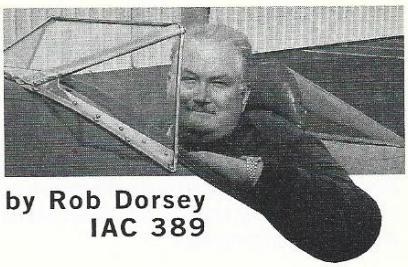
Stick & Rudder



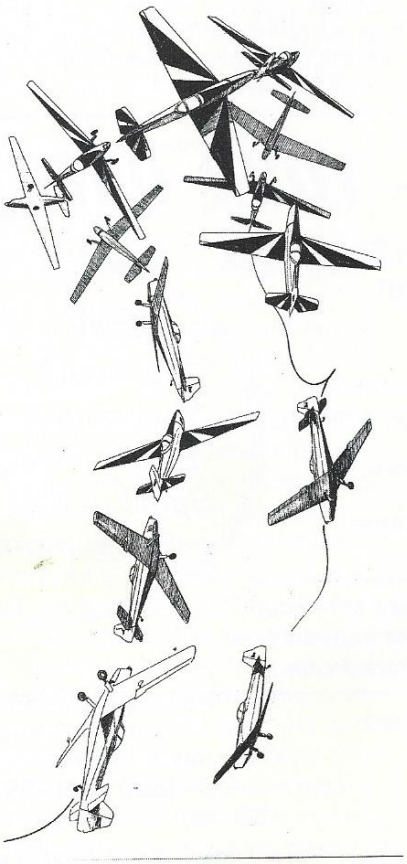
by Rob Dorsey
IAC 389

Lomcevak! The Secrets Revealed (Part 2)

Out of the Eastern European sky comes the wildest ride in aerobatics, bar none

Last month we established some background for an understanding of the lomcevak, or tumble, by going into the mechanics of the inverted flat spin, and we finished with the question, "What has a flat spin got to do with the lomcevak?" Answer: Everything.

On a cold and blustery day in the late winter of 1994 I sought the help of a half-dozen stout lads and opened the Sea-Land container sitting in front of the hangar. As the big steel container door creaked open, I could not help but feel like Howard Carter opening the tomb of Tutankhamen. Just like old Howie, I found "wonderful things" within, for here, crated and cradled, was an almost new Zlin 50LS broken down into five or six big pieces and lots of little ones. With reverent care we lifted the bits out and set them on the hangar floor. What came out of the big, steel box was a fuselage sans engine, the long, one-piece wing, a couple of horizontal stabilizers, and a 300-hp Lycoming on its mount plus boxes and boxes of little components. Next morning the fun began, and it concluded some two-and-a-half months later when the FAA finally granted me an airworthiness certificate in the Experimental Exhibition category.



First flights are, well, first flights come complete with all the attendant anticipation and apprehension born of putting a foreign-built airplane together yourself and then flying it without a checkout. Fortunately, all went well, and I was able to gingerly go about the task of learning to fly a new airplane. You see, this was my first "high performance" monoplane, and to a Texas kid raised on Stearmans, Great Lakes, Zlin 526s and such, this machine was newfangled to the point of being intimidating. To all of you who learned in S-2Bs and now fly Extras and Sukhois, this may sound a bit quaint, but please give license, it was my first.

A month or so later and feeling that I now had the airplane well in hand (self-delusion, I believe, is a gift, not an acquired trait), I began to work on more advanced stuff. Gathering up my nerve I climbed to altitude and went through the usual worrisome learn-the-new-airplane routine: inverted spins (what a surprise, lovely and slow as a Decathlon), botched maneuver simulation (a veritable yawner since the airplane has no "habits"), and inverted flat and upright flat spins (easy and textbook in every way). The very next afternoon I got some coaching from my wife, Robin, and my longtime friend, John

Harper, aka Harpo, who occasionally spends a portion of his year hanging out with us. Harpo was an aerobatic student of mine in the Tiger Club's Stampe in 1970 and did me most proud by going on to be a four-time member of the British Aerobatic Team and a 25-year professional air show pilot.

Anyway, John and Robin are on two handheld radios, and John has been working at getting me to try these things that had become an air show standard of his, what he liked to call a "knife-edge flick." In fact, it is an oscillating, cross-control, outside snap using forward stick with same-side rudder and aileron inputs, which, as you know, is cross controlled when in inverted or negative flight.

Harpo reckoned that these "knife-edge flicks" were the very essence of aeronautical cool and that, since I now had such a cool airplane, I should master them. He suggested I start with an inverted descending line and then work into other modes, so I pulled around in a half-Cuban to the 45-degree inverted downline and, as John had instructed, stuffed the stick into the far left corner and booted full left rudder. What I got was not pleasant, earned me -4.2 on the g meter, and made me bump my head on the canopy in a most uncool fashion. It also earned me a, "No, no, no, that's not it," from my buddy John. "Do it again," he said, so I did a turn around and asked him what I might do to make it better. "Start from slow, inverted, level flight this time," said he, so I looped up to inverted, got about 100 mph on the top, and did the left stuff and boot thing again, but, having had my head almost separated on the last try, I "pushed" the controls in to the stops a bit more gradually.

Well, all hell broke loose. It was like the airplane had tripped over its own nose. I was so startled and fascinated that I just had to see where this was going to go, so I left everything where it was. What I saw from my seat was what looked like a very fast, half outside barrel roll followed by three of the world's fastest and smallest outside loops. That nose went through blue, green, blue, green, and blue faster than you can read this and then wound up in a gentle, powered tailslide from which it fell over nose-down into a dive. During the maneuver itself the sensation of the airplane being totally disconnected from the air around it was acute. In fact, I could actually and quite clearly feel the airflow "re-attach" when the nose fell down and the airplane started flying again. It was like a train jumping back onto the tracks. What was also amazing to me was that the whole thing developed only about -1.5g. I had done lomcevaks before, in my Zlin 526 in the '70s, a few times in various Pittses, and once in the Stearman (not successful, very ugly, I don't want to talk about it), but they were never like this. The Zlin 50, as I have come to find out, is one of the nicest tumbling airplanes around and, with the correct control inputs at the right time, seems to completely leave the world of normal flight and enter an unrestrained, never-never land of end over end. The feeling of the airplane going "loose" as it breaks and the rapidity of the rotation are awe inspiring, at least to me. Robin keyed the mike and said: "Honey, that was COOL! Do another one!" and Harpo shouted, "No, no, no, that's still not it. Try the flick again, without the lump this time." For the moment, I demurred.

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The lomcevak is not just one maneuver, if it may even be so called, but it, or rather they, are a family of gyrations characterized by the presence of inertial forces which overcome the stability of the airframe and result in some predetermined but imaginative flailing about. We Americans usually think of the lomcevak as the classic end-over-end tumble, but the Eastern Europeans, headed up by the Czechs, have developed about five of them. They have inverted conical lomcevaks and upright conical lomcevaks and a lovely little thing sometimes called the "necktie" in which the airplane flips from the vertical climbing attitude onto its wingtip, rotates in pitch about the lateral axis, and then flips back into a vertical dive. When done well, it all happens in one revolution, and the metaphoric name "necktie" offers up an image of a man's tie, up around the neck and back down. We, however, will deal here with the classic end-over-end tumble so often seen at air shows and in 4-Minute Free programs at competition events.

All members of the lomcevak family require that we work out a way to build up within the airframe rotational forces sufficient, be it in pitch, yaw, roll, or all three, to overcome the natural stability

of the airplane. The result is a departure from controlled flight. It's just like taking a model airplane by the tail and throwing it like a knife. It tumbles end over end until such time as the energy diminishes and the natural stability inherent in the shape takes over. In short, this means that, ultimately, the airplane is heavier on the front end, is shaped somewhat like an arrow, and will eventually wind up falling nose down. Now, we cannot build up near the force of that knife toss in any maneuver, but we can get enough pitching energy going to get a decent tumble or two. Here's how.

...remember that airplanes that have their mass and weight located away from the geometric center of the airframe have a distinct advantage in performing lomcevaks.

WARNING: Do not take the following as a method for attempting the lomcevak or any derivative. I do not recommend that you try this maneuver. If performed in an airplane that is incapable of the figure, it may cause airframe, motor mount, crankshaft, or propeller failure. If performed badly in an airplane capable of the maneuver, well, see above. The following is meant for educational and entertainment purposes only. If you go out and try this in your Decathlon or anything similar, you have my vote for the sport aviation Darwin Award.

We saw in the inverted flat spin the control combination that best aggravated the spin and produced the flattest results. That combo was full forward stick, full rudder, and full aileron with the rudder, that is, right/right. When the lomcevak first came to America, we were told that the best way to perform one was to do an upward, outside snap roll, timing that snap so that, at the top of the roll, we were at minimum airspeed and at the point where the highest negative pitching moment was developed, and then we were to hang on and let nature take its course. This will work, but it takes a heck of an outside snap to develop the pitching forces necessary to produce a tumble. A better way in many airplanes with clockwise rotating propellers is the left/left method that gained me such spectacular results on the first attempt. Left/left means the stick goes in the forward left corner with full left rudder. In Yaks, Sukhois, and such, I understand that the tumble is best if the stick goes far right with right foot. It is best entered from a slightly inverted knife edge in the direction of the controls, that is, just past 90 degrees left for a left/left and way nose up, say, 60 degrees or so.

But, of course, the question will arise, "What about the Pitts?" The omnipresent, ubiquitous, wonderful Pitts. Be it S-1C, S-2C, or anything in between, you will be told that it will do a great lomcevak. My take on any statement like that is...well, sort of. If you read the first installment of this discussion, you will remember that airplanes that have their mass and weight located away from the geometric center of the airframe have a distinct advantage in performing lomcevaks. It doesn't take much to see that means a monoplane. The inventor of the maneuver, Ladislav Bezák, used a Zlin 226, the ultimate in spread-out mass. With a heavy engine on one end and a heavy empennage on the other, it was a natural. Just get some negative pitching forces going and, shazzam, over it went, ass over teakettles.

The little Pitts, ah, that's another matter. Just a look will tell you that the mass is concentrated near the center of the airframe. That means it is a really good design for most aerobatics. If the mass and weight are near the center of gravity, then it will be

easy to move the airplane about its axes. The airplane will have little resistance to control inputs; it will be responsive. Since the lomcevak is a departure from controlled flight, which is usually something to avoid, the Pitts is a good design indeed because it resists it. Why would anyone want to design an airplane which would easily go flippin' nuts, tumbling end over end, with just the slightest provocation? Certainly not Curtis Pitts. Therefore, if one wants to tumble in a Pitts, you've got to abuse the airplane aerodynamically. Don't expect it to happily tumble with a low negative g. If you want to do a lomcevak in a Pitts, and I advise against it with anything other than a wooden or composite propeller, you will have to be prepared to hit the entry quite hard and fast on a steeply ascending line. I do not want to betray my intense misgivings about even trying this maneuver in the Pitts by wishing you good luck. Just be careful.

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So, once again I have most probably succeeded in leaving you with more questions than answers. It is hard in the space provided here to delve into the intricacies of such a complex maneuver. But, I would not be your friend if I did not leave you with this very important anecdotal warning. At the 1968 U.S. Nationals in Fort Worth, Texas, national champion Harold Krier went out to practice in his newly modified de Havilland Chipmunk. It had a Ranger engine and an Aeromatic propeller. He didn't come back. What he did do was phone from a farmer's house to say that he was down in a field. After he had finished his practice, he decided to do a lomcevak for fun on the way back. The propeller hub failed, sending a blade off into the countryside, and Harold was just able to get the airplane, with the engine mount twisted off and the engine hanging by the control cables, into a field! Several of us helped him take the wings off and load the Chipmunk onto a flatbed trailer. Harold the unshakable was visibly shaken.

Be careful.