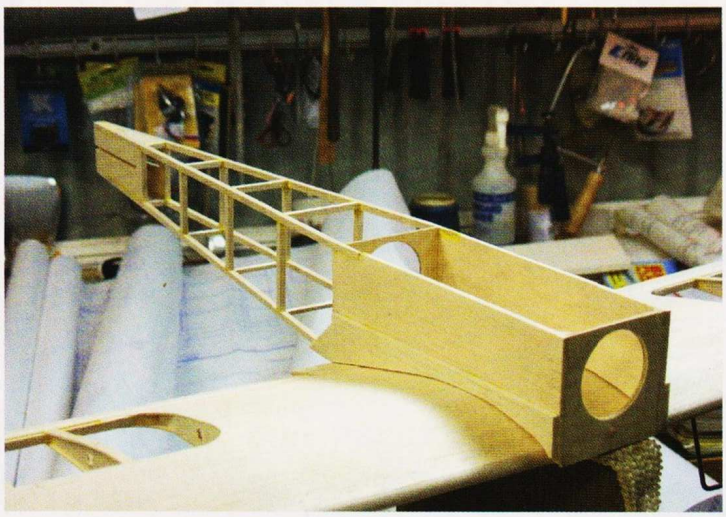
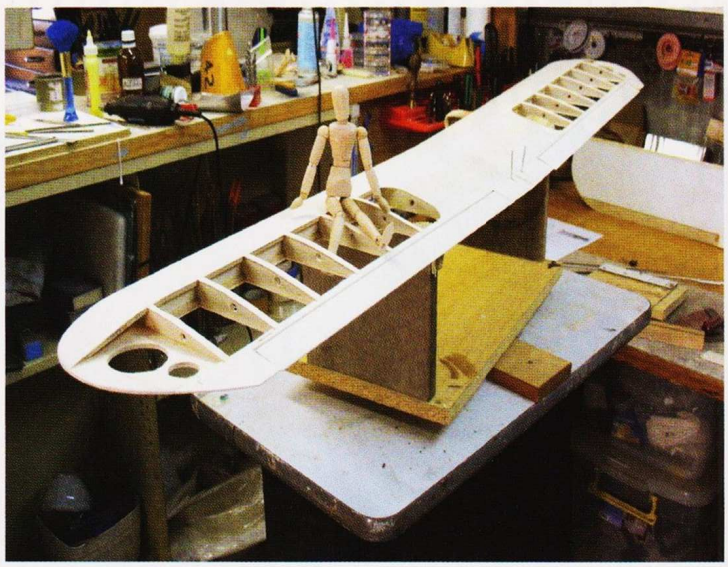


Ryan's Daughter

A 52" span sport model designed by Peter Rake for electric power and 4-function control. Prototype models built by both Peter Rake and Pat Lynch



Nothing too complicated about the fuselage to this point, just two box structures joined over the plan



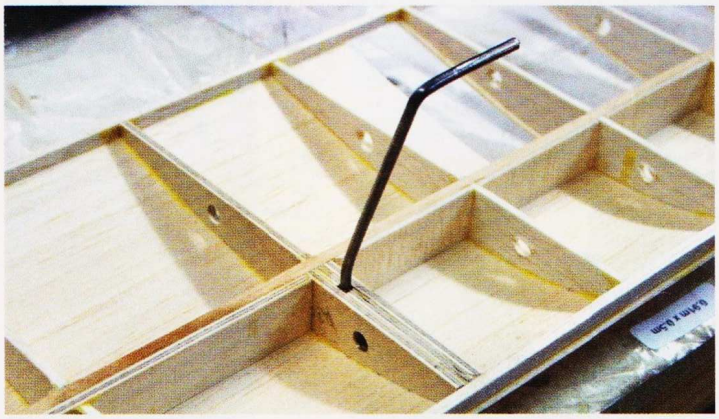
Similarly, the wing is pretty simple too. A very sturdy, 'D' box affair with cap stripped ribs

Ryan's Daughter was first conceived several years ago. At the time, I had just a vague idea of how I wanted the model to appear, something along the lines of a U.S. style low-wing trainer from between the wars. This vague idea gained a little flesh on its bones with the production of a rough sketch but didn't become a reality until Pat Lynch mentioned he was looking for something upon which to improve his flying skills. His current models were, he said, not sufficiently taxing for him to actually learn anything. I suggested that he try a low-wing type for a change and he asked if I had any designs in mind. Anyway, the upshot of it all is that Ryan's Daughter was drawn up in CAD and the plan forwarded to Pat. He promptly set about building the model – while I waited for a set of laser cut parts to arrive. Although Pat finished his model before mine was even started, a serious hand injury prevented a successful test flight. Fortunately, he is now well on the road to recovery, but it did mean that I really had to get on and build my version.

You will notice slight differences between the two models, Pat's in the construction shots and mine in the photos of the finished model and flying shots. These are purely cosmetic differences, both models being built the same but built to look slightly different. The version you see on the plan is exactly as originally designed, and how I built my model. Which nose shape you prefer, and which cockpit positioning, is entirely up to you. As long as the basic model remains unchanged it won't make any noticeable difference to the way the model flies.



The 1/8" ply U/C rib with slot for the wire U/C leg



U/C leg in place and ply doublers epoxied in place. I did my model the other way round, sheeted the bottom first and then fitted the leg before sheeting the top

Equipment Required

The model is designed to be fairly lightweight, whilst still having sufficient bulk to cope with some wind. Both prototypes worked out to about 40 oz flying weight and I assure you that the model will handle a bit of a breeze. Test flights with my model were carried out on the type of day I would normally stay at home.

To achieve both goals, reasonably lightweight gear was used, matched to a medium sized brushless outrunner and 3S LiPo pack. In my case, that meant that servos were Hitec HS81s, the receiver is a medium sized Hitec job that I have had for years and the motor is a PJS 1500. A 3200 mAh battery pack and 30 A ESC keep it all working. The motor is almost certainly overkill, but it's awfully nice to have a good reserve of power available. Fairly lightly propped, an APC 11" x 5", the motor pulls around 21 A flat out. Given a coarser pitch prop, the PJS 800E would almost certainly be pulling a similar current. So, any motor rated for 170-200 watts would be fine. I have 220 watts available but have yet to get to full throttle.

Construction Overview

There is nothing complicated or unusual about the way the model is built, it is all basic, totally conventional aeromodelling. Bearing that in mind, along with the fact that Ryan's Daughter isn't aimed at the complete novice, I'll keep the construction details fairly brief. What I will concentrate on are any areas that I feel may need additional information. To keep it all simple, I'll separate the construction into stages and leave it to you to determine how much of the advice given you actually want to take.

Since the fuselage is probably the most complicated part of the entire model, that seems like the perfect place to begin.

Fuselage

Study of the plan will reveal that the fuselage is basically three box structures, joined and shaped. Pat built his as three distinct boxes, but I simply built a front and rear and then joined them. Because of the length of the 1500 (I had originally intended to fit the 800E) I used a scrap balsa spacer to move the ply part N a little further forward. You could, of course, move the firewall back but I wanted to use the laser cut parts throughout. Since it would only fit in one position, that's where it went. Whilst the 800E is the same diameter as the 1500, it is quite a bit shorter.

With the basic boxes assembled and joined, the shape is filled out using formers, stringers and lots of thick balsa sheet for the nose. With the motor temporarily fitted, the nose blocks were tack glued in place and the motor shaft used to centre part N. The nose was rough shaped before being cut away in front of the firewall to provide easy access to the motor. The separation line I used is shown on the drawings, the lower nose block and forward section of the cowl being removed as a single unit. A wire dowel locates the cowl and a screw retains the lower block.

As an aside, I didn't hollow out the top nose block. I epoxied another piece to the nose block to mount the battery, to bring it level with the hole in F1, and epoxied a ply and Velcro strap battery retainer to it.

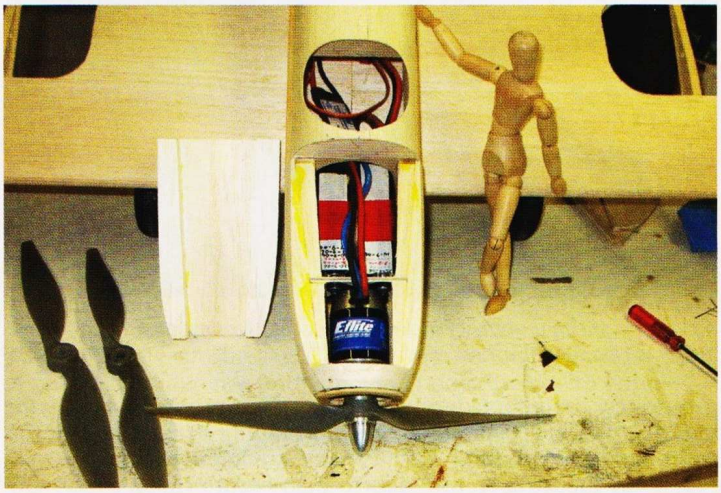
The only advice I can give here is to use fairly hard balsa (as hard as you can get) for the side stringers. The wood I used wasn't as hard as I would have liked and I need to remember not to pick up the model by the rear fuselage.

Tail Surfaces

Assemble the all-sheet tail surfaces, cut them to shape, round off the edges, sand smooth and join the elevators. That's it, job jobbed.

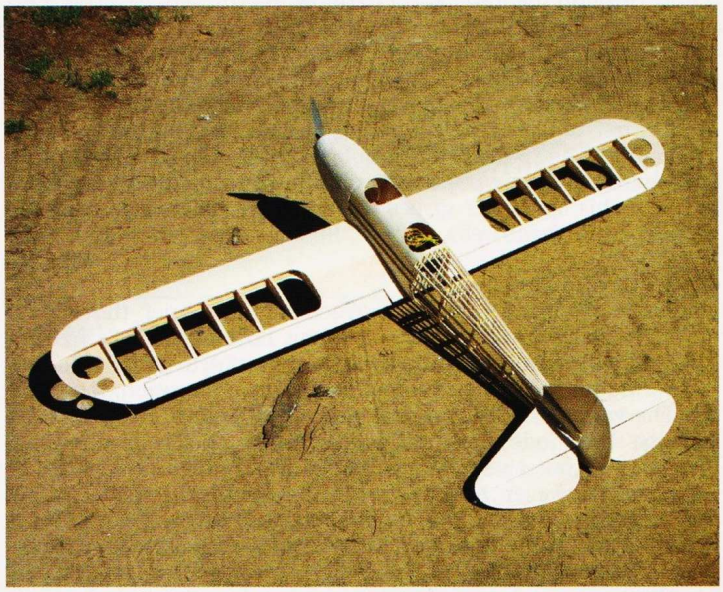
Wings

The lightening holes shown in the wing ribs are totally optional. My model has them, Pat's model doesn't. Don't, under any cir-



The motor mount and access options that Pat used on his model

Looks really good, doesn't it!





The much simpler mount system for the PJS motors. 1500 used here but 800E would almost certainly do the job



A close-up of the dummy cylinders. The access separation line on my model is clearly visible here

cumstances, be tempted to use anything but proper, birch ply for the U/C ribs. This is probably the most highly stressed area of the entire model so anything less just isn't strong enough.

To make life simpler, and also to help ensure I didn't warp the wings while sheeting them, I built in the lower surface sheet during assembly. Only one U/C rib doubler was glued in place and the top sheeting was left until later. Then it was a simple task to drill a hole through the lower sheet to allow the U/C legs to be epoxied in position. Epoxying the second doubler in place at the same time. Clamp it up until set and THEN add the top sheet and cap strips.

The 14 SWG aileron torque rods have proved perfectly adequate, but feel free to use 12 SWG ones if you so desire.

As regards the spars; I was unable to obtain four lengths of strip hard enough so the top spars are obechi. Pat couldn't get any hard balsa, so his spars are spruce. In either event, do not omit the vertical grain shear-webs.

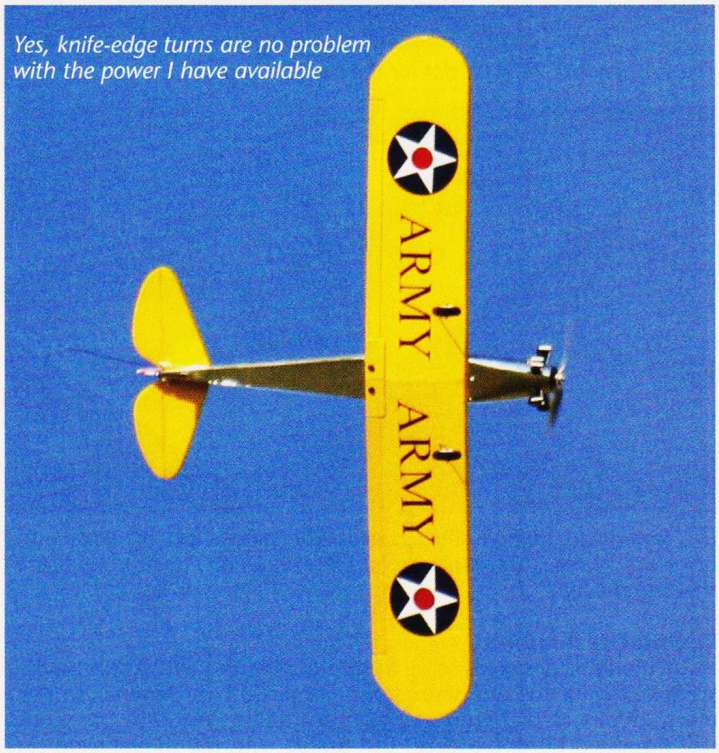
Covering and Finishing

Since I've kept the building instructions fairly brief, that allows me more space to go into detail about how my model was finished. Much more interesting than 'glue part A to part B'.

Covering on my model is something of a combination of materials. The wings and tail surfaces are yellow Solarfilm, but it's the fuselage that made me puzzle over what to use. The original idea had been to do a yellow and blue finish, a bit like a PT-19 or Stearman. However, having seen a very attractive model PT-22, and seen how Pat had finished his model, it became clear that it was a far more interesting colour scheme if the fuselage was polished aluminium.



Ryan's Daughter is all ready for test flights. Unless you dump the model in the rough, the cylinders survive well



Yes, knife-edge turns are no problem with the power I have available

I bought some material marketed as model covering that looked perfect. Just a shame it turned out to be more like Fablon. It would go around compound curves only if gradually persuaded by stretching and the application of gentle heat. (It isn't supposed to need heat to stick.) Also, because of it's Fablon-like nature, it's quite thick and heavy. I estimated that it would add more than 5 oz to the weight of the fuselage if used on the entire fuselage. Because of it's thickness, it wouldn't go on at all well over the stringers. It went on okay, but wouldn't follow the line between stringers, preferring to give an almost stringer free curve. However, it does have one very interesting property, it can be embossed with rivet detail – a ballpoint pen used from the back of the covering, prior to application. Wanting to take advantage of that fact, while most of the fuselage was covered with chrome Profilm (chrome Solarfilm no longer being available), the nose was covered with the shelf covering type material. You have to be careful not to flatten the embossed detail during application, but with a little perseverance it works quite well. The anti-glare panel is unashamedly Fablon.

Dummy cylinders on my model are assembled from laser cut balsa and ply parts with carbon rod pushrods. However, commercial cylinders could equally well be used. Epoxied into holes in the nose blocks, they have so far withstood the few nose-over landings unscathed. Just one of the advantages of flying from a grass strip.

Cockpit Coamings

Possibly of more interest are the windscreens and cockpit coamings. The screens are sections cut from disposable plastic beakers.



Still gliding, even if not actually making much headway into the wind. Admirably demonstrated how controllable the model remains – all the way down to dead stop

More gentle turns are just as simple and do actually look better





They are framed with over length pieces of cable insulation, which are then glued into holes drilled in the decking. They're a little on the brittle side, but easily replaced in the event of damage.

The coamings are from an extruded rubber section intended for use on vintage cars. Sold by the metre, this is a sort of inverted 'T' section with a loop on the end. Removing the 'T' is simplicity itself. I tried, unsuccessfully, to cut it off but the results were always disappointing. As a last resort, I tried brute force and ignorance. Grab both sections and pull them apart. Actually, it's very easy to do and works perfectly. You end up with a 'C' shaped section and a 'T' shaped one. The 'C' shaped bit is glued into a ring and just slipped onto the edge of the cockpit. I'm still working on finding a use for the 'T' shaped remnant.

The markings used on my model are cut vinyl graphics and I'm perfectly happy to make the file available to anyone requiring it. With that, you could even print your own markings onto decal paper. You will, however, require a CAD program as it currently stands. If there is enough demand, I'll split it up into A4 sheet size and then email a PDF file to anyone needing them – FOC.

Flying

Although it definitely looked breezier than I like for test flying, I decided to take the model to the flying field and see how I felt once there. The windsock was almost standing straight out from its pole and it most definitely was windier than I had hoped for. It was at about this point that temptation reared its head. Okay, so it wasn't horrendously windy, probably about 15 mph with slightly stronger gusts. Absolutely no problem at all for a .40-powered model weighing 4-5 lb. Except, of course, my model weighs just half of that and was a totally untried design. Nonetheless, temptation won out and it was decided that the model would be flown.

Before going any further, the model is intended to have a spinner, but I didn't have one available at the time so flew it without. Anyway, with the usual checks carried out, the model was headed into wind, I took a brief spell for the nerves to settle, my wife got ready with the camera and the throttle was gradually eased open. A little bit of up elevator until the model was moving and Ryan's Daughter was off and running. One thing soon became abundantly clear, even on an 11" x 5" prop, this model is not lacking in urge. After a nice straight run of about 20 ft, and still at little more than ¾ throttle, the wheels cleared and away she went. The left wing dropped a little, soon corrected with a dab of right aileron and the model was flying beautifully. Wind? What wind? Once I was happy that I had time to adjust the digital trims, some right aileron trim and some up elevator were fed in and that was as traumatic as it got. It says a lot for the model that after just a couple of trimming circuits, I was perfectly happy to start making low passes for the camera, turning in quite tightly at the end of each pass. Ryan's Daughter has impeccable manners.

The model was lined up and brought in for a landing. A bit bouncy, but was down safely. Because of the wind direction, and the low sun, it was necessary to cut the approach short and drop quite rapidly below the dazzle of the sun. Not an ideal situation for a first landing but it worked just fine. The first flight had probably lasted about 5-minutes and a very relieved designer/test pilot walked over to retrieve his model.

Knowing that I now had a trimmed model, and that there was plenty of charge left in the battery pack I prepared for a second flight. Without the stress of a proving flight, I was more able to enjoy the model and explore its' foibles. At the balance point shown on the drawing, you will have a slightly nose heavy but eminently flyable model. Fine-tuning of that can come later, once I really start to see what the model will do.

Tight, reasonably slow turns are no problem at all – left or right; I was pleasantly surprised by just how easily the model does them. The nose comes down a little as the turn develops, but as you level out and climb away again the model is never in any danger. Even so, this only happens when you've stood the model on a wingtip and haul it round. More sedate turns are simplicity itself. Next time out I was determined to try a few aerobatics.

If anything, it was even windier than the day of the test flights, however, I promised myself to test the model further and I think we succeeded.

I must admit I really like having all that excess power available. Gently pick up speed, getting up to about half throttle then hit the power. The model practically leaps into the air and climbs away beautifully – even from a relatively slow ground speed.

This time was much better and I was able to do what I wanted, try some loops and rolls. With the power available, loops from level flight are so easy, just haul back on the stick and up she goes. All completely effortless and a joy to watch. Big loops, tight loops, it makes no difference to the model, it does them with ease.

Rolls, although far from axial, are just as simple. A sweeping turn, to pick up some speed, level out and hit aileron. The model needs a fair bit of down elevator at the inverted stage, but that's pretty much par for the course with this style of model. Entering a roll immediately following a loop, with the model heading back up, works better and looks great.

Summary

So, not only an easy-to-fly low-wing model, a fun model too. As you may gather, Ryan's Daughter shrugged off the blustery conditions without any effort whatsoever. If it weren't for the windsock standing straight out from the pole, you wouldn't have known there was any wind. This will definitely be the model I fly when all my others are grounded by too much wind. The more I fly it, the more I like it!

RCMW

Contact Details

Peter Rake
Email: peterrake@aol.com