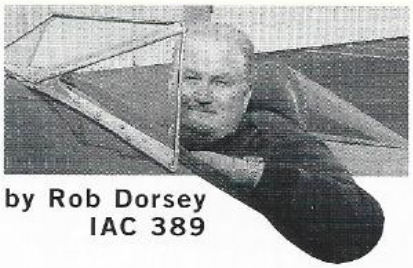
Stick & Rudder



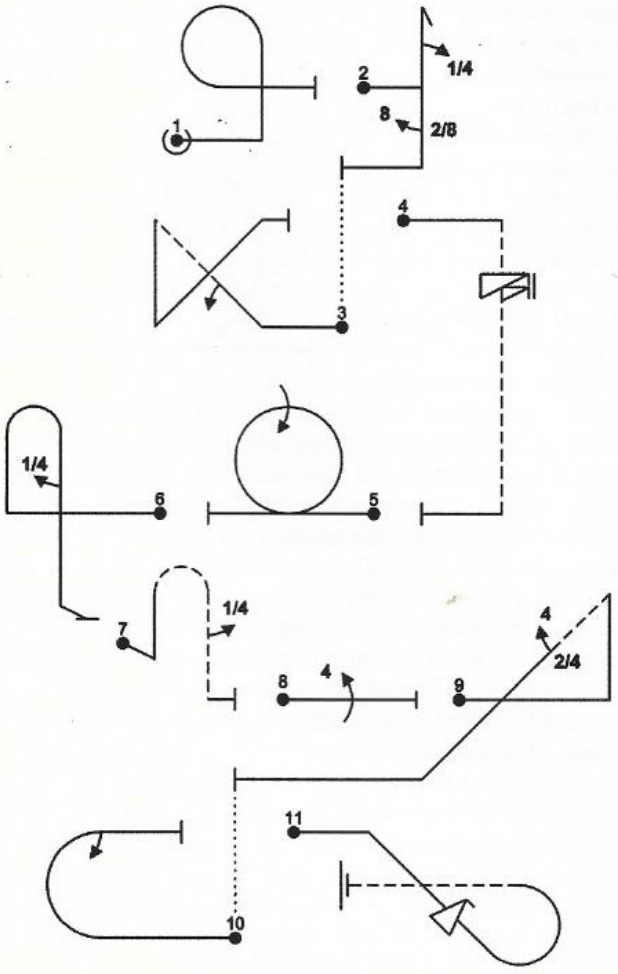
by Rob Dorsey
IAC 389

Through the Sequence

The 2001 Intermediate Known

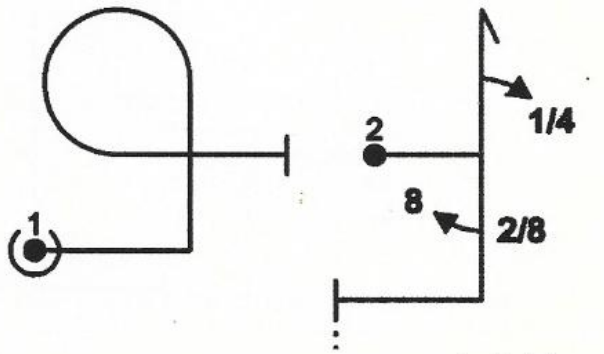
Wow! Talk about controversy! This Known has raised eyebrows and blood pressures among even seasoned Intermediate competitors ever since it came out, and it has even generated calls for a mid-season change. Not so fast! Let's at least talk about it.

So, there I am, just two weeks before the Columbus, Ohio, contest having only recently reacquired my beloved Zlin 50LS. (It's a long story that makes me look pretty dumb, so I'd rather not go into it here, thank you very much. Buy me a beer at Nationals, and I'll fess up.) I am desperately trying to get back into the saddle after 14 months of biplane flying, no simple feat considering the Zlin's particular requirements. Being as cautious as the next guy, I, of course, began the workouts to get my Zlin chops back by flying individual figures and figures in clumps of three or four. As my comfort returned, I could go on to my old and familiar Intermediate Free. I needed to get my head back into the decidedly Czech feel and sight picture of this airplane. The Zlin is very docile with no tricks, but it is vastly different to fly, and the transition from the American Muscle Biplane takes, at least for me, some retraining.



After two flights of the Free, I am ready to tackle the Known, and it looks like I will have only half a dozen flights left before the contest, including on-site practice. Of course, I have analyzed it and "visualized" it per Master Chiang's Method (see "Stick & Rudder" in the February 2000 *Sport Aerobatics*), but I haven't as yet flown it.

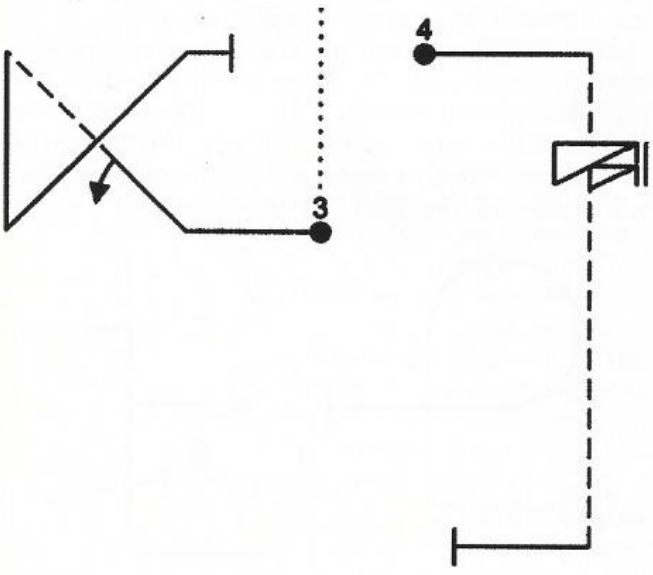
The first figure is a pull to vertical followed by a three-quarter loop to level flight. This thing takes more thinking than I imagined. When analyzing it I had fluffed it off as just a loop with a line, and on its own, it's dead easy, but the one-quarter roll up stall turn (hammerhead) that follows wants about 180 mph if I am to do it with any pizzazz. The danger is in holding the vertical up too long and then flying the three-quarter looping segment as a normal loop. You will then exit the figure at about normal looping



speed, and that leaves you with only the beggar's choice of either diving for energy or attempting the quarter-up hammer at far less than optimum speed. Decathlon drivers, you know the feeling. You in particular must plan for the speed needs of the following figure more than just about anyone else in this category. It is precisely like playing billiards. Your "leave" must be predetermined based on the energy required for the next figure. When you analyze any sequence, an Unknown let's say, you should make notes as to how to attain or preserve the needed speed.

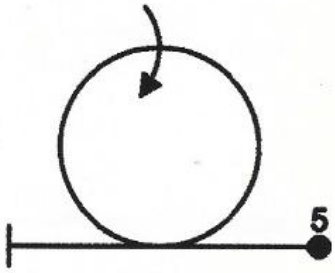
The trick on this figure is to limit the vertical to just a hesitation (and that means just moving the stick to neutral and back again, more about that later) and then really float the top segment to open up the radius of the three-quarter loop so that you exit with lots of speed. You simply must leave the power full on throughout and resist the temptation to pull it off on the downward looping segment, unless VNE is truly a problem. Speed is your friend!

After the hammerhead comes one of those new, weird-looking figures (aka fishtail) from the revised catalog that challenges our dedication to not fly these things as they are drawn! If you do, you risk breaking it all—your butt, your airplane, your ego, the whole enchilada. You must discipline yourself so that each of the 135-degree corners is a loop segment and nothing more. In fact, the "top" one after the 45-degree climbing roll does not need to be the same radius as the 135-degree corner at the bottom, so you don't have to worry about the need to pull that bottom radius too hard. All of the Family 1 figures share that advantage, and there is no reason in taxing either ourselves or our poor little airplanes by trying to do otherwise. Take it easy, and fly each corner of Figure 3 as a partial loop. Remember, high G means high angle of attack, and that means high drag. Preserve your energy, and you will lose less altitude through the sequence.



It is also wise to carry that last 45-degree climbing line up as far as it will carry you because the next figure is the one-and-a-half-turn spin, Figure 4. This spin is interesting only because of the gyroscopic tendency of most airplanes to recover nose down, even a little negative, after one-and-a-half turns. In the Pitts you might even find that you must pull the nose to the vertical attitude after stopping the spin. Remember to get that power on immediately after stopping the rotation, while you are positioning the nose to vertical. You may be vertical nose down, but you ended the spin with very little speed, and you will need some for the figure to follow.

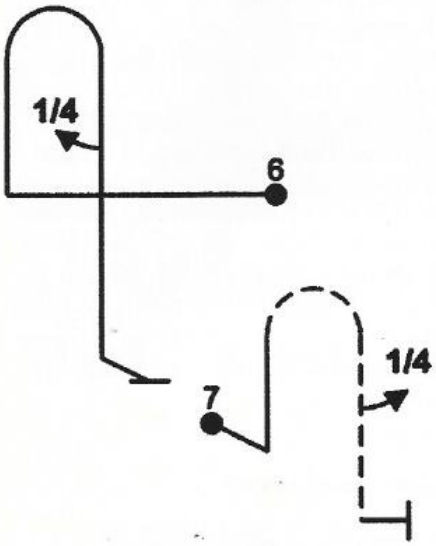
We used to call Figure 5 a Chinese loop. I don't know why. The Cuban-eight has a delightful explanation for its name, and I am sure that there is a suitable anecdote for the Chinese loop, but I have yet to hear it. Regardless, it is an unfortunate appellation for a truly gentle and entertaining figure. The aileron roll across the top of an inside loop has none of the wildness of the avalanche (snap roll on top of a loop) and allows us to demonstrate our grace and rhythm for a change. We have talked the looping subject to death, but there are still some missteps that can be made in this figure that will really show up to the judges, and interestingly enough, it is the hotshot, fast-rolling airplanes that usually get into trouble here. You see, you must slow down the roll rate so that you can smoothly fly the airplane across the arc at the top of the loop. Failure to do so sticks out like a bad nose job. Decathlons, it's your moment, because here, rolling slowly and tracking the arc, you actually have a distinct advantage.



Start the roll about 20 degrees or so before the top of the loop. In the Decathlon that's just a bit above your normal inverted flight attitude. Now, this gets tricky. While you may look inverted (you know, being upside down and all), you are actually in positive flight, with regard to angle of attack, so all the rules of positive flight apply. That means that, unlike the roll at the top of an Immelman, where we are definitely in negative flight and where you must use crossed controls to coordinate, here we will use normally coordinated aileron and rudder to initiate the roll. Now, I know that many of you with high-performance monoplanes have completely forgotten about coordination, positive or negative, but come on, regardless of the airplane, if it has ailerons, it has adverse yaw. Use a little rudder with the aileron to make the nose track straight.

And, if you think that you can get away with anything just because your little monster rolls at 1,000 degrees per second, you, my friend, are ever so wrong. If you wait until level attitude inverted and then slap that little stick over and zippity-do-da around from inverted to inverted in a flash before re-

joining the loop, the judges will see (you're gonna hate this) a line. Yep, a line, and you will get a 7 and the comment "flat on top." You can't roll fast enough to keep it from happening. Do yourself a favor and slow the roll down. Start a little early and blend it gracefully into the loop. If you start the roll nose-up inverted, you should arrive at upright just a hair above the normal, level flight attitude. Then, you can continue the roll while letting the nose drop ever so gracefully until you arrive at inverted at about the same attitude nose down. You should then immediately load the airplane up and start the pull on the back side of the loop.



The two humptys that follow are a challenging little twosome designed to provide cross-box positioning and to demonstrate your mastery of the genre. That said, you had best hope that you are on the downwind side of the box, or the cross-box line will need to be very short indeed. If, in a lower power airplane, you came out of the roll-on-top loop at normal loop exit speed, say 140 mph in the Decathlon, then the pull humpty may seem unworkable. It essentially comes down to what you think a vertical line should be. From the judges' line we often see competitors exaggerate vertical lines and, by so doing, put themselves in energy difficulties after the line. Remember, the line needs only to be perceived by the judge. The dilemma arises from the belief that there has to be some measurable time in the line to drive that perception. The fact is, if you move the stick to neutral and immediately pull or push, you will establish a perceptible line. Let's go over that again. If you are to pull to a vertical line, as in the first figure of the 2001 Sportsman Known, and then to push over to level flight, you would only need to loop to vertical, center the stick, and then push it for the recovery to level. That little hesitation in neutral will give sufficient line for a grade. Now, if you have the energy and power to set a five-second line, great. It's just that it ain't necessary. A line is a line, or at least that is the intent of the judging criteria.

Figures 8, 9, and 10 are comfortable old friends to any Intermediate pilot, a four-point roll, a half-

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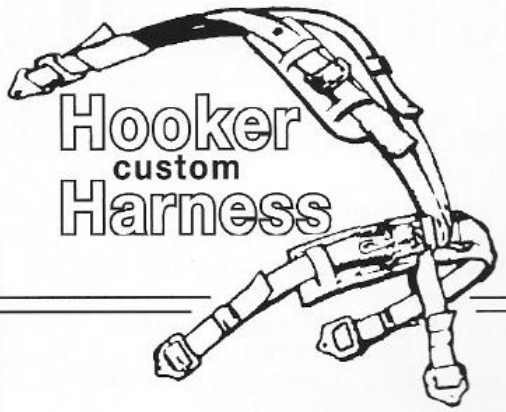
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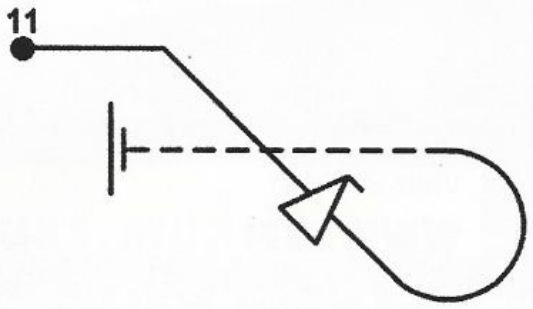
Cuban-eight, segmented into the now-familiar wedge shape of the expanded Family 1 figures, and an Immelman. These are all figures we have discussed previously and, I hope, thoroughly. However, last, but certainly not least, is Figure 11, the focus of much recent debate. It is a Family 8 figure, and it's a sort of half-Cuban-eight starting with a push to the 45 downline and an inside loop to inverted. As befits the latest fashion, this sequence ends inverted, which seems to me to be a bit untidy, but there it is. The odd little figure itself is not the problem; it is the inside flick (snap) on the 45 downline that has created all the fuss.



We have had 45 down flicks before, so obviously that's not the big deal. In fact, the 45 down flick is easier in some ways than a level one because we can use less engine power and the airplane does not tend to decelerate as much. No, the problem is in placing it in the middle of the line and then having enough energy to pull around nicely to inverted. This, more than any figure in this Known, is airplane-performance specific. If you have an airplane with high-speed flicking capabilities, then it's a walk in the park. If you are flying a Decathlon, then it is not, and you must make serious decisions at the outset as to just what you are willing to give up to get through the figure, and that includes taking a break before it if you have any problems completing it successfully. At any rate, you must snap at your proper snapping speed and no more. If that means, in your airplane, that you must dive in the line after the snap until you attain a looping speed sufficient to allow you to neatly fly away inverted, then so be it.

This is one figure you can't force. Besides, breaks are quite cheap in Sportsman and Intermediate, and that is intentional. It is to encourage you to take one if there is any doubt about your speed, altitude, or position. It is better than putting yourself in harm's way just to get through a figure at the bottom of the box where your margin of error is minimal. It is unquestionably better to break your sequence than to break your airplane.

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