BLUEB

Vintage-style elegance from Andrew L. Reid

'Bluebird' was conceived as a traditional style, three-function sports model of distinctive appearance intended for quiet, relaxed general flying rather than continuous aerobatics. A particular requirement was that it should be suitable for operation with a PAW 19 R/C diesel motor.

To obtain the best performance out of what might be considered a relatively small power unit for this size of model, some thought was given to producing a light but strong structure, eliminating ailerons to simplify wing construction and control installation, and employing a soarer-type aerofoil section (Gottingen 602), to ensure a reasonable glide performance.

The prototype tipped the scales at 3lb 4oz, generous wing area giving a wing-loading of just over 10oz/sq.ft, which is light for a power model. 'Bluebird' is thus not a model that has to be rushed in for a landing the moment that the motor cuts – quite the opposite, a great deal of enjoyment can be had in prolonging the flight-time by searching out available thermals when the conditions are right.

Although designed around a diesel, any suitable 19-25 size two-stroke glow motor or equivalent four-stroke can be used to provide the motive power. Construction is straightforward, but performance with this type of model depends upon keeping the finished weight within bounds. With careful selection of materials and use of adhesives, 'Bluebird' will remain serviceable for a long time and provide a great deal of Sunday-flying enjoyment.

Construction

Building 'Bluebird' should not be difficult for anyone of moderate experience and the following notes are intended to provide some general assistance to prospective builders, rather than a complete description.

Fuselage

The fuselage consists of an orthodox sheet sided box with 1/32in ply doublers to rear of the wing, and incorporating 3/16in square balsa longerons. Basic assembly is easier if the engine-bearers are glued first to the sides rather than the front formers. Use five-minute epoxy for attaching the sides to the formers. Fix formers 1 to 3 first, and allow the epoxy to set before drawing together at the rear. Take care to ensure that the fuselage is not banana-shaped or twisted.

The rear top-decking is best applied slightly oversize. To obtain the curve, moisten the outer face slightly and carefully work in sufficient curve with the fingers whilst holding the moist side of the sheeting in front of a heat source. The decking pieces shaped in this manner can then be easily pinned in place using white-glue, allow 24 hours to dry out. The tapered 1/2in balsa capping is added after trimming off surplus 1/8in sheeting.

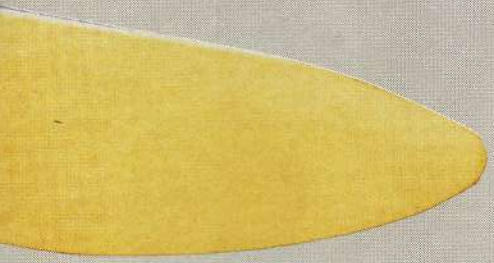
It is advisable to thoroughly seal inside the engine and tank bays to protect against fuel ingress. Bonding resin was used on the prototype and applied after adding the bottom sheeting but prior to fixing the top sheeting.

The decking over the wing centre-section is carved from soft block-balsa, which may be laminated from roughly cut pieces of 1/2in sheet. The block is pre-shaped approximately using razor-plane and file, prior to tack-glueing in place for final shaping with the fuselage. The finished block may then be removed and fitted to the wing centre-section later.

The use of longerons enables a fair amount of material to be removed from the fuselage corners when shaping to the final rounded contours, but care should be taken not to cut too deeply into the longerons themselves.

Wing

Begin construction of the wing by pinning down the trailing-edge, lower cap-strips and lower center-section sheeting between trailing-edge and the spar. The bottom spar is next laid down packed up 1/16in above the surface of the building board. (This may be acheived by making some of the lower cap-strips long enough to extend under the spar, cutting off the surplus later). Next to be added are the ribs, dihedral braces, and



top spar. Note that there is no need to notch the ribs into the trailing-edge when cap-strips are employed, since the glue area of the joint is greatly increased by this method. The basic framework is completed by attaching the false leading-edge to the front of the ribs. Select balsa that is sufficiently flexible to curve round the tip ribs easily.

The two wing panels are joined together by the wing-braces, which should be cut from good quality ply. Prop the first panel next to the second glueing the main wing-brace to the lower spar of the second panel in the process, then complete the construction of the basic framework of the second wing panel.

The top and bottom sheeting of both wing panels may now be completed, not forgetting the front location dowel and the vertical webbing between the ribs (Note: this should be glued in place before completing the top sheeting and cap-strips).

The 1/2in thick leading-edge and the laminated portion at the tips are added last. The laminated section may be made as follows: Make up a 'swatch' of four pieces of 1/8in thick balsa a little over-size in width and length. Glue the strips together for the first 3in or so of their length only and allow to dry. Cut this end to a suitable splice-angle to match the straight portion of the leading-edge, which should already be in place. Work some white-glue between the laminations and contact surfaces and tape the laminations firmly to the wing. The adhesive acts as a lubricant between the balsa strips allowing one to slip over another as they are taped in position around the curve.

The solid balsa decking is glued permanently over the wing centre-section after final shaping and sanding of the wing, and should be cut away to clear the ply seating plate for the wing fixing bolt. The wing and fuselage assembly should be carefully checked for correct alignment at this stage; any discrepances will be difficult to correct later.

Tailplane and fin

These items are quite straightforward. Cut out one side and pin down to the building board. Assemble the interior framework on this side and sand level prior to adding the second balsa skin (Note that cross-pieces in the fin require sanding to a taper). The solid balsa rudder and elevator are best tack-glued to the fin and tailplane so that both items can be planed and sanded to final profiles in one-piece.

Fin and tailplane are fixed to the fuselage prior to final finishing although it may be found easier to cover the tailplane first.

Motor-mount and undercarriage

Making a plate motor-mount separate from the main bearers is well worthwhile – it provides a much neater engine installation, stops fuel from soaking into the front of the fuselage and makes removal of the engine for servicing very easy. The particular advantage for diesels and four-strokes is that it provides a more rigid mounting and better vibration absorption. The mounting plate may be cut from 1/4in thick ply or heavy gauge dural sheet. A composite mount was employed on the prototype 'Bluebird' using 1/8in thick ply with a facing of 16 swg dural epoxied on to the motor side. This had the advantage of being very easy to cut out using a motorised fret-saw. The finished motor mounting plate should be attached to the main hardwood bearers with four size 6 self-tapping screws.

The two-piece dural cantilever undercarriage shown on the plan may appear rather novel, and indeed it was originally employed due to a lack of dural sheeting in sufficient lengths! Nevertheless it has proved quite practical in that it allows the undercarriage to pivot rearwards in the event of hitting an obstacle on landing, a frequent occurance on the very rough field over which the prototype 'Bluebird' is normally flown.

Final assembly and finishing

Accuracy of alignment of wing and tailplane should have been carefully monitored during construction, but a final check that all is square and that incidence angles correspond with those shown on the plan before covering and painting will be well worth-while. A snug wing-seating may be obtained by bedding the wing onto a thin layer of Plastic-Padding applied to the seating area on the fuselage (cover the underside of the wing with polythene to prevent it sticking to the Plastic-Padding).

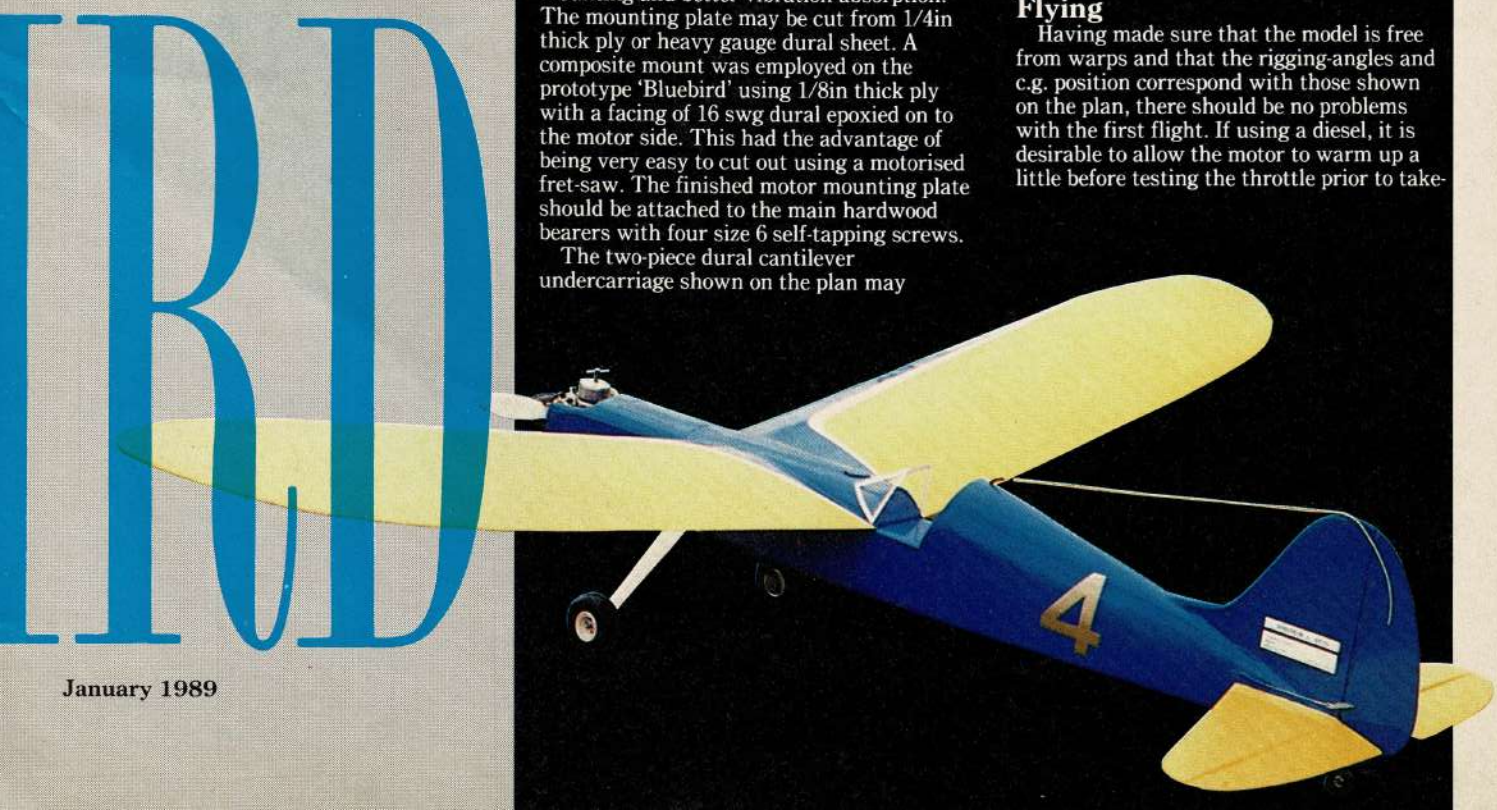
The type of control system employed will be largely a matter of personal preference, the prototype 'Bluebird' used snakes to throttle and elevator with a closed-loop system for the rudder. Push-rods to rudder and elevator are not recommended due to the constrictions of the rear fuselage.

Any type of covering and finishing may be employed. The fuselage and fin on the prototype were covered with heavy-weight tissue applied with clear-dope, sealed with several further coats of dope before applying two coats of Humbrol blue enamel, a combination which appears to be resistant to diesel fuels. The wings and tailplane were covered with Solartex and sealed with Clearcote, final trim being applied with enamel and adhesive trim-tape.

The fuselage is capacious enough to take standard size radio equipment; if smaller size servos are installed it is recommended that a 500 mAh size nicad is used to avoid the possibility of exhausting the receiver battery after one or two longish thermal-assisted flights.

Flying

Having made sure that the model is free from warps and that the rigging-angles and c.g. position correspond with those shown on the plan, there should be no problems with the first flight. If using a diesel, it is desirable to allow the motor to warm up a little before testing the throttle prior to take-



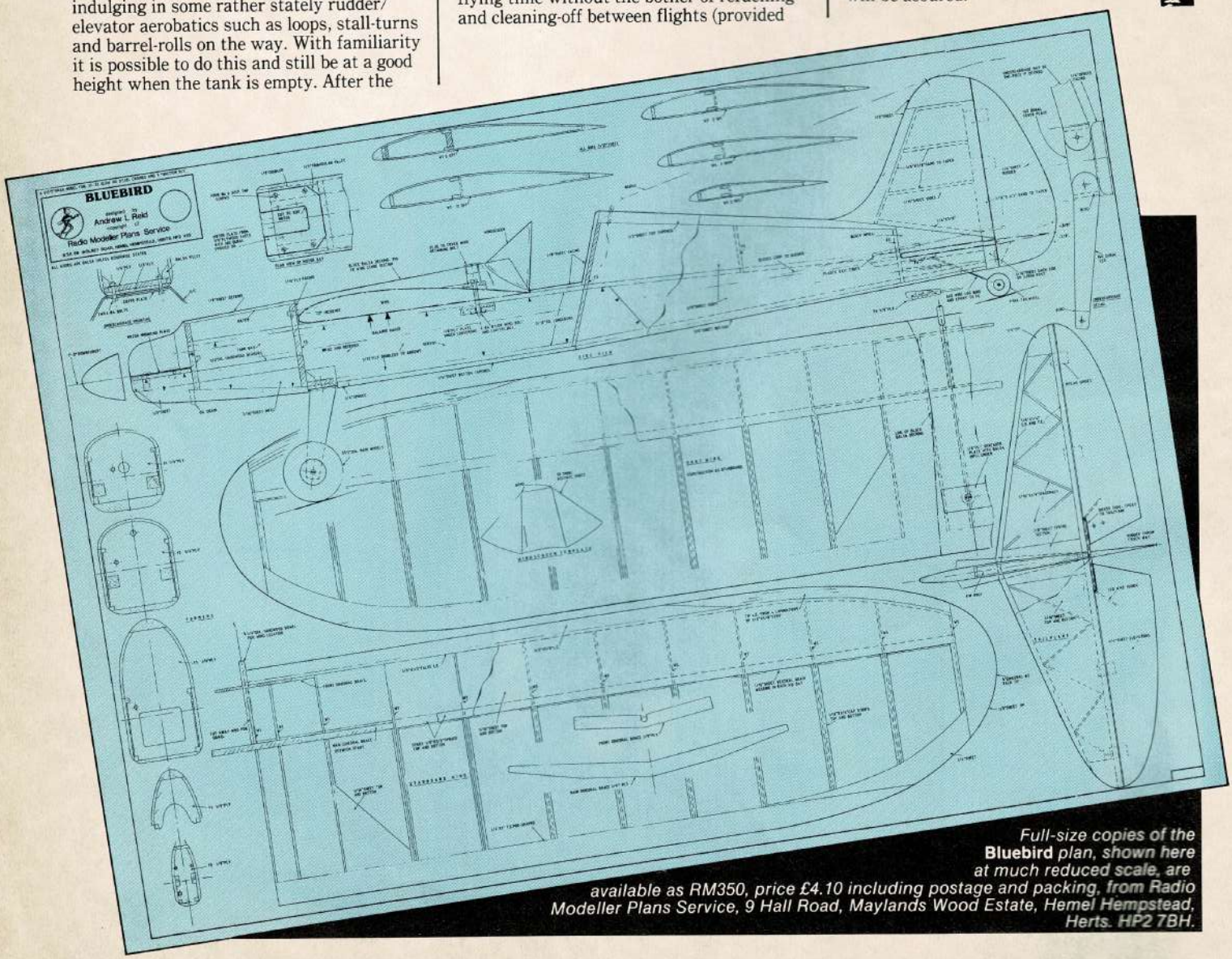
What could be simpler - or more fun! PAW diesel hoists **Bluebird** *aloft with minimum fuss, then it's all down to snifting out a thermal or two to prolong the enjoyment. Build one for this spring.*

off or launch. 'Bluebird' has such a light wing-loading that either an R.O.G. take-off or a hand-launch can be used as suits the flying site. It is preferable to 'run' rather than throw the model into the air from a hand launch; this will avoid starving the motor of fuel at the critical moment, and gets the model up to flying speed, especially on calm days. Some slight down-elevator trim may be required during the power-on phase of flying, easing in a little up elevator for the glide.

A typical flight with 'Bluebird' will consist of a leisurely climb to altitude, indulging in some rather stately rudder/elevator aerobatics such as loops, stall-turns and barrel-rolls on the way. With familiarity it is possible to do this and still be at a good height when the tank is empty. After the engine cuts, 'Bluebird' can assume its second role as a quite efficient glider, the name of the game now is to use any thermals which may be about to prolong the flight period, which can be quite a long time on favourable days. A further refinement is to use the thermals during the motor-run by throttling back to tick-over and climbing the model in the naturally provided lift. In this manner it is possible to achieve a lot of flying time without the bother of refuelling and cleaning-off between flights (provided that there is no-one else waiting impatiently for the frequency peg!)

One of the benefits of using diesel motors is that they are more economical in fuel consumption than glow motors and, by using the previously described flying technique, long flights can be achieved with a small tank (the prototype 'Bluebird' is fitted with a 2oz. clunk-tank). Another advantage of diesels for sports flying is that the only field equipment required is a can of fuel, a rubber finger-guard for starting and some cleaning materials.

Finally, the bluebird is widely regarded in many parts of the world as a symbol of good-luck and happiness. By building one from this plan, happiness on the flying-field will be assured!



Full-size copies of the **Bluebird** *plan, shown here at much reduced scale, are available as RM350, price £4.10 including postage and packing, from Radio Modeller Plans Service, 9 Hall Road, Maylands Wood Estate, Hemel Hempstead, Herts. HP2 7BH.*