A FLIGHT TEST EVALUATION OF THE SZD-50-3 PUCHACZ 2-PLACE SAILPLANE

By Richard H. Johnson and Sharon Smith, Published in *Soaring* Magazine, April 1994

The SZD-50-3 PUCHACZ (pronounced poo-hots, which means owl in Polish) is the current model of the excellent 2-place, tandem-seated advanced-training sailplane manufactured at the PZL™BIELSKO factory in Poland. It is of modern composite construction and is delivered with a beautiful and apparently trouble-free, hand-polished, white polyurethane finish. It is fully aerobatic and approved for spins, inverted flight, slow rolls and even snap rolls. As shown in the Figure 1 three-view, its cantilevered taper wings are slightly swept forward to place both cockpits ahead of the wing, thereby providing excellent visibility from both cockpits.

When the Texas Soaring Association took delivery of their new advanced trainer, they kindly invited me to perform basic performance tests and handling evaluations. Since TSA instructor Sharon Smith formally performed my checkout in that sailplane, it is prudent that she co-author this report and express her opinions of the PUC-HACZ from a club flight instructor's point of view. Bill Scull and Saka Havbrandt, chief glider flight instructors in England and Sweden, respectively, appeared to be enthusiastic about the use of the PUCHACZ sailplane for advanced glider pilot training, and I was looking forward to see if I also agreed.

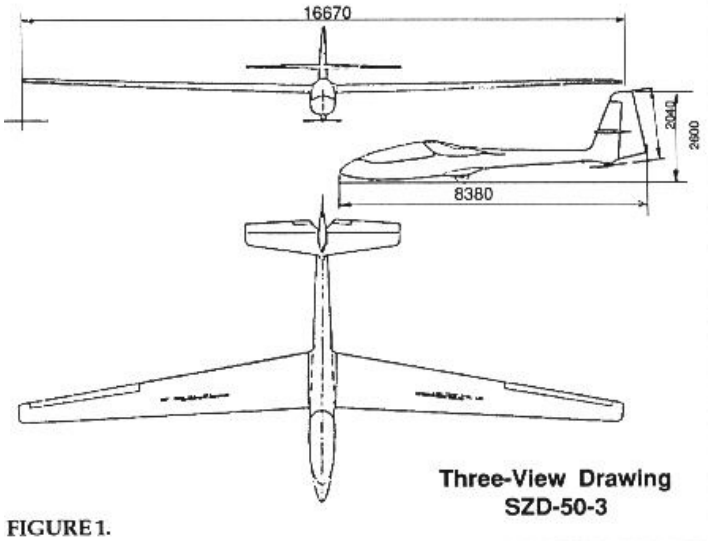

FIGURE 1.

While Sharon Smith was performing my sailplane type checkout, she also provided flight test data recording assistance during the initial two high tows, which were performed to measure the PUCHACZ sink rates in smooth air. The following day, TSA private pilot Glenn Park agreed to occupy the rear seat and record data during the third sink rate measurement flight, and the following airspeed system calibration flight. The sink rate data recorded during the three flights were corrected to standard sea-level conditions, and are shown plotted versus calibrated airspeed in Figure 2.

There an L/D max of about 32.3 is shown at 48 kts, and a minimum sink rate of about 145 ft/min is indicated at 43 kts. That is quite good for a training sailplane, and our measured glide ratio was almost 8 percent higher than the 30-to-1 polar modestly claimed in the sailplane handbook, and shown here in Figure 3. Our test sailplane, N503S, had no special preparation, and even the wing tip tie-down holes were left open. The horizontal tail joint was taped, as were the wing roots, and that is a standard practice, even with training sailplanes. The canopy was fairly well sealed by the factory, though we did notice some leakage during the sub-freezing winter test flying.

The PUCHACZ airspeed system was calibrated with the Dallas Gliding Association's master airspeed indicator, Kiel tube pitot and trailing bomb static system. The PUCHACZ's measured airspeed system errors are shown versus indicated airspeed in Figure 4. The airspeed system appears to be very honest with only about 1 or 2 kt errors measured over the near stall 36 kts to 104 kts high-speed calibration range. However, those small errors existed only with the yaw string near center. Large airspeed system errors were noted when the yaw string is off-center, even moderately.

The sailplane system utilizes a flush nose pitot which works well except when sideslipping or skidding. There the airstream's flow across the flush nose pitot apparently causes a loss in pitot pressure and the airspeed system to indicate lower than it should. It was disconcerting during sideslip approaches to see the ASI indicate dangerously low airspeeds when the airspeed is actually adequate. A short pitot extension should correct that relatively minor problem.


A view of the SZD-50-3 PUCHACZ in flight during tow.

The PUCHACZ is pleasantly stable on all axes, and equipped with a nose

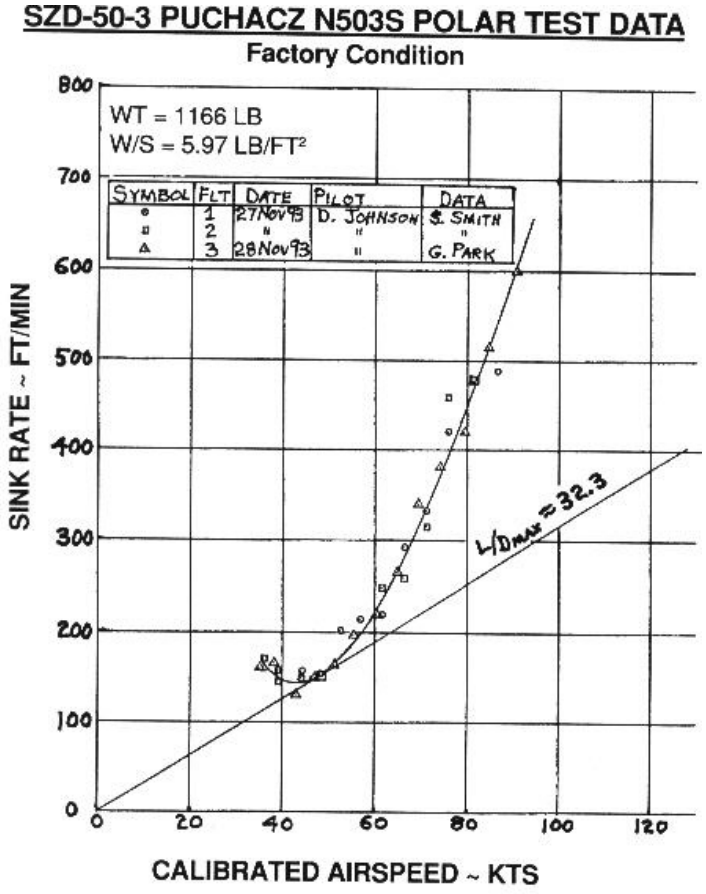

FIGURE 2.

tow hook which makes aero towing perhaps too easy for good training. A CG tow hook is also provided for auto and winch towing, which we did not perform during our evaluation. Though not recommended by the handbook and not performed during our evaluation, aero towing with the CG hook would probably better equate the PUCHACZ aerotowing characteristics to those of many high performance sailplanes that are not equipped with nose tow hooks.

The excellent pitch and yaw stability exhibited by the PUCHACZ is provided by the generously-sized vertical and horizontal tail surfaces, combined with a sensibly-long tail arm. The height of the vertical tail is an even 2 meters (6.56 ft), and the span of the horizontal tail is close to 4.25 meters (13.94 ft), which is slightly more than one fourth of the 16.67 meter (54.68 ft) wing span. Of notable perfection are the dual elevator trim tabs (one each on left and right elevator side) that are cockpit adjustable (see Figure 1). They allow precise pitch trimming both during aero towing and over a large free flight airspeed range.

The PUCHACZ's roll control is surprisingly good despite the relatively short span of the ailerons. 45 degree to 45 degree rolls can be accomplished in about 5 seconds, while flying at 48 kts indicated airspeed. Another currently somewhat unusual design feature is that the airbrakes extend from both the top and the bottom surfaces of the wing. Their effectiveness is exceptionally good, making it almost impossible to overshoot on a landing. Their operation have little effect on the PUCHACZ's stalling speed, at least compared to the currently prevalent top-surface™only airbrakes that increase stalling speed by about 2 to 3 kts. The cockpit handle actuation forces are pleasantly low.

The cockpit is large, comfortable and well configured. The controls are well located and easy to operate, and the rudder pedals are adjustable in flight. The only cockpit layout complaint that I can proclaim, and it is a small one, is that the wheel brake actuation is not connected to the airbrake handle. To actuate the wheel brake, one must release the airbrake handle and reach to the cockpit floor for the separate wheel brake knob. On the positive side, all the controls connect automatically when the sailplane is assembled.

During the handling testing, I found that the PUCHACZ will drop a wing and start to spin, when provoked, in a very similar manner as will my Ventus and many other modern high performance sail-planes. That apparently is one of the principal reasons that many instructors recommend its use in advanced training. When sailplane pilots are fully qualified in the PUCHACZ, they should be well prepared for safely flying a wide variety of modern, high-performance sailplanes. That in itself is a good reason for recommending the PUCHACZ for training.

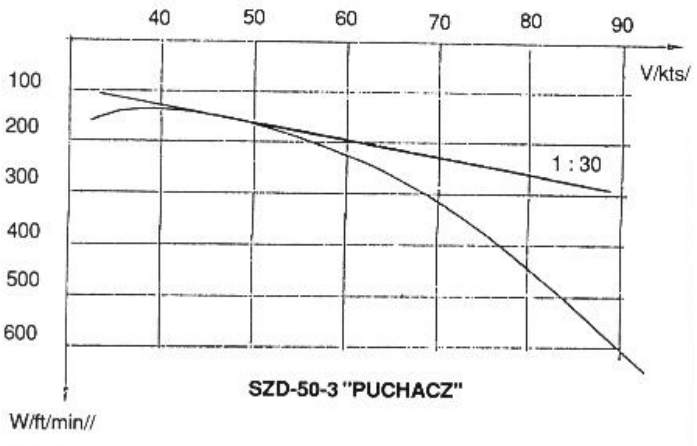

FIGURE 3.

During WW II all military glider and airplane pilots were instructed in spins, and required to demonstrate a good degree of proficiency therein. The primary and basic stage training aircraft, including gliders, were designed and required to be

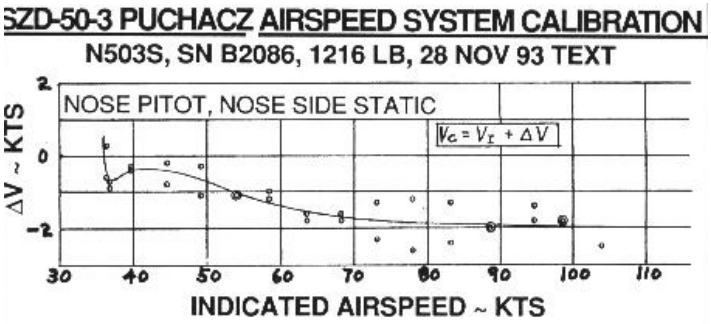

FIGURE 4.

suitable for spin training. I remain convinced that the pilots trained there were more competent because of that training.

Subsequent to the generalized flight test evaluation of the SZD-50-3 Puchacz two-seated trainer, a series of about 14 test spins were conducted by the first author. Kindly assisting from the rear seat was Dean Carswell, a long-experienced ex-RAF glider flight instructor and currently a senior flight instructor with the Texas Soaring Association. The spin tests centered principally upon optimizing recovery from half-turn spins where recovery was initiated at the 180-degree rotation point, thus attempting to simulate a recovery from an accidentally entered spin.

The Puchacz Handbook instructions say intentional spins require full nose-up elevator to maintain the spin (along with pro-spin rudder, of course). It further states that recovery is to be initiated by full opposite rudder, followed by a 1 second delay before the stick is pushed forward of neutral. When that technique was utilized, the spins terminated somewhat slowly. The over-rotations averaged about 115 degrees beyond the recovery initiation point. The altitude loss was about 425 feet, measured as the spin initiation altitude less the minimum altitude during pull-out. To keep the test results as consistent as possible, the pull-outs were limited to roughly 2.0 “G”s.

When no delay in the forward stick motion was utilized for recovery, the spins ceased almost immediately. Over-rotations averaged only about 20 to 30 degrees beyond recovery initiation, and altitude loss measured about 375 feet. That is about 50 feet less than that measured when the Handbook recommended 1 second delay in forward stick motion is utilized. As a comparison,the Grob 103 Twin II Handbook recommends no delay in forward stick motion during spin recovery, and that technique also appears to be better for the Puchacz.

This photo features the instrument panel arrangement and the spacious seating area in the cockpit.

At Dean’s suggestion, one spin test was performed with the stick held full aft and recovery attempted with full counter-spin rudder only. The rotation was stopped after about one full revolution, but the Puchacz’s powerful elevator kept the wings stalled until the stick was moved part way forward. Altitude loss was excessive. Overall the Puchacz’s spin characteristics appear to be excellent for training, and TSA can certainly be proud of their new trainer’s capabilities.

AN INSTRUCTOR’S VIEWPOINT OF THE PUCHACZ

by Sharon Smith

The rear seat of the SZD-50-3 is comfortable and raised slightly above the seat of the forward pilot, thus providing excellent forward visibility. The large canopy allows for a viewing range of approximately 270 degrees, enhancing the ability of the instructor to watch for traffic. The canopy, particularly at the rear needs sealing as it provided a steady flow of air across my shoulder and face (somewhat unwelcome at 10,000 ft and 18.7 degrees Fahrenheit).

The rear seat back is adjustable, prior to flight, to four positions. This requires removing the cross support from the rear seat and repositioning it in the desired slot. The procedure is simple to follow but not easy to implement, as some have seen. The rear rudder pedals do not adjust. The front seat back does not move but the rudder pedals have a large range of fore and aft adjustment. Beneath the forward pilot’s knees is

room for tw0 ballast weights that are screw attached to the cockpit floor. The pilot weight requirements are the same as for the Grob G103 Twin II.

All controls are easily within my reach. I am 5 ft. 4 in. tall and not particularly long legged, and I have been comfortable in both the front and rear seat. Presently, the only instruments installed in the rear cockpit are an airspeed indicator, an altimeter and a compass. An addition of a variometer is planned for installation there.

So far TSA has not used the PUCHACZ for initial instruction, and only a little advanced instruction has been given to date. The sailplane arrived just before winter and this limits my comments on actual teaching. In a poll of several club instructors the comments that were repeated most frequently were “I love it,” and “It flies like a real airplane.” I feel these two phrases exemplify the main qualities of the sailplane as a teaching tool. It is very enjoyable to fly with well-balanced controls and above average flight performance.

The trim tab is very effective and can be set to allow nearly hands off flying. However as it is not as forgiving as the traditional Schweizer 2-33, the student must attain a higher skill level before being released for solo flight. During stalls, the left wing has a tendency to drop. This is the case even in a gentle right turning stall. The drop is fairly precipitous and requires positive forward stick to recover. This same tendency makes the PUCHACZ a wonderful spinning sailplane.

It easily enters a spin by a method I have read about in books but until now not experienced - crossing the controls. This compares with forcing the Schweizer into a spin by slamming the bottom rudder. The spin is more positive than in the 2-33 and once again requires positive application of first rudder, then stick to recover. It does not appear to recover on its own.

Overall, the glider is physically comfortable and a pleasure to fly. It is a definite asset in the overall club training program. I wish to thank the instructors of TSA for their general impressions and input on the flying characteristics of the PUCHACZ.

IN APPRECIATION

Many thanks go to the Texas Soaring Association and their members who provided the high tows and the excellent sailplane needed for this flight test evaluation, and their kind assistance with the testing. Also to the towpilots who patiently flew into the sub-freezing atmosphere above the TSA Gliderport, and especially to Ken Jacobs (YF), who coordinated the operations.