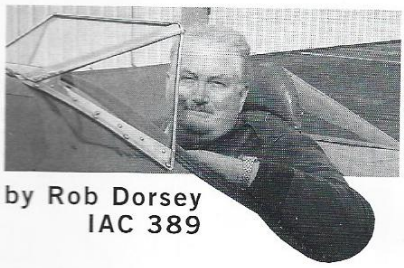
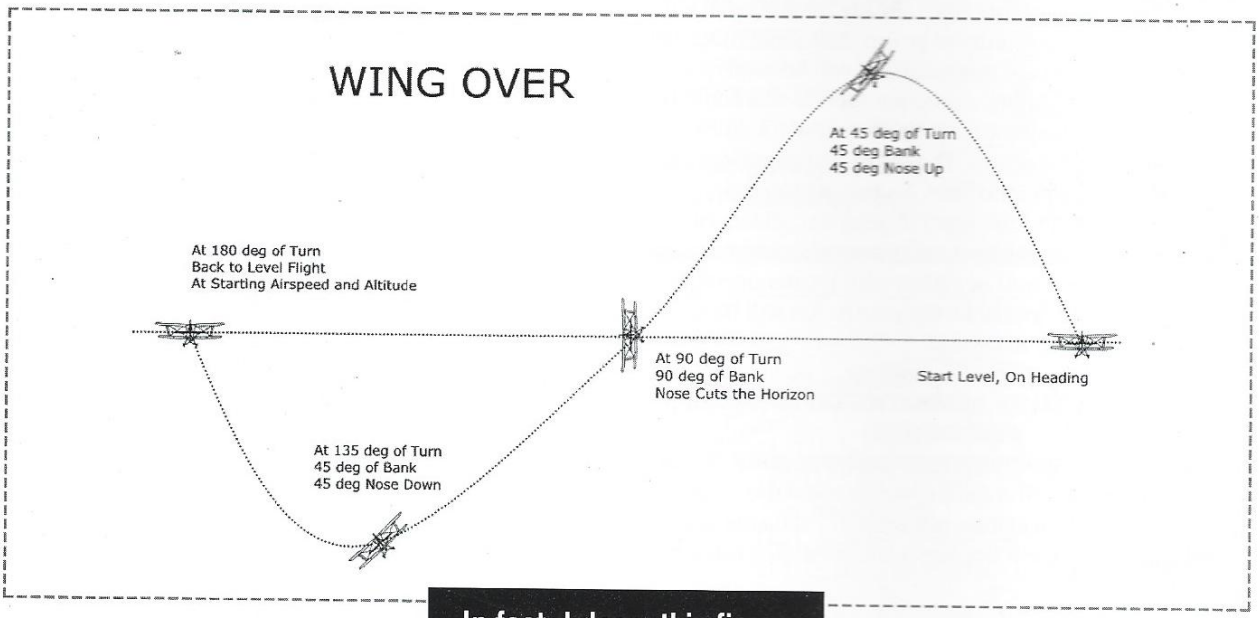
Stick & Rudder



by Rob Dorsey
IAC 389

In The Beginning...

You have wanted to fly aerobatics all of your adult life. The plastic airplanes, hung by thread and thumbtack from your childhood bedroom ceiling, were often posed inverted or in steep climbs or dives, and you couldn't possibly fly your .049 Cox Little Stinker without trying a loop or two. More importantly, you sort of enjoyed the steep turns and accelerated stalls you practiced while working toward your private certificate. Now, bored with droning from A to B, you again think about looping and rolling, about gaining a true command of the horizon. But how? Where to start?



To all things there is a beginning. Regular readers of this column who have progressed beyond basic aerobatics will, by now, have flipped past these pages and gone on to the contest results or accident reports. The fact that you have read this far would indicate that you are possibly not in that group and that the following may pertain to you. So suppose, for a moment, that you have caught the sport flying bug (else why would you be reading this magazine) and that you have gained access to a sport airplane, either by partnership, purchase, or by building the thing (and, having done that, my hat is off to you). It could be a Citabria, an RV, a warbird, or a vintage airplane; regardless, you know that it has at least some capacity for aerobatics, and that has the effect of spurring you on. The trouble is, you might be the type who needs to ease into things. Perhaps you are imbued with the wisdom of middle-aged caution or are simply a sensible and careful person. Either way, you cannot imagine cramming yourself into the front seat of a Pitts S-2B and being force-fed a full regimen of aerobatics on 10 flights in five days by an instructor who's too young to name

In fact, I deem this figure to be of such importance as a training tool that I personally use it whenever I have been away from aerobatics for a while or if I am flying a new airplane, just to warm up and re-enforce the feel, orientation, and coordination.

all four Beatles, while living in a motel room far from the comforts and support of home. No, you would first like to gain some modicum of experience and orientation in your own, familiar airplane in your own, familiar airspace. After all, as Charlie Chan said, "When testing water, it's best not to use both feet." You would like to have some entry level aerobatic maneuvers that you could use to warm up to the idea without beating yourself or your airplane up and without scaring yourself puce. You, my friend, are in luck.

Modern training wisdom has succeeded in watering down one of the most graceful and satisfying maneuvers you can fly in any airplane

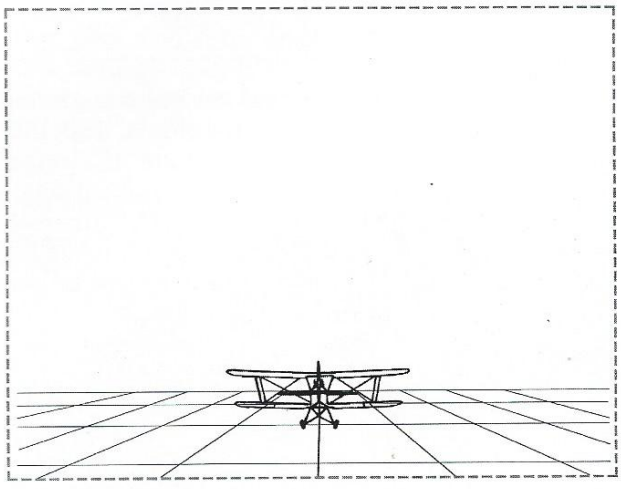
Over the years, one of the things I have pursued is teaching aerobatics, a lot of it to ab initio students who had never banked more than 60 degrees and who had never achieved a pitch attitude higher than a short-field takeoff. I quickly found that plunging them into the whirling, jerking, noisy world of continuous aerobatic flight was counterproductive. You see, there is, in any flying, always the requirement for maintaining orientation. It is what airline training calls "situational awareness," and 95 percent of situational awareness is just knowing what's going on. A great portion of your aerobatic skill is determined strictly by your level of orientation. You need to develop your thinking in a three-dimensional way.

Now, your present flying certainly is in a three-dimensional environment, but you really approach it in a two-dimensional manner. Navigation is a two-dimensional exercise, and your use of up and down are gradual and confined to climbing and descending. Aerobatics, on the other hand, really uses all of the dimensions, including a fourth—speed—and you must develop those parts of your brain that deal with using all of your senses to form a mental, three-dimensional model of what the airplane is doing in space. Wow! Sounds hard, don't it? It's not really, but it takes a little getting used to.

Early on I discovered a training maneuver that outdistanced anything else I had tried previously. Derived from the humble lazy eight, which our ever-capable FAA has chosen to dilute into a non-maneuver, a half of a lazy eight, flown with aerobatic attitudes and precision, becomes a wing-over and provides an almost perfect training figure for the new and aspiring aerobatic pilot. Here's how it goes.

If you have done a commercial or flight instructor course, you were exposed to the lazy eight. Modern training wisdom has succeeded in watering down one of the most graceful and satisfying maneuvers you can fly in any airplane and which is very beautiful as seen from the cockpit. Trouble is, it's an absolute bore as seen from the ground, hence its loss of standing in the powered aerobatic competition arena. What it provides, however, is the challenge of flowing the airplane through a constantly changing series of attitudes, airspeeds, and altitudes whilst achieving precise key points. And it does all of this without pulling more than +2 Gs, which means that it can be done in any airplane capable of a steep turn! You can practice the wing-over in a Pitts or a C-152, and the resulting benefits are equal. Get good at it, and you will be the beneficiary of enhanced orientation, coordination, and confidence regardless of the airplane type you practice this in. Cool, huh?

To do the wing-over, climb to a decent practice altitude and pick a prominent surface feature for orientation. A long, straight road is perfect (British readers may disregard this suggestion). Now, aligned with this feature, dive a little bit and pick up a speed about 20 mph faster than cruise. Most airplanes will do this figure at cruise power, but some, like the 220-hp Stearman or 65-hp Cub, might need more throttle. Start a smooth pull up to the horizon, and as the nose passes through it, start a smooth roll into a climbing turn to the left. We will do the left wing-over first since our right-turning props will help us along.



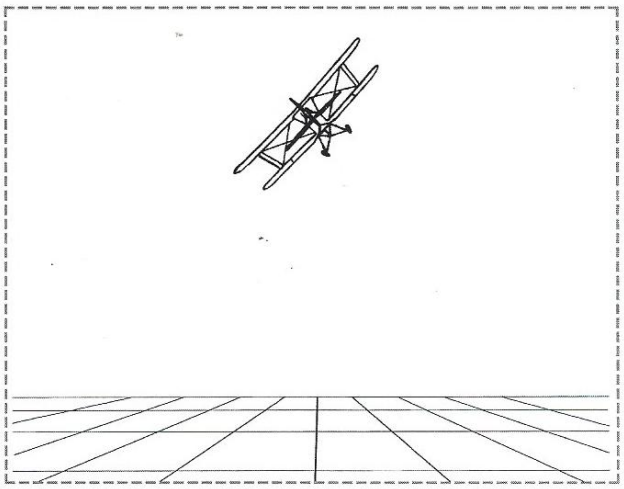
Look past your nose and try to determine the 45-degree turn point at which you should achieve both a 45-degree bank angle and 45-degree nose-up attitude. While this may look like the highest altitude you will achieve during the figure, it isn't. Practically, whenever the nose is above the horizon, the airplane

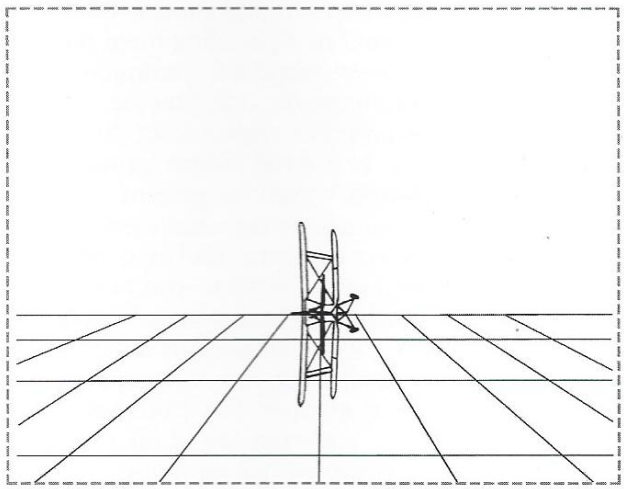
is climbing. Now, keep increasing the bank angle with rudder and aileron but relax the elevator pressure so as to allow the nose to gracefully arc downward toward your next, and most important, key position—the 90-degree turn point. Here all must come together as you should achieve a 90-degree bank just as the falling nose cuts the horizon. Here you are actually at the highest altitude of the figure and the slowest airspeed. A right wing-over may require prodigious right rudder at this point, but the left one is nicely aided by torque and P-factor. From your cockpit the nose is flowing fluidly through a continuous figure, and we are as one with our airplane, hearing the wind, feeling the changing speed through the controls, and seeing our nose flow gracefully on its way down through the horizon.

But rather than relaxing, it's time to pay extra attention because the next key point is coming up and it is the one most easily blown. The 135-degree turn point requires that we are 45 degrees nose down and that we have reduced our bank angle to, again, 45 degrees. Here our airplane is accelerating rapidly, the sound and feel tightening as the speed builds, and we must reverse our coordinated aileron and rudder to begin the roll back toward level flight. Too nose down, and we will defeat the objective of returning to level flight at the precise entry airspeed and altitude by gaining too much speed and losing height. Too shallow, and we will not "penetrate" to the entry speed and will wind up high and slow. Precision on the "dive side" then is of importance if we want to master this figure, and master it we must, for if we cannot feel confident that we can hit the points, attitudes, altitudes, and speeds required by this exercise, how will we muster the confidence to progress to more demanding aerobatic maneuvers? In fact, I deem this figure to be of such importance as a training tool that I personally use it whenever I have been away from aerobatics for a while or if I am flying a new airplane, just to warm up and re-enforce the feel, orientation and coordination.

...it is a great clearing turn as you set yourself up for practice, and it can wow the heck out of a neighbor's kid on a first ride without things getting at all out of hand.

As we pass the 135-degree point at 45 degrees nose down, we smoothly but firmly pull and roll back up to the horizon so as to reach level flight, having traversed a 180-degree turn and regaining our original entry speed and altitude. You've now done a complete and graceful wing-over, and its uses are manifold. It makes a great air show turnaround, it is a great clearing turn as you set yourself up for practice, and it can wow the heck out of a neighbor's kid on a first ride without things getting at all out of hand. As seen from the cockpit it is aerobatics, and it will build the skills and orientation you need to progress. Aerobatic instructors who have read this out of curiosity, take heed. This figure will tell you a lot about your student and his or her aptitude and ability.





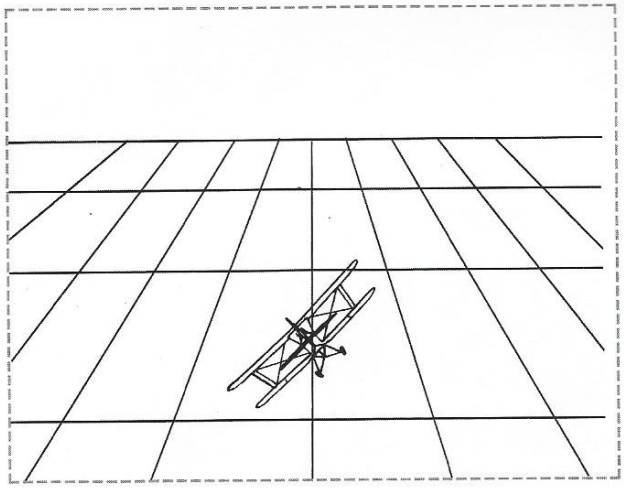
Once you have a grasp on the left wing-over do it to the right, remembering that torque and P-factor in an American, right-turning engine will be fighting you and that determined rudder will be required to keep the ball in the center. Once you have the right wing-over conquered you can put them together into a full, aerobatic lazy eight and enter the next threshold of your pre-training experience. Folks, no kidding, if you can fly successive 90-degree banked lazy eights with the ball in the center, hitting the starting airspeed and altitude with confidence, you will find that you have little trouble when you move into more traditional aerobatic figures.

For the February 2000 "Stick & Rudder" column I wrote an article entitled "Mr. Chiang's Method" in which I told the story of a Chinese pianist who was

imprisoned by Mao during the "Cultural Revolution." On release, fifteen years after his arrest, he needed only a month to prepare himself for a concert. This was amazing because Chiang had no access to a piano in prison.

Chiang maintained his musical facility through the use of visualization, now used to teach everything from yoga to pain control. It can be an invaluable tool for any activity requiring precise orientation and situational awareness in a confusing environment. In other words, it is near perfectly suited as a training technique for aerobatics.

To make it work for you, try this: Find a comfortable chair, away from the noise and bustle of your life, and sit in it. Close your eyes and imagine, visualize, the cockpit of your airplane in flight. Now, take that camera of your imagination and pan around.



There is the nose out beyond the windshield and beyond it the horizon. Looking left and right you can view the wingtips as you would when turning your head, it's all there. Now "fly" your visualized airplane through the wing-over. Think as you do about the control movements required, but mainly "see" the visual cues of nose and wingtip as they move through the horizon. There is no need to get up and hand fly or "dance" your way through. Stay put and relax. A hand dance is good for working off some preflight jitters, but here you need your mind clear and focused. Try to avoid outside distractions.

Think as you do about the control movements required, but mainly "see" the visual cues of nose and wingtip as they move through the horizon.

You do not properly know a maneuver until you can completely fly it in your mind, visualizing the nose and wing, the positioning, and the power. This may take quite a few repetitions of the process. So be it. When successful, you have "burned" the figure into your mind, and when you take it to the airplane, you will find that you will never wonder where the airplane is during the maneuver. Like "burning in" a ROM chip, you have programmed the figure into your mind where it will serve your subconscious throughout the flight. As you gain proficiency you should return to the chair and review the visualization to refresh the image.

This may, to some, sound too "new age" for good ol' macho aerobatics, but let me assure you, it is a venerable technique requiring no investment, save your time. Use it well, use it often, and watch your level of orientation increase exponentially. All this lends credence to the idea that there is a Zen of aerobatics.

So, have a go at the wing-over, do not progress to more advanced aerobatic maneuvers until you have had a good spin recovery course, join IAC, and have fun. After all, it's a hobby.