



BEN HUR 'flying down the straightaway' wide open!



I have just cracked the throttle and 'old Ben' is about to take off.

## building *BEN HUR* 11' 3" 'C' & 'D' 3-point Cab-over Hydro

by Hal Kelly



Here she is in a tight turn, no worry about flipping this hydro in a turn.

### SIZE OF RIB NOTCHES IN GIRDERS

RIB 1	1/2" X	2 - 3/4"
RIB 2	1/2" X	2 - 3/4"
RIB 3	3/4" X	3 - 1/4"
RIB 4	3/4" X	3 - 1/4"
RIB 5	3/4" X	2 - 3/4"
RIB 6	3/4" X	2 - 3/4"
RIB 7	3/4" X	2 - 3/4"
RIB 8	3/4" X	2 - 1/2"
TRANSOM	NONE	

### BILL OF MATERIALS

#### BRONZE MONEL, or EVERDURE FASTENINGS

2 lbs. of 3/4" No. 16 Anchorfast nails 950 to lb.  
3 gross of 1/2" No. 8 flathead wood screws  
1 gross of 1 1/2" No. 8 flathead wood screws  
2 gross of 1 1/2" No. 8 flathead wood screws  
1 gross of 1 1/2" No. 6 flathead screws  
1/4" lb. of 1" 10 gauge wire brads

#### PAINT PRODUCTS

5 lbs. of Weldwood glue  
1 lb. of Wood Dough or similar surface filler  
1 gal. of Spar Varnish (for the inside)  
3 qts. of Vinylon X clear (for decks ond bottom)  
1 qt. of Clear Nitrate Dope  
1 qt. of Vinylon Surf White (or color to suit) for deck and trim  
2" sq. of Muslin or Aircraft wing fabric

#### MAHOGANY

Coaming strengthner, dash,  
ribs 4, 8, transom and 2 battens ..... 2 pieces 1/2" x 12" x 12"  
Sponson afterplane ..... 1 piece 3/4" x 6" x 12"  
Ribs 1, 2, and 3 ..... 1 piece 1/2" x 10" x 12"  
Battens, framework, and rest of ribs ..... 5 pieces 3/4" x 12" x 12"  
Bow piece—glued up ..... 3 pieces 1/4" x 1 1/2" x 14"  
Decking ..... 2 pieces 1/4" x 4' x 8"  
Bottom, girders, gussets, ..... 2 pieces 1/4" x 4' x 12"  
sponsons, and chines ..... 2 pieces 1/4" x 4' x 8"

#### SITKA SPRUCE

#### MAHOGANY PLYWOOD WATERPROOF

#### FIR PLYWOOD WATERPROOF

Motor mount ..... 2 pieces 3/4" x 13" x18"

#### HARDWARE

1 steering wheel  
1 safety throttle  
1 Bowden throttle cable 9' long  
1 piece of steering rope 34' long  
2 rear pulleys  
2 steering rope anchor tiebacks  
2 forward steering coaming pulleys  
1 Aluminum bow handle  
2 Aluminum stern handles  
12' lengths of 12" half round aluminum  
1 sheet of 1/8" aluminum 18" x 6' for airtraps and back of motor mount

RACING NUMBERS: may be obtained by writing AMERICAN POWER BOAT ASSOCIATION; 22811 Greater Mack; St. Clair Shores, Mich. 48080

BEN HUR—a very fast 'C' 'D' Hydro of the new, sensational 'Cab-over' design that just about flies over the water. She has excellent turning characteristics in both rough and smooth water. The safest type of hydro to race in rough water, it will run through the 'stuff' that other drivers have to back off for. With a good 'D' motor speeds of over 70 m.p.h. have been recorded, on gas. The Michigan 7" by 12" propeller has proven best on the Mercury Mark 55-H motor.

For the non-racer who would like a big hydro that will take two people with safety for a fast, safe, soft ride, Ben Hur would be ideal. For use with a motor that does NOT have a racing lower unit the transom should be 17" high. She will take any motor from 25 to 60 HP. Most important is getting the proper propeller for your outfit. This must be done before you try hopping up your motor. If you will give me the motor make, year, HP, model number, weight of the boat with passengers, and tell me to what use you want to put your outfit, I will tell you the make and kind of propeller you should use, its cost and if need be, can sell you same.

Before building Ben Hur, read these instructions, study the step-by-step pictures and then go over the drawings. If you are new to boat building, I would suggest doing this several times. All rib drawings are full size, so take all measurements directly from the drawings for every rib dimension.

Nearly all the framework is Sitka Spruce, except Ribs No. 4 and 8, transom, sponson, afterplane and a few odds and ends. All framework is 3/4" and 3/4" thick—most 3/4" lumber comes 1 3/4" thick so have your lumber yard plane it to 3/4" thickness. This will make it easier for you to line up the bottom. When finished Ben Hur will weigh in at about 150 lbs. if the material I list in the bill of materials is used.

Study the girder drawing; it is drawn to scale. Though not full size, all measurements are indicated on the drawing. Temporarily fasten your two pieces of girder plywood together and trim and notch both girders simultaneously.

RIBS: Due to space limitations only half of each rib is shown, but since the ribs are symmetrical, each side being the same shape, this will offer no problem. Cut out all your rib components and place them on the full size rib drawings. Mark a centerline on all rib beams. 3/4" No. 16 Anchorfast nails are used to secure the 3/4" plywood to the frames. Weldwood glue is used throughout. A piece of thin wax paper or cellophane under the ribs will keep the glue off your plans. Ribs No. 1, 2, and 3 are made of 3/4" Spruce. Rib No. 3 is completely backed with 3/4" plywood, glued and fastened with 3/4" No. 16 Anchorfast nails. The middle deck support and dash are put in place when the hydro is turned over to finish the topside. A fly cutter is almost a must, and is used to cut all lightening holes. Follow rib drawings for size and position. The fly cutter in photo 2 is adjustable.

RIB No. 4 is made of 3/4" thick Mahogany. The whole rib is backed with 3/4" plywood, similarly to Rib No. 3. Note the holes cut in the Mahogany; they are cut before fastening the 3/4" plywood to the back. Ribs No. 5, 6, and 7 are made in the same manner though they vary in shape a bit; 3/4" thick spruce is used. Gussets are 3/4" plywood.

RIB No. 8 and the motor mount are made up of two individual pieces which are attached separately to the girders. Rib No. 8 is 3/4" thick Mahogany, backed with 3/4" plywood. Cut lightening holes in the Mahogany and notches for the 3 middle battens before fastening 3/4" plywood. Motor mount and Rib No. 8 both are set at a 14° angle in the girders. Cut motor mount to size indicated in rib drawings.

Transom is 3/4" Mahogany and is made in the same manner as Rib No. 8. Drill all lightening holes and batten notches before fastening 3/4" plywood to back. Check rib drawings for proper angle at which all notches are to be cut. The transom is in two sections.

ASSEMBLE RIBS AND GIRDERS: At this point you have all ribs, transom and girders ready for assembly. The girders are set up on a simple jig. Note photo 5 Two 2x3's are set up on a suitable base parallel to each other. The outside edges are exactly 18" apart. The girders are temporarily fastened to the outside of each of the 2x3's with clamps and screws. Level and square the girders in relation to each other. Fasten Rib No. 1 to the girders with glue blocks and 1" brads. Rib No. 8 is placed next and fastened in the same manner. From each end sight along the girders to make sure these ribs are in line with each other. Ribs No. 2, 3, 4, 5, 6, and 7 are fastened in like manner. It is important that all ribs be exactly in line with each other. The two battens that attach to the ribs and girders are next. They are fastened to the ribs first with glue and 1 1/2" No. 8 screws, and from the inside of girders to the battens with 3/4" No. 16 Anchorfast nails. Let the battens protrude at stem and transom, to be trimmed later.

TRANSOM: The girders are screwed and glued to the transom with 3/4" No. 8 screws. The battens and sheers follow. See step-by-step photos for the correct procedure.

MAIN SPONSON BEAMS and the battens they are fastened to come next. The bottom chine section of each beam is accurately cut to shape. The sponson part of the beam is only roughly cut to size now. Assembling this piece is the most difficult part of the whole project and will take a little time and care for proper fitting. The batten adjoining this beam is first fastened to all frames and the transom, and then the main sponson beam in turn to this batten and Ribs No.

1, 2, 3, and 4 with 1 1/2" No. 8 screws. Don't forget the 3/4" sq. piece of wood that is fastened to Rib No. 4 and runs from main girder to sheer. The non-trip chine is fastened to this piece.

BOW: This consists of three 3/4" by 1 1/2" sections of spruce. Use one piece to bend around the bow so the battens can be trimmed off. All three strips are coated with glue on both sides, except the outside strip. They are grouped together while the glue is wet, bent and screwed in place at the battens and ribs. This bow is clamped together every few inches with 'C' Clamps (see photo No. 18).

CENTER BOTTOM: Fair only this section of the bow for the time being. This piece is 18 1/2" wide and is glued and fastened to all battens, Rib No. 8 and bow with 3/4" No. 8 screws. This piece may be fastened to the girder battens with 3/4" No. 16 Anchorfast nails. Two other battens are placed on top of this center bottom panel, above girders; they are 3/4" x 1" and are planed to form a taper ending about halfway between Ribs No. 1 and 2. These two battens are glued and screwed in place with 1 1/2" No. 8 screws on the outside edges of the center bottom piece. (See rib drawings for exact position.) It is very important that they be parallel to each other.

NON-TRIP CHINES: Be sure the sheers and bottom chine are faired to receive the 3/4" plywood. (See photo 19.) Glue and fasten in place with 3/4" No. 16 Anchorfast nails.

SPONSON AFTERPLANE: Cut this piece to the size shown on the rib drawings using 3/4" Mahogany. Rib No. 4 is fastened to the afterplane with glue and 1 1/2" No. 8 screws. The sponson beam is carefully cut to its final shape. (See photo 23.) Sponson battens are fastened in place. The outside batten consists of two pieces of spruce 3/4" thick which are glued together. The sponsons are carefully faired at the main sponson beam, sponson batten, and built-up bow.

BOTTOM BATTENS are carefully faired to receive the two remaining sections of the bottom. Check the rib drawings to see exactly how they should look. Cut out roughly at a point where the motor should fit, in the middle of the center bottom piece at the transom, and glue another 3/4" piece of plywood to this piece to beef up the afterplane. (See photo 25 and detail transom drawing.) After it is dry and the clamps are removed, carefully cut out a section for the motor according to the Deck Framing drawing. The remaining two bottom pieces are now fastened in place with glue and 3/4" No. 8 screws.

SPONSON PLANKING: the 3/4" plywood covering the bottom and sides of the sponsons are carefully fitted. The bottom planking extends over the sides except near the front where they butt. After the sides are carefully fitted, the planking is glued and nailed in place with 3/4" No. 16 Anchorfast nails. It is screwed to the sponson middle batten with 3/4" No. 8 screws. Study photos carefully for clarification.

Before removing the hull from the jig, carefully sand down and give the bottom and sponsons two coats of varnish for the present. Place the hull rightside up on level supports, well padded. Once again the hull is leveled and secured to prevent it getting out of shape. Fasten the middle deck brace in place and the dash for the steering wheel. Fair all ribs to receive deck battens. Before putting deck battens in place, give the inside of the hydro 3 coats of varnish.

DECKING: All deck battens are fastened in place with 3/4" No. 8 screws. The 3/4" decking is carefully fitted, glued and nailed in place with 3/4" No. 16 Anchorfast nails from bow to transom, about 2" apart. The decking is best fastened to the inside battens with 3/4" No. 6 screws about 12" apart. (See photo 36 for extra coaming support.) The 3/4" x 3/4" coaming strip on top is glued and fastened in place with 3/4" No. 8 screws. The floor boards are merely screwed in place.

FABRIC DECK: Fabric is fastened in place with tacks or staple gun and given 4 coats of dope. A small strip of cloth is used to cover the tacks at the top. The ones on the outside edge are covered with 3/4" x 3/4" wide plywood. The trim on the coaming and deck are given two coats of paint, colored to suit your taste.

HARDWARE: 3/4" half-round aluminum is used on the outside edge of the hydro secured with 3/4" No. 16 Anchorfast nails. Check the finish drawing for placement of hardware, etc. Note that the lefthand pulley is about 2" further back than the right one to enable the steering cord to run off the wheel properly.

AIRTRAPS: Check the finish drawing for their size and shape. I used 3/4" aluminum which your local tinsmith can cut to size.

RACING: Motor angle and height are very important for your best speed, and many a race has been lost because the motor was 3/4" too high or low. Your weight, prop and manner of driving make it almost impossible for me to give you the perfect set-up. Give or take a bit, a 13° height on your motor mount is about right. For best results with a Mark 55-H your motor should be kicked IN a bit on Ben Hur. A 7" by 12" Michigan prop should be excellent for most races. But for an extremely short course you might have to run a Michigan 7 1/2" by 10". A marine speedometer is a must while making these adjustments. Your best speed is only determined through methodical testing. In order to tell what results you obtain from your changes, make only one alteration at a time before each test. I always run my motor with a full butterfly. In case of a flip it's much safer for you and the other drivers and will save you from a blown motor. See you at the races.

