

Cessnas 2 Oshkosh 2021



This slide show is meant to be reviewed in a classroom setting along with instruction provided by an instructor well versed in formation flight techniques. This course material is copyrighted by Rodney Swanson and is to be used for training Cessnas 2 Oshkosh pilots only.

It is not our intention to “re-invent the wheel”. There are numerous formation flight references on the market that will provide everything you need. We will be utilizing excerpts from some of those references to aid in standardization.

Nothing provided in this course of instruction is meant to contradict the tenets of basic airmanship or your aircraft operating handbook. Formation flight is a risky endeavor and should be afforded due diligence.

AGENDA

- Introduction
- Legalities
- Definitions
- Procedures
- Ramp Exercise
- Preflight Briefing
- Practice Flights
- After action review

Formation Flight Training -Introduction-

- Why are we doing this?
- Is it legal?
- Who is going to participate and are they sufficiently trained?

Why are we doing this?

- We are continuing the tradition of the Cessnas 2 Oshkosh mass arrival
- We want to arrive and park together at KOSH
- We welcome the challenge and reward of additional training

Is it Legal?

What are our requirements

Part 91.111

- You may not operate so close to another aircraft as to create a collision hazard.
- Can not conduct formation flight, except by arrangement with the PIC of each aircraft
- Not authorized when carrying passengers for hire

FAR 91.13

“The catch-all”

You may not operate your airplane in careless or reckless manner so as to endanger the life or property of another

Who is going to participate and are they sufficiently trained?

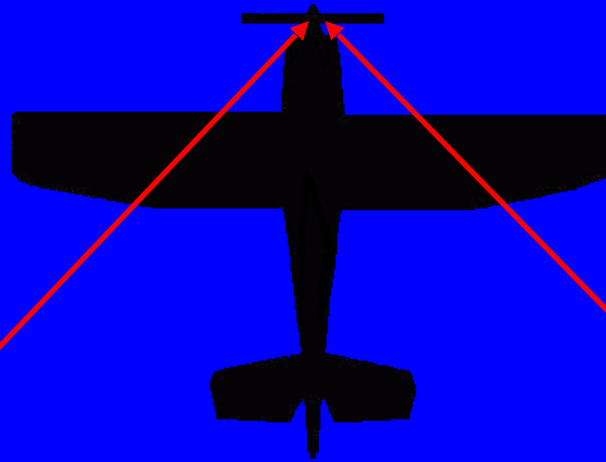
- Trained pilots with a **SAFETY FIRST** attitude
- Cessnas 2 Oshkosh participants that have dedicated themselves to the time and training required to conduct formation flight **SAFELY.**
- Members who have completed a formal course of instruction
- Members who attend the pre-formation briefing.

Definitions

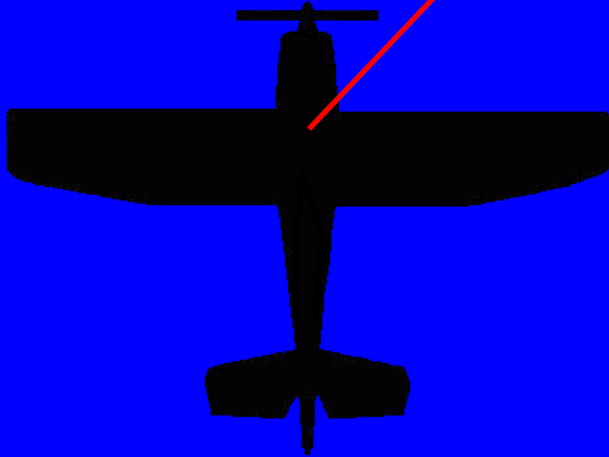
- For the purposes of Cessnas 2 Oshkosh, formation flight will be defined as flights of three in a delta (\wedge) formation no closer than four wingspan distance laterally with formation angle maintained at approximately 45° degrees.
- Distance between elements will be $\approx 2000'$

Definitions: Element

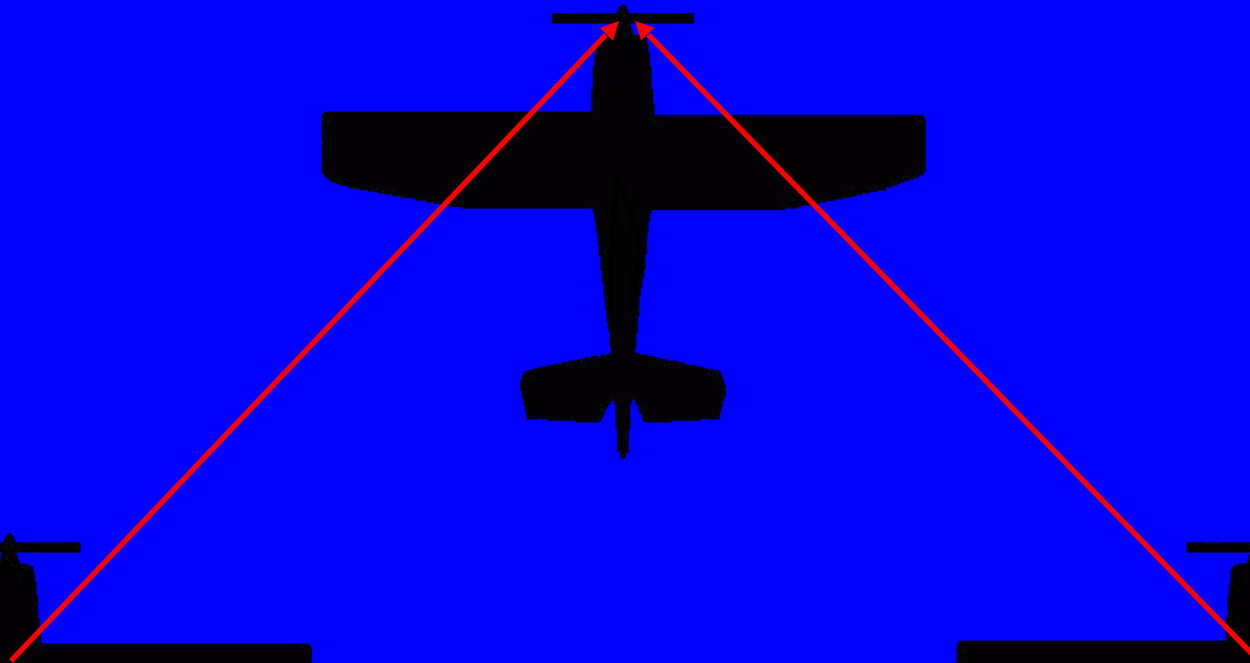
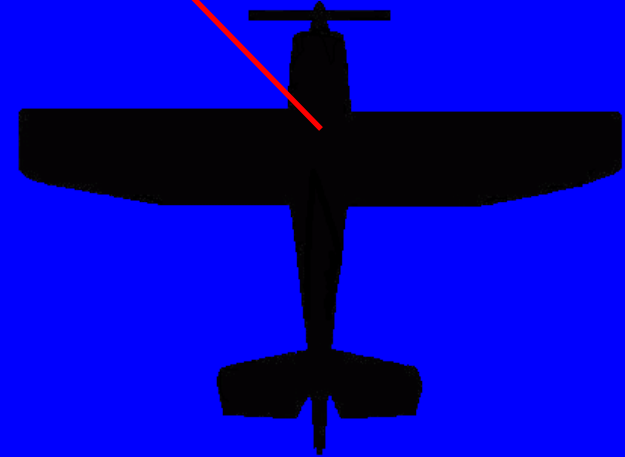
Lead



Chalk 2



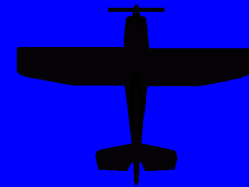
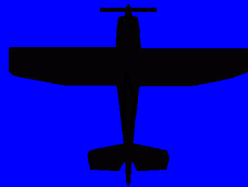
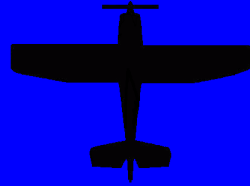
Chalk 3



Definitions: Flight

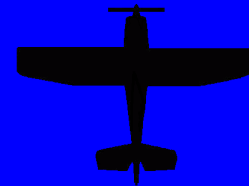
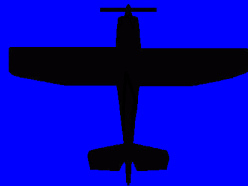
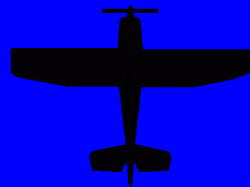
Element Alpha

Not to scale



Element Bravo

Not to scale

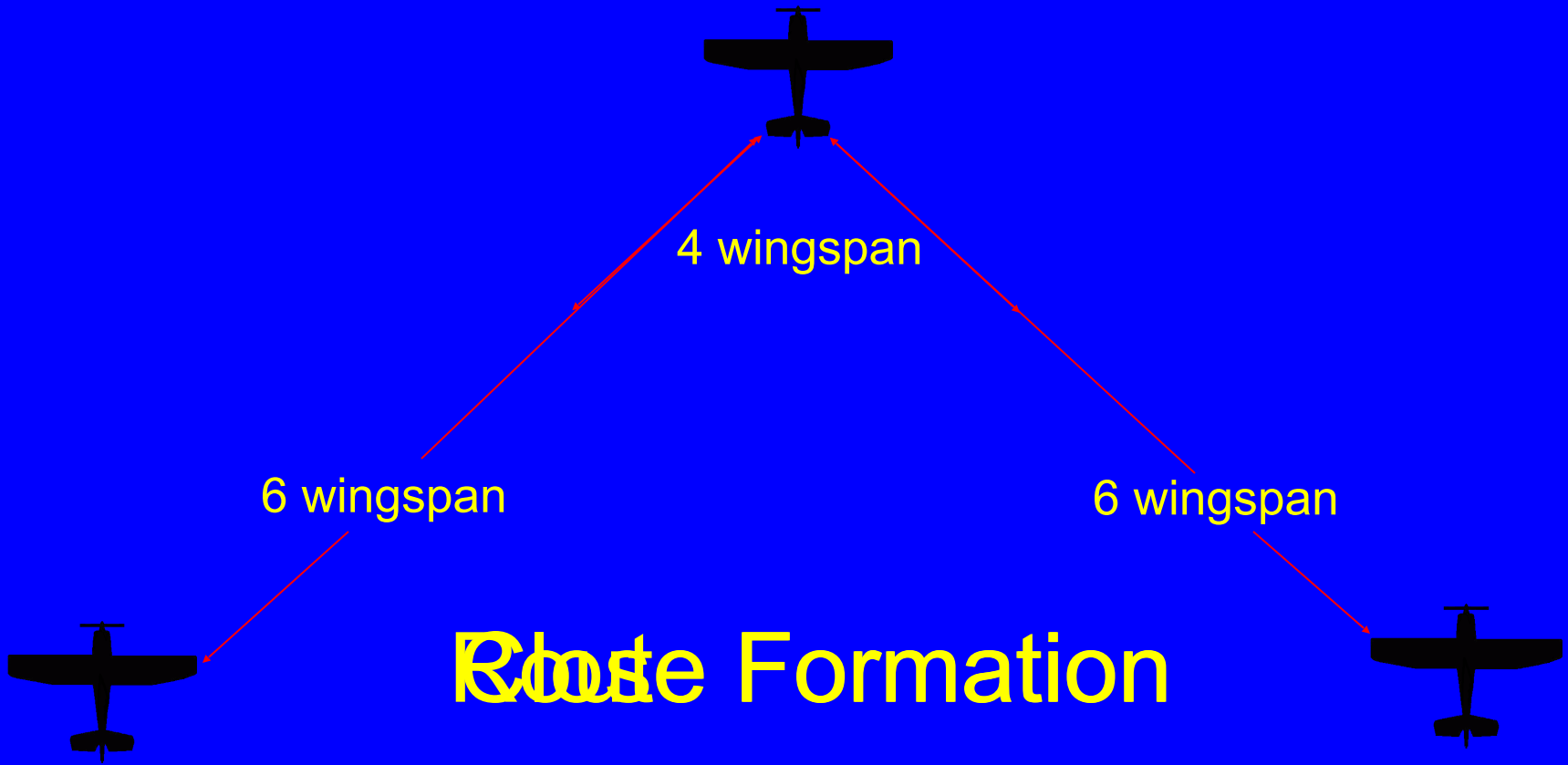


Definitions: Route Formation

- Position that is used for initial join-up
- Approximately 6 wingspan (2 more than our goal of 4 wingspan)
- Easier (less workload) to fly
- Allows for instrument scans, nav, setting up your cockpit

Definitions: Close Formation

- The ultimate “goal” position, 4 wingspan lateral separation
- Does not allow for instrument scan
- Higher workload and concentration
- Counter intuitively easier to maintain station-keeping

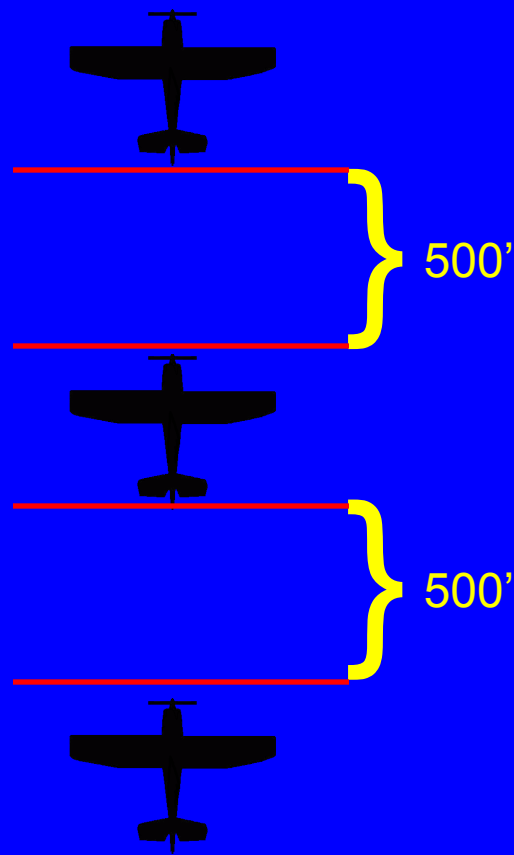


Route Formation

Trail Formation

- Easy to maintain lateral spacing
- Lead's roll and yaw visual cues are immediately sensed
- The most difficult to judge closure rate
- Will not be used in Cessnas 2 Oshkosh enroute. It will be necessary transitioning to the pattern
- Trail separation will be $\approx 500'$
- DO NOT "stack-down" in trail

Trail Formation



Procedures

-Safety-

- KISS
- If you lose sight of lead, separate!!
- If you separate more than 90 degrees off heading, climb to 2300' MSL and go to Ripon. You have other elements behind you.
- Fly your formation, stay with lead.
- Keep off the radio
- Minimize cockpit distractions, use your passengers

Procedures

-Safety-

- **Brief the flight and fly the brief**
- **If you lose sight of lead, separate!!**
- **There will be no in-flight re-joins!!**

Procedures

Pre-Taxi

- Have all pre-flight duties to include run-up, fuel sample, etc. complete prior to formation brief at KUNU. Be completely ready to fly.
- Radios will be setup as: primary com is Air-to-Air frequency typically 122.75 alternates are 122.925 and 123.45
- Second com will be ATC

Procedures

Pre-Taxi

- Element Leads will have appropriate navigation methods set up. Routes will be briefed
- Wingmen will have backup nav set to take over lead as necessary
- Everyone needs to reduce in-plane distractions to the bare minimum
- Only flight Lead / Trail has squawk, all others squawk stand-by.

Procedures

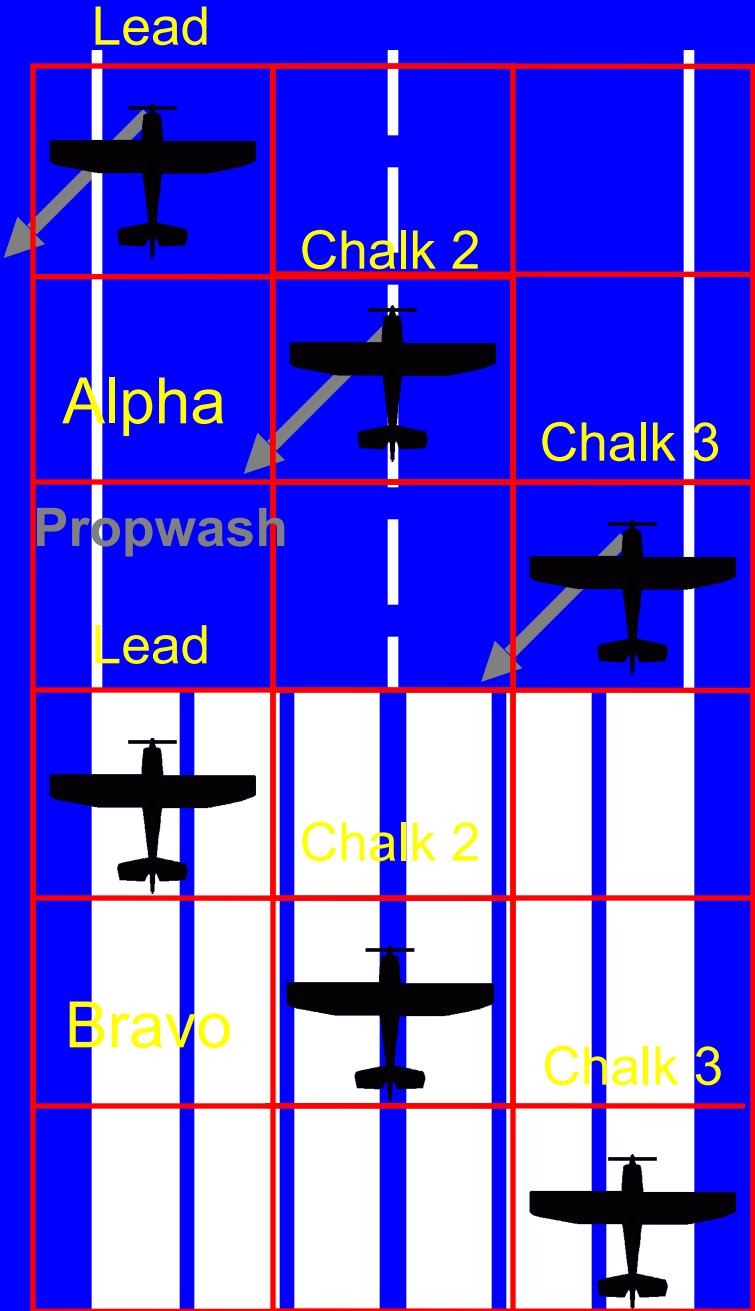
Taxi

- Ensure all members of your element are ready for taxi
- Element Lead will taxi out, closely followed by chalks #2 and #3
- Flight Lead will call for taxi to the runway (No delay between elements)
- Position on the runway ready for takeoff

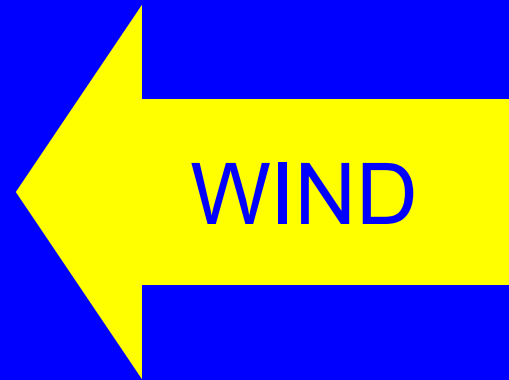
Procedures

Takeoff

- All aircraft will utilize navigation lights and landing lights in flight (if able).
- Closely sequenced takeoff. No more than 5 seconds between aircraft of the same element
- Elements will be sequenced by their takeoff times.
- Lead ensures smooth application of power



Line-up at KUNU
 (Ex. = winds from
 right side of runway)



Procedures

Takeoff

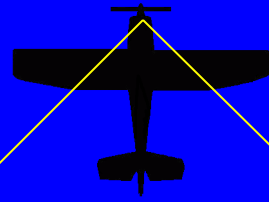
- Lead climbs out at the briefed speed.
- Lead maintains no more than 500 fpm climb rate
- Lead shall maintain briefed speed. Climb rate is secondary
- Chalks 2 & 3 can use a 20kts overtake until within 270' (\approx 8 spans) then slow

Enroute

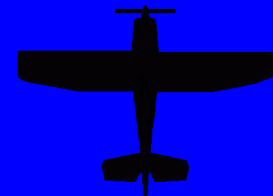
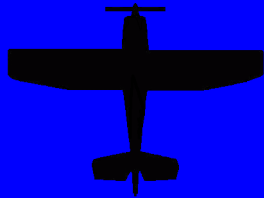
Everything about the Cessnas 2 Oshkosh flight is predicated on the speed of the elements. We cannot overstate the importance of attaining and properly maintaining your briefed airspeed. If given a choice between climb rate and airspeed, always choose airspeed. This will ensure the required level of safety for the entire flight.

Procedures Enroute

- Lead maintains briefed speed
- Chalks 2&3 approach their “route” position ≈ 6 span on the correct angle
- Once established *slowly* move in to your close formation ≈ 4 span
- Keep wings level with Lead. Move laterally with pedal
- **NEVER BANK INTO LEAD. IF YOU LOSE SIGHT OF LEAD, SEPARATE!**



Moved
to
Route
Formation



Procedures Enroute

- After closing on element Lead, maintain fore and aft position with throttle, lateral position with rudder and vertical position with elevator
- At any one time, all 4 controls may need to be manipulated to maintain position.
- It is important to eliminate motion relative to Lead as soon as it is sensed.

Procedures Enroute

- Vertical position will be “stacked down” approx 10’. (Hold your index finger parallel to the horizon. One finger width between lead and the horizon). Do not climb above Lead!

Safety Tip

- All motion relative to Lead must be eliminated as soon as you can sense it. This will minimize the “accordion effect”
- Climbing above Lead, also known as “stacking up”, may cause you to lose sight of Lead in the background. If you lose sight of Lead, Separate!!
- Keep Lead at your same level or slightly above

Procedures Enroute

- For aircraft with Constant Speed props, leave the RPM at a setting that will allow you to apply power rapidly without damage to your engine. Stay in the “green”.
- Smooth control movements are a must!
- Flying wing, you will likely be putting in control movement then immediately taking it back out. You will never stop trying to maintain position

Procedures Enroute

- Never take your eyes off of Lead. If you look down, Lead will not be where it was. **Guaranteed!**
- Don't stare at Lead. Maintain eye movement. This will allow you to better determine relative motion
- Turns will need to be anticipated. If you are inside the turn, power will need to be reduced immediately.

Procedures Enroute

- If you are on the outside of the turn, power will need to be increased immediately
- Maintain your position relative to Lead!
- Enroute turns should be planned not to exceed 30 degrees of heading change at any one time

Procedures Descent

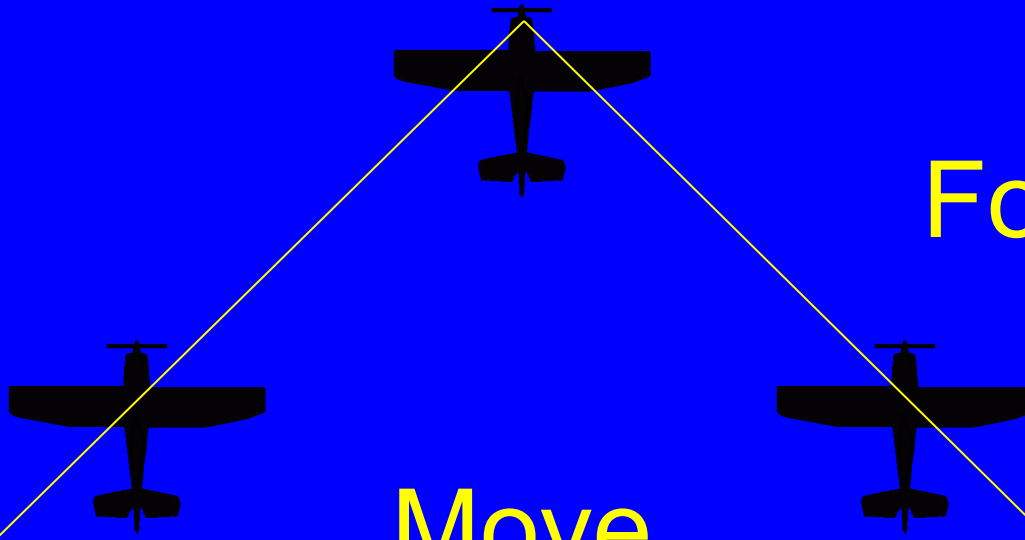
- Leads will anticipate descents and begin at designated 4 mile waypoint. This will require a descent of approximately 450fpm
- Wingmen need to reduce power immediately upon initiation of descent to avoid overrun of Lead

Procedures

Descent (con't)

- Points at which to extend gear/ flaps will be briefed and followed. Expect 3 miles from KOSH
- Smooth transition to trail. Expect ≈ 2 miles, Element Leads will make radio call e.g..
“Alpha flight, go trail”

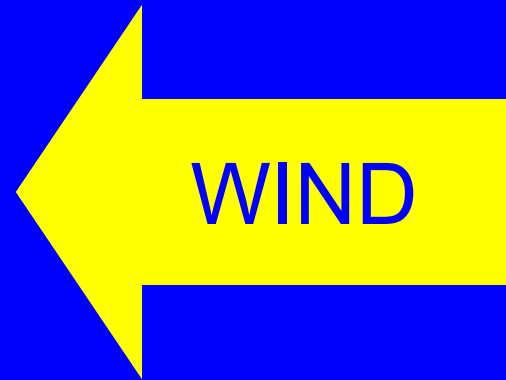
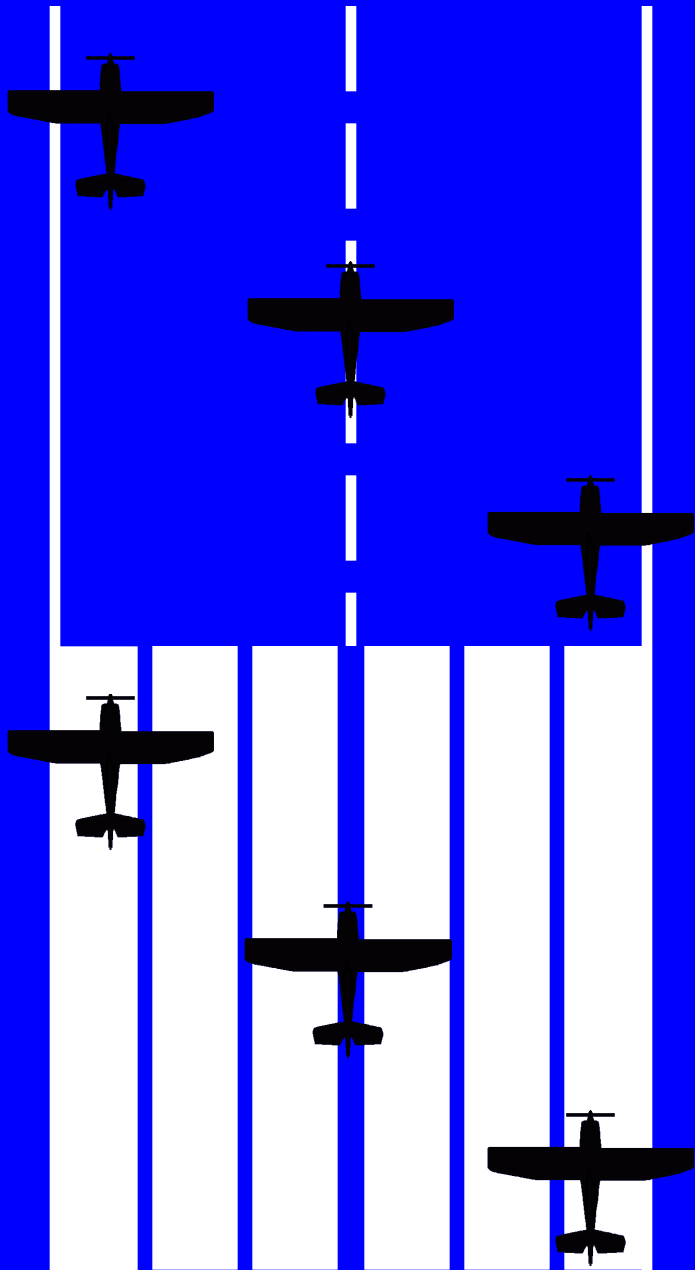
Trail
Formation

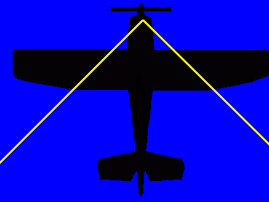


Move
to
Trail
Formation

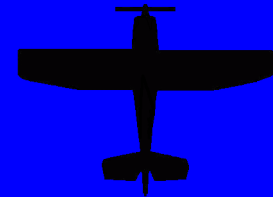
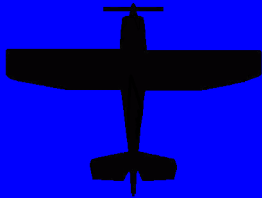
SUMMARY OF MANEUVERS

Line-up at KUNU
(Ex. = winds from
right side of runway)

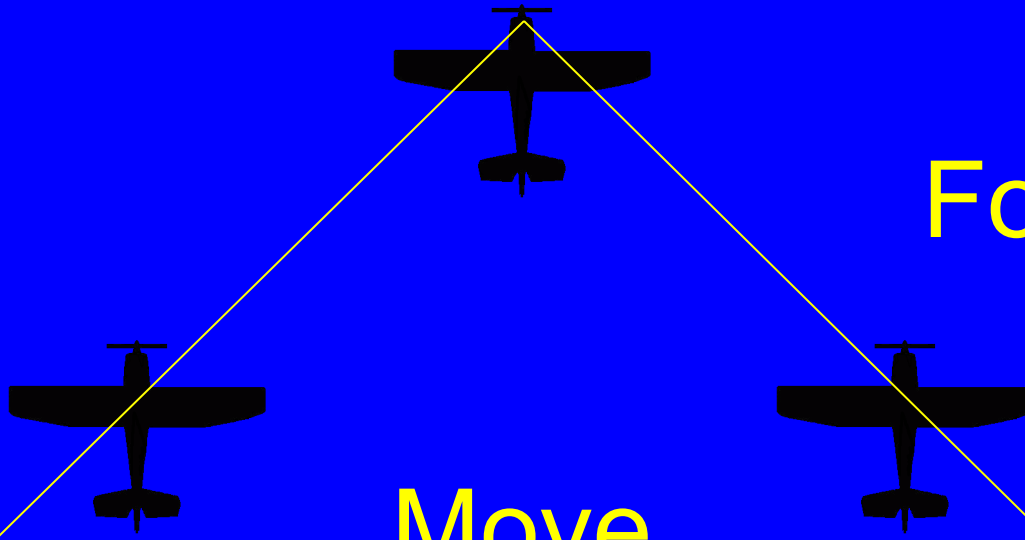




Moved
to
Route
Formation



Trail
Formation



Move
to
Trail
Formation

Contingency Plans

- If Lead breaks on the ground, chalk 2 will take over Lead position and take over Lead call-sign
- If chalk 2 breaks, chalk 3 will maintain his position in element and keep call-sign
- A one aircraft element is permissible. The surviving chalk would take Lead call-sign and fly single-ship
- **BOTTOM LINE!** Call-sign equals position in element

Contingency Plans (con't)

- A tug will be standing by at KUNU to assist in moving disabled aircraft off the taxiway or runway
- If an aircraft makes an “off airport” landing, following aircraft will advise ATC and continue the arrival.
- No participating aircraft will provide Search and Rescue!

Contingency Plans (con't)

- In case of mechanical issues after takeoff, determine if a landing needs to be made immediately.
- Waupun is left of our course and Fond Du Lac (FLD) is just to the right of our course line.
- Have in mind a plan for immediate landings.
- DO NOT plan for a return to Juneau!

Procedures Arrival

- Formation landings will not be conducted
- Closely sequenced and planned landings will aid in our arrival
- Be prepared to transition to trail formation at ≈ 2 miles from KOSH with a radio call from element lead. Chalks 2 & 3 will slowly and carefully start transitioning to trail at a distance to ensure a safe landing.

Procedures Arrival

- Lead will plan for a mid-field touchdown (yellow dot, 3200' remaining) while keeping his speed slightly faster than normal
- Chalk 2 will touchdown at the 1/3 field length (purple dot, 4750 remaining)
- Chalk 3 will touchdown on the approach numbers OR Rwy 36R

Go Arounds

- Apply full power, turn away from the airport, climb to cruise altitude plus 300' and proceed to Checkpoint #3
- Wait for last element (300/400 series) to pass and immediately fall into trail
- You will now be “Cessna Trail” for ATC purposes

Procedures Arrival

- After touchdown all aircraft will move to the “cold” side of the runway. This is the same side that the turn to exit will be made. This will facilitate the safe execution of a possible go-around by a following aircraft.
- All aircraft will expeditiously taxi to the end of the runway knowing that aircraft are touching down behind them

Procedures Arrival

- Follow the ground guides to parking
- Welcome to AirVenture 2021!
- A comprehensive after-action brief will be conducted at the Cessna BaseCamp tent 10 minutes after the last aircraft lands
- Bring your notes, comments, and thick skin