

Innovation



Innovation will fly vertical for ever, fly backwards in a 5mph breeze and is steady as a rock inverted at 2ft.

With this 59" wingspan stunter, Peter Tindal proves that not all fun-flyers have to look the same



When I read the RCM&E article about Christophe Paysant La Roux flying indoors with a large model, my interest was aroused. However, being a firm believer that model aircraft should look something like their full-size counterparts, I thought that the appearance of such a model would be enhanced if it looked more scale.

So what type would satisfy my desire? Thoughts of Christophe, being French, pointed me towards the CAPs but the Dalotel seemed much more practical and straightforward.

Christophe's model weighs in at just 2kg for a Super Tigre 45, so some rough sketches and calculations were made and various ideas kicked around. The perimeters were set and the design adjusted mentally to suit:

- Engines available - ST46, OS46SF, ST 51
- Weight range from 1.8 to 2.5 kg (giving prop hanging capability)
- Able to fly extremely slowly - high drag
- Able to turn extremely tightly
- Extreme stability for precise low level flying
- Cheap to build in case the idea doesn't work!

The ST 51 was chosen as the preferred power plant as the SF was occupied and the power/weight ratio was better than the ageing ST46. The weight could only be partly determined and would eventually become exactly 2.5 kg (before an engine change). The ability to fly slowly would be paramount and partly achieved by low pitch props and the rest by drag, induced by a very thick wing and square leading/trailing edges to the tailplane and fin. The ability to turn extremely tight (as per control line aerobatics) without the use of coupled flaps and elevators would be achieved by having a long moment arm and large moving surfaces. The downside would be the weight behind the centre of gravity but seeing as this was going to be a light model, this wouldn't be a problem and nose length would be determined almost on completion so that weight wouldn't need to be added (hopefully!). Stability beyond normal requirements for extreme manoeuvres close to the ground is almost a contradiction in terms and would eventually have to be obtained using transmitter mixing rather than being determined by CG location. To build cheap would

mean to build from the scrap box so a visit to the workshop and a forage for half an hour dictated the main construction.

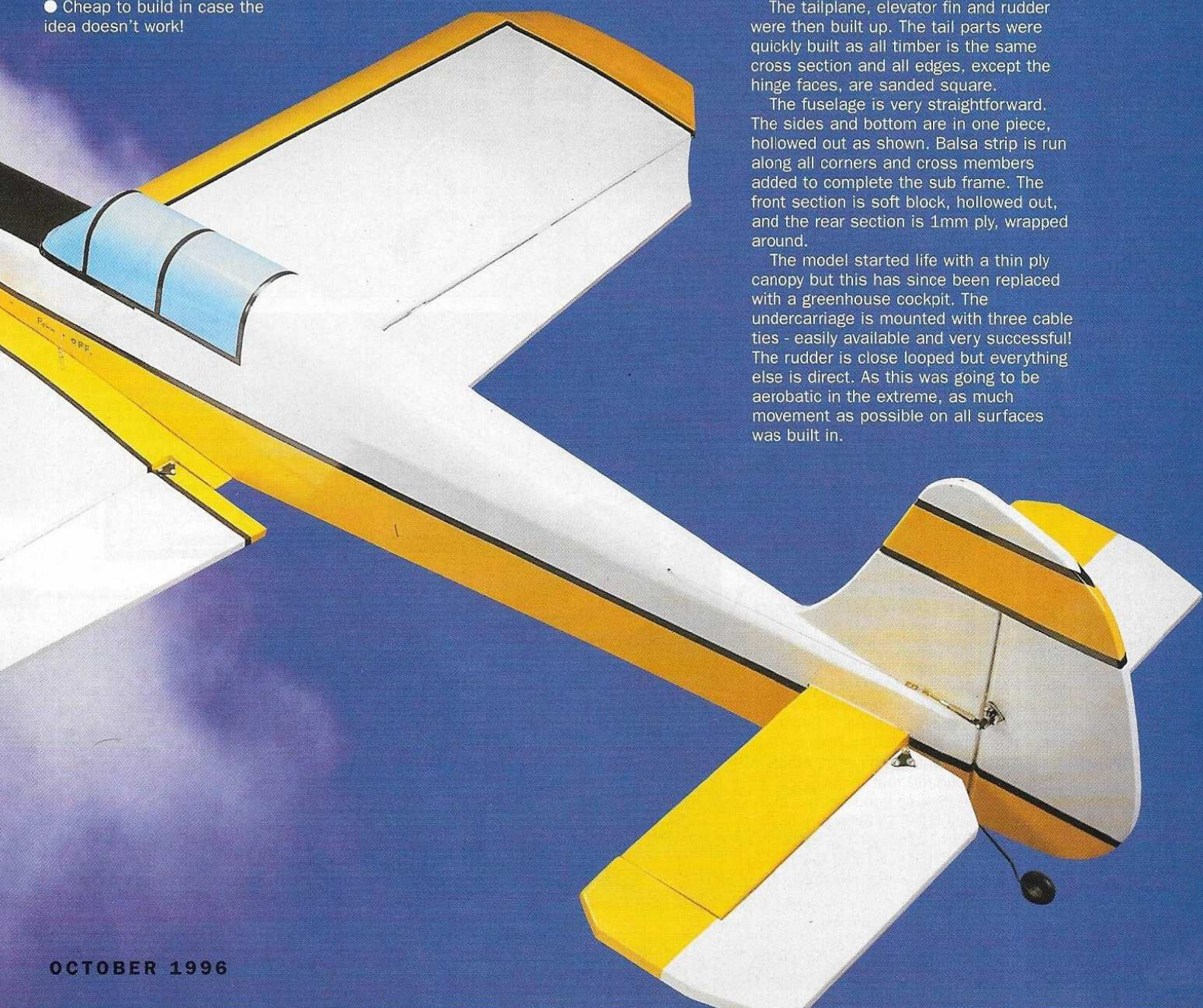
On the board

Outline sketches were made, followed by a rough working drawing which was good enough to build from. The model was designed to suit the only fixed item to hand, being a cowling from an FAI aerobatic model. The wing leading edge was cut from foam and hollowed out at the tip sections. A $\frac{1}{8}$ " balsa spar, full depth, was added and the centre section reinforced with carbon fibre. The whole section was veneered and the spar then hollowed at the tips to match the hollow in the foam. The rear section of the wing was cut and veneered before being sliced into eight ribs on a band saw. These were then stuck to the main spar which was resting on the bench in its cut-outs. The trailing edge was added, followed by the 1mm ply centre section covering. The tips were then stuck on as a block and the bow fixed at one end and followed around the tip shape, then final sanded. No veneer was added to the tips which were eventually covered, along with the rest of the model, with Profilm.

The tailplane, elevator fin and rudder were then built up. The tail parts were quickly built as all timber is the same cross section and all edges, except the hinge faces, are sanded square.

The fuselage is very straightforward. The sides and bottom are in one piece, hollowed out as shown. Balsa strip is run along all corners and cross members added to complete the sub frame. The front section is soft block, hollowed out, and the rear section is 1mm ply, wrapped around.

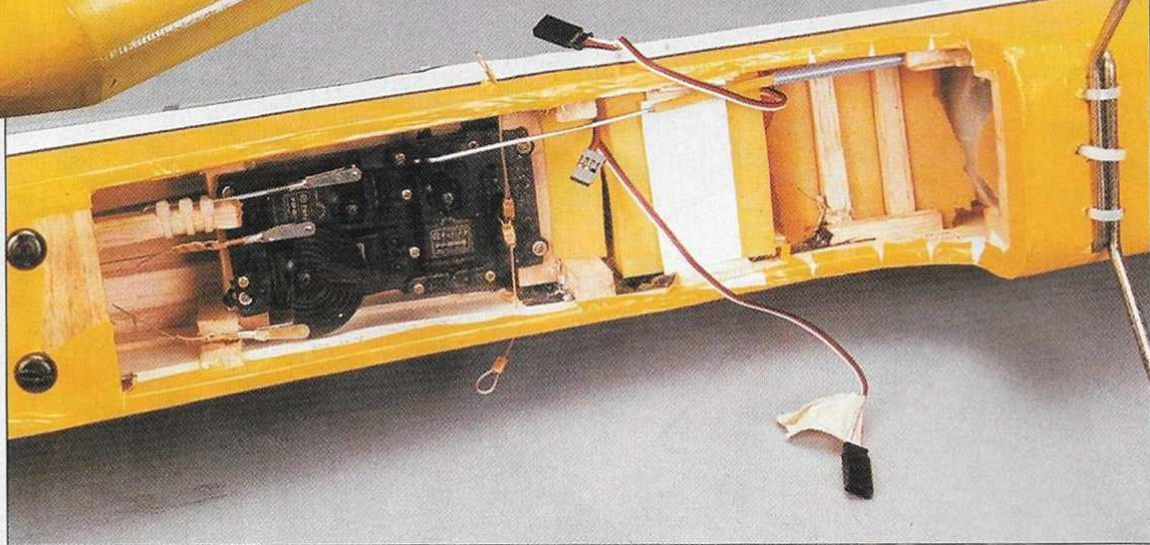
The model started life with a thin ply canopy but this has since been replaced with a greenhouse cockpit. The undercarriage is mounted with three cable ties - easily available and very successful! The rudder is close looped but everything else is direct. As this was going to be aerobatic in the extreme, as much movement as possible on all surfaces was built in.



If you are wondering what to build next and you look beyond the Innovation, then you will be missing out in a big way!



Inside the roomy radio bay.



Not having the courage of my convictions, I decided on very low rates for test flying. Subsequently, I decided on loads of exponential and have now settled on Aileron - 24% type 1, Elevator - 4% type 1, Throttle - 50% type 2, Rudder - 12% type 1.

With the ST 51 and Q silencer the model weighed in at 2.5kg and props from 12 x 4 to 14 x 5 were tried.

Revelation!

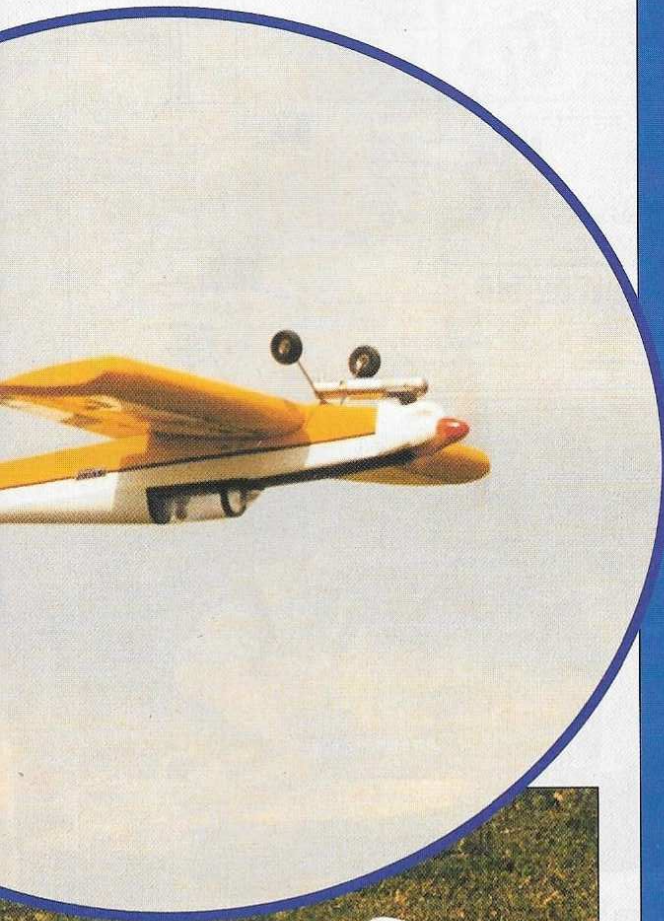
The first time out was a total shock to the system. Not knowing what to expect, I fired up the ST, pointed her along the strip and opened up the throttle. Everything then happened in slow motion - the model ambled into the air after about 10ft and was as stable as a snooker table and just as flat. I began to worry that I had built the best trainer in the business (perhaps I have!). I made the first turn and felt that this was going to be a lazy model, no good for me, and who could I sell it to? As I came back towards myself at about 50ft, I pushed the ailerons right over and had to release almost immediately as the roll was completed in no time.

Following a tailplane failure, Pete re-built the Innovation, which now sports a clear acetate canopy.

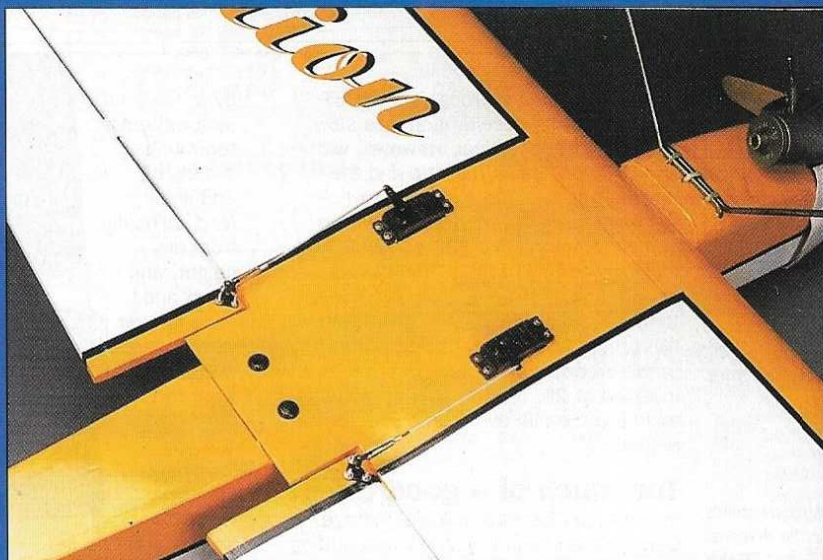


'Perhaps I'll fly it a bit more before I sell it', I thought! Over the next hour I flew closer, lower and slower than I have ever flown before. If ever a model instilled confidence, this was it.

Early in the model's life, whilst practising prop hanging, I had an engine cut at about 20ft and it just fell to the ground. I really expected to collect a pile of bits, because of the light construction, but was pleasantly surprised to find just two broken wing bolts and a cracked fuselage side. At about this time I decided I needed more grunt so an Irvine Q72 was purchased and installed and a transformation took place.



Tail surfaces are quick and easy to build from balsa. Note the squared off trailing edges.



'Barn door' ailerons dictate the use of separate servos.



Innovation now has even more oomph thanks to an Irvine Q72. Nylon tie wraps provide a cheap and reliable way of retaining the undercart.

There was nothing wrong with the ST except that the acceleration was slow, but it still went vertical. However, with the Q72, vertical is ballistic and the throttle has become a serious toy!

I have flown the model through the complete control line F2B schedule, including the flat circles, hourglass, square horizontal eight, four leaf clover - the lot - and it just doesn't give up. It will fly vertical for ever, fly backwards in a 5mph breeze and is steady as a rock inverted at 2ft. It's the sort of model that makes you smile every time you start the engine.

Too much of a good thing?

In June our club had a Scale/Vintage Barbecue and Fun Day and I was putting the Innovation through its paces. From full throttle across the strip, I shut the engine and gave full down for an outside $\frac{1}{2}$ loop... Snap - the tailplane broke in half 20ft from the ground - oops! It hit the ground hard in front of 50 people. The tailplane was broken (well I expected that!), the rudder was knocked off, there were three broken hinges, the canopy was crushed, the prop broken and the wing bolts sheared.

So if you build one from the plan and you fancy a bigger engine than a 51 (wonder what a 90 would do?) then beef up the tailplane with carbon rovings for horizontal strength, just in case. The rest of the model takes an awful lot of abuse, even with the Irvine 72 on a 14 x 5 with no ill effects. I've been trying to get a 16 x 4 as I feel there is no substitute for diameter, but I cannot find one.

This is a big area model, nearly 930 square inches, and is extremely light for its size, so it will fly on anything from a 40 upwards. At 13.5 oz./sq.ft. it's better than a lot of gliders. The CG is variable

by at least an inch without too much difference, and it will land vertically from any height, and climb and glide forever.

If you are wondering what to build next and you look beyond an Innovation, then you will be missing out in a big way. If you watch this space, there will be some more "cartoon scale" models to follow which should be just as good, although I can't imagine them being any better! ●



Anxious smiles before the first test flight!

Datafile

Plan Specifications

Name	Innovation
Designed By	Peter Tindal
Aircraft Type	Fun-fly/stunt
Wingspan	59"
Fuselage Length	54.1/2"
Engine Range	.51 - .72 cu.in.
Rec. Number of Channels	Four
Control Functions	Aileron, elevator, rudder, throttle
C.G. (from L.E.)	4" - 5.1/2"
Weight, Ready to Fly	5.1/2 lbs.
Wing Loading	13.1/2 ozs./sq.ft.