

# Formation Flight Safety

Part 3

BY CHARLIE PRECOURT, SAFETY COMMITTEE CHAIRMAN, EAA BOARD OF DIRECTORS

**I'VE ALWAYS CONSIDERED** formation flying one of the most enjoyable types of flying we can do. Formation fundamentals strengthen your overall flying abilities, but also require some unique training to perform correctly and safely. To re-emphasize some important points from our first two articles, don't take up formation without some good instruction. Your instructor doesn't have to be a CFI. In fact it is more important the instructor be well experienced in formation and in the type of aircraft you want to learn than be a CFI. The best CFIs in the world can't teach you to be safe in formation unless they have formation experience.

The FAA doesn't provide any requirements for teaching or testing for these skills through the normal certificates and ratings, so we have to rely on experience within the pilot community. A great reference is *The Formation Pilot's Knowledge Guide* published by FAST, the Formation and Safety Team. (Visit [www.SportAviation.org](http://www.SportAviation.org) for a PDF.) I highly recommend it!

Another key point discussed in Part 1 is the challenge of flying the lead position. It is important to learn to perform on the wing to a high degree of proficiency before attempting to learn lead, as these positions are two entirely different skills and should be approached in building block fashion. One way you'll know when you're ready to start learning lead is when you can recognize the mistakes the leader is making while you're on the wing!

To continue from Part 2 with more on the finer points of flying the wing position, I was thinking about the student errors that make me uncomfortable when I'm teaching a pilot to fly on the wing. For close-in formation, our correct position relative to the leader is determined by a number of things. One is it places you close enough that you could penetrate IMC together without losing sight. Another is the proper position allows maneuvering through turns safely, while the inverse is true: Being out of position can increase the risk of collision.

Inevitably, when a pilot is first learning to fly close formation, there will be lots of deviations from the proper position, but I become most uncomfortable when the wingman drifts high on the leader. There are a couple of reasons for this. First, as you drift higher, the leader is moving more toward your aircraft underside where it gets harder to see. Worse, if the leader initiates a turn into you while you are out of position high, lead will appear to be going under you. To match his turn you need to bank away, which will cause you to instantly lose sight altogether, so you're now stuck, even though you're only a few feet away. Very uncomfortable, and a big no-no. As a rule of thumb, I don't want to ever see the entire upper surface of the leader's wing (low-wing





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aircraft), and I make corrections immediately to avoid that happening. If the leader is in a high-wing aircraft, being out of position high is even worse, as the leader also loses sight of you! To avoid getting high on the leader, some wingmen of formation demonstration teams will fly with the pitch trim “preloaded” nose down, requiring them to hold constant back pressure to stay level. With this trim setting, any drift high can be corrected quickly by just relaxing back pressure. This is not a technique I have used personally, just never adopted it, but I know many have. The point is to avoid getting high on lead.

Another common student error I see during turns in close formation occurs when the leader turns away from the wingman. When the lead’s turn away from you makes you see his aircraft’s belly, it gives the impression that you’re low. Instinctively the first correction the student makes is to pitch up to correct. The problem is students often correct in pitch without initiating bank, so they end up drifting wide. At this point they

have traded the low position error for a wide position error, necessitating two sizable corrections. Instead, when the lead turns away from me, I make sure that I match his bank and roll rate as a priority, and then correct the vertical error with pitch. Ideally you can do both axes together, but if you trend out of position low as lead turns away, be sure to get the bank error fixed pronto. In doing so, I don’t have to correct two errors (vertical then lateral), as I never get wide. I maintain proper lateral by keeping up in roll, and then gradually fix the pitch.

Another maneuver to master on the wing is the rejoin. Rejoins return us to close formation from more distant positions, and they can be done straight ahead or turning. Practice turning rejoins by positioning about 800 feet in trail of the leader. Lead initiates a 30-degree bank turn, and the wingman follows and accelerates 5-10 knots. This is another place where being high on lead makes me uncomfortable. Wing should descend enough that lead appears above the

horizon (three to four finger-widths held at arm’s length is a good rule of thumb). At this point your higher speed gives you a bigger turn radius, which will move you toward lead. You strive to fly along a 30-45 degree bearing line aft of the leader. You can estimate that by flying your aircraft to keep lead near the front lower quarter panel of your windscreen. From that starting point, if you increase bank, lead will move aft in your view; if you decrease bank, lead will move forward. So “driving up lead’s wing line” is controlled by varying bank angle. As you get closer you can start to reduce speed to match lead’s and slide into position. Your safety escape route is provided by staying below lead, and if you find closure rates are too high for comfort, you roll out your bank and pass behind and below lead, overshooting to the outside of the turn until the speeds are matched. Mastering the turning rejoin will be a great confidence builder for more complex formation skills to come later. Fly safely out there! *EAA*