

## Converting a vintage design for radio control - Ben Buckle's Diamond Demon

# new lamps

Many of you will know of my interest in vintage designs, and their general suitability, as trainers. This last winter, my night class put together the Diamond Demon. Having already built the Red Zephyr and Majestic Major, I decided it was time to try a smaller vintage design, if only to have an easier time getting the thing into the car each week!

When you have a Majestic Major built but not covered, putting the radio in, is hardly a problem. There is buckets of space, you can adopt any method you choose, as long as you take the centre of gravity into account. A smaller model, such as the Diamond Demon, is however a different kettle of fish.

Let me say from the outset, the Diamond Demon does not make the ideal trainer; it is fundamentally too small. I believe a trainer should be at least 60 inches in wingspan, this helps with visibility, as well as stability. However, someone who has a few hours on the clock, approaching 'A' certificate level, may well enjoy this pretty little model. This particu-



**The Diamond Demon, Starspan covering, OS 10 engine, Radio Active prop, Ripmax battery, and so much more!**

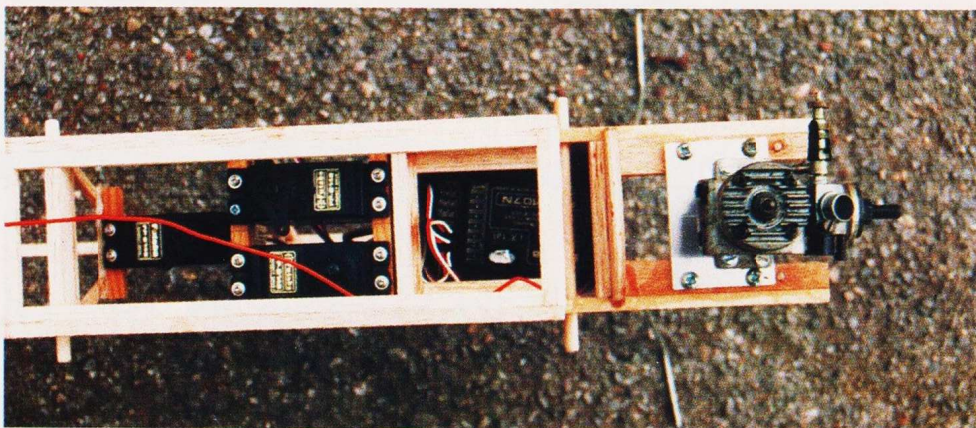
lar design will sit easily in the boot of most modern cars, made up with the wings on, already to fly.

The main purpose of this article, is to run through some of the modifications you may wish to make, in converting the model to radio control. Most of what is covered will relate to other models of a similar type, I hope you will find the following helpful. The story begins after the model has been made but not covered, bare bones! I find that this is a method that is not quite universal, but as good

a starting point as any. Vintage models are nearly always lightly constructed, so you are usually adding material rather than taking it away. Wings are the usual exception, when it often pays to add webbing between wing spars and some beefing up of the centre section. Each model will need evaluation, before you make adjustments, add extra wood carefully, too much extra weight will defeat your objectives. A general rule that says, 'Heavy models fly badly' cannot be over stated, so think before you stick and keep things as light as possible.

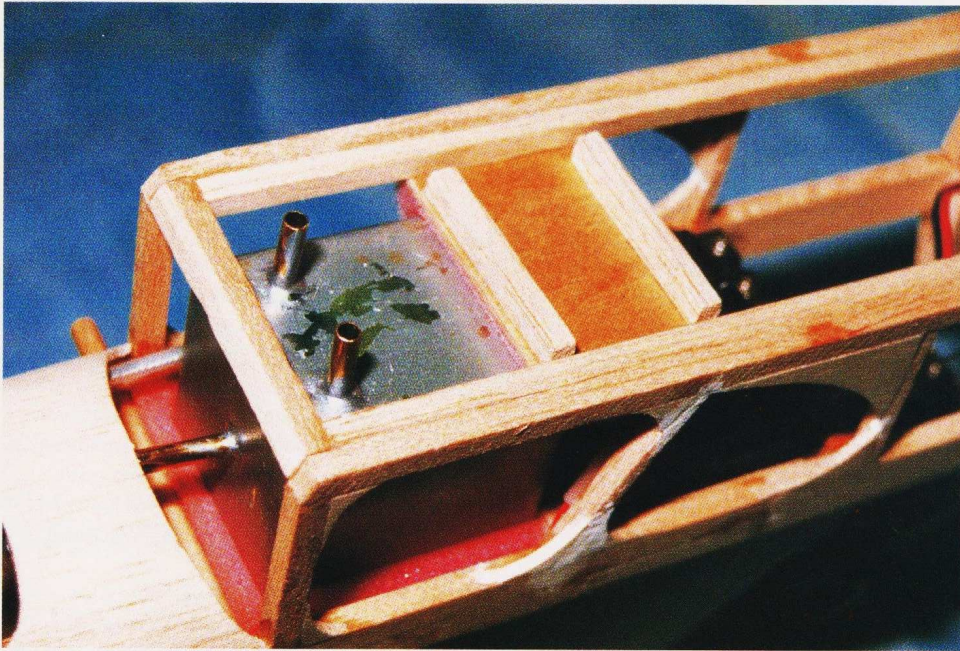


**Keith Adams, chief builder. Keith loves his building and flying, as he loves his wife, with quite a few miles on the clock, Keith has loved both for years.**



**This picture illustrates the engine and its mounting position, the exhaust is left off to show you the small amount of side thrust built into the mounting plate.**





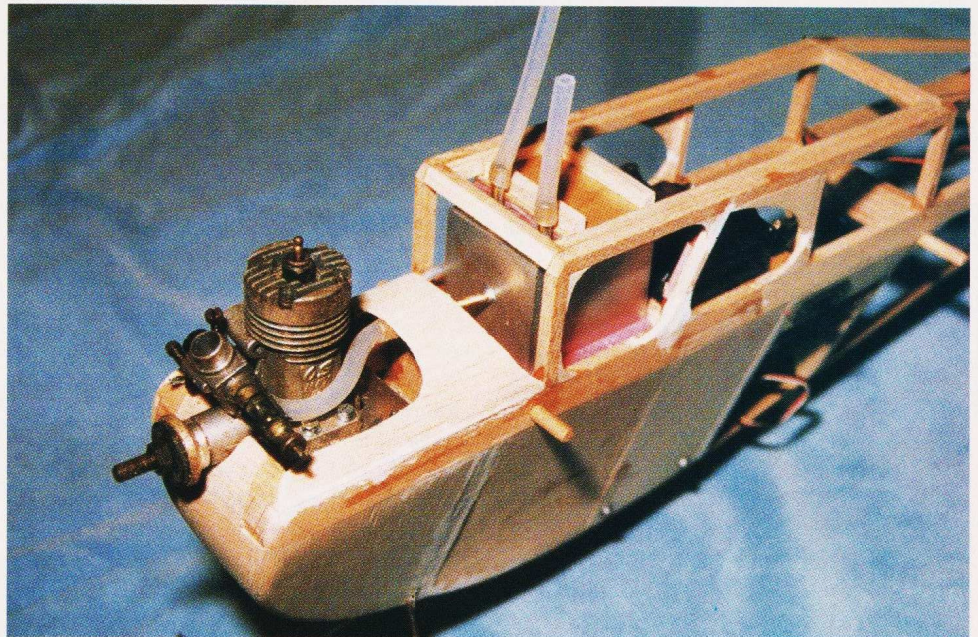
Here is pretty good view of Tony Harding's tank, the fuel feed fits neatly inside the cowl, while the filler and breather tubes will extend through the wing centre. Keith's neat sliding door is also evident, it is shown slid back to allow tank removal.

## The engine

I decided on an OS 10 FP, for my power supply. This was not a straightforward choice, I often take the opportunity to use a vintage engine, for such a project. I wanted reliability, with a view to my youngsters flying the finished project, for this the OS 10 is perfect. I can start one of these simple, yet efficient engines with either a 'chicken stick', or an electric starter.

Fitting the engine into the model was a piece of cake, simply making up an alloy mounting plate, which in turn is screwed to the engine bearers. The bearers were as standard to the plan, and supplied with the kit, as was the alloy mounting plate. Two degrees of right hand side thrust was built into the plate, when drilling the mounting bolt holes. Whilst, on the subject of bolts and screws, allow me to guide you on this one! The engine is bolted with locking nuts to the alloy plate, this is then mounted onto the engine bearers, using set screws. The principal here, is to allow the whole plate with engine to come adrift as one unit, in the most unfortunate crashing event, that will at sometime happen to us all. In general, I have found this method to work, but I am not going to admit to crashing that often!

Finally the throttle is operated by means of a servo mounted only six inches behind the engine, on the centre of gravity. This is a straight run, with the outer bowden cable secured with epoxy resin, to the inside of the fuselage side. This set up allows smooth, kink free operation of the throttle.



This shot shows the sliding door holding the tank within a foam bed. The fuel tubing is also attached, the whole arrangement is very satisfactory.

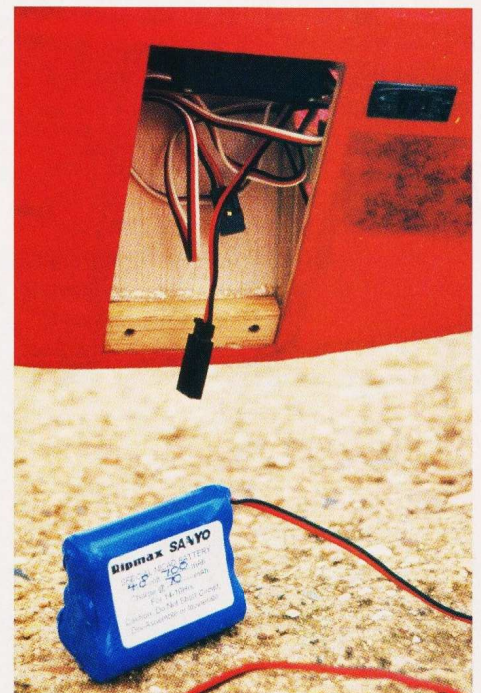
## Tony the tank

Yes, I had Tony Harding make one of his custom tin tanks, there wasn't very much room, so Tony had to put his thinking cap on, this is the solution, that we jointly came to. The other person that I have yet to mention, is Keith Adams, as usual, Keith took the model home regularly, to finish work we started in the class.

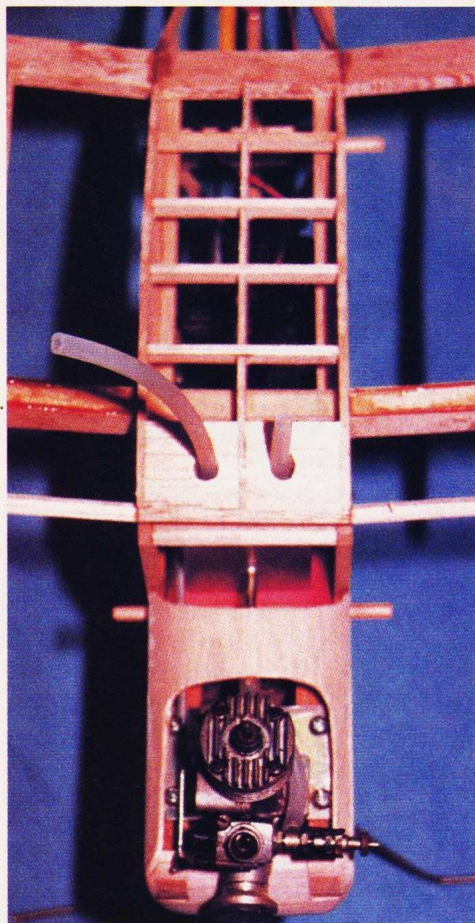
The special battery pack made up by Ripmax. The picture shows the pack upside down, so you can read the details. Keith constructed this clever hatch for inspection, the battery is wrapped in thin plastic foam, ensuring no movement within the fuselage. See text about ordering.

Because we the wanted to position the tank so that the needle valve on the engine was in the same horizontal plane as the middle of the tank, we had to make the tank to fit between the wing and just under the thrust line. So that the tank would hold at least 2 ounces of fuel, the top of the tank nearly touched the bottom of the wing, the photographs explain this more easily. It was decided to extend the filler and breather tubes with flexible silicone tubing, right through the wing centre, again the photographs tell all. This may all sound very elaborate, but was in fact easy, the plumbing became an interesting modelling challenge.

The tank was nestled by thin plastic foam, and secured with another of Keith's clever ideas. He made a small wooden sliding door arrangement, which has more foam attached, this makes for a comfortable fit, maintaining easy tank removal. Extra care was taken to







Wing in position, with tank tubes through its centre, all rather clever.



Loads of detail here. The aerial is threaded through carefully to avoid snagging, exiting centrally at the fin. The lower servo allows a straight operation of the elevator, while the upper closed loop system is just visible. Finally the battery hatch construction can be appreciated.

fuel proof the thick rolled paper tubes, that were built into the wing centre. Again the wing was made but uncovered before this modification was undertaken, truly this did not add significantly to the models building time. To finish up on the tank, the fuel feed tube comes just inside the cowl, and the filler and pressure tubes, come out of the wing.

## Ripmax Battery Division

The lovely diamond lines of this little model, really do restrict the space available for the battery pack. I really wanted to get the weight down as low in the model as possible, mainly to aid stable flying.

I remembered my recent trip to Ripmax H.Q. where I spent the day, you may have read my RIPMAX 50th Anniversary report, published earlier this year. Ripmax have a battery division, which is effectively a stand alone business, they make up battery packs of all shapes and sizes. Here was my solution, a quick phone call, backed up with a diagram of what I wanted, was sent by Fax. A week later, my little parcel arrived, exactly what I had ordered. The way forward for you, is to present your local model shop, with a diagram of what you want, most model shops deal with Ripmax. The proprietor will then get your customised pack made for you at Ripmax, who will deliver this to you through the model shop. Ripmax operate this way, it makes it all possible. You cannot go direct to Ripmax, their structure is not designed to work that way, you must order through your model shop. You may like to know, that this is a quick service, and not expensive, my special pack, with enormous lead cost just eleven pounds.

## The receiver and switch harness

The receiver was packed within foam, and inside a plastic bag, under the fuel tank, deep in the Diamond. This used available space, keeping out of the way of control runs. If you ever position a receiver under a fuel tank, or in any place where there is a possibility of fuel getting near to it, take precautions, fuel and receivers do not mix!

One other thing that you should be aware of, is making sure you have clean, firm connections between your servo leads and the receiver. When receivers are hidden away, the temptation is to ignore them, it is vital that you periodically inspect the receiver and its connections, poor contacts kill models!

Observing the photographs, will help you see the receiver aerial, neatly running through the fuselage, exiting at the front of the fin. We used a small piece of outer cable to guide the aerial away from the closed loop wires that operate the rudder. Another piece of outer cable was attached to the top of the fin, this was the final guide for the aerial. Throughout the anchorage of the aerial, there are no fixed positions that restrict the aerial wire from movement. This is to ensure the aerial is not stretched on a bumpy landing etc.

The switch harness is positioned on the opposite side of the model to the engine exhaust, here again oil interferes with electrical connections. One should also take hand launching into account, the switch should be so positioned, as to avoid an accidental switching off at the vital moment. The charging lead needs only to be accessed when the wing is off the model. I advise the wing to come off after every flying session, this avoids letting elastic bands being neglected, remem-

ber they are meant to hold the wing in position when flying. I have witnessed several model crashes, just because of weakened elastic retaining bands.

## Control runs

I have already covered the throttle, which is operated via a bowden cable. The elevator is operated by a dowel rod, this has threaded steel rod ends which are securely fixed to the dowel. The photographs illustrate this quite well, notice how the elevator servo is mounted low down in the model. There are two benefits that come from this low mounting of the servo, the mass is lower in the model, increasing stability, and the dowel rod is free to run without catching the higher closed loop system.

All in all, the control movements have worked out to be neat and workman like. The centre of gravity has finished up bang in the correct position, meaning no extra weight needed to be added, to either the front or rear of the model, always satisfying. A project like this, makes you think, and thinking is good for modellers, everything then becomes more satisfying.

## Conclusion

The model was covered with Starspan, this is a covering material supplied by FMK. Having little or no control on publishing dates (and Ed, I don't want any), you may well have already read this article, anyway it's worth reading!

The model flies very well, proving to be extremely stable for this size of model. Most of my night class have had a go, they all love it. I suggest that this would make a really good project for those of you who like a good build, who are able to fly the 'A' certificate schedule. You can be assured of many happy hours flying, a foot off the ground, the length of your strip, this is where the OS 10 comes into its own, very reliable throttling.

The kit is available from most good model shops, or direct from 'Ben Buckle Kits', 9 Islay Crescent, Highworth, Wilts., SN6 7HL. Tel. (01793) 764017.

**RCMW**



Coming in for another of those long low runs through the strip. The translucency of the Starspan can be appreciated from this shot. The Diamond Demon is a beautiful flyer, give Colin Buckle a ring and get building!