Building a Mick Reeves 1/4.5 scale Hurricane—

Instalment 6

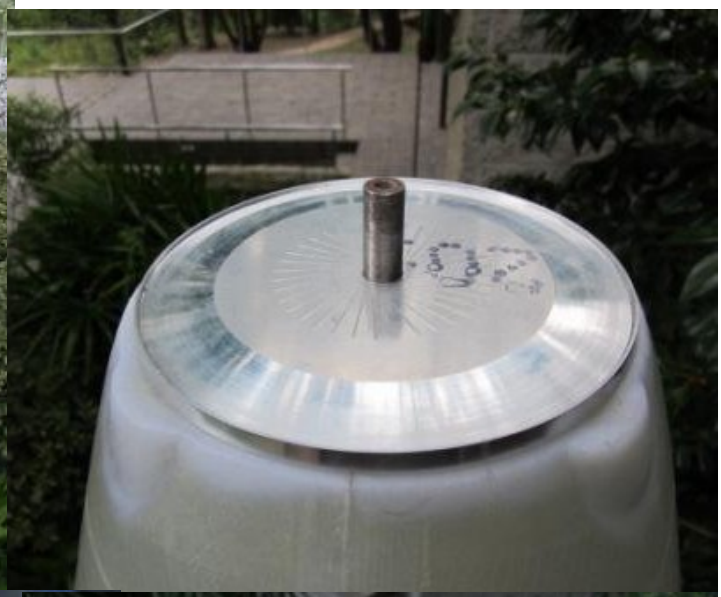
Engine, Exhaust, Servos, Batteries and Wiring

Fitting the Engine:

Before fitting the engine to the firewall I have accurately mounted the cowl to the fuselage. The cowl has to conform to the correct thrust lines and be fair with the panelling. If the engine crankshaft is now aligned with the cowl all should be good.

You can see from the photo that I have fitted the wing centre section to the fuselage and hooked the undercarriage legs over the deck railing. The engine can now be placed onto the firewall and the cowl can be fitted over. The spinner back plate is then fitted to the crankshaft over the end of the cowl and the motor is then moved around until the spinner back plate aligns with the cowl edges. I then carefully remove the back plate and cowl and pencil around the ends of the stand-offs on the firewall, remove engine, mark centre of pencilled stand-off positions, drill and fasten stand-offs and don't forget the Loctite.

Piece of cake.!



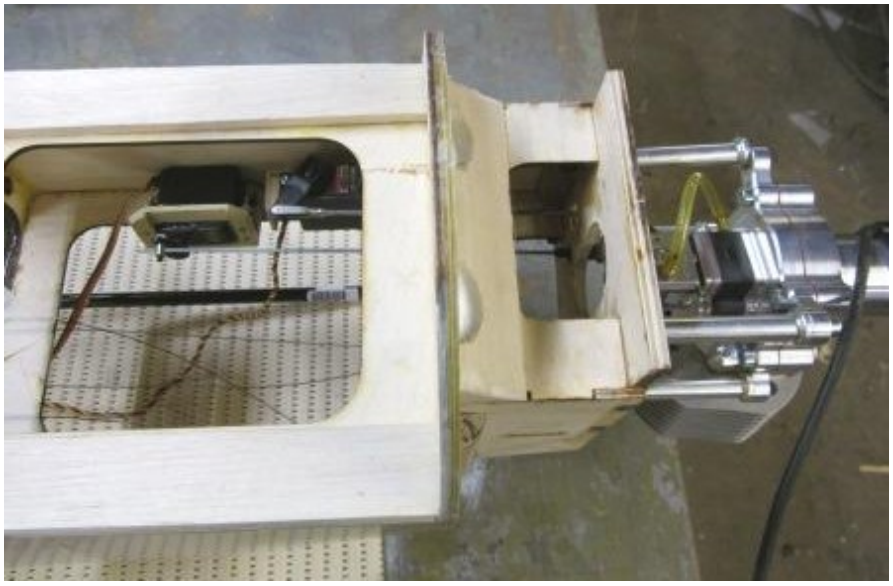
You can see from this picture that I have purposely canted the motor over a few degrees to position the spark plug under the motor on the planes centreline, this is so I can fit the plug cap inside the Vokes filter.

I had originally intended to use a Zenoah G62 but when it came to the crunch it just wouldn't fit within the cowl, it was too wide. So started a search for a suitable motor. I didn't want a motor any bigger than 60-70cc as I reckon anything larger would turn the Hurricane into a rocket ship. I achieved 10kg of static thrust from a DL50 in the Vailly Hurricane so an engine that can give me around 12kg static thrust for this aeroplane that will weigh in the 15-16kg range is IMO ample. After a bit of research I settled on the new DA60 and was about to place the order when I came across this Chinese engine. The engine is called a JC60 EVO. It's 60cc and rated at 6hp but it remains to see if the horses are Chinese ponies or proper horses.

I have started running it in and it has now had 1/2 an hours running on a test bench. I'm running it in with a Bolly carbon 21x12 three blade prop. It's had a few brief full throttle bursts and tached at 7100rpm which creates a helluva draught.

My only concern with the engine at this stage is the typical amount of vibration these single cylinder engines have. I have used Zenoah's, 3W's, DLE's, DL's and DLA's in the past and they all vibrate, this engine is no worse or better. Every screw, nut and bolt has to be fastened with Loctite. I still might swing back to the DA60 but I'll give this thing a go and see how it turns out, it certainly seems strong enough..

Servos in the Fuselage:

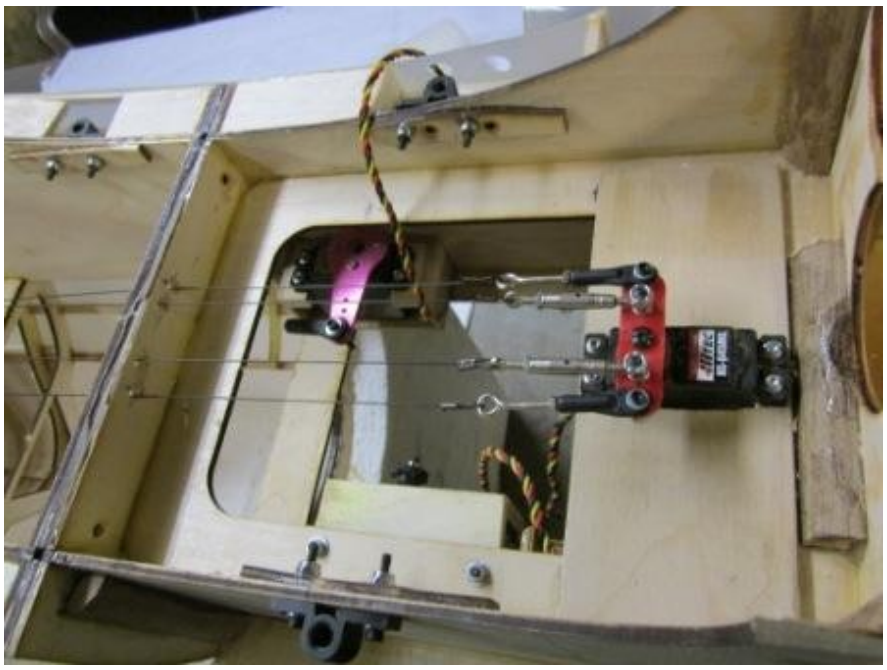


I am going to need only four servos in the fuselage but I'm anxious that they all are forward of the C of G which makes it a bit tight even for an airframe this big.
The picture on the left is of the throttle servo, Hitec HS635HB servo rated at 6 Kg/cm and the Hextronic HX5010 7kg choke servo, I'll fit the elevator and rudder/tail wheel servos in the lower centre of the front section. They have to be fitted as low as possible so the cables and pushrod don't interfere with the look of the lower cockpit area.

I'm going to use 6V to power all on board servos through a power buffer.

The combined rudder / tail wheel servo is mounted behind the firewall. It's a Hitec HS645MG rated at 9.6 kg/cm

The tail wheel and rudder cables are positioned through holes drilled in the fuselage joining former

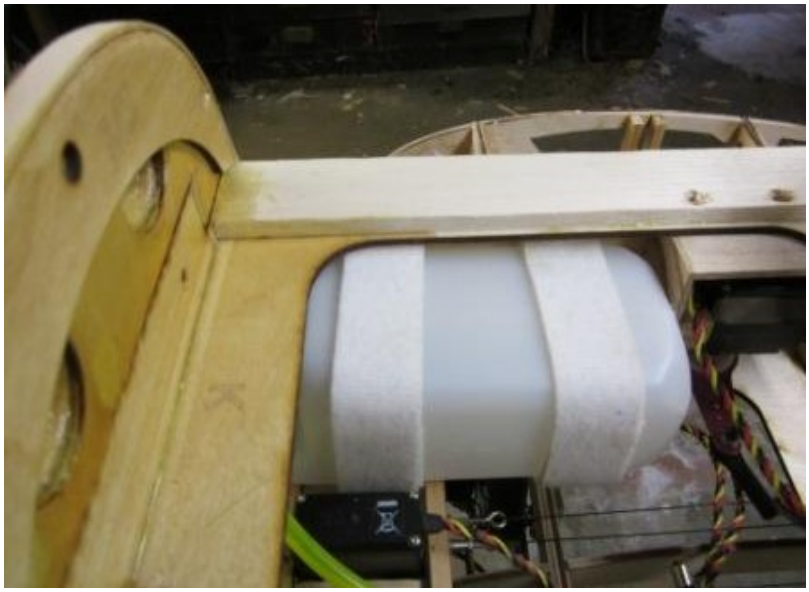


The elevator servo is a Hitec HS5955TG rated at 24 kg/cm. It's got an aluminium extension arm fitted with a ball link connector to the carbon pushrod. Bit of an overkill here but it was available in the spare parts drawer

The carbon push rod is 10mm in diameter is 1300mm long and weighs 61grams

Fuel Tank:

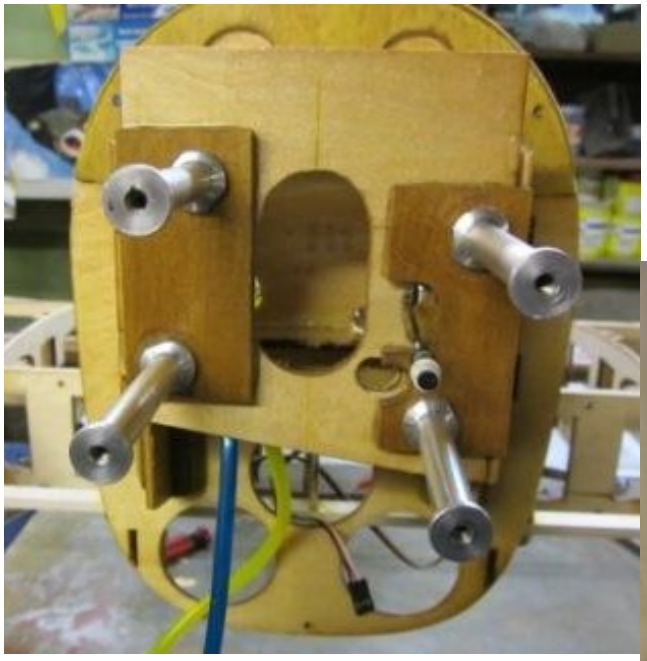
The fuel tank is a simple Dubro 16oz tank converted to gas with Tygon tubing and Dubro gas plug and is held in place with two Velcro straps.



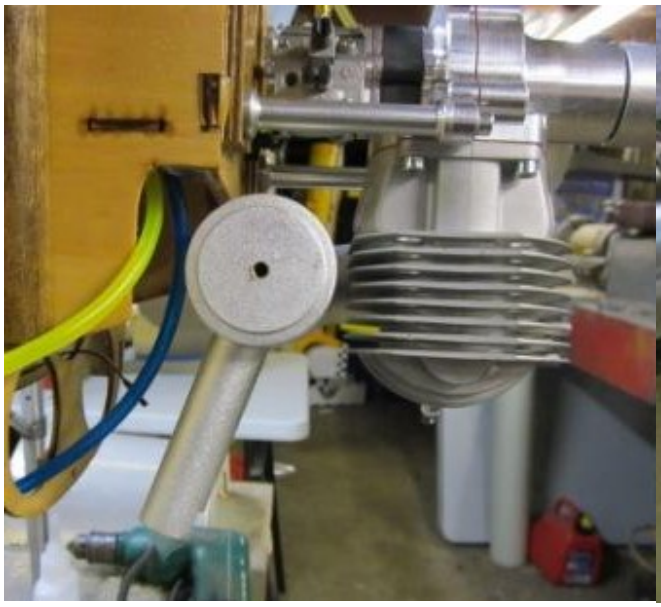
I can get about 15 minutes out of a 16oz tank and as most of my flights will be about 10 minutes or less it's big enough.

Exhaust:

Hiding the exhaust pipes is always a challenge with scale model aircraft and this is harder than usual. I would have liked to take the exhaust away to exit through the radiator housing as I did on the Vailly model but as this model has a full depth cockpit that is impossible so I'm going to exhaust through the Vokes filter.



I'm going to modify a standard Pitts muffler so that the exhaust pipes are in line but before I do this I had to cut away the engine mount for the muffler to clear



The shots above show the standard muffler. The exhaust pipes will need extending and the outer pipe must be repositioned to the centre line

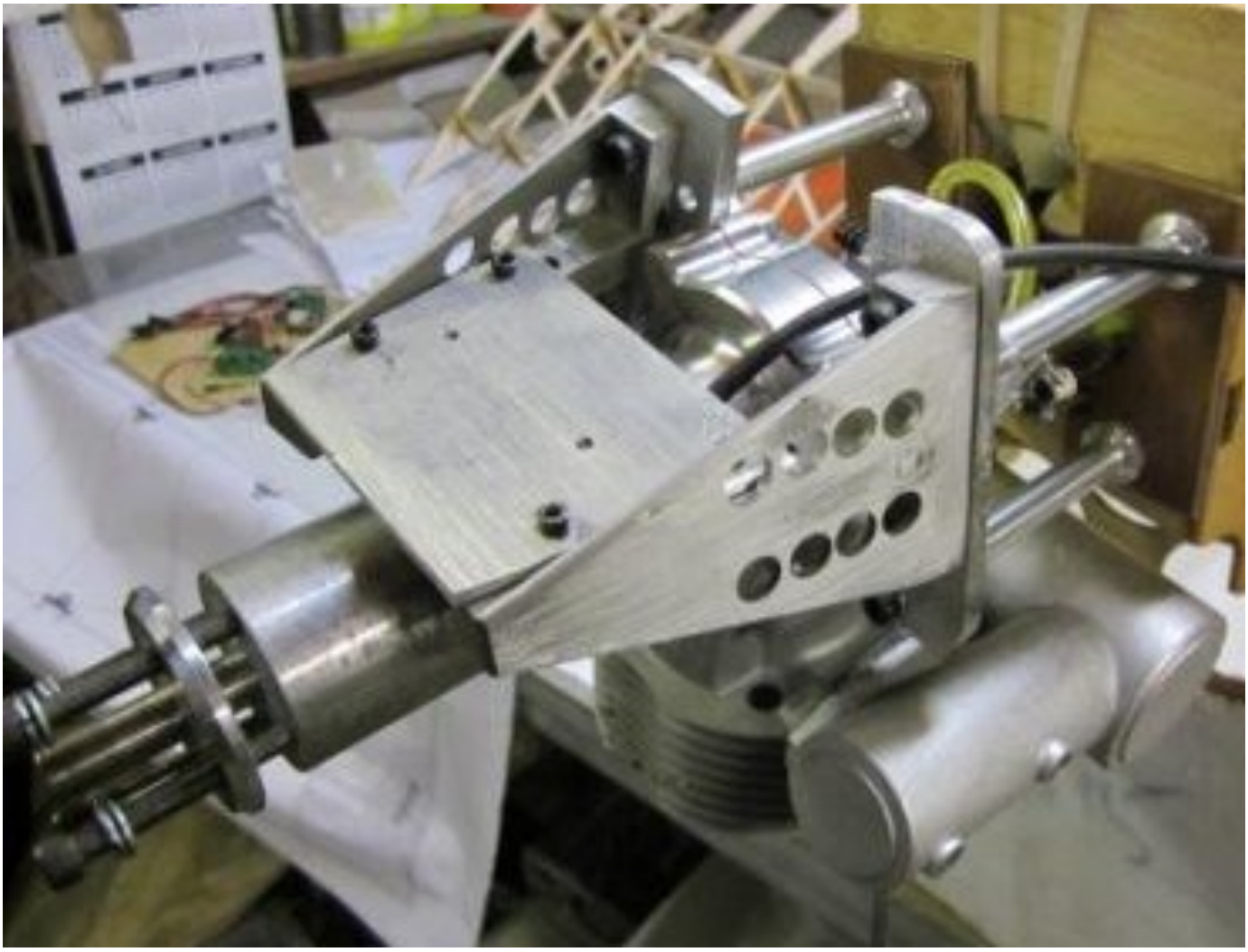
This shot left shows the right hand pipe as we look at it down the centre line. The other pipe will be replaced with a bent pipe to go behind the straight pipe and end up in line and behind.

The Vokes filter will have to have an unscale like hole in the bottom to allow the exhaust gasses to escape. It's a compromise but at least the aircraft profile will remain correct.

This picture is of the modified muffler with the outer pipe blocked off and a new pipe down the centre line.
The pipes are over long and will be trimmed off flush to the outer surface of the Vokes filter

From the head on shot you can see that both pipes will exit the fuselage down the centre line through the Vokes filter added to the cowl

Ballast Tray:



To longitudinally balance models of these old fighters seems invariably to require adding weight in the nose. I suppose this is because the ratio of engine weight to fuselage weight is very different from full size to model.

To add the minimum weight to achieve a balance you need the longest lever you can get at the front of the plane. I've made up an aluminium mount from a couple of engine mounts and a bit of 10g aluminium plate. Sheet lead will be bolted to the plate to achieve a balance.

The plane will be balanced with a full tank and wheels retracted..

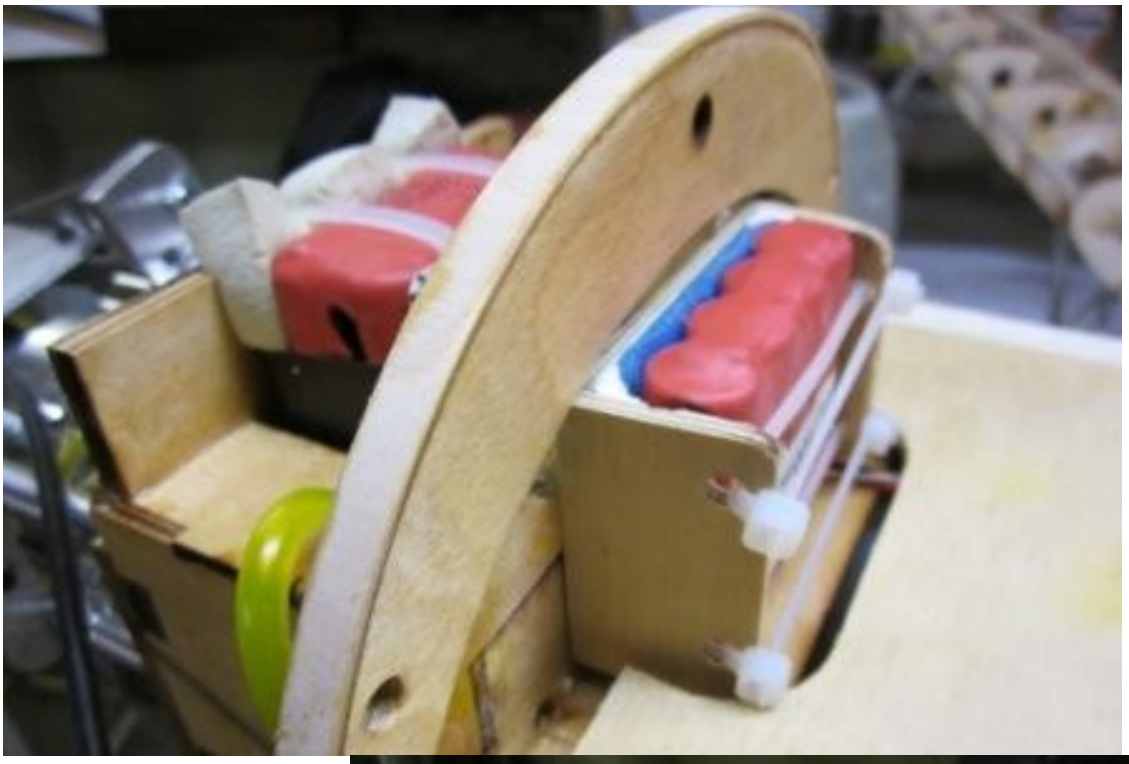
Much as I hate the idea of having to add ballast to this model to achieve the correct C of G I think it will be inevitable

Battery Power:

I need four on board battery packs for this plane, one 2000mah NiMh 4.8V pack is for the receiver alone, one 4000mah 6V NiMh pack for the servo buffer and navigation lights, one 2000mah NiMh 4.8V pack for ignition and the last pack is another 2000mah NiMh 4.8V pack for electric retracts and landing lights.

All will be attached to the airframe as far as possible forward of the C of G.

All the pack are made up from Sanyo Eneloop cells and are secured to battery boxes with Velcro and cable ties.



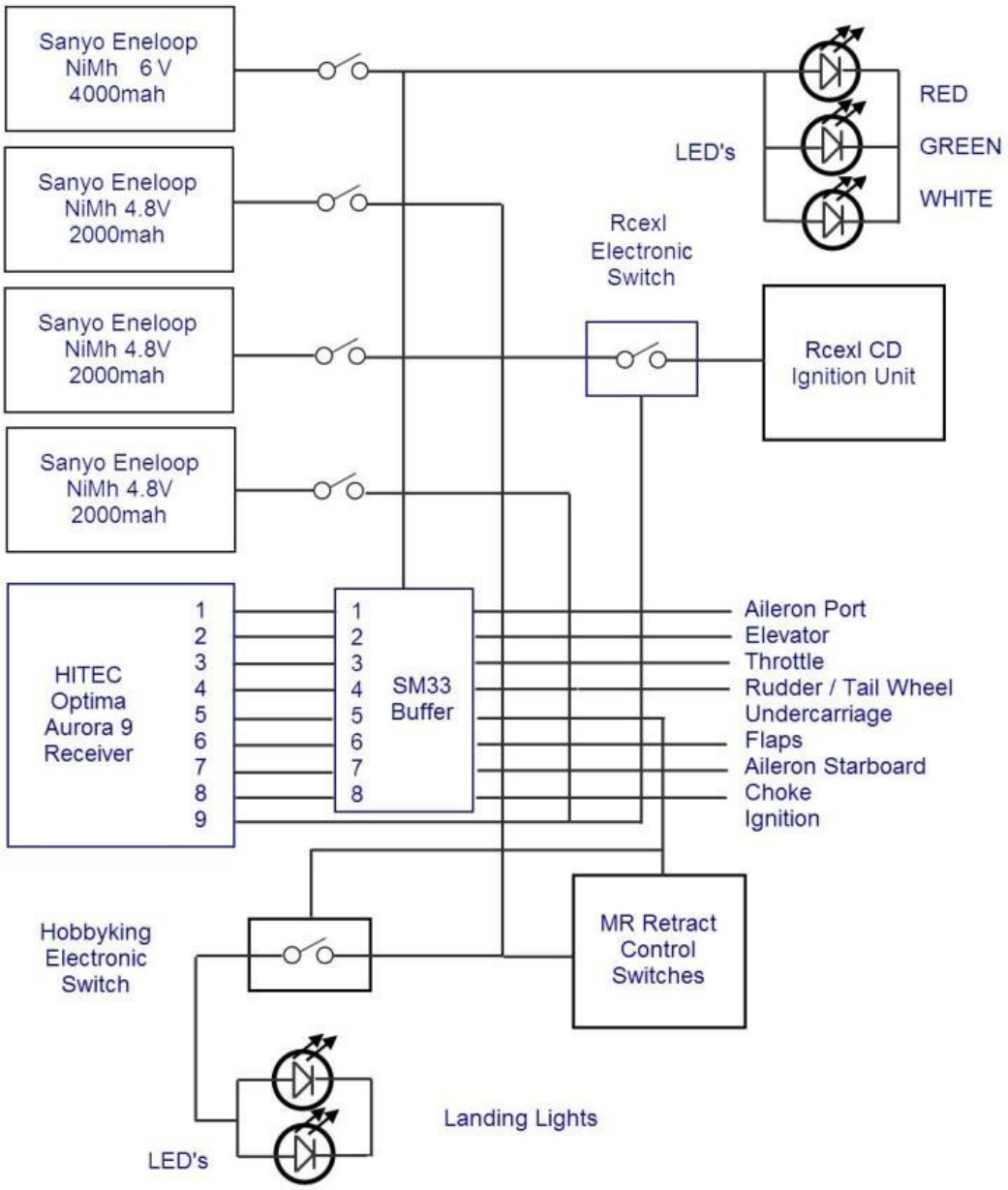
This picture is of the firewall with the ignition and retract/lights pack in front and the receiver pack behind

This is the underside front of the fuselage and shows the position of the 6V 4000mah servo buffer pack.

Wiring Diagram:

I need to power up: 1 x Hitec Optima 9 receiver
1 x SM33 SMS Opto Isolated Servo Buffer
1 x Rcexl ignition unit,
1 x set MR electric retracts
2 x Landing lights
3 x Navigation lights
10 heavy duty servos..

So it's not your average club flyer circuitry. I like a separate power supply for all servos and a stand alone power supply for the receiver. For the servo buffer I use a unit from SM Services UK, this is an 8 channel buffer with opto isolation P/No. SM33. The added bonus of being opto isolated is preventing any ignition crackles from getting back to the receiver. All the batteries are the low self discharge Eneloop NiMh type that I find excellent. and I don't need voltage regulators.



Now that I've got a lot of the nuts and bolts type stuff done I can get on with finishing the wing centre section, fitting the inner flaps, covering and then fitting it to the fuselage, should be fun....