

The Ariel

An R/C Yacht For Fliers

*You can build it in a week of evenings
for less than \$25.00*

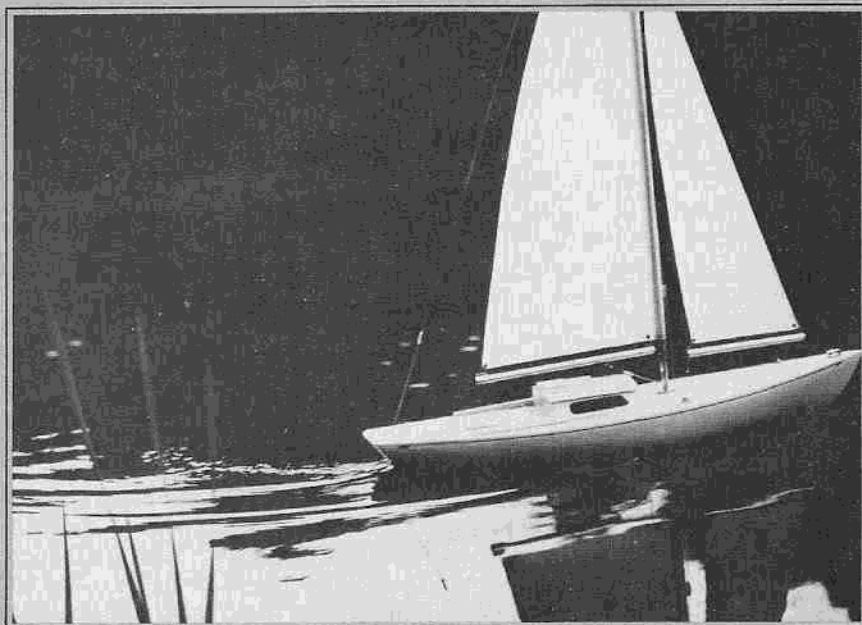
BY EDWARD A. STINSON

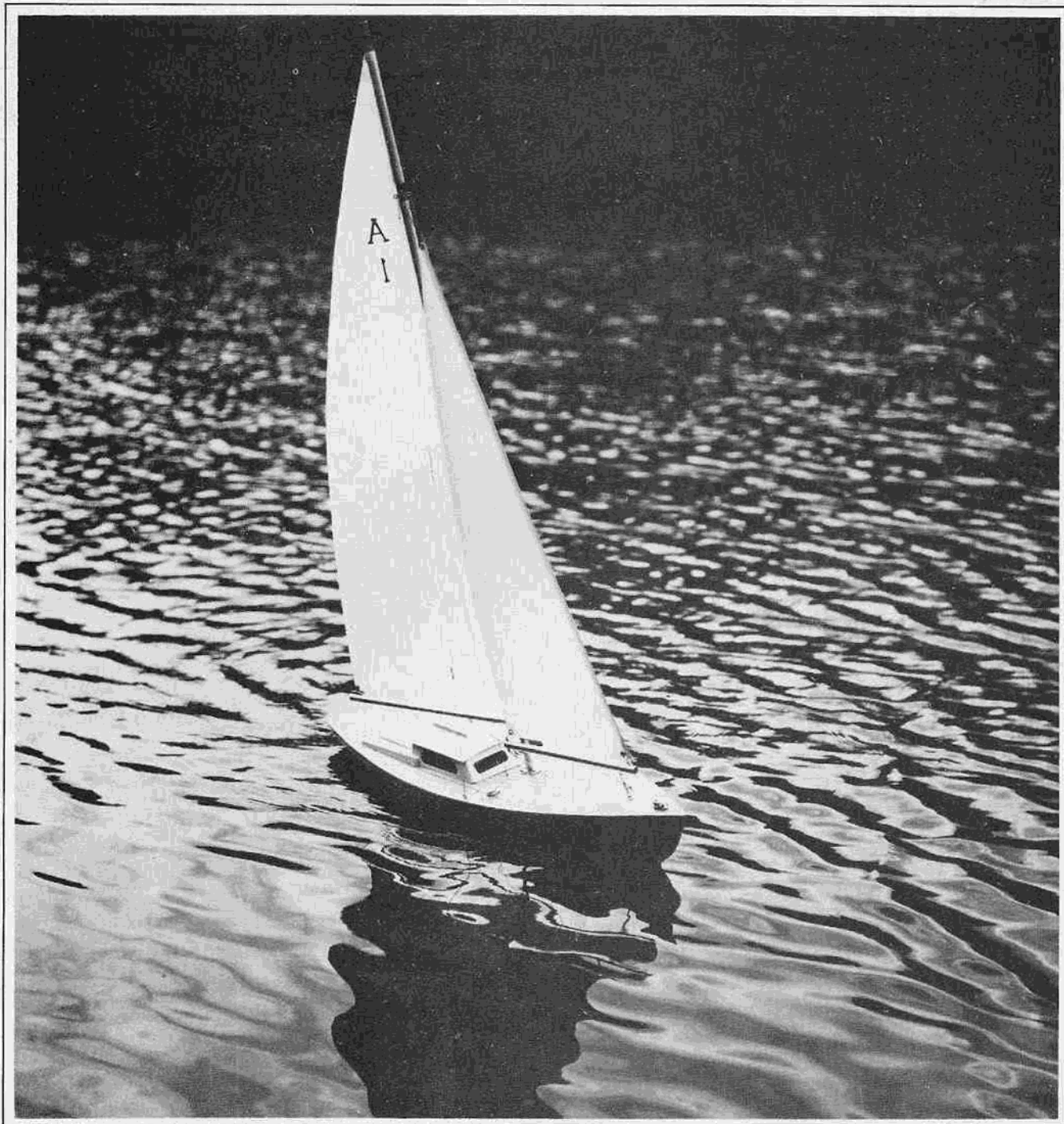
I have always enjoyed building both aircraft and ship models, but I have not always found my interests shared by others. It's not that many of my fellow airplane buffs don't look with favor on radio controlled sailboats, but they are unwilling to invest more time, effort, and money to put a boat in water, than an airplane in the air. Besides, if you are sailing then you can't be flying! Well, this design was meant to meet that challenge. The prototype was built in a week of evenings, which compares favorably with all but the most simple, or prefabricated, aircraft. The original boat cost less than \$25.00, exclusive of the sail winch (I used the mechanics from an old servo). The design will probably be viewed as small by many who are experienced in sailboating, but it is large enough to carry radio equipment and sail well under a wide range of wind conditions including those times when it is too windy to fly and enjoy it. Also, it is readily portable (I defy you to comfortably transport a wife, two children and a medium sized "A" boat in an Opel Kadett) and built from materials which are available in most hobby and hardware stores. The "Ariel" was designed with a somewhat greater beam than many models of this size. This produced a boat which heels less and handles the older R/C units without being over-burdened. To insure that the Ariel's performance could be exciting in a moderate breeze, her displacement was held to a minimum to promote planning under these conditions.

Construction of this boat is quite conventional. It is strip planked in 1/8" x 1/4" balsa on 1/4" balsa frames previously affixed upside down to a straight, unwarped board. The prototype used Ambroid, but any other waterproof, fast drying glue which sands out well could be used. Be sure to have a healthy supply of pins on hand for this operation and drive them edgewise into the planks as a temporary clamp while the glue dries. I did not attach the fin keel until the boat was planked, decked, and completely sanded out. When the hull is completely planked and dry it can be removed from the building board. Detach the supports used to hold the frames to the building board and sand the frames and sheer strips fair for decking.

The prototype used 1/16" birch ply as a deck while the model (#3) in the photos used 1/8" Italian Poplar three-ply plywood. The latter is available at many good lumber stores. After adding the deck the hull can be sanded completely smooth for fiberglassing. I suppose that the hull could be silked or even MonoKoted, but neither of these methods offers the bruise resistance of a good fiberglass finish. But before any finish is applied, the fin keel should be sanded to a reasonable airfoil shape and the lead bulb cast and bolted on. The fin-keel assembly should be epoxied into the previously sanded hull. Use the epoxy to form a smooth fillet where the keel and hull meet.

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When the fin keel is finished and in place, the rudder should be built up and sanded to an airfoil cross section. Then the hull, the keel, and the rudder should be fiberglassed. I put on three final gel coats of white finish resin and sanded them out with progressively finer grits of wet-or-dry paper concluding with number 600. I did not fiberglass the deck, though that could be done. Instead, I sanded it and lined out the planking using a nylon tip black marker. At this point make up the cabin coaming and hatches from balsa and ply. Bevel the cabin walls to fit flush with the deck as well as the

roof (which should be removable) and then sand the cabin smooth. I used dope and sanding sealer to build up a good white finish with gray trim. The window was painted on, but MonoKote black trim could be used. For that matter, the whole cabin could be MonoKoted or whatever other finish you favor. The cabin can now be glued to the deck and the whole affair given two coats of satin finish polyurethane varnish.

With this done the hole for the rudder tube can be drilled and the tube epoxied into place. When this is dry, the rudder can be installed. First,

slip a washer onto the rudder post and then a short (1/8") piece of Neoprene tube which acts as a spacer as well as holding the rudder in place while the tiller is either soldered or epoxied to the post. As an alternative, a nose wheel steering arm could be used, although a new 1/16" hole should be drilled much closer to the post to produce at least a 30 degree from center throw on the rudder.

At this point, the radio equipment can be installed. The general layout, as used successfully in the prototype, is shown on the plans. The details are left to the individual builder. The sail

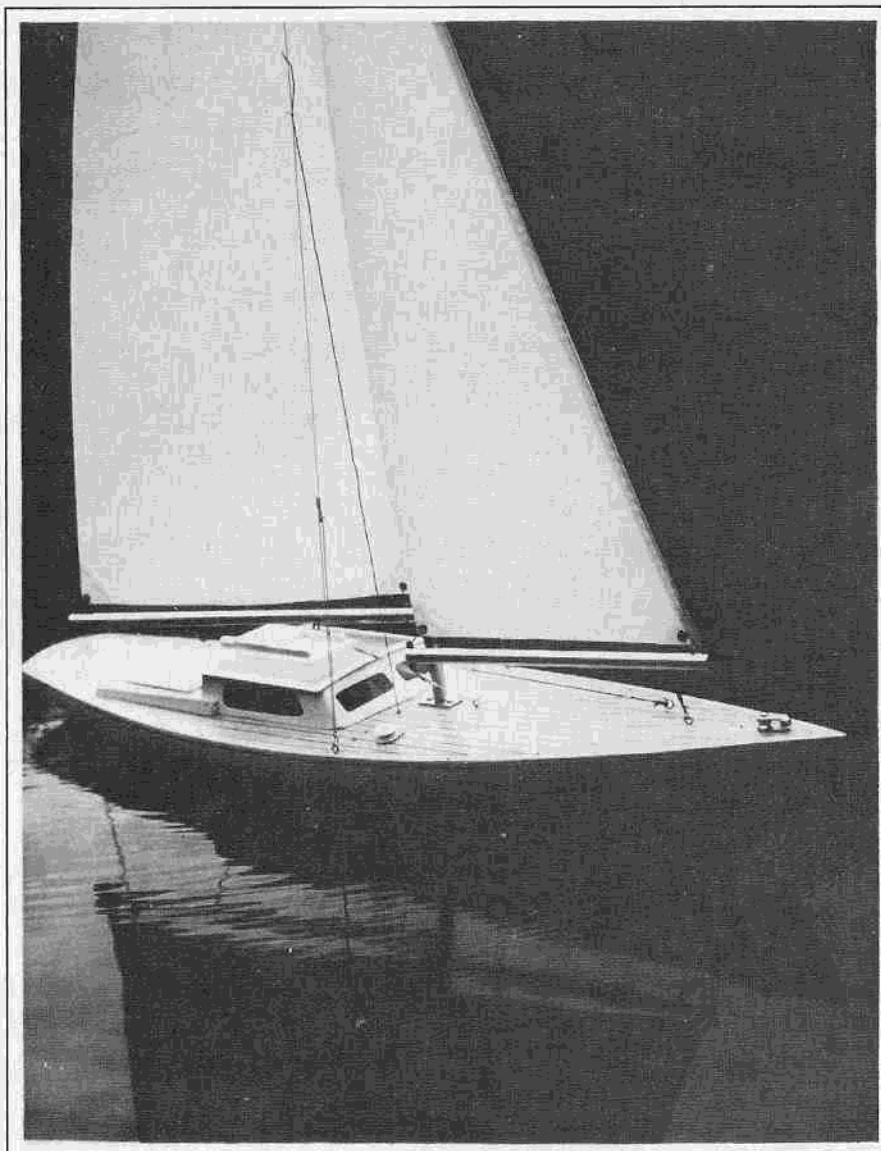
winch used on the original boat was nothing more than an old S 4a servo with the electronics removed but for the suppression circuit. Operating on 4.8 volts it has more than enough power for the task used. I have never found it necessary to place an electronic limiting switch on the winch, but for those who would feel more secure with it, Figure 1 will work.

SAILS AND RIGGING

Few things are more critical to the successful operation of a sailboat than the quality of the sails and their location in relation to the hull. As to the latter, the plans show a fixed mast position which gives good sailing properties under normal wind conditions. If a builder is interested in getting the most in performance in overall wind conditions the mast should be shortened four inches and given an adjustable mounting on the deck. Adjustments of this type are reasonably easy to foul up; therefore, the details are left to those with the experience to effect them successfully. The mast on the prototype was fabricated from thin wall tempered aluminum tube. This is not always easy to find so an equally successful alternative can be laminated from two pieces of 3/16" x 1/2" x 44" balsa and one piece of 1/8" x 1/2" x 44" spruce. If it is impossible to find 44" long balsa, splice up the pieces from the more common 36" length, making sure that no two splices fall at the same point. As an alternative the boom and jib club can be cut from 1/2" diameter dowel. Once the spars have been cut or built, drill 1/16" pilot holes for the screw eyes used in the rigging. On the mast and boom, fit and epoxy the goose-neck fittings in place. Now, turn your attention to the sail.

To assure good performance "cut" these from 4 oz. Dacron sailcloth. Actually the sails should be "melted" from the cloth using the sharpened end of a wood burning tool or low wattage soldering iron. This seals the edges, removing the necessity of seaming. Fold and sew the leading edge of both sails as shown on the plan. Use nylon or dacron thread only. This should produce a pocket for the forestay in the jib and the mast in the mainsail. Glue on the reinforcements in the corners and, when dry, put in dressmaker's grommets as indicated on the plan. Now the mainsail can be slid onto the mast and boom assembly. The jumper strut and screw eyes can

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LIST OF MATERIALS

Quantity	Dimension	Material	Primary Use
1	1/4" x 6" x 36"	Balsa	Frames & Keel
1	1/4" x 3" x 36"	Balsa	Keel & Deckhouse
1	1/2" x 3" x 12"	Balsa	Transom & Deckhouse
1	1/8" x 2" x 36"	Balsa	Rudder & Deckhouse
As needed	1/8" x 1/4" x 36"	Balsa	Planking
1	1/16" x 12" x 48"	Plywood	Deck, rudder, hatch, etc.
1	1/8" x 6" x 12"	Plywood	R/C installation
2	1/4" x 6" x 12"	Plywood	Fin keel
1	5/32" dia. x 12"	Brass tube	Rudder tube
1	.035" x 4" x 10"	Aluminum	Fittings
1	.065" x 12" x 12"	Brass	Gooseneck & tiller
1	7/32" dia. x 12"	Aluminum tube	Jumper strut
1	1/2" dia. x 72"	thin wall alum. tube	Mast & spars
2	1/32" dia. x 36"	Music wire	Forestay & fittings
1	1/16" dia. x 12"	Brass wire	Gooseneck & fittings
1	18" x 45"	4 oz. Dacron	Sails
5 yds.		50 lb. fish line	Rigging
18	3/16"	Screw eyes	Rigging
2	Small	Swivel snaps	Rigging
1	Cotterpin		Rigging
1	Awning pulley (sm.)		Rigging
1	1 1/2" x 8"	Screw	Rigging
1	quart	White fiberglass	Finish Resin
1	yard	fiberglass cloth	
1	pint	polyurethane satin	Finish Varnish

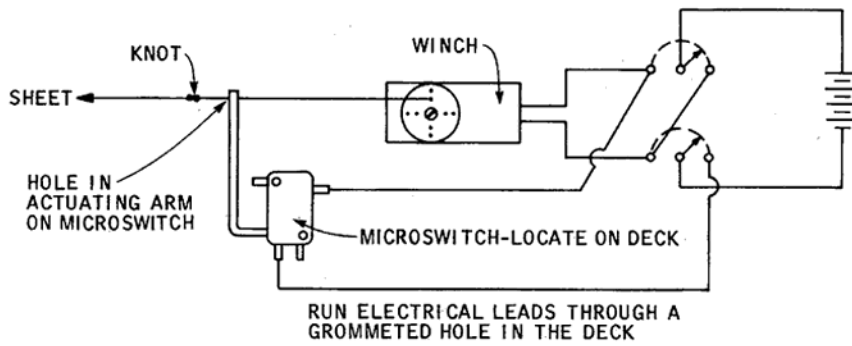


FIGURE 1

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now be permanently fixed in place. The forestay can be slid into the jib and the rigging can then be completed. The rigging on the prototype was 50 lbs. test braided Dacron fish line,

although I am sure nylon would suffice. The bowsers can be made from 1/16" thick plastic or purchased from a supplier as can the many small hooks. On the original, small wire parts (hooks, etc.) were bent from 1/32" music wire while 1/16" brass wire was used on a later boat.

At this point the radio can be

re-installed. Put the receiver and battery in plastic bags to protect them from possible water incursion. After 2 or 3 hours sailing, a tablespoon or two of water can find its way into the hull and the bags keep the radio dry. The antenna can be run through a grommeted 1/8" hole in the deck near the mast and then suspended vertically by a short piece of elastic thread attached to one of the stays. The radio switch was located inside the cabin on the original. The cabin roof acts as a hatch and can be quickly lifted to turn on the radio. If you wish, both the tiller hatch and the roof can seat down on wing mounting tape being pulled up snug with pan-head screws — this produces a virtually water tight configuration under any reasonable conditions.

Well, that completes it. Now, go talk your flying buddies into building one (along with yourself, of course), and enjoy some of those too windy-to-enjoy flying days with a little sailing competition. □