



DH53 Hummingbird

Background

I first became acquainted with the full-size aircraft during a visit to Old Warden in the late seventies after having become aware of the type via the book 'de Havilland - The Golden Years', which provided the design information. First thoughts at that time were around a model spanning about 1.8 metres for a .40 4-stroke. However, due to interest in various other projects it did not materialise.

More recently, largely due to the water logged state of our club site in the autumn and winter months making flying IC powered models unpleasant if not impossible, I decided to enter the low cost end of electric flight.

Having got a feel for electric via two electric gliders, a 400 powered sports model, and reading relevant magazine articles, I felt ready to attempt designing a small electric scale model. The

**FREE
PLAN**

A conventionally built 45" span Speed 400 powered near-scale model from the Golden Era for 4 function R/C.

Hummingbird was already in mind, I had sufficient information to hand, and so far as I am aware, it is a type not previously modelled.

Description

The model is designed at 12.5% scale. At this size it fits fully rigged into most family cars. Construction is based on the full-size with concessions to practical model-ability where appropriate. Wings are separate panels located to the fuse-

lage by short pegs and a rubber band. The compression struts are functional, taking the flying loads and setting the dihedral.

Hitec HS81 servos fit into each wing. Closed loops are used for rudder and elevator. Access to rudder and elevator servos, receiver and battery is via a hatch in the fuselage bottom.

The Graupner Speed 400/FG 2.33:1 turns a 10 x 6" folding propeller. A fixed blade propeller is more scale like, but the first landing resulted in a fractured gear-

The low slow pass is very impressive.



Hybird

box casing. A Schulze 25A speed controller fits behind the motor, its BEC output provides sufficient current to drive the four HS81 servos and a 7 channel Micron receiver.

Air enters the engine/controller compartment via holes in the cowl and dummy cylinders, passes through former F1, exiting through the cockpit opening. The top cowling detaches providing access to the motor and speed controller.

Tail Pieces

Build the tail surfaces over the plan and sand to shape. Make elevator and rudder horns and epoxy in place. Elevator and rudder are hinged with Mylar.

Wings

Mark the rib positions on the main spars and dry fit the ribs. Pin down trail-

ing edge, 1/8 square lower rear spar, lower aileron spar, and main spar with ribs dry fitted packing up the main spar with scrap 1/8 sheet. Line everything up and glue. Add wing tips, upper rear spar, upper aileron spar and leading edge. Remove from the board and cut out the ailerons. Face the front of the aileron with 0.4 mm ply. The rear wing spars after removal of the ailerons are not faced, the covering material is brought over from top to bottom. Make the aileron horns and epoxy them in place. Fit the aileron servos, temporarily hinge the ailerons with masking tape, and make up the control linkages. Ailerons are hinged with the covering material. Aileron servos are finally fitted prior to covering.

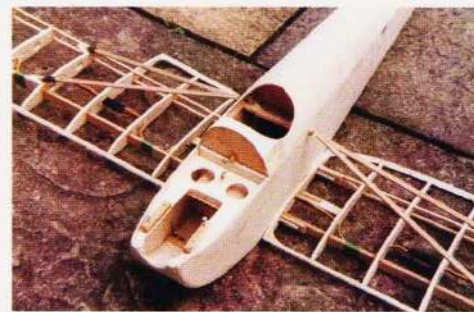
Fuselage

Initial assembly is done with the sides pinned upside down over the plan. Threading a piece of piano wire of similar diameter to the wing pegs through the front peg holes helps with alignment. Dry fit F1 and F2. When everything is square, add cyano. Bring the rear fuselage together at F5, glue this former in place, then bring together the rear end making sure the sides extend beyond the last uprights to provide a slot for the fin post. Add top and bottom cross braces, and bottom sheeting from about F3 back to F5 to make the assembly more rigid to handle. Remove from the board and fit the motor mounting plate, undercarriage mounting plate, servo bearers, 3 mm ply strut fixing plates and brackets. Fit the tailplane mounting plate chamfering it to give +3 degrees incidence. Form the tail skid from 20 swg piano wire, then bind and epoxy it to the mounting plate and glue into the fuselage.

Dihedral Rigging

Make the struts from 1/4 by 1/8 spruce slightly over length with the fixing tabs fitted at the fuselage end only. Attach the wings ensuring they are square to the fuselage with the rubber band, and attach the struts to the fuselage. Jig up fuselage about 25 mm above the board with the sides vertical and the bottom of the wing parallel to the building board. Pack up the wings to give 12 - 15 mm dihedral on each side at R10. Cut the struts to length allowing for the fixing tabs, bind and glue the tabs in place, then drill through the tab screw holes into the fixing blocks in the wings.

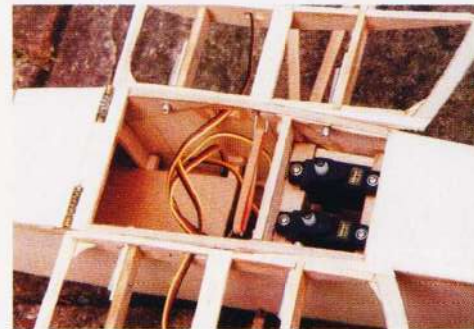
Hinge the elevator, then align the fixed tailplane with the wings and glue in place ensuring sufficient space in front of the fin post for the elevator to move freely.



Old Warden DH53 example is still flown regularly at their 'Twilight' airshows during the summer.



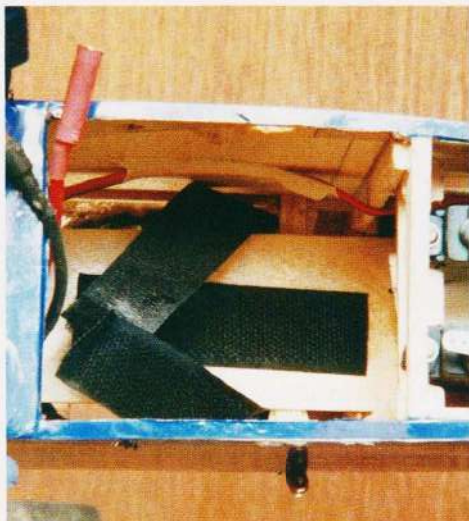
The prototype before covering. The ventilation hole had not been cut in F1A at this stage.



View underneath showing servo mounting, wing retaining system, and battery tray which has since been extended as shown on plan.



Motor and speed controller installation. Note cut-out in F1A.

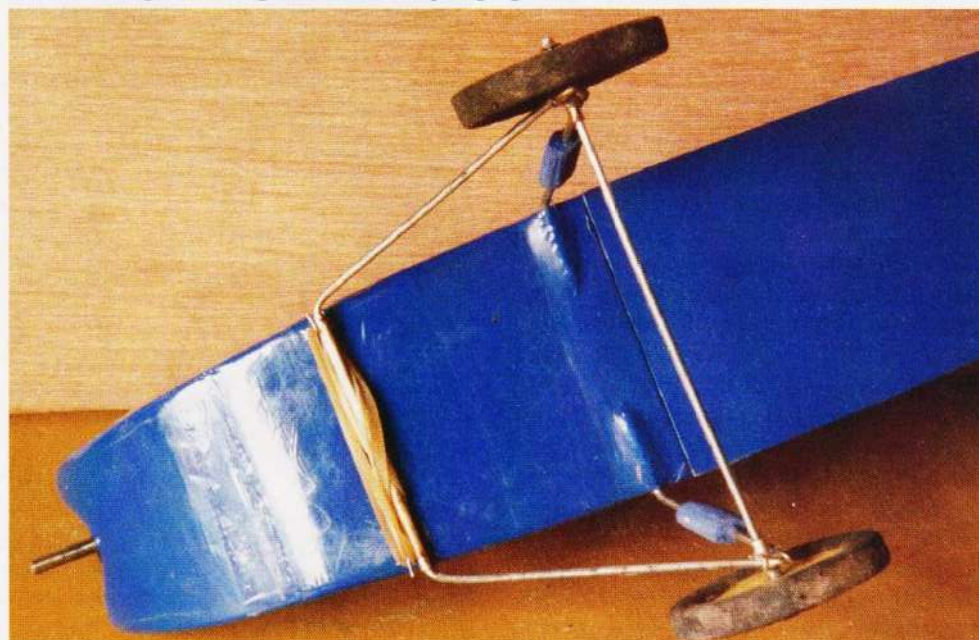


Final battery tray. Battery is secured with Velcro plus a Velcro strap to support the heavier 8 cell 800 mAh pack.

Offer up the fixed fin, check vertical and longitudinal alignment and glue in place. Add fuselage top formers. Decking will roll round and fit in one piece if cut to the diagram shown on the plan and wetted on the outer surface. The cockpit opening is cut after the deck has dried out. Temporarily fit the motor and gearbox. Tack glue the cowl formers in place, and plank the cowl from fairly soft 3/16 balsa using Aliphatic wood glue. When dry remove the cowl, sand the planking flush with the front former, then add pieces of suitably thick balsa to build up the nose shape. Hollow out the front of the cowl to clear the gearbox, then sand the cowl to shape. Epoxy small wire hooks to cowl former C2 and the motor plate, to take a securing rubber band.

Form the undercarriage from 16 swg piano wire as shown on the plan. Fit to the fuselage so that it hinges about the mounting tubes. Secure the front struts

Undercarriage showing rubber band springing.



Closed-loop connections to rudder and elevator.

to the fuselage with a rubber band. This allows it to spring backwards when harder landings occur. Cut the axle from 16 swg wire. Cut two 10 mm lengths of 16 swg brass tube and fit them over the axle. Position the axle with the tubes in the bottom of the 'V'. Bind with fuse wire and solder the brass tubes to the 'V' bottom. Wheels are made from 6 mm hard ply. A round bottom groove is made in the edge to retain the glued on tyre, which is a 6 mm wide slice cut from a Mardave car tyre. Bush the wheels with brass tube.

Covering

The model was covered with Profilm, which adds torsional rigidity to the

wings. Colours are taken from the Shuttleworth example; dark blue fuselage, silver flying surfaces, with white letters on the fuselage, and blue on the wings.

Centre of Gravity

Position the battery to give a balance point 20-25 mm in front of the strut attachment point. This is a safe position for the first flight if the recommended elevator movement is not exceeded (see chart).

The wing bracing struts are fully functional and should not be omitted.





The dummy engine cylinders are attached to the cowl access hatch to complete the original look.

Flying

The ailerons are very powerful so do not exceed the recommended throw for the first flights. Check for wing warps and that both wings are rigged with the same incidence. Wait for reasonably calm conditions. Check the C of G position and correct operation of all control surfaces. Open the throttle and give the model a firm straight and level hand launch. Keep it straight for the first 10-15 metres while the airspeed builds.

The finished model represents a good 1930s monoplane of distinction with its typical DH colour scheme.



My test flight was done with a 7 cell 500 mAh pack using 9 x 7" wooden prop. The wind was probably in excess of 15 mph, and this combined with excessive aileron movement almost resulted in a down wind forced landing. However, I recovered the situation for a heavy landing in what were now gusty and turbulent conditions which proved that a fixed prop plus a poor landing causes the gearbox casing to fracture. The next attempt was in ideal conditions with reduced control throws and

SPECIFICATIONS

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Type: DH53 Hummingbird.
Scale: 12.5%. (1:8)
Wingspan: 45 ins. (1143 mm).
Overall Length: 30.25 ins (768 mm).
Number of servos: 4 plus speed controller.
Motor type: Speed 400, with FG 2.33/1 gearbox.
Battery: 7/8 cells, 500-800 mAh.
Weight: 30 oz with 8 cell 800 mAh battery pack.

CONTROL THROWS

These are measured at the extreme trailing edge of the control surfaces.

Ailerons: 8 mm up - 6 mm down.
Rudder: 25 mm each way.
Rudder: (C.A.R.) Approximately 10 mm each way for rudder at maximum aileron deflection.
Elevator: 12 mm each way.

the 10 x 6" folding prop. All went well, the model being easy to control with no vices. I was able to try various battery configurations. The power-off glide is reasonably flat but not very long as the drag reduces penetration, so the approach is best made under reduced power, shutting off as the model crosses the threshold. Basic aerobatics (which the full-size was never intended to do), are within its capability, but it looks best flown at low level close in. Flight times of up to 10 minutes can be achieved with the 8 cell 800 mAh pack depending on conditions and how you use the throttle.

Building and Flying Experience

Due to the type of model this represents it is advisable to have some previous plan-building knowledge. This model is not suitable for beginners, however, it would make an interesting subject for a first time scale flyer.

RCMW

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