

# Precision Aerobatics Katana MD

By Mike Southwood for RCME

## INTRODUCTION

If a model has convinced me that electric power can and will overtake glow engines, this one has. It is the first electric model I have flown which has, as far as I can see, no disadvantages, and many advantages.

It is also a little depressing to find that after 60 years of model making, building mostly from scratch or kits I never compete, that the quality of cutting, assembly and finish of this plane are quite superb - never will I be able to build a 48" span, good looking, strong, rigid and superbly covered model like this, weighing just over 2lb's.

The Katana doesn't get messy or change balance while the fuel runs out. It performs the same after idling around in a thermal for 10 minutes without the risk of the engine stopping. It can climb vertically until I can no longer see it or just idle around at walking pace. Want to see how easy it is to build and fly? OK, read on.

The box was collected from Al's Hobbies along with a selection of other parts necessary to complete the model. It is, at least for me, a new type of construction incorporating extreme precision, laser-cut ply and balsa parts, reinforced and braced with carbon fibre. The structure is very complicated but results in a light yet rigid plane designed from the start for electric power and Li-Po batteries.

All the covered parts were packed in the one large box, with a little polystyrene foam protection, but all in bags taped to the sides and bottom of the box. Care is required removing the bits without inflicting damage. An instruction manual is provided covering the assembly with recommendations for the equipment required.

## FIRST LOOK

This is the most advanced design, certainly in terms of construction and materials that I have so far experienced. Parts are mostly assembled from laser-cut ply, but with bracing from carbon fibre rod, sheet and tube. Every effort has been made to keep weight to a minimum yet retain extreme rigidity. All the laser-cut parts interlock and are a perfect fit. Very little glue has been used so I found

some joints that came apart if pulled too hard. A problem where laser cutting leaves carbon on the joints which prevents effective bonding with glue.

Covering is something like Profilm, with some basic decoration, so the builder is left to apply the extra transfers supplied. The covering is generally excellent, although there was some slight wrinkling that needed ironing out after completion.



Fittings are of a high quality and include carbon fibre rods for linkages and carbon fibre sheet horns.

A closed loop is used for the rudder. The undercarriage comprises two moulded legs, again of carbon fibre; they're light but strong. I was pleased to see that the whole undercarriage area was strongly braced back to several bulkheads with carbon fibre tubes.

The motor mount is a pre-built from a laser-cut ply tower structure. It is intended for the motor to be mounted inside, bolted to the front bulkhead with the shaft poking through. Down and side-thrust are built in. I chose to use a Dualski Outrunner that has a very nice prop driver and mounting cross-plate. This could not be fitted inside the ply structure and a new bulkhead had to be made from birch ply and jointed to the original mount after cutting back by the length of the Dualski. In my case the motor now bolts back to the shortened mount and hangs free in front.

The wings are separate panels and are fitted to the fuselage with a carbon fibre spar tube secured with bolts through the side. The ailerons are beautifully hinged and have a very free and smooth action. The wheels are very light and thin although they look fine once covered by the GRP spats.

## **EQUIPMENT USED**

- Motor - Dualsky XM3636CA
- Propeller - APC 12 X 5
- ESC - Dualsky XC4018BA - 40 amp.
- Battery - Kong Power 3s 2200mAh / 25C
- Servo's - PICO / NARO + FHP/BB/F
- Radio - Spectrum DX7. 2.4GHz with AR 7000 receiver.

The aileron servos are housed in the wing so extension leads are required unless the exiting leads are lengthed, I extended the leads. A Y-lead is also required unless you use a 6-channel receiver and a computer programme for mixing. Connectors must be purchased and soldered on to the ESC and Li-Po battery. I used 3.5mm gold tubular types.

## **ASSEMBLY**

I removed the fuselage from its clear plastic bag, it was examined and checked for damage, all was well. The canopy is a perfect fit and is held down by four magnets and two pegs. Some covering film should be cut out here and there as described in the instructions using, in my case, a small soldering iron, which not only cuts through but also melts the edges and seals them to the wood.

Fitting the stabiliser and elevator was easy, they both lined up very well with the wing. Just remember that the elevator has to go in first, if you forget, it will be impossible to fit without cutting a slot in the tail post. Hinges on the tail feathers are of the cyano' type.

No problems were found fitting the chosen GWS Naro Servo's. The one for the rudder had to have a (supplied) carbon fibre arm extender screwed to the top of the standard arm. A longer screw from my scrap box held the assembly on to its splines.

The tail feather hinge gaps have to be sealed with an iron-on clear tape, whilst, of course being careful to allow full movement of the surfaces. This procedure is claimed to obviate flutter - a decided risk given that very large control surfaces are being powered by micro servos. I used cellotape for this job, because if there had been enough tape supplied as iron on film, then all I could think was that I must have lost it!

The Wings required no work other than fitting the servos. I elected to paint the servo recesses, just to look better after the servos were fitted. I used a Y-lead and decided to leave servo installation until after the wings were bolted on. It proved easy to hook the servo leads and pull them through using a bit of bent wire.

With everything assembled the servos were centered using a standard receiver and battery. Operating rods were then made up from the supplied carbon fibre rods that were pre-fitted with a Z-bend. The second Z-bend had to be bound and glued to the rod at the correct length to centre the surfaces. No adjustment is possible once made up.

The rudder is operated by a Kevlar thread closed loop system. It's a bit of a fiddle getting the strings through and setting up the tension. For some reason the adjusting screws have to be underneath where one can't get at them without removing the servo arm. The big rudder appears to be quite floppy, but it has worked well for me. Later I plan to use a larger rudder horn as the geometry results in too much movement and too much flexibility. Cutting down the movement by using the transmitter means a loss of some precision.

The motor mount had been previously modified to accept the large outrunner motor. This assembly was glued into place, and was a perfect fit. I used white PVA for this and added a couple of triangular reinforcements. The cowl fitted perfectly, using the method in the instructions to mark fixing holes over the carbon fibre reinforced tabs. I used my own 1½" spinner to finish off the front. My chosen propeller was a 12 x 5 APC for test flying at least.



The Li-Po battery proved to be slightly too big to pass forward through the opening over the internal tray, but a little work with a Dremmel type drill and a sanding drum soon achieved a perfect fit.

I glued a piece of Velcro around the battery tray, to secure the battery for flying. Access to the connection is superb, the whole canopy and top deck come away forward to the cowl. The ESC was tie wrapped to the engine mount, inside the cowl.

## RADIO

The main reason for buying this kit, was the attraction of using the new technology whilst mixing carbon fibre and ply / balsa in a model. The result was looking so good, I decided to purchase a new radio set! I chose the Spektrum DX7 2.4GHz. Being a gadget lover and having experienced a few shoot down's in the past, well I couldn't resist!

The Spektrum clearly uses a JR case and even has the reversed charger connection. No charger is supplied so one has to be careful not to use an existing Futaba charger without changing polarity of course. The supplied digital servo's, are excellent, but too large for this plane but GWS NARO's fitted without a problem. I did use the rubber grommets, but am of the opinion that for an electric model, it is probably better to mount them hard in the bearers, best to use a washer and a touch of silicon glue.

The two linked Spektrum receivers were fitted using back-to-back foam pads, there's plenty of room. The aerials were set at right angles to give maximum coverage from all angles. The DX7 wasn't easy to programme, at least not for me. I took a long time with the instruction book before I had allocated dual rate switches and set up the rates and exponential as suggested in the Katana instructions.



## TO THE FIELD

Just a day after starting assembly, we were ready to fly except for setting up the transmitter. Unfortunately, the wind

was very strong and after a flight with a CAP 22 electric model, I decided not to risk the new Katana.

The next opportunity brought bright sunshine, but a very gusty wind from the wrong direction. Anyway, I decided to give it a try, aimed the model into wind on the short grass and opened up the throttle - she took off after about 20ft and climbed away at a very respectable rate on about ½ power.

One click of right trim had her 'hands-off' and straight. Even in the gusty wind, flying was stable and not too difficult, despite very fast responses.

After 8 minutes of varied aerobatics (not 3D as that is not my scene) a landing was called and a nice slow approach made. One thing I found is that a little throttle is needed, so it is best to land just using throttle to sink or rise. With power off she stops very fast, but does not stall - she just flops about.

There was still plenty of power left, so I took her up for another 5 minutes of flying before returning for a charge. With the meter and charger hooked up, the battery took 1283mA to get back to full. Not bad for the flying done, very good in fact.

For the second outing I tried fitting the tiny 4.5g park flyer receiver. It went in well and functioned after binding (the term used by Spectrum to lock the radio to the plane) Unfortunately a range check showed what I thought was poor range at about 50ft with the test button held in. Probably due to all that carbon fibre in the fuselage, because bench testing had shown about 90ft. Back to the full size receiver for now. All flying has been done with the radio supplied as part of the DX7 set.

My recent flights have all been good. Masses of power to climb vertically, but with the capability of flying around under full control on half or less throttle. The battery lasts about 15 mins although I have never run out of power. I could probably save a little weight by using a 1800mAh Li-Po, but this might upset the balance. With control surfaces set to low rates the model seems almost trainer-like, but with full power and high rates it becomes a very fast and responsive plane.

## CONCLUSIONS

This is a really well designed and manufactured model. For its size and wing area, it is very light yet very rigid. The aileron hinges are a masterpiece, how they should always be, but seldom are. I had very few building problems, the only non-standard bit was modifying the engine mount to take the Dualski 15 class motor. That added ½ hour to the assembly time, but apart from that it all fitted perfectly and looks superb. The final build time was about 8 hours.

The one problem I foresee is when I crash the thing. Note, I say 'when' because this is such a good plane to fly that I'm sure that it will eventually overcome my caution. Repairs will not be easy, the woodwork is weak without the carbon fibre and is so rigid that a good crash will probably destroy it.

Mike Southwood

## Datafile

- Name - Katana MD
- Manufactured by - Precision Aerobatics / FiberFusion
- UK distributor - Al's Hobbies, Tel - 0208 445 8999
- Wingspan: 48"
- All-up weight: 985g.
- Wing area: 500 sq in
- Wing loading: 9.77oz/sq.ft.
- RRP - £119.99 or £191 with motor, ESC and Li-Po battery.



Please note that the flying and ground images of the Katana MD were taken at the 2007 Hastings Model Airshow (Jon Sales photos) - Ed.