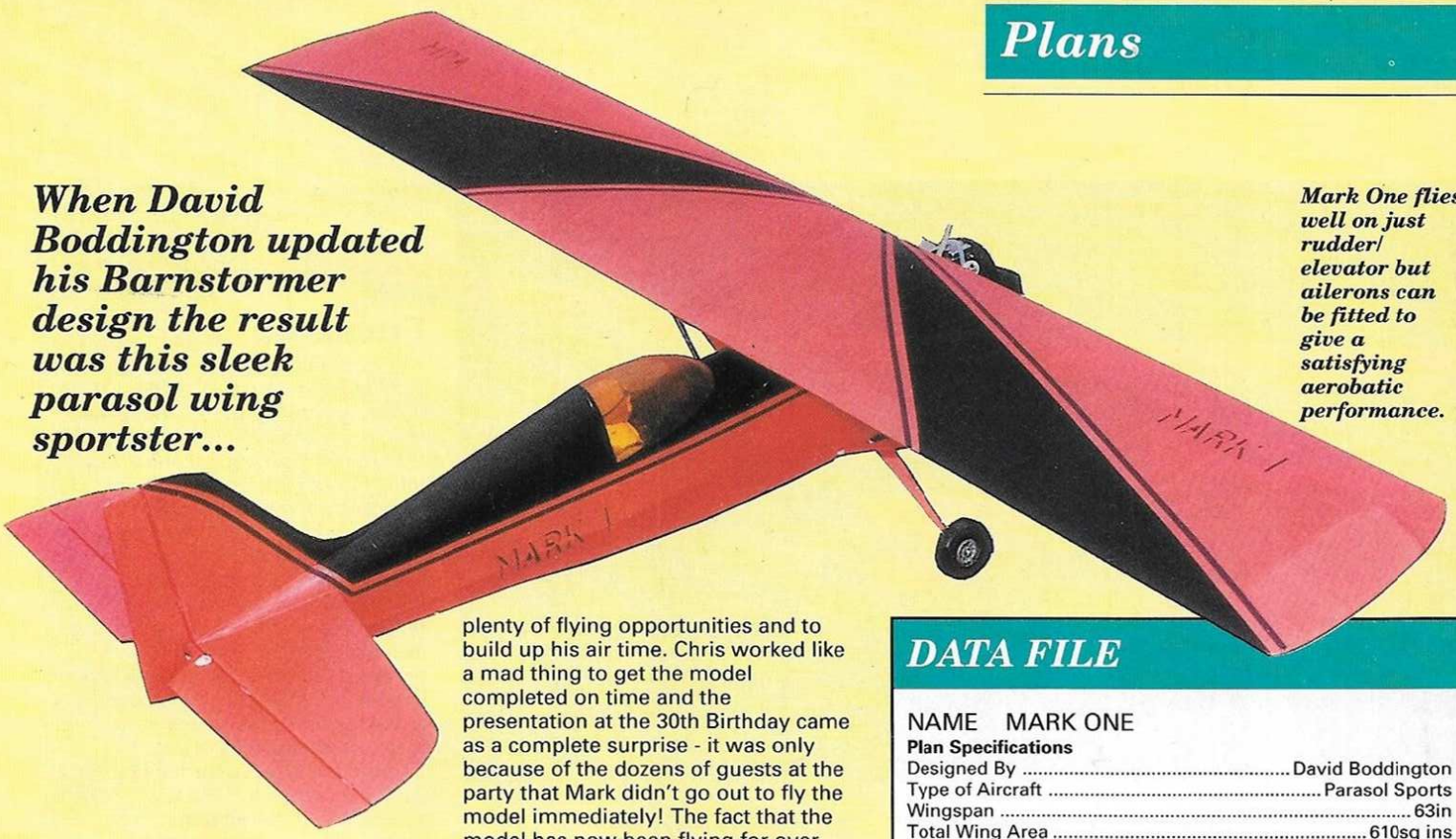
MARK ONE

When David Boddington updated his Barnstormer design the result was this sleek parasol wing sportster...



Mark One flies well on just rudder/ elevator but ailerons can be fitted to give a satisfying aerobatic performance.

Mark One was designed as a tribute to a modeller who has suffered more than his fair share of trials and tribulations over the years. Mark Underlin is a member of the Model Pilots Association, who, with his wife Amanda, regularly attends the MPA aeromodelling weeks at the Haven resorts, and MPA events at Old Warden and Grendon Underwood. It was after one of the Filey modelling weeks that we learned of Mark's health problems. Mark has been suffering from kidney failure since the age of eighteen and two transplant operations have proved to be ineffective, so he has to resort to dialysis on a daily and nightly basis. In spite of these severe handicaps Mark took an absolutely full part in all of the aeromodelling activities on offer at Filey, both the building and flying events.

When Amanda was organising a surprise 30th Birthday party for Mark it offered the perfect opportunity to demonstrate the caring side of the MPA. Although time was fairly short it was decided that we would present him a model, ready built and complete with engine and radio control equipment. Amanda and friends purchased the OS 40 Surpass four-stroke engine and a mention to MPA members who had attended the Filey week, brought an immediate response with donations sufficient to cover the costs of the Hi-Tec radio control equipment. Ray Bullen provided some of the Artmill balsa for the construction and Chris Dickens kindly offered his services, plus additional materials, for the model.

For sometime I had thought about updating my Barnstormer 63 design and the presentation to Mark made the ideal excuse for this project. Having just reached the solo stage at the MPA Devon Cliffs week, Mark was ready for a stable sports model to give him plenty of flying opportunities and to build up his air time. Chris worked like a mad thing to get the model completed on time and the presentation at the 30th Birthday came as a complete surprise - it was only because of the dozens of guests at the party that Mark didn't go out to fly the model immediately! The fact that the model has now been flying for over three months and has clocked up many flights is testament to Mark's flying abilities and to the rugged nature of the model. Photographs of the model were mostly taken after the many flying sessions, hence the signs of wear and tear.

Design

There is obviously no need to explain the name and the genesis of the model, which is directly related to the Barnstormer designs, the first of which is now some 25 years old. Changes made to bring it to Mark One standard includes the incorporation of sweep back on the wings, the cabane struts being simply formed from pianowire, a cowled upright engine, enclosed cockpit and the use of all sheet tail surfaces. Flying characteristics have, if anything, improved on the original and the wing sweep, together with the use of a four-stroke engine, helps to achieve the correct balance point without resorting to added nose ballast.

There are not many decisions to make before you start chopping and sticking but check for the fit of your engine on the bearers, also the spacing for the servos. Note that the fuel tank is housed in a plywood tube with access to the tank from the front of the fuselage. This has two advantages; the tank is totally separated from the radio equipment and the tube helps to strengthen the forward part of the fuselage. Check the dimension of the round fuel tank you are to fit; note that the tube ends in front of former F4.

Wing struts are not 100% necessary from a structural consideration (for non aerobatic flying) but they do improve the appearance considerably. If you are interested in a more aerobatic performance you should certainly fit ailerons and I would suggest reducing the wing dihedral by half.

DATA FILE

NAME MARK ONE

Plan Specifications

Designed By	David Boddington
Type of Aircraft	Parasol Sports
Wingspan	63in
Total Wing Area	610sq ins
Aerofoil	Clark shoe-size 8!
Fuselage Length	39in
Tailplane Span	24in
Tailplane Area	157sq ins
Tailplane Section	Flat plate
Fin Height	9in
Rec. Engine Range	.30-.40 cu ins
Fuel Tank Size	6oz
Rec No of Channels	3-4
Control Functions	Elevator, Rudder, Throttle (Ailerons)

Materials used in Construction

Fuselage	Balsa & Plywood
Wing	Balsa
Tail Surfaces	Balsa

Wings

Wing panels are built flat over the plan. Pin down the lower trailing edge, rear spar and lower main spar (supported on 1/16in packing). If ailerons are to be fitted they should be constructed at the same time as the wing, the ailerons being cut away after the panel is completed.

Glue the ribs to the spars, canting the root rib to the required dihedral angle, followed by the top main spar, top trailing edge strip and the 3/8" square leading edge. Leave to dry before adding the top leading edge sheet, capping strips and top centre section sheet. Remove from the building board and glue the 3mm plywood strut fixing pieces and wing strut blocks in position, plus the wing tip pieces and gussets.

Sand the root ribs smooth and join the two panels, propping up each tip by 1.1/16in. When dry remove from the board and cut slots for the dihedral braces; glue them in position supporting the tips to the correct dihedral. Leave for the glue (PVA) to set thoroughly, prepare any servo boxes and aileron linkages and glue the lower leading edge sheeting, cap strips and centre section sheeting in place. At the fixing points for the cabane struts the 1/16in balsawood is

cut away and 1.5mm ply substituted. Drill pilot holes for the 10g nylon saddles and wing strut fixing. Sand the whole wing to profile.

Tail surfaces

Select firm but light balsawood for these surfaces and cut out lightening holes to reduce the overall weight. Taper the elevators and rudder and round off the leading edges and tips. Fit your favourite form of hinges and control horns.

Fuselage

Construct two sides from 3/16in front sheet (to arrows), 3/16in x 3/8in top longerons, 3/16in x 1/4in lower longerons and uprights, plus sternpost, 3/32in x 3/16in diagonal and 3/32in infill. Formers F4 and F6 are constructed from a 1/8in hard balsawood core with 0.8mm plywood each side. Leave out the top V, where the cabane struts fit, but retain the cutout top piece for fitting later. Mark the positions of the formers on the inside fuselage sides and glue the plywood doublers and 1/2in triangular in position. Also glue the crosspieces to the formers and cut the remaining fuselage crosspieces to size.

Glue the sides to formers F2, F4, F6 and F7, adding the 1/2in lower nose sheeting and checking that the sternposts align when pulled together. Bind and epoxy the tailwheel leg to F11 and glue F8A to F8. Glue formers F3 and F5 to the fuselage framework and

then F8, F9 and the crosspieces etc until the rear stern posts are joined. Glue the 3/16in x 3/8in top centre rear stringer in position and check the whole fuselage for squareness; set aside to dry.

Form a 0.4mm plywood tube for the fuel tank and fit a 1/8in disc at the rear; fuel proof internally. Drill the beech engine bearers for engine bolts. Glue the bearers and tube in place and the lower part of the 1/4in nose ring. Glue the 0.4mm ply front top decking, overlapping the top longerons by 1/8in. Note the positions of the formers F4 and F6 on the decking. Cut away the sheeting at the position of the cockpit, under the canopy. Add the 0.4mm ply rear decking.

Bend the pianowire cabane struts to shape, cut slots in the 0.4mm ply decking and provisionally insert the struts in formers F4 and 6 and saddle clamp the wings in position. Check for correct alignment then bend the 18g pianowire crossbraces to size (the braces are bent upwards to the inner side of the rear cabane). Remove the wing and bind and solder the fronts of the crossbraces in place. Bind and spot solder the rear joints, remove clear of the fuselage side and complete soldering of the rear joint. Epoxy the cabane struts (slow drying epoxy) in the formers, check wing alignment again and then add the 1/8in V infill pieces to the cores of the former. When all is set, sand the infill pieces smooth to the decking. Fair the cabane struts with spruce, epoxy and bind with strong thread or cloth.

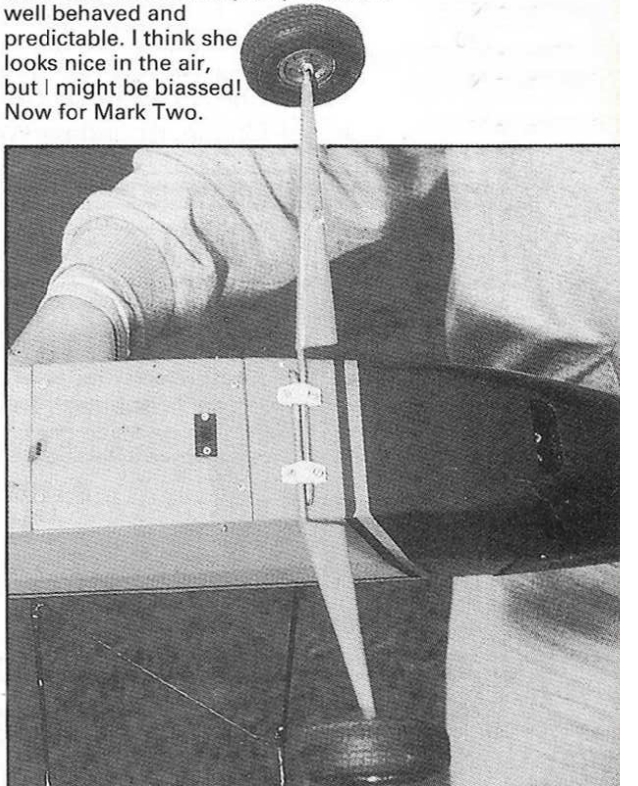
Add the 1/4in side sheeting (grain vertical), 1/8in lower sheet and 3mm ply and form hatch for access to the radio equipment. Form the removable engine cowling from F1 (top), F1A, 1in block, F2A and 0.4mm ply. Carve and sand the nose area to rounded shape; you may need to fit additional balsawood under the front of the engine bearers for the curvature. Glue the side 3/16in x 1/4in stringers from the front 1/4in sheet, to past F11 and sand to taper at rear. The undercarriage legs are bent from pianowire and are held in position with double saddle clamps screwed to the 3mm plywood, under the sheeting. Fair the legs with hard 3/16in bound to the legs with nylon and dope. Wheel spats are optional (use 2.1/2in dia wheels).

Finishing and radio installation

Use a pushrod for the elevator linkage. The rudder can have a pushrod or closed loop linkage (in which case the rudder servo should be centrally mounted). Keep the battery well to the front, just behind F3. The ailerons can be actuated by individual servos, or with pushrods and a centrally located servo. Any of the standard forms of film or textile coverings can be used, although the fabric materials will give a more resilient finish. The tail surfaces should be covered before they are glued to the fuselage, but covering not applied to areas where surfaces are to be glued.

Flying

No need to get paranoid about the test flying of this one. Check the balance point, engine and radio operation and the wings for warps - or the lack of them. All control surfaces working in the correct directions? No one else in the circuit? Wind strength and direction OK? What else are you waiting for - open up the throttle and go! You can opt for a take-off or a hand launch; either way you will find that Mark One has no nasty surprises, it is well behaved and predictable. I think she looks nice in the air, but I might be biassed! Now for Mark Two.



Top: Another winning design from David Boddington, seen here holding on tight in typical summer conditions! Below: Radio access is through a large plate in the fuselage floor allowing for easy maintenance. The u/c fits into torque blocks and is secured with saddle clamps.