

DG FLUGZEUGBAU GMBH



Aerobatic Test flights of the DG-1000S/18m Serial Numer:10-1S1

This article was written by Alwin Guentherth of Bruchsal,
who is one of Germany's experts in glider aerobatics

We needed to run a number of tests in order to set the stakes for a category "A" certification (aerobatics) of the DG-1000 with 18m wingspan. Therefore I needed to check the general handling of the plane while flying upside down. After checking the general flying characteristics with 20m wingspan Swen Lehner and I took off at 10-25-2000 with 18m wingspan and a central center of gravity (approx. 380mm) for a first aerobatics check flight.

The first thing I did was a stall speed check. The plane stalled at 68 km/h IAS in normal flight. It was easy to spin after applying full elevator and rudder. The DG 1000 did approx. 1/4 more spirals after stopping the spin in a vertical flight layer. It was easy to round out the aircraft.

The next things we did were figures of the certification "utility", such as loop, turn, chandelle and lazy-eight. The entrance speeds were 180-200 km/h. The figures proved to be easy to fly and didn't demand special skills of the pilot.

I managed to fly a loop with an entrance speed of only 170 km/h without stalling in the top part.

The rudder has to be applied slowly in the direction of the intended turn until the full rudder is applied at a min. speed of 140 km/h. The DG 1000's behaviour is comparable to that of an ASK 21, a Twin - Astir or a DG 500.

Slight rudder against the direction of the turn and a slight aileron movement in the direction of the turn will assist in a clean turn once a vertical flight pattern is established. The turn can then be completed at a speed of approx. 110-115 km/h. After completing these tests to our satisfaction the program came to the inverted flight.

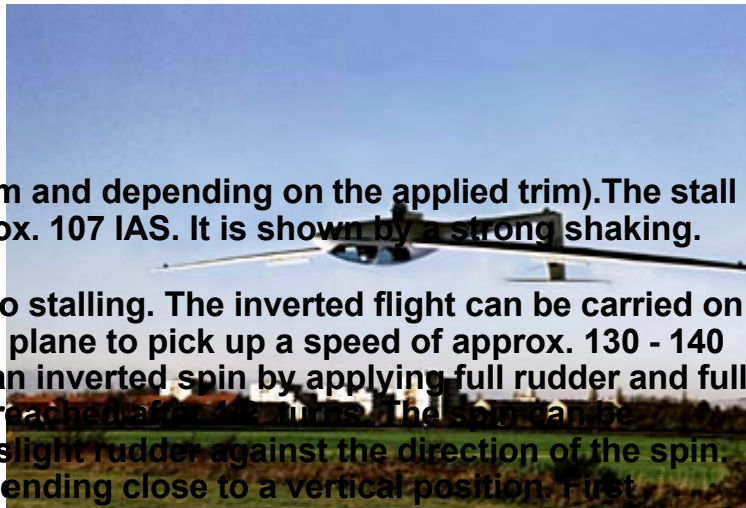
We started by flying a half roll to the left and ended up inverted. While rolling the plane to the other side we noticed a smooth and nice reaction to the controls. The approx. rate of a full (360) roll was 11 - 13 sec. / 360, which is comparable to other double seaters.

We noticed quickly that the DG 100 is capable of a steeper angle of attack than the DG 500. Further we noticed that the stall danger is significantly reduced while flying inverted and the controls are all fine.

The flying characteristics remind me of the ASK 21, which is counted as one of the most stable gliders. The stationary inverted flight was tested at speeds from 110 to 220 IAS. (We will have to calibrate the airspeed indicator for inverted flights before making exact statements about the speeds).

We were happily surprised about the little amount of force that had to be used on the elevator control. (A result of the bars and weights in the control mechanism and depending on the applied trim). The stall speed in inverted flight is reached at approx. 107 IAS. It is shown by a strong shaking.

The plane will change to an attitude prior to stalling. The inverted flight can be carried on by reducing the elevator and allowing the plane to pick up a speed of approx. 130 - 140 km/h. The plane can be maneuvered into an inverted spin by applying full rudder and full (pushed) elevator. A stationary spin was reached after 40 turns. The spin can be stopped by applying neutral elevator and slight rudder against the direction of the spin. The plane can be easily rounded out after ending close to a vertical position. First measurements and estimates show a loss in altitude of approx. 120 - 150m / turn.



No - it's not a real photo..... 😊

I also tested a flick roll in order to get a real perspective of the flying characteristics of the DG-1000. Flick rolls have proven to be difficult especially in double seaters with good flying behaviours and a low wingspread due to their inability of causing a dynamic stall. The flick roll was entered at 120 IAS with a full rudder and elevator. The stall occurred after a drastic rise of the angle of attack. It happened softly and clean. The DG-1000 proceeded to an inverted pattern. The movement could be stopped by reducing the elevator and applying slight opposite rudder. We achieved the normal flying pattern by a half loop as a follow up.

The "pushed roll" has to be flown at a higher speed due to the decreased lift. We entered the maneuver at 150 km/h IAS. Pushing the elevator completely forward and applying full rudder will place the DG-1000 into a normal pattern again. It can probably be improved by a slight pull on the elevator in the last part of the roll.

After going through these tests on the DG - 1000/18m I can come to the conclusion:

The DG 1000 is a perfect aircraft for aerobatics - the stable flight characteristics are favourable for flight training.

The characteristics of inverted flying are a lot better than those of the DG-500 Trainer (Orion) making it easier to handle than the DG - 500.

The further test flights will show the exact number and amount of allowed figures to be regarded as safe and sound to handle for every pilot. What can be said is that every figure flyable with a DG-500 can be flown with a DG-1000. And the flying will become easier.

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A short final note:

It proved to be quite a surprise for us that the DG-1000 is better than DG-500 in aerobatics and about as easy to handle as the ASK-21. We did not expect that because the characteristics of a modern airfoil with it's improved gliding ratio generally comes along with bad flying characteristics while flying upside down. By opting for a more **conservative airfoil** we have apparently built an all-round aircraft, capable of aerobatics and good gilding and flying characteristics.

[Back](#)   [Home](#)