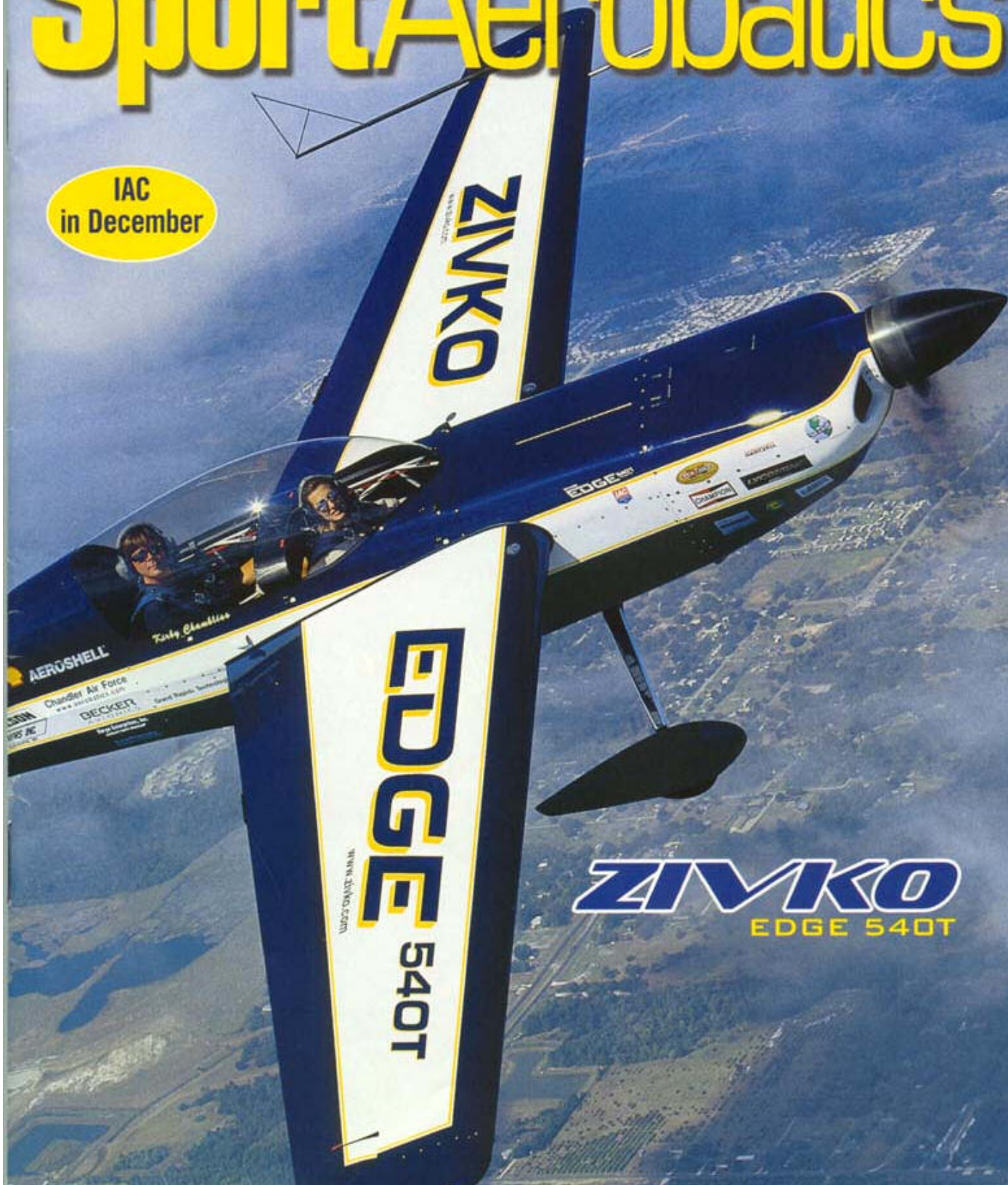


THE NO. 1 INTERNATIONAL AEROBATICS MAGAZINE

INTERNATIONAL
AEROBATIC CLUB'S

Sport Aerobatics

IAC
in December



ZIVKO
EDGE 540T



There is NO Competition

One of the most anticipated acrobatic airplane debuts occurred in March 2000 at the Championships of The Americas (CoTA). The wait had been longer than expected, but the time spent was well worth it.

At COTA a number of people saw Kirby Chambliss' Edge land, and right behind it, it looked like he landed again. This second plane was the twoplace Edge 540T, and the word was that you had to see this airplane.

The Edge 540T is a follow-up to the very successful Edge 540 single-seat design that debuted in 1993 when Kirby Chambliss flew the first one from Zivko Aeronautics in Guthrie, Oklahoma. Seven years and 14 planes later, it is one of the most competitive acrobatic airplanes in the world, and its popularity is growing now that the airplane has been seen on the world level at the past two World Aerobatic Championships (WAC), thanks to Kirby.

Zivko Aeronautics

Flying an Edge cross-country is an interesting experience. The first of the two questions most often asked is: "What is that?" Even though the name is on the side of the airplane, it is often mistaken for an Extra. The second question often asked is "Zivko? Is that Czechoslovakian?"

No, the airplane hails from the United States, from Guthrie, Oklahoma, just North of Oklahoma City. Even a number of townspeople in Guthrie have no idea a worldclass acrobatic airplane was designed in their small town - by an entire family that includes Bill and Judy Zivko, their son, Eric, and their three daughters, Aimee, Stacie, and Katie.

A quick history of Bill Zivko's work experience includes three years with Jim Bede on the BD-5, two years at Micro-Turbo (a small jet engine manufacturer), and three years as a shop manager at Scaled Composites, the company headed by Burt Rutan that produced the Starship and Voyager, among other successes. The Zivkos moved to Oklahoma in 1986 and began making kit components. They were soon introduced to the world of competition aerobatics through the late Tom Jones, who wanted an all-composite airplane. Financing was hard to come by, and shortly thereafter Jones was killed in a Sukhoi, and the project was terminated.

The acrobatic community was in need of a wing for the Laser, a design derived from the Stephens Acro by the late Leo Laudenslager. John Roncz designed the airfoil, and Zivko Aeronautics, formed in 1987, began producing wings. The Edge 360 evolved from a Stephens Acro with an Edge wing and an 10-360 engine. However, it was soon determined the wing could withstand a lot more than what a fourcylinder could give it, and the airplane would be challenged in the Unlimited category. Thus the Edge 540 began to take shape.

The Two-place Emerges

With the success of the single-place, it was only a matter of time before a two-place version was in the works. There were rumors going back almost two years that Zivko Aeronautics was designing a two-place. Visitors to the Zivko shop in Guthrie could see the welded-steel frame of the two-place sitting in a back room. Last year the airplane quickly began coming together, but as a side project to the single-place airplanes and the unique research and development projects for which Zivko Aeronautics is also becoming well-known, though few in the acrobatic community know this side.

One of the goals with the single-place airplane was to make it as user-friendly and maintenance-free as possible. It was to be a work of art that could withstand the rigors of acrobatic flying. This same goal applied to the design of the two-place. It has the same engineering and construction details of the Edge 540 and uses the same engine, a LY-CON modified Lycoming 10-540 with 340 hp, though up to 380 hp is available. The constant-speed propeller is also a carry-over from the Edge 540, a Hartzell HC-C3YR-1AX1 with composite blades.

Specifications

The Edge 540T is impressive for a two-place airplane. The empty weight is 1,260 pounds, only 75 pounds heavier than the single-place Edge. The wingspan is 25 feet 2 inches in standard mode; however, the addition of extended wingtips extends the wings by another 9 inches. The extended wingtips were required for FAA certification to get the gross weight stall speed down to 61 mph, from the 62 mph stall speed without the extended wingtips. As with the single-place, the fuel capacity is 42 gallons in the wings and a slightly higher 20 gallons in the header tank (the singleplace carries 18.5 gallons). Aerobatics, however, are not permitted with fuel in the wing tanks. Gross weight of the airplane for aerobatics is 1,850 pounds, which translates to a useful load of 590 pounds. With a full load of fuel, this leaves 470 pounds available for two people. The performance specifications for the airplane are nothing short of amazing for a two-place airplane. The Edge 540T cruises at 185 knots at 75 percent power and climbs at 3,700 fpm. The roll rate is the same as the single-place, a very fast 420 degrees per second. The wing has been static tested to 20 G's, though the G rating for the airplane is ± 10 , as this is the limit imposed by Lycoming on its engine mounts. The 540T has dual controls with basic



instruments for the front seat passenger. As with most two-place aerobatic airplanes, starting is accomplished from the back seat. Electrically adjustable rudder pedals are standard and a great feature if you anticipate numerous people wanting to fly with you. The standard canopy is a two-place, though an optional single-place canopy will give an additional weight savings and transform the airplane into a single-place. Additional weight savings may be obtained by removing the front seat and controls. Like the single-place seat, the rear seat in the 540T is adjustable in height and angle of recline. The two-place offers additional baggage space between the firewall and front passenger that is accessible from the outside of the airplane. This baggage compartment is limited only by the size of the bags stuffed in it; it will hold up to 150 pounds. The standard Edge turtledeck is still behind the pilot; however, the size of the opening will limit you to smaller bags; it has a weight limit of 15 pounds.

With the single-place airplane, the center of gravity (CG) envelope is such that there is essentially nothing you can do to get the airplane out of its designed CG range. A common problem, especially with the two-place Pitts or Eagles, is an aft CG, particularly with a single person in the airplane. Generally, adding a second person brings the CG forward since that person is sitting near the true CG of the aircraft. In addition to CG, pilot and passenger weight must be considered in order to keep the useful load within the aircraft's limits.

As for the two-place Edge, the battery in the aircraft is movable, and with two people, the battery should be placed in the front of the aircraft. In this configuration, the aft CG limit will be reached only if the pilot and passenger each weigh 230 pounds and there is only two gallons of fuel on board, hopefully an unlikely scenario.

As with most prototypes, there are usually a few things to work out in subsequent aircraft. This is the case with any airplane, and it is also true with the Edge 540T. The airplane in its current form is outstanding, but the Zivkos are adamant about getting the airplane to exactly the specifications and performance they want. For instance, the front seat in the 540T has been redesigned three times since the original was put in the prototype. The Edge 540 also went through a similar process, as most evidenced by the composite tail of the last six airplanes versus the fabric tail of the earlier airplanes. Customers awaiting the 540T are kept informed of changes being made to the airplane, and those who have dealt with Zivko Aeronautics in the past know that they are true to their word and that the airplane will surpass expectations when delivered.

Flight Characteristics



A few weeks prior to the 2000 U.S. Nationals, current U.S. National Champion Steve Andelin found himself without an airplane. A single-place Edge pilot, Steve was contacted by Kirby Chambliss, who offered to let Steve fly his 540 at the Nationals. Steve accepted, and in return it was his job to ferry the 540T to Sherman, Texas, the site of the U.S. Nationals, where it was displayed and used for demo rides. He also was able to wring out the two-place and now has just about as much time logged as Kirby.

Since Steve also flies a single-place Edge, this was an opportunity to get some information from someone who had flown both planes. Prior to flying the Edge 540, Steve was a Pitts S-IE pilot. When asked about the comparison between the single- and two-place Edge, Steve says the pitch and roll forces are nearly identical. The stall characteristics of the airplanes are slightly different. The 540T stalls at a slower speed than the 540 and seems to like a quick tug on the stick to get a clean stall. The wing on the 540T has more wing area and a larger chord, which creates a little more lift than the 540 wing. With a single person at the controls, it makes the stall a bit more challenging than in the single-place, though by no means difficult or unpredictable, just different. Zivko is currently working on ways to address this issue.

Steve says that with the two-place canopy, the airplane flies knife-edge very well, something the single-place and the two-place with the single canopy do not. This is surprising as monoplanes generally do not fly knife-edge nearly as well as biplanes. From a competition stand-point, the extra wing area allows you to fly tighter maneuvers if you want, and the extra lift allows for a better ability to fly off the top of maneuvers. Falling out of something is rather difficult.

The snap characteristics of the airplane are slightly different than the single-place ones. The technique for beginning the snap is almost identical, but the feeling of the snap is different since the pilot is sitting slightly more behind the wing than in the 540. The recovery is identical. With the two-place canopy, an attempt to do multiple snaps results in the airplane wanting to come out of the snaps. According to Steve, this is common among two-place Extras, which require the addition of a large amount of aileron to maintain multiple snaps. Zivko is addressing this issue as well. Steve says the vertical snaps are almost identical to the single-place ones.

There is a little less visibility when landing the 540T versus the 540 because the pilot is sitting a bit further back on the wing. Steve says that getting used to this and landing on narrow strips, such as Kirby's, is not a problem. Wheel landing the airplane is extremely easy, even if the airplane is landed three-point and then the tail is brought up.

Steve believes the airplane is capable of flying in the Unlimited category under the IAC rules and would have no problem being competitive in this arena. At the international level where multiple snaps in the freestyle are almost a necessity, the airplane might be a little challenged. Steve also says the airplane has no bad tendencies and is very easy to recover following any maneuver that doesn't go as planned.



The Edge Veteran

There is no pilot more associated with the Edge than Kirby Chambliss, the first recipient of an Edge 540. Kirby has the job of test flying every Edge, and he also had a hand in the design of the Edge 540T. Kirby wanted the two-place to be able to perform comparably with the single-place, but with the addition of a second person. He wanted the airplane capable of flying Unlimited but realized that you don't get something for nothing. There is always a trade-off when trying to make a two-place airplane perform like a single-place airplane. Kirby says, "What we have done with the Edge 540T is to make it an Unlimited competitor as close to the single-place as we could. It will be competitive in Unlimited but will have a hard time performing a six-figure free. This is one of the drawbacks to adding another seat."

Kirby also mentions Zivko is currently trying to improve the multiple snap capability of the Edge 540T. The airplane tends to lose energy through the snap and does not snap with the same rotation rate as the single-place when performing multiple snaps. With a single pilot, the roll rate and vertical performance of the 540T is identical to the 540. Kirby says there are some things he

can do with the two-place because of the extra wing area that he cannot do with the single-place, such as putting the nose at 80 degrees and hanging for a second immediately after takeoff. The airplane also performs flawless multiple back flips. Overall, he and Zivko are very happy with the result of their efforts.

Single-place Versus Two-place

With the introduction of the two-place Edge 540T, Zivko has made choosing an acrobatic airplane even more difficult. The performance of the 540T far surpasses any other two-place aircraft on the market. The base price for the 540T is \$238,477. Though the two-place Edge is bound to be popular, the single-place is available for those wishing to compete in the Unlimited category at the world level. With both airplanes, you'll get quality, craftsmanship, and the support of one of the most honest companies in the aviation business today. You will not be disappointed!

For more information please contact:

Zivko Aeronautics Inc.,
502 Airport Road,
Guthrie, OK 73044
Phone: 405-282-1330
Fax: 405-282-1339
www.zivko.com

Article written by: Vicki Cruse
Photos by: Mark Schaible
Cessna 210 photo plane pilot: Bruce Moore