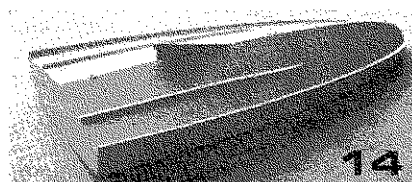
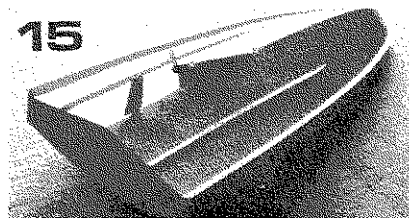
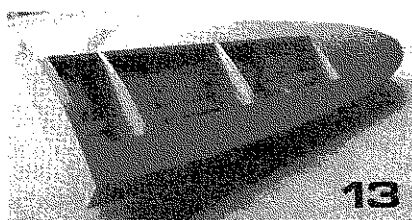
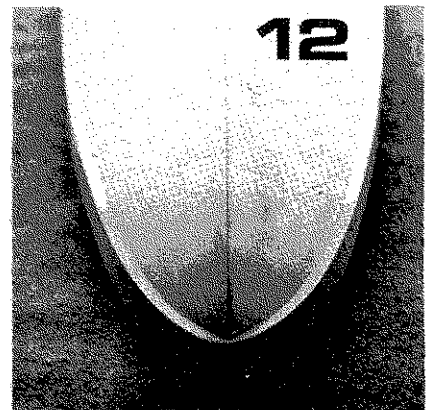
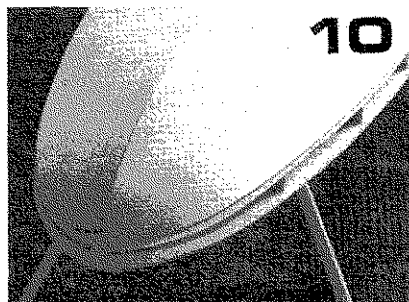
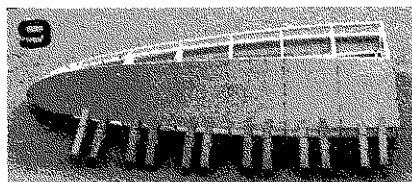
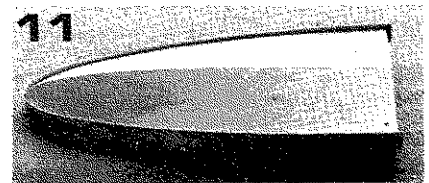
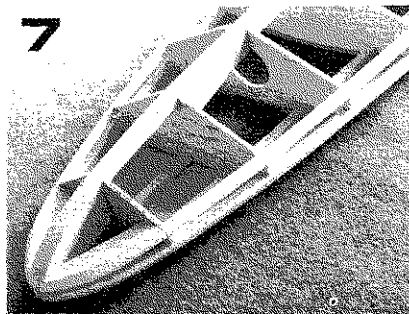
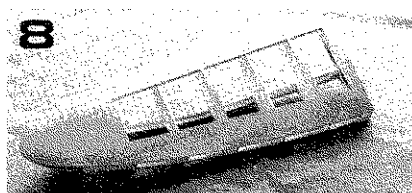
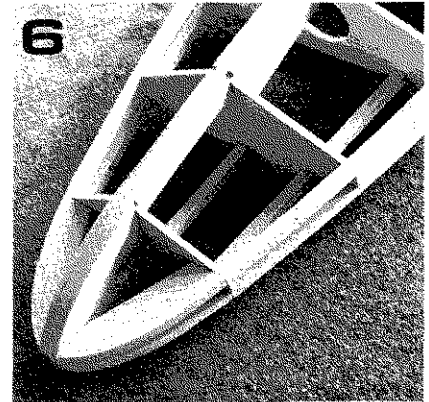
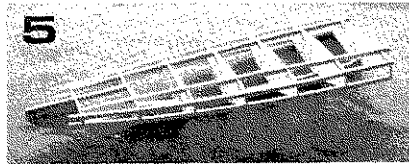
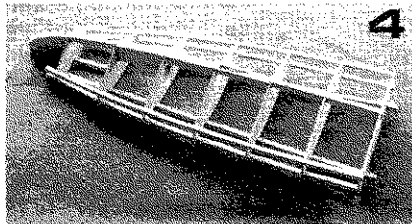
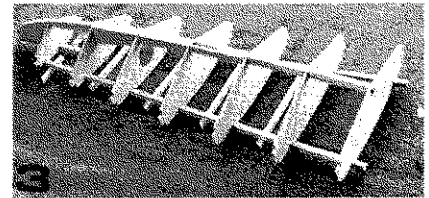
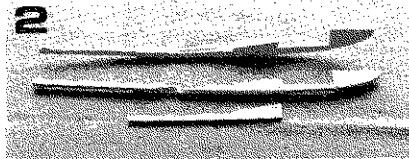
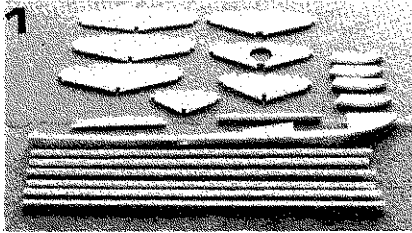


Ellipse photo assembly sequence — numbers refer to text



boat for the 1980 International at Red-house Park. Rough calculations showed that, if a lightweight hull was used, a Hummingbird 20 motor and 24 1.2 amp/hr nicads could be accommodated within the 2kg weight limit. Splitting those into three packs of eight would keep the sailing weight down to 1.2 kg (against 1.5 kg for the *Avanti*). The input power to the motor

would be $8v\ 12A = 96\ \text{watts}$ ($10v\ 8A = 80\ \text{watts}$ for the *Avanti*).

The first boat built, in March 1980, was similar in shape to the current design but the hull bottom had a greater change of deadrise towards the bow. This caused the steering to be rather too sharp for multi-racing, so another plan was drawn (*Ellipse 2*) with only half the change of deadrise from stern to bow, although the transom was the same shape as before.

This second boat was built in ten days and was first run only forty-eight hours before the 1980 International. With a

Graupner P40 propeller the speed was about 12 mph with about 5½ minutes running time per battery pack. No problems were encountered at the International except for the lack of speed (21 laps compared with 27 by the winner). The first, second and third places all went to boats which ran for the full 15 minutes without changing batteries (see *Model Boats* September 1980).

In the quest for more speed I rewired the same 24 1.2 amp/hr Nicads into two packs of twelve, still with the plug-in quick facility. The motor was removed and rein-

stalled driving through 2:1 gearing. Some lengthy experiments showed that the best propeller was a Graupner X40 which gave about 8 minutes running per battery. Speed had increased to 17 mph even though the power available was, theoretically, the same (now 12v 8A = 96 watts). At Redhouse Park on 29th June I achieved 1st place and set a new course record of 29 laps.

Ellipse 2B is basically the same design but with minor changes in construction and the addition of the two inner spray rails. In this latest form I have gained two more 1st places, at Redhouse Park on 7th September and at Maidstone on 21st September.

Construction

The basic framework, of keel, formers, stringers and bow pieces, is made from $\frac{1}{8}$ in and $\frac{1}{4}$ in medium balsa, using balsa cement or an 'instant' glue (Zap etc.) and is covered with plywood which is best secured by a slow drying epoxy adhesive. The recommended sequence of construction is as follows.

Protect the plan with a sheet of polythene or melinex film. Pin parts 12 and 13 in place over the plan (i.e. the side view) and glue one part 14 in place on top of them. When dry, remove from plan and glue the other part 14 in place on the other side (see Photo 2). Pin parts 8 in position over the top view, on $\frac{1}{4}$ in supports, and add formers 1 to 7 (but not 1A) using a set-square to ensure that they are upright. The keel assembly can then be added (see Photo 3). Parts 9 and 9A can be added while the frame is still pinned down. If Zap or a similar 'instant' glue is used 9 and 9A can be easily bent from $\frac{1}{4}$ in \times $\frac{1}{4}$ in and held while the glue is applied, but if a slower drying glue is used it is easier to cut them to shape from $\frac{1}{4}$ in sheet (see Photos 4 and 5).

The frame can now be removed from the plan and the ends of stringers and keel trimmed flush with 1 and 7. Parts 10, 10A and 11 can now be added together with the remaining $\frac{1}{8}$ in keel doublers and part 1A with its $\frac{1}{8}$ in \times $\frac{1}{4}$ in support (see Photo 6). The completed frame should now be sanded to section using a sanding block at least 2 in \times 6 in (see Photo 7). The $\frac{1}{32}$ in ply-

wood transom is fixed to the rear after cutting out the hole in 1 to save glue.

The deck can now be cut to shape from $\frac{1}{32}$ in ply ($\frac{1}{64}$ in can be used and will save about 1 oz) approx. $\frac{1}{4}$ in oversize all round. Hold in place temporarily with clothes pegs and mark the three cut-outs for motor battery and radio gear from beneath. Remove from frame and make cut-outs. A small piece of $\frac{1}{16}$ in ply should be glued to the underside of the deck to support the receiver aerial. Glue the deck in place using clothes pegs and pins to hold and, when the glue is dry, trim to exact shape (see Photo 8).

Cut two bottom skins to the shape shown, which is approx. $\frac{1}{4}$ in oversize all round. Steam the front over a kettle and bend to approx. shape while cooling. Glue one piece in position, again using pegs and pins to hold it down (see Photo 9). When dry, trim to size noting the bevel needed at the keel centreline for the second skin to overlap. Add second piece and trim to size (see Photo 10). The side of the hull should now be sanded smooth to ensure a good fit for the side skin, which is cut from a single piece of $\frac{1}{32}$ in ply and wrapped around the bow (see Photo 11). The side skin is left proud of the bottom skin to form the edge of the spray strip. The taper of the overhang can be drawn using a card template 18 in long tapering from $\frac{1}{4}$ in at the back to $\frac{3}{16}$ in at the front. The forward 3 in of the side skin is reduced so that there is no overhang at the extreme bow.

The spray strip itself is made from an 18 in length of $\frac{1}{4}$ in \times $\frac{3}{16}$ in balsa, tapered to $\frac{7}{16}$ in \times $\frac{1}{4}$ in at the front. One edge must be angled to fit the bottom skin and it can then be glued in position. The final shape is easily achieved with a knife and a sanding block. The front 3 in of the spray rail is made from filler (Isopon, Plastic Padding etc.) (see Photo 13). The inner spray rail is cut from a 12 in length of $\frac{3}{16}$ in \times $\frac{1}{4}$ in hard balsa or spruce, the front 3 in being tapered to a point.

The holes for the rudder assembly and stern tube can now be cut and both parts glued in place. If using direct drive with a universal coupling, the motor can also be installed now, using a 10 in length of $\frac{1}{8}$ in

I.D. brass tubing in place of the coupling and propshaft to ensure perfect alignment. The skeg is made with a centre core of $\frac{1}{32}$ in ply and two pieces of $\frac{1}{8}$ in balsa. The rear should be tapered to a sharp edge before it is glued in place.

Finishing

Apply three coats of clear dope, sanding well between coats and lightly after the third (two coats are sufficient inside). Two coats of paint can then be applied again sanding between coats (I used Woolworths Cover Plus but any good enamel, polyurethane or cellulose paint will do) (see Photos 13 & 14).

Servos can be stuck to former 2 with double sided tape, and using a 16g rudder link with an $\frac{1}{8}$ in O.D. aluminium pushrod to the motor switch. The receiver and Deac are held in place with scraps of foam rubber.

If using a geared motor with a correspondingly large propeller (eg. X40) the propeller torque is increased by the same factor as the gearing. Batteries are therefore installed some way to the port side of the centreline (about 1 in) to act as a counterbalance. Fine adjustments should be made as necessary so that the boat rides exactly level when viewed from behind. If this is not done the boat will easily capsize in left hand turns (see Photo 15).

The gears on my 2 kg boats (using 12 cell batteries) are, for the motor and propshaft respectively, a 14 tooth Lectricar (steel) and a 30 tooth (nylon) from a Marx Hectoperm motor. With 10 cells and a gearing of 1:6:1 I have also used this design for 2½ kg and 2½ kg restricted events and a larger version (25 in \times 10 in), for 2½ kg and unlimited racing, has been drawn but not yet built. Future developments for the 2 kg class will include better motors (the AYK G21200 and Marx Duoperm will be tried shortly) and, possibly, a parallel drive with a flexible shaft. A speed of 20 mph should not be too difficult which would give about 34 laps on the course used at Redhouse Park.

I would like to thank my wife, Penny, for taking the photographs, and also to thank fellow club member John Denney for his help in developing the boat.