Considerations: In general, the least powerful aircraft should be placed in front or #1 position in 4 ship formation flights. Placing a lower powered aircraft in the middle of a large formation is not recommended as it can cause additional "slinky effect" issues down the formation.

1.4. Debrief: The Flight Lead will conduct the debrief (unless training, where Lead may direct a student run the debrief). If training, Safety Pilots and students will conduct a self-assessment. Have thick skin for the debrief. The objective is to improve both performance and safety.

Chapter 2

COMMUNICATIONS

2.1. Set #1 radio (COMM1) to the primary internal frequency (sometimes referred to as the TAC freq) and place the backup internal frequency in the #1 standby. The #2 radio (COMM2) will have ATC frequencies (e.g. tower/ground). Be precise and short with communications. You will understand why on your first 20+ aircraft formation flight with one internal frequency.

2.2. Any directive/informative communication from Lead ("Execute", "Go", etc.) will be acknowledged by the wingmen in turn, e.g. "two", "three", "four". The only exception is "Push" comm, which generally will not be used for most training events. When in doubt, acknowledge Lead.

2.3. If the aircraft in front of you does not acknowledge, wait 3 seconds and then acknowledge. Example: "two", "four". "three". If you get skipped, wait for the last aircraft and then acknowledge (only if you heard the original command). If required, Lead will "clean up" by going direct, e.g. "Three, go echelon left". Reply is "three."

Chapter 3

GROUND OPERATIONS, TAXI, AND RUN-UP

3.1. Ground Operations.

3.1.1. **Engine Start.** Typical engine start time is 20 min after rehearsals. Start engines at the designated time (GPS time is the standard). After engines are running each pilot will individually tune radios to the pre-briefed frequencies. Expect Lead to execute the check-in 2 minutes after start. Example; "COPA flight, check-in", followed by "two", "three", "four" on the internal frequency. Accomplish all required Cirrus checklist items including obtaining ATIS. On cold starts, wait until the oil temperature reaches at least 100° F before taxiing. When #1 is ready to taxi, another flight check will occur: "COPA flight, ready to taxi". Acknowledge with position if ready ("two") or advise that you will need additional time ("two needs 1 minute). Once ready, advise "Two's ready". At that point, Lead will call for taxi again - respond in order. When all aircraft are ready, Lead will call ground and begin taxiing after clearance is given. Subsequent aircraft will depart parking to form up in order.

3.2. Taxi.

3.2.1. Each aircraft will taxi out in their proper sequence. All aircraft will have strobes, position and landing lights on (all lights on). #2 will set the spacing, recommend 1.5-2 aircraft lengths (~50') between each aircraft. Until on the main taxiways, aircraft will taxi on the centerline. Once on the main taxiways, and if appropriate, #1 will initiate a stagger taxi. Match #1's position, but stagger no further than the center of your respective side of the taxiway. Taxi smoothly with no sudden stops or accelerations. 10kts ground speed is the standard, deviations should be announced.

3.2.2. **Run-Up.** #1 will turn into the run-up area, and park at approximately 60 degrees to a line or seam. #2, #3, #4 will match #1's position keeping spacing tight (wing overlap is OK). Conduct individual run-ups. After completing the run-up, ensure mixture is full rich (or appropriate for pressure altitude) all Before Takeoff checklist items have been accomplished. Each pilot checks over the adjoining aircraft to catch and notify pilots of any out-of-the-ordinary conditions such as fluid leaks, open or unlatched doors/hatches/flaps or trim in an unexpected position, etc. Once ready, each pilot must look "down the line" (i.e. Lead looks at #2, #2 looks at #3, #3 looks at #4, etc.). The last pilot in the flight, whether #2 or #5, passes the "thumbs-up" signal when they are ready to proceed. Each member of the flight in turn passes the thumbs-up smartly up the line when they are ready (i.e. #4 passes it to #3, who passes it to #2, who passes it to Lead). If you do not see a thumbs-up from the plane behind you, do not pass a thumbs-up the line until the problem plane indicates ready with a thumbs-up. Once Lead sees the thumbs-up from #2, they know the entire flight is ready. Lead will then call "COPA flight, check flaps, lights, and transponder". Wingmen will acknowledge "2, 3, 4", and verify those items are set correctly. Flaps 50%, lead squawks (all others OFF; note that most transponders auto on after T/O when in standby so you will need to go to OFF. Perspective aircraft require pulling the circuit breaker, normally accomplished during preflight). All aircraft strobes off except the trail aircraft. If the departures are interval, the element tail of each interval will strobe until formed in a single flight.

Chapter 4

FORMATION FLIGHT

4.1. Lineup.

4.1.1. **Two-Ship Lineup.** #1 will take the center of their side of the runway, and will choose the left side of the runway when environmental factors allow. Element takeoffs should be avoided if the crosswind component is >8kts. If crosswind is a consideration, Lead lines up on the DOWNWIND side of the runway. This is to prevent lead's prop wash and turbulence from affecting the Wingman during the takeoff roll. Lead must taxi down far enough to ensure their Wingman can safely pass behind. Wingman should line up in a "wing-abreast" position that is acute of the normal bearing line, aligning Wingman's leading edge with Lead's trailing edge, and with sufficient wingtip clearance (min 10') to ensure that each aircraft can clear the other in

case of an abort or blown tire. Typically each aircraft lines up on the center of his or her half of the runway, width permitting. Once in position and ready, #2 will give a head nod or thumbs up to #1.

4.1.1a Three-Ship Lineup. The Vic departure requires a 150' wide runway and should be avoided during strong crosswinds. #1 will take the center, #2 and #3 will position to the left and right of #1. Wingman will line up in a "wing-abreast" position that is acute of the normal bearing line, aligning Wingman's leading edge with Lead's trailing edge, and with sufficient wingtip clearance (min 10'). Visual signals are often difficult to see by both wingman; utilize the co-pilot if available or radio as required.

4.1.2. Four-Ship Lineup. In a 4-ship, the first element will line up far enough down the runway to give the second element ~250' spacing. For reference, one centerline stripe plus the spacing between lines is 200' at standard airports. One and a half white centerline stripes will provide correct spacing. The second element lineup is the same as in a two-ship lineup. Once in position and ready, #4 will give a head nod or thumbs up to #3, and #3 will call "COPA 3, ready" letting Lead know the flight is formed on the runway and ready for departure.

4.1.3. Take Off Run-Up. Power settings are 21" MAP for #1 and #3, and 22" MAP for #2 and #4. Deviations in power settings do occur and will be discussed during the brief (SR20 vs SR22 vs Turbo etc - see back of brief sheet for recommendations). If able, place the least powerful or heaviest aircraft in front. #1 will give the hand signal for "run em up" and each Wing will acknowledge receiving the signal with a confirmation head nod or thumbs up. Wingman will adjust to the briefed MAP for takeoff, and when ready look back to their lead and give a head nod to indicate they are ready for takeoff.

4.1.4. Element Takeoff. Once the element lead receives a head nod or thumbs up from wing that they are ready, the element lead will signal brake release with a large head nod. Lead will slowly draw their head back, and then give a fast, large (chin to chest) head nod forward, releasing their brakes simultaneously, wait 4 seconds before slowly advancing the power to a briefed setting (typically 27" MP at sea level for the lead aircraft). Power advance should be smooth, taking at least 5 seconds for Lead to build to the takeoff power setting, which is less than full takeoff power. Smoothly rotate at 75kts.

4.1.4.1. Individual Interval Takeoff: Standard spacing is 8 seconds between aircraft. No large head nod will be given. Subsequent aircraft simply count to 8 using "1 thousand, 2 thousand, 3 thousand" etc.

4.1.4.2. Element Interval Takeoff: Each element's takeoff will be as previously described. Standard spacing is 8 seconds between elements. Unless briefed otherwise, rejoin to fingertip.

4.2. Departure.

4.2.1. **Flap Retraction** will be at 500' above obstacles and greater than 90 KIAS. Lead will call "COPA flight, flaps in 3,2,1". Retract on the silent 0 count. Climb out is 110 kts IAS until the flight is formed. If multiple elements are rejoining, the last element calls 'Sausage' when the flight is linked up. Lead will acknowledge and slowly accelerate to 120 IAS until reaching altitude.

4.2.2 **Join Up:** If Lead begins a turn, Wingmen will begin their turn to move to a rejoin position on the inside of Lead's turn as soon as a safe altitude is reached. Proper bearing line reference is placing lead's outside wingtip on his rudder. Use power to control the closure rate. Closure can be difficult to judge with a tail aspect. Wingmen should reference their indicated airspeed as compared to leads briefed airspeed, to help determine closure rate. Wing will call "gimme some" if necessary to accomplish a join up.

4.2.3. **Ops Checks.** During the departure, kick out (tail wag) to Route formation and accomplish an Ops Check while the flight is in route formation. Route formation is flown forward of the normal bearing line (acute). Lead should announce any turns since wingmen are often diverting attention inside the cockpit. In turns, members on the inside will maintain the normal formation reference (step down), but members on the outside of the turn will turn level with Lead by putting Lead on the horizon (Echelon turn). Flight will check instruments and make any adjustments (radio, nav, switch fuel tanks, adjust heat etc.) as required or briefed. Lead will call "COPA Flight, ops check complete". Acknowledge in order, but only by number unless you have an abnormal ops check. If you have an abnormal ops check, describe the issue and time required to resolve. Lead should conduct a kickout to route formation in order to allow the flight to conduct an ops check every 20 minutes during a flight or when pilots are required to execute an action that will take their eyes off of lead (example, enter a new frequency).

4.4. Recovery & Arrival.

4.4.1. **Ops Check.** #1 will accomplish an RTB ops check. This is when Lead obtains ATIS/AWOS for the flight and refines the arrival plan as required. Lead will brief the arrival plan and direct the flight as required (formation, position wings etc).

4.4.2. **Overhead Breaks.** #1 will plan to arrive at pattern altitude and break at either the runway threshold or midfield (or as tower directs). Aircraft bank angle is 45°. Once Lead breaks, #2 maintains LEVEL flight and breaks as briefed, typically at 4 second intervals. When Lead breaks, everyone starts counting. When #2 breaks, the onus is now on #3 and #4 to match that interval (in case #2 is slightly fast or slow to break). During the break, it is critical for each Wingman to keep the aircraft in front of them on the horizon, DO NOT climb or descend during the break. Each aircraft will maintain their power setting for the first 90 degrees of turn, and then reduce power to roll out on downwind at 100 KIAS and match the aircraft attitude and spacing ahead. Make smooth power corrections, and DO NOT GET SLOW! Set flaps to 50% abeam the runway threshold, then slow to 90 KIAS. The flight will be tight to the runway when at the abeam position, watch out for overshoots. On final (3/4 mile from threshold), set flaps to 100% and slow to final approach speed of 85kts. Each wingman will fly the same track and

airspeeds as the #1 aircraft. Be prepared for wake turbulence and prop wash from the preceding aircraft. Lead should plan landing on the centerline, all others will land on the hot side. After touchdown, it is important for the lead aircraft, (and subsequent wingmen), to avoid normal ground braking. Let the aircraft roll longer than the typical rollout to provide sufficient spacing for the aircraft following. Move to the cold side soonest, and announce "position #, cold" on internal COMM1 (this also helps inform Lead when all aircraft have landed).

4.4.3. Formation Approach/Landing. If wind is not a factor, it is desirable but not mandatory for Wing to be on the OUTSIDE of the turn on the base and final turns. Otherwise, position Wing on the upwind side of the runway. Fly a double wide pattern if on downwind, utilizing shallow angles of bank while in the terminal area. Use caution if Wing is on the inside of the turn - they can quickly be 5 kts slower. Place the wingman on the right side, environmental conditions permitting. Plan on a 5 nm final, and have flaps to full no later than 2 nm final. Lead will call all flap movements on the radio, e.g.: "COPA flight, flaps full in 3,2,1" and execute on the silent 0. Once established on final, the wingman's position will be as follows: Wingtip on lead's tail (acute position), minimum of 10' wingtip separation, reduce step down by half. #1 aircraft will align the approach with the center of the runway until 1 mile final, then slowly shift to their side of the runway leaving room for the Wing to center on their side of the runway. #1 will fly a final approach speed of 85 KIAS until approximately 50' AGL, then slowly begin reducing power (no throttle chops), flaring, and landing. After landing, Lead maintains a little power to allow Wing a drag advantage. Lead aircraft does not brake unless necessary, use the entire runway. Once the rollout is stabilized, Wing will pull power and fade to trail. If desired, Wing can initiate gentle braking to establish more nose to tail separation. If the runway exit is on the wingman's side, Wing calls "2's cold" when it is safe for Lead to fade across Wing's path, to the cold side (exit side). Lead will not cross in front of Wing to make a turnoff until Wing calls "Cold." If Wing is on the hot side, they will create sufficient spacing and then maneuver to the cold side. Wing will call "2's cold" when established behind Lead.

4.4.4. Taxi to Parking. Lead will exit the runway on an appropriate taxiway, and if feasible, stop at a safe point and make a 60 deg pivot or turn, leaving enough room for the remaining aircraft. Each Wingman, in succession, will pull close matching #1's parked position. All pilots will conduct their After Landing checklist (flaps up, all lights on, lean mixture etc). Once accomplished, wingmen will pass a "thumbs up" up the line. When all Wingmen are ready, Lead will make any radio calls as are appropriate, and taxi the flight back to the parking area. Taxi per paragraph 3.2.1. Wingmen will match Lead's configuration for taxi back to the extent possible (most notably cracked or open doors).

4.4.5. Parade Parking. Aircraft will line up 90° from the designated parking position, in trail. Lead will call "Parking in 3, 2, 1" and on the 0 each aircraft will add power to pivot 90° into their respective parking positions. All aircraft will align with Lead if able and come to a stop. Lead will call "shutdown in 3, 2, 1" and each pilot will begin shutdown on the 0 count. The shutdown is rhythmic, at the same pace as the countdown. Starting with engine cutoff, all switches off, then doors open.

Chapter 5

FORMATION EMERGENCY / ABNORMAL PROCEDURES

5.1. Element Integrity/General Recovery Procedures. When an emergency or abnormal situation is encountered, a "Knock It Off" will be called, and the problem aircraft will be given the lead to allow them to work the situation. "The bleeder is leader." The wingman should help with navigation and checklist duties as required.

5.2. Takeoff Aborts.

5.2.1. Two and Three-Ship Element/Vic Takeoff Abort. The aircraft aborting will make a radio call when able. "COPA 1's aborting" while maintaining their side of the runway. Wingman will either execute a single-ship takeoff (two ship element) or the create a 2 ship element (Vic takeoff). If lead aborts in a Vic departure, the #2 aircraft assumes the lead.

5.2.2. Two-Ship Interval Abort. If the Lead aircraft aborts, they make the radio call and maintain their side of the runway. If the Wing has not released brakes, they should cancel their takeoff. If they have released brakes, the Wing will need to decide immediately whether to abort or continue.

5.2.3. Four-Ship First Element Abort. If either or both aircraft in the first element aborts, it is imperative that a timely radio call be made to prevent the second element from having a conflict with the first element. The aborting aircraft will steer slightly toward the runway shoulder, if able, to increase the room available for the second element in case they are already on the role. If the second element has not released brakes, they should cancel their takeoff. If they have released brakes, the second element lead will need to decide immediately whether to abort or continue. If multiple elements are operating on the same frequency, or if there are sub-flights in the formation, the call sign should also be included.

5.2.4. Four-Ship Second Element Abort. Since they are behind the 1st element, an abort by the 2nd element is procedurally the same as a two-ship element takeoff abort.

5.3. Over-Running the Element Lead on Takeoff. If the wingman is overrunning the element lead, they should call for more power ("COPA 1, push it up"). If this does not resolve the overrun issue, the wingman should assume the lead position and set power as briefed. NEVER make large power reductions near rotation or shortly after rotation. Do not utilize brakes to maintain position. The element lead may offer to pass the lead position to the overrunning wingman until the situation is sorted out. In a Vic departure, if a wingman overruns the #1 aircraft and becomes lead, the new lead will maintain runway alignment or heading if airborne. The flight will be in a momentary echelon formation until Lead can redirect (most likely by taking back lead and returning to the original Vic formation).

5.4. **Lost Sight (Blind).** As a general rule: #2 be informative; #1 be directive. If the wingman loses sight of their lead aircraft, they will call BLIND ("COPA 2's blind, 4,600 feet"), and break-out of the formation, if required, to ensure deconfliction (down and away). Lead will remain predictable by continuing current heading and altitude (or attitude if climbing or descending) when sight was lost. If #1 has sight of #2, they may rejoin on #2 or direct #2's eyes back on #1 (by giving clock direction, above or below, and distance). If #1 is also blind, 500' altitude separation should be directed, and a rejoin can be effected once that altitude separation is established and a visual is reacquired. Calling distance and bearing to a common waypoint can help orient a blind wingman. If a significant separation occurs and gaining visual becomes problematic, return to base (RTB) single ship and rejoin on the ground.

5.5. **NORDO.** The NORDO aircraft will pass the visual signal indicating lost comms. If VFR, the good aircraft will lead the flight back to the airport and inform/coordinate with tower/CTAF. If unable to descend VFR, flight will divert to a nearby VFR airfield while closely monitoring the flight's fuel state. The good aircraft will lead and perform a element landing, rolling all the way to the end of the runway to allow the NORDO wingman as much room as possible to slow and assume the cold side of the runway. If an element landing is not possible, conduct an overhead or downwind break. Normal clean-up and taxi-in procedures should be followed into parking.

5.6. **CAPS Pull / SARCAP.** If a CAPS deployment occurs, the wingman should monitor the distressed aircraft from a high stack. Do not under-fly the last known altitude of the parachute and do not follow the CAPS aircraft through the weather. If in a four-ship, direct the other element to remain clear or RTB and be prepared to relay information. Mark the position with a known landmark, radial/DME fix, IFF Ident, and/or radio call to ATC. Act as on-scene commander until Bingo fuel or transferring control to another aircraft or rescue agency. Expect 121.5 to be unusable due to the ELT signal (if able, the incident aircraft should turn off the ELT if a wingman is on station). The on-scene commander should attempt to assess the survivors' condition visually. This information should then be relayed to applicable controlling agencies/ATC to assist responding rescue assets. Passengers/safely pilots should utilize all available sources (Google maps, ForeFlight, etc.) to find road intersections to pin point crash location. This is better info than Lat/Long for emergency vehicle response.

5.8. **Midair Collision:** The affected aircraft will immediately take separation and individually sort out the level of damage. An available non-mishap aircraft will provide chase duties. Do not delay recovery, turn toward the nearest divert field. Chase aircraft will fly no closer than required to observe the mishap aircraft without becoming a distraction, or endangering their aircraft from the other aircraft's abrupt maneuvering due to loss of control, structural failure, etc. Avoid flying directly behind damaged aircraft. Chase should fly a position from which the pilot can observe the damaged aircraft, but otherwise remain silent unless absolutely required or requested by the damaged aircraft. "Over-helping" may distract from performing critical steps in resolving the emergency. If low in altitude, consider climbing (if possible) to improve CAPS performance or to simply allow for more options (trouble shooting, controllability checks, better glide range).

5.9. **Bird Strike:** While in close formation, care must be taken not to cause a mid air collision attempting to avoid an imminent bird strike. If a bird strike does occur, gain separation before handling the emergency. The most critical conditions due to bird strike are engine or prop failure, airframe structural damage, or cockpit penetration. Consider being led back for a wing landing if forward visibility is severely restricted.

Chapter 6

LIMITATIONS

6.1. **Minimum Formation Weather:** Experience, IFR proficiency, terrain and other factors must be taken into consideration when weather deteriorates below 5,000/5.

- 4 Ship formation and fewer: 3,500' ceilings, 5 miles visibility
- 5 Ship formation or more: 5,000' ceilings, 5 miles visibility

6.2. **Maximum Tailwind:** 5kts (for OSH arrivals only)

6.3. **Maximum Crosswind Component for Element Landings:** 8kts

- Gust spreads greater than 10kts, use caution

6.4. **Currency:** 2 formation flights within 6 months to fly in the C2A mass arrival. Plan on arriving the C2A mass arrival ready to fly, not to knock off the rust.

6.5. **Hard Deck:** 3,000' feet AGL or 1,000' above the highest obstacle if obstructions exits in the designated training area. 4,000'-5,000' AGL is often ideal if factors such as weather, traffic, aircraft performance are not issues (more time to troubleshoot during an emergency, cooler temperatures for non air-conditioned aircraft).

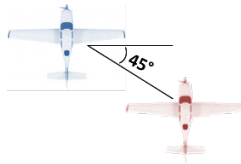
6.6. **Major Aircraft Repairs:** If less than 50 hours since a major aircraft repair (example: new cylinders, turbocharger installed) notify Lead prior to the start of the clinic to discuss. If in doubt, discuss any recent modifications or maintenance to your aircraft with Lead.

6.7. **Cirrus Flight Time:** If less than 100 hours, notify flight Lead. While not a limitation to participate in formation flying, Lead will help determine what mitigating factors can be taken into account to reduce risk.

Standard Terms

Acute: The opposite of "sucked." To be in a position very far forward in the formation or bearing line.

Bearing Line: The line angled off the lead aircraft. C2A uses 45°.



Bingo Fuel: The fuel state at which the flight must return to base. A predetermined fuel figure in gallons that allows for return to base plus sufficient reserve.

Blind: When a wingman loses sight of lead.

Cross under: A maneuver to change the position of a wingman from one side to the other.

Dash or Chalk 2, 3, 4 etc: A military term to reference successive wingman in a flight.

Element: A flight of two aircraft.

Flight: Multiple aircraft flying under the direction of one aircraft (Flight Lead). The flight is often led by the most experienced formation pilot, with the second element leader acting as the deputy or Wing Lead.

Formation: A preplanned flight of 2 or more aircraft under the command of a Flight Leader, using a standardized set of visual signals and verbal commands to direct the Wingmen.

Gaggle: An undisciplined group of aircraft, milling about in roughly the same piece of sky, sometimes attempting to impersonate a real formation.

Gimmie One: What a wingman calls to lead when they have insufficient power to keep up. Defined in Cirrus as 2" of manifold pressure or 3kts. If you need more...Gimmie Two is acceptable (4" of manifold pressure and about 5 kts).

Go: Used to direct the flight, wingman always acknowledge in order.

Initial: As in initial approach. Refers to the approach on runway heading used when doing a 360 overhead break.

Kickout: Prefer Route When lead directs the flight to loosen the formation a safe distance to allow pilots to briefly look inside to adjust radios or check instruments/engine data.

Knock it off: Terms used to cease maneuvering.

NORDO (Lost Comms): If you cannot transmit, signal by waving hand across your mouth. If you can't hear, wave hand across your ear. If at night, flash position lights.



Can't transmit



Can't receive

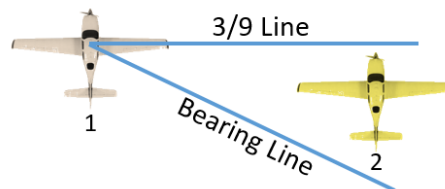
Ops Check: When directed by lead after a kickout to route, a pilot's opportunity to scan instruments and engine data to confirm normal operations and make any adjustments.

Parade: Formation configuration used when the flight desires to demonstrate an "airshow" appearance by synchronizing actions and appearance. Examples are simultaneous shutdowns, lights off or after landing actions such as simultaneous flap retraction.

Push it Up: A phrase to inform lead to speed up.

Push: Go to a frequency without acknowledgment. Used in lieu of "Go", which requires an acknowledgement from wingman. When in doubt, say "acknowledge" if you desire a response from wingmen.

Route: a 'relaxed' formation position that allows greater spacing between aircraft and can be used to facilitate ops checks, frequency changes, or simply allow the wingman to momentarily go heads down in the cockpit. Acute position between bearing and 3/9 line.



Re-form: Command given by lead to bring a flight back into close formation. Usually called after a route or to direct a new formation.

Sausage: When the trail aircraft is 'linked up' with the flight. Informs lead the elements are one flight.

Smash: Available power, airspeed or energy. Normally used to denote what 'power' an aircraft

has in reserve or available.

Step Down: The vertical space by which #2 is lower than Lead.

Sucked: To fall behind lead or briefed bearing line, or be too far out on the position to be able to join up with available engine power. You will require 'smash' to fix a sucked position.

The Break: The breakup of the formation over the runway when a flight executes the 360 degree overhead. The turn or break is usually significant to separate from the flight and reduce energy in preparation for landing. Sometimes referred to as Initial or Pitchout.

Visual Signals



OK or READY



Start or "Run it up"



Understood or NOW



Cross Under #2



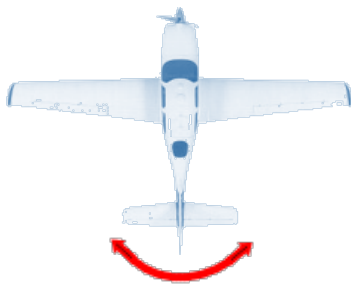
Cross Under #3 & #4



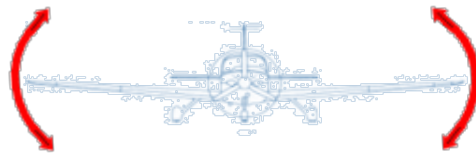
Echelon Turn (from fingertip)

Airplane Signals

KICK OUT (Wag Tail)



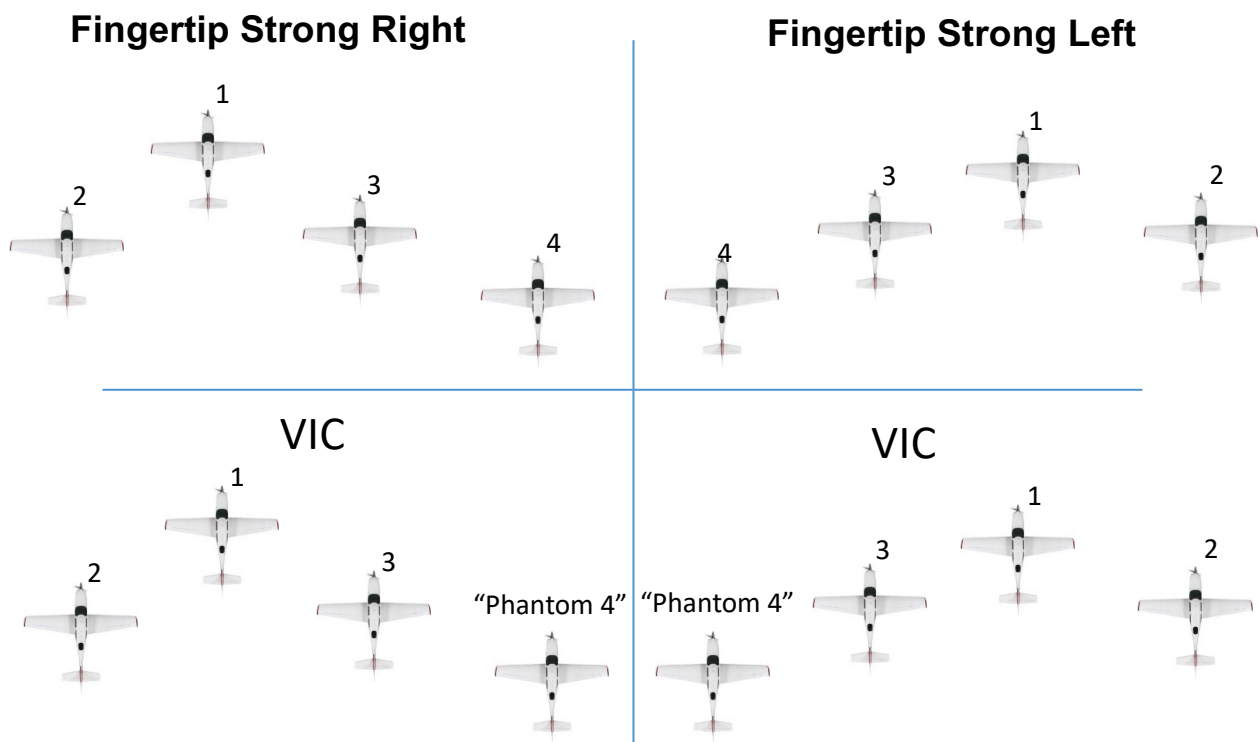
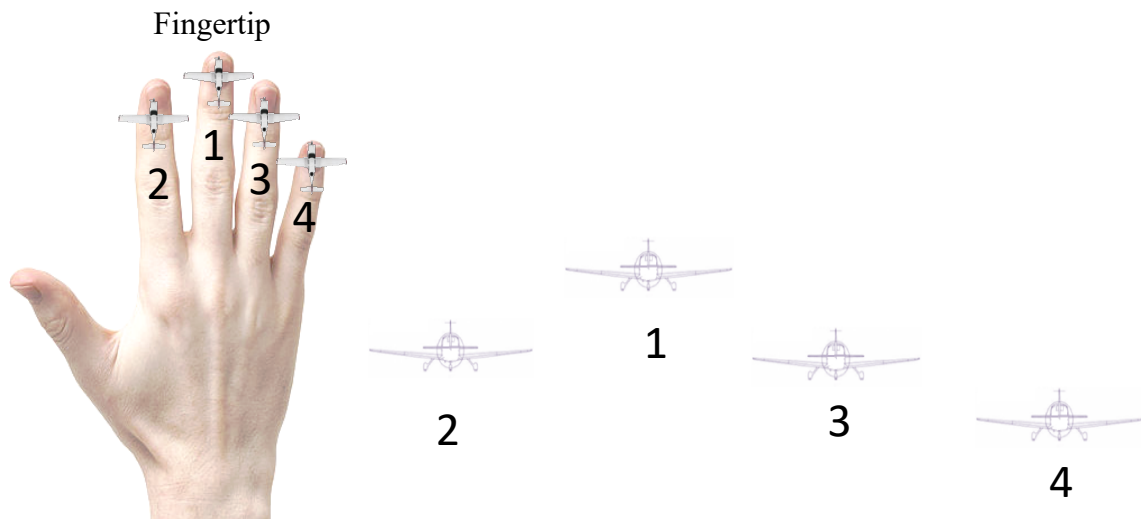
RE-FORM (Rock Wings)



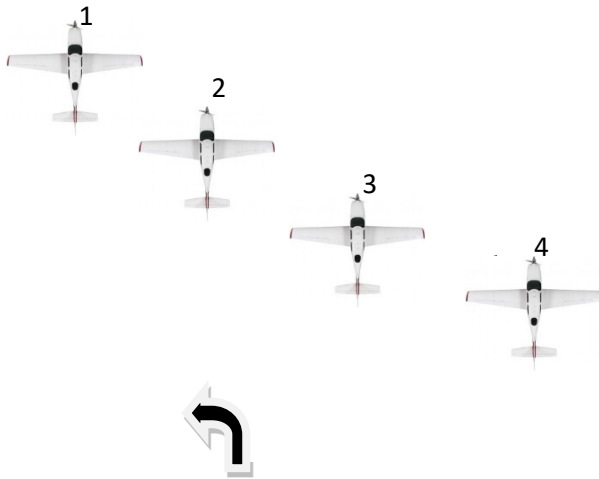
Go CLOSE TRAIL (Porpoise)



Types of Formations

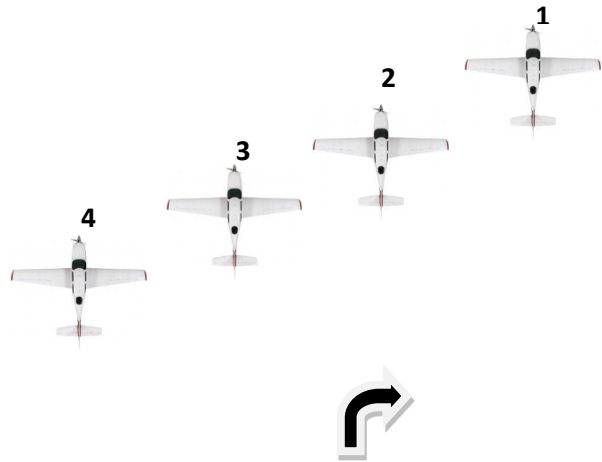


Echelon Right



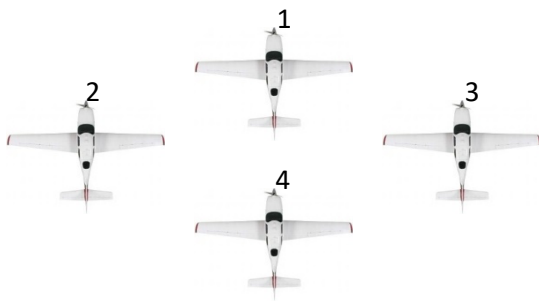
Left Turns Only

Echelon Left



Right Turns Only

Diamond



Close Trail



Self Assessment (with Safety Pilot)

Our goal is to allow each pilot to assess their skill level and self designate a proficiency level with the help of a Safety Pilot. There are no 'certifications' or 'check rides' provided by C2A. This guide will determine your level of participation in future formation flights and ultimately the C2A mass arrival. There are 4 categories of proficiency and responsibility:

Rookie	Wingman/Element Lead	Safety Pilot	Flight Lead
Attended Clinic	Solid position holding skills	Recommended by a Flight Lead	Able to lead a 4 ship formation
Understands fundamentals	Proficient at element take off and landings	Strong Cirrus formation skills	Numerous Formation Flights
Requires Safety Pilot	Can fly 2 and 4 ship wingman positions solo and lead an element.	Passed written test, knows SOP, rehearsed on Emergency Proc.	Recommended by a C2A Safety Pilot or Flight Lead

There is no set number of formation flights or hours required to achieve a specific level of participation. A Safety Pilot will help you in your assessment. If for any reason your assessment varies significantly from your Safety Pilot's, you can fly with another Safety Pilot for a second opinion. You can overcome any deficiency with practice. Our goal is quality formation pilots over quantity. When you become a Lead pilot, you expect your wingman to fly safely with you and understand the plan and your commands. Safety is our top priority.

Currency: It is important to practice and remain proficient at formation flying. It is a skill that atrophies with time. Recommended currency is 2 formation flights within a 6 month period. This is a conservative recommendation. Consider formation flying the same way you approach IFR or night flying currency. If you are outside your currency, use a Safety Pilot to reset.

Proficiency Grades	Symbol	Description
Requires Improvement	R	Limited Proficiency. Deviations occur, verbal prompting required, Safety sometimes takes controls.
Satisfactory	S	Solid fundamentals, deviations occur; corrected in a timely manner with no verbal prompting. Safety doesn't take controls.
Excellent	E	High degree of skill, almost zero deviations (mistakes are minor if any). Getting ready for next level (Safety or Lead Pilot).