SOARING

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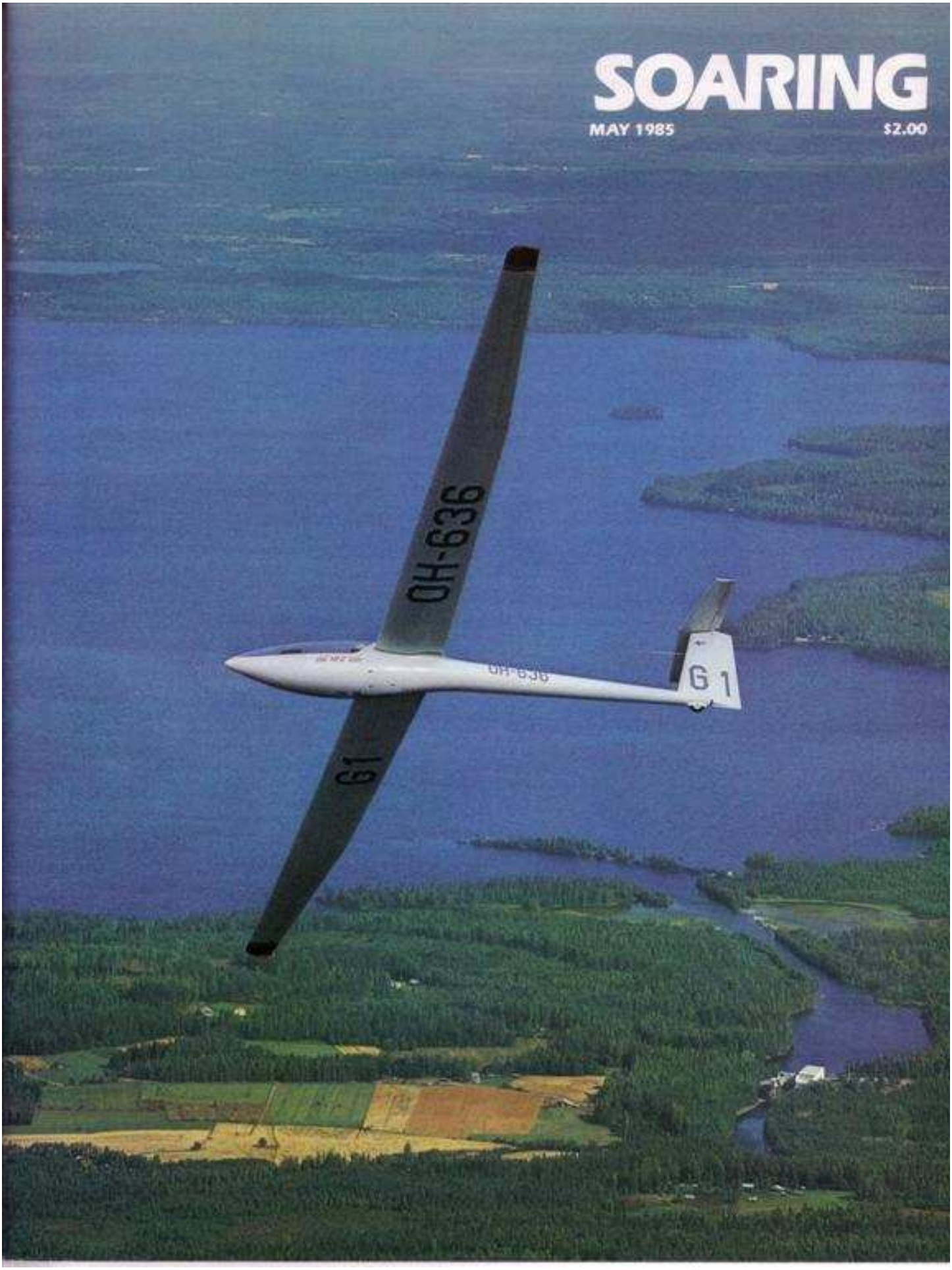
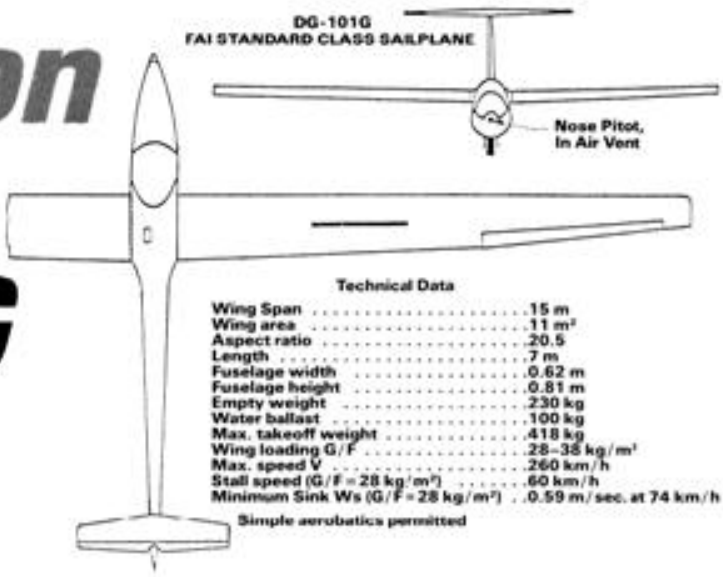


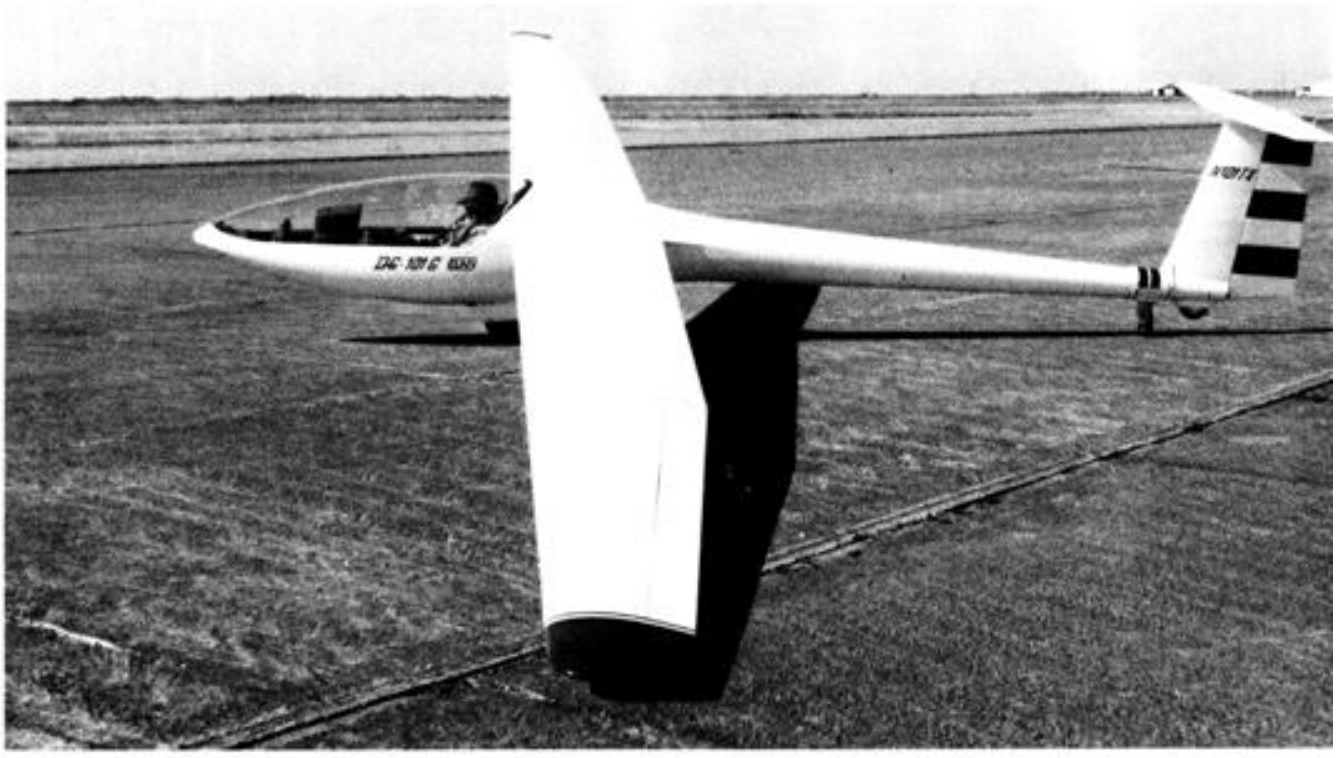
A Flight Test Evaluation of the DG-101G

FIGURE 1



by RICHARD H. JOHNSON

If you're not active in world competition the DG-101G offers a great view, good performance and unusual economy in a modern glass ship.



Glaser-Dirks Flugzeugbau GmbH is a relatively new West German sailplane manufacturing firm that is both designing and building an increasingly large array of fine new sailplanes. The DG-101G design evolved from an earlier DG-100 model, and both are 15-meter span fiberglass Standard Class designs. **Figure 1** presents a 3-view of the current DG-101G model, along with its factory-provided technical data.

Wilhelm Dirks is the talented principal designer of all of the popular DG line, which now includes the -200 (15 Meter), -300 (advanced Standard Class) and -400 (self launching) series of modern sailplanes. A DG-500 two-place model is now in development. Some of these models are manufactured in Yugoslavia at the Elan associate factory, as was our serial no. E168 test sailplane. They provide a fine sailplane at a most reasonable cost of about $12,000 plus instruments, options, trailer and shipping.

Albert Lang of Richardson, Texas, has wanted to own a modern fiberglass sailplane for himself and his son to fly at Caddo Mills, and the DG-101G appeared to be a good choice. He kindly loaned it to the DGA, even before flying it himself, and we performed seven high-tow test flights in still winter air to obtain its performance polar, airspeed calibration and wing drag probe data. Its sink rate was tested during the first four test flights and the data are shown in **Figure 2**. A very good 36:1 L/D_{MAX} is indicated at 52 kts. I performed the first three test flights, and Mike Newgard (who weighs about 60 lbs. more than I do) performed the fourth test flight. The data from Mike's Flight 4 were corrected to my 703 lb. gross weight by the square root of the weight ratio factor method.

Since my 155 lb. plus 17 lb. parachute weight was near the 165 lb. (75 kg) minimum cockpit loading, my test data were taken with the center-of-gravity near the DG-101G's aft limit. Our test sailplane's empty cg was .71 in. (18 mm) forward of its aft limit, with a total allowable empty cg range of 4.25 in. (108 mm). On the other hand, Mike's 215 lbs. plus parachute brought his cockpit load to about 20 lbs. less than the max permitted 257 lbs. (117 kg). This cockpit loading for Flight 4 moved the sailplane cg to near-forward-limit, and that made a good test of cg location effect on performance. Note that Mike's forward cg performance data appear to be equal to those that I took at near aft cg limit, and possibly are better above 80 kts.

The DG-101G's airspeed system calibration data were obtained during Flight 5 and they are shown in **Figure 3**. An unusually small error magnitude of less than ±2 kts is shown over the 36 kt-to-121 kt test range. The handbook-specified ASI static sources are low on the fuselage sides, about 15.5 in. (.39 m) aft of the fuselage nose. Since this sailplane also used a flush fuselage nose pitot/air vent system, a later additional test flight was used to measure any possible pitot errors. They proved to be very small at all airspeeds, and less than that which our calibration instrument is capable of measuring (½ kt).

FIGURE 2
DG-101G N101TX POLAR TEST DATA

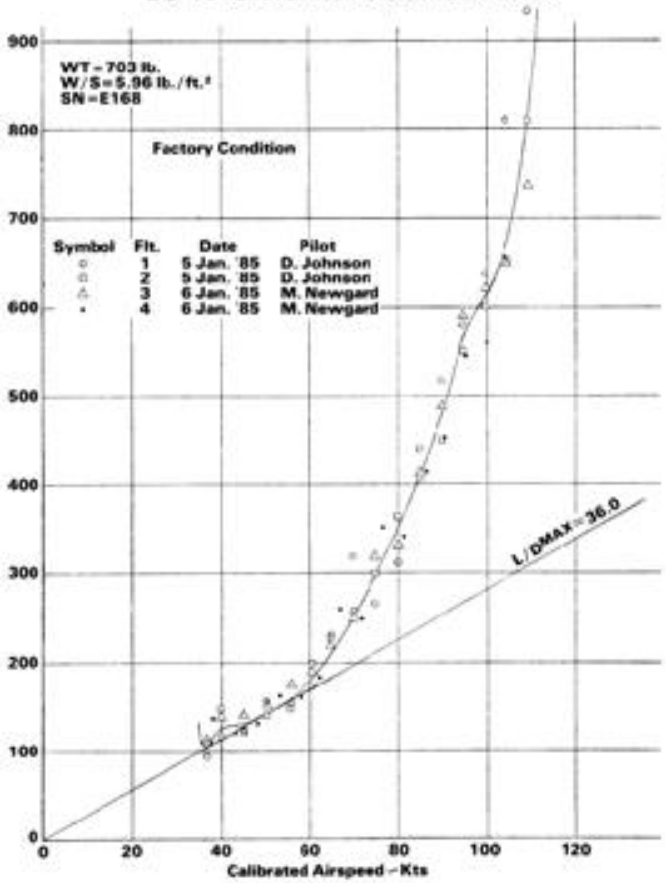
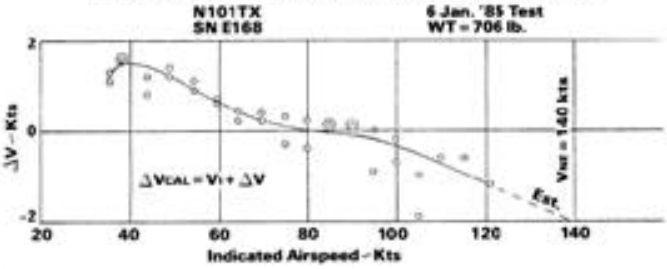


FIGURE 3
DG-101G AIRSPEED SYSTEM CALIBRATION*
Fuselage Nose Pitot, Fuselage Nose Side Static



*Measured Pitot Error = 0 kts, from 36 to 120 kts CAS

PERFORMANCE FLIGHT TESTS

Please consider that sailplanes of the same make and model sometimes vary in performance by as much as 10 to 15 per cent. Since our Dallas Gliding Association tests seldom have more than one sailplane of a model available for testing, our tests certainly cannot be construed as being representative of all sailplanes of the tested model. My current opinion is that small irregularities in the sailplane's wing profile shape are responsible for the major portion of these observed differences. It is necessary to achieve extensive laminar flow areas on the wing surfaces if the modern sailplane is to meet its designer's expectations. Air sealing and wing surface condition also can contribute to performance differences.

—Richard H. Johnson

Figure 4 shows the DG-101G wing drag probe data measured during Flight 6. Here, relatively low wing profile drag is indicated between 40 and 60 kts; but linearly increasing at higher airspeeds, principally because no wing flaps are provided to optimize the wing's camber (Standard Class rule).

Because it was suspected that the fuselage nose pitot system might be somewhat deficient at higher airspeeds, a Kiel tube was temporarily installed to provide the full pitot pressures needed for accurate drag measurements. However, the above discussed Flight 7 pitot error test proved that the Kiel tube installation was unnecessary with this ship.

The workmanship and design details of the test DG-101G are very good. The cockpit is very well laid out and comfortable, and it can accommodate relatively large pilots up to 257 lbs. The canopy sides extend more than halfway down the sides of the fuselage nose, and that provides outstandingly good visibility from the cockpit. Front hinging of the canopy provides good access to the instrument panel and easy pilot entry into the cockpit.

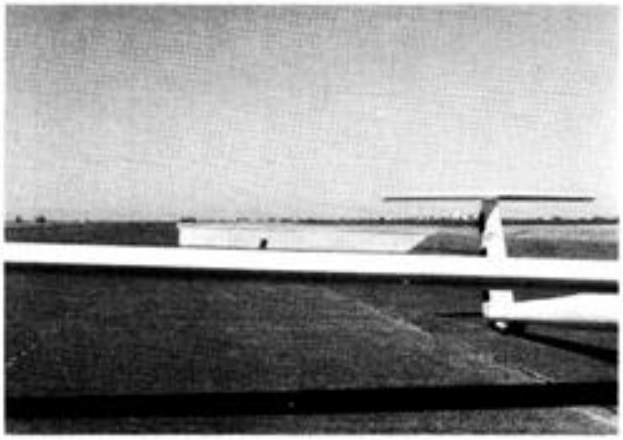
The main retractable wheel is a generous 5-inch by 5-inch size Tost wheel assembly with a standard mechanically actuated drum brake. The final part of the airbrake control handle travel actuates this wheel brake in a good firm manner, so that excellent braking is easily achieved. A pneumatic tail wheel was a provided option, which made ground handling easier than with a standard tail skid.

A combination aero/winch launch towhook is located on the fuselage bottom about 3.3 inches forward of the main landing wheel. Though many sailplanes use this low aft towhook location, the towrope's tension from a strong towplane's pull will cause the sailplane's nose to rise suddenly at lift-off. A firm nose-down elevator control must be applied promptly to correct that. For that reason the handbook recommends that *full nose-down trim* be set before taking off. I did not set the trim there during my first two takeoffs, and I was a bit embarrassed with my unexpected liftoff, zooming, and subsequent corrections. On later flights, I found that it was much more comfortable to follow the handbook's recommendations of setting *full nose-down trim* for the takeoff.

The wing airbrake and aileron controls are connected

Front-hinged canopy makes it easy to enter, good dive brakes make it easy to land and optional tail wheel makes it easy to handle on the ground: an all-around easy sailplane is the 101G!

Generous-size cockpit suits pilots up to 257 lbs., and canopy extends below centerline on each side to open a panoramic view. Belly hook is just ahead of main gear and results in pitchup on liftoff if you don't trim fully nose down.



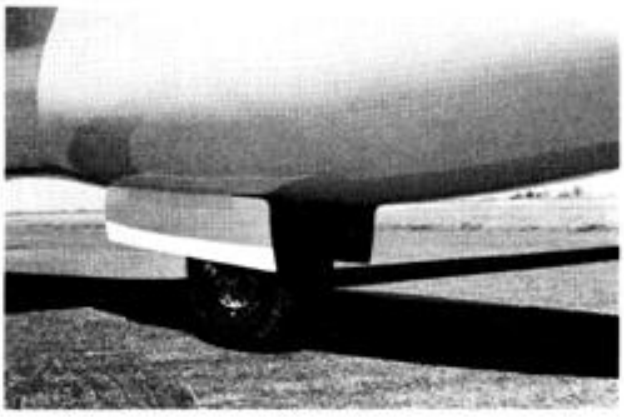
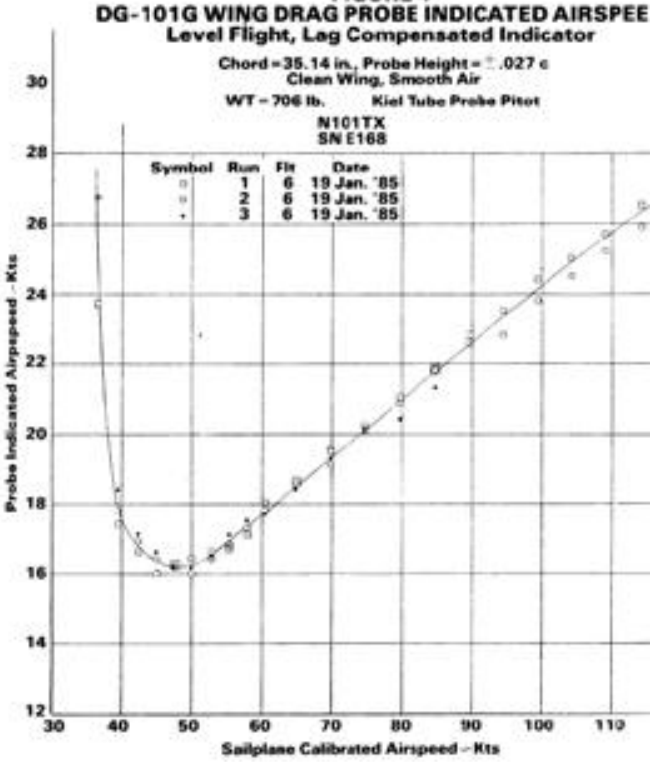


FIGURE 4
DG-101G WING DRAG PROBE INDICATED AIRSPEE
Level Flight, Lag Compensated Indicator



manually, but the elevator control connection is automatic. The fiberglass wings weighed about 134 lbs. each, including an empty 12 gallon (approximate) capacity water bag ballast system in each panel. We did not test or measure the water ballast system because of the cold winter environment of our test. The wing thickness-to-chord measurement t/c_{MAX} values average .1873 at the roots, .1756 at the aileron root and .1455 at the aileron tip. Chordwise waviness measurements showed an average of about .005 in. (.12 mm) peak-to-peak, which is very good smoothness for a factory sailplane. No wing root air seals were installed on out test DG-101G and it appears that a better L/D_{MAX} might be attained if they were in place. We have planned further testing to investigate that.

A normal configuration 2.25 m horizontal tail is provided, with a relatively large-chord fixed stabilizer and a relatively small-chord moveable elevator. That, combined with an excellent parallelogram cockpit control stick mounting, provides excellent longitudinal control and stability characteristics. The control stick system is comfortable to use at all test airspeeds with no tendency to cause pilot-induced oscillations. Aileron control is good, with no tendency to drop a wing during takeoff or landing rolls. 45-degree-to-45-degree rolls could be performed in about 5 seconds while flying at a relatively low 45 kt thermaling speed.

Level flight stall occurred at about 36 kts. Very little buffeting preceded the stall, at least with my relatively aft cg location. However, there was little sharpness or wing dropping tendency to the stalls, even when in turning flight. I was able to achieve about 2 hours of weak winter thermaling in the DG-101G and I considered its climb capability to be quite good. The elevator trim was easily re-set by using the control-stick-mounted release/engage lever.

The airbrakes are Schempp-Hirth type wing top surface parallelogram plates of about 53 in. (1.35 m) span each. They are easy to operate and adequately large to provide good glide path control. A slight nose-down pitch change occurs when the airbrakes are extended, which is desirable in my opinion.

In summary, the DG-101G is a fine sailplane overall and an excellent value, suitable for almost anyone except a fanatic Nationals competition pilot.

Simple, functional panel and control layout provides good access of instruments and easy pilot entry/exit. The horizontal stabilizer is mounted well forward so as to overhang the leading edge of the vertical fin.

The reader of flight test evaluations should recognize the data are subject to uncertainties regardless of the method used. The data presented are those measured and experienced, but they do not purport to be absolute or always repeatable and comparable to other data. Hence they should be used with appropriate consideration of the implications and uncertainties involved.—ED.

Photos by the Author