FULL SIZE PLANS

STUBBLE JUMPER

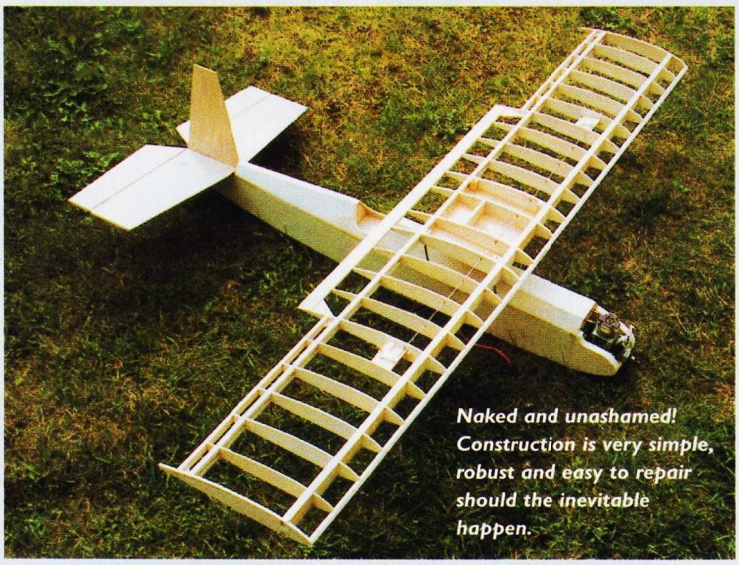
A rough field, easy-flying R/C sports model for 0.15cu.in. motors, designed by Peter Miller and built by Dave Perryman

This design started out as a doodle of a simple way to make cabane struts. I then added an aircraft to this sketch, then the drawing became ever more complicated with slots (and slotted ailerons), even flaps. I wore out two erasers playing with the design.

At about the same time that I got fed up with the complications, friend and fellow club member Dave Perryman expressed an interest in building from one of my designs: he really needed a model that was relatively easy to fly, with good low speed handling to practice approaches, and yet still be capable of mild aerobatics. He also wanted something fairly quick to build and which was capable of being operated from one of our rougher sites.

A quick re-draw of my 'doodles', and we had a nice little parasol wing model with plenty of wing area, simple construction, attractive looks and - hopefully - when powered with a .15cu.in. engine, the desired performance.

Now Dave is still learning to fly, but he has built a number of models, all from plans. He has only recently built his first kit. Not only that, but he builds well and his covering is excellent - rather better than mine, I have to admit. No worries about handing over the plans to him, then!



Naked and unashamed! Construction is very simple, robust and easy to repair should the inevitable happen.

Construction has been kept as simple as possible because the model is designed for quick building and easy repair. There is only one area which might be considered slightly tricky, or complex: the cabane strut assembly. However, this has been designed to be as foolproof as possible and utilises motorcycle spokes in its construction. You should be able to buy these from a motorcycle dealer near you (especially one that specialises in motocross or trials machines) or look in the Yellow Pages under 'Motorcycle Engineers' for wheel builders.

If you have any trouble, you can send to Dragonfly Motorcycles of Broad Street, Bungay, Suffolk NR35 lEE. Phone/Fax: 01986 894798. They take credit cards. Mention that it is for a model aircraft.

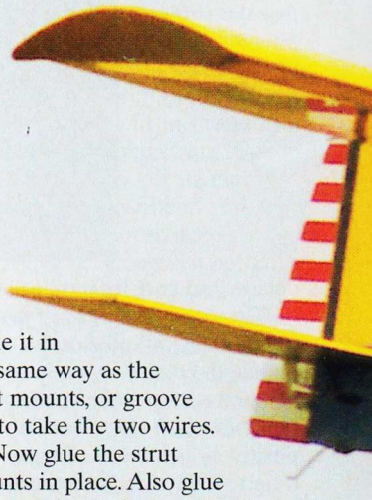
Fuselage

This needs to be built first so that the cabanes can be constructed in the jig, using the ply plate that is built into the wing later.

Construction is very conventional. Start by gluing the doublers to the fuselage sides, then glue formers F1, 2 and 3 to one side, ensuring that they are at exactly 90 degrees to the side. When the glue is dry, add the other side. Leave to dry, then pull together at the rear and glue, making sure the fuselage is straight and true: use a jig if possible. Finally, fit the remaining formers.

I used 12swg struts, but these are quite rare and you would be better off using 10swg spokes. They are very strong, but not quite as hard as piano wire.

Cut the ½in. square strut mounts and make grooves for the tubes. As an alternative, you could use ½ x ⅜in. and fit strips of plywood to build-up the groove. At the same time, cut the ½ x ¾in. undercarriage mount, you can make it in the same way as the strut mounts, or groove out to take the two wires.



Now glue the strut mounts in place. Also glue in the undercarriage mount and drill for the U/C uprights. Cut the slotted ⅛in. ply pieces which take the uprights of the U/C legs: note that the slots must be staggered to allow for the slight displacement of the Undercarriage wires.

Alternatively, you can glue the ¼in. ply in and drill together with the main U/C mount, just be careful not to drill out the side of the fuselage...

Cut the brass tubes for the cabane struts to length and epoxy into the slots so that the ends are flush with the fuselage sides: make sure that they are level with the top of the mounts and parallel to each other.

Mark out, cut out and drill the 1/16in. ply plate that fits in the wing. Cut out the two strut jigging pieces, using scrap Liteply for these.

Now tack-glue the jigging pieces to the fuselage: they should locate neatly between F2 and F3 and rest on the strut mounts. Bend the struts as shown, then slide into the tubes and wrap some thin copper wire round each

strut before sliding a washer onto each strut. Fit the ply plate, making certain that it is horizontal and not twisted in any way: it should now be tack glued to the jigging pieces. Leave to dry.

Turn the model upside down, slide the washers into contact with the ply plate, and slide the copper wire up to the washer. Solder securely.

Next, bend the strut diagonals to fit, bind in place and solder - taking care not to move the washers. That done, remove both the ply plate and the jigging pieces. Remove the struts until the model has been covered.

Fit the control snake outers and then add the turtle decking, the ply tail skid mount, the tailplane platform and the 1/16in. sheet fuselage bottom with the grain running across the fuselage width.

Prepare the 1/16in. ply hatches which cover the forward part of the fuselage bottom. Fit strips of 1/4in. square hardwood to the edges of the fuselage to take screws that hold these in place.

Note that if larger servos are used, you may have to mount the receiver behind F3, now is the time to decide on this.

Temporarily install the engine and build the cowl from 1/2in. sheet: at this stage you can also temporarily fit the fuel tank, etc.

The tail is made from soft 1/16in. sheet. Cut out the components (if you don't have 4in. wide balsa, then join the parts), then round off the edges.

It is a good idea to fit the struts and plate now to make sure that the tail lines up with the wing. You could glue the tail on now, but it is easier to cover everything first. Remove the covering from areas to be glued, and stick it on later

Wing

The wing is very easy to build: there is no dihedral and no sheeting - and because there is no sheeting, it is flexible - so care must be taken when covering to avoid warps.

Pin down the lower main spar, the 1/16in. ply plate and the rear spar. Now, fit the ribs followed by the top spars. Slot the trailing edge and fit in place. Next, add the leading edge and glue-in all the webs.

Fit the aileron spar followed by the aileron leading edge and aileron ribs: add all the 1/8in. sheet gussets and the ply horn mounts.

Glue in place the 3/8in. square hardwood blocks which take the ends of the struts. Drill these out, once glued in place, by drilling through the holes in the 1/16in. ply plate, turn the wing over and then *very carefully* counter-bore the holes to take the spoke nipples: do not take this larger drill right through the block.

Now glue in the bellcrank mounts before fitting the bellcranks and pushrod. Cover the top of the centre section with 1/64in. ply: this goes over the leading edge, spars and trailing edge. Cut away the servo bay area, which will be covered with a removable hatch - also made from 1/64in. ply.

Finally, fit the tips, add the 1/16in. balsa sheet for the aileron pushrod exits, and then sandpaper the wing smooth.

Covering

The model may be covered in any material, but *Solarfilm* is my personal recommendation. You could use *Solartex* for the wing if a .15cu.in. engine is used

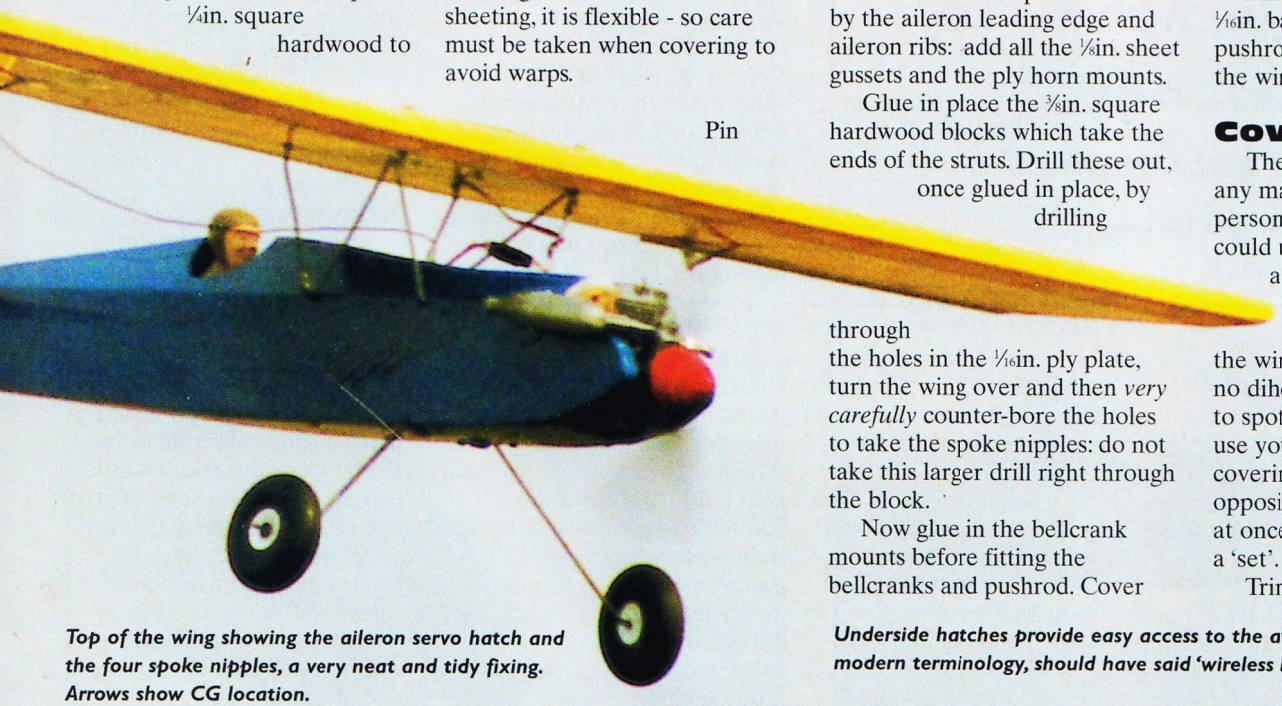
Be very careful to avoid getting a warp in the wing. Because the wing has no dihedral, warps are very easy to spot: if one has crept in, then use your heat gun on the covering and twist in the opposite direction to remove it at once, before the wing can take a 'set'.

Trim was done with *Solartrim*.

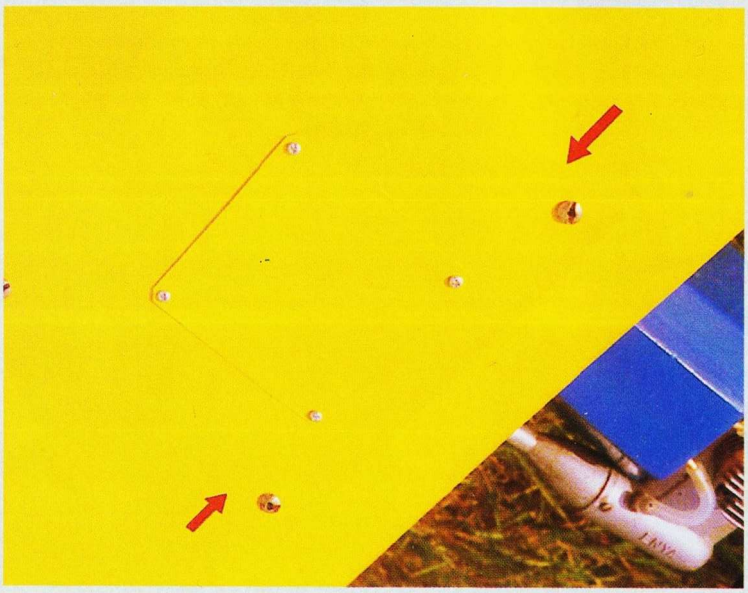
STUBBLE JUMPER

Specifications

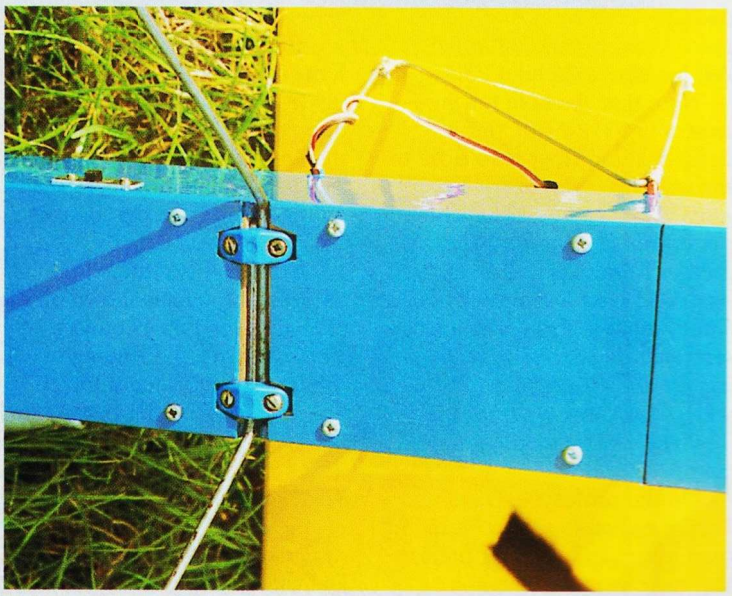
Type:	R/C sports
R/C functions:	Engine, elevator, aileron and rudder
Power:	0.12-0.15cu.in. 2-stroke
R/C equipment req:	Standard R/C system, 4 x standard servos
Wingspan:	49¾ in. (1264mm)
Wing chord:	Root: 9in. (230mm)
Wing section:	Flat bottomed, 11% thick
Wing area:	446sq.in.
Tail section:	Flat plate
Finished weight:	3lbs 1oz (1389g)
Wing loading:	15.8oz/sq.ft
Control throws:	Aileron - 9mm up, 6mm down Elevator - 12mm up, 12mm down Rudder - 25mm each way



Top of the wing showing the aileron servo hatch and the four spoke nipples, a very neat and tidy fixing. Arrows show CG location.



Underside hatches provide easy access to the avionics bays. Sorry, that's modern terminology, should have said 'wireless bay'.



Enya SS 15 is more than enough power for this light model. You can mount it upright rather than canted over if you prefer.

Dave chose a common but very effective semi-scale scheme that suits the type of model, but there were many similar `planes flown by the French and Germans, not to mention modern home-builts, so take your pick.

Installation

The wing struts are slid into the tubes: if the tubes are a good fit they can be left loose, otherwise epoxy them in place.

The servos can be mounted in either of two ways. If you have smallish servos, they will fit three abreast, larger servos may have to be installed with the rudder and elevator servos side by side and the throttle servo across the fuselage in front of them. If you use this arrangement the receiver will have to go behind F3.

Note that the hole for the snakes in F3 is a slot, this is because the former is so close to the servo that the snake will move from side to side slightly as the output arm rotates. The battery is located under the fuel tank, and the receiver positioned where there is space. The aileron servo is fitted in the wing. I suggest the *Radio Active* clips, which allow the servo to slide down and be held with a small clamp.

On the prototype, Dave Perryman found that he could fit the battery and receiver under the tank: just wrap them in plastic bags to protect them from fuel leakage.

The position of the aileron horns will give slight differential aileron movement. Fit the snakes and set up the elevators with ½in. throw each way, rudder at least 1in. each way and the ailerons should have ⅜in. up and about ¼in. down: the latter will depend on the amount of differential.

Slide the undercarriage into the holes and hold with flat clamps. Fit a tailskid: this can be a strip of dural held on with self tappers, or a bent wire skid . Another alternative would be to fit a steerable tailwheel if you plan to fly off smooth surfaces.

Hold the tank in place with some foam padding: don't pack it tightly, just enough to stop it flopping about. The engine is shown fitted tilted over at an angle - you may not need to do this, it depends on the silencer fitted to the engine.

The completed model balanced exactly as shown on the plan and weighed 49 ounces which gave a wing loading of 15.8 ounces per square foot, a figure that I consider perfect for this type of model.

Coming past the full size hangars, this could be a scene from the `30s.

Flying

The day of the test flight turned out to be ideal: warm, dry and with a very gentle breeze. This must be almost unique, because it was also the BMFA Nationals weekend!

After taking the ground shots, the motor was started and the first flight made by Stuart Pickett, who flies all my models while I take the flying pictures. Stuart soon had the model cruising past and banking round us. Once the photos had been taken, he put it through a few aerobatics and said that it was a nice model.

I took over and found that loops were easy, rolls were surprisingly axial, and that the model could be flown inverted with a little care. Next, I tried the low-speed handling. I throttled back to a tick over and then fed-in 'up' elevator until I had full travel. *Stubble Jumper* wallowed around, nose high. Every so often, one wing would drop gently and the nose would fall off to one side - but as soon as the model had regained a little speed, it could be picked up again. During this, full up elevator was still held in.

The model will spin nicely and comes out in half a turn. The glide is long, flat and slow. Coming in to land on longish grass, one just holds in some 'up' to slow it down, the wheels dig in and it gently flips onto its nose.

OK, so we can fly it - how will Dave like it? Well, he was soon enjoying himself immensely, doing aerobatics and generally throwing the model all over the sky. He said that he felt more confident flying this model than any previous one. He went home a very happy modeller.

The *Enya SS15* provided more than enough power, and I am sure that *Stubble Jumper* would fly very nicely on a .12cu.in. DO NOT try fitting anything bigger than a .15 though, it would destroy the character of the model.

Summary

This model has met all the design criteria and would make a great follow-on from a basic trainer, in fact it is easier to fly than many so-called trainers.

With about 1½in. of dihedral under each wing tip, it would make a good basic trainer but the builder would need a little experience in construction. Apart from the training aspect, it is a great model for flying from rough fields on those quiet summer evenings, or frosty winter days, and it is small enough to fit inside most cars in one piece.●

Builder Dave Perryman and 'Stubble Jumper' ready to go. Kink on the top decking was due to a drawing error on Peter's part, now corrected.