Antares –The Silent Motorglider!

Antares, the first high performance electric powered sailplane in the world is close to entering the marketplace. The 20m test bed LF20E, the first retractable engine high performance sailplane powered by electricity, built to test the new technologies used, has been flying successfully since its first flight on 7th May 1999. Due to the positive results gained with the LF20E, a production version which is of a completely new aerodynamic design, the 18/20 m Antares is expected be flying in Prototype form by the summer of 2000 and entering production at the beginning of 2001.

The aircraft first became known to the world when presented to the 23. Symposium on Sailplane Development in Braunschweig, Germany. The aircraft is the product of the young sailplane designer Dipl.Eng. Axel Lange and his even younger but highly motivated start up company, Lange Flugzeug GmbH, stationed at the Zweibrücken/Pfalz airport.

Like many a great plan the project "Lange-Antares" had a simple beginning. As a designer, previously working at DG, Lange had an intimate knowledge of the wishes of the customers and the problems of conventional motor-gliders. The longer he worked in this conventional area, the clearer his vision for the future. For his sailplane of the future he defined the following principles;-

A high .performance, practically silent and ecologically sound propulsion system. Optimal aerodynamics to give outstanding flight characteristics and strong competition chances. Comfortable and simple handling. Minimal servicing through a new service concept. Elegance in the design of a beautiful aircraft.

What Lange wanted to do could not be accomplished by a single person in a single company. He needed a network of specialists. Lange gathered together internationally renowned specialists, such as for instance Professors Jeanneret and Vezzini of the Technical University Biel (electric motors and high performance electronics) and Professor Boermanns of the Technical University Delft (development dynamics and wind tunnel tests) who brought their expertise to the project.

The preliminary results of this concentrated research was the development of the electric propulsion system of the Antares. This revolutionary new propulsion system is at the heart of the design. Light weight and high performance nickel-metal-hydride batteries, a brush-less 42 kw+ electric motor, new high performance electronics and a large, very low rpm propeller were designed as an integrated propulsion concept. The results are high climb rates (about 4.4 m/s), a high service ceiling of 1950 m without water ballast and with a noise emission of less than 40dB, practically silence.

High power is one side of this propulsion concept, reliability, safety and simple handling the other. Constructive fine tuning such as the use of a brush-less motor, with the minimizing of the use of wearable parts in the rotating motor optimize the service safety. Relatively few, but high quality parts give a minimal failure risk. For example the electrical connections used, are off the highest aviation quality. In the unlikely case of a short circuit, the voltage decreases rapidly. This is detected by a safety connection and the batteries are switched off in just several milliseconds. Indeed the entire battery set is monitored by an electronic system that monitors and controls battery temperature and the tension of the batteries. If a defective cell is found it will be switched around. The entire battery system is inside the wings with all related cables fixed in glassfibre. The batteries are connected to the motor by two touch-safe and non-commutable plugs. An air exhauster positioned under the baggage compartment with automatically opening and closing 100 x 100 mm outlets on the under side of the wings ensures that the batteries are kept at the required temperature.

Compared to internal combustion engines the Antares propulsion system has very little vibration. This avoids wear and tear problems and offers the prospect of greater reliability. All the propulsion functions, i.e. extension and retraction, and adjustment of the propeller as well as the power regulation are done by the Lange-One-Lever operation, which has been registered for a patent. To actuate the system visual contact is not necessary. The design will used a hinged propeller similar to the design used for years in the Ventus 1 and 2 motorgliders. A hydraulic system is utilized for the actuation of the engine, engine doors and undercarriage, as this system showed itself to be reliable and more compact than existing systems. Servicing promises to be minimal and TBO is 1000 hrs.

The famous aerodynamicist Prof. I.M.M. Boermanns has

developed the aerodynamic design of the Antares wing and fuselage. As it is a completely new design there was no need to consider using or adapting existing components, and could be designed aero-dynamically as one piece. This as resulted in an optimal wing - fuselage junction also the wing and winglet combination in an ideal line. The most important improvement however is the completely new wing geometry of the super-elliptical wing which includes 9 profiles. Boermanns' wing design offers such low induced drag which was previously only obtainable in fully elliptical designs, but without the known poor flight performance of such wings. In both straight and banked flight the stall characteristics are benign. The rather large tail and aileron size assures great stability as well as the agility of a 15 m design. Even in the 18 m version the electric sailplane will be competitive, and will not lag behind conventional designs. The 20 m version will bring optimal performance in the middle and high speed ranges and especially in slow thermalling.

The fuselage design was developed incorporating the ideas of the leading scientists at TÜV Rheinland and several specialists from Formula One motor-racing. The aim to maximise the Antares cockpit as a safety zone. Energy absorption is an important safety theme with all new sailplanes. A specially designed undercarriage will minimize the danger of spinal injuries in case of round-out/stall accidents, and a new cockpit seat has been designed for the same reason. Another design element with relevance to safety should be mentioned, and that is the excellent visibility from the cockpit.

There are perhaps a couple of drawbacks to the design to which Lange is responding. Firstly is the increased weight of the wings, which makes the rigging and de-rigging more difficult, a special rigging/ derigging system has been developed. Secondly is the need for recharging of the batteries which necessitates the need for a field with electricity or for you to have your own generator. Every Antares will be delivered with a suitable charger to meet this need and the company are developing a portable charger which will make cross-country tours possible.

The Antares promises to be a fully competitive high performance self launch sailplane, a completely new design, with quiet propulsion, 18/20 m span, easy handling and excellent flight characteristics. The price, is expected to be 10000-15000 DM more than its competitors for the 20m version. It will be interesting to see how the market reacts to this ***silent motorglider***, especially considering the increased concerns about aircraft noise around airports and gliding fields that many of us face.

For more details of the Antares contact Lange Flugzebau GmbH, Flugplatz Geb. 388, 66482,Zweibrucken, Germany.

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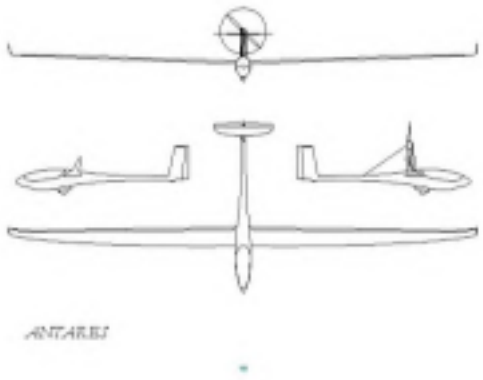

Antares Technical Data

Wing span	18 meter (59 ft)	20 meter (65.5 ft)
Wing area	11.9 m^2 (128.1 sqft)	12.6 m^2 (135.6 sqft)
Wing aspect ratio	27.2	31,7
Fuselage length	7.4 m (24.3 ft)	
Height	1.45 m (4.7 ft)	
Empty weight	401 kg (884 lbs)	405 kg (8934 lbs)
Max. gross weight	595 kg (1312 lbs)	
Min. wing loading	39.6 kg/m^2 (8.1 lbs/sqf)	37.7 kg/m^2 (7.7 lbs/sqf)
Max. wing loading	50 kg/m^2 (10.24 lbs/sqf)	47.2 kg/m^2 (9.7 lbs/sqf)
Best L/D)	>51:1	>54:1
Min. sink rate at 475 Kg	0.54 m/s (105 fpm)	0.52 m/s (100 fpm)
Stall speed at 475 Kg	73 km/h (39.4 knots)	71 km/h (38.3 knots)
Waterballast	120 Litres 31.7 US gallons	
Motor Type and Battery system	Electrical NiMH	
Motor Performance	42 Kw 56hp	
Maximum climb speed at 475 Kg.	4.8 m/s 942 ft/min	
Maximum climb speed at 595 Kg.	3.9 m/s 768 ft/min	
Maximum climb altitiude at 475 Kg	1890m 6200 ft	
Maximum climb altitiude at 595 Kg	1510m 4954 ft	