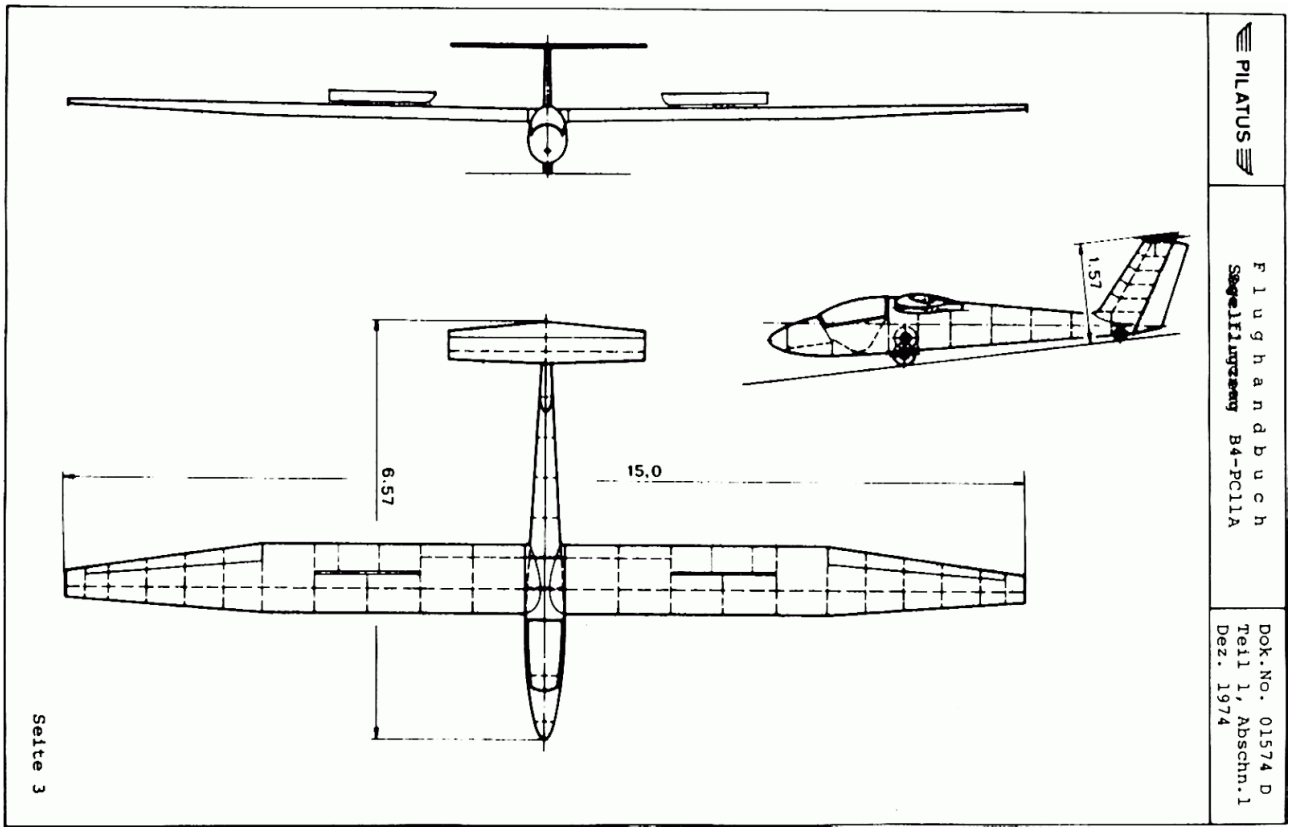
2021-06-11

Fliegerland Pilatus B4 – Build Log



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1. Getting the plane

My friend Krister Bergenfeldt bought a used Fliegerland Pilatus B4 and I was really impressed with how it flies. I had seen it fly earlier by the first owner but it was not until I saw Krister flying it that it really caught my eye. It has a really wide span of flying characteristics, being good both in thermals and somewhat agile in aerobatics.

When my interest was woken I contacted Fliegerland and owner Reiner Pfister to see if it was possible to buy one. The initial response was not promising. There was none in stock and he was not interested in sending it to Sweden. I told him that I was interested anyway and that I was willing to come and pick it up myself if he should have any more available. This was 30 September 2018. After that I more or less forgot about it. In January 2020 I suddenly got an email from Mr Pfister stating that he now had some B4's in stock and that I could have one if I was still interested. I told him I was still interested and we agreed for me to come and pick one up in Germany at the end of February 2020.

Said and done, in the end of February I took a trip by car down to Sankt Ilgen where Fliegerland is located. It is a bit southwest of Heidelberg, 1189 km from Kungsbacka in Sweden where I live. The weather was good and the trip went smoothly. It is always nice for a swede to be able to hammer down the autobahn in 200+ km/h legally. The roundtrip took one and a half day to complete with an overnight stay in Egerstorf south of Hamburg on the way down.

The Pilatus in my rental Volvo just after I collected it in Sankt Ilgen. Note also the 20 bottles of Schneider Weisse beer, an obligatory item to pick up on any trip to Germany. :-)

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2. Technical details

Item	Value
Wing span	5 m
Fuselage length	227 cm
Flight weight	10.5 - 12 kg
Wing profile	HQ-Strak
Scale	1:3
Wing construction	Foam planked with abachi wood

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3. Equipment

Servos

Rudder function	Servo	Torque
Aileron	Savöx SA-1256TG x 2	20kg/cm @ 6V
Flaps	Savöx SA-1256TG x 4	
Air-brakes	H-King HK-15298B x 2	10kg/cm @ 6V
Elevator	Savöx SA-1256TG	
Rudder	Savöx SA-1256TG	
Tow release	D-Power HVS-5140BB MG	12kg/cm @ 6V

I decided to use Savöx digital servos on most functions. I have never used Savöx servos before but they come highly recommended by many modelers and I decided to give them a try for this build. The SA-1256TG has a torque of 20kg/cm at 6V which should be well enough for this plane on the primary rudder functions. Lindinger had a discount price on these which made them attractive. On the air brakes I used two Hobby King servos that I had laying around from a previous build where they never got used. They are a bit slow perhaps but will do the job for the air brakes. For the tow release I used a cheap but strong analog servo from D-Power.

Since I have decided to use non-HV servos I will use a PowerBox Competition SRS together with two standard Multiplex receivers. An alternative approach would be to use all HV servos and a Multiplex RX-16-DR Master receiver which have built-in support for two batteries but no voltage regulation.

Servo mounting hardware

For the wing servos I used 58x58 mm plastic servo mounts from Extron Modellbau. They are universal servo mounts for 20mm servos and especially suitable for use in a styro/abachi wing. Note that each pack contain two mounts so only four packs are needed.

Receiver

Multiplex RX-9 x 2

Power distribution

PowerBox Competition SRS

Power source

Jeti LiIon 3000 mAh x 2

Wheel

112 mm Fema Wheel.

Covering

Oracover 6m white and 6m black film.

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Wood

4mm and 5mm plywood from MBS Models in Herrljunga. Excellent quality plywood.

Carbon tube

5mm carbon tube also from MBS Models.

Linkages

For the primary rudder functions I use 3mm swivel ball links and 3mm “fork” links together with 3mm threaded rod.

Connectors for the wings

D-sub connectors with high current pins from Muldental.

https://kabel-me.eu/details/71409 and https://kabel-me.eu/details/71410

Tow release

GroMoTec 12/10 mm tow release

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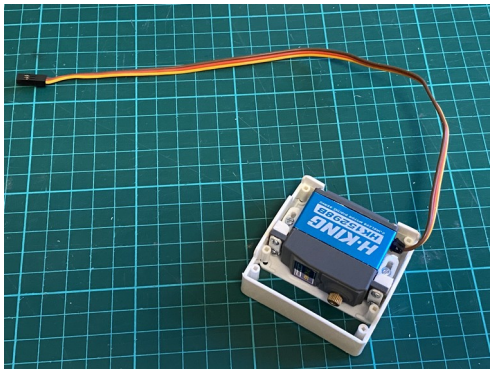
4. The wing

First I started by cutting out two more holes for flap servos. It seems crazy to have only one servo on each flap so I intend to use two on each. The flaps are really huge! I placed the additional outer flap servo 200mm from the edge of the aileron.

Extra outer flap servo.

Then I connected a 2.5mm threaded rod with a clevis to each airbrake. The airbrakes were already perfectly installed by Fliegerland. After that I glued the covers to the top of the airbrakes with epoxy. The covers had a really nice fit.

Assembling the servo mounts.



A break servo seen from the underside.

A flap servo seen from the top.

Next step was to glue all the eight servo mounts in place. I used UHU Por contact glue.

After that I cut out slots for fiber glass rudder horns for the ailerons and flaps.

I mounted all the servos and linkages and tested the rudder functions. Then I removed the rudder horns to make it easier to cover the wing.

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After covering the wing with Oracover I glued the rudder horns in place with epoxy and mounted all the linkages again.

White top side.

Black bottom side.

Aileron servo completed.

I placed the rudder horn directly in line with the servo arm which is not entirely correct since you get a slight angle of the control arm when using a ball link in just one end (only a normal “fork” link is possible to fit inside the servo mount). For the serious builder using two rudder horns for

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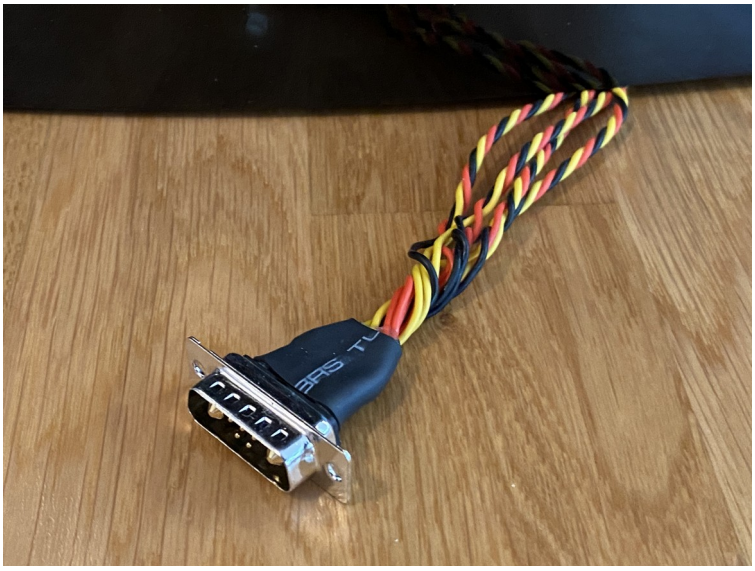
each servo is recommended (one on each side of the ball link). It might make a difference when doing vertical Mach 2 dives from 2000m altitude. But since I rarely do that I think I'll be fine… :-)

I cut the cables of the wing servos and soldered extensions in place. I then pulled them trough the wing using a long piano wire with a little hook in one end. After that I soldered the D-sub connectors to the extensions with around 15cm of the cables coming out of the wing. The D-sub connectors from Muldental were great. Easy to solder and really robust. As a finishing touch I used special shrink tube lined with heat glue to protect the soldered connections.



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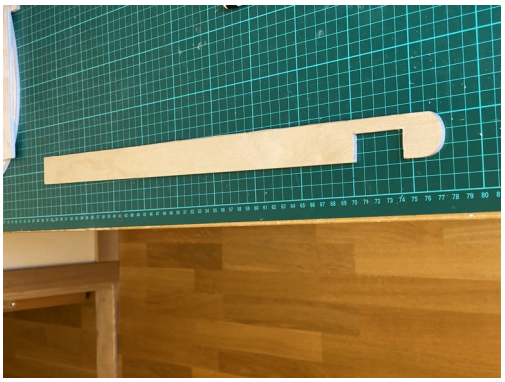
5. The fuselage

I started by making all the necessary wood parts needed:

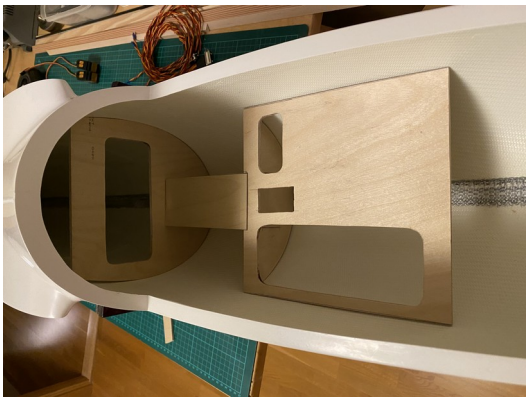
- Spar for the fin where the elevator servo is mounted.
- Spar forward of the wing tube.
- Parts for mounting the wheel.
- Plate for mounting the PowerBox, the receiver and the batteries.
- Plate for mounting the tow release servo.

Main spar, behind the wheel.



Spar for elevator servo inside the fin.

Complete wheel assembly.



Wheel assembly and mounting plate for the PowerBox and receiver inside the fuselage.

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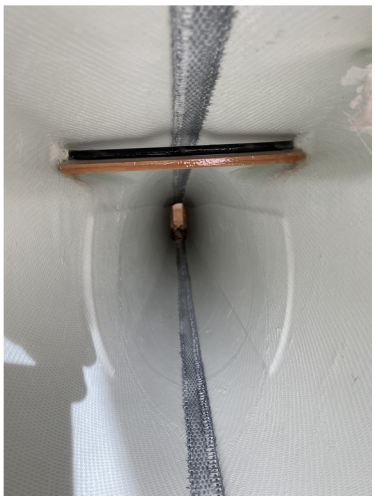
A lot of gluing is needed. I started by gluing in a carbon fiber tube for the “torsion pins” at the back of the wing together with a piece of hard wood. Then I glued in the wing tube and the main spar. I put 160g/m2 carbon fiber mat in the fuselage around the main spar. The wheel assembly and the mounting plate for the PowerBox came next.

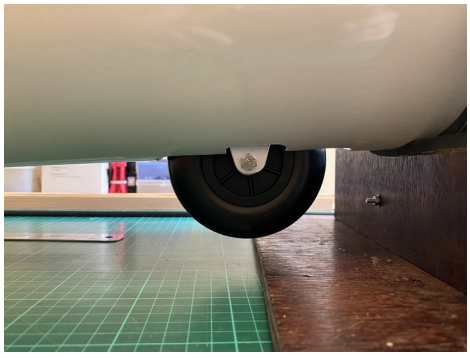


Carbon tube and hard wood piece at the rear of the wing.

The main spar as well as the wheel assembly and mounting plate glued in place.

On top of the main spar an extra piece of wood is placed so that the main spar meets the wing tube and are glued together.

The servo for the rudder sits at the back of the mounting plate for the PowerBox. It is not connected directly to the rudder. A large servo control arm sits forward of the main spar and is connected to the rudder via a wire linkage. The servo is then connected to that control arm.



The wheel. The wheel axle sits between two aluminum plates

that are screwed to the wooden wheel assembly.

A carbon fiber tube was glued inside the front of the fin reaching down to a piece of carbon fiber mat at the bottom of the fuselage to make the fin more stable.

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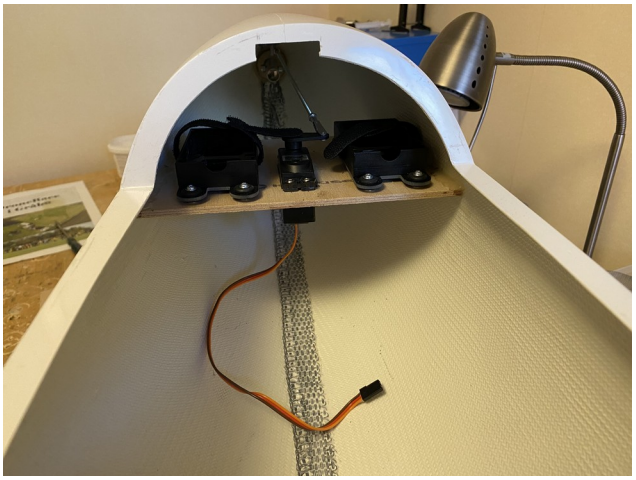
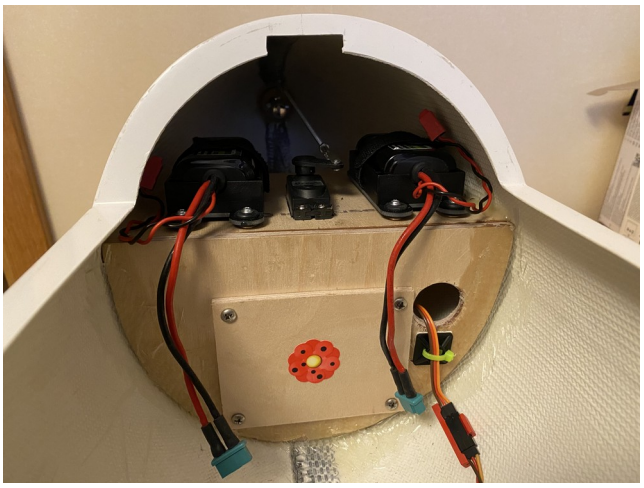
The rear spar for the elevator servo was glued to the fin together with carbon fiber mat as reinforcement.



The plate holding the servo for the tow release and the receiver batteries.

After test assembling the plane and checking the CG I realized that a lot of lead was needed in the nose. Around 1600g was needed. I decided to create another spar connecting to the plate for the tow release servo. In this spar I created a box that will hold the lead with a covering plate attached with four screws.



The spar with the wooden box for the lead. Batteries and tow release servo above. Also a little tribute to my hometown Kungsbacka in the form of the "May flower" on the covering plate.

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6. Tail wheel

I started by cutting away the moulded tail wheel using a Dremel tool. After that I glued two fiber glass laminate plates on the inside of the fuselage with epoxy and fiber glass. The wheel axle consists of an M4 bolt that goes through the laminate plates.

The tail wheel in place. On this picture you can also see the rudder linkage. Initially I made exit holes for the rudder linkage wire in front of the tail wheel but that did not work very well (too small deflection of the rudder was possible). That is why the piece of tape covering the hole exists.

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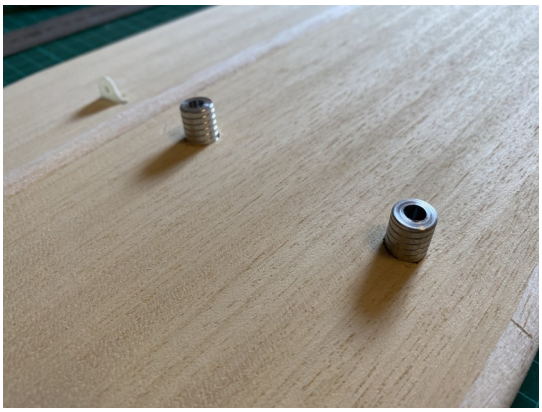
7. The stabilizer

The stabilizer is attached to the fin with two M5 screws. The nuts are already installed in the fin. The stabilizer itself has only a soft core (only foam no hard wood) where the bolts go through so reinforcement is needed. I decided to use two round metal sockets. These are 20mm long and 10mm in diameter.

Metal sockets. Note that there is room for the head of the screw in the top end so that the screw will be flush with the top side of the stabilizer. Also the outside is ribbed so that the epoxy attaches better.



Underside of the stabilizer with the sockets half way down.

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8. Mounting the wings

The wing joiner on this plane is made of fiber glass. What is a really bad thing is that the joiner as it comes from Fliegerland is too thick and doesn’t fit into the wing tube..?!? The inner diameter of the tube is 25mm but the joiner is 25.2mm. Really annoying and something that I have never experienced from any other producer. A lot of sanding and test fitting is needed before the joiner fits into the tube. The joiner is also too long, about 80mm, but that is easy to fix since the fiber glass rod can easily be cut.

Test fitting the wings.

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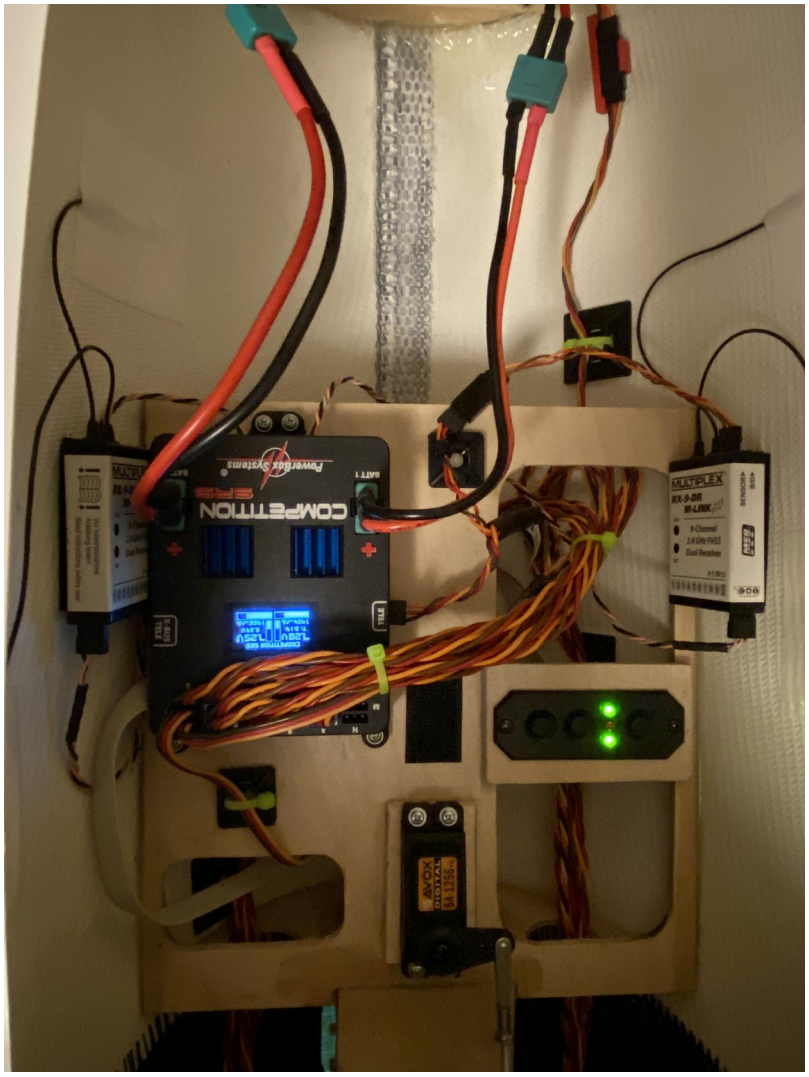
9. Receivers and power box

I installed a PowerBox Competition SRS together with two Multiplex RX-9 receivers. I mounted the switch on a little wood frame that I glued on top of the mounting plate. The servo cables from the wing and elevator servos go through round holes in the main spars. All the servo cables come up through a big hole in the mounting plate and are strapped together with cable ties.



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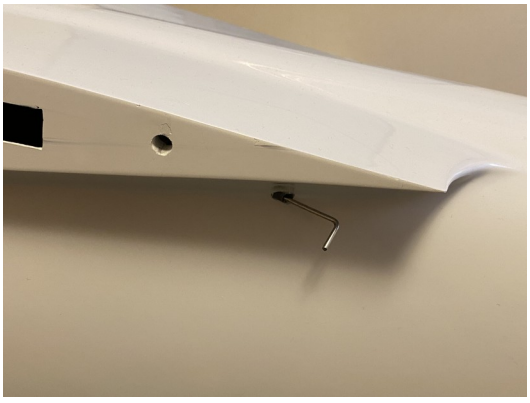
10. The canopy

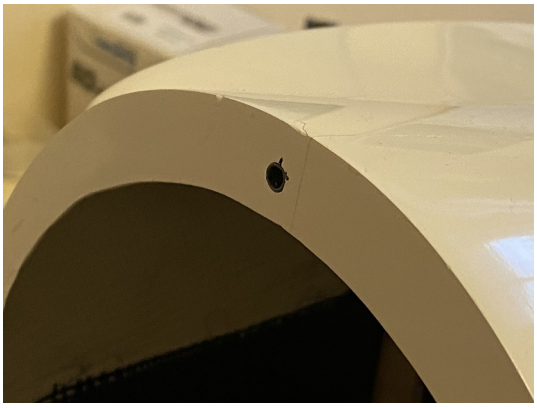
The canopy is fastened to the fuselage using two plywood pieces. The one in the nose goes in to a filed out cut-away in the fuselage. In the back a piano wire goes in to a hole in the usual fashion.

Plywood piece glued to the front of the canopy.

Plywood piece glued to the back of the canopy.



Opening “handle” for the canopy.



Hole in the fuselage where the piano wire goes into the canopy.

The canopy glass needs to be trimmed to fit the canopy frame. When that was done I glued it to the frame using epoxy.

Simple instrument panel (decals). The frame of the canopy was spray-painted white.

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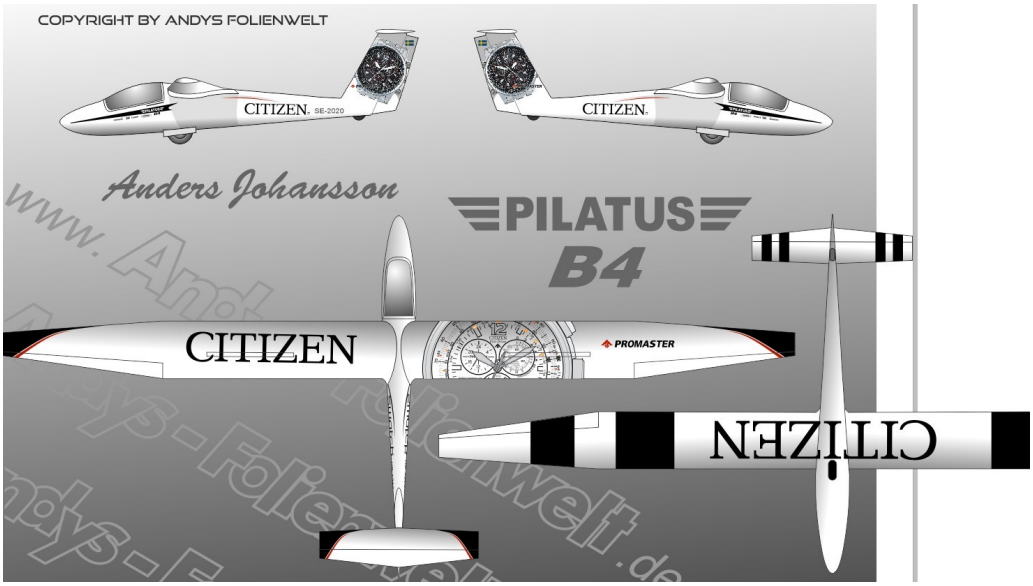
11. Decor

I’m a bit tired of all the Pilatus B4 in the classic red-blue-white design scheme and have decided to go for something different.

Andy’s Folienwelt had an alternative in the form of the “Citizen Watch” design scheme.



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12. First flight

Due to the pandemic it was a long wait for the first flight of this plane. Even though I was finished with the build during the autumn of 2020, it was not until the first IGG Sverige meeting of 2021 that I got to fly it.

In the beginning of June 2021 me and my fellow glider pilots of IGG Sverige gathered at the historic flying site of Ålleberg, nearby Falköping for the first tow meeting of the year.

The weather was perfect! Warm and sunny and lots of thermals.

During the initial two flights I released at only 300m to be able to see everything going on with the plane. I quickly realized that the “high rate” settings on elevator and ailerons was the way to go. In the “high rate” setting I also mix 50% aileron on the flaps. For my taste this is perfect, I think the model I too docile using only the ailerons by themselves. I will only use the recommended (high rate) control throw settings from Fliegerland.

When the flaps are deployed the plane will raise the nose quite a lot at high speed. At low speed only very slightly. I have not added any down elevator mix when deploying the flaps, I think it is easy to control manually with the stick.

The first flights went very well without any troubles.

During the third and following flights I released at 450m and found lots of thermals. The Pilatus is really good for this. I didn’t fly any acrobatics during this first weekend with the plane, that will have to wait for the next occasion.

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13. Conclusions

All in all a satisfying build let down only by the wing joiner that did not fit very well. I can still recommend this model for everyone that wants an uncomplicated and robust classic aircraft.

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