

## FFI Formation Guidelines and Standard Procedures

### Mooney Supplement (Rev 15 - 20 JAN 2020)

This document describes formation flight differences between RV and Mooney aircraft. In conjunction with the *FFI Formation Guide*, this Supplement establishes the "Mooney Standard."

**Element Takeoffs:** 100' minimum runway width.

- Flaps: none for J and earlier models; takeoff flaps for K and later models.
- Power: Lead gives Wing a power advantage. Brief changes as needed for dissimilar aircraft or airport conditions.
- Gear: retract with Lead and transition to fingertip position when clear.

**Interval Takeoffs:** Interval as briefed (as seconds or "air under the wheels"). Pilots should use full power, and may use flaps if desired. Gear up at pilot discretion.

**Rotation speed:** 70-80 KIAS

**Climb-out:** Quickly accelerate to 100 KIAS and climb at 500 FPM. Climb rate may be decreased appropriately for dissimilar aircraft in the flight, but Lead will maintain 100 KIAS.

**Interflight Calls:** Radio calls may be used *in lieu of hand signals* in flight due to visibility issues within the cockpit of a Mooney. Radio directives will be acknowledged by wingmen.

**Pitchouts / Breaks:** Use 45° Angle of Bank (AOB) and five (5) second intervals for landings, use three (3) seconds for Rejoins, and use two (2) seconds for Extended Trail (ET). Left Breaks are favored for the two (2) second breaks to ET due to cockpit visibility restrictions.

**Rejoins:** Lead maintains a constant 20° to 25° AOB for Turning Rejoins.

**Rejoin Reference Line:** Leading corner of vertical stabilizer aligned with the leading corner of outboard wingtip. This gives a 45° reference line.

**Cruise speed:** 120 KIAS. Note: Lead may adjust for maneuvering with dissimilar aircraft.

**Maximum speed:** 150 KIAS

**Echelon Turns:** Recommended Bank angle 30°. Smaller bank angles may be more challenging for the wingmen.

**Lazy Eight Maneuvering (Fingertip / Diamond / Close Trail):** Lead should work the formation up to maximum maneuver limits of +20° / -10° of pitch and at least 30° of bank. Due to the visibility restrictions inherent in cross-cockpit (wingman on left wing) flying, pilots need to develop proficiency in cross-cockpit Lazy Eight maneuvering.

**Extended Trail Entry:** Use 45° AOB. Left Breaks are preferred for better visibility.

**Extended Trail Maneuvering:** Lead should work the formation up to +30° / -20° pitch and at least 45° AOB, but must not exceed maximum maneuver limits of 60° AOB. Excessive negative pitch should be avoided as this could lead to an over speed of wingmen.

**Close Trail Spacing:** One ship length between aircraft, with adequate stackdown to permit vertical separation in the event the aircraft in front loses power and moves aft quickly.

**Mooney Landing Profile (for Overhead Breaks, Element, and Single Ship Landings):**

- Lead chooses an Aim Point that will allow landing 500 to 1,000 feet beyond the approach end of the runway.
- **Fly a stable, on speed (90 KIAS) approach with an approximate 3° glideslope, and hold the Aim Point.**
- At approximately 100 feet AGL (crossing the fence), begin a **SLOW, SMOOTH** power reduction.
  - *Note: If performing an Element Landing, your wingman will mirror your actions, and Lead should not go to full idle (Lead leaves 1" of MP above idle power setting of power in).*
- Do not flare aggressively, but rather just hold the nose off as you approach the runway. Touchdown will actually occur at 70 to 75 KIAS, approximately 500 feet beyond your Aim Point.
- **This is a NO FLAP landing for everyone.**

**Overhead Breaks:**

- Initial is flown at 120 KIAS. 45° AOB with five (5) second intervals for landings.
- Wingmen will match bank angle of plane ahead with the goal of rolling out in trail on the downwind at 100 KIAS with gear up.
- Each aircraft lowers gear when entering the downwind and slows to 90 knots.
- At the perch, lead begins a descending base to final turn, maintaining 90 KIAS on final. Use Mooney Landing Profile described above.
- All aircraft make a "Base, gear down" call for final check and to aid Lead's situational awareness.
- Use the Centerline-Cold landing method: all aircraft land on the centerline of the runway, then drift to the cold side when under control.

**VFR Pattern Entry - Downwind Breakup:** Fly downwind at 100 KIAS with gear and flaps up. Lead turns at the perch, the next wingman delays 5 seconds before turning. Extend gear during the base turn. To avoid compression, Lead must fly formation landing profile to enable each subsequent aircraft to maintain 90kts on final.

**Element Landings:** 100' minimum runway width. Wingman automatically extends gear with Lead and moves to acute, 10' minimum wingtip separation, level-stack position after gear extension and established on final. (See Mooney Landing Profile above).

## Mooney Fingertip References

These references give a 45° sight line that matches other FFI sight lines (e.g. RV, Bonanza). Larger images are available at <http://bit.ly/mooney-ffi>

**Note:** This is a change from the previous reference using the first flap hinge on the spinner.

- 1: Trailing edge of **second** flap hinge on cowl seam
- 2: Spinner slightly visible below wing
- 3: Opposite elevator visible



### Detail: 2nd flap hinge on seam

This is slightly out of position to show details.

The correct position is when these two points are touching.

## Mooney Takeoff / Landing References

Align Wingman's leading edge of wing with Lead's trailing edge of wing, and with sufficient wingtip clearance to ensure that each aircraft can clear the other in case of an abort or a blown tire. Put Lead's head on the horizon.



## Mooney Route Position References

Align lead's near wingtip on spinner. Some horizon visible below lead.



## Mooney Echelon Turn References

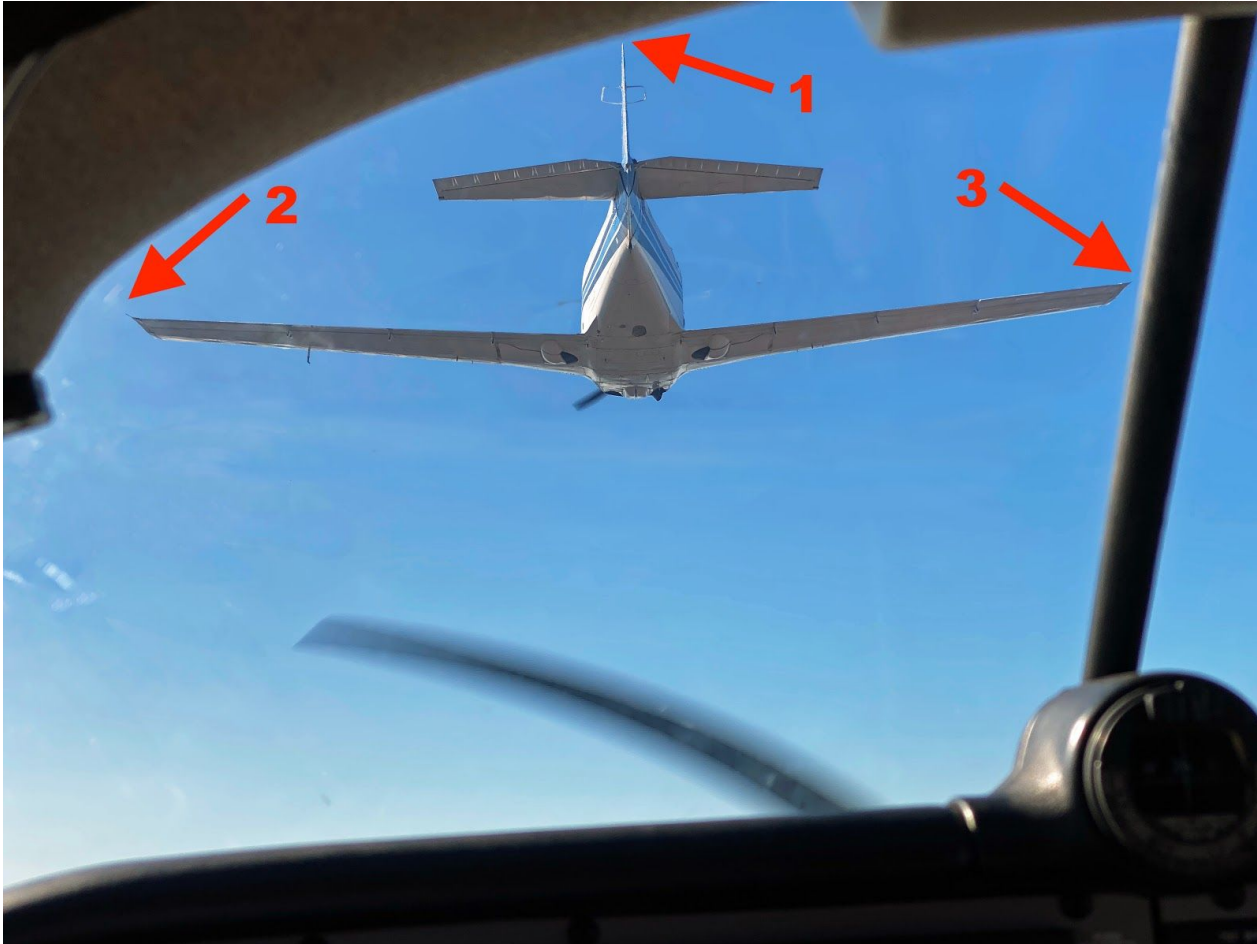
1: Vertical line from 2nd flap hinge to tie-down ring to vertical cowl seam

2: Sliver of horizon visible under belly



## Mooney Close Trail References

- 1: Put top of rudder at top edge of your windshield
- 2: Left wing near left edge of windshield
- 3: Right wing at center post
- 4: Center on lead by keeping the fuselage sides symmetrical
- 5: None of the upper wing visible



## Mooney Rejoin References

- 1: Lead on the horizon
- 2: Leading corner of vertical stabilizer to leading corner of outboard wing



Acute (and low)



Correct 45-line position



Sucked