Sapphire

The Sapphire electric soarer is the new version of our very successful Azure, which was designed to be as lightweight as possible, as it had to use a heavy Speed 400 powertrain. When we designed the Sapphire, we took use from our long-years experience with the DLG models. These gliders, made with the foam/skin technology, flew much better, than those stick and film types. The main reason for this substantial improvement is the smoother surface, devoid of the bumps caused by wing ribs. Additionally the foam/skin structure provides much better rigidity allowing a higher aspect ratio, and reduced induced drag. The aspect ratio is about same as that of free flight power models, which operate at a similar range of Reynolds Numbers. Each half of the wing is made as single part, with the dihedral built-in during the moulding process. As the radius of the bending is non-zero, the brake and aileron must not be side by side: there is a firm part in between. Otherwise, the hinges material might break.

The pod was designed to be used for many different types of models and equipment. It is long enough to accommodate an efficiently big (14") folding prop. The pod is very slick, yet it provides enough room for the RC and the powertrain. The bottom of the fuselage is slightly flattened to get even more room inside the pod. The rear fuselage consists of a long carbon/glass boom to provide a good tail moment and thus excellent flight stability.

The very lightweight tail feathers are made in similar method as the wings, and the two part construction allows the tail to be removed for easy transport.

The CG can be correctly positioned even with the very lightweight components: A direct drive Motor Dualsky Xmotor 2826CA-10 (40g outrunner) and LiPo Xpower 1000-2S battery weighing only 65 grams, allowing a very low AUW to be achieved.

We recommend the on-board RC system is supplied from the Dualsky VR-3 voltage controller or a speed control with a switching regulator (SmartBEC)

Specifications	
Wingspan	2000 mm
Length	1130 mm
Empty weight	from 310 grams
RTF weight, w. recommended equipment	from 530 grams
Wing airfoils	AG 44-45-46

Recommended equipment:

- Motor Dualsky XM2826CA-10
- Prop Aeronaut 9,5x5 to 10x6
- Prop spinner 32/3,2 pin 8/3
- Akku Dualsky XPower 800 / 1300-2S (EX, G5)
- ESC Castle Phoenix 25
- Rx and servo supply: controller VR-3
- Servos GWS PICO BB 6x
- Rx: min. 7 channels
- 5 cm servo extensions

Model assembly

Fuselage

Cut off the pod tip, so that the opening is of approximately 25 mm diameter. Glue in place the motor mount. The mount in the kit suits perfectly for the outrunners of 28 diameter o.d. and spinner 32 mm. The sizes of the mount and spinner allow for enough room for the motor cables.
How to adjust correctly the motor mount: Find a longer bolt ca M8 with nut and screw on it into the motor mount central hole. Use the bolt as the indicator of the correct motor axis adjustment: ca. 0-1 deg down, ca. 1 deg right. Fix the mount in position with few CA drops. Remove the bolt and secure the motor mount in position with epoxy, around the mount perimeter, from both outside and inside. Be sure to leave the mount surface clean, in area of the contact with the motor face.
Sand the excess pod tip so that the motor mount is ca. 1-1,5 mm deep.

Bend the canopy mount wire, so that its ends are in the middle of the canopy. Fix in place with medium CA and activator. Secure with a square layer of glass fibre.

Epoxy in position ply rectangles, which make for the wing bolt attachment nuts. With the wing as template drill holes 3,2 mm a run tap M4.

Assemble the wing and fuselage pod. Assemble the boom with the V-tail halves. Glue the boom to the pod to secure correct position of the wing and V-tail.

Make the cut outs in the servo mount to accept the servos you will use. Install the mount and the servos.

Wing
Caution!!! Even if invisible, the wing surface is slightly porous. Any contact with some organic solver (nitro) will attack the foam core!

Use very sharp and thin blade to cut the notches for the arms in the moving surfaces. Locate the arms so that they protrude through the parts. Glue the arms in place from both surfaces. The epoxy fills the corners what provides for very firm assembly.
The arms of the brakes point rearwards!

Cut off the servo flanges. With servo tester or RC set up neutral servo arm positions. The aileron servos arms point in right angle to the wing bottom surface, the brakes servo arms should point rearwards so that the scope of the motion allows for full brake deflection.

V-tail (See cross tail addendum below)
Install the arms of the moving surfaces, with method described above. The two pushrods are very lightweight, made of carbon rods 0,8 mm. The rods are guided in plastic tubes. They are of ca. 20 mm long, ca 150 mm apart.
For the transport, we recommend to tie the pushrods tips to the boom tip with an elastic band.

Moving surfaces deflections
We suppose to program three flight modes: normal, thermal, speed.

Normal: Flaps (ailerons and brakes) – neutral position, flat bottom surface
Thermal: Flaps (ailerons and brakes) ca 2 mm down
Speed: Flaps (ailerons and brakes) ca 2 mm up
The flaps movement must be compensated with elevator, in the same sense: flaps down, elevator down and vice versa.

Typical movements of the control surfaces:
Ailerons: ca +10/-5
V-tail: +/- 8 mm

Caution: Too large deflections of the V-tail can result in total loss of control !

Butterfly
Brakes: + ca 70 deg
Ailerons: – ca 10 mm
Elevator compensation: ca 2 mm, adjust as necessary

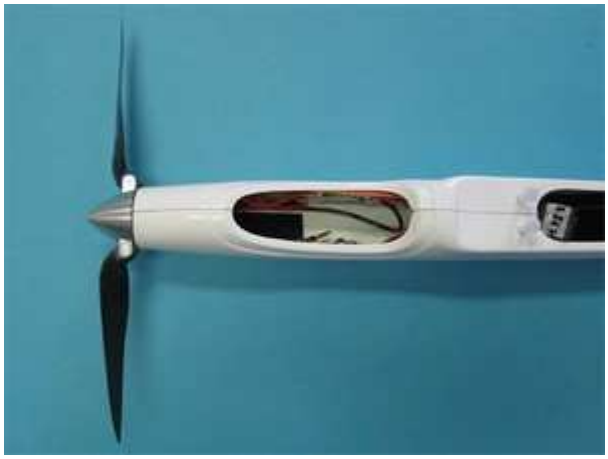
Transmitter sticks: according to the pilot habit. Usually, the motor is controlled by a switch. The brakes (buttefly) must allow for gradual control.

Centre of gravity
The good starting position is ca 60 mm behind the wing leading edge. Usually, the CG is moved rearwards when you and the model are good friends.

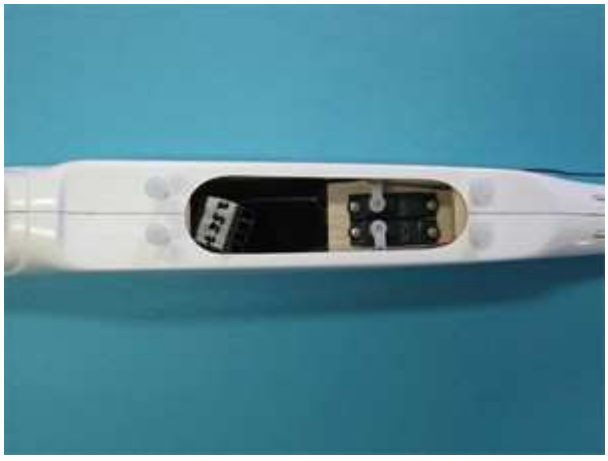
Flying

If the CG is in correct position, the model should fly instantly, without problems.
Lot of fun

The pod is very sleek. It is long enough to accept 14" dia. Folding prop. The bottom part is flattened to obtain more space for the equipment.

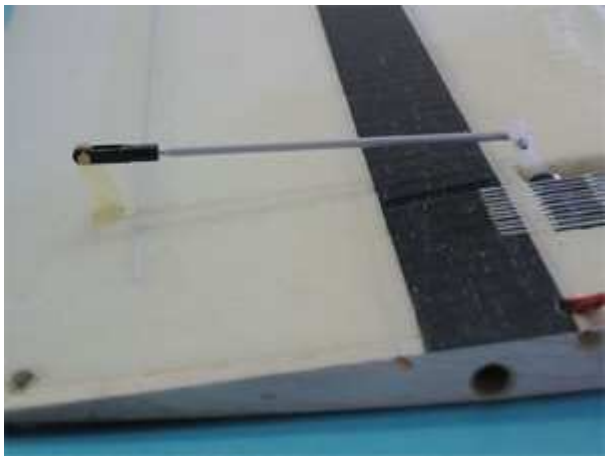


Top view. There is enough space for ESC and voltage regulator (on sides) and battery in between (not shown). The spinner 32 mm provides enough space for the ourunner 28 mm dia with the input cables.



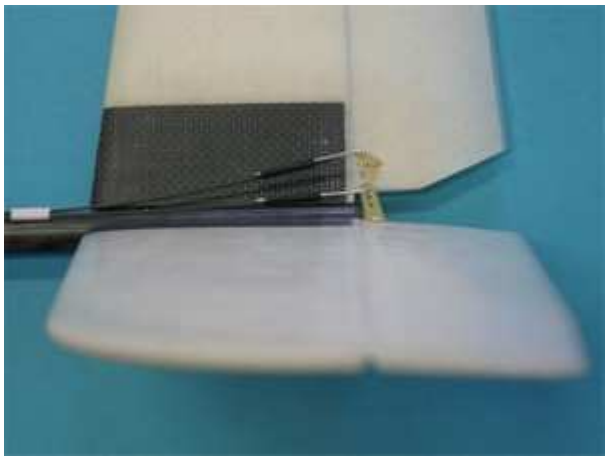
Right hand surface: ESC Castle Phoenix 25. Left hand surface: voltage controller VR3 supplies 6 servos

Four 5 cm extensions to attach easily the wing servo cables. Plastic bolts with cross heads. V-tail servos.



Pushrods outlets: white plastic tubing guides the 0,8 mm carbon rods. The other guides are ca 20 mm long, in ca 15 cm distances, glued on the tube surface.

Brake pushrods. Note that the arms are pointed rearwards to allow large brake deflection.



V-tail pushrods.

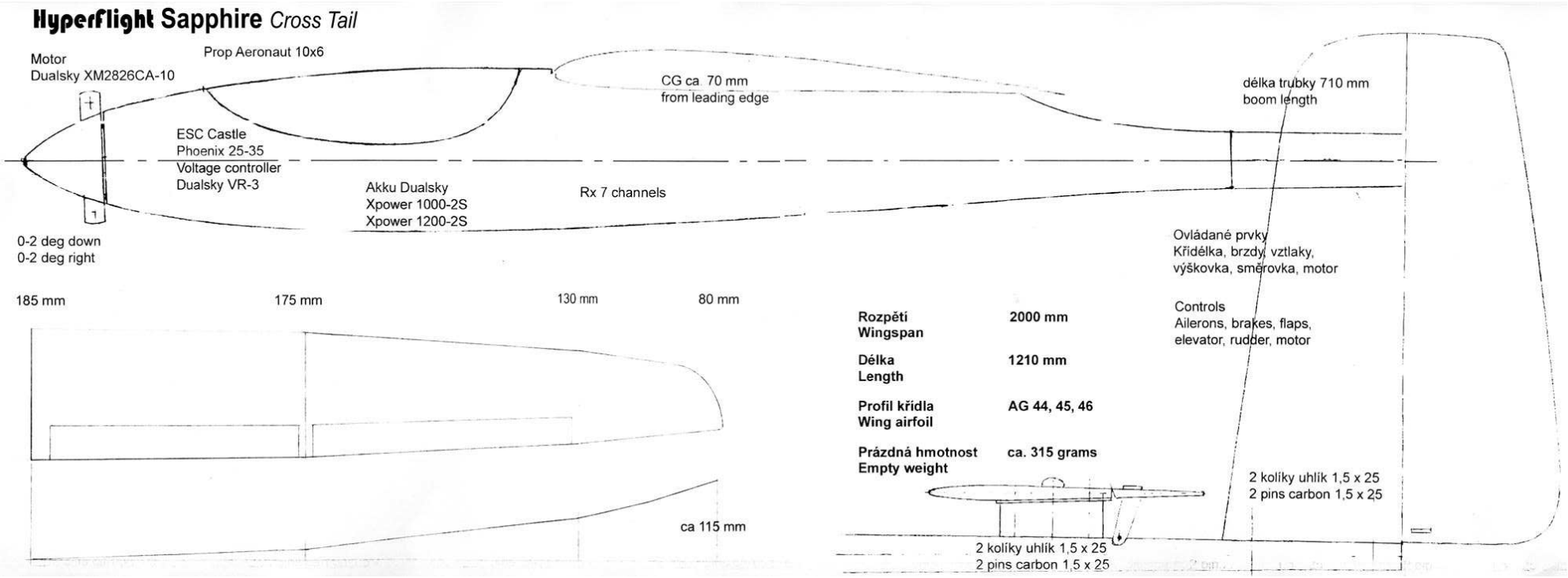
Secure the V-tail with rubber band. Simple and effective.

Sapphire Cross Tail Addendum

Drill two 1,5 mm holes for the fin securing pins through the boom. Mark the positions of the holes on the fin root rib. Drill holes in the fin. Assemble and glue the fin to the boom.
Screw the stab to the stab mount with the plastic bolt, fix its position with 1,5 mm pins but do not glue them yet.
Place the stab/mount assembly onto the boom, take care to keep right angle vertically and horizontally. When correct, drop CA to "pin" the mount in place.
Remove the stab and glue the mount on the boom with medium CA. Check again.
Drill 1,5 mm holes through the mount AND boom, install the 1,5 mm carbon pins and glue with thin CA.
Only NOW push the complete tail and boom assembly on the pod. Rotate the boom on the pod, so that the stab is perpendicular with the wing.
The centreline of the stab airfoil should be perpendicular with the boom axis

Elevator throw: +/- 8 mm
Rudder throw: +/- 20 mm

Hyperflight Sapphire *Cross Tail*



Rozpětí **Wingspan**	**2000 mm**
Délka **Length**	**1210 mm**
Profil křídla **Wing airfoil**	**AG 44, 45, 46**
Prázdná hmotnost **Empty weight**	**ca. 315 grams**