

ERK 36



A **John Bowmer** design
Outerzone plan oz 11482

I had long been intending to put my working but unflown modern Galloping Ghost* hardware to good use and had been pondering a suitable subject. After making a list of potential candidates, I eventually chose this John Bowmer s/c design, originally published in Model Aircraft Magazine in 1963, which I had previously encountered back in that era. This neat model was originally drawn for 40" span with single channel RC (Rudder only) using a

rubber-driven escapement and a Merlin diesel swinging a 6" prop. I did depart from the plan in some areas, most noticeably with a sparless all sheet wing for added 'bouncability'.

* If Galloping Ghost means nothing to you, the links at the bottom of this article will provide enlightenment if wanted.

As I had a few spare outrunner motors (A 2212/13T 1000kv) similar to that in my 38" SWANNEE (another elegant Bowmer design), I decided to shrink this ERK to a similar wing area, giving me confidence that my motor would be suitable and avoid having to source something larger. I downloaded the plan into my CAD and shrunk it to 36" span. Thereafter any curved part outlines were printed onto A4 sheets while the majority of rectangular parts simply transferred to wood by measurement. If you wanted to work from a hard copy drawing you could take the .pdf plan to your local print & copy shop who would produce a working printout at any size you might care to choose. I was now ready to cut Balsa.

My preferred building routine is to start with wing construction, especially if it needs later to be faired into the fuselage structure. Previous small RC models had been built with all sheet wings and ERK was to be no exception as I already had a good stock of 1/16" sheet. After joining, trimming to size and surface sanding the sheets, LE reinforcement strip was added, then all the ribs from 3/32" Balsa. With the separate lower surfaces complete, 1/8" root ribs were trimmed for the dihedral angle and the two sections married to check for the angle suggested on the plan, trimming with a sanding block until correct. Once that had been done, top surface sheeting was fixed to each wing half and held firmly by rubber bands over each rib position to ensure good adhesion. I now had two completed wing halves ready to join at the desired angle. When that glue had cured, the centre section was reinforced with two successive feathered layers of lightweight glasscloth fixed using SkinCrylic laquer - only because I had a lot remaining from previous projects. The finished but uncovered wing came out at a pleasing 83 grams, increasing to 93 grams after covering with lightweight tissue and several coats of thinned dope. As expected, I had a light structure that would be a lot more ding resistant than the open structure of Bowmer's original. The considerable weight saving of modern RC gear should more than offset any weight gain of the airframe.



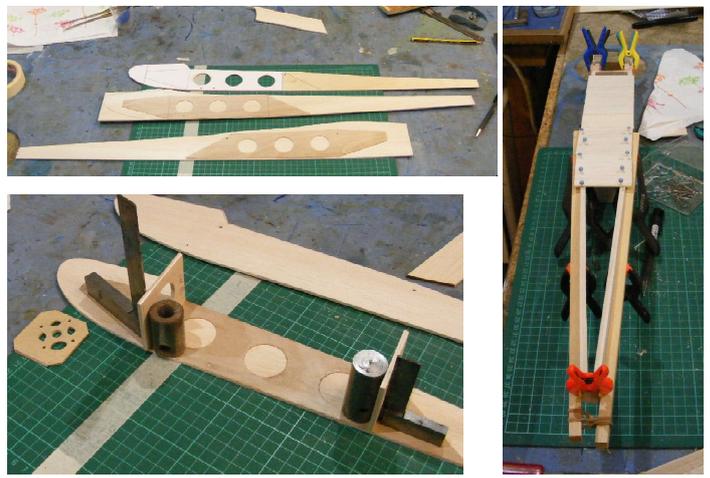
Ribs added to lower wing skins



Fixing upper wing skins

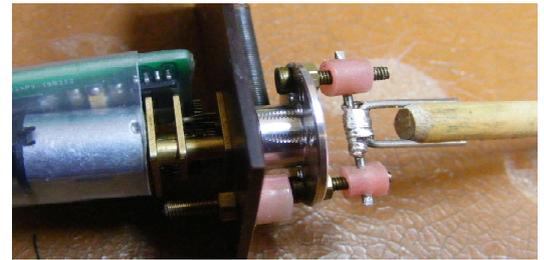
I next turned to the fuselage. As I was making it up as I went along, I started by fabricating a side template from 0.8mm Ply, complete with dowel holes and markings for internal parts such as formers and doublers. By that means, I was sure that the two 3/32" Balsa sides ended up as close as possible to identical and allowed later accurate transfer of all the wing and undercarriage dowel positions; it would also speed any repairs or production of a second fuselage. Before adding any formers, a 0.8mm ply doubler was added to each side using PU (expanding) glue. The advantage of this adhesive is that only tiny quantities are required, using a credit card scraper to fully cover the surface and remove excess, while the slight foaming action really penetrates both surfaces while pressure is applied, adding minimal weight. In contrast to contact adhesives, PU gives plenty of 'jiggling time' depending on which type is used. I use a 30 minute version that grabs the wood quite adequately after about 15 minutes.

The forward three formers (motor, wing LE and wing TE) were glued to one side and when that had cured, the other side added taking care to keep everything square. Once that was done a few crossgrain sheets of 3/32" Balsa were added to the undercarriage area to keep those sides parallel but pulling the tail ends together produced a considerable bow which I did not want. To overcome this, two lengths of 10mm spruce were temporarily held against the rear sides until the addition of more lower sheeting had stabilised that area. This kept the rear end true before adding the top fairing between the cockpit and fin. From then on, it was a matter of adding sheet and shaping block until the fuselage looked more like an aircraft. Motor mount, F1, had been prepared before fixing it to the fuselage sides and, once the main fuz had been completed, the forward motor cowling was added



Fuselage assembly

with odds and ends of Balsa block from the scrap box and shaped to taste. Internally, the GG Twitcherator mount was made from 1mm Paxolin sheet held in place by vertical rails down the fuz sides just forward of the TE. As an alternative to the GG actuator, a similar sliding mount was made for an upended standard servo with its output axis horizontal to connect with the torque rod to actuate just the rudder (this is really only a "guided free flight" model). Like the wings, the completed fuz was sanded and tissue covered overall with a suitable choice of colour which may be refined with tissue trim after initial flights have been made. Bowmer's original had been for Rudder only and this mode would probably be used for my first flight to establish a sound basic trim before returning to the GG system.



GG actuator with Torque Rod drive

The final structural job was to find a suitable cockpit canopy where the distinctive shape of the original deserved a bespoke form. Paper templates for plan and side views were taken from the drawing and I then looked for a suitable piece of softwood to form a moulding plug. That search ended after a brief workshop tidy up when I rediscovered some chunks of blue foam that should be firm enough for the job. This material was very easily shaped with knife and sanding block but the surface, even after fine sanding, was still too rough to attempt pulling a canopy. To seal the surface I applied two coats of SkinCrylic, sanding back when cured. However, this had not fully filled the surface so another layer was added this time mixed to a creamy consistency with microballoons. When that had hardened, sanding progressively down to 600 grit, an excellent smooth finish was achieved. The plug was then wedged into a plastic 'pop' bottle that had its base removed for easy access. The open end was clamped shut in the bench vice then a hot air gun applied to shrink the plastic onto the plug. Much to my surprise the first attempt was successful and after trimming away excess plastic, I had produced an acceptable canopy. The hard foam plug had even survived the ordeal in a reusable state.



Canopy forming

Now complete apart from some cosmetic trim, my 36" ERK weighs 15.5 ounces (440 grams) with a 2S 900 LiPo onboard; quite by chance the cg lies in just the right place without further fettling. With that setup, 160 Watts is available for a wing loading around 9 ounces per sq. foot. I know that motor works well in a similar airframe with a 2S 1300 so it will potentially go like a rocket on 3S !

Flying

With pleasant weather forecast for the Easter weekend, I fettled all the innards and prepared the ERK for a maiden flight in Rudder only 'on-the-button' Mode using a mini propo servo upended to drive the GG torque rod linked only to the rudder. The elevator was locked in neutral and not driven. What I wanted was to establish a good basic trim for what this design was originally intended. My main concern being the effectiveness of that small rudder. I need not have worried. First attempt at ROG ended up with a nose-over so a hand launch followed. ERK flew out of the hand into a gentle breeze with a sporty rate of climb and a hint of stall tendency. Immediate application of rudder

turned it off the stall and once at a safe height, power reduced to result in a stable cruise at about half power; rudder authority being quite adequate. Rate of climb or descent was easily controlled with throttle changes and the subsequent landing/arrival (no elevator/no flare) was otherwise uneventful, other than inverting the band on undercarriage.

Before the second flight, I added about 1/32" down packing to the stab and another hand launch had it soaring away under full s/c control. Button flying was a delight and level cruise achieved with around half power with the 2S battery onboard. I was glad that I had chosen light weight rather than power because the 3S battery would have produced a rather exciting rocket ship ! *(later, perhaps)*

Now I have established a good s/c trim and am familiar with the basic stability characteristics, I will return it to the workshop and swap the servo for my GG Twitcherator with the elevator properly connected. Who knows, it may even be able to achieve a landing flare next time.

Another good 'un from John Bowmer.

Spike S. 16 Apr 2022

Links:

For information on the eGallop Ghost control system, see

<https://youtu.be/rZu2foaUOLs> and

<https://youtu.be/MqPz3oUb88>

An extensive source of early RC expertise can be found on the Retro RC Forum:

<https://mode-zero.uk>