A FLIGHT TEST EVALUATION OF THE L-23 BLANIK

By Richard H. Johnson, Published in *Soaring* Magazine, February 1996

The 2-seated L-23 Super Blanik is a new model of the well known Blanik L-13 conventional tailed metal trainer, of which 2649 were built between 1956 and 1979 at the LET factory in what is now the Czech Republic. They have long produced quality metal airplanes and sailplanes, including the L-33 Solo World Class Sailplane entry that was reported recently in Reference A.

Both the L-13 Blanik and the newer L-23 Super Blanik are well crafted of aluminum, and all external surfaces are flush riveted on the L-23. Fabric covering is used for the elevator, aileron, and rudder control surfaces to reduce their weight, inertia, and mass unbalance about their hinge lines, and that is a good engineering practice. The cockpits are configured in tandem and the wings are swept forward 5 degrees so that both pilots are seated ahead of the shoulder high wing spar. The wing span of our 1991 test L-23 was 16.2 meters (53.48 ft), with an area of 206 square feet (19.15 sq m2). The empty weight of our test sailplane was 683 pounds, so even with 2 persons aboard the wing loading is only about 5 lb/sq ft 2(25 kg/sq m2). That provides a reasonably low takeoff and landing speed. The modern T-tail configuration keeps the well sized horizontal stabilizer clear of any tall grass, should a landing have to be made there, and allows somewhat more efficient usage of hangar space. Figure 1 presents a 3-view drawing of the 16.2 meter span L-23 Super Blanik.

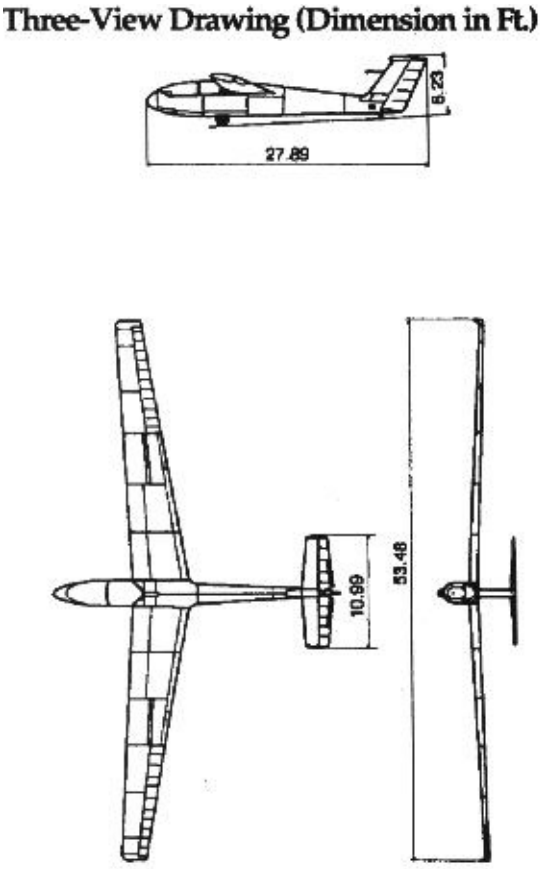


FIGURE 1. L 23 Super Blanik

Sturdy forward hinged fork supports well sprung 13.8 inch diameter by 5.3 inch wide landing wheel.

When Steve Hundley and Klaus Weimer of Dallas brought their L-23 to Caddo Mills for use in the flight training school there, they kindly offered its use for flight evaluations. Three high tows were made to 10,000 feet to measure its sink rates at calibrated airspeeds varying from 35 to 107 kts, and those test data are presented in Figure 2. A minimum sink rate of about 170 fpm is indicated at 42 kts, and a maximum glide ratio of about 27:1 at 47 kts. It should be appreciated that our test sailplane was being used for training operations from concrete runways. Since the basic sailplane comes equipped with only fiberglass skids at its wing tips, our test sailplane had been fitted with relatively small roller blade wheels mounted on each wing tip. Those obviously added a small amount of drag to the basic L-23 airframe, but greatly facilitated its ground handling.

Three additional tows were made to 8,000 feet to calibrate the L-23's airspeed system. Unfortunately, after the first calibration flight a large leak was discovered in the sailplane's static system that resulted in cockpit static pressure being used for the ASI static pressure reference. Those test data are shown plotted in Figure 3, as airspeed system error versus indicated airspeed. The ASI system errors that were measured with the static system open to the cockpit were less than 4 kts, and that was considerably less than the 9 kts of error that was subsequently measured after the leak was


L-23 parked beside Caddo Mills Runway.

Well balanced DFS type airbrake deployment test prior to takeoff.

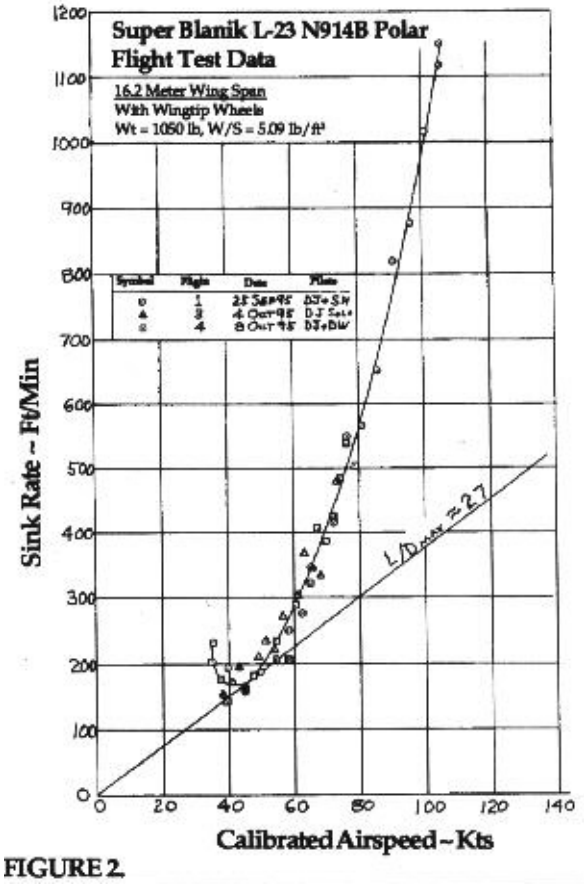


FIGURE 2.

repaired!

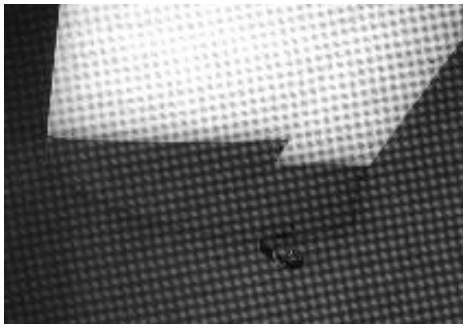
The Handbook specified ASI system static ports are located on the fuselage nose sides beside the rear instrument panel. As with the L-33 Solo tested earlier, the static ports were not flush with the fuselage sides, and they protruded significantly into the airstream. That caused the fuselage airflow to create a significant unwanted suction at the static ports, instead of the neutral ambient pressure desired. Any suction at the static pressure reference causes the ASI to indicate higher than its true values. Here the suction measured at the protruding static ports was considerable, and that resulted in relatively large errors in the airspeed system differential pressures (pitot minus static pressure). The airspeed system calibration data with the protruding static port reference pressure are shown plotted in the lower portion of Figure 4. About 9 knots of ASI system error was measured at 110 kts, decreasing to about 1 kt of error at 40 kts.

The last airspeed system calibration flight was made with the protruding static ports made aerodynamically flush by a sheet of cardboard taped to the fuselage sides in the areas surrounding the static orifices, similar to that which was done during tests of the L-33's protruding static orifices. Those test data are shown in the upper portion of Figure 4, where less than 2 kts of error is shown over the 35 to 114 kt test airspeed range. The L-23's Handbook indicates only small ASI system errors, therefore the factory test sailplane likely had flush static orifices. At this writing Blanik America's Vitek Siroky recently received authorization from the LET factory for the owners of L-23's to have the static orifices ground flush with the fuselage sides, as they are now doing at the factory. Since the L-23 is a fully certificated Standard Airworthiness Category sailplane, we could not modify its configuration without formal approval from the factory.

The handling and stall characteristics of the L-23 are excellent for a training sailplane. When provoked it will readily enter a spin, as a good trainer should. Buffet is felt at about 2 or 3 kts

Front cockpit with landing gear handle on bottom right, airbrake handle on upper left, wheel brake.

Ball bearings support solid rubber tire of full swiveling tail wheel.



Roller blade wheel on fiberglass wing tip skid facilitates ground handling.

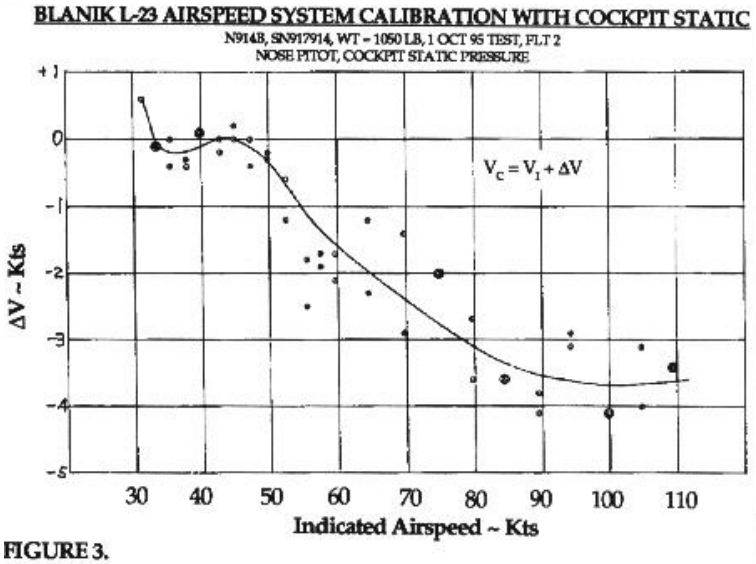
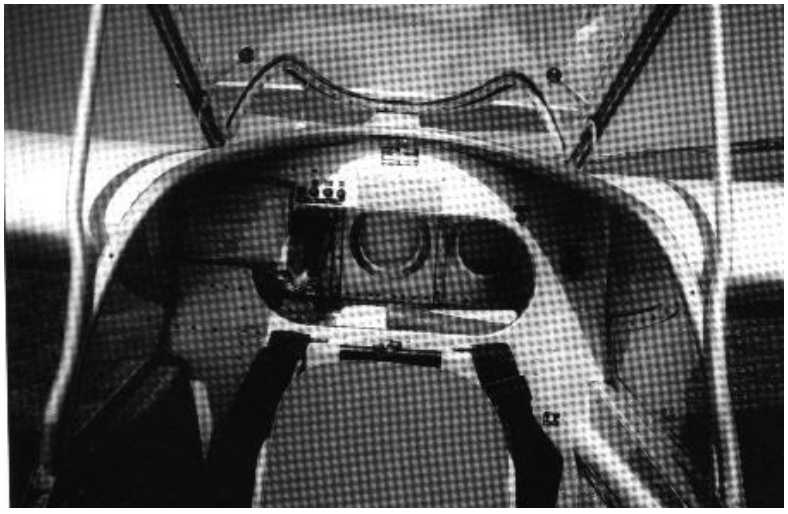


FIGURE 3.


Baggage compartment behind rear seat shows wing spar at aft end. Small side windows are at sides of rear seat.

before stall, and that should be adequate warning for most pilots. The aileron control system is a little stiff by modern standards, and the large chord ailerons cause the aileron control forces to increase rapidly with airspeed. That tends to limit the pilot's ability to overload the wings during aerobatic roll maneuvers at high airspeeds. At 45 kts our test L-23 could roll surprisingly well, requiring only about 4 seconds to perform -45 to + 45 degree rolls.

Moderate aerobatic maneuvers are permitted in our 16.2 meter 1991 model L-23, including loops and spins. The newer L-23 models include a strengthened 16.2 meter wing, with which many more aerobatic maneuvers are permitted. Also, optional extended wing tips are available for extending its span to 18.2 meters, but the aerobatic maneuvers with that configuration are not permitted. About 15 minutes are required to change out the wing tips.

A very good feature of both the L-13 and L-23 is the well sprung semi-retractable main landing wheel, which provides excellent landing gear operational training for those who will later check-out in fully retractable landing gear sailplanes. When retracted the L-23 wheel is still well supported, and it protrudes somewhat more than half its diameter out of the fuselage. That way no damage is done if the pilot neglects to lower it before landing, and only the soft travel of the well designed air-oil oleo strut is lost. Our test sailplane was equipped with a standard landing gear warning horn system, which activated when the airbrakes are opened if the wheel is not in its down position. Another potentially desirable feature was an additional switch installed in the canopy rail that activated the horn if the forward canopy was not closed. It would have been much better if that switch had been located to sense the canopy latching, instead of merely its closing.

The L-23, like the L-13 before it, is a tail dragger, with the main wheel located well ahead of the sailplane's flight C.G. A mechanical drum type wheel brake is actuated by a handle located on the left cockpit floor, and it is powerful enough that one needs to be careful not to overapply it and thereby scrape the fuselage nose on the ground. The tail wheel is a full swiveling unit that makes ground handling easy, and obviates the need for a ground handling tail dolly. Likely because of the L-23's large and powerful rudder, the full swiveling tail wheel does not seem to present any significant directional control problem during takeoffs or landings. One complaint I heard about the L-23's takeoff characteristics was that, because of the long stroke of the oleo strut as it extended, the glider would rise a few inches during the early part of its roll, and that was disconcerting to those used to flying sailplanes without soft riding oleo struts. I soon adapted to that characteristic by applying a small amount of nose down elevator during the takeoff roll, and I really appreciate the soft ride on the oleo strut


Author's dial guage measures height of airspeed static port protrusion.

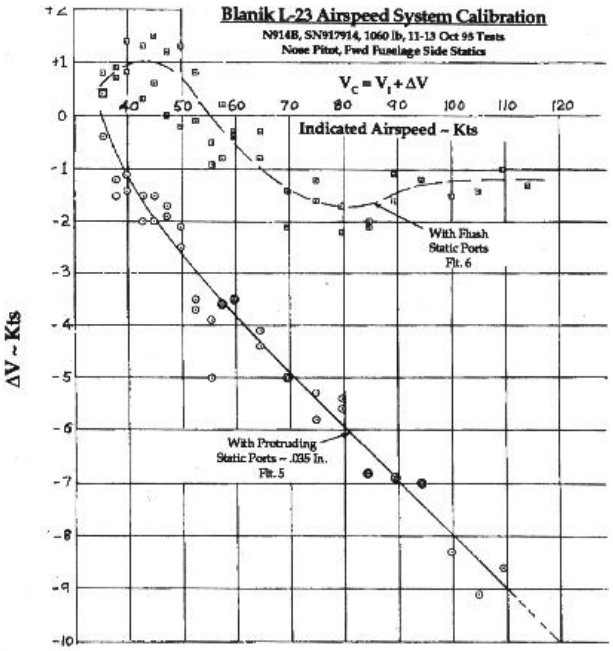


FIGURE 4.

system.

The airbrakes are of the excellent German DFS type that were used with many of the older German sailplanes, such as the Weihe and Kranich high performance designs of the 1930's. They consist of top and bottom surface plates that both rotate and translate as they are extended. When closed, the plates lay flat on the wing surfaces, and are recessed to be completely flush. It is an aerodynamically balanced design, where the top plate opens first at its trailing edge and the bottom plate opens first at its leading edge, as do those of a Schweizer 2-33 and the later model Schweizer 1-26's. The difference being that the Schweizer airbrakes are somewhat simpler than the DFS type because their plates are simply hinged to the wing surface and do not provide an air gap between the plates the wing surface, as the DFS type do. The L-23's airbrakes are well balanced in their actuating forces, sized to be moderately powerful, and are easy to use. The Handbook indicates that they will limit the sailplane's velocity to about 124 kts indicated when in a 45 degree dive at full 1124 lb gross weight. That is 9 kts below maximum allowable dive speed, but we did not include that in our flight testing at Caddo Mills. With the airbrakes extended, the stall speed increased by only about 2 kts.

When retracting the landing gear, one needs to grip the actuating handle with their palm facing outboard. Otherwise they are likely to receive a scrape on the back of the hand from the bulkhead located just aft of the handle's up location. That backhanded gripping is no problem because the landing gear system is spring balanced and easy to actuate.

The cockpits are adequate in size and all the controls are comfortably located and easy to use, The pilot's visibility is good from the front seat, but only fair for the instructor in the back. The only major criticism I have is that the seating is not comfortable in either seat. The limited cockpit lengths require both pilots to sit almost upright, and there is insufficient upsweep of the forward portion of the seats for proper thigh support. That causes almost the entire weight of the pilot's body being supported by the bottom-most pelvic bones, and I can only stand that for about one hour at a time. Also, the seat backs really need improving, at least for the American market. They are shaped like giant bread pans, and designed, I am told, to fit parachutes that are much thicker than ours. That would not be too bad except that the lower lip of the seat back pan is positioned about 2 inches (5 cm) above the seat floor, and they bear uncomfortably against the pilot's rear. Added seat bottom cushions would help there, but they decrease the available cockpit height. Vitek Siroky advises me that the factory has designed a much better seat back for the instructor's cockpit, and it is in the process of being certified. No word yet about an improved front cockpit seat back, and that is badly needed.

Blanik America advises that the delivered price of a new L-23 is in the low $30K range for the basic 16.2 meter sailplane, including instruments. About 50 of the L-23's have been delivered in the U.S. to date, and they appear to be gaining in popularity here as a rugged, well made training sailplane replacement for our aging Schweizer 2-33 and Blanik L-13 fleets.


Airspeed static port temporarily made flush with fuselage side with cardboard taped to area surrounding protruding port.

Thanks go to Steve Hundley and Klaus Weimer for allowing us to flight test their fine sailplane, and to the Dallas Gliding Association for providing the high tows needed.

References:

A. “A Flight Test Evaluation Of The LET L-33 Solo Sailplane,” R.H. Johnson, *Soaring* Magazine, July, 1995.

AN INSTRUCTOR’S VIEW OF THE L-23 BLANIK

By Bruce R. Beddow

The Blanik L-23 is able to serve well as a general-purpose training glider for any school or club. Student pilots can learn the standard maneuvers required throughout flight training easily because this glider has normal overall handling and flight characteristics. As with other trainers of relatively light wing loading, such as the Krosno KR-03A, Schweizer 2-33 or 2-22, beginner students will usually be ready to solo with 20 to 30% less flight time than with heavier trainers, such as the Grob G103 or Schleicher ASK-21.

Also, the L-23 landing characteristics are easier to master than those of other designs, especially the G103, because it has well balanced spoilers that do not exert erratic pressures on the spoiler handle.

The landing gear of the L-23 provides several features that are not found on most popular training gliders. Its semi-retractable main gear can be used to train a student on the procedures of flying with retractable gear without much risk of damage should the student forget to lower the gear before landing. We have had a gear up landing on our concrete runway with no damage to the ship thanks to the lack of gear doors and the slight exposure of the wheel when it is retracted. The loss of gliding performance while flying with the gear down on the L-23 is negligible, so an instructor may choose to leave the gear down and avoid instruction on retractable gear. The main gear also has a shock absorption system that should prevent damage to the main gear support mount, an area that we have found to be one of the more frequently damaged areas for trainers. The absence of any nose gear or skid on the L-23 exposes the underside of the nose to occasional scrapes, especially if considerable braking is used. The wheel brake handle is located on the left floor and requires the pilot to release the spoiler handle to operate it. The pilot’s concentration may be disrupted while hunting for the brake handle on the floor, for this reason brake activation with the spoiler handle or with a squeeze grip on the stick is often preferred. The swiveling tailwheel provides good ground handling characteristics, however the glider may weathervane in an undesirable manner when parked or awaiting take off in a crosswind. The L-23 was delivered with no protection for the fiberglass wingtips. Tipwheels or metal skids are needed for heavy school use.

As a stall and spin trainer the L-23 is superior to some of the most popular two-place sailplanes available. A good stall or spin trainer is one that has stall and spin characteristics that are representative of gliders in general. The L-23 is such a trainer. Stall and spin resistant trainers, such as the Schweizer 2-33 and G 103 Twin II, are not well suited to stall or spin training. Such ships do not have the stall or spin characteristics needed for a complete demonstration and education of stalls and spins. Furthermore, student pilots may not gain the respect for the potential hazards of these maneuvers needed for flying gliders that are more stall or spin prone. However, gliders that are extremely spin prone, such as the Schweizer 2-32, are not very suitable either, they could overwhelm a novice pilot. The L-23 exhibits spin behavior representative of gliders in general, although it has an apparent need for aileron to be held into the direction of a spin in order to maintain the spin.

The cockpit area of the L-23 is satisfactory for use as a two-place trainer. Its broad weight and balance range will accommodate most solo pilots, or student and instructor combinations. The ballast weight provided is easy to install and allows lightweight pilots to fly in the front seat. The dual instrument panels provide easy viewing of the instrumentation for both pilots. The ventilation is good, especially through the two side canopy vents which draw more air and appear to be more rugged than similar vents found on other sailplanes. As with most two-place gliders, the front seat visibility is good. The forward visibility from the rear seat is quite good compared with other two canopied gliders. This is because the frame between the two canopies is thinner than that on other gliders. However, the rear seat visibility to the side is significantly obscured by the leading edge of the wing, which is approximately at eye level. This is most noticeable when clearing turns; it is necessary to look both above and below the wing to get a thorough view. The rear canopy can be opened or closed only when the front canopy is open. This can cause confusion or delays if the proper canopy operation sequence is not followed. Furthermore, this canopy design is not desirable to instructors who prefer to be able to operate their canopy when they choose. The seating in front and back is snug. The front seat is between the exposed rudder pedals of the back seat. The fit between these pedals is tight and conflict may arise between rudder movement and the front pilot’s body. The rear seat shoulder space is also somewhat limited. The seat back pans have a protruding lip which presses against the pilot’s

lower back and makes both seats uncomfortable. This seat design, and the lack of space for a pilot to shift positions cause flights of more than one hour to be very uncomfortable.

The handbook for the L-23 includes much detailed information that is useful to pilots. However the information is provided in a sporadic manner that may be confusing to student pilots, so student pilots may require extra assistance while reading this handbook.

In summary, the Blanik L-23 is a versatile training glider. It can perform well for beginner student pilots and transition pilots in both the dual and solo phases of training. Some details such as pilot comfort, rear canopy operation, and wheel brake actuation could be improved.