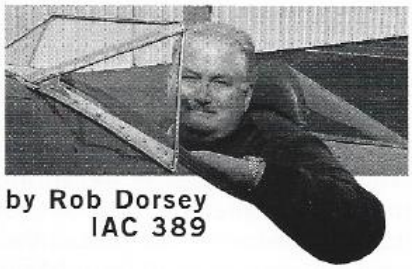
Stick & Rudder

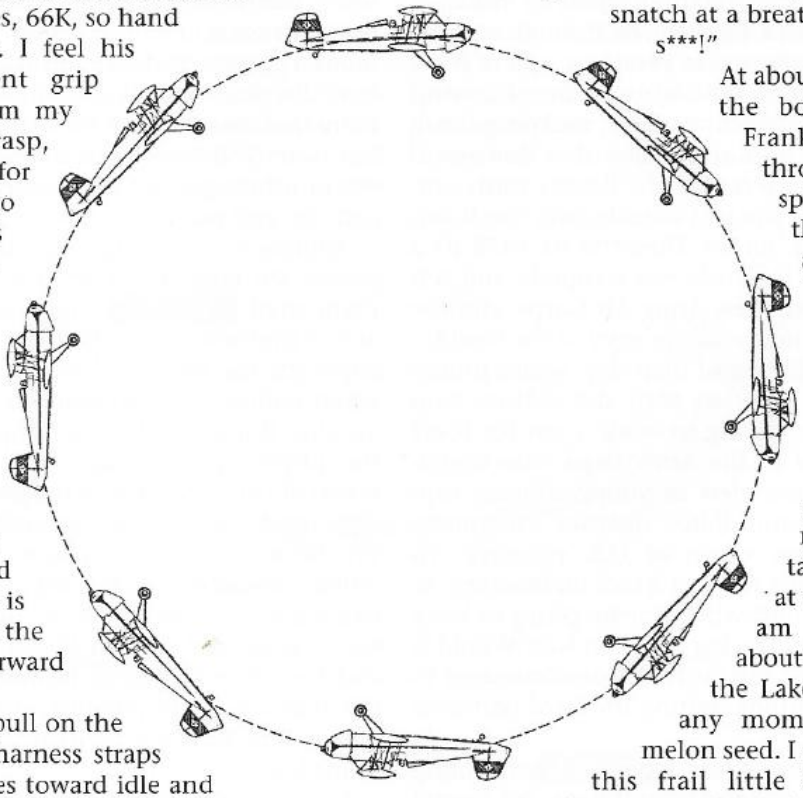


by Rob Dorsey
IAC 389

Going Outside

The sign on the old Tiger Club hangar in Waco read: "You ain't been till you've been Outside!" Take it easy getting into this phase of aerobatics, but give it a try. It is a sort of rite of passage for us wing flingers, and if your airplane is up to it, so may you be.

I'm on my fifth aerobatic training ride. We are at 3,000 feet and have just rolled upright after several minutes of inverted flying and inverted turns. My instructor shakes the stick and slaps the top of his worn leather helmet to signify that he is taking control. We have no intercom in the 1930 Great Lakes, 66K, so hand signals are a must. I feel his firm and confident grip wrest the stick from my more tenuous grasp, and I brace myself, for Frank Price liked to introduce things without much discussion. He called it "immersion therapy." Frank's right hand emerges from the tiny front cockpit hole of 66 Kilo and his index finger makes a round and round looping motion. It is not lost on me that the motion is rolling forward and not backward.



In preparation I pull on the belt and shoulder harness straps as the power reduces toward idle and the nose suddenly arcs down into the green central Texas countryside. At first there is nothing but a growing weightless feeling, and given the extended -1 G flying we had just been practicing, it is child's play. But as we arrive at the vertical, and the speed builds, the wires take on a growing whine, and the negative G begins to increase, not as a jolt, but as a relentless pull at the harness coupled with the alarming sensation of hurtling at the ground. I am anxious but not yet frightened silly; however, as the nose passes vertical and even as my newly acquired instincts tell me that we have passed some kind of a point of no return, I can't help but snatch at a breath and mouth, "Oh s***!"

At about 30 degrees before the bottom of the arc Frank shoves the throttle on hard, despite our speed, and the G is now harsh and unrelenting. The wires are wailing, and the belt feels as if it will pull me in two. I cannot believe that the frayed and oil spotted cotton military belt can take my 220 pounds at this loading, and I am sure that I am about to be spit out of the Lakes' little cockpit at any moment like a watermelon seed. I also wonder at how this frail little airplane with its shrieking wires and bulged wing fabric can endure such abuse. It takes a long time to trust your equipment.

Then, suddenly, there is blue sky over the nose, and we are starting up the back side as the little Warner clatters away, and I try again to catch my breath. Suddenly something hits my forehead with a

splat, and I see, in an almost abstract way, that it is a drop of black engine oil, quickly to be followed by another from a dark little stream that is flowing up the inside of the windshield pane. The oil has apparently welled up from its usual home in the belly of the Lakes to seek freedom at the edge of the open cockpit, only to wind up splattered on my face. Wiping oil from my goggles, I try, as Frank had instructed me, to turn my head and look at the wingtips as we arrive at the vertical and continue up and over. I am sure that the G is much less now, but it doesn't feel like it, and I sneeze because of saliva that has flowed from my throat to my sinus. I do, however, notice that the wind shriek in the wires has diminished to a shrill moan. When the view of the wingtip shows us to be approaching the 45-degree nose-up point, the G slackens off rapidly, and suddenly, not with a "plop" but in a graceful, settling of the parachute to the seat bottom, it is over. We are, again, rattling along back at 3,000 feet and only about 60 miles per hour, but we are there. I have been through my first outside loop! I am allowed to breathe a sigh of relief until the stick wiggles, indicating return of control to me, and the hand from the front cockpit pokes a thumb in my direction and makes that downward looping motion again. "Oh, s***," it's my turn.

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As far as we know the first outside loop was flown by the indomitable Jimmy Doolittle in 1928 in a Curtiss P-6E Hawk. Doolittle was a captain and test pilot in the relatively new Army Air Corps, and the Hawks were brand new and the envy of the world—the air superiority fighter of their day. Seems Jimmy had been kind of obsessed with the outside loop thing and had been trying to work it out for some time, unbeknownst to the Army brass who understandably took a dim view of young, fearless captains taking such uninhibited liberties with many thousands of dollars worth of U.S. property. To Doolittle, the airplane was just a tool for learning, so he slipped out of sight whenever he could to work on the outside loop. The big question was, Would it work better from the top, as it was demonstrated to me, or from the bottom, getting the hard part over in the beginning?

Military and stunt pilots had been performing "bunts," a half outside loop from the top, for several years, but the ability to push up and complete the maneuver had, at least so far, eluded its pursuers. It seems everybody was doing the bunt with the throttle closed to preclude excessive speed buildup, and they just couldn't get the airplanes to fly up the back side of the figure. The airplanes of that day tended to shed wings and things if the speed or negative G were too high, and even with the Curtiss' great strength, Doolittle eventually succeeded in ridding himself of the top wing of a Hawk while performing the outside loop at an air show. Of course, as soon as he parachuted to the ground, he ran over to a young lieutenant and commandeered his P-6, took off, and completed his show routine. What a trooper!

As it turned out, doing the loop from the top was most successful for Doolittle, and the strength of the P-6E allowed him to cross the bottom of the maneuver at the high speed and full throttle required to make it up to the top. Eventually he perfected the loop from the bottom as well.

If you have an aerobatic airplane capable of inverted maneuvers, you will probably be tempted to try at least some outside figures someday. If you are flying at a solid Sportsman level, or perhaps Intermediate, you have surely exposed yourself to inverted turns, perhaps some inverted spins, and maybe some modest pushes. You may have done enough, at least, to realize that there is a whole other dimension out there that doesn't seem to bother your airplane at all but hurts your head and narrows your vision—the world of negative flight, outside looping and corners, and pushing.

Approach outside figures with respect. Many airplanes are built about twice as strong in positive flight than in negative flight, e.g., the Pitts has +6 and -3 limitations, and therefore it is much easier to approach the structural limits when pushing than when pulling. Your limitations, however, are quite another thing. I will not attempt here to delve into the physiology of negative G. There have been reams of paper devoted to the good, the bad, and the ugly results of constant exposure to outside loads. We have all probably known someone who has either contracted the dreaded wobblies—the vertigo-like nauseating condition of the inner ear—or who has experienced broken blood vessels in the eyes and face or horrendous headaches. I knew a very fair-skinned, hard-pushing, British Sukhoi pilot named Tim Barnby who used to break blood vessels in his knees.

Even without any of the injurious stuff, negative G hurts. I have heard some acro heroes say that outside maneuvers were uncomfortable. Yeah, right, so is falling down a flight of stairs with a fork in your mouth. Pushing Gs, kids, is painful! No matter how long you do it, it will only become more tolerable, not pleasant. If it does, get help. You have just dis-

covered a masochistic corner of your personality. However, if you want to fly all of those figures, it is something that must be done. It is like being confronted by a sidewalk bully. Here is nasty work, maybe even dangerous work should the bully get out of hand, but necessary work nonetheless if you ever want to fly beyond Intermediate. Life is full of choices.

For the reasons mentioned above, ease into your new pushing experiences. Begin with pushes that carry no commitment. If you just fly along in your Decathlon and push the stick forward from, say, 100 mph with the intent of doing an outside loop, you are not really committed until the nose reaches about 70 or 80 degrees nose down. You can still pull out, albeit at prodigious airspeed. If you continue much beyond 80 degrees, you are committed, and you must be willing to continue to push until inverted or risk breaking your airplane. There is an old analogy that establishes the notion of commitment, and it is "ham and eggs." The chicken has made no more than a contribution. The pig, now he's made a real commitment.

Don't be too hot to reach the -8 or -9 you hear about the monster boys doing. They also turn new $300,000 airplanes into well-used airplanes in about 600 hours.

To work up to our personal commitment, I recommend first pushing up to a 45 from level inverted flight (**Figure 1**). It accomplishes several things. First, it will help your orientation since you will need to look out to the wingtip to establish the 45 upline. Second, it will do the obvious and expose you to negative G. Try to push hard enough to see at least -2.5 on your G meter. You must build up a tolerance to negative G.

Next, from a half-Cuban-eight entry, push from the 45 downline to the 45 up (**Figure 2**). The beauty of the push from 45 down to 45 up, as a training exercise, is that you can abort the maneuver at any time without getting in trouble. In other words, relating back to our porcine pal, there is no commitment. This is 90 degrees of push, and you should now try to be more aggressive, working up to achieve -3 G on the meter. This is entirely enough for now. Most of the negative G figures in the catalog can be gotten through at -3 and certainly all at -3.5. Now, -3 will most probably not score well, but you will be able to get through just about everything and then work up to sharper corners if you need to. Don't be too hot to reach the -8 or -9 you hear about the monster boys doing. They also turn new $300,000 airplanes into well-used airplanes in about 600 hours.

Don't be surprised if it is tough at first to make yourself push hard enough to develop very much G. It is an unnatural act. As the discomfort builds you will naturally slack off on the pressure, and at first, you may think you just pushed hard up to the 45 only to see only about 2.2 negative G on the clock. Don't be dismayed. You have to make yourself push the stick far enough forward. It will also seem that it takes much more forward stick to push up than back stick to pull the same amount. Well, it just may. If your airplane

Figure 1

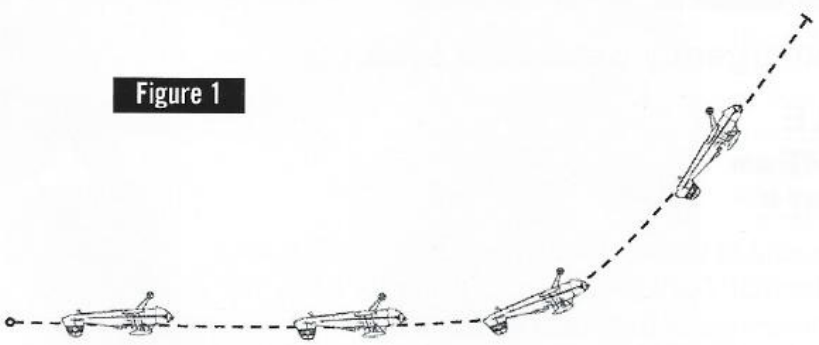
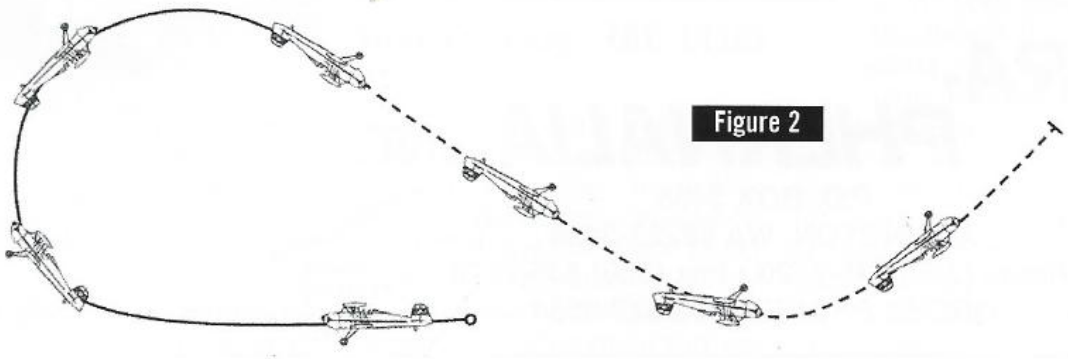


Figure 2



has any proclivity for positive flight, and most do, then it will take more elevator deflection to push it than to pull it. Some airplanes even have their elevator servo trim arranged to provide more help on down elevator than on up. Check out yours, and you may see what I mean.

Once you are able to push from 45 down to 45 up with confidence (note that I did not say "comfort"), it's time for some commitment. I suggest that, for your first real outside figure, you might consider a hammerhead with an inverted exit **(Figure 3)**. For the first attempt, we pull up into a hammerhead and fly it like any other until we turn around at the top. Now, rather than leaving the power on, we will reduce it to less than half (but not closed in the Pitts), hold the downline only long enough to get a little airspeed, and then push the stick forward to get a feeling similar to our push-ups. Hold the push as the ground passes by the nose and wait until you see the normal inverted attitude with the nose above the horizon before stopping your push. You can now add some throttle and roll upright.

It's perfectly all right here to engage in a little

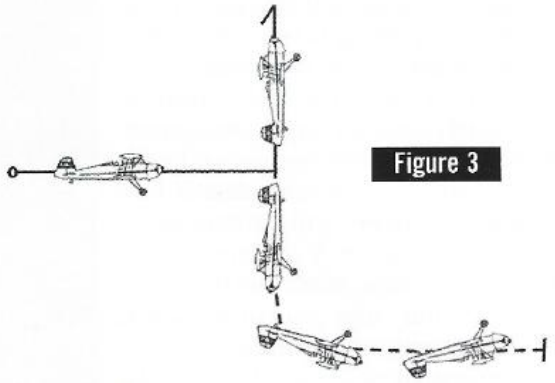


Figure 3

self-congratulation. You've got a real, live outside figure in your repertoire. With practice you can add others, if you choose, or having done the push out of the hammerhead, elect never to do anything like that again, ever. Life, as I said, is largely a matter of choices. You will hear some Advanced competitors complaining about the hard pushes in their category. I sympathize, but to quote the public radio humorist Garrison Keillor, "If you didn't want to go to Minneapolis, why'd you get on the train?"