

Diamond Demon

Nostalgia's not like it used to be. We bring Ben Buckle's classic up-to-date with electric RC



The late Ben Buckle laboured long and hard researching past delights and the vintage movement does have a very healthy following world wide. Son Colin, is keeping up the good work and has made some concessions to the current generation in offering details of radio assistance to a number of models in the range.

Silent Flight has taken this a step further and electrified the Diamond Demon, an original Leon Schulman design from 1937.

Typical of the era, this model features built up construction using the well established by then, method of balsa and doped tissue construction which gave a light yet rigid structure considered essential at that time. A generous undercamber gave a high lift coefficient and a slow flying aeroplane which was not so important then, as everything went away down wind at the same speed. Style was becoming a consideration and whilst today's eye would consider it a caricature of a light aircraft, that deep fuselage had its counterparts in full size aviation at that time.

So what do you get?

As usual with Ben Buckle kits, well selected balsa and ply, good quality die cutting and clearly and easily understood plan and instructions. I needed to buy a pair of 2 1/2" wheels but that was about all.

Build a fus

The drawings show that the



TOP: Basic crutch construction can be seen here, also control tube runs.

ABOVE: Kit contents

construction is based upon a centre crutch of 1/2" x 3/16" balsa and that supplied for the job was well selected being on the hard side of medium, true and straight grained. The drawings show hard wood sections let into the front of these longerons which are pinned down and glued up over the plan with spacers between. I didn't bother with the hard wood. The triangular formers are built up over the plan and glued to the crutch with a spine running the length of the fuselage. This is shown as one length of 1/4" square, I used two of 1/4" x 1/8" for a little extra strength. Die cut formers are provided and the underside of the fuselage rapidly took shape. The cabin construction and rear upper

fuselage are equally quick. A hole through the front ply bulkhead will be needed to run the motor wires through and the undercarriage wire can then be bent and fixed in place before the front side cheeks.

The motor mount was made from 1/4" ply and was made a little narrower than the fuselage to give a bit of taper up front. This was glued in to give around five or six degrees of down thrust, a guess admittedly but it seemed a good idea. A 1/16" ply deck cut out to accept the motor was glued in to reinforce the front end as can be seen in the photographs. A balsa former was glued to the front of this to enable the font to be sanded and a cooling duct also cut and sanded.

Servos? Fit midis, minis or

micros if you wish since there is precious little load on rudder or elevator servos, but you will gain no advantage and standard size are much cheaper. The servo mounts were set with the rear under the trailing edge and subsequently proved to be spot on for balance. Sorted out the servo handing and the control runs at this stage.

The fin, rudder and underskid have a laminated outline and construction is straightforward. The wire skid is bound on with thread and at this stage, it is suggested that balsa sheet be glued in with slots to clear rudder closed loop controls and the elevator push rod. This would have been easy enough but the horns provided would have sufficed for a much heavier model and the closed loop did not have a straight pull so I decided from choice to use 1/16" i/dia nylon tubes with lightweight horns fitted. Z bends were made at the rear and Radio Active clevises with brass ferrules at the servo end. For a medium load application, I swear by these as being quick and versatile.

The tailplane

This is super quick to build. The outline can be glued up in one piece and cut through after sanding. The upper surface aerofoil section can be sanded in easily enough by eye. It was here that we noticed a discrepancy between tailplane and fuselage drawings since the chord on the fuselage was less than that of the tailplane. No problem, just moved the rear former and shortened the top strake piece. After preliminary sanding, all the tail surfaces were glued up to the fuselage.

And the wings

The balsa for the main spars are hard and straight. Pre-cut ply dihedral braces are supplied and the instructions are to build one wing, lightly oil the plane to bring the lines through to the other side, turn over and build the other side before gluing up both sides with braces and ribs etc., to the centre. I figured it was easier to glue up the ply braces and spar assembly complete; that way, the root ribs could be built in as work progressed.

You will still need to oil the plan and perfect for this job is a drop of brake fluid dabbed on where ribs

and spars need to be aligned. Oh yes, the trailing edge needs to be packed up to match the undercamber and since this is thicker than the section at that point, it seemed that it would be easier to sand the upper surface than the lower. Watch the leading edge at the tip, this dips down to blend into the sheet balsa tips and perhaps inadvertently gives a bit of wash out too.

Covering

White rag tissue is provided but since I had been much impressed by the results obtained by club mates with mylar film and doped tissue, I decided to have a go. The findings are that on wing upper surfaces, flat or external curves, that photo mount spray is adequate but can be a bit messy on the second surface since it cannot be directed precisely. On an undercambered wing, it works fine holding the film to the ribs - that is until dope pulls the tissue tight when it also pulls the film off the ribs. Obvious I suppose since the adhesive allows photos to be repositioned for some time later. Still, it did help to peel off the film and tissue when I decided to recover it the right way using thinned Evostik impact adhesive thinned half and half with toluene with the film ironed on and heat shrunk.

Film under the tissue does make it more handleable but a carelessly swung plug on the end of a soldering iron flex will still go through it...

If I were doing this again, I would probably use Litespan or maybe translucent Solarfilm which would look very attractive and be quite in keeping with the project. The purist would use tissue and dope - thought the purist might not use radio.

Fitting out

As with the horns, the hinges supplied are a bit hefty (the rudder is only 3/16" thick Colin) and these were replaced with some small moulded ones.

The wheels were not supplied with the kit and those purchased were drilled oversize. The problem was solved easily using four of those little flanged brass spacers that Futaba supply with their servos. One was slid onto the spindle flange inwards, and tacked with thin cyano. The wheel was then placed on another pushed

into the wheel hub with a bit of end float. Micro balloons (or any powder) were sprinkled around the spindle end and also locked up with cyano making a solder free and neat joint.

The kit box suggests .75 to 1.5cc diesels but we decided to try a Speed 400 sized direct drive motor and seven 600 cells. A soft start switch is not essential for a direct drive but are around the same price and one of those delightful 'little finger sized' BEC (battery eliminator circuitry) Graupner switches plugging into the receiver was used. Motor, prop and adapter and switch are all available from your local shop or mail order from 'Gliders'. The nicads need to be quick discharge of course but with a BEC dispense with the need for a receiver nicad. A voltage cut

off means that the motor cannot exhaust the servo supply so there will be time to glide around for a while when the motor stops.

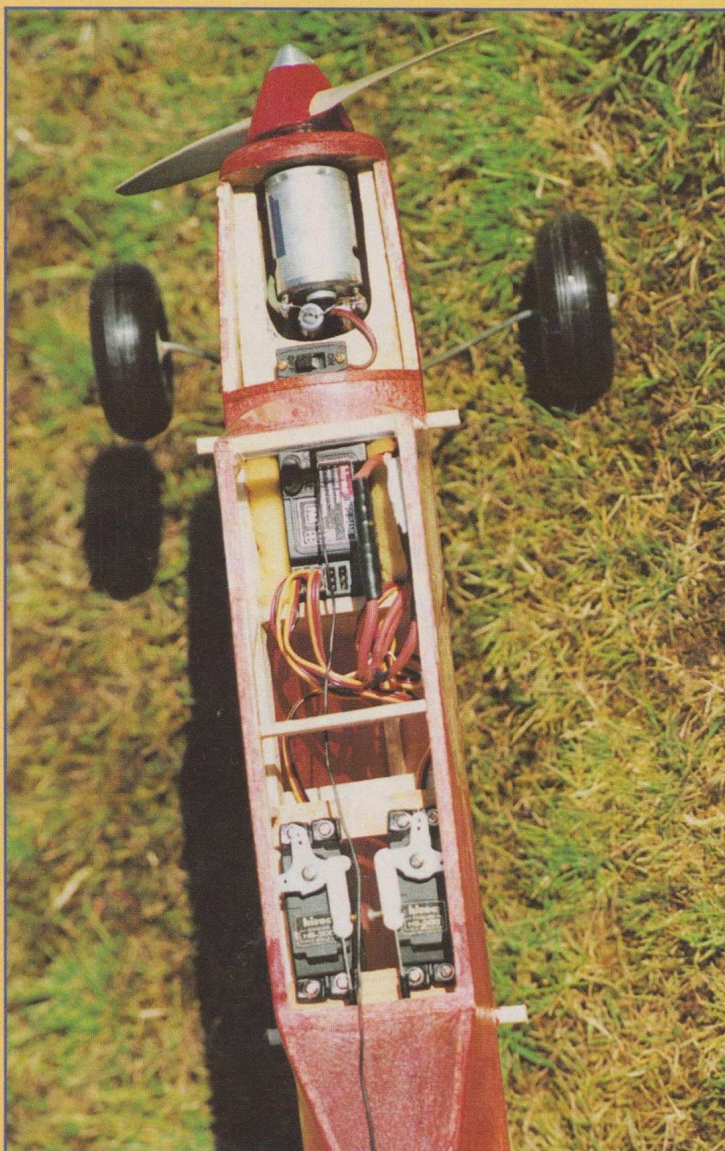
Whilst a rapid charger is a help, a seven cell pack can be charged from a standard transmitter charger so you need not be stuck.

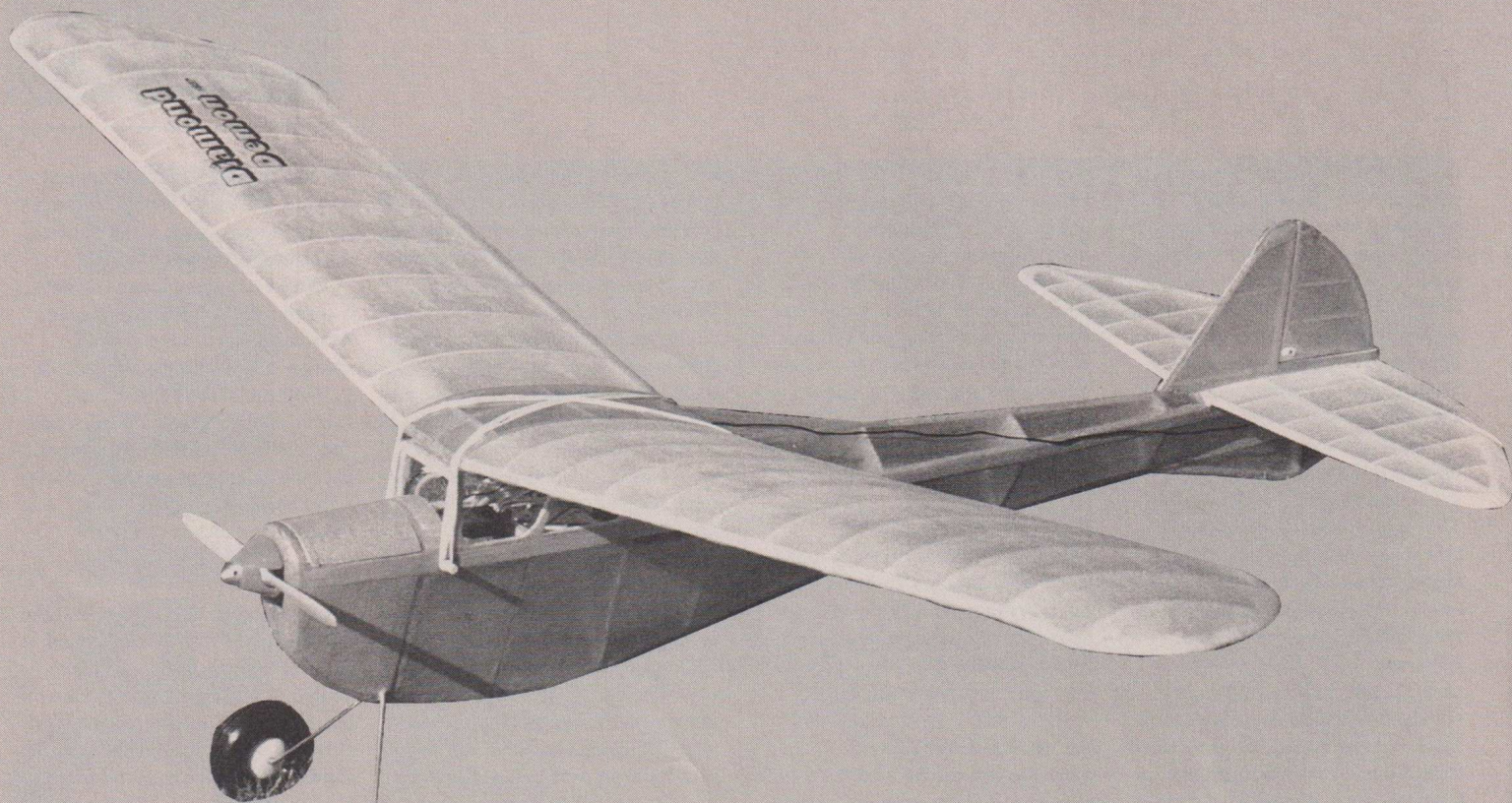
With the switch under the motor and the seven cell pack and receiver foam packed in the next bay, the balance point came exactly right. So, control movements checked and nicads charged...

Flying

A calm evening was chosen and the first flight was made from a hand launch since the grass was a bit rough. A climb away giving sure but steady height gain resulted and although not overpowered, the climb was positive at all times and

BELOW: Wings off shot shows hardware location. Balanced right first time.





was quite in keeping with the character of the model. Transition to glide was gentle and rudder control was quite positive. The single-sided elevator was adequate considering that this model might have been considered as radio assist rather than radio control.

Subsequent flights off mown grass gave a nice tail up lift off with a 'scale' appearance to it. Be ready to feed in down elevator though as the wheels touch on landings to make it 'sit down' or nose overs are quite likely unless you are flying off a runway or a bowling green. That's a useful knack to acquire anyway.

Calm weather sports flying is what it is best at. Yes you can thermal the Diamond Demon as well as anything else but with that undercambered wing and single sided aileron, keep it in the field or don't blame me if you lose it.

You may care to experiment with different prop sizes and nicad packs. Initial flights were made using a 7" x 4 1/2" though 6" x 6" and 6" x 3" give different combinations of climb rate and motor run. Eight cells should not be necessary unless you can use a speed controller. Seven cells and a six by six should give around seven or eight minutes of useful motor run with a probable glide of at least as long again.

Conclusions

Enjoyed this exercise. As a lesson in building and an appreciation of the art from nearly sixty years ago,

I came to appreciate the Diamond Demon for its own sake.

The kit is good value, there are a couple of spelling mistakes on the drawing and I would prefer the wing to be drawn out fully rather than have to oil and turn it over. I have a few bits of linkages and wood left over but they will come in handy. As a slow flyer, no one expects it to do anything other than cruise round and that it does sweetly. As a slow flyer too, it is also very forgiving to the beginner - just watch the wind speed and relax.

Thanks Colin.

Specifications

Span	48"
Chord	7"
Area	330 Sq.ins
Weight	25 ounces
Wing loading	11 ounces per sq. ft.
Length	32 1/2"
Manufacturer	Ben Buckle, 9 Islay Crescent, Highworth, Swindon, Wilts, SN6 7HL.

ABOVE: Spot the difference, no significant performance change with other props.

BELOW: Single sided elevator adequate for this model.

