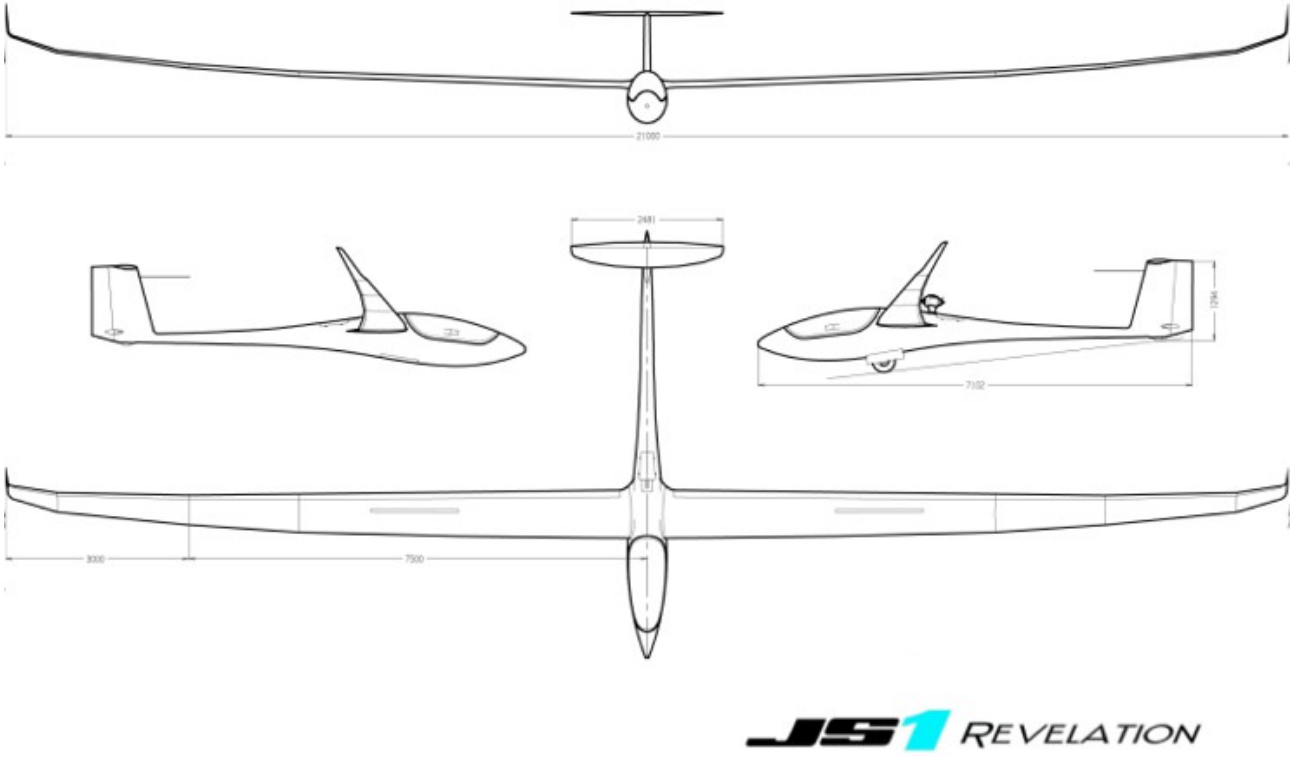
06/18/18

Windwings Jonker JS-1 Revelation – Build Log



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1. Placing the order

I've been flying large scale gliders now since 2003 as a member of the “IGG Sverige” community. Since 2011 I've mostly been flying a 1:3 ASW-15 (5m) from Manfred Schadl. Two years ago I also bought a used 1:3 ASH-26 (6m) from Schueler. These two planes complement each other in a good way and is all I really need for a towing event such as an IGG meeting. In recent years many of the pilots in the IGG community have stepped up to 1:2.5 or even 1:2 size gliders, but in doing so they also create a transportation problem. Most 1:3 size gliders will still fit in an ordinary station wagon which is a big plus for me.

In the summer of 2017 I started looking for a replacement to my ASH-26 and I soon had the Jonker JS-1 from Windwings as a hot candidate. I also looked at interesting alternatives from Paritech, FW Models, Baudis and Let but finally decided to go for the JS-1. I placed my order with Windwings in the middle of august. The owner Jörg Etzler was quick to respond and really helpful in answering my questions.

Here is a list of what I ordered.

Ordered items
Jonker JS1 Revelation full carbon
Wing and fuselage bags in Cordura
Cable set
Retract from Florian Schambeck with disc brake and servos
CNC-made wood parts for the retract
Mounting kit for the retract in metal
Scale Cockpit
Under side of wing painted black
Build service, mounting of the retractable landing gear
Build service, mounting of the canopy including paint job

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2. Technical details

Item	Value
Wing span	7000 mm
Fuselage length	approx. 2370 mm
Flight weight	approx. 15kg
Wing profile	“HQ-Strak” 11 %
Scale	1:3
Wing construction	Transport friendly four part wing

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3. Shipping

The model ready for shipping in Jörg Etzler's garage. A nervous wait for arrival begins.

Finally! The package has arrived at the post terminal in Gothenburg. No damage, what a relief ...and it fits in my car.

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4. Test assembly

I did a quick test assembly of the plane in my living room as soon as I came home with it.

What a beauty! ...and my old ASH-26 pilot feels right at home in the cockpit.

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5. Equipment

Servos
Choosing servos is always an interesting activity when building a new model. I've decided to use a mix of what Windwings recommend, servos that I already have and some other that I feel comfortable will do the job.

Function	Servo	Recommended by Windwings
Ailerons, outer	2 x KST x10HV	x
Ailerons, inner	2 x Hitec HS-7245MH	
Air brakes	2 x KST DS225MG	x
Retract	1 x KST DS125MG (disc brake) 1 x Graupner HBS860 BB MG 180 degree servo	x
Rudder	1 x Hitec D-625MW	
Elevator	1 x Hitec HS-7954SH	x
Flaps	2 x MKS HV-747H	x
Release	1 x Hitec HS-5585MH	

I could have used the recommended KST X10 servos for all four ailerons but I had a new Hitec HS-7245 laying around which I wanted to get use for so I bought another one of these to use as inner aileron servos. Same with the rudder servo. I choose this particular model of servo just since I had a new one already which is up to the job. The third servo I have chosen on my own is the release servo. I went for a Hitec HS-5585 here. The rest is per the recommendation from Windwings. All servos are of “high voltage” type since I intend to use 2 x LiIon as receiver batteries without any voltage regulation.

For the wing servos I have bought servo frames from RC solutions (X10 and 225) and Servorahmen.de (7245) - type “Hitec 17”. For the MKS servos used for the flaps I will make them myself.

Receiver
Multiplex “WINGSTABI RX-16-DR pro“ (no 55017).

It has a built-in 3-axis gyro which I'm not planning to use. For me the main advantage of using this particular receiver is that it has an integrated power distribution solution capable of delivering 35A current from two receiver batteries, eliminating the need for a separate “power box”.

This receiver require a magnetic on/off switch (no 85196), very similar to the Emcotec equivalent switch but with a different connector.

The receiver can only be set up with a Windows PC or an Android phone/tablet and to make this easier I connect a Multiplex bluetooth module (no 45188).

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Receiver batteries
Jeti 2 x 2600mAh 2S Li-Ion

Tow release
GroMoTec 12/10 mm tow release

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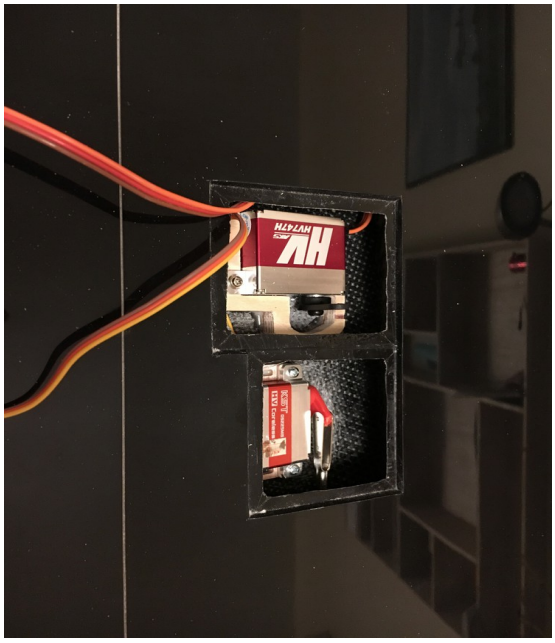
6. Installing the wing servos

I started the build by gluing the fastening mounts for the wing servos. For the outer aileron servos, 10mm KST X-10, I use servo mounts made from wood by RC Solutions.

For the inner aileron servos, Hitec HS-7245, I use plastic servo mounts made by Servorahmen.de. Since these are slightly too thick in one end I had to use a file to cut off a few millimeters. Had I used 10mm servos for all four aileron servos this would not have been a problem.



For the flaps I made the mounts myself from 7mm multi-layered plywood. I saw a firm (www.mttec.de) that makes servo mounts for MKS 747 and copied their layout.

For the airbrake servos, KST 225, I use servo mounts identical to the ones used for the outer aileron servos.

The airbrakes had 3mm pushrods already installed. All I had to do was to cut them off about 20mm and add an ordinary 3mm link.

All in all a very smooth installation of the wing servos.

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7. Wiring up the wing

When I ordered the model I also ordered ready-made wire kits made by the firm Ka-Wi-Tech. This is a real time saver and worth every Euro.

The wires for the wings laid out on the floor. The connection between the wings and the fuselage are with D-sub style connectors.

Putting the wing wires in place requires making holes in the wing root for the D-sub connectors and holes in the outer and inner wing panels to let the servo cable for the outer aileron servo through.

The D-sub connectors are screwed in place in the wing roots.

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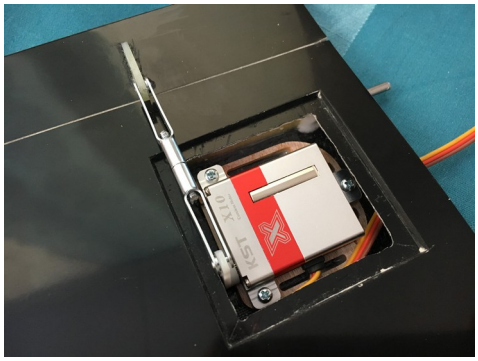
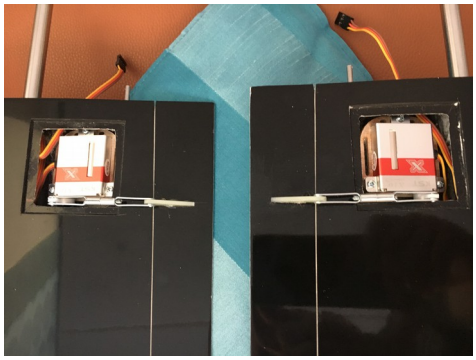
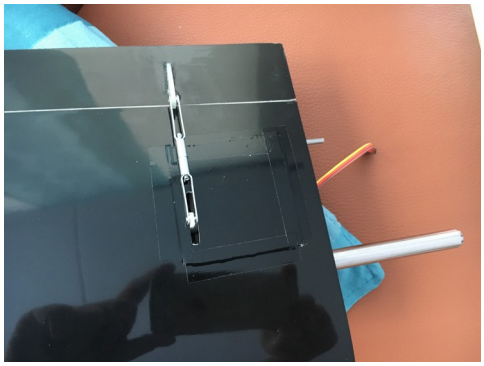
8. Connecting the ailerons and flaps





I use ordinary M3 links for the outer and inner ailerons.



Outer ailerons. Inner ailerons.

Due to the fact that I use the 7245 servos, which are slightly too thick, for the inner ailerons I had to make an extra, 10mm wide, slot in the cover to get it flush and cover that hole with black vinyl film.

For the flaps I use ball links, also M3, with M2 screws.

In the picture there are two ordinary links but I replaced the one connected to the rudder horn with a ball link to get it slop free.

The servo covers are made of fiber glass painted black. A rather big piece was included with the model that you have to cut out suitable servo covers from. I fasten the servo covers to the wing with black vinyl film.

Flaps.

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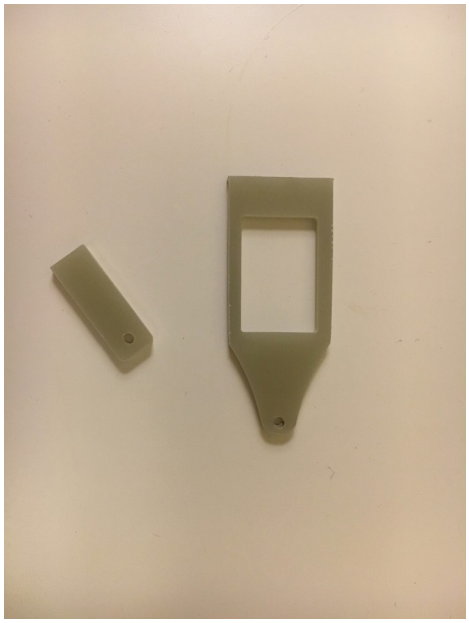
9. Elevator and rudder

First I had to make a hole in the top of the fin to allow for the elevator linkage to get through to the elevator. In order to get the rudder to come properly close to the fin I also had to file a half round opening in the back of the top of the fin. After that I screwed the elevator servo in place inside the fin.



Then I glued the supports for the rudder in place. These are made of fiberglass and consists of a big and a small item. For some reason I had received two of each of these which made me a bit puzzled at first.

Only one of each is needed though.

The bigger item goes into the slot of the rudder in the top and the small item sits under the rudder. When the glue had dried I added some extra epoxy together with fiberglass “flock” around the bottom piece to secure it thoroughly.

I use an M3 threaded rod as elevator linkage. To make it stiffer I epoxied a 5 mm carbon fiber tube around it.

A short M4 rod end is screwed into the elevator and fixated with epoxy. The link at the end of the elevator rod is then connected to this.

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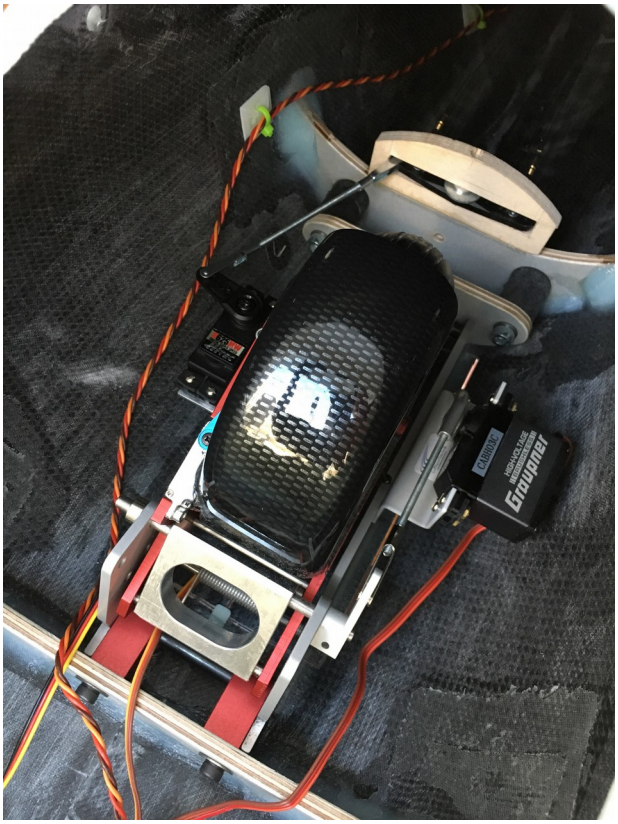
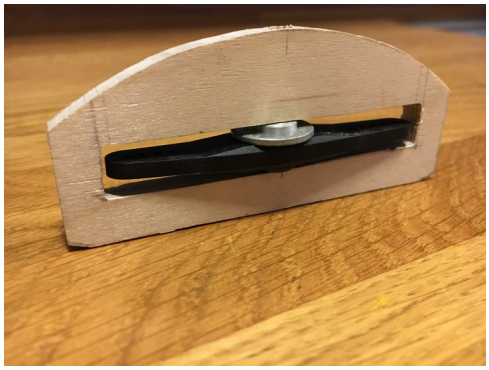
I intend to use a wire linkage to the rudder. In my opinion a pull-pull wire linkage is superior to a piano wire running inside a plastic tube which is a common linkage solution for the rudder on gliders. Of course putting the rudder servo inside the fin provides a slop free alternative but then you get a heavier tail that is harder to balance out.

I put the rudder servo on a small metal support on the side of the gear assembly. The gear servo already sits on the other side on a similar support. I removed the entire gear assembly from the model to get enough room to work inside the fuselage.



In order to get a symmetrical pull-pull operation of the wires I have made a small “rudder mechanism” (see picture) that I will glue on top of the rear gear support span. The black servo arm is the largest type that comes together with some Hitec servos.



The rudder servo is connected to the “rudder mechanism” with a short 3mm linkage.

The rudder itself is connected with a 3 mm pull-pull wire system to the “rudder mechanism”.

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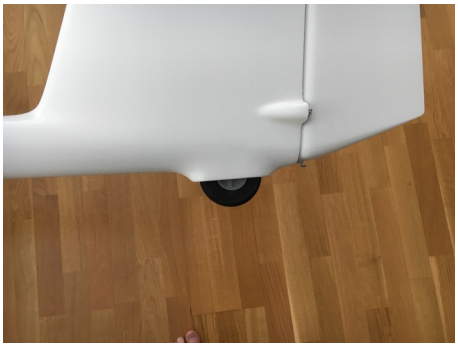
10. Tail wheel



It is necessary to make an opening in the underside of the tail for the tail wheel. The wheel that is included with the model has a diameter of 55mm. The opening I made is roughly 60x20 mm in size. I drilled a 3 mm hole through the fuselage sides for the wheel axle and fixated it with epoxy.

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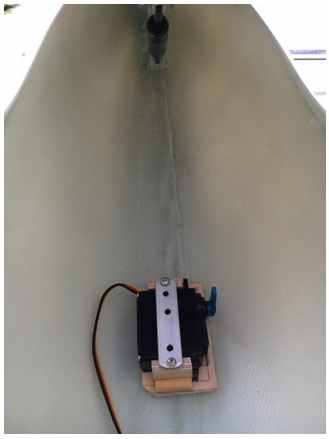
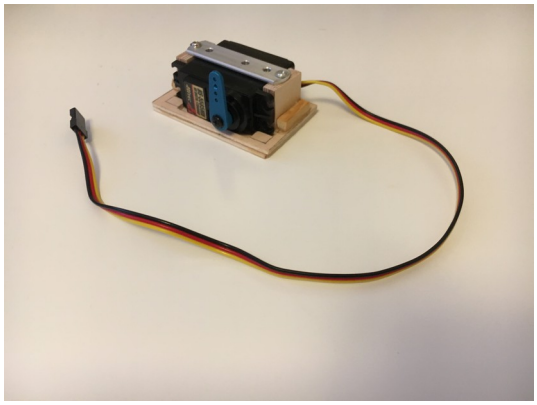
11. Tow release

I made a servo mount for the tow release servo of plywood. The servo is fixated with an aluminum piece.

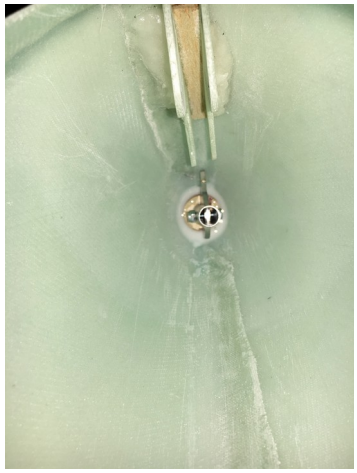




The tow release from GroMoTec does not have a support “cone” at the front, it's just a plain tube, so I made one out of plywood. Basically just a round ring with a 12 mm inner hole.

I drilled an 8mm hole in the fuselage nose and used a file to make the hole 12mm.

Fastening the tow release turned out to be difficult. The opening mechanism for the canopy (the one that holds the hydraulic damper) is very close to the nose, making it virtually impossible to fit the tow release. I saw no other way but to temporarily cut the canopy mechanism in half so that I could get room to fit the tow release.



The image to the right shows the tow release glued in place with epoxy and fiberglass flock. You can also see that the canopy mechanism has been removed.

An M3 threaded wire is used as the push rod between the servo and the tow release with M3/M2 swivel ball links in each end.

The finished installation to the left. I put back the canopy mechanism and stuck a piece of balsa in between the fiberglass parts (the sides of the canopy mechanism) to connect the two parts.

Let's hope I don't need to get to the tow release soon, since this will be tricky without removing the canopy mechanism again.

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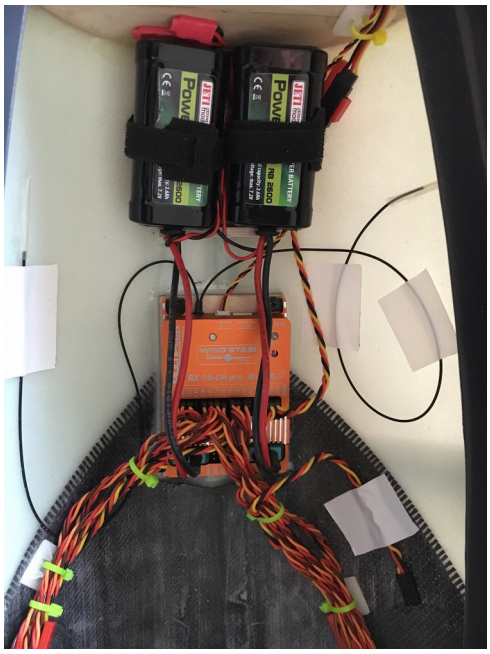
12. Receiver and batteries

I have screwed the Multiplex receiver to a plywood plate which I have glued to the fuselage. I have also glued two small plastic tubes to the fuselage, one on each side, to ensure that the antennas are positioned in a good way. All the servo cables are tied together with cable ties.



The receiver batteries are placed on two small pieces of wood and fastened with velcro ties.

The magnetic on/off switch is fastened with a small metal strip on one of the screws holding the release servo.

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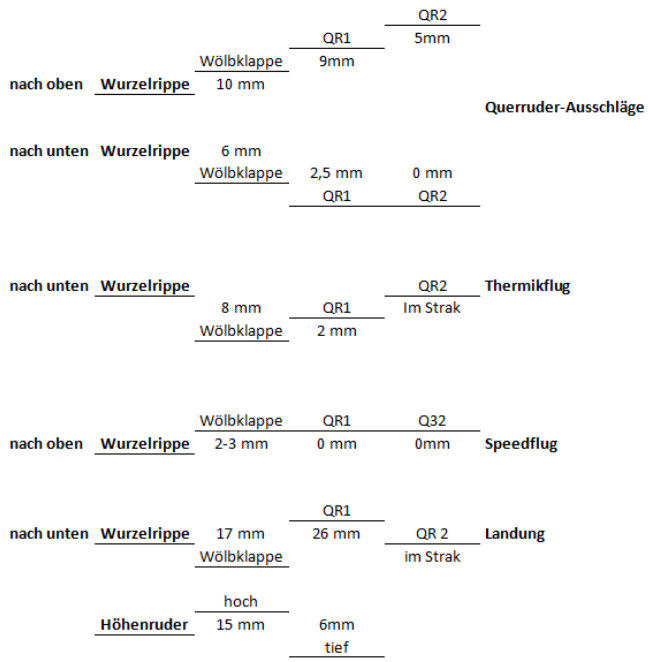
13. Radio setup

The recommended control throws (from Windwings). In table form and as a picture from Windwings homepage.

In the table + equals up and – equals down. The control throws on the wing controls are measured from the wing root. I have activated aileron mixer for all controls in the normal/speed/thermal phases. In the landing phase I have disabled aileron mixer for the flaps.

Control/Phases	Normal	Speed	Thermal	Landing
Outer aileron	+24, -8.5	+2 to +3	0	0
Inner aileron	+19, -8.5	+2 to +3	-6	+9
Flap	+10, -6	+2 to +3	-8	-17
Elevator	+15, -6			
Rudder	+- max possible			

Windwings have a slightly different way to state the same thing. They measure the distance between the controls on the wing starting with the distance from the wing root for the inner most control (the flap). The image below is from Windwings homepage. As I interpret this the middle control shall e.g. go up 9 mm in the landing phase (26 minus 17).



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I have accomplished these settings on my Wingstabi receiver. It takes some getting use to doing all the mixing in the receiver instead of in the radio. Multiplex has a Windows program and an Android app for this. I did the basic setup using the Windows program and have then used an Android tablet to do the fine tuning of the controls, setting up the flap mixers etcetera.

Servo assignment Wingstabi receiver and logical assignment of channels on the Profi-TX transmitter.

Servo port	**Control**		**Channel**	**Function**
1	Left outer aileron		1	Aileron
2	Elevator		2	Elevator
3	Rudder		3	Rudder
4	-		4	-
5	Right outer aileron		5	Flight modes (gyro phases)
6	Left flap		6	Airbrake
7	Right flap		7	Aileron trim
8	Left inner aileron		8	Elevator trim
9	Right inner aileron		9	Rudder trim
10	Left airbrake		10	Flap phase 1-3
11	Right airbrake		11	-
12	Wheel brake		12	Wheel brake
13	-		13	Flap phase 4
14	-		14	Vario
15	Retract		15	Retract
16	Tow release		16	Tow release

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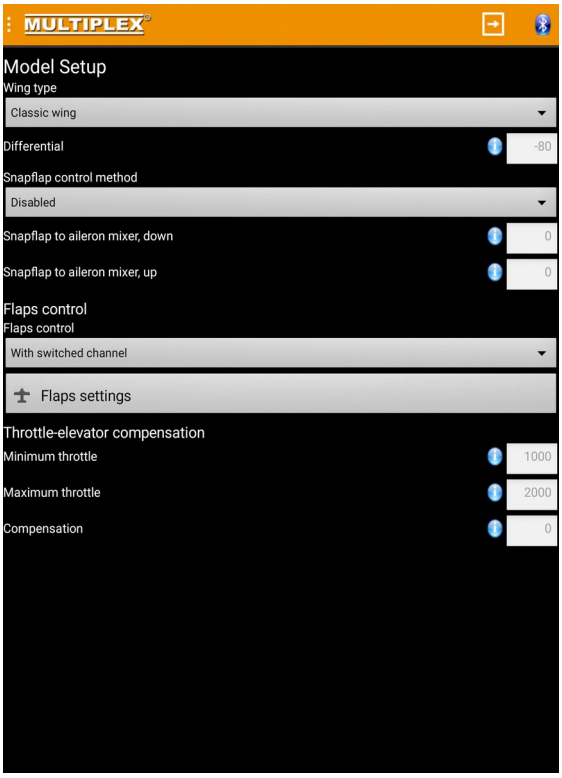
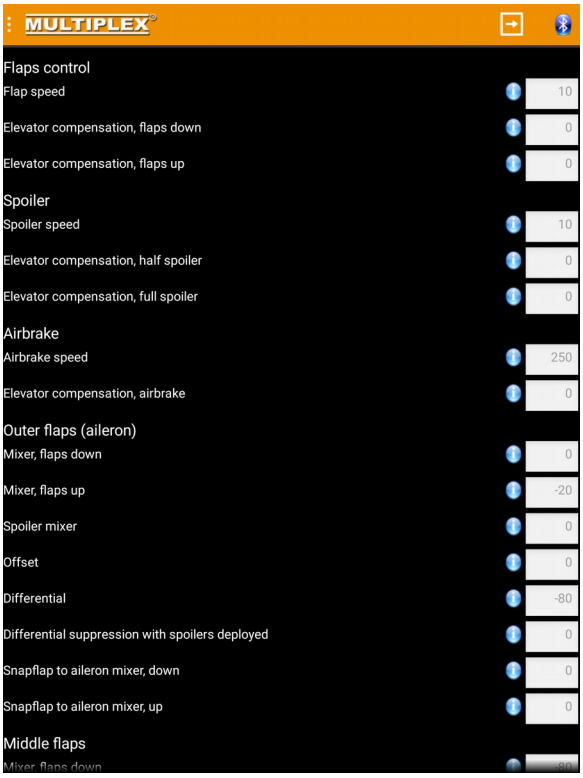
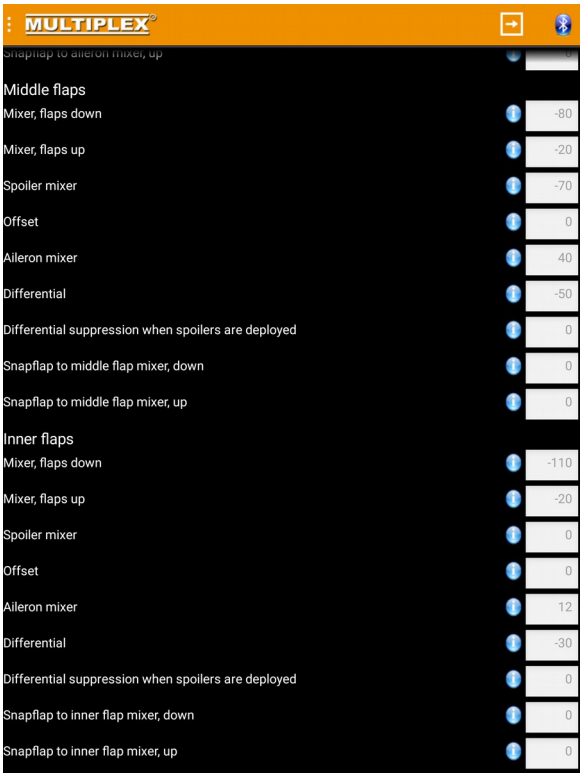
Below are some screen shots from the Multiplex Android app.



General model settings.





Flap settings for ailerons (left), flap settings for middle and inner flaps (right).

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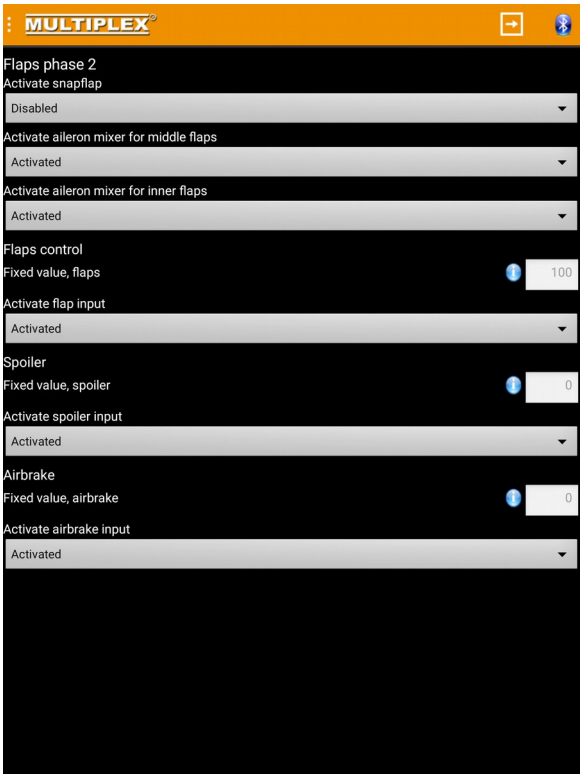
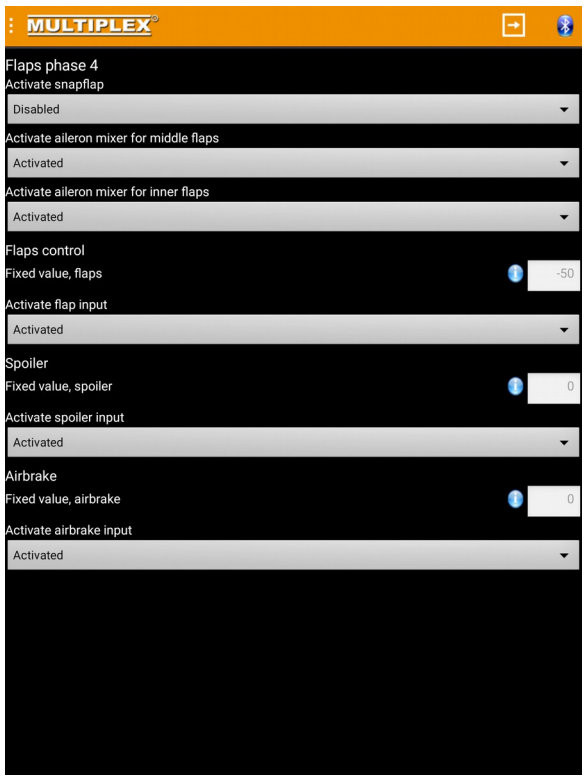
Phase 1, landing.



Phase 2, speed.

Phase 3, normal.



Phase 4, thermal.

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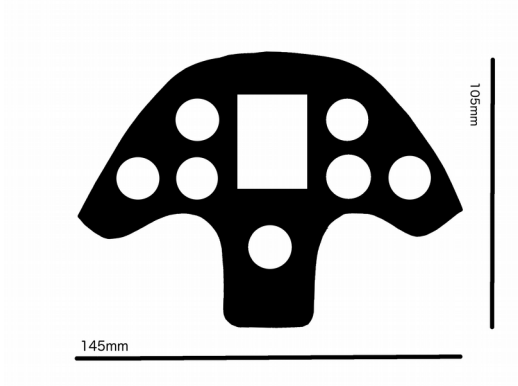
14. Scale cockpit & decoration

I started by browsing the Internet for JS-1 instrument panels and found a few variants that look nice. The instrument panel Let makes for their JS-1 looks particularly good but the form doesn't match the form of the Windwings JS-1 instrument panel.



The Let instrument panel to the left. Nice carbon look. In the middle another panel that I used as inspiration. I like the big GPS display, it looks modern. To the right an interior view from a full-size JS-1.

I used a piece of paper and a pencil to copy the correct shape of my panel (the orange piece above). Then I scanned the paper template with a scanner. I used an image editor (Gimp) to overlay the panel to the right above on my template. Note that the instrument panel is slightly unsymmetrical.



Here is the result to the left.

A friend of mine will create the panel in carbon fiber using a CNC milling machine. An svg export of the path with the black panel was used as input to the CAD program.

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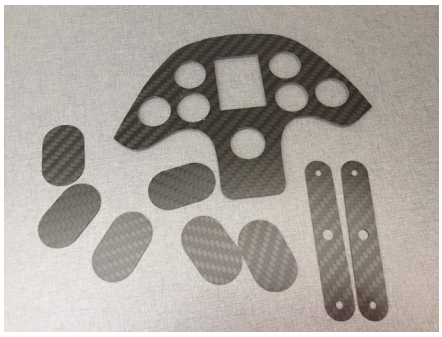

To the left is the finished result from the CNC milling machine (together with some other parts for another project). Looks great!

The finished panel to the left with printed (ink jet using photo paper) instruments glued to the back of the panel.

I have attached the cockpit sides to the inside of the fuselage using strong double sided tape. The seat is then attached to these sides using adhesive velcro. The seat back is attached to the seat with adhesive velcro as well.

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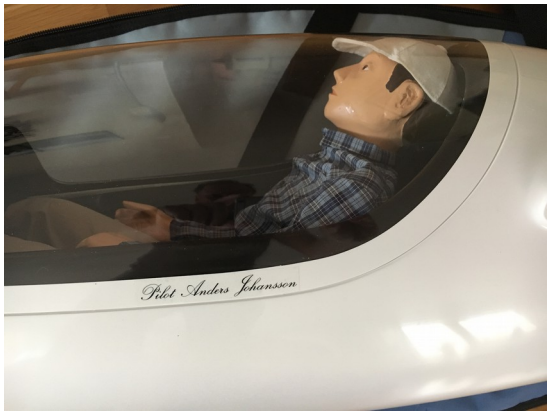

I put my name on the canopy frame, It's a nice touch I think.

The decals have been cut using a computer guided vinyl cutter. I asked Windwings if they had an image with the “JS-1 revelation” logo and they provided me with a good enough resolution pdf that has been used as input. The lettering is something I came up with myself. Swedish registered gliders have registrations starting with the letters S, T and U.

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15. Balancing

Initial balancing indicated that around 1400g of weight was needed in the front of the fuselage.

I made two plywood spars which I epoxied to the fuselage and on top of these I put a plywood lid, creating a small compartment, a box really, for the ballast. I then filled a plastic bag with lead balls which I put inside the box. The lid is held in place with three servo screws. The wood box fits below the fiber glass parts that constitute the sides of the cockpit interior.

The plane balances out nicely with this arrangement. I will start flying with the CG 100 mm from the front of the wing root. Windwings states 100-110 mm.

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16. Test flight

The first flight took place on the 19th of May. It was during IGG Sverige's first meeting of the year in Brännebrona. The weather conditions were almost perfect, the only slight trouble was a clear blue sky with no clouds, making it hard to see the models at higher altitudes.

During the start and towing the JS-1 immediately felt good. I released from the towing machine at around 400m. I then made a rather short flight of about 10 minutes just to get a feel of the model without actively seeking thermals. The black underside of the wings made it noticeably easier to see the JS-1 compared to the other gliders against the blue sky.

The first landing went OK as well. I activated the landing phase during the landing approach. When the flaps extend it starts to climb slightly but I have not added any down elevator in the landing phase, I like to adjust that manually with the elevator stick. I aimed for around 70m of altitude on the base of the runway and extended the brakes fully. It was easy to get a good approach angle and easy to level out just before touchdown with good elevator response. There was no tendency of “nervousness” in the elevator which sometimes is the case for gliders with a large wingspan relative to the fuselage length.

During the weekend I made nine starts with the JS-1. At one occasion the thermals were so strong it was almost hard to come down again (but that applied for everyone, not just me). The JS-1 picks up speed really well and it was easy to maintain altitude in weaker thermals as well. I used the thermal phase frequently when the thermals were weaker but I did not try the speed phase.

All in all I'm very satisfied with the JS-1 so far.

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17. Acknowledgements

- Thanks to **Jörg Etzler** for excellent service and for creating this beautiful glider.
- Thanks to **Per Takman** for the help with creating the instrument panel and for cutting the decals.

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