

VAMOOSE... Class B Outboard Hydroplane

**Over-all length: 10'-2⁵/₈". Weight: a little over 100 lbs.
Beam: 4'-3". Speed: about 50 mph with Class B racing outboard.**

By David D. Beach, Naval Architect

THE summers of 1949 and 1950 saw the growth of a nationwide interest in outboard-motorboat racing. The majority of those whose interests were aroused started their racing careers with stock utility boats, which are conventional, family-type hulls with ordinary outboard motors, just as delivered from the manufacturers. For the beginner, that combination is satisfactory. For the real racer, however, who has an inherent dislike for the strictly stock type of craft, the hydros are more appealing. And for the man who wants a really hot hull—one that will allow his carefully tuned motor to perform best—this little craft is the answer.

The American Power Boat Association, 700 Canton Drive, Detroit 7, Mich., which

is the outfit that registers raceboats and sanctions races, defines a Class B hydroplane as one that weighs at least 100 pounds, including steering gear, motor controls, and permanently attached hardware. The boat is used in combination with a motor having a piston displacement of between 14 and 20 cubic inches.

The hull design of *Vamoose* closely follows several of my previously designed hydroplanes, all of which are enjoying modest success in eastern and midwestern racing circuits. It is a single-step job with a flat after plane that has substantial nontrips and parallel chines. With a 150-pound driver and a really hot motor, the boat is a 50-mph craft and will keep well up in the fleet. She weighs a mite over the minimum

of 100 pounds, all the surplus weight being in structural members designed to make the boat capable of taking the rough water of a well-churned race course. The frames are closely spaced and ample battens in the bottom provide a good measure of strength.

Let's look at the lines drawing. The first step in building the boat will be to reproduce this full size on a 4x12-ft. panel of 1/4-in. white-painted plywood. Frame lines are on the after faces of the bottom frames. When the full-size lines are completed, frame templates can be made directly on the body plan. Allow for the 1/4-in. thickness of the plywood bottom and the laps as indicated on the several framing details. One feature of this boat that makes the construction easier is that the bottom frames from step to transom are identical.

There is a preferred sequence in constructing a hydroplane like this. If it is followed, the boat will be rapidly and easily completed.

(1) In the drawing labeled Assembly Details, note the preliminary-framing sketch. This shows the fixture upon which the boat will be built and the two stringers that are her main structural members.

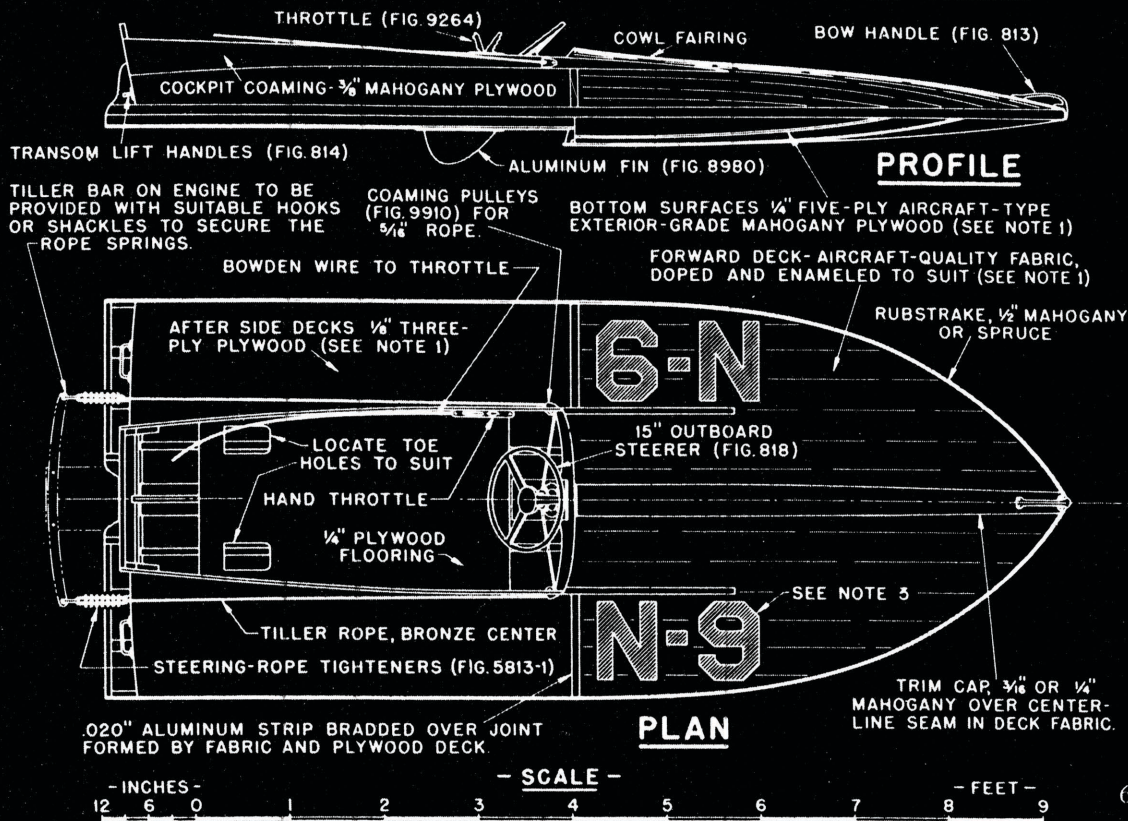
On a piece of two-by-six, erect on edge seven equally spaced one-by-sixes and level, square, and securely chock them in place. Tie strips along their ends will help. Draw a center line from end to end of this fixture.

(2) On the one-by-six crosspieces of the fixture, lay out the curve of the stringers as given on the lines drawing and construction plan. Erect suitable uprights to which you can clamp the stringers.

(3) The stringers are as shown on the construction plan and profile and are of 3/4-in. exterior-grade mahogany plywood. They should be templated from the lines layout and carefully cut to shape. Note that the bottoms are perfectly straight from the step aft. Also note that the after ends are raked at the same angle as the ransom. Lightening holes are cut between frames. Care should be taken when cutting these holes to leave at least 2 in. of material above and below the holes and 4 in. between holes.

(4) Remembering that the boat is to be framed upside down, clamp the stringers to the uprights erected on the cross members of the fixture. Take special care that the aft ends are perfectly horizontal be-

GENERAL NOTES: 1. DECK FABRIC, DECK-FABRIC DOPE, ENAMEL, AND AIRCRAFT-TYPE PLYWOOD CAN BE PURCHASED FROM AIR ASSOCIATES, TETERBORO AIR TERMINAL, TETERBORO, N.J. SEE THEIR CATALOG NO. 20
 2. ALL DECK HARDWARE AND EQUIPMENT, IDENTIFIED BY FIGURE NUMBERS, TO BE AS SHOWN IN THE W.C. CATALOG, AVAILABLE FROM BIRBARIE MARINE SALES, BOSTON POST ROAD, BRANFORD, CONNECTICUT.
 3. RACING NUMBERS (ASSIGNED BY AMERICAN POWER BOAT ASSOCIATION, 700 CANTON AVENUE, DETROIT 7, MICHIGAN) TO BE PAINTED ON BOTH BOWS IN A COLOR THAT CONTRASTS WITH THE DECK COLORING.



cause they determine the flat after plane on which much of the performance depends. Now the work should look like the sketch labeled Preliminary Framing Detail.

(5) Cut the bottom frames from single widths of $\frac{5}{8}$ -in. spruce. The material should be carefully selected to have straight grain with no checks, cracks, or knots. All the frames from No. 6A at the aft side of the step to No. 11 are identical. The transom frame is similar except for the angle at which it is set. Each frame forward of the step must be made from an individual template. The frame at the forward side of the step (No. 6F) is extra deep, its top coinciding with the top of the frame on the after side of the step (No. 6A).

(6) Carefully locate the frame lines on the stringer bottoms and place the frames in position, starting with No. 6A and working aft to the transom and forward to No. 3. Check the center line of each frame and then fasten a $\frac{3}{4} \times 1\frac{1}{2}$ -in. tapered bracket to each stringer and frame as shown in Section C-C. Use plenty of clamps to secure the members while driving the screws. Here and in all other joints in the structure apply good marine glue to the contacting surfaces before securing in place. Immediately after driving the screws, wipe off all excess glue. If it gets a chance to harden, it'll be extremely difficult to remove.

(7) When all the frames that land on the stringers are secured, cut the notches for the keel, which is of spruce, finished $\frac{3}{4} \times 4$ in. With the keel properly fastened down into frames No. 3 to 6F and hanging out forward, fasten suitable uprights to the fixture to pull the forward end into its proper curve; then fit the forward frames to the keel. Leave the keel clamped to the uprights until the side strips are fastened to the outboard ends of the frames. Fasten the after section of the keel into frames No. 6A to the transom, using two $1\frac{1}{2}$ -in. No. 12 screws at each frame.

(8) When all the frames are fitted and the keel pieces fastened to them, the next piece to be incorporated in the slowly growing structure is the transom. Cut it to the proper shape from a piece of $\frac{3}{4}$ -in. plywood. Secure it to the stringers with $1\frac{1}{4} \times 2$ -in. oak transom brackets. Drive four $1\frac{3}{4}$ -in. No. 10 screws through the transom into each bracket and two similar fastenings through each stringer into its bracket. Note that the brackets notch over the transom frame. The inside transom knee and outer doubler should be fitted later, after the planking is on.

(9) The next step is to install the two 1-in.-thick side strips. These are of a tough, resilient wood such as hemlock or steam-

bent oak or spruce. They extend from the nose block to the end of the after planing surface. The nose block should be shaped as shown on the construction plans and rabbeted over the keel. The side strips are beveled together at the center line on the forward end of the nose block and are secured to it with two $1\frac{3}{4}$ -in. No. 12 screws. Fasten each strip to each frame with a single $1\frac{3}{4}$ -in. No. 8 wood screw. Work from forward aft on this job, alternating from one side to the other and boring an under-size hole in each frame for each fastening so as to prevent splitting.

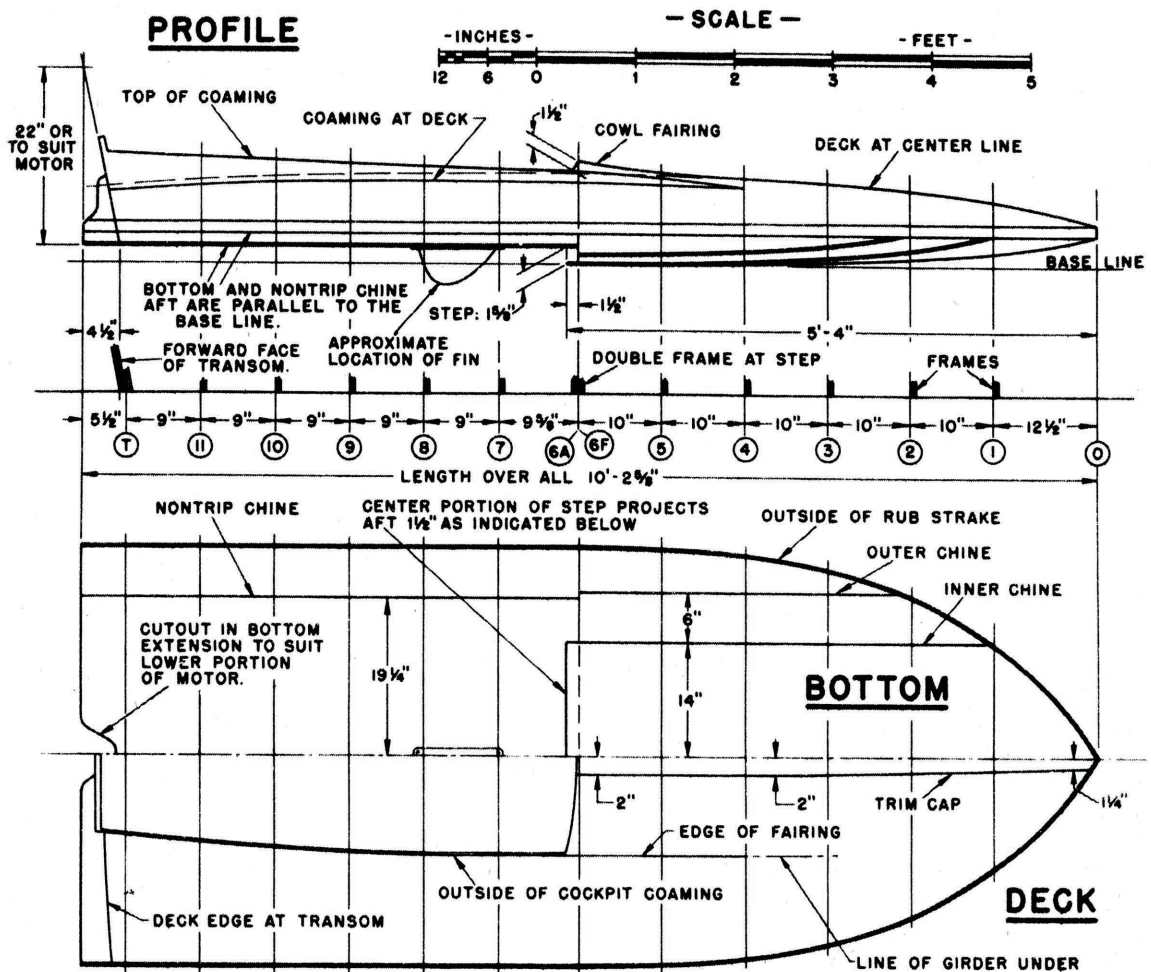
(10) The chine strips are next to be fitted. These are $\frac{3}{4} \times 1\frac{3}{4}$ -in. clear spruce and are notched into the frames and beveled to suit. Note that there are two chines on each side forward of the step and but one on each side aft. The chines forward are butted to, or half-lapped into, the side strips and each is fastened with two $1\frac{1}{2}$ -in. No. 8 screws. Use care when beveling to have the chines match the frames, as good landings for the bottom planking are essential for a tight and strong boat. The chines are extended beyond the transom $4\frac{1}{2}$ in., as indicated on the construction plan. At each chine-to-transom joint, put a short length of glue-impregnated cotton wicking between the contacting surfaces. This will help keep the transom tight under the heavy vibration and pounding from the motor.

(11) Fit the $\frac{5}{8} \times 1\frac{1}{4}$ -in. bottom-stiffening battens into the frames as indicated on the construction plan, extending them beyond the transom like the chines. Lap or butt them to the side strips forward and bevel them on the bottom to permit the planking to lie flush. As you did at the chines, apply cotton wicking to each of the batten-to-transom joints.

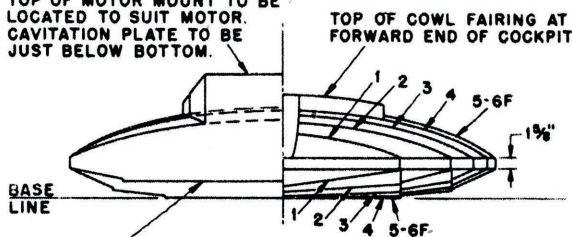
(12) The hull is now ready for the planking. Before starting to fit the $\frac{1}{4}$ -in. five-ply aircraft plywood, recheck all beveled members. Since the planking is the tie that holds the bottom together, it must have a good surface to lie on. With a straightedge, make closely spaced athwartship and longitudinal checks. If part of the structure is too high, plane down the offending section; if part is low or hollow, carefully fit a filler and plane it down to the proper height.

(13) The first planking panels to be fitted are the after nontrip planes. These lie between the chines and the side strips and each measures about 7×60 in. Secure them to the side strips, frames, transom, and chines with glue and 1-in. No. 8 flathead wood screws on $2\frac{1}{2}$ -in. centers. When the glue has set, plane down the inside edges to provide flush landings for the center

PROFILE



TOP OF MOTOR MOUNT TO BE LOCATED TO SUIT MOTOR. CAVITATION PLATE TO BE JUST BELOW BOTTOM.

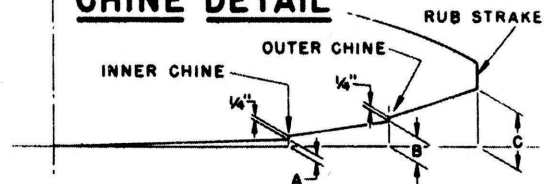


NOTE: AFTERBODY FRAMES 6A, 7, 8, 9, 10, 11, & T ARE IDENTICAL EXCEPT FOR DECK CAMBER.

BODY PLAN

CENTER LINE

CHINE DETAIL



DETAIL ABOVE INDICATES HOW HEIGHTS ARE GIVEN IN TABLE OF OFFSETS.

TABLE OF OFFSETS

OFFSETS GIVEN IN INCHES AND EIGHTHS OF INCHES TO OUTSIDE OF PLANKING AND TO TOP OF DECK.

FRAME NUMBER	1	2	3	4	5	6-F	6-A	7	8	9	10	11	T
— HALF BREADTHS —													
RUB STRAKE	13-7	19-4	23-0	24-5	25-3	25-4	← STRAIGHT →					25-4	
COCKPIT COAMING							12-0	12-0	12-0	11-6	11-2	10-4	9-6
— HEIGHTS ABOVE BASE LINE —													
KEEL AT CENTER LINE	1-4	0-6	0-2	0-1	0-0	0-0	1-5	← STRAIGHT →					1-5
INNER CHINE "A"		1-6	0-6*	0-2	0-0	0-0							
OUTER CHINE "B"			2-1	1-3	1-1	1-1							
RUBBING STRAKE "C"	3-6	← STRAIGHT →											3-6
CENTER LINE OF DECK	8-0	9-2	10-0	10-5	10-7	11-0	11-0	11-0	11-0	10-7	10-6	10-3	9-5

panel, which is a single sheet from chine to chine. Take special care to see that this sheet fits snugly against the after face of the deep frame at the step. The edges at the chines are left square, as indicated on the sections, and the after end extends beyond the transom frame as shown. Use ample glue and clamps along the landing at the transom and stagger the fastenings into the transom and transom frame. Make certain that the plywood is pulled down hard on the transom frame and that a tight joint is obtained. This is where the boat takes the worst pounding and leaks are most likely to develop. Two staggered rows of fastenings are driven into the keel, one on each side of the center line.

(14) The bottom planking forward of the step is made up of six panels instead of three. These panels are fitted in the same order as those aft of the step, working from the sides in toward the center line. The chines are parallel to the center line, so fitting the panels will be simple. The center panels, as you will notice from the upside-down view of the completed bottom, extend 1½ in. aft of the step. This allows air to get in behind the step, quickly killing suction drag. Take special care when fitting the center panels to have the plywood land square and full on the bottom of frame No. 6F. Like the transom, this is where leaks are prone to develop, so a bit of extra attention is warranted.

There are just a couple of little items to be taken care of before the bottom will be completed. First, fit a filler and five brackets beneath the forward-step extension, as shown on Section D-D. The ¼-in. mahogany-plywood filler strip is 1⅜x28 in. It is glued and screwed in place and should bear snugly against the forward and after-plane bottom planking. Do not force it into place, but carefully plane it to fit. The five brackets help keep the step aligned and the limber holes in them allow proper step ventilation. Place each outer bracket about 3 in. from the edge and space the remainder equally.

Second, trim off the planking panels so they are flush with the outside edges of the side strips. Since you are edge-planing plywood, go at it carefully and slowly.

(15) Before going on with the construction, the entire bottom will have to be sanded smooth, first with a medium-grit paper and finally with a fine paper. Carefully fill all the depressions over the screw heads with a good filler such as Wood-Dough. Apply it liberally with a stiff putty knife, pressing it down into the slot of each screw. Let it dry overnight.

(16) Since there are about 700 screws in the bottom of the boat, you have about 700 filled holes to be smoothed off. Sounds discouraging, doesn't it? It really isn't too bad, so let's go to work. Wrap a piece of coarse paper on a suitably shaped sanding block and, using fore-and-aft strokes, start in. The coarse paper will knock off the high spots and clean up the traces of remaining glue. Then, when you feel satisfied with the looks of things, switch to the lighter stuff and go over the bottom again. The best smoothness gauge you can use is the palm of your hand—an occasional pass of your palm over the work will advise you as to your progress. When further effort brings no further noticeable increase in smoothness, the job is finished. Carefully wipe off the dust and sweep up the chips and shavings on the floor because next we tackle the bottom varnish. Nothing is more detrimental to the "skin you love to touch" than dust in the air when varnish is going on; so do a good job of cleaning up.

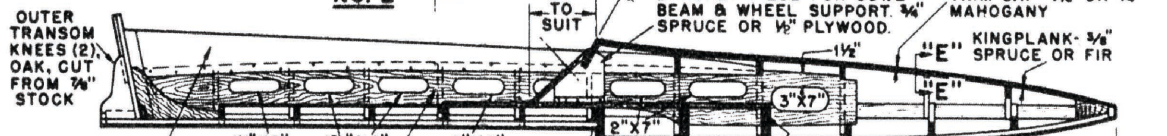
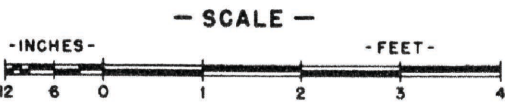
(17) When the dust has settled, put on a coat of filler and follow that with a sealer. Use non-grain-raising types, checking after they are dry for roughness of the surface. You may have to sand the bottom lightly again—you be the judge of that. Apply the first coat of varnish and let it dry well, allowing at least a couple of days. When dry, lightly sand it down with very fine paper and apply the next coat.

(18) After the second coat is dry, unclamp the boat from the fixture, carefully turn it over, and place it on a pair of well-padded horses. Saw the deck beams from ½-in. spruce, as indicated on the sections, and secure them to the after faces of the bottom frames with glue and three 1-in. screws at each joint. Attention is directed to the note on the construction plan indicating that only beams Nos. 1, 2, and 3 are continuous from side to side. The remainder of the beams in the forward deck are cut for the stringers. Small chocks are fitted on the stringers to provide landings for the beam ends. Section C-C shows a detail through the short beams in way of the cockpit and indicates that the brackets are notched at the top to permit the beams to land solidly. Two ¾-in. No. 8 screws are driven through the top of each bracket into each beam.

Note on the construction plan that the cockpit coamings extend from the transom to the beam on frame No. 4. These are cut from ⅜-in. mahogany plywood and are 6 in. deep at the transom, tapering to 1½ in. deep at frame No. 4. They are fastened to the tops of the stringers as shown in Sec-

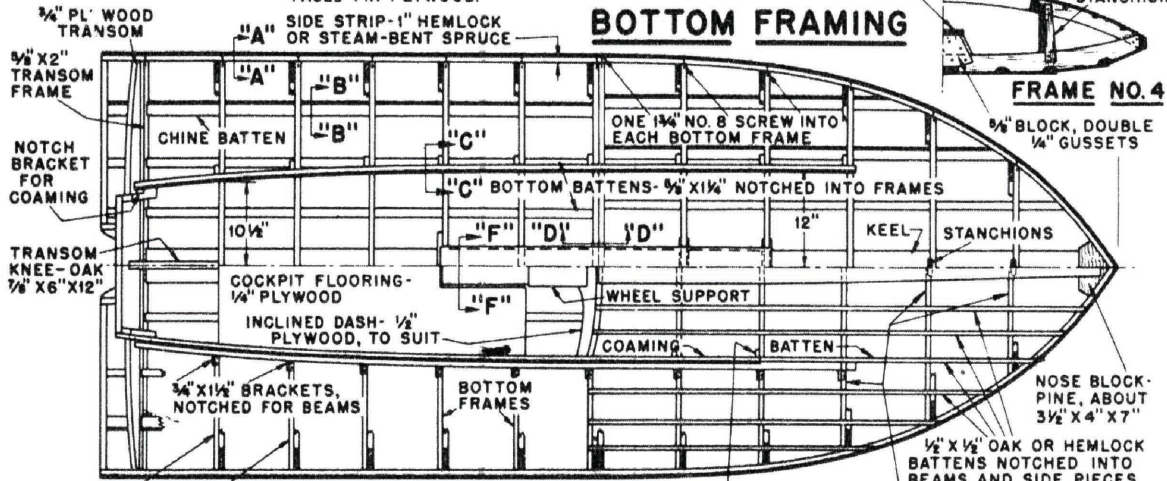
INBOARD PROFILE

FABRIC, TACKED TO KINGPLANK AND 1" SIDE STRIP
SEE DETAIL "E-E"
FRAME NO. 2

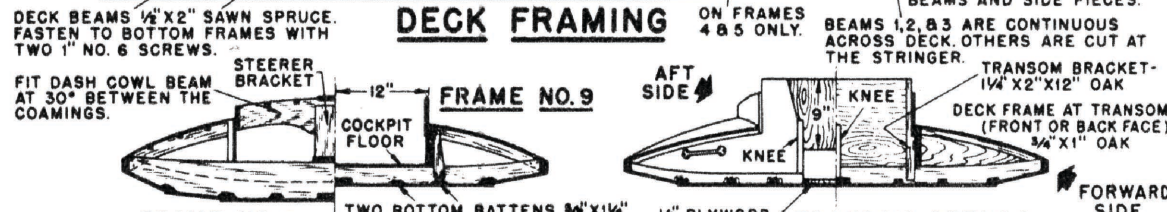


INSIDE COAMING - 3/8" MAHOGANY MARINE PLYWOOD. FINISH BRIGHT.
3/4" PL' WOOD TRANSOM
5/8" X 2" TRANSOM FRAME
NOTCH BRACKET FOR COAMING
TRANSOM KNEE - OAK 7/8" X 6" X 12"

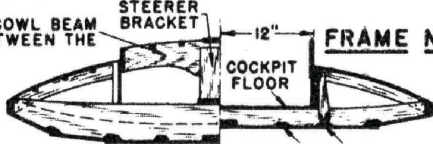
BOTTOM FRAMING



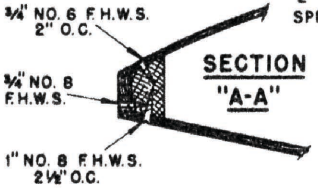
DECK FRAMING



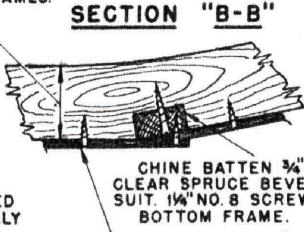
FRAME NO. 6



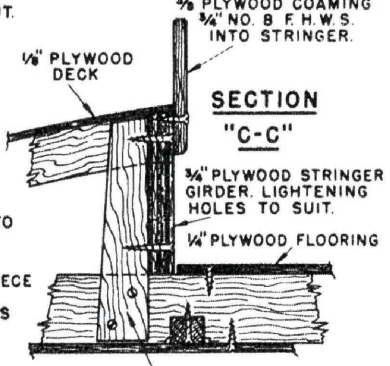
TRANSOM DETAILS



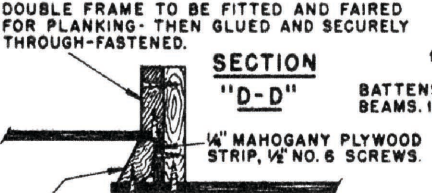
SECTION "A-A"



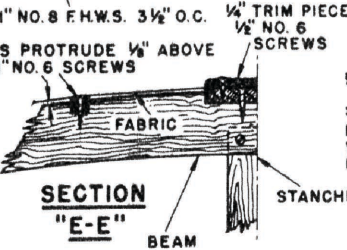
SECTION "B-B"



SECTION "C-C"



SECTION "D-D"



SECTION "E-E"



SECTION "F-F"

FIVE 3/4" BRACKETS ACROSS STEP-LIMBERED AND GLUED.
SPRUCE GIRDER TOP 3/4" X 5" TWO 1 1/4" NO. 8 F.H.W.S. INTO EACH FRAME.

KEEL 3/4" X 4" SPRUCE - ONE 1 1/4" NO. 8 F.H.W.S. INTO EACH FRAME. STAGGER SCREWS TO PORT AND STARBOARD.

SCALE (IN INCHES) BELOW IS FOR CROSS-SECTION DETAILS A-A TO F-F ONLY. DOES NOT APPLY TO OTHER DETAILS.



tion C-C and must be fitted before installing the center deck beams on frames Nos. 4 and 5 and the inclined dashboard at frame No. 6. Note that the center portions of the last three deck beams in the forward deck are lifted slightly (see section at frame No. 6) to form a cowl. The inclined dash is cut from 1/2-in. plywood and should be of ample depth to take the speedometer. End fastenings through the coaming secure the dash until the steerer bracket can be installed between it and the step girder, which will be fitted later.

(19) Next, finish up the transom. Note on the construction plan and on the transom detail that two knees are fitted on the after side of the transom, one either side of the cutout in the bottom extension. As indicated on the lines plan, that cutout is made to suit your motor. It should be just large enough to permit the motor to swivel without hitting the bottom extension. Before the knees can be fitted, stiffeners, sawed from 3/4-in. oak and notched for the bottom battens and chine, are fastened at the after end of the bottom extension. Secure each stiffener to its adjacent side strip with two 1 1/2-in. No. 8 screws and to the bottom planking with 1-in. No. 6 screws on 3-in. centers. Fasten each knee with four 2-in. No. 10 screws driven through the transom, two 1-in. No. 8 screws through the bottom planking, and one 2 1/2-in. No. 10 screw through the stiffener. Fit a 1/2-in. plywood doubler between the knees on top of the bottom planking and a second doubler on the transom itself. Secure each doubler with glue and a quilting of screws. Cut small limber holes in the knees and in the stiffeners at the battens and chine to let water drain out of the bottom extension as the boat gets underway.

(20) The step-girder top is a piece of 3/4x5-in. spruce, 41 in. long, which is fastened to the tops of frames No. 8, 7, 6A, and 6F and to the tops of the brackets on frames No. 5 and 4. These brackets are detailed on the section at frame No. 4 and are simply blocks that are double-gusseted to the frames with 1/4-in. plywood. The girder ties the forward and after planes together. See Section F-F for fastening details.

(21) Now let's tackle the foredeck battens. These are 1/2x1/2-in. hemlock, oak, or spruce, spaced equally from the 3/8-in. spruce king plank to the deck edges and are parallel to the center line. The king plank and battens protrude 1/8 in. above the deck beams. Temporarily tack them down while you check for fairness, which is important as high or low spots will cause the

fabric decking to wrinkle. When certain that all is smooth and fair, permanently fasten the battens and king plank in place.

(22) Before closing in the boat with decking, clean the inside structure and give it a couple of coats of varnish. Nothing works quite so well for cleaning out the dust from between the frames as a good tank-type vacuum cleaner.

(23) Now you're ready to put on the decking. The 1/8-in. plywood after deck goes on first. Carefully cut each side to fit from the transom to the beam on frame No. 6. Spread glue on the stringer tops, beams, and side strips and clamp the decking in place. Fasten it with 3/4-in. No. 6 screws, spacing them 2 in. apart in the stringers and side strips and 3 in. apart in the beams.

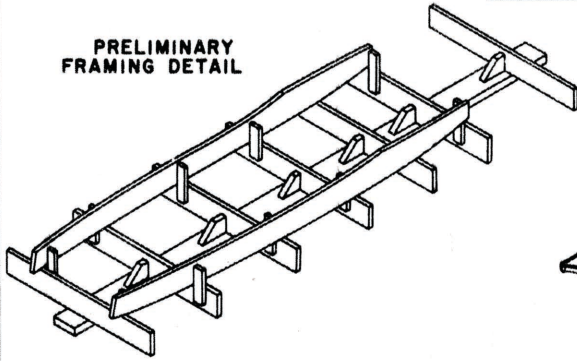
The fabric deck forward is put on one side at a time, with a seam on the center line. Secure one piece along the center line with copper or Monel tacks on 1 1/2-in. centers. Pulling the fabric taut, stretch it over the edge of the side strip and tack it down from the stem to about frame No. 4. No tacks are to be driven into either the beams or the battens. Next, carefully stretch the fabric over the cowling battens from frames No. 4 to No. 6. When there are no wrinkles, drive a line of tacks into the top of each coaming forward of the dash. This will permit you to cut the fabric carefully along the outer edges of the coamings and tack the loose edges to the stringers below. Now repeat the stretch-and-tack procedure for the remainder of the side, back to frame No. 6. Tack the after end of the cloth along the inclined dash and to the top of the plywood after deck at frame No. 6. The final touch is to glue on some pinked gummed tape along the coaming-stringer cut, over the tacks. Repeat this process on the other side.

Finish the fabric with a couple of coats of good fabric dope, followed by two or more coats of colored lacquer. This is where you can come forward with a distinctive color scheme. There are no rules on the subject except that your racing numbers must be of a contrasting color to the deck. The after deck and coaming are varnished, of course, and the name of the boat is applied over the varnish.

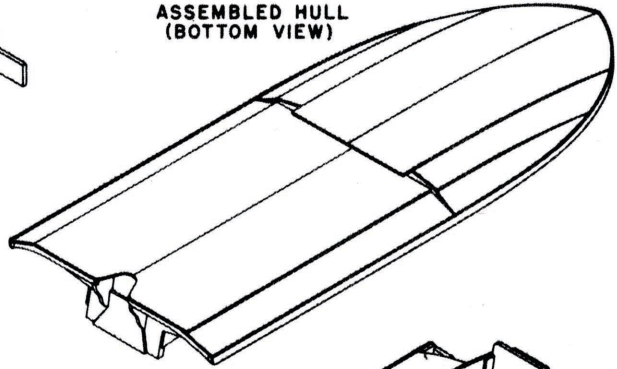
Now she's complete except for the trimmings. Fit the wheel bracket, the inside transom knee, and the 1/4-in. plywood flooring and ceiling; then add the hardware and trim. The fin is located about as shown, but may be moved a couple of inches forward or aft to suit your own ideas. The throttle is placed where shown on the deck plan. The wheel should be tried in several loca-

ASSEMBLY DETAILS

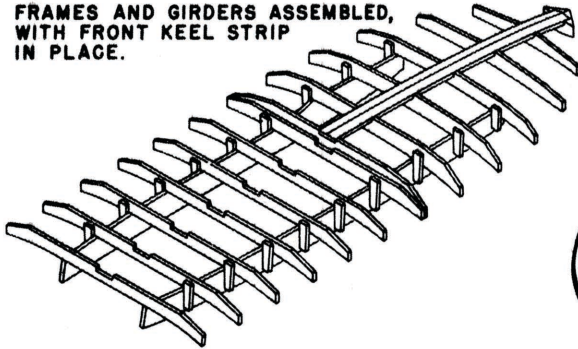
PRELIMINARY
FRAMING DETAIL



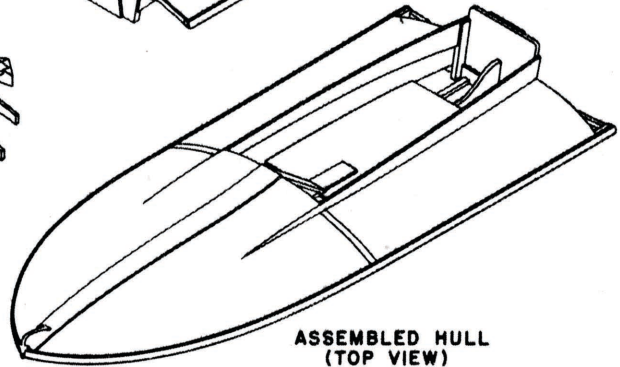
ASSEMBLED HULL
(BOTTOM VIEW)



FRAMES AND GIRDERS ASSEMBLED,
WITH FRONT KEEL STRIP
IN PLACE.



ASSEMBLED HULL
(TOP VIEW)



tions on its bracket to determine the most comfortable position. That may take several runs to determine.

That's about all. You built it—now race it; but before entering competition, get lots of practice. Engage in impromptu races whenever possible. You'll find that out-board drivers are like Sunday motorists.

On a circular course, there is a considerable amount of cutting in and out, especially at the turns, so it is well not to try to win from the beginning. Good luck and good racing! •

Large-scale plans of Vamoose are available. See page 143.

LUMBER LIST

(Approximate Quantities Required)

Exterior-Grade Mahogany Plywood

Cockpit Coaming: 1 sheet, $\frac{3}{8}$ " x 12' x 7'-0"
Dashboard, Transom Doubler, and Bottom-Extension
Doubler: 1 sheet, $\frac{1}{2}$ " x 24" x 24"
Stringers and Transom: 1 sheet, $\frac{3}{4}$ " x 4'-0" x 8'-0"

Aircraft-Type Mahogany Plywood

After Side Decks: 1 sheet, $\frac{1}{8}$ " x 4'-0" x 6'-0"
Planking, Flooring, Ceiling, Gussets, and Step Strip:
3 panels, $\frac{1}{4}$ " x 4'-0" x 6'-0"

Specify that all wood listed below is to be used for boat-building and is to be air-dried to a maximum of 15% moisture content. All hardwood is to consist of first, second, and select grades only. All softwood is to consist of A and B grades only.

Spruce

King Plank: 1 piece, S2S $\frac{3}{8}$ ", 5" wide, 5'-6" long
Deck Beams: 4 pieces, S2S $\frac{1}{2}$ ", 6" wide, 10'-0" long
Bottom Battens: 2 pieces, S4S $\frac{5}{8}$ " x $1\frac{1}{4}$ ", 16'-0" long
Step-Girder Brackets: 2 pieces, S2S $\frac{5}{8}$ ", 2" wide, 7" long
Bottom Frames: 60 lineal ft., S2S $\frac{5}{8}$ ", 6" wide
Step Brackets: 1 piece, S4S $\frac{3}{4}$ " x $1\frac{3}{8}$ ", 12" long
Chines: 2 pieces, S4S $\frac{3}{4}$ " x $1\frac{3}{4}$ ", 14'-0" long
Keel: 1 piece, S4S $\frac{3}{4}$ " x 4", 12'-0" long

Step-Girder Top and Steerer Bracket: 1 piece, S4S $\frac{3}{4}$ " x 5", 5'-0" long

Fir or Spruce

Stanchions: 1 piece, S4S $\frac{3}{4}$ " x $1\frac{1}{2}$ ", 6'-0" long
Brackets: 2 pieces, S2S $\frac{3}{4}$ ", 2" wide, 10'-0" long

Pine

Nose Block: 1 piece, about $3\frac{1}{2}$ " x 4" x 7"

White Oak

Transom Deck Beam and Bottom-Extension Stiffeners:
1 piece, S2S $\frac{3}{4}$ ", 4" wide, 7'-0" long
Transom Knees: 1 piece, S2S $\frac{7}{8}$ ", 6" wide, 3'-0" long
Transom Brackets: 2 pieces, S4S $1\frac{1}{4}$ " x 2", 12" long

Hemlock, Oak, or Spruce

Deck Battens: 6 pieces, S4S $\frac{1}{2}$ " x $\frac{1}{2}$ ", 10'-0" long
Side Strips: 2 pieces, S2S 1", $2\frac{1}{2}$ " wide, 16'-0" long

Mahogany

Trim Cap: 1 piece, S2S $\frac{1}{4}$ ", 5" wide, 5'-6" long

Mahogany or Spruce

Rubstrakes: 2 pieces, S2S $\frac{1}{2}$ ", 2" wide, 16'-0" long