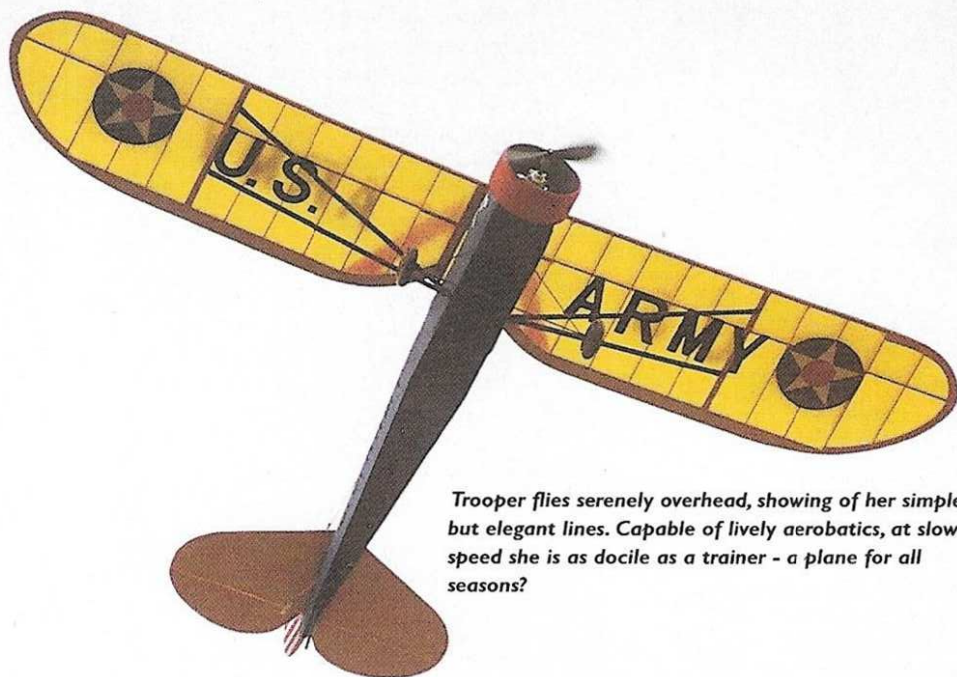


TROOPER

A sports model with a touch of the 1930s trainer. Designed by Peter Rake for geared 400 electric power



Trooper flies serenely overhead, showing off her simple, but elegant lines. Capable of lively aerobatics, at slow speed she is as docile as a trainer - a plane for all seasons?

This model came about as the result of a sketch I made whilst on holiday.

I have attempted to make the construction of the model as straight forward as I possibly could, whilst still managing to end up with an attractive end result. This includes making the model a one-piece structure. Don't be put off by this though, she is more than capable of withstanding the bumps and knocks of regular day to day flying. Over the years I have found that simple models often work out to be light models, and light models fly better and suffer less damage than heavy ones. So please, don't be tempted to 'beef up' the structure at all, it really doesn't need it.

Equipment

The motor/gearbox unit is one I hadn't tried before. It is the one that Multiplex suggest for their Hummel model, and very

reasonably priced it is, too. For around the £14, you get the motor, gearbox, propeller driver and a propeller. It's true that the propeller is a bit smaller than I would normally use on a model of this type, but if it is supposed to fly the Hummel, then it should be fine. It's easy enough to change if not.

The urge is provided by a pack of 7x700AR Ni-Cad cells. That decision was made for me by the need for some nose weight. I would normally use 500AR cells, but I used the heavier 700s instead of adding lead. Don't try to save money by using cheaper cells, it will only work out more expensive in the long run. I have yet to find a cell that comes even close to the Sanyo AR for efficiency and durability.

Control functions on my model are provided by a Jeti 4 micro Rx., two 9g servos, available under various brand

names, and a Kontronc Easy 1000 speed controller. This economic and very reliable combination provides us with an airborne control system that weighs less than two ounces and costs very little more than standard size equipment. You could of course use a standard size Rx. and mini servos if they are what you have, but no standard servos please.

So, having dealt with the hows, whys and wherefores of the model, let's get down to some serious building.

Wings

Begin wing construction by building the centre section complete with $\frac{1}{16}$ " ply dihedral brace. At this stage the brace is nothing more technical than a $\frac{1}{2}$ " wide strip of ply. Once this assembly, which should have taken all of ten minutes, is dry, the wing panels may be built.

Before starting construction,

notch the spar for the wing tip and taper it down to meet the tip. The taper should only run from the most outboard complete rib. Now pin down and glue together the wing tip pieces, the trailing edge, the spar and the leading edge. Build up the curved, inner section of trailing edge with layers of $\frac{1}{4}$ " balsa sheet to match the height of the cut down root rib. All of the wing ribs may now be glued into position. The tip rib is formed from a blank which is cut to fit over the spar and tip pieces, and is trimmed to shape in situ. Add the $\frac{1}{4}$ " x $\frac{1}{8}$ " strut mount pieces, allow the glue to dry, and then trim and sand the wing panels ready for joining.

Pin the c/s firmly down to the board before gluing the wing panels to it. Five minute epoxy is a good choice of adhesive for the job, but don't mix it until you have all the parts ready to join. Pin down each wing root snugly against the c/s and pack up each tip $\frac{3}{4}$ ". Once the glue has set, the ply brace is simply trimmed off flush with the bottom of the wing panels. I find that this method avoids any temptation to align the wing panels with the brace rather than with the c/s.

Tail surfaces

Since you probably feel that you deserve a rest after cutting out the wing ribs, I'll deal with the easiest part of the whole model.

You have a choice with the tail surfaces, they may either be built-up, as shown, using $\frac{1}{8}$ " balsa sheet and strip, or cut from firm but light $\frac{3}{32}$ " balsa sheet. I have used both methods and find that whilst the built up version is lighter, it is more likely to warp if you are using film to cover the model. The built-up surfaces should be covered with something that will shrink less aggressively, such as Litespan.

On my model the control surfaces are hinged with film, top hinged on the elevators, and side hinged on the rudder. This is the best method on the sheet surfaces since they are quite thin, but the slightly thicker built-up surfaces may be hinged using Mylar hinge strip. No doubt, however, you have your own favourite hinging method.

Whichever mode of construction you use, all finished assemblies should be sanded over all, have the edges rounded

and the elevators joined. At which point, they are ready to cover.

Cowl

The exact size of the cowl is not really that important, so just use whatever size former you have to hand. My cowl was formed around a glass jar that had been wrapped with polythene to prevent sticking. PVA is probably the best adhesive for this job, but do allow plenty of drying time before removing the cowl from the former. The cowl may then be sanded to shape and covered,

up the two sheet sides, complete with the c/s struts and join them with F1, F2, the motor plate and the u/c plate. Take great care to ensure that the structure remains perfectly square. If it isn't, your wing seating won't be either. While this assembly is drying, make up the two rear built-up side frames over the plan. Once the glue is completely dry, the rear fuselage box may be assembled, again over the plan. Make sure that this assembly is also square, as well as straight, and allow to dry. The two basic box sections are now joined over the plan to provide the basic



Above: The Multiplex motor/gearbox/prop combo that suits this model perfectly. The cowl couldn't be simpler - note the lead weight epoxied to the inside lower surface - as far forward as you can get.

or sealed and painted, as preferred.

The cowl on my model is glued onto hardwood mounts attached to the fuselage front, but you could equally well screw it to the mounts, as indicated on the plan.

Fuselage

As any of you who are familiar with my models will know, I feel that the best way to achieve a straight fuselage is to build it as follows.

Make

the fuselage assembly. Once the glue has set, we can proceed to give it some shape.

Glue formers F1A, F1B and F2A in place and then add the 1/16" sheet deckings. Bind and cyano the u/c wires in place and then add all the in-fill pieces. It will strengthen the rear of the fuselage, and make it easier to handle, if the remainder of the formers and all the stringers are fitted at this point. Tack glue the balsa nose blocks in place and then trim and sand the entire fuselage to shape. Remove the nose blocks and hollow them out. The motor unit and speed controller should be fitted at this stage, and then the nose blocks should be glued firmly in place.



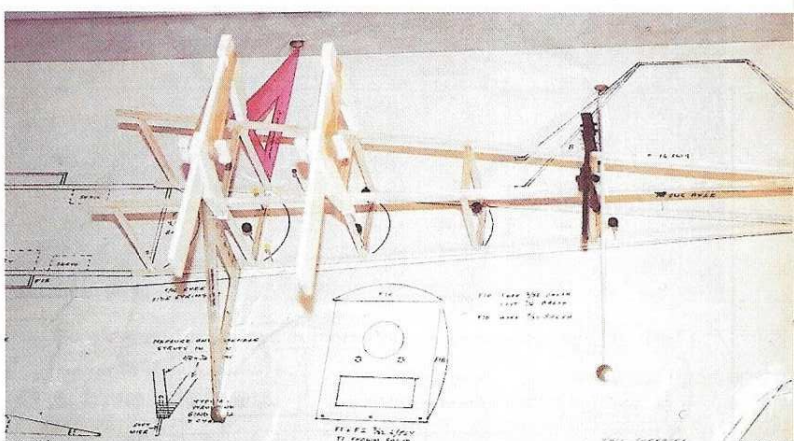
Bind and solder up

the u/c, cut out the cockpit, fit the snake outers and finally check that no more sanding is required. We're finally ready to start getting our model dressed.

Covering & Finishing

The prototype model is covered in a combination of film and Litespan, Flag Blue Solarspan for the fuselage and yellow Litespan on all flying surfaces. The markings are a combination of film/ paint and trim tape all matted down, as is the rest of the model. If the film is treated with Prymol first, the paint and varnish will take quite well. All paint work is Humbrol enamels.

There isn't really too much detailing that can be done on this model. A pilot figure, some tail surface rigging and perhaps some panel lines is about it. The model really relies on its' colour scheme for character and so can be kept fairly light.



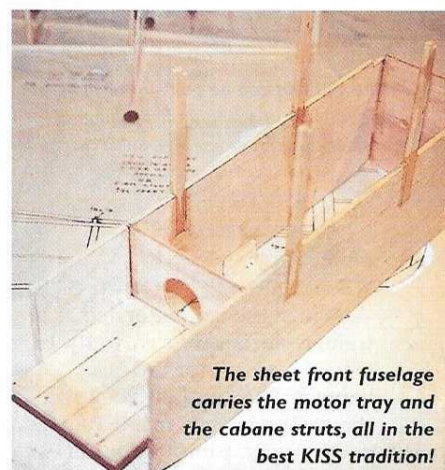
Peter's method of building two fuselage halves separately, then joining, makes for a true assembly.

Assembly

Obviously the first job here is to fit the wing to the c/s struts with epoxy. Do take care to ensure that this assembly aligns accurately since everything else will use it as a guide. The wing struts are made up actually on the model. Measure the length of both front struts first, take the average length and make up the ends as shown. These two struts may now be glued into position on the model. Now make up the two rear struts in a similar fashion and bind and glue them in place. This will now make the wing to fuselage fitting very firm indeed.

Hinge the control surfaces to the tail plane and fin, and now these may be epoxied in place using the previous assembly as a

FREE PLAN . . .



The sheet front fuselage carries the motor tray and the cabane struts, all in the best KISS tradition!

guide to alignment.

Don't fit the 1/32" ply access hatch yet or it will get in the way while the radio gear is being fitted. Once my installation was complete, the hatch was hinged at the front with tape and retained at the rear with a wire in tube type catch. All very cheap, simple, and effective.

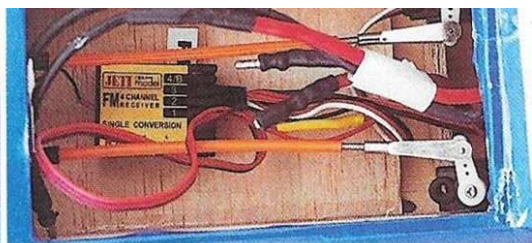
Installation

This really couldn't be a great deal simpler. Since the snake outers are already fitted, fit the control horns to the rudder and elevators, make up one end of the snake inners and slide them into place. Add the adjuster and clevis to the forward ends of the snakes, tape the servos to the fuselage sides with the arms at neutral, and snap the clevises onto the output arms. If you smear the balsa with epoxy and allow it to go tacky before pressing the servo tape against it, you will find that it will hold much better. My Rx. and speed controller are retained in a similar fashion.

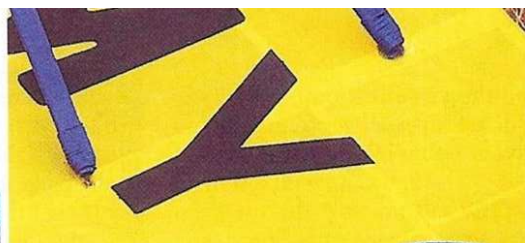
Use the weight of the Ni-Cad pack to help achieve the correct balance and then fix it with a



The tail end can be built-up or light, but firm sheet. Use tape side and top hinging for the rudder and elevator - couldn't be simpler!



Access to the electrics is through a hatch on the bottom of the fuselage - note the use of micro servos - keep that weight down!



Trooper is a one-piece model, so the struts are fitted permanently. The addition of a tidy colour scheme really adds character.

small amount of silicone sealer.

Airborne Trooper

Whilst she isn't intended as a trainer, she is very easy to fly. In fact, if it wasn't for the lightweight nature of the model, she would actually make quite a good trainer. But this doesn't mean, by any means, that she is boring to fly. Take-offs are very 'laid back' affairs, and are followed by a steady and stable climb out. Turns can be as sedate, or otherwise, as you care to make them, and loops, stall turns and a rudder/elevator flick role are all within her scope. In other words, she is a relaxing to fly model that will provide a bit of excitement should you so desire. Which ever way you

choose to fly her, she's fun.

'Dead stick' landings pose no problems, her glide is quite good and she will sink in nicely. I wouldn't recommend holding her off for too long though, since she may stall on you. Whilst under normal circumstances this wouldn't be a problem, it's not funny if she's only a few feet off the ground at the time.

Flight times well in excess of eight minutes are to be taken as the norm, and she remains well-behaved throughout the flight. She is definitely all I'd hoped for from such a light and inexpensive model, and a lot more besides.

Try one for yourself and you'll see what I mean. ●



Specifications

Name:	Trooper
Type:	Sports semi-scale electric
Designed by:	Peter Rake
Wingspan:	48" (1220mm)
Area:	328sq.in.
Weight:	1lb. 6oz.
Wing loading:	9.3oz/sq.ft.
Wing section:	10%, flat bottomed
Motor:	Multiplex 'Hummel' geared unit
Cells:	7 x 700mAh Sanyo AR
Functions:	3 (rudder/elev/motor)