KWARCINSKI MODELS STARLING PRO.

by Klaus Weiss

I had been looking at the Starling, fully moulded glider, for some months now, so it was a pleasant surprise to be in the position to write a review of this kit, for Airborne magazine.

I am essentially an R.C. Sailplane pilot, so it is always exciting when a new model hits the market. There has been a sad lack of modern, sleek, 2 metre wingspan gliders available to the market in recent times. The exception has been the very reasonably priced and excellent range of Blejzyk gliders coming out of Poland. These gliders have addressed this shortcoming to a large degree, but this latest offering to come from the same country, has set a new benchmark on affordable quality.

Europe tends to be at the cutting edge of technology, so it is no surprise that the exceptional quality and finish of these moulded models is right up there with the best, at an attractive price.

Let's see what you get for your dollar.

The Kit:

The Starling Pro utilises the SD 7084 airfoil. This airfoil is used to increase the speed range and penetration of this model, and has served very well on other European gliders. It is an excellent thermal section and also races quite well with the slim RG15 airfoils. It has very good stall characteristics, according to literature I have read, making it a good choice for the Starling.

The Starling arrived in a plain brown box, with the contents securely taped and wrapped, to prevent them moving. The wings, fuselage and tails, are wrapped in white foam 'sheaths' to further protect the exceptional finish.

The fibreglass fuselage is pre-coloured and finished in the moulds. A very shiny and slick finish, with carbon fibre and Kevlar reinforcements under the wing saddle and right along the bottom. There is a towhook block glassed into the bottom of the fuselage, and wing blocks with threaded blind nuts fitted and aligned for an accurate fit. Carbon rods are also installed in the rear of the fuselage, for the V tail halves to slide on. Lastly, a fibreglass canopy completes the fuselage.

The wings are in three pieces, and are fully moulded, hollow construction, with factory hinged control surfaces using Kevlar skin hinges. The spars are carbon fibre reinforced, and the joiner boxes are wrapped in Kevlar thread. No further work is required on the aileron, flap or V tail control surfaces, apart from fitting the horns. Steel joiners and alignment pins are installed, and all cut outs are milled. Even the holes for mounting the horns are pre-drilled.

The V tail, or stabliser halves are similarly constructed to the wings and are removable for transport. They have the ball link horns already installed.

All hardware, including pushrods, horns, bolts, fuselage servo trays, wing servo covers, tow hook, etc. are included in the kit. You will need to supply clevises and rods for the ailerons and flaps, as well as clevises for the V tail connections at the servos.

The Starling is 95% pre-fabricated, so it shouldn't take more than a few nights to get it assembled. Let's get to it.

Construction:

I started with the fuselage, simply because I had to wait for delivery of the JR331 servos and the Schulze 835W receiver, which were obtained from Airsports R.C. The week end was in the way, so I had two days to contemplate the assembly.

The kit is almost ready to fly, and as such, did not contain any instructions, apart from a plan diagram and a diagram showing the aileron and flap servo installations.

Building time is comparatively fast, and it could be possible to build the Starling Pro in one weekend if you put your mind to it. Having said that, I didn't find it totally easy, as there is a bit of epoxy and microballoons to mix, with plenty of scope to go wrong for the inexperienced, or unwary builder. I will try my best to write this review so that any pitfalls will be covered. Other builders may do things differently to how I am going to do it, but I am working to a deadline, and doing it quickly. I will skip over the obvious stuff.

The first step is to sand the servo tray slightly, for a snug fit. I glued it in, with 30 minute epoxy. Make sure that the servos you are going to use, will not bottom out in the fuselage. Don't glue the tray in too low. The laser engraving on the servo tray, recommends Graupner C341 servos, but the JR 331 servos are virtually identical in size and slightly higher in torque, making them an ideal choice for me

Next, I marked the outer sheaths of the pushrods, and cut them to size. I rolled a length of 13mm wide masking tape around the diameter of the outers, every 120mm or so, down their length. A dab of epoxy on each masking tape collar, soon had them attached to the inside of the fuselage. They need to be anchored, to prevent any flexing. Make sure you get a smooth run, as you don't want the inner rods to bind. Test fit the inners, making sure that the ball link collars go far enough into the fuselage, to give sufficient down movement of the elevators. The inner sheaths now have to be cut, so that the threaded couplers and clevises can be fitted at the servo end. The couplers have to be soldered on to the steel core in situ, as they will not fit down the outer sheaths. Measure the inners so that they are the correct length and attach the couplers. Centre the servos, centre the elevators and connect the clevises. All done.

I put the fuselage aside for now, and started on the wing panels. Again, some forethought is needed, to prevent mistakes being made.

Wings.

Trial fit the servos and make up the rods and clevises to the correct length. Please make sure that the servos are centred. Offset the flap servo arms as per the kit diagrams, so that you will be able to get sufficient down flap, for landings. Place a drop of cyano onto the aileron and flap horns, and press into place. I don't think that the composite wing skin layup has any foam between the balsa and glass, but use foam safe CA if you have it. Alternatively, use a thin smear of 5 minute epoxy.

At this stage, I also tacked the 600mm aileron extension leads to the shear web, at the servo cut out. This will prevent them becoming tangled or jammed in the linkages, once the servos are attached. The ailerons are bottom actuated while the flaps are top actuated. The flaps are hinged on the bottom and the ailerons hinged on the top. The servos are required to be installed as far forward as possible in their respective locations. Mine butted up against the spar.

I decided to glue the servos into the wings, rather than fiddle around with mounts. The JR331's were wrapped in masking tape, and then glued in place with a blob of 30min epoxy and microballoon mixture. *(see footnote).*

I marked the location of the servos prior to gluing, so that everything lined up. You will have to do one at a time and hold it in place for 15 minutes or so, until the epoxy cures. Doesn't take long to do the four servos.

Radio Installation:

I fitted a set of Sanyo 2300mah NiMh batteries in the nose of the Starling, and the Schulze receiver slotted in to the rear of the servo tray. For the time being, I will find it easier to transport this model with the centre wing panel attached. An alternative will be to fit a D connector, and solder up the wires, so that it is easy to connect and disconnect the wings. I think that I will do that in the near future.

With all the radio gear installed, the Starling required only a few grammes of lead in the nose, to balance the model at a CG location of 76mm from the wing LE, measured at the fuselage junction.

I used a JR9Xll radio, which is a terrific radio for sailplane use. It has a lot of pre-programmed sailplane mixes already in the software, making for an easier chore when it comes to programming the various functions.

There is no information supplied with the kit, in regards to CG location or control surface throws, so I started the set up as follows;

CG location – recommended 70 - 78mm from the wing LE. [Actual – 74mm.]
Elevator – recommended +/- 8mm measured at TE. [Actual – 8mm +/-]
Rudder - recommended +/- 10 mm. [Actual – 8mm +/-]
Aileron - recommended 11mm down-24mm up. [Actual – 8mm down–15mm up.]
Flaps – 60 degrees down for landing.

All these values are only a starting point, and fine tuning will be done over the next month or so. There will be preset values for launch, landing, butterfly or crow landing, cruise, thermal modes and so on. Elevator compensation needs to be worked out for flap deflections. Full span camber for thermal mode. Rudder to aileron mixing. Aileron to flap mixing. The options go on. For the purpose of this review however, it will be just the basic flight modes.

Flying.

I weighed the Starling Pro before heading to the field, and it came in at 1105gm (390z). The test flights were held up for two weeks, due to strong winds and otherwise unsuitable weather, but the day finally came. Temperatures were in the high 20C's with light to moderate winds from the west. Time, and the Airborne Editor, waits for no man.

Flat field Thermal Flying.
The control throws were checked and a range test performed. Everything looked good, so off to the flight line. A couple of hand tosses indicated the CG and elevator position were close enough for a test flight. Since the plane hadn't been flown before, I didn't use any flap or aileron camber on launch, as I didn't want to risk the glider popping off the highstart, on the first flight. I stretched the heavy duty highstart to around 80 paces (about 6.4kg on a spring scale) and threw the Starling into the sky.

It went up at a 70-degree angle, straight as an arrow, and showed no signs of stalling. There was no need for rudder during the launch, and a shallow dive and zoom, for a ping off, saw an additional 10m or so in height gain. The plan for the first flight was to get used to the flying characteristics, check aileron, rudder and elevator response, and also to see what it did on application of flaps. The Starling was set up on my JR 9Xll, so I had all of the mixing capabilities I would need to get the plane sorted out. For this flight however, it was just basics. The fine tuning would have to wait. The aileron and elevator had lots of authority, so the throws could be reduced a little. I had 50% differential on the ailerons, which seemed perfect for my style of flying. The cold westerlies had been blowing all week, and today was no exception, except that the strength was manageable. I found a small thermal and quickly worked the Starling up to roughly 300 metres. A dive test showed that if anything, a couple of grammes more nose weight could be added. The model didn't pull out of the dive, but nor did it tuck under, which told me that it was pretty well neutral. A lot of pilots like to fly that way, but I still like a bit of stability, where the model slowly pulls out of a dive. A couple of more launches were all that I could manage that day, before the wind once again strengthened. It has been blowing at 60kph for days on end, and I haven't been able to get back out onto the field, for further testing. All indications show that the Starling will be a force to be reckoned with, in the 2 metre class. With launch camber and mixing, it should really go up hard on a winch. Hopefully I can write a short follow up in a future issue of Airborne.

Slope Flying.

August/September aren't really good months for slope flying on the coastal strips around Sydney. The westerly winds are predominant, so a time for suitable conditions had to be waited on. Getting someone along to take photos, or fly the model, is also difficult.

One afternoon, the wind changed from the south west, around to south east, so a phone call to Geoff Summers, had us down the local slope for a couple of hours. Geoff took the pics, while I flew the model. The model was committed and tossed out towards the ocean. No worries – it flew straight out, climbing steadily in the lift. The Starling flies quite fast, and the streamlined design of the glider,

makes it very quiet. A couple of clicks down trim were all that it required to race up and down the coastal hill. After a few passes, the roll rate was checked, and it was very speedy at full aileron deflection. Surprisingly, the rudder response was very slow, so some adjustment on the horns is going to be called for. Next, the flaps were deployed, to see the Starling pitch up very sharply. Some elevator compensation is going to be programmed in, to prevent that happening on landing approach. In general, more down elevator is needed during the beginning of the approach, and the addition of less elevator as the flaps go down. There is a pre-programmed mix in the JR9X ll, making setting up much less a chore, but it will take several flights to get the mixes correct.
The turns were so quick, that one could be forgiven thinking snap flaps had been programmed into the radio, and a sharp bank in front of the flight line, let out a satisfying “whoosh” of air. Hammerhead turns and axial rolls looked easy.

With no flap programming, the problem of slowing the Starling down for landing, was starting to raise its head. This is a fast model, and the landing area at our slope is not at all friendly. It is good for foamies, but this is a hollow moulded, fibreglass and Kevlar/carbon work of art. Several approaches saw the Starling retain its flying speed, so I took it wayyy down low and flew back up the slope towards ourselves. Speed washed off pretty quickly, and a couple of practise runs saw the third approach spot on for a landing. It was an anti climax, as the Starling settled gently onto the grass, after a bank back into wind. The up hill approach is the one to use when flying polyhedral or dihedral ‘floaters’ on the slope. A lot of current, new, pilots have learnt to fly the slope on EPP/Foam gliders, and have no idea how to land a fragile balsa or glass ship. They speed across the face, and dump the model in, just as they would a foam ship, only to see bits of balsa and covering explode across the landing area.

There were no surprised with the Starling, and it is a terrific sailplane. I would highly recommend it to the pilot who is after a sleek, well designed glider, which is at home on both the flat field and slope. I look forward to further flying with this model. It is a winner, in my opinion.

Summary.
The Starling is quick to build. The fit of the wings and tailplanes is super accurate. You could choose to use carbon rods in Teflon tubes, to save a bit of weight on the tailplane control, but the supplied units are just fine. The flight performance is simply fantastic. It's the kind of performance leap that getting your first moulded model is. Words or images simply can't do the flight performance or finish, justice.

Value for money is always an individual issue, but at $455.00 the Starling Pro is not a casual purchase. The price is very reasonable for the type of model you are getting, and I have seen moulded gliders twice the price and not half as good as this one. Make some enquiries and see if you can look at one, or see one fly.

Specifications.
This is a 2-6 channel, slope or thermal / bungee glider.
Fully moulded wing, fuselage and V-tail.
Wing span: 2000mm
Length: 1110mm
Wing Area: 35.25dm^2
Stab. Area: 4.1 dm^2
Weight: 720g (empty)
Wing Profile: SD-7084

Mounting Servos in Moulded Wings

Moulded models are becoming more available and more popular with a large number of pilots. They do pose a few questions with regards to radio installation, and one of those is, "how do you best mount the wing servos?" The technique I used and many others have used, is very simple, so I will be brief in explaining it.

If you feel that your servo case needs some protection, simply wrap a few layers of tape around it. Masking tape works well but be sure to sand the gluing surface to remove any release agent. You don't have to use any tape if you don't want to.

Mix up a paste of top quality 30 minute epoxy and micro balloons and apply to the appropriate surface of the servo. What we want is for the excess glue to be pushed away from the servo arm and creep out at the other three sides. This is simply achieved by holding the servo by the servo arm and applying that end to the wing skin first. As the rest of the servo is pushed down the excess glue will be pushed out away from the servo arm. Have a few cotton buds or similar on standby, to get any unwanted glue away from the moving parts.

The servo will be firmly mounted, and will not let go unless really clouted. When it does let go all that will break is the glue joint leaving you with a pre-formed "cup" into which you can re-glue the servo again. A light smear of epoxy is all that is required, and you shouldn't have to re-trim the servo.

Of course when mounting servos in this or any other manner, you shouldn't forget to double check your linkage and servo arm geometry. Ensure that you centre your trims, sub trims, flap settings and other servo functions, before screwing the servo arm in place and securing the servo.