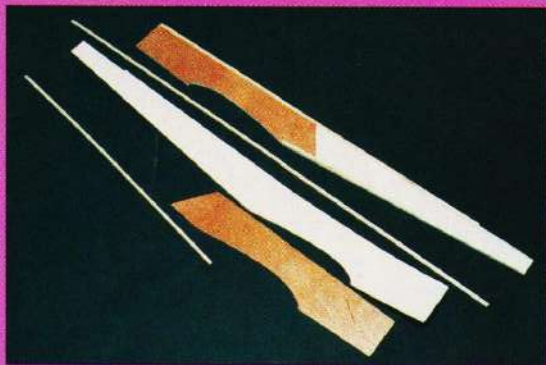
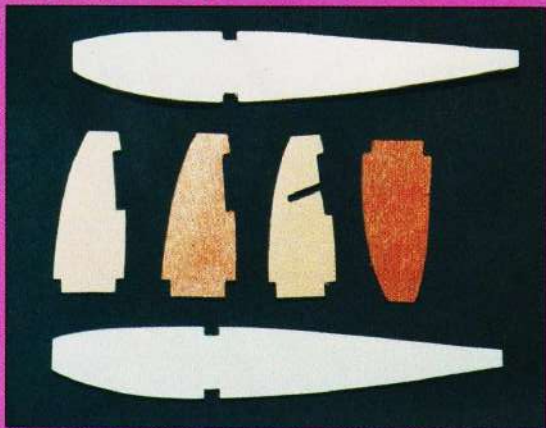


# BEEP

## A simple sports model from Dereck Woodward to test the qualities of Foamboard as a construction material for modellers.



*Fuselage sides, one finished, one in component form - nothing difficult about this one, even if she's mostly artist's foamboard.*



*These are the ribs from the first BEEP, with a semi-symmetrical section, but the idea is the same. The full ribs are from 1/8" foamboard, the part ribs are from plywood and form part of the UC attachment. Symmetrical sectioned Mk. 2 is far more fun to fly!*

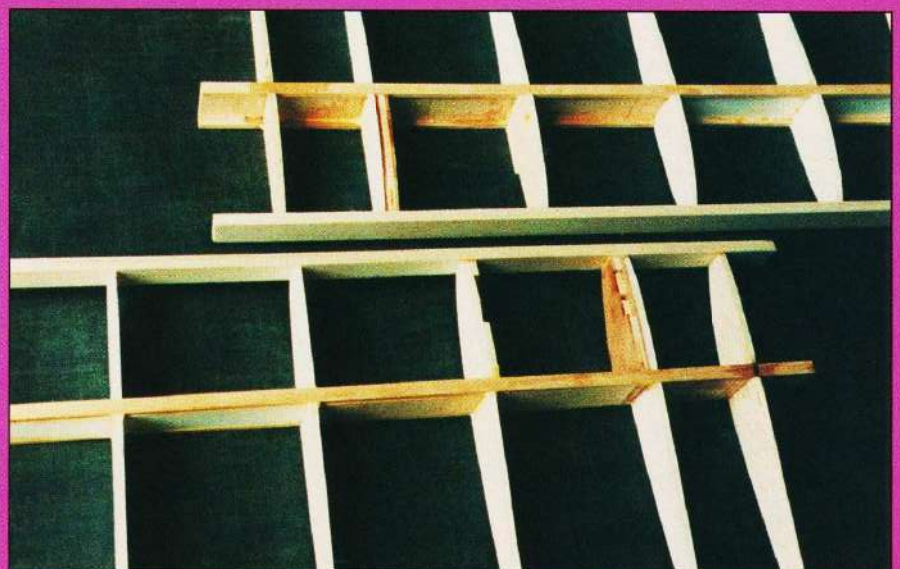
**T**urns out one of my club mates had experience with FB, so I picked his brains first. Roy Day is very much a 'thinking' modeller and he had worked FB out to be around 7 pounds per cubic foot. I'm more a 'doing'

modeller, so set to playing with the stuff, and discovering that (A) You can cut ribs from it, (B) You can cut anything flat from it and (C) It won't bend far before it creases and loses its strength at the crease point.

At this point, cautious engineers would carry out tons of tests, build skiploads of samples, accumulate disks of data. None of those are any fun on a fine weekend, so I built a model aircraft instead!

Convention starts at the front - there's no substitute for a reliable engine. I placed my OS 25 FP on the board, put a four ounce tank and RC gear behind it and went from there.

*Basic wing structures ready to join by trimming the spars to match the dihedral angle over the plan. The foamboard shear webs are fitted between the spars - NOT on their rear faces. This point is vital for keeping the wing together!*



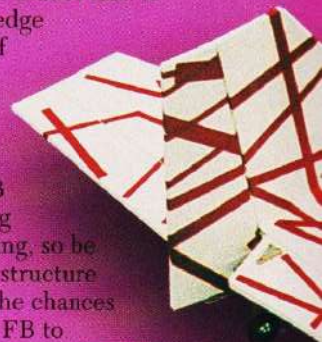
## The basics of foamboard

It comes in 1/8", 1/4" and 1/2" thick sheets, plain white is much cheaper than the coloured stuff. FB handles like medium grade balsa - without grain. A sharpening stone is handy, as paper dull knife blades fast. A metal straight edge and a large, self-healing cutting board are useful too.

Creasing FB by over bending causes weakening, so be careful. As the structure goes together the chances of bending the FB to creasing point are lowered. Trying to bend dry FB is not on - it will take the curve from wing seat to fuselage stern post, for example, but that's about it.

I just 'Discovered' a 'New' material! Yes - one that promises to revolutionize modelling, change the way we think and perhaps even walk the dog in its spare time.

Naturally - like most of its ilk - it's been around for ages and is repeatedly dug up by folk like me who feel the need to be a little different. This epic new material is artist's foamboard -



# PD!

only dreamt of. Art shops are hard for me to pass by - and I failed to pass a big one. In both, I'm confronted by racks of artist's foamboard - white foam covered with white paper - and much cheaper than 'Ecuador Gold'. Well, Yorkshire men can't pass by a bargain, so I lay out a few dollars, take it home and try to figure out what to do with the stuff.

You can sand an edge with care - trimming the fuselage top down to match the sides is a case in point. Catch the flat, shiny outer paper coat with sandpaper

NEVER, NEVER screw, glue or otherwise hang any high - stress items directly onto FB! It is only paper glued to white foam, after all. All the required additional reinforcement needed on 'BEEP' has been added, so don't add weight and lose performance.

In the wing, a wide track torque rod UC mounts on ply beams and ply sub ribs. FB is used for vertical shear webbing, but it goes between the spars not glued to the spar rear faces as is often done. That is important if you want to keep the wing together.

Glues are important - use foam friendly CA or PVA. It's cost and convenience against economy and patience - CA is fast but pricey, PVA is cheap but takes a while to set. Epoxies are fine, but weighty - use sparingly, if at all! If in doubt about what you are about to glue with - check it on a piece of scrap FB, lest wailing and gnashing of teeth be heard from your workshop!

Wing spars are spruce, LE's and TE's are balsa as ever. This means the wing can be built with ribs from

either FB or 3/32" balsa over the same plan with

indifference to high 'G'

snaprolls later on. This is all to

make happy both the modeller who

can't find FB and the traditionalist who wants a

fast building, cheap ball of fun

ideal for chucking into the car and all over the sky - wherein lies the other face of 'BEEP'.

Whether built from FB or wood, BEEP is about as cheap an RC model as you'll find. Even if you buy a new 25 or 'thirtysomething', BEEP plus engine will cost about the same as a decent 46. Your standard sized RC gear will fit easily and a four ounce tank is good for around ten minutes of eyeball wrenching aero's even with the OS 32 F ABC I've been using to see how strong she is (the answer, aerobically speaking, is - 'unbreakable'!), lots longer with the OS 25 FP. So, if you're fed up with getting a hernia carrying your latest 'model', the cost of a tank of fuel or a broken prop hurts nearly as much - do yourself a favour and invest a few hours in building to put the fun back into flying again.

'FB' from here on - and, unlike many 'new' materials, it's probably only going to require you to change one modelling habit. You could end up spending less!

and you've just taken off the gloss and left a fuzzy area of paper.

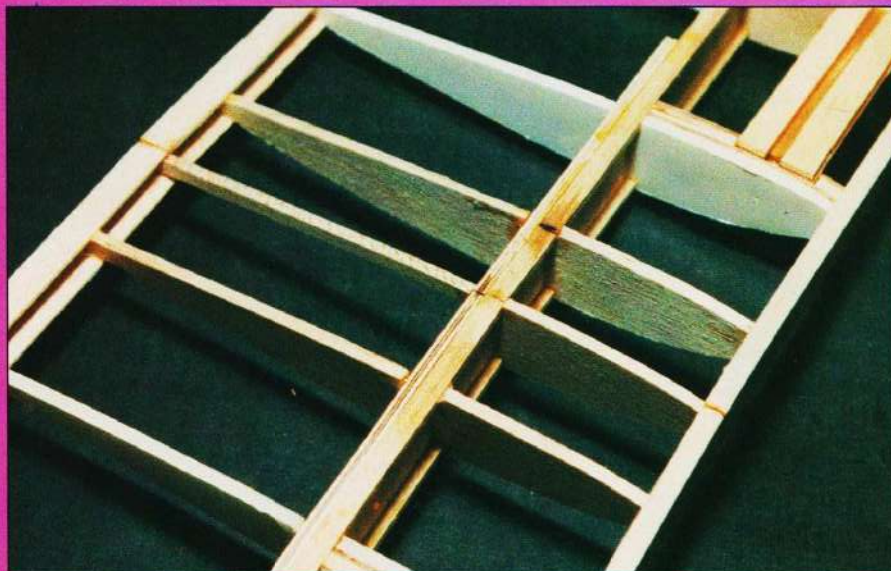
Drilling - for the wing band dowels, for example - is pretty easy. I just treat it like drilling through wood and it leaves a clean hole, but use a sharp drill bit to avoid tearing the FB surface. Another good way to drill a larger hole is to use length of sharpened tube - that old tranny aerial you bent and haven't had the heart to toss out is good for tubing.

*Here's the wing panels joined and I've also fitted the mainspar dihedral brace and the UC mounting plates. The centre ribs are fitted after joining, they mostly support the LE and centre sheeting.*

## Background

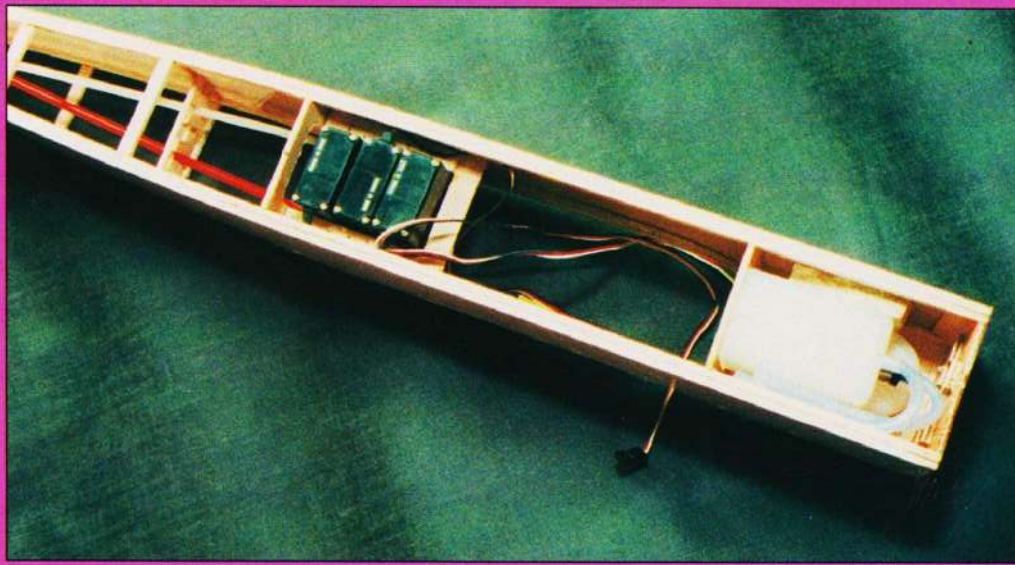
My designs are much the same inside - it's only the outside shape that changes! For example, a 'D' tube wing is light, torsionally rigid - and I can build them fast using traditional balsa and ply. So - why mess about with funny stuff? I just used my vast stocks of beloved balsa, ply and spruce.

Then I moved from rural England - thirty odd miles from shops - to just outside Washington, D.C. and shops I'd



## Come on - let's build the wing

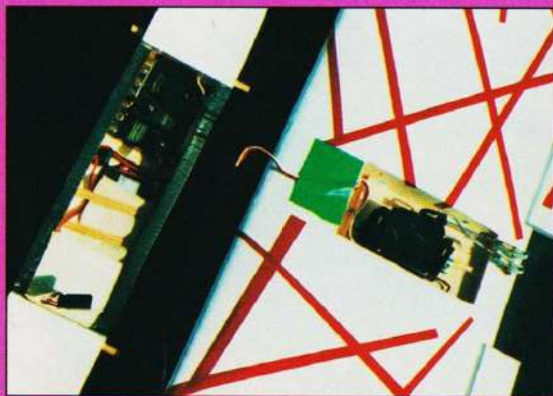
With a constant chord, I make a template from 1/16" ply and cut out ribs until I've enough. If building the 'composite' structure, note that some ribs are balsa. Once you've added the ply UC fixtures to the appropriate ribs, you're off. The wings are just a regular 'D' box structure, I never have gotten around to buying or making a jig and still seem able to build them straight.



*Fitting the guidance before the top and bottom sheeting is always easier. Those three standard servos are right up at the top of the fuselage to clear the aileron servo and torque rods.*

and shape the outlines as drawn, cover and hinge. I used some 1/4" triangular stock to reinforce the fin/tailplane joint, these gussets are covered separately and fitted after covering, doing so afterwards is little easier than 'filming the neighbour's cat!

Don't omit the balsa and ply reinforcement under the control horn positions called for on the plan Bolting on high stress items like control horns is a No - No with FB - see above. Otherwise, that's it at this end.



*Radio bay is big enough for standard gear! Aileron servo is best fitted on its side as shown here, to better clear the bits in the fuselage.*

Glue the ribs to the bottom spar, followed by the top spar and LE, the TE and its 1/2" by 1/16" caps. Somewhere in there, I add the inter spar webbing. This I glue between the spars - saving material, glue and weight and essential with FB webbing, as gluing it to the back of the spars involves merely gluing to the paper. Between the spars, the FB is in compression and will take it stuck on the back, I doubt it. Putting the webbing in before adding the top spar makes sense too. For a little difference, I leave out the centre rib for now.

Joining time - cut two rectangles, 1 1/4" deep by the wing chord long, from FB or balsa, and tack glue them onto the tip ribs, with their top edges on the centrelines of the tip ribs. Place the panels against a straight edge and trim the spars, LE and TE until they all match, then glue the joints before adding the dihedral braces.

When that lot has set, add what remains of the centre rib - you're installing it pre-cut rather than fitting a full rib, then hacking chunks out of it. The installation of the centre rib precedes sheeting up the 'D' box - cutting the bottom sheet around the UC beams - and centre section and you're about done.

The ailerons can be made in two

ways - first off, find a sheet of 3/8" balsa and cover the carpet in whittling and dust. Or FB again! Two strips of 1/8" FB, 1" wide, are used, with a 1/16" framework glued to one. Chamfer that framework down and add the top PB strip. Edge the front with 1/4" balsa and chamfer as for any other LE and that's it done. The model doesn't notice the thick aileron TE at all - believe me, I've done some extensive research into her aileron responses!

The two wing tip designs flown are shown on the plan - one on the port wing, the other on the starboard. I'd recommend using a matched pair, one or the other, as opposed to sticking to the plan. I couldn't detect any difference in performance between the two, but that may not be true with one of each on the same model!

## Tailfeathers

Not a lot to say, other than not to fret about the taper free cross section it works fine! Cut out the shapes, edge

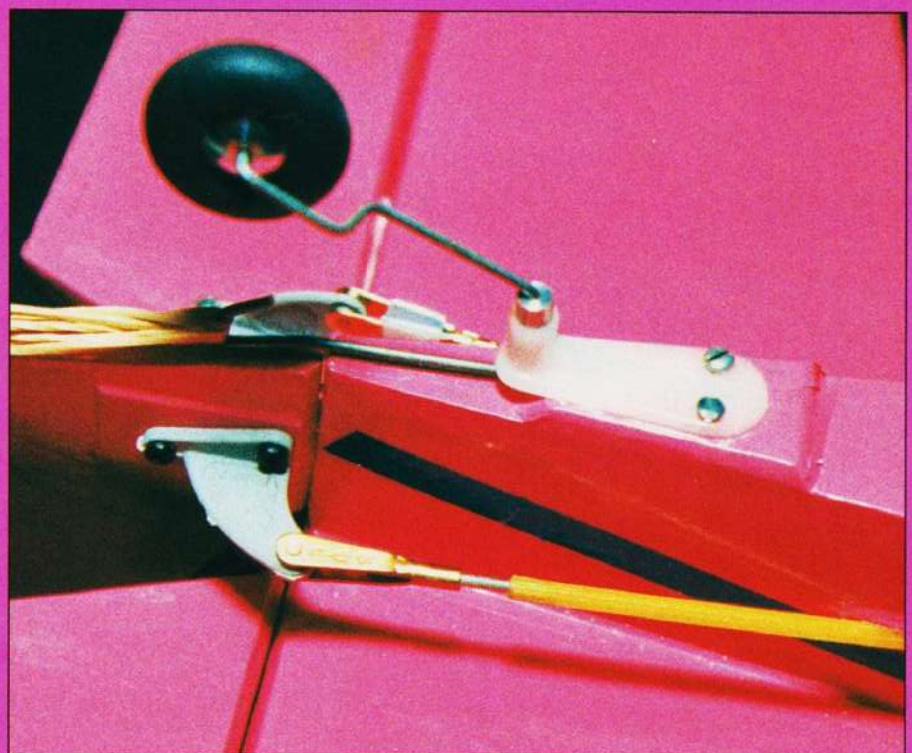
## The Fuselage

- Is there to keep the flying bits in order and keep rain off the radio. It's a shape only its mother (or an Uglybox driver) could love, but that's the idea. Cut out the sides from FB, the doublers from 1/64" ply and make the formers while you're at it.

The plan shows a position for the rear face of the prop. This will put the engine in the correct place to balance your BEEP. If you can't buy an engine mount that's long enough, no problem, 'stretch' the sides forward. If a 40 really has to be used - you might want to shorten the front end a little. She balances fine as drawn and built.

Mark where the doublers go - build a left/right pair of sides here. Building a pair of models because your mate

*Commercial tail wheel bracket does the honours back here, with light rubber band to de-couple the shocks of steering from the rudder. Cheap, cheerful and it works.*



came round, spotted two left sides on your bench and you're too proud to admit to an error may not be what you wanted. I start by spreading plain white PVA glue very thinly onto the mating surfaces. Leave to dry (time to cut out some other pieces?), then warm up an iron to 'good and hot'. A 'film iron' works - whether you use Mum's best steam iron is up to you ...

Line up a doubler onto a side and 'tack' down with the iron. Thanks to an unpronounceable chemical reaction caused by heating the two dried layers of PVA (with the iron) and applying pressure (also with the iron - a very economical technique), they'll be stuck together. This is far cheaper than liberally spraying CA glue around. To complete, add the 1/8" square corner glue blocks and balsa rear doublers.

Forget that the sides are gloss white instead of balsa coloured and join them up with F1, 2 and 3. When dry, pull in at the rear, to the chamfered stern post and make sure it's all straight and square. I do have a fuselage jig and use it whenever I remember - honest!

This is where I'll fit my radio, control runs, engine and fuel tank. Right now, you can see all the parts and check for snags that will be buried once you've boxed in the fuselage. For top and bottom sheeting, I mark FB around the fuselage, cut out and glue on - try to avoid getting glue on the outside, even if I can't!

## Guidance and Go

I flew her initially with an OS 25 FP. The two BEEP prototypes did just fine on the lower power, then I pushed the envelope, in jet jock speak, to test her structural integrity by installing my OS 32F ABC and re-flying the test profile.

Actually, I opened up, took off, rolled inverted and went at it! As she keeps landing in one piece, I am quite happy that her limits are acceptable. The hotter combo is a lot of fun (even if it burns four ounces of fuel in just ten minutes!). Any of the current crop of Schnuerle port 20 - 25 lumps will do just fine, though I expect someone to fit a 46 (then wonder why it came out nose heavy).

Three servos sit in a ply fuselage tray, while the aileron servo lies on its side in the wing. Stick with that and things will miss each other. Putting the aileron servo upright could lead to grief when the wing is banded on.

3/32" torque rods handle the ailerons and 'Goldenrod' snakes head aft to translate my whims into rudder and elevator movement. Control horns are your favourite nylon type, set up the throws as per the plan for starters. We all have different ideas here, so you'll soon be 'tweaking' them to your flying style.

## Wrapping the Project up

Both of mine were finished in 'splinter', very easy to do and I know which is mine in the pits. #1 was overall pink with purple trim, #2 was a much more sedate white with metalflake red! This is easy to do - I used 'Solarfilm' for covering and 'Solartrim' for decoration. Covering the model in one colour makes for a quick job, while cutting out the random trim strips was done with a ruler, scalpel and abandon (Note - 'gay abandon' is not something one uses when living as close to Washington, DC, as I do. Regular abandon is far safer!). As there is no measuring involved, this is a very quick finishing scheme to use.

## Rock and Roll!

This is not that mythical model for novice to world pattern contender! 'BEEP' is neutrally stable, fast to blistering (depending on what's up front!) and fully aerobatic in a fussy kind of way. As set up on the plan, the roll rate is comfortably fast, pitch response is enough for square loops, spins and snaps and the rudder goes a long way for stall turns, knife edge and other such 'left thumb' tricks. On the other hand, she's got a long moment and large tailfeathers - with lower power and control throws, she'd be a good, serviceable first low winger that could teach the newer solo pilot a lot for low investment, both in cash and time

She'll do all the looping, rolling and combination manoeuvres easily. The snap and spin rates are fast, as you'd expect from a model with little inertia, and start and stop crisply on demand. Unless she's tail heavy, those two live safely in a corner of the envelope marked 'use only when needed'. That was built in because I have flown some pattern comps and cannot abide models that stop spinning when they feel like it, as opposed to 'on heading'.

Knife edge flight isn't brilliant but she will trim out to track straight and fly level or climb slightly. Let's face it - in knife edge, she's flying on the fuselage and an 'airfoil' that starts with an engine screwed to a flat plate isn't going to win many contests. To baffle the natives, flip onto a wing tip, then waggle the rudder stick rapidly from neutral to full top rudder. She'll fly along with the tail swishing up and down, in the yawing plane. Looks fun - it is. Another demonstration of her neutrality is to yaw the tail rapidly with alternate left and right rudder - while flying a loop. Practice these tricks when no-one is looking - they can go a funny shape!

A Cuban Eight looks good with hesitation or two point rolls instead of regular half rolls. With the OS 32F, I can fly Cubans with 'Six Point rolls' or a 'roll and a half' between loopy bits. Vertical double Immelmans look



**BEEP - the tastefully pink 'n' purple Number 1 - with the perpetrator of this headlong rush into cheaper modelling materials (Plus DC RC's background power pylons - I didn't take this shot!).**

spectacular - you half roll going up and down with the half loops at top and bottom!

Ground handling is easy, with the steerable tail wheel making positioning on our grass strip easy. As the steerable tail wheel is de-coupled from the rudder by a small office rubber band, I'm not worried about servo gears getting beaten up. Take-offs are easy - she tracks straight and lifts off fast. A half roll after take-off into a push up to vertical looks pretty cool, a pull into a full vertical climb - out takes all the OS 32 has and so far I've not found where she runs out of steam.

For landings, there's adequate low speed elevator to flair her into a three pointer - what more could you want? That bit can be proceeded by an inverted 'circuit' from an overshoot into a half loop, inverted downwind, pull through the rest of the loop and flair onto the strip. Hey - 'BEEP' isn't fussed where the ground is!

## Hangar Flying

I met my specification, 'BEEP' proved that foamboard can substitute for balsa in many areas, giving some useful savings and I've also got a great low maintenance model for sports flying - she'll get skis for snowbound Winter days and I'm even tempted to rig her for floats - the OS 32F has enough extra power to compensate for the extra drag. Go on - give BEEP a try. In this day and age, small is beautiful, light is right and low cost can't be bad with the state of the economy. At least BEEP's performance is always bouncing along on the bottom!