

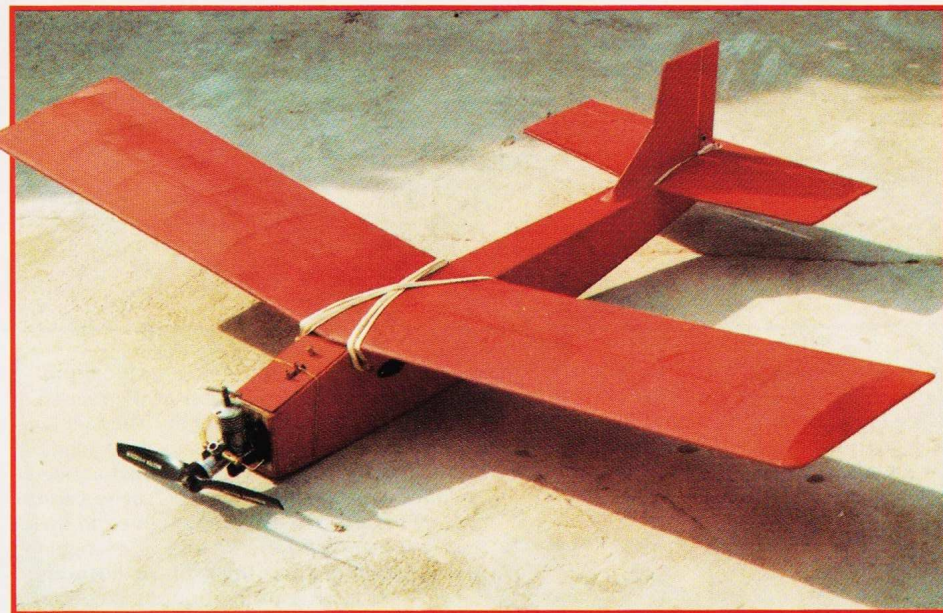
RHUBARB

Luckier than most, I have the opportunity to fly my model aircraft whenever I want near our farm cottage. Unfortunately the field I'm allowed to fly in is far from suitable. It is fairly small, gently sloping and surrounded by menacing, plane-grabbing trees (my brother's glider has already been victimised by one such tree). Trying to fly your average sports plane around these obstacles, especially when coming into land, is a bit of a handful, so what I needed was a small, easy to fly and manoeuvrable model capable of flying from this site.

My first reaction was to sift through a pile of free plans I had collected over the past few years, to look for a suitable model but nothing really fitted my exact needs. After a lot of thought, the decision was made to design the Rhubarb. The advantages of small models have been well explained in columns like "Weekend Pilot" and "Engine Bay", but the question was how small to make it? I had a spare old P.A.W. 80 (no throttle) out of a broken control line plane and also a set of Fleet Micro Radio gear extracted from a hand launch glider, so I thought I would design it around them.

Small models can often be twitchy and difficult to fly (ever seen Bob Ryan's micro

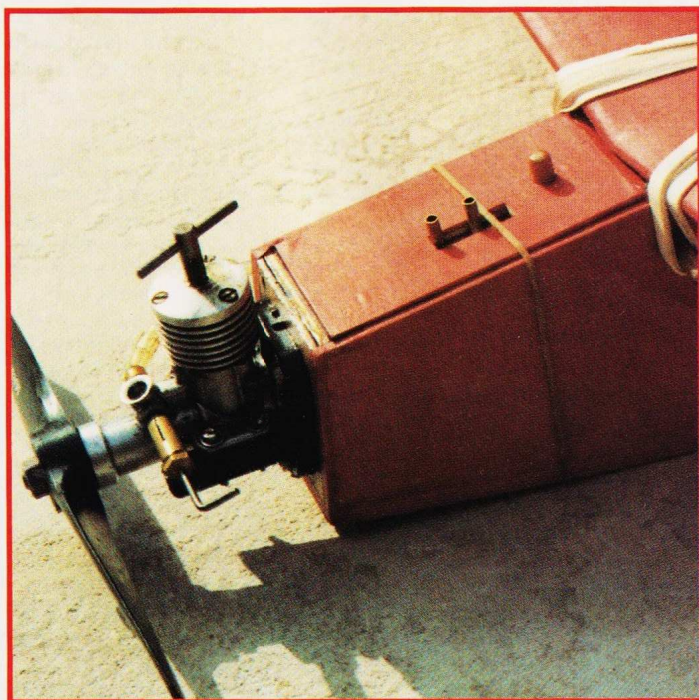
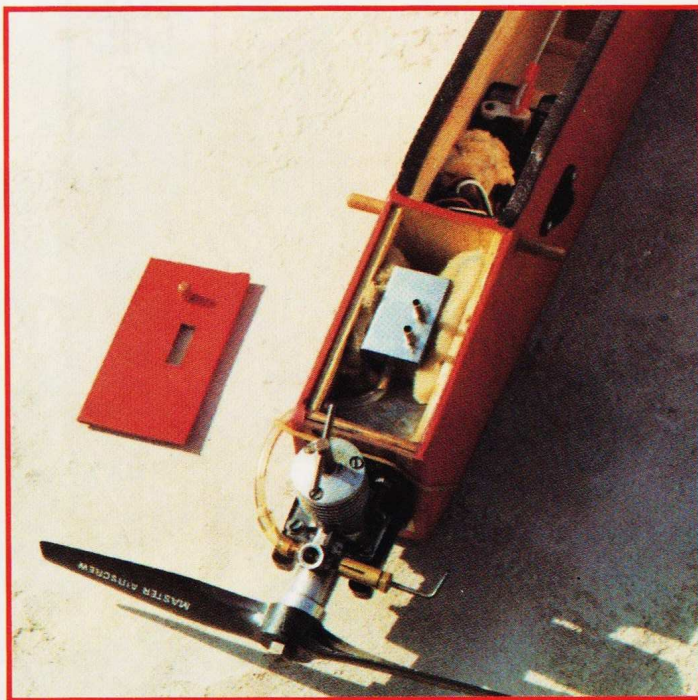
Frustrated at the need to fly in small fields, Tim Rose took matters into his own hands and designed his own answer.

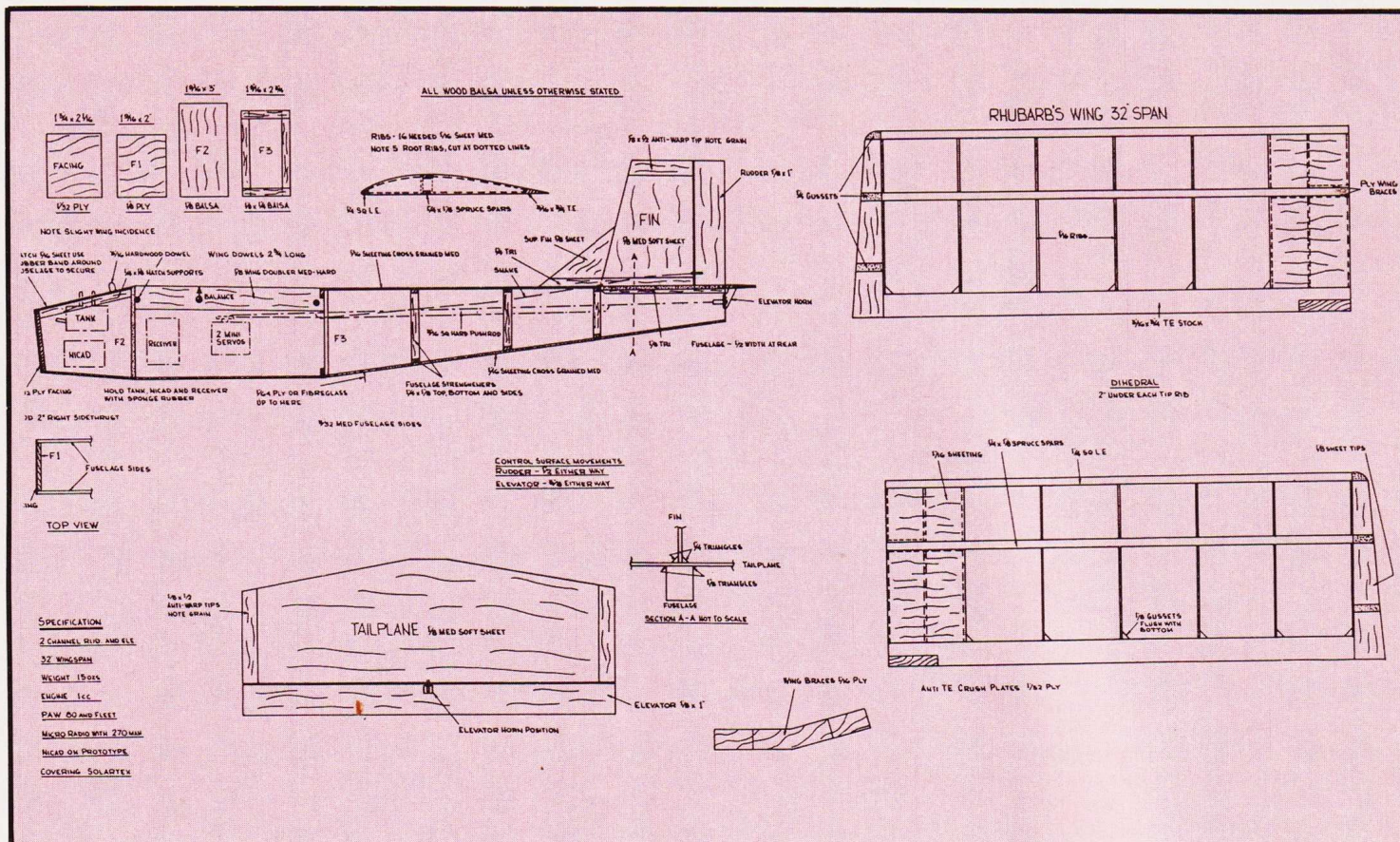


The engine used on the prototype was a PAW 80 which provided ample power for the model. Any engine in the 1cc range will be fine although you may need to adjust the thrust lines if you use a more powerful engine.

Of a simple box design and traditional built up wing, Rhubarb has proved both light and very rugged. This is a design that will fly better the lighter it is — builders take note!

The general layout is fairly straightforward using micro gear. The tank bay could happily hold a small, commercial tank although the battery pack was sited here to balance the model.





fly? — how does he do it!). The Rhubarb had to be stable and easy to fly so I employed large tail areas and moment arm into the design, using the theory of trainers. The rest of the plane is fairly standard.

Construction

The Rhubarb is very quick and easy to build and shouldn't present any problems to someone who has built a few models before. As with all models, especially small ones, try to keep Rhubarb as light as possible. Careful wood selection will help here as well as lightweight radio gear. I used cyanoacrylate glue for most of the construction, except in high stress areas such as the nose and wing joints where I used 5 minute epoxy. The ready to fly weight turned out at 15oz, but anything up to 20oz will be OK.

Fuselage

The fuselage is made up of a simple box section. First of all, using medium grade balsa, cut out the two sides, wing doublers, formers, strengtheners and hatch supports. Make up F3 using $\frac{1}{4}$ " x $\frac{1}{8}$ " balsa. Then glue the wing doublers, hatch supports and strengtheners on to the fuselage sides making sure you have built a left and right hand side.

On to either side, glue the formers F1, F2 and F3 in their correct positions ensuring that they are at right angles to the sides. Use 5 minute epoxy for the plywood F1. Once completed, attach the other side to these three formers and then glue on the $\frac{1}{16}$ " ply bulkhead facing.

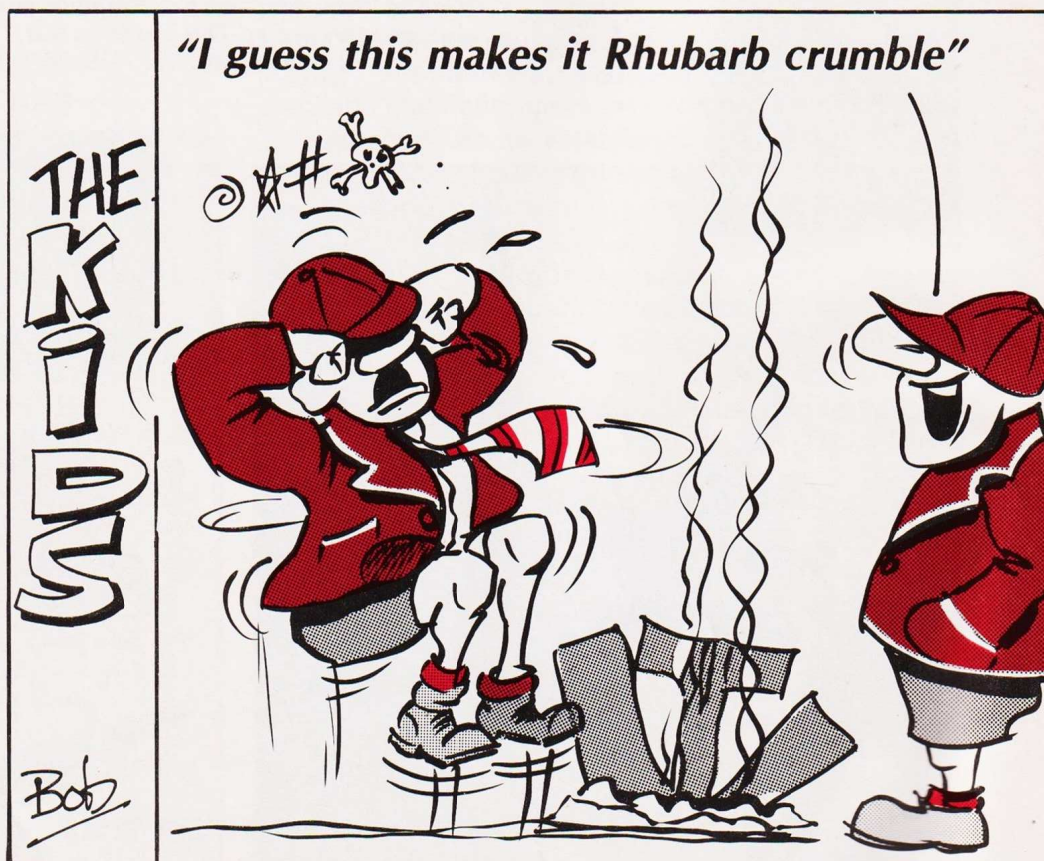
The tailplane, fin, elevator and rudder can now be cut out of light $\frac{1}{8}$ " sheet balsa and made up. The $\frac{1}{2}$ " x $\frac{1}{8}$ " tips on the tailplane and fin have the grain running in the opposite direction. This stiffens them and also prevents them from warping.

Using a piece of scrap $\frac{1}{2}$ " balsa block pin the fuselage sides together at the rear so they are positioned correctly. The tailplane can now be glued on to the fuselage, making sure that it is horizontal. Once this has been done, the top sheeting of $\frac{1}{16}$ " balsa can be added grain crosswise. Next glue the fin in position and add the $\frac{1}{4}$ " and $\frac{1}{8}$ " triangular pieces to strengthen the fixing of the fin and tailplane. Leave out the bottom sheeting until the radio gear has been installed.

The hatch is simply made from $\frac{1}{16}$ " balsa

with a small cut out for the tank tubes. A small piece of $\frac{1}{4}$ " dowel is inserted into the hatch to make it easy to hold.

Drill the holes for the $\frac{1}{4}$ " wing dowels, but don't glue in the dowels until the fuselage has been covered. I skinned the bottom of the fuselage with $\frac{1}{64}$ " ply to protect it when belly landing. Fibreglass and resin would be just as good. Give the fuselage a final sanding and round off all the edges of the tail end. It is now ready for covering.

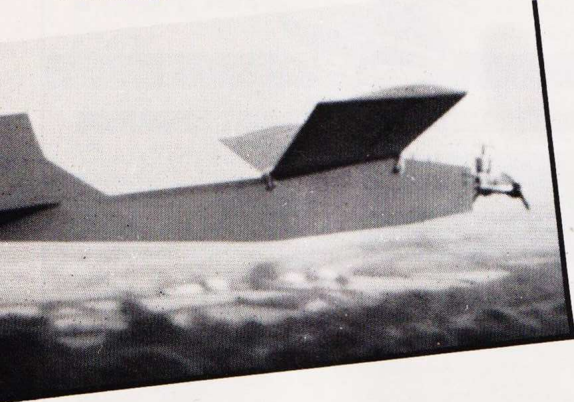


Wing

The Rhubarb's wing is quite strong and also fairly light. This is due to a built up structure incorporating spruce spars. The ribs are made using the sandwich method with two 1/16" ply wood rib templates. The five root ribs have to be cut as per plan, to allow for the wing centre sheeting.

Pin down the leading edge, trailing edge, centre sheeting and lower spar. Add all of the ribs except the root rib ensuring they are at 90°. Then glue on the top spar, wing tips and all gussets. When both wing panels are completed, they can be joined using the 1/16" ply braces and 5 minute epoxy. Put one panel flat on the building board and raise the other 4" high at the tip rib. After joining, add the centre rib, top sheeting and 1/32" ply pieces which stop the rubber bands crushing the trailing edge.

On the prototype, I added 1/4" wash out at each tip, measuring from the trailing edge down to a flat surface. You can build this in during construction by packing up the trailing edge at the end with 1/4" scrap balsa, or you can incorporate it when covering the wings. Once covered, bend the tip up from the trailing edge and shrink out the wrinkles from the covering, until the correct height is obtained.



Engine

As mentioned earlier, I used a standard P.A.W. 80 diesel engine for the Rhubarb, this having a capacity of .8cc. Any engine around 1cc — diesel or glow — should be OK. Beam mounted engines like the P.A.W., will need a small engine mount, but this presents no problems. Radial mounted engines like the Cox's should be fine. Downthrust is built in to the fuselage although it might need a bit of fine tuning depending on the engine. Use small washers behind the mount to set the engine at the desired angle. I would also recommend about 2° of right side thrust, again use washers.

I used a small 7 1/2cc soldered tin fuel tank held in place by sponge rubber behind F1. This tank held about 3-4 minutes of fuel, which was quite sufficient. Cox engines and similar, with built in tanks, would avoid the complication of fuel tanks.

As the Rhubarb was built for flying rather than looks, I didn't bother with a cowl, to simplify setting up the engine.

Installation

Micro radio is not essential for the Rhubarb. Standard radio can fit, although the fuselage sides might need widening slightly. Obviously the smaller and lighter the radio

gear, the better. Try to use at least a small battery pack to keep down the weight.

The servos are mounted on plywood rails reinforced with balsa at the sides. I used a push rod for the elevator and a plastic in plastic snake for the rudder, taken above and in front of the tail plane. Make sure all linkages are free when using micro servos. The control surfaces are hinged with very small pinned hinges, although Mylar hinges would be more suitable as the wood is only 1/8" thick. Make sure the battery pack is wrapped up well to absorb vibration and is protected from oil if placed in the tank bay, as mine was, to obtain the correct centre of gravity. Cut a small hole in F2 to take the battery pack lead going to the receiver.

Covering

Unusually, I covered the model completely in red Solartex. This might be a bit heavy for small models, but heat shrink fabrics are considerably stronger than the films, so I

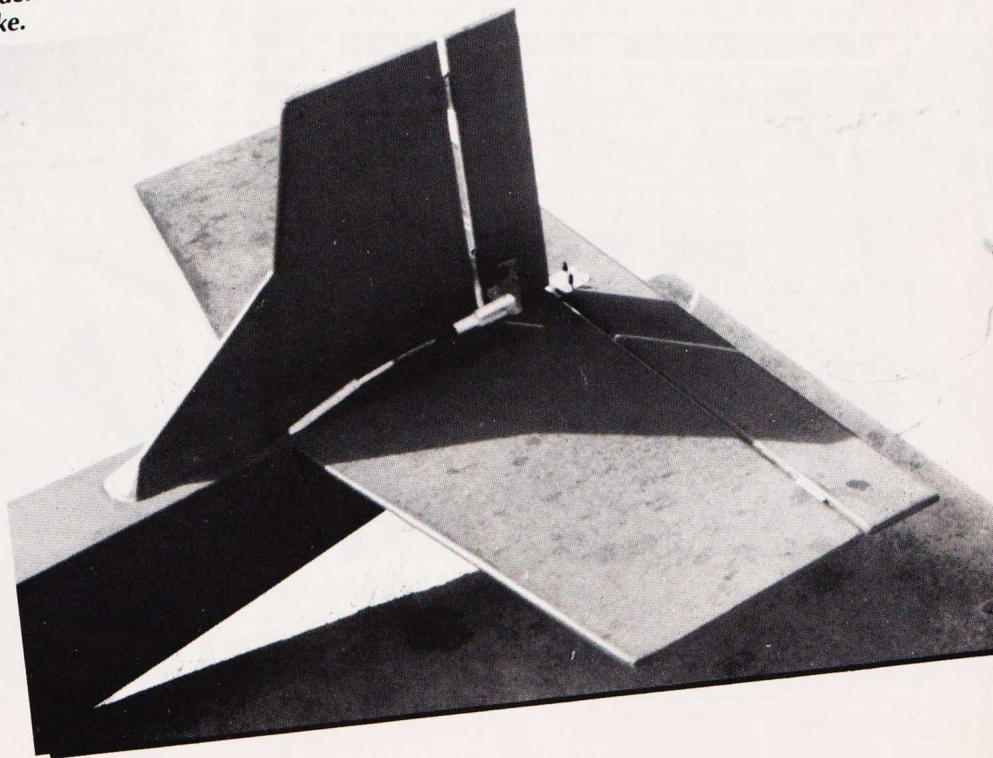
decided to accept the weight penalty for the strength. Film or tissue would be alright for the fuselage, but I would recommended a heat shrink fabric like Solartex for the wing, especially if it is going to be flown in rough fields. I gave the Rhubarb a double coating of clearcoat around the nose area and the fuel tank to stop any fuel seepage.

Flying

It is best to test fly the Rhubarb without the engine running. A firm hand launch should result in a flat glide. Next try it with the engine going. For its size it flies fairly fast, but compared with 40 powered sports planes it is quite slow.

Once trimmed out it is easy to fly and very stable with that large tailplane. When up elevator is held in to make it stall, it just hangs around, nose high and gradually drops or mildly stalls. There is no sign of tip stalling at all.

The tail end of the model is all sheet with cross grain tips to prevent warping and impart extra strength to the structure. Rudder control was via a plastic in plastic snake.



The Rhubarb can turn very tightly enabling it to be flown from small places, which was the original intention. Although aerobatics were not its main function, the plane will loop and stall turn easily and just about do a roll.

I have flown it with a 20 foot streamer made from strips of tissue paper joined together. The idea of 3 or 4 Rhubarbs combat flying in a small space, where the aim is to cut your opponent's streamer with your propeller, would be very exciting to fly and watch.

The glide of the Rhubarb is quite good and flight times can be extended by climbing to a height before the engine cuts.

As an experiment I fitted a 45½" wing from my Starling H.L.G. (published a few years ago in RCMW) on the Rhubarb, as the wing chords are about the same. With this wing,

the glide was superb, much slower and flatter. On one hot calm afternoon, I had a 25 minute thermal flight with this wing. As the Rhubarb is very stable, the wingspan could be increased up to about 45" for a better glide. This could be simply done by adding more rib bays. The model is still surprisingly manoeuvrable, even with a longer wing.

At the end of the first test flight it was grabbed by one of those trees I mentioned! It fell out from about 20' and landed undamaged, which goes to show how strong and rugged it is.

If you decide to build Rhubarb, feel free to modify anything to suit your needs, as it is a very versatile and simple design. Have fun! □

