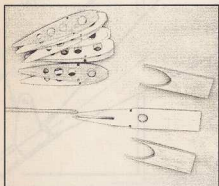
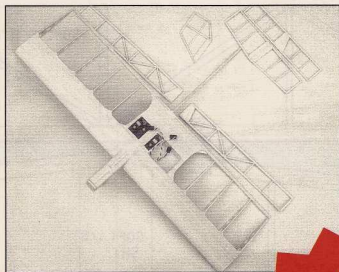
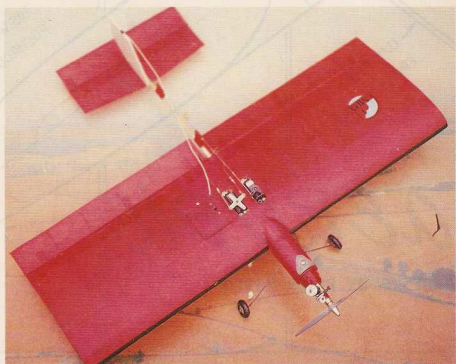


Aerobic

Are you feeling lucky, punk! Right, who out there's got the nerves to build Peter Miller's mini Fun-fly for indoor aerobics at the M.E. Exhibition?



Parts count is minimal – you could cut this lot out during a commercial break! Model is a real quickie to build.

Finished machine above and ready for covering at left; as you can see, there's just enough structure to hold everything together.

When I first introduced the American Competition Fun Fly model into this country I was amazed at the incredibly small area needed for aerobatics. My mind started clicking (and it wasn't Deathwatch beetle as suggested by some of the club members). Would a smaller version be able to fly aerobatics indoors?

For various reasons the idea was shelved until Christmas '93 when I was looking for something to build, Christmas morning and the idea rose to the surface. One week later the model was complete.

The concept is a model that will fly slowly but with very fast control response, it is roughly a scaled down Fan Dancer for the TD.010 but, due to being a little over weight and large, performance was marginal. I had foreseen this possibility and so provision was made for screwing on a TD .020.

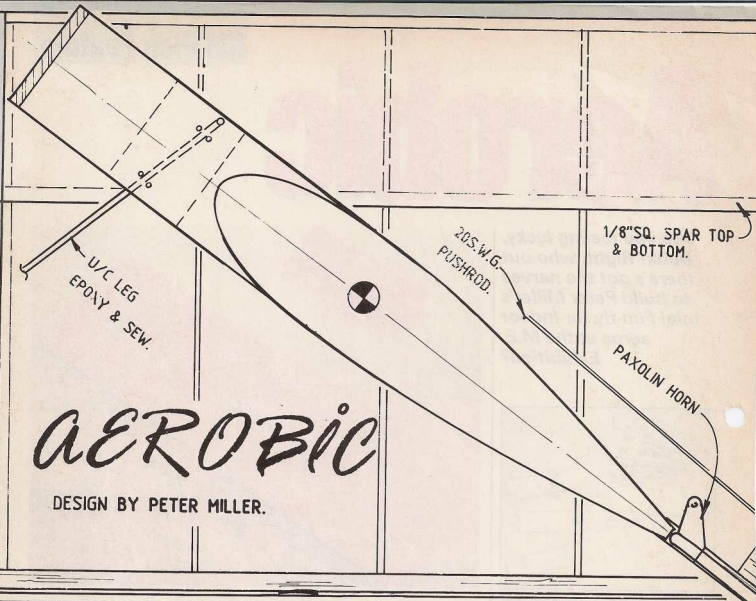
The .020 is a little too powerful but fitting the prop backwards will help, the model will also fly with the PecWee. I have not got round to trying to fly indoors, someone else can have the honour of achieving what will be a 'World First'!

Construction

Construction is simple and easy – well, there is so little of it that it can't be anything else! Cut out all the wing ribs and the centre pod. The tip ribs are soft 3/32nd sheet, the centre four ribs are medium to hard 1/16th sheet, the rest are soft 1/16th sheet. The pod is medium 1/4 sheet. If you now cut out the engine mount and soft 1/2 sheet side blocks you will have a complete kit of parts.

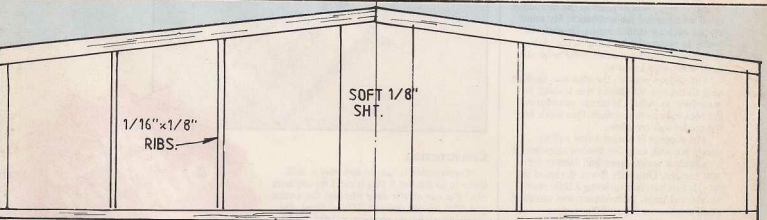
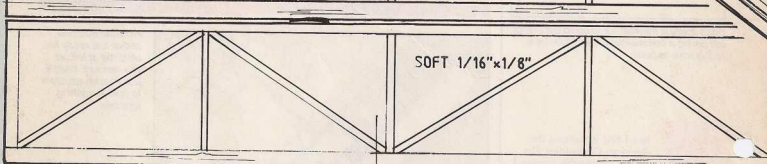
The four centre ribs and the pod need holes cut for the various leads as shown on the plan; further lightening holes can be cut

BUILD FROM OUR FULL SIZE PLANS



AEROBIC

DESIGN BY PETER MILLER.



LEAVE ALL CONTROL SURFACE T.E.'s. SQ.
TO REDUCE POSSIBILITY OF FLUTTER.

9=16"x1/8" SOFT L.E.

BATTERY

R.X.

SERVO

SERVO

1/64" PLY HATCH

SW.

S/T. SCREW

H'WOOD BLOCK

1/32" SHEETING

SOFT 3/16" SQ. T.E.

NOTE:
DUPLICATE R.X.
HATCH IF 50M.A.H.
BATTERY IS USED

SLAKE OUTER
GUIDES.

PAXOLIN
HORN,

SOFT
1/8" SHEET.

AILERONS 1/8" SQ. OUTLINE.

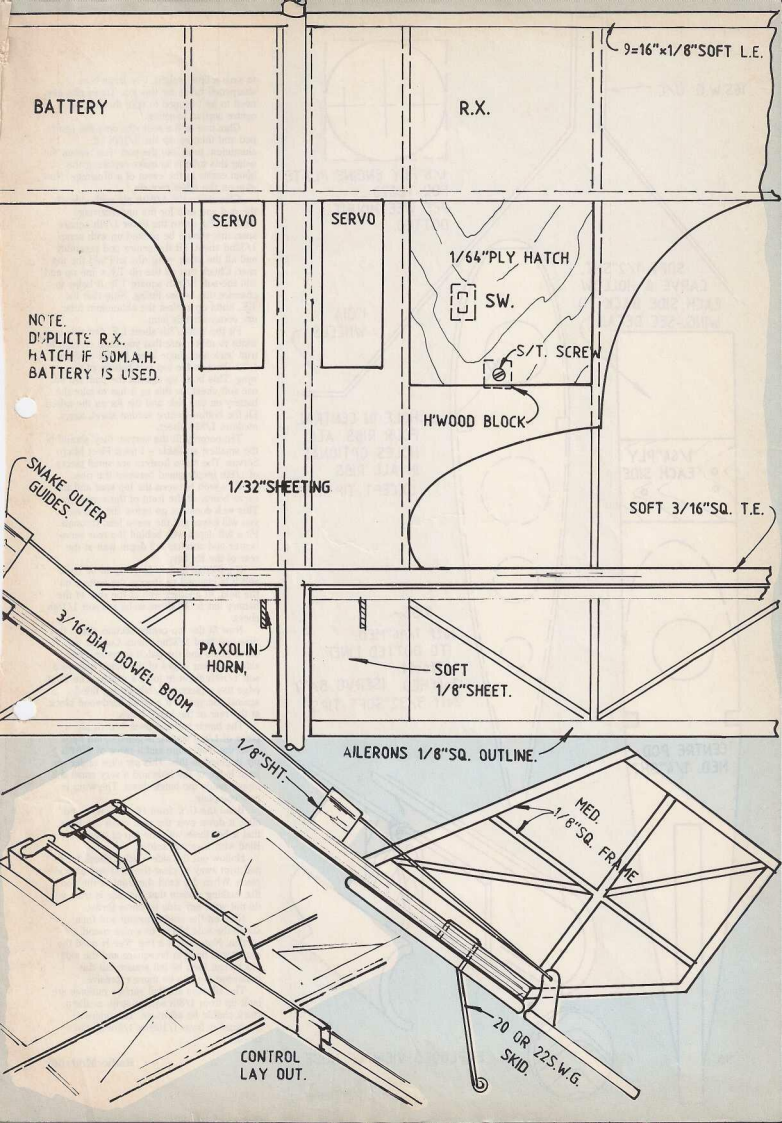
3/16" DIA. DOWEL BOOM

1/8" SHT.

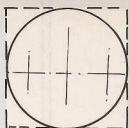
MED.
1/8" SQ. FRAME

20 OR 22S.W.G.
SKID.

CONTROL
LAY OUT.



16S.W.G. U/C.



1/8"PLY ENGINE PLATE
FOR TD020
PEE WEE MOUNT
DOTTED.

SOFT 1/2"SHT.
CARVE & HOLLOW
EACH SIDE BACK TO
WING-SEE DETAIL.

1/64"PLY
EACH SIDE

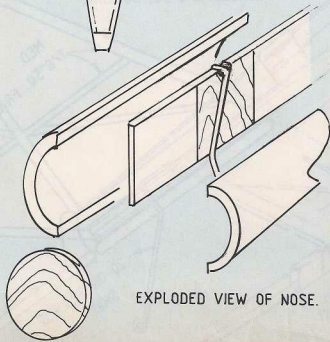
1"DIA.
WHEELS.

HOLE IN CENTRAL
FOUR RIBS. ALL
HOLES OPTIONAL
IN ALL RIBS
EXCEPT TIP RIBS.

RIBS:~

2off 1/16"MED.
(TO DOTTED LINE)
6offsoft
2offMED. (SERVO BAY)
2off 3/32"SOFT TIPS.

CENTRE POD
MED. 1/4"SHT.



EXPLODED VIEW OF NOSE.

to save a little weight. Use large bore sharpened tubes for this job. These ribs also need to be trimmed to take the 1/32nd centre section sheeting.

Glue one of the root ribs onto the centre pod and then epoxy the 3/16th i.d. aluminium tube into the pod. The reason for using this tube is to make replacing the boom easier in the event of a breakage. Now glue on the other root rib.

Glue down the 1/64th ply each side of the pod and for the undercarriage binding. Pin down the lower 1/8th square spar; this should be packed up with scrap 1/32nd sheet. Fit the centre pod assembly and all the other wing ribs and add the top spar. Check that all the rib T.E.s line up and add the soft 3/16th square T.E. It helps to chamfer this before fitting. Note that the T.E. butts up against the aluminium tube; use epoxy for this joint.

Fit the soft 1/8th sheet L.E. Cut this over width to make sure that you have enough to trim back and shape later. Fit the medium 1/32 sheet to the top and bottom of the wing. This butts up against the pod. Do not use soft sheet for this as it has to take the battery on one side and the Rx on the other. Fit the bottom centre section sheet, again medium 1/32nd sheet.

Temporarily fit the servos; they should be the smallest available - I used Fleet Micro Servos. The servo bearers are small pieces of 1/8th litleply glued between the ribs.

Fit a web between the top spar and the servo bearer at the front of the servo bay. This web does not go below the bearer or you will never get the servo lead through. Fit a full depth web behind the rear servo bearer and another full depth web at the rear of the Rx bay.

If a 50Mah battery is going to be used and it is planned to change the battery on the field, fit another web at the rear of the battery hatch. All these webs are soft 1/16th sheet.

Now fit the top centre section sheet; this time use hard 1/32nd sheet. Cut out the servo holes and the hatch areas and line sides and rear edges of the hatch hole with soft 1/16th sheet to form a rebate. The front edge has a piece of 1/8th square fitted against the spar. Fit a small hardwood block at the rear of the hatch holes.

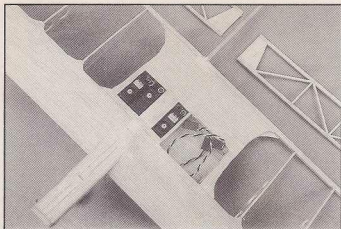
The hatch is made from 1/64th ply, a piece of 1/8th square is glued 1/8th back from the front edge and a piece of 1/64th ply is glued to this. This ply slips under the front ledge of the hole and a very small self-tapper holds the hatch down. The wing is now complete.

Bend the U/C from 16 SWG wire and slide it down over the pod, cut a notch so that it lies flush with the top of the pod. Bind with wire and solder.

Hollow out the side blocks, check for fit and trim away to clear the U/C and glue in place. When dry sand the front of the pod flat, making certain that the face is true, you do not want any side or down thrust.

Glue on the engine mount and then shape the side blocks to a nice round section. Note that if a Pee Wee is used the mount will have to be square and the side blocks can then be left square but the hollowing out can be more extensive.

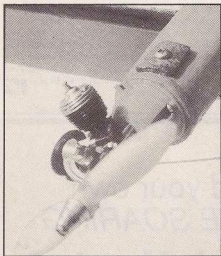
The ailerons and tail surface outlines are built up from 1/8th square strip, medium stock should be adequate. The internal structure is from 1/16th x 1/8th medium stock.



Radio installation on three channel version; as it turned out, the extra channel for throttle effort was not worth the effort and extra weight.

Covering

The model is covered with Litespan. Whatever colour scheme you choose, make sure that the top and bottom of the wing are in very contrasting colours, after a roll you will want to know which way up it is FAST. If using the 110 Mah battery fit it into the left hand L.E. outboard of the servo bay and thread the lead through to the Rx bay before covering.



Cox TD 020 fitted; angle is not significant – it was to miss the screw holes for the 010 which proved too small! Use Cox prop fitted backwards.

The hinges are made from Litespan. Take two strips of Litespan with the grain running across the narrow dimension and coat each strip with Balsaloc. When dry, place the two strips, coated sides together, with a 1/8th overlap and iron together – resting them on pieces of scrap 1/8th sq will help. Cut the strip into short pieces and you have the old clothes horse hinge. A suitable alternative would be sewn hinges.

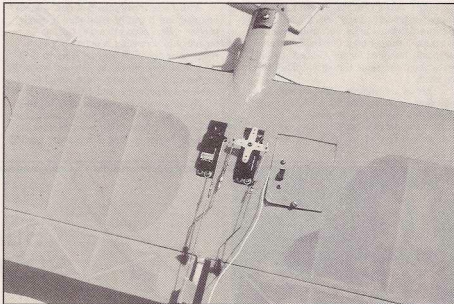
Just to put your mind at rest, take one of these hinges and pull it apart. If you have the grain in the right direction you will find that it is very hard to tear the material and the Balsaloc will not fail.

Radio and controls

Note that a radio with exponential rates makes life an awful lot easier. The model is assembled in the following sequence. Prop the 3/16 dowl boom up 1/8th at the front and glue the tailplane to the bottom of the

boom.

The tail skid is made from 20 SWG wire, 22 SWG would be even better if you have some. Drill through the boom and tailplane, thread the skid through and mark and drill the front hole and push the skid home. A smear of glue will hold it. Bend the lower



part back and bend a small loop in it... sharp skids can do damage and be painful.

Glue the fin to the boom and tailplane. This makes a very strong assembly. Hinge the ailerons and elevator and glue the paxolin horns into place.

Fit the servos. Threading the leads through the holes in the front of the ribs is a bit of a Chinese puzzle and I had to cut two 1/2" holes in the lower sheet to help with the task, these can be covered with Litespan patches afterwards.

Fit the switch into the hatch; you may prefer to omit the switch and plug and unplug the battery but I do not like this system. Very small DPDT slide switches can be obtained which will save weight. Connect everything together and set the neutrals.

The aileron pushrods are cranked to give a straight push-pull action. They are made from 20 SWG wire in two pieces. If the servo output arms have larger holes the front Z bend can be made from 18 SWG wire.

The two parts of each pushrod are bound with a few turns of thin copper wire. When the ailerons are set at neutral the joint is soldered together. Later adjustments can be made by bending the rods slightly or

melting the solder and resetting the rods.

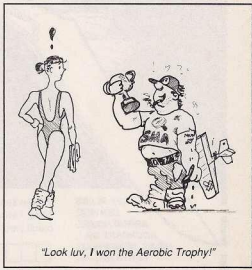
The boom is now smeared with glue – epoxy or PVA can be used – and it is slid into the aluminium tube. In the event of a breakage it is easier to drill the dowl out of a tube than it is to drill the dowl out of balsa.

The elevator is connected with a push rod made in the same way as the aileron pushrods. Before joining the two pieces slide a couple of short pieces of snake out over the rod. Once the elevators are connected fit small pieces of soft 1/8th balsa between the snake outers and the boom to make outriggers and glue in place, then cover with a strip of Litespan. Make certain that the elevator pushrod runs clear of the aileron pushrods.

The Rx is wrapped in bubble pack, the aerial runs to the top of the fin and then trails back. Fit a pair of 1" wheels to the U/C and screw the engine in place. Balance the model as shown and also check for lateral balance; you will probably need a scrap of lead glued to one wing tip to achieve this.

It is worth talking about the battery before we leave this stage. Fleet produce a

Recommended installation of two channel radio; Fleet micro gear proved excellent. Note hatch with on/off switch.



50 Mah battery pack which will last about 20 minutes with two micro servos. If this is used you will get about four or five flights with the model.

If you get hold of one of the PP3 type rechargeable batteries and take it to pieces you will find that there are two thick cells welded together and a thick and thin cell, also welded together. The two thick cells are 4.8 volts, 110 Mah capacity and are smaller and lighter than a normal 110 Mah battery pack. The cost is not as much as a 50 Mah pack but you will have to buy a lead. Other makes have seven small cells so you will need to separate four for your pack.

The prototype weighed just about 8 ounces ready to fly.

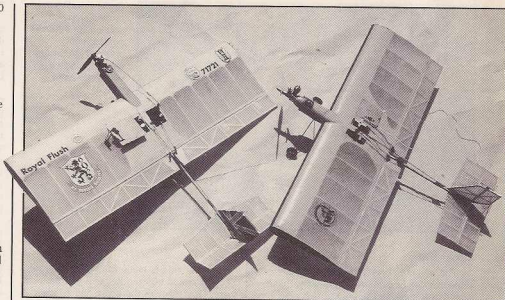
3 channel Aerobic

A second Aerobic was built with a throttled Cox Pee Wee. Great care was taken to save weight with the result that the model weighed no more than the first, even though it had an extra servo. Quite frankly it wasn't worth the effort and the basic two channel model is just as good!

Flying

Fitted with a Cox TD .020 and a standard prop, the model is fairly fast. Fitting the prop backwards tames the speed while retaining adequate thrust. I then fitted a 5x3 prop originally intended for the G-Mark .03; this gave about the same thrust but didn't break so easily.

Throws are: Ailerons 3/4" up and down, elevators 7/16" up and down. When using dual rates the control throws could be halved for low rate but fine tuning of the throws will depend on the model and



Super simple, super small and super agile. Less than a pound in total weight, this tiny model is fun to fly - but colours must be different between top and bottom for orientation.

personal preference.

With these throws the roll rate is mind boggling but it can be controlled to single, precise rolls. Loops are small with no tendency to screw out. Control is greatly reduced on the glide and so, if using dual rates, high rate should be selected when the engine cuts. Under power the model is stable yet responsive, and HOW!

Flying should be done in calm weather until you are used to the model, practising for possible indoor flying must be done in flat calm to get an idea of the space needed.

It will be found that, with practice, the model can be flown in a very small area, definitely as small as the average school sports hall. Flying in a large garden would be no problem, how about limbo under the clothes line, a quick roll through the rose bushes and a touch and go on the bird table?

As for indoor flying, well I know that it will be possible but it will be two minutes of total concentration and terror, the noise of the Cox will rattle round the rafters and you will be praying for the engine to stop! See you at Olympia!

