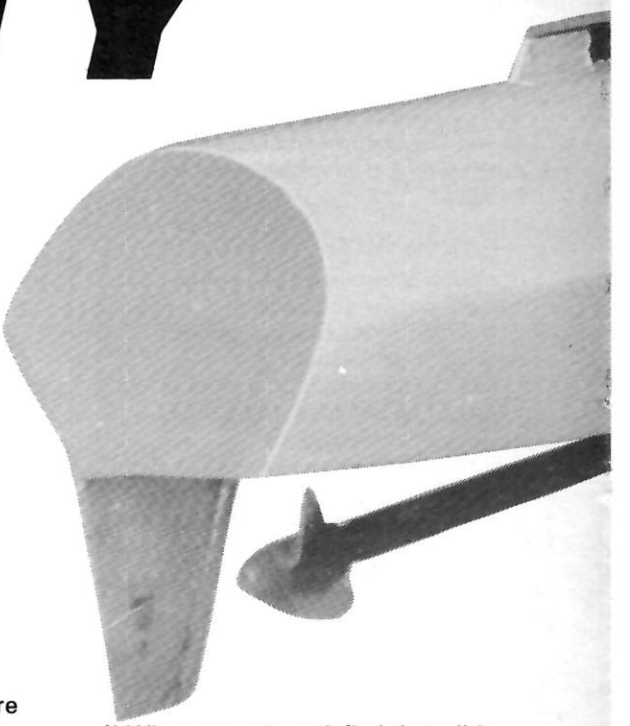
SEVENTY



Build a 70cm long attractive fast electric from our full size plans — designed by John Simpson

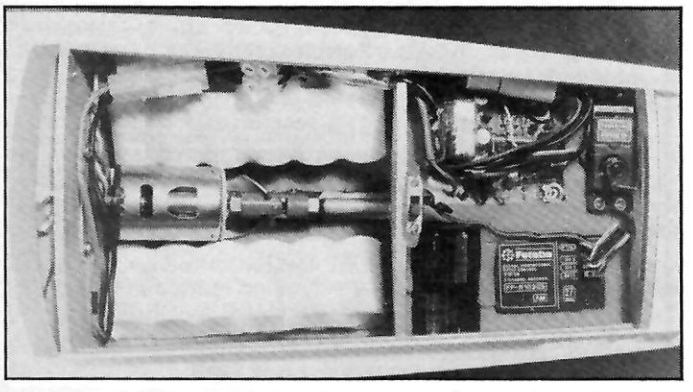
The "70" derives its name from its length — 70cm., and will look very impressive on any boating lake or bookshelf. It was designed from the outset for maximum aesthetic appeal rather than constructional simplicity, but having said that, if the tricky stages are performed carefully and with patience, no problems are foreseen. Wrestling with springy plywood will certainly pay handsome dividends as the final sleek result emerges.

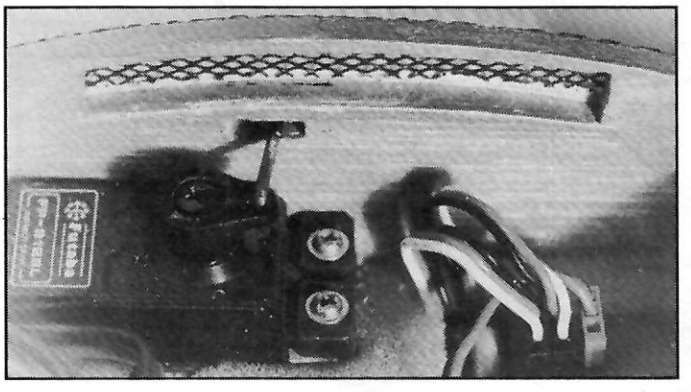
Modifications

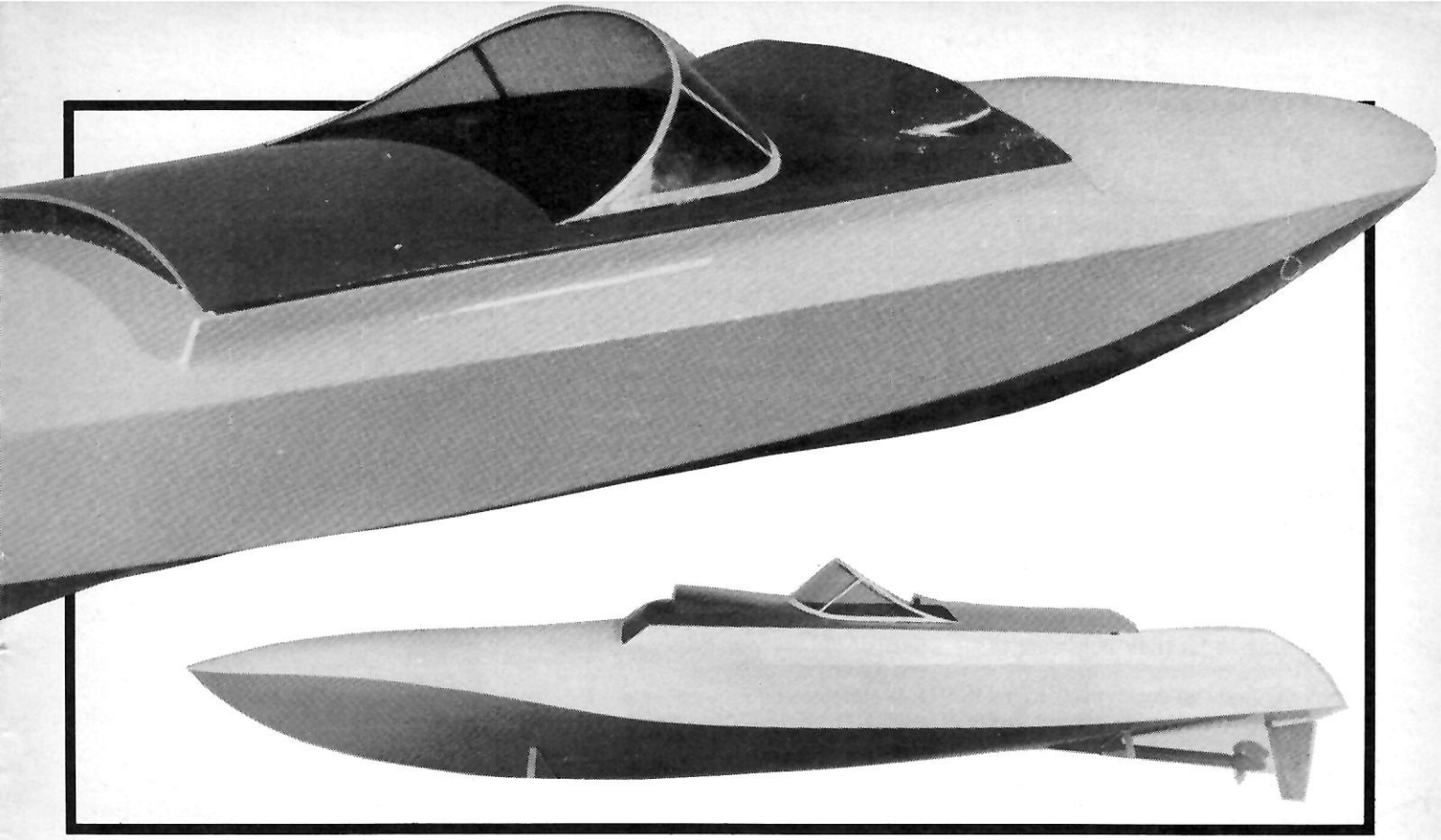
The hull is designed around a powerful electric motor of the cylindrical type, flanked by twin nicad packs for reasonable endurance. For greater power and endurance, and also a saving in weight, a modeller of reasonable ability might like to adapt the design for i.c. power by the addition of engine-bearers set into F3 and F4. (If a prop. larger than 1½in diameter is to be used, the keel channel must be steepened accordingly). Alternatively, one may wish to scale up the entire model in order to take, say, a 10cc. engine for competitions. Appropriate strengthening, eg. a thicker keel and a greater number of formers, is left to the individual.

Construction

1) Trace the keel and formers onto good quality 4mm ply. Try to work as accurately as possible – symmetry and smooth curves are important to the final result.
2) Cut the keel into two to allow the propshaft to be passed through later, and reassemble the parts using 4mm ply strips on each side. Ensure that the final keel length is still correct, and add similar strips at the rudder-post site.
3) Mark off the position of each former on the keel and try a 'dry-run' assembly to ensure that they fit snugly and at right angles to the keel. You may find it helpful at this stage to make a small jig to hold the assembly upright. A 2in. offcut with two vertical members 4mm apart to hold the keel will suffice, and save a lot of strain on the patience later on.
4) When you are satisfied that all is correct, the assembly may be glued. Evo Stik 'Resin W' is recommended for its strength and ease of use.
5) Trace, cut and fix the forward deck reinforcer.
6) Now deal with the gunwales. The hardest part is at the front, between F1 and the forward point. Choosing a supple piece of wood and/or steaming will help; another trick is to make a series of shallow saw-cuts on the inside of the curve. Keep them as even as possible or an irregular curve will result. The most time-consuming, but completely idiot-proof method, is to trace the two quadrant shapes (between F1 and the deck reinforcement) from the plan onto 4mm ply, allowing for the thickness of the gunwale at the curved edge. Glue the quadrants into place prior to fixing the gunwales. This method gives a greater gluing area, holds the curve perfectly and makes the front of the boat enormously strong. Before fixing the gunwales in place, make certain that you have the means of holding them while the glue dries. Miniature







crocodile clips, bulldog clips and steel needlework pins are invaluable. Additionally, the structure can be sandwiched between suitably heavy objects placed on either side.

7) Having secured the gunwales – and hopefully avoided the spectacle of seeing them fly off in a shower of pins and clips – the chines may be attached in similar fashion. Prior to fixing, cut them accurately to length and remember to bevel the rear ends in readiness for the transom. Note that the direction of curvature reverses between F1 and F3.

8) Trace, cut and fix the forward hull reinforcers and the transom.

9) Assuming that a cylindrical motor is to be used, trace the motor mount onto aluminium sheet and bend it as shown in Fig 1. Bolt it temporarily in place between F3 and the keel. Attach the upper mounting nuts firmly to the front face of F3 with epoxy resin.

10) Pins and clips at the ready – now is the time to sheet the lower portions of the hull. If 1mm ply is plentiful, cut a generous rectangle the length of the boat and wide enough to reach from keel to chine. Place it against one side of the keel and cut away the inner edge at the front until the ply fits round as far as the front point. When this curve is established, transpose it to a second ply rectangle for the opposite side of the hull. If the ply is at a premium, you may prefer to make a card template first.

Attach the ply, one piece at a time, starting at the rear, working along the keel and chine, and finishing at the front by clipping onto the gunwale. Ensure that it is held to all the formers.

11) When the glue is completely dry, remove all the ironmongery with care and trim down the excess ply with a sharp knife, exercising great care not to put undue stress on the structure. Larger areas can be cut carefully with scissors.

12) You will find it very useful to construct the stand at this stage. Prepare the ends, taking the hull section from the plan of F2 and F5, and link with a crosspiece. The design is not important; the stand is for display purposes and to protect the rudder when in transit.

13) Prepare the sides from narrow rectangles of 1mm ply. Note that whereas the sides are at right-angles to the bottom at F6, they are flat with it forward of F2, so the forward portion of the curve must be cut before the sides are fixed. After fixing, trim off the excess as before.

14) Select a suitable size propshaft to match the proposed power output – the keel channel may need enlarging with a round file. The length of the propshaft depends on the motor and coupling used. Shortening the propshaft, if necessary, may be done by removing the driveshaft, tapping out one end-bush with a rod, then hacksawing off the desired length of casing and re-fitting the bush. Finally, shorten and re-tap the driveshaft, taking care to remove any swarf before reassembly.

Bolt the motor to the mount, attach the coupling and screw on the end of the propshaft. If rotation is smooth, the propshaft may now be glued in place. If, however, rotation seems unduly stiff (allowing for the friction of the motor), adjust either the mount or propshaft until minimum friction is achieved.

15) The rudder is made from strong brass rod and brass sheet, soldered together (brazed if possible) and running in a tube attached to the forward face of F6 (Fig 2). Try to make the post and tube as close a fit as possible. Solder a tiny 'ring' of the tube immediately above the rudder to provide a lower bearing. Drill a hole in the keel immediately forward of F6 to take the tube, and secure it firmly with epoxy resin (roughen the tube's surface first). For extra reinforcement, make a small metal bracket to hold the top of the tube. Before installing the rudder assembly for good, try the propellor on – it may prove impossible to fit later!

16) The design of the hatch requires the section between F5 and F6 to be sealed, so unless a secondary hatch is wanted (with attendant problems of fitting to the curved deck) the rudder linkage must be designed and fitted before the deck is glued down. The exact linkage design depends on the position of the servo, and this is left to the individual. It may prove useful at this stage to plan the arrangement of the radio gear and fix the rudder servo temporarily in place while the linkage is finalised. When the degree of movement each way is satisfactory, couple the linkage securely to the rudder post.

17) The deck is perhaps the hardest region of all, since the region forward

Far left, interior layout, note on/off switch on former 4. Left, servo access to rudder assembly and optional rear vent. Photos by the author.

of F2 features curvature in two planes. Starting with a piece of 1mm ply a little larger than the top of the boat, plot the shape of the aperture required for the hatch and remove this panel, so that the deck drops neatly over the projections on F3 and F5. Small bearing strips of 4mm ply, approximately 1cm deep and just longer than the ends of the hatch, will need to be attached to these formers to support the deck – copy the curves for their upper edges from the tops of the projections.

You may find the deck easier to lay if it is bisected from the front point to the centre of the hatch aperture. Glue and pin the deck from the stern as far forward as F3, and allow to dry. Lay one half of the forward portion up to the point and notice how it overlaps the deck reinforcement. Cut away as much overlap as you can before gluing – this will make things much easier later. Glue each half of the front deck in turn, trimming the first half back to the centre of the reinforcement to provide a bearing for the second half.

18) The sides of the hatch surround are made from softwood strips 1cm wide and 2mm thick. Cut them to length from the plan and glue to the sides of the projections on F3 and F5. These strips also serve to reinforce the deck. The curved fairing at the front is fashioned from 1mm ply or veneer, eg. sycamore.

19) The hatch is made in the same way as the surround, with a top of 1mm ply or veneer. The framework is most accurately made by assembling it *in situ*, using softwood strips for the sides and 4mm ply for the ends and central support. As for the deck bearers in (17), copy the curves from the nearest formers. Use thin card spacers between the framework and the surround to give sufficient clearance for painting later.

20) When the framework is dry, remove it from the aperture and prepare the top, ensuring enough overlap to cover the surround. With the framework on a flat surface, glue and pin the top in place. When dry, fit the hatch into the aperture and trim off the excess top.

21) If some ventilation through the engine compartment is desired, now is the time to deal with it. Using a fretsaw, cut a slot in the projection on F5 (see photo) and a matching slot in the rear hatch former. Similarly, cut a hole in the hatch top under the site of the air intake. Note: Use of the intake will restrict the boat to relatively calm water only.

22) Trace the shape of the air intake from the plan onto thin aluminium sheet. Fashion it into an appropriate curve with round-nose pliers and fix it to the hatch with impact adhesive or Superglue. Fair into the hatch with filler.

23) The windshield is made from clear acetate sheet and is secured by Superglue while being held manually. Take care not to get any glue above the base of the acetate. When set, mask the join using a 'frame' of thin strips of self-adhesive paper or plastic. Alternatively, you may prefer to design a more solid windshield from perspex panels.

24) To avoid inconvenience when removing the hatch, the aerial is made from a strip of aluminium foil, glued to the deck from F3 to the prow and clamped to the receiver wire with a small nut and bolt inside the hatch fairing, (see photo).

25) For painting, remove the hatch and treat it separately. All surfaces to be painted should first be filled to cover pinholes, etc., sanded and given a coat of primer. This in turn should be sanded and a second coat of primer or an undercoat applied. Finally, finish with two coats of enamel paint, sanded in-between with wet and dry paper. The region behind the windshield should be painted matt black to give the illusion of a cockpit.

The interior need not have such a careful treatment; a practical finish such as matt black or silver is suggested.

26) The motor and radio-gear should now be fitted. If the builder is planning to change either the internal layout or the propulsion source (see *Modifications*), it is recommended that the craft is test-floated. This is valuable in helping organise the components in terms of weight distribution, since care must be taken that the stern does not settle too low.

To minimise vibration as well as providing an easy mounting, the radio-gear should be set into foam rubber cut to fit snugly in the rear compartment, (see photo).

27) Charge the nicads and check that the transmitter and receiver batteries are in good condition. Test all functions and check that the servos are adjusted correctly. You are now ready to head for the boating lake, or for the more cautious captain, the bath first! Bon Voyage!