

EXCALIBER II



By JERRY DUNLAP . . . This fully competitive outboard tunnel-hull racing boat by our "R/C Power Boats" columnist has been winning races and setting records since early 1977. It's the first to go over 40 mph.

• The development of the Excaliber model outboard design has been somewhat of an evolutionary process covering the last three years. Since finding one's roots has become a rather "in" thing recently, let me take a little time to trace the roots of the Excaliber II model outboard tunnel.

The original Excaliber concept was developed by a good friend of mine, David Knowlen, back in February of 1977. Since designing the first Excaliber, David has moved on to slightly bigger things. He is the designer of the new Circus Circus unlimited hydroplane and its sister hull, the Squire Shop. At the time of this writing, David is serving as a design consultant for the Circus Circus unlimited racing team. David's involvement with full-size racing hydroplanes goes back over twelve years to a time when he designed, built, and raced his own 280 class limited hydroplane. In recent years, David has restricted his interest in hydroplanes to the research and development phases of this sport.

Although he now designs full-scale racing boats, David was an avid model boat and airplane builder in his youth. When the K&B .21 Outboard first became available in late 1976, David expressed an interest in designing a boat for me to use with this new power source. He provided me with a set of lines in February of 1977, and the original boat was featured in a fall issue of *RC Sportsman* in 1977. The original Excaliber was 29-1/2 inches in length and featured a tunnel width of 8-1/2 inches. I set a NAMBA straightaway record of 35.95 mph in March of 1977 with this boat.

That record has since been broken a number of times. I used this same boat for racing during the spring and early summer of 1977 with pretty good results. However, I could see that the boat was a little bigger than it needed to be, and its potential was limited.

In July of 1977, three weeks prior to the 1977 NAMBA Nats in Reno, Nevada, I contacted David about redesigning the boat by making it smaller. At that time, he was heavily involved in other projects and couldn't take the time to redesign the boat. He said he wouldn't mind if I used his ideas to design a smaller version. Using the basic design concepts provided by David, I scaled the boat down to 26-1/2 inches in length, with a tunnel width of 7-1/2 inches. The new hull was completed just prior to the big race in Reno. The 1977 NAMBA Nats was its first race, and it placed first out of 48 entries in the outboard class. That hull went on to set an oval course record, win the District 8 Outboard High Point Award in 1977, and became the first stock outboard tunnel to be officially timed at over 40 mph.

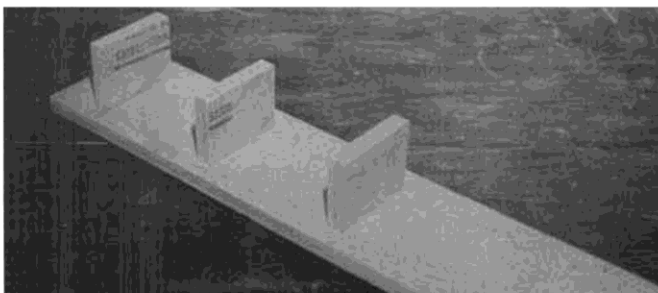
As often happens when you hit upon something that works pretty well, others want to build your design. Such was the case with the redesigned Excaliber, to which I now added "II" after the name. During 1978, John Havens, Jr., from Olympia, Washington, used the Excaliber II design to establish a new stock outboard record in the NAMBA straightaway of just over 42 mph. Although this record has been broken by a hydroplane design, I think it still stands for stock outboard tunnel. John also used his



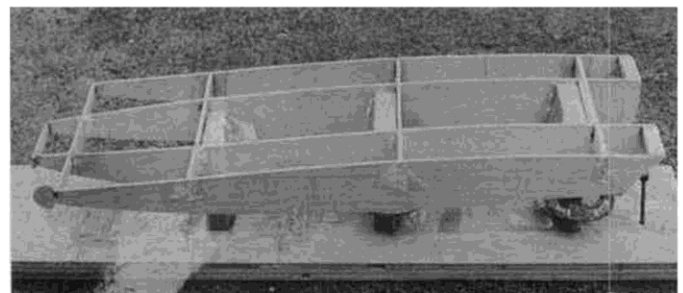
The author (left) and Dennis Caines, 1st and 2nd at Dist. 8 Points race in May '79.

Excaliber II to win the 1978 District 8 High Point Award, and my Excaliber II placed second to his. During the first half of the 1979 racing season, the Excaliber II belonging to Dennis Caines, also from Olympia, was the leading boat in District 8 Points. As the results show, the Excaliber II has been a rather successful design.

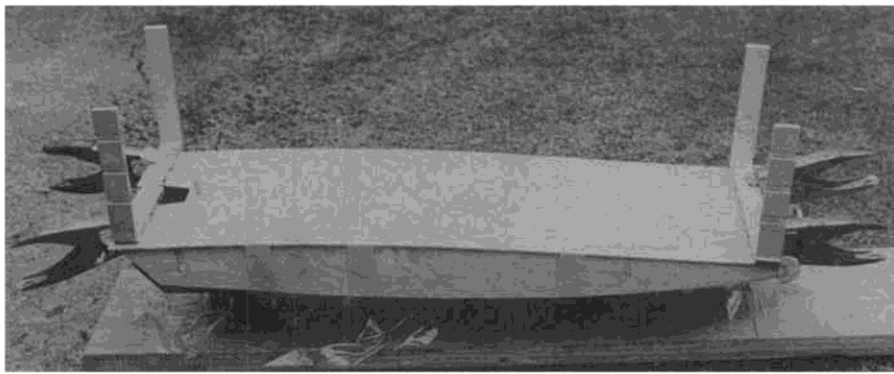
The Excaliber II has been built by a number of people, both experienced and inexperienced model boaters. It offers semi-scale appearance, and the construction isn't too difficult. The boat should be built entirely from plywood; the specific sizes needed are called out on the plans. Use epoxy glues for all



A simple building jig for the center section is a must; this one is made from plywood.



The center section framework attached to the building jig with C-clamps.

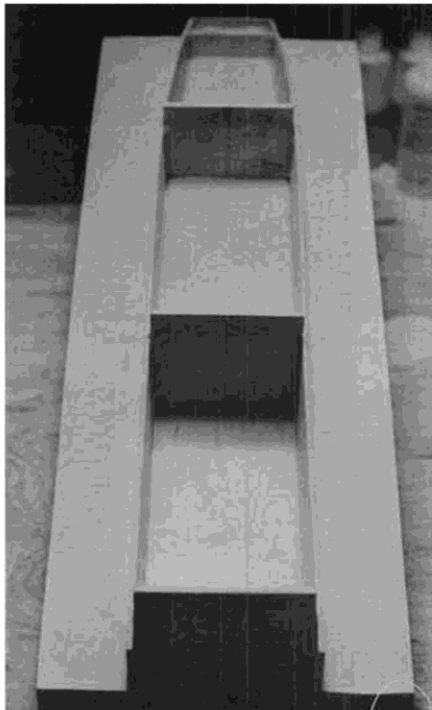


Center section bottom being attached to the framework. Clamps and masking tape and pins hold the plywood sheet in place.

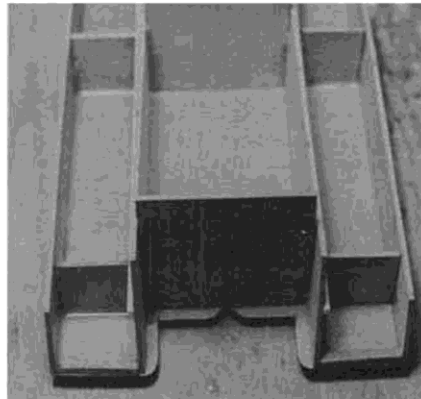
construction. I personally prefer to use five-minute epoxies for building frameworks and slower drying epoxies for sheeting the hull and sponsons. Since the plywood will need to be cut to shape, it will be necessary to have access to either a band saw or a jig saw. A question that is often asked me is, "How long will it take to build this boat?" There is obviously no way I can give anyone an answer to how long it will take them to build the Excaliber II. However, I did build the first Excaliber II, paint it with clear, and install my equipment, in four days. I should also mention that those four days were spent entirely devoted to that project . . . like 12 hours a day. Well, let's get started with the construction of the Excaliber II outboard tunnel.

THE BUILDING JIG

A most important part of building this model is the use of a building jig for assembling the center section. This jig is simply a flat building surface with upright pieces attached to it where the first three frames are located. The importance of building a true center section cannot be overly emphasized,



The center section with the top pieces glued in place.

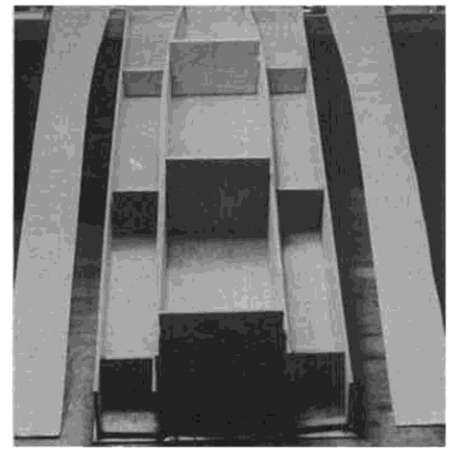


Rear of the center section.

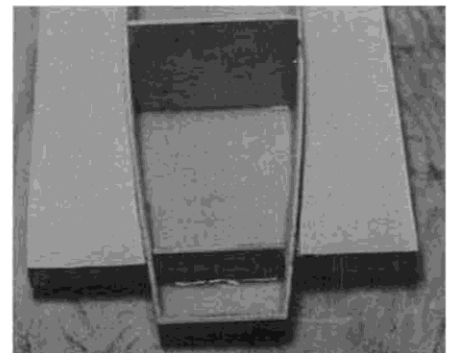
since proper alignment of the sponsons depends on a squarely-built center section. The interlocking pieces of the center section require the building jig to hold them in proper alignment while the bottom is being attached. I have included a photo of the very simple jig used for building the boat. Any type of material can be used for the building jig.

ASSEMBLING THE CENTER SECTION

The framework for the center section is really quite basic, with four frames running crosswise, four frames running lengthwise, and a nose piece. As shown on the plans, the frames are notched so they can be slipped together. The most important thing to remember about the framework is that it should be as true as possible. The two lengthwise frames forming the cowling can be inserted into the cross frames, and then the cross frames can be clamped to the building frame. Leveling the cross frames will bring the longitudinal frames into alignment when they are evened with the cross frames. This alignment process is probably the most important step in the



Center section ready for the top pieces to be epoxied in place.



Front of the center section.

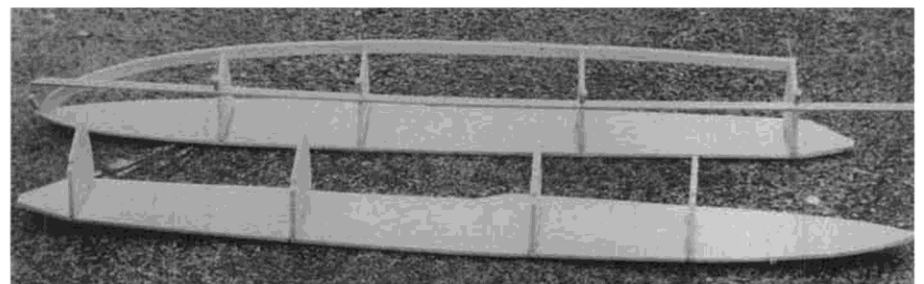
building sequence. Time spent in doing this process right will yield dividends during later phases of the building and running of the boat.

ATTACHING THE CENTER SECTION BOTTOM

The 1/16-inch plywood for the bottom should be pre-cut prior to gluing to the framework. The bottom piece should be firmly clamped to the pieces at the back and front of the center section. Tape can be used to pull the bottom down against the outside frames. Weights or pins can be used to keep the bottom against the cross frames. Once the epoxy has set, the framework and bottom can be removed from the building jig and the bottom can be trimmed.

ATTACHING THE CROSS SECTION TOPS

Either 1/16 or 1/32-inch plywood can be used for sheeting the top of the center section. A strip of stringer material is glued along the outside of the cockpit longitudinal frame where the



Sponson frameworks being glued up. Be sure to make a right and a left!

top pieces will butt against this frame. The top pieces can be pinned to the transom frame and clamped to the front frame. Pins and tape can be used to keep the pieces in position while the glue sets.

When dry, trim the top pieces even with the outside frame. A cap piece can be cut for covering the back of the center framework. Prior to attaching the top pieces, it's a good idea to paint clear over all the interior that will be covered by the top pieces. The top pieces can be given a thin coating of epoxy over the entire surface when they are being attached. This will help insure a water-resistant interior.

BUILDING THE SPONSONS

The sponson frameworks are built separately from the center section and attached to the center section. The sponsons can either be sheeted first and attached, or the framework can be attached and then sheeted. I use the latter method, but I've seen others sheet the sponsons first. The construction of the sponsons is fairly simple. There is one longitudinal frame and four cross frames. A stringer is used for the bottom chine and plywood is cut for the top sheet. Remember to build one right sponson and one left sponson! I only mention this because in the past, I've glued two of the same sponsons up before realizing my mistake. One time I even placed the crossframes in position upside down! The mistakes were discovered very quickly, but it just goes to show that even someone who has built lots of model boats can goof when not paying careful attention. Tack the longitudinal frame to a flat building surface when gluing the top sheer piece and chine stringer in position. The top sheer



The author's Excalibur II has the radio box built into the boat. Plexiglass cover serves as a base for the driver and mount for the switch. Finish is K&B Superpoxy.

goes in place first, since the chine stringer attaches to it at the bow of the sponson.

Once the sponson framework is completed, it is ready for sheeting or attaching to the center section. I personally recommend attaching the sponson framework to the center section prior to sheeting. This will prevent the framework from twisting while the sheeting is being applied. Before sheeting the sponsons it will be necessary to bevel the outside edge of the chine stringer to allow the bottom sponson piece to fit flat on the framework. Pre-cut the sponson bottom and use small clamps and pins to hold it in place while the epoxy sets. When dry, trim the bottom

piece so the sponson side can be attached. Masking tape and pins can be used to hold the part of this piece that attaches to the chine, and clamps can be used to hold it in position along the top sheer. The sponson sides are trimmed to accept the sponson tops. Since the front of the sponsons have somewhat of a compound bend for the plywood, it will be necessary to use lots of tape and pins to keep this piece down on the framework. The sponson bottoms should be 1/16 plywood, and the sponson sides and top can be 1/32. The 1/32 will bend much easier for the sponson top. Use the same procedure for sealing the sponsons as that used in sealing the center section.

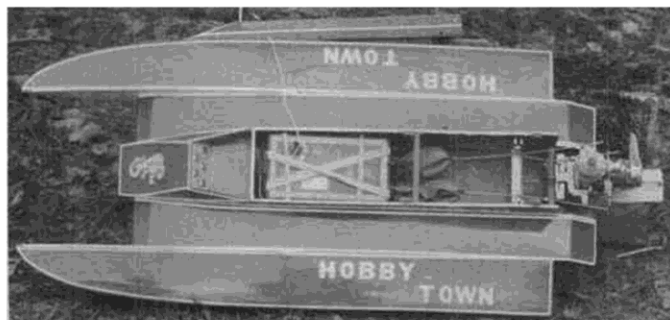
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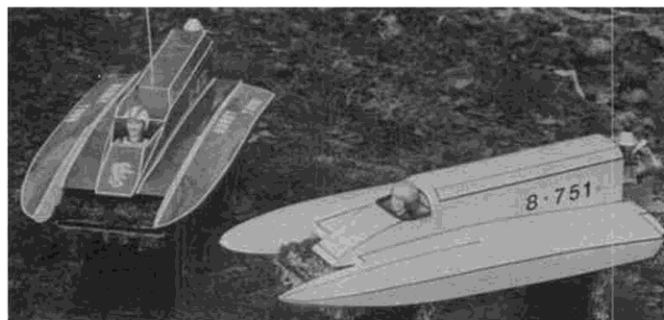
K & B Autotrim installation. A valuable device for adjusting the engine settings.



Stern view of the author's Excalibur II. Best performance is with a J.G. E-20 prop.



Mike Wight's Excalibur II uses a separate waterproof radio box. Ready-made boxes are available, or you can make your own.



Excalibur II's by Mike Wight (left) and Leo Dreith. Cowling shapes can be easily modified for different appearance.

BUILDING THE COWLING

The plans show a simple, straight type of cowling for the Excaliber II. I have seen many different cowling schemes used on this boat besides that shown on the plans. You can see some of these different cowlings from photos in the article. The aft cowling is removable to allow access to the fuel tank, mounted in the aft cowling, and for making adjustments to the engine. For anyone who might be interested, Vic Drew, 1628 Corona, Medford, OR 97501, can probably provide you with a fiberglass aft cowl like that used on the fiberglass Excaliber II he makes. I don't know what Vic might want for making and shipping an aft cowl, but you could drop him a note and ask for a price quote.

INSTALLING THE RADIO SYSTEM

There are two methods available for installing the radio system in the Excaliber II. Many model boaters prefer to mount their equipment in waterproof boxes and then install the box in the boat so it can be removed. An excellent choice for a radio box for the Excaliber II is the one available from G&M Models, P.O. Box 342, Broadview, IL 60153. The box, measuring 2x3x5 inches, would fit very nicely into the radio compartment. I have used this box in other installations and have found it to be an excellent product.

It is also possible to build a radio compartment into the boat, and this is the method I've used with the Excaliber II's I have built. Four 1/4x3/8 hardwood strips can be glued inside the radio compartment so that a plexiglass lid can be screwed atop the radio compartment. Use either gasket material or silicone sealer to make a seal between the plexiglass and the wood strips. Waterproof radio box seals are available from a number of sources. G&M Models has a fine radio box seal, and I've also had good luck with the radio box seals from K&B Manufacturing. The Kwik Switch from DuBro Products does an excellent job in the mounting of the on/off switch for the receiver.

If the radio is installed in the boat, K&B Manufacturing has a kit for hooking up the throttle linkage that works very well. I have used it on my boat and found it to be most satisfactory. For the rudder linkage, use 1/8-inch brass tubing with threaded shafts soldered to both ends to attach Kwik Links to the servo and engine.

Use of heavy-duty type servos is a good idea on the outboard engine. The outboard unit can place a great amount of stress on the rudder servo, especially the servo gears.

INSTALLING THE OUTBOARD ENGINE

I recommend using either the K&B Autotrim or the Hughey Adjustable Outboard Mount on the Excaliber II. To achieve maximum performance from your outboard tunnel, it will be necessary to adjust the height of the engine on the transom. The K&B Autotrim also allows for adjustment of the engine

angle away from the transom. If an engine mount isn't used, mount the engine where it is shown on the plans.

FINISHING THE EXCALIBER II

It is definitely recommended that an epoxy type finish be used on the Excaliber II. There are a number of good products available at most hobby shops that will provide a good finish for the boat. It should be remembered that a good finish is directly related to good preparation of the hull for finishing. I like to use auto body putty for filling cracks and pin holes; it dries very hard in a short time and is quite easy to work. The boat should be sanded and filled prior to the application of any finishing material.

After filling cracks and holes, I like to brush on a couple of coats of K&B clear, thinned about 25%. This helps seal the wood and also fills the grain. When the clear has dried thoroughly, the hull is sanded with 220 grit paper and a coat of K&B primer can be brushed or sprayed on the hull. The primer will fill the grain and also assist in making any blemishes appear that went undetected during the initial filling and sanding. These areas can be filled and the primed hull sanded with fine grit paper. The hull can now be primed again and final sanding done in preparation for the application of the color coats. I personally lean towards one solid color for the entire hull, with trim tape, lettering, and numbers used for contrast. There are certainly many things a builder can do with the finishing of the model to add realism to its appearance.

RUNNING THE EXCALIBER II

After three years of working with this design, some things have become rather obvious on trimming the hull. The prop that has proven most successful is the J.G. E-20. This is available from J.G. Products, 8030 Fordham Road, Los Angeles, CA 90045, if you can't find one at your local hobby shop. Be sure to check any prop for balance before running on the outboard. An out-of-balance prop will cause increased wear on the lower end bearing.

The Excaliber II is designed to ride on the last few inches of the sponsons. Most of the Excaliber II's in this area are running with six to eight ounces of weight up front to keep the bow down on windy days. The boat is very responsive to changes in the prop depth and changes in the angle of the engine under or away from the transom. Shimming the engine under the hull will cause the boat to ride wetter; shimming the engine away from the transom will lift the bow.

The only way to find the best ride is to spend lots of time experimenting with engine settings and weighting the hull. Prather Products has stick-on lead strips that are really great for experimenting with weighting the hull.

The Excaliber II is not the best tunnel available for racing in rough water or

windy days. The tunnel configuration is designed for maximum lift on flat water. When the conditions get rough and windy, driving the Excaliber II takes extra attention.

I believe the Excaliber II should be a fairly easy boat to build for even a beginner. If assembled properly, it should prove to be a competitive hull for outboard tunnel racing. I would be interested in hearing any comments from those who build the hull. You can send these comments to **R/C Model Builder** and they will be forwarded to me. Good luck with building the Excaliber II and welcome to model outboard tunnels!

P.S.: I realize that the proper spelling for King Arthur's sword is Excalibur. Dave Knowlen, designer of the original Excaliber, purposely misspelled the name. ●