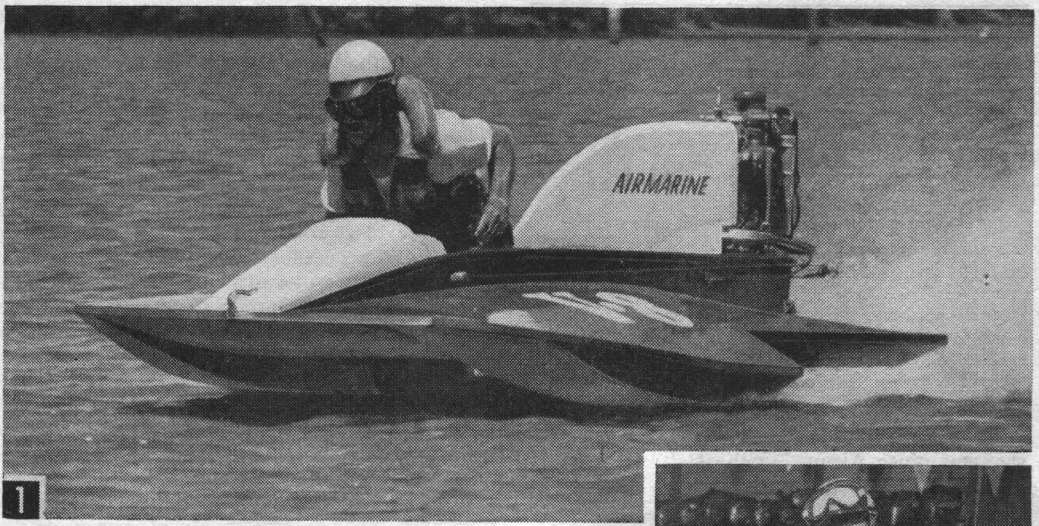

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Photo above shows Joe Michelini test driving his Airmarine Special at about 85 *mph*. Photo at right shows Joe with American Power Boat Association's 1958 National Championship Trophies for Class F that he won at Lakeland, Florida. In the past 20 years Joe has taken 1st place in many Class B, C, F and CU events with the dozen or more boats he has designed and built.

Airmarine Special

NATIONAL CHAMPION Class F Racing Hydroplane

By JOE MICHELINI

Craft Print Project No. 297

IN this article, Joe Michelini, nationally famous competition speed boat designer-builder and driver, tells you in step-by-step description with dimensioned plans how to build his class F racing hydroplane with which he won the APBA Class F national title in 1958. *All of the latest professional racing-hull design data gained from 25 years of experience are incorporated in these boat plans.—Ed. Note.*

Unlike the conventional 3-point, racing hull design, which has been and is still being used by most competition boat-racing drivers, my Airmarine Special represents a new concept in hydroplane design which results in a greater degree of stability and control in the 70 *mph* and higher range. In this speed range the conventional 3-point design becomes airborne, riding on the two forward sponson surfaces and the transom bottom surface. When the sponsons on this type hull strike a wave, the impact lifts the forward part of the hull increasing the angle of incidence, exposing the large flat underside of the hull to the wind. The force of the wind can and often does lift the sponsons clear of the water, resulting in complete loss of control and in some cases flips the boat and driver over backwards. Such a mishap or even loss of control is enough to lose a race.

With Airmarine design, on the other hand, the *transom end* becomes *airborne* at an intermediate speed range and the boat's angle of incidence permits a steady flow of air through the air tunnel and, by use of air traps, releases the air at the transom end. Thus the front half instead of riding unstably high, assumes a fairly level attitude. As speed increases, the whole boat becomes airborne but its flight path is still very close to level. The fact that this design presents less wetted area thereby decreasing friction, naturally increases boat speed over the conventional 3-point design. This balanced condition over a center of gravity located at the aft end of the

STATEMENT OF USES

TYPE: Two-point, prop rider competition racing hydroplane for use in Class F outboard races sanctioned under American Power Boat Association.

LENGTH: 140½ in.

WIDTH: 76 in. max. at sponsons.

WEIGHT: Approx. 275 lbs. less motor and fuel.

SPEED: 85+ *mph* setup for competition racing. Unofficially clocked at 90 *mph* on a straight-a-way run.

CAPACITY: One driver.

CONSTRUCTION: Plywood planking over wooden framework.

MOTOR: Mercury, Mark 75H Class F. 6-cylinder racing motor using alcohol fuel. Lower unit has 1:1 gear ratio.

PROPELLER: Mercury, special two-blade, surfacing type steel racing wheel.

sponsons gives Airmarine the stability, ease of control and safety so needed in the higher speed range.

In its present trim, Airmarine is balanced for a driver weighing 175 lbs. Since balance in this type design is critical, any appreciable change of driver weight, gas tank and accessory placement must be taken into consideration. The driver in moving backward or forward can, of course, compensate for some changes in balance, but this method of controlling balance during flight must be understood if the boat is to perform properly.

Construction. Mahogany lumber and marine grade, mahogany-faced plywood were used for framing and planking on the original Airmarine Special. However, since mahogany is expensive and difficult to obtain in some areas, substitutions in the order noted in the Materials List can be used. All lumber should be straight grained and clear of knots.

Building Form. Use stock-size lumber yard material for the building form (Fig. 2-E), and select thoroughly dried and absolutely straight 2 x 8-in. planks for the two top pieces because the entire alignment of the boat hull depends upon the flatness of these two planks. Mark a centerline lengthwise on the 2 x 4-in. stock between the planks and layoff the station lines on it starting at 1 in. from the back of the building form. Then draw station lines on the 2 x 8-in. planks at right angles to the centerline and label them 1, 2, 3 etc.

Make the building-form frames (labeled sec. A-A to D-D in Fig. 2-D) next. Be sure the 1 x 2-in. frame bottom pieces (actually ¾ x 1⅝ in.) are assembled square with the beveled edges of the frame sides. Mark the centers of the building-form frames on the bottom piece and fasten them to the 2 x 8-in. planks at the dimensioned locations (Fig. 2-E), lining up their centers with the centerline on the 2 x 4. Check to see that they are at right angles with the 2 x 4 centerline and fasten to the 2 x 8-in. planks with one 8 x 1½-in. *fh* screw at each end so they can be removed later. Then using a 2-ft. square to hold them perpendicular to the 2 x 8-in. planks, nail the 1 x 2-in. diagonal braces in place. Nail a 1 x 2-in. strip along the top center of the frames and mark a centerline along its entire length. This completes the building form.

Boat Hull Framework. Start construction by making full-size drawings on house building paper of the hull frames detailed in Fig. 3. Tape or tack the paper to a sheet of plywood because it will be necessary to partially drive finishing nails at various points to make use of a ⅜ x ½-in. wooden batten when drawing the curved lines. Because the frames are symmetrical, only one half of them are shown in Fig. 3. However, when making your full-size drawings, draw in both sides because they will be used to position the frame members during assembly. Draw the transom directly on the ¾-in. plywood it will be cut from.

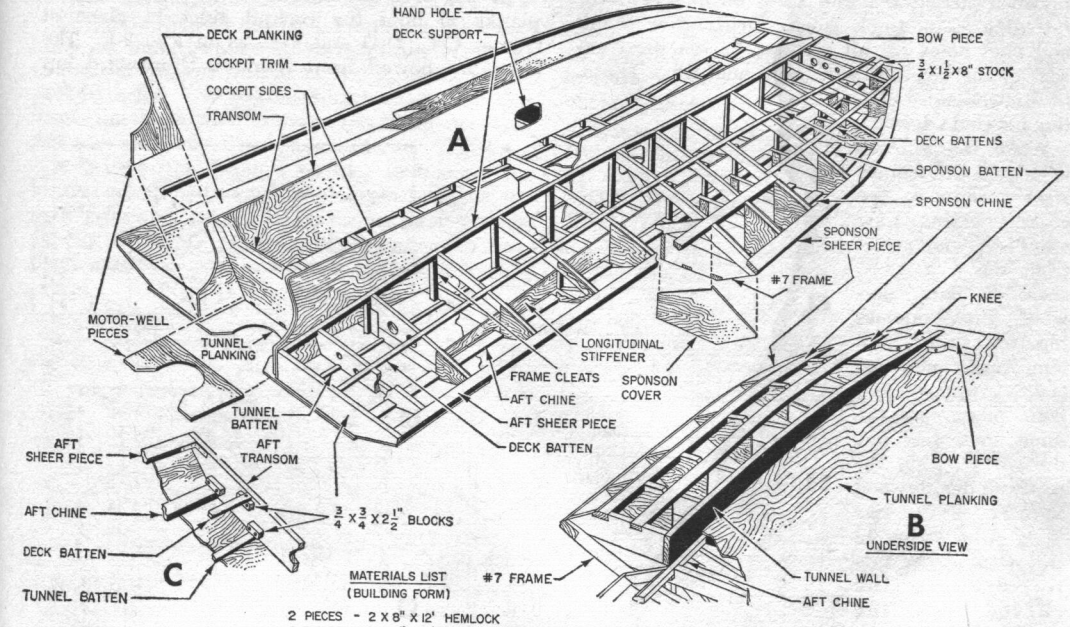
To transfer the shapes of the frame members and gussets to wood for sawing, do not cut the drawings. Instead, use sheets of carbon paper or a leather-crafter's, toothed spacing wheel to transfer the shapes of the curved frame members. This tool produces a series of tiny holes in the wood that can be easily followed when sawing on a bandsaw. Since the frames are symmetrical you can saw two deck-beam frame members at once by nailing two boards together. Mark and cut out the gussets from ⅛-in. plywood.

Note on #7 frame that the two diagonal pieces are fastened to opposite sides of the frame, and that the ¾ x ¾-in. pieces are fastened to the forward side on #2 to #7 frames and between the gussets on #8 to #10 frames. Cut the notches marked X in Fig. 3 in the bottom members on all frames before assembling. All other notches for battens, chines, etc. are best cut after assembly to framework.

When assembling the frames, place the pieces on the full-size drawings to locate them accurately and fasten them with waterproof glue and ¾ x .065-in. *Stronghold* nails through the ⅛-in.

MATERIALS LIST—RACING HYDROPLANE

No. Req.	Size and Description	Use
	PLYWOOD	
1	¾" x 15" x 8' exterior marine plywood—fir	transom
1	⅜" x 4' x 12' exterior marine plywood—fir	cockpit sides and transom
1	¼" x 4' x 12' exterior marine plywood—mahogany or fir	tunnel planking
3	¼" x 4' x 8' exterior marine plywood—mahogany or fir	sponson planking, floor, aft deck, aft side planking
3	⅛" x 4' x 8' exterior marine plywood—mahogany	decking and frame gussets
	LUMBER	
12	¾" x 5⅝" x 12' mahogany, Sitka spruce, fir	all framework pieces
1	3¾" x 7⅝" x 10' mahogany, Sitka spruce, fir	bow piece
	FASTENINGS	
1 lb	¾" x .065 bronze Stronghold nails	⅛" plywood
2 gross	#8 x 1½" *fh* galv. screws	
2 gross	#6 x 1" *fh* galv. screws	
2 doz	#8 x 2" *fh* galv. screws	
1 gal	Elmer's Waterproof glue	



MATERIALS LIST
(BUILDING FORM)

2 PIECES - 2 X 8" X 12' HEMLOCK
6 PIECES - 2 X 4" X 12' HEMLOCK
1 PIECE - 1 X 6" X 4' HEMLOCK
3 PIECES - 1 X 4" X 12' HEMLOCK
3 PIECES - 1 X 2" X 12' HEMLOCK

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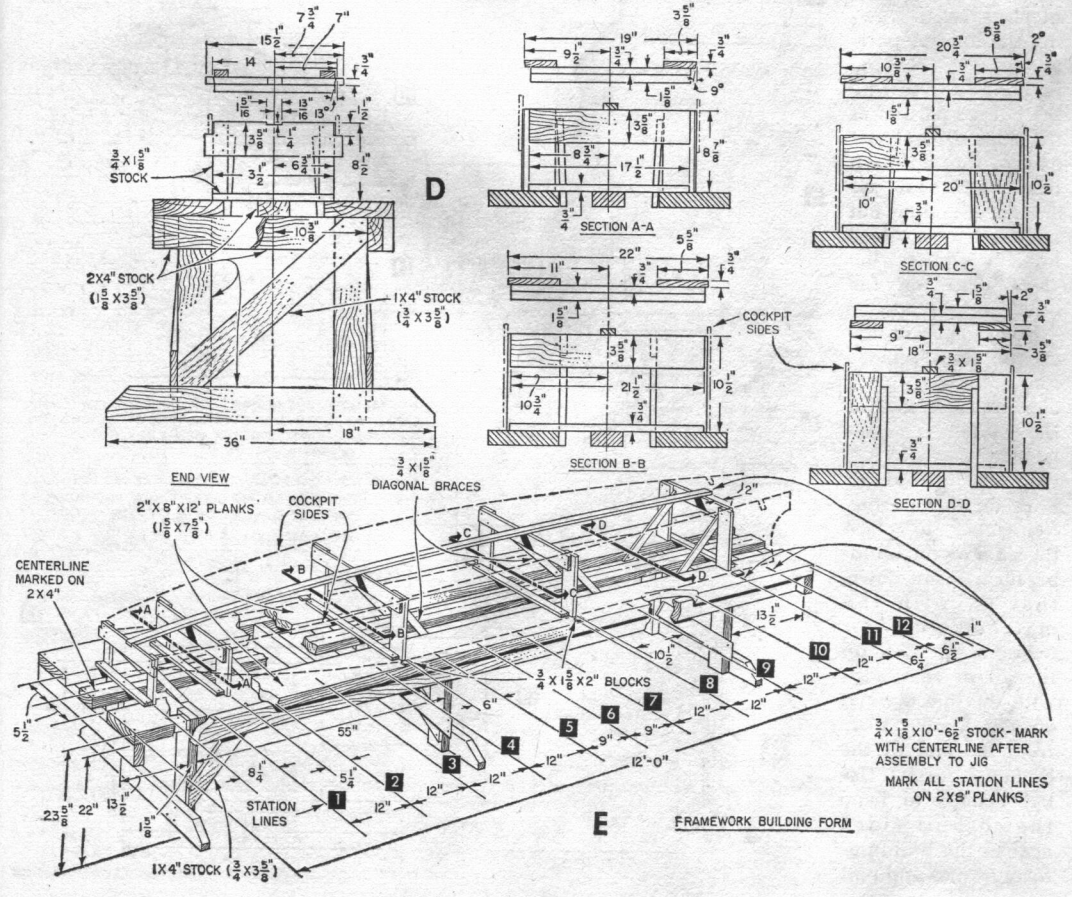
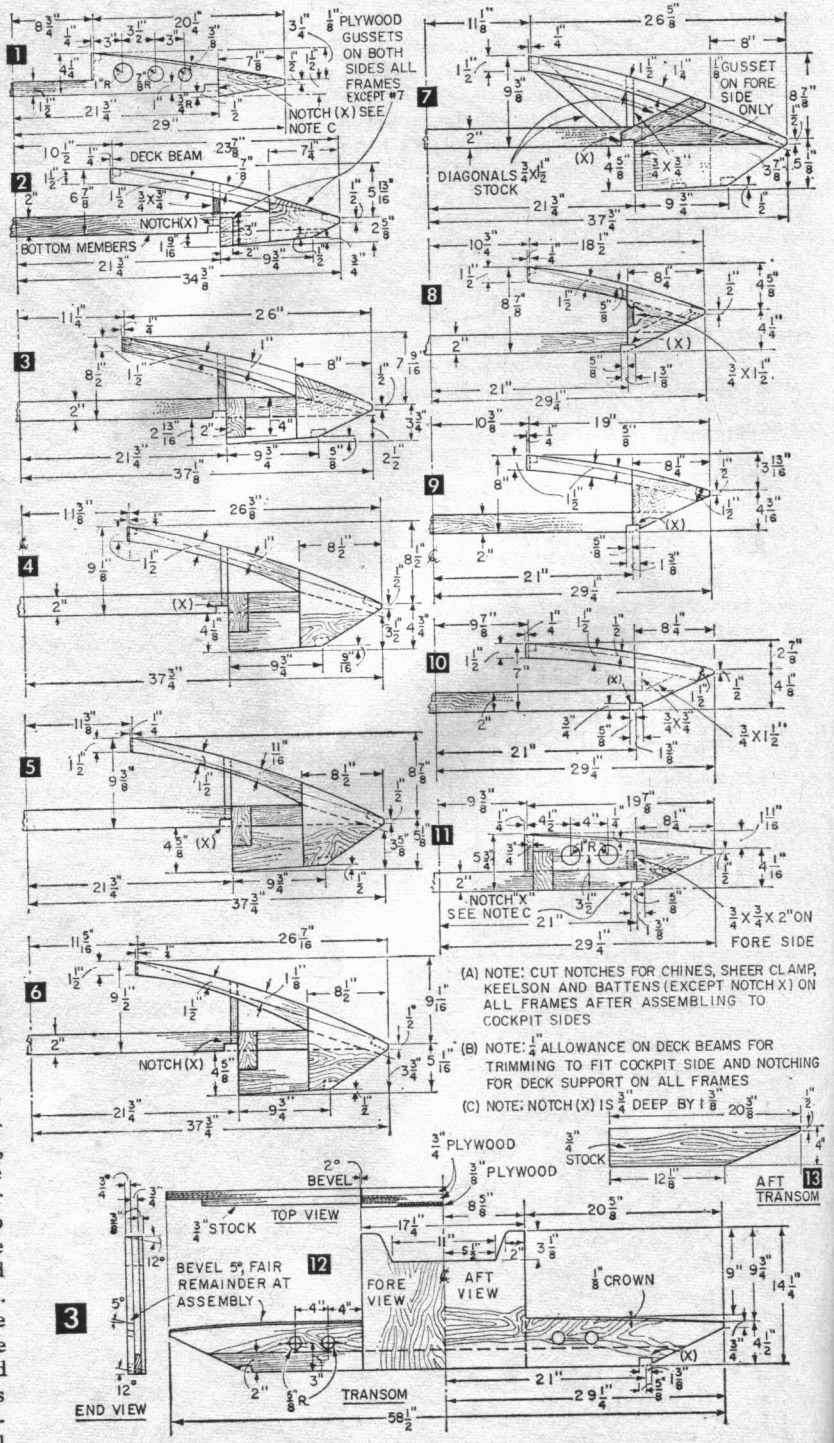


plywood gussets and #8 x 1½-in. *fh* screws for fastening ¾-in. thick stock. Drill screw shank and pilot holes for all screws. Fasten the transom pieces together with glue and #8 x 1½-in. *fh* screws before cutting beveled edges.

While the glue is drying on the frames start working on the cockpit sides. Saw two 14-in. wide strips from the 4 x 12-ft. sheet of ⅜-in. plywood. Place one on top the other and temporarily nail together so you can saw both pieces at the same time. Lay out the cockpit side directly on the plywood as in Fig. 4. Cut two ¾ x ¾-in. strips 12 ft. long and use one for drawing the curved deck line shown as a dot-dash line in Fig. 4. Use nails to hold the strip in place when drawing the line. A portable jigsaw will come in handy for sawing the curved portion of the sides. *Do not* saw along the dot-dash line, but turn the sides over and lay out another curved deck line in exactly the same place on the other cockpit side.

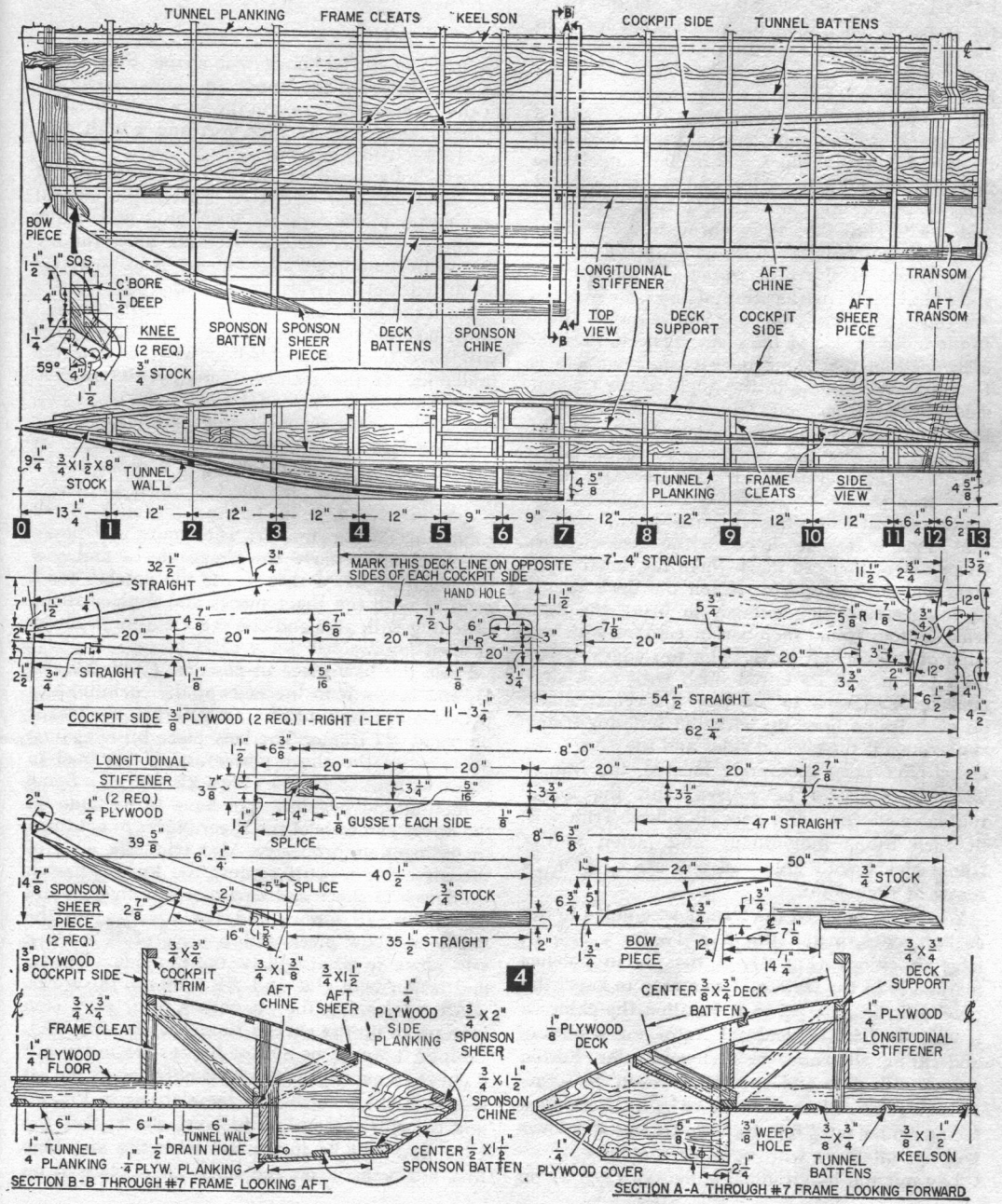
Now, separate the cockpit sides, remove the nails and place one on each side of the building frames labeled A-A to E-E with the dot-dash lines on the outside. Remember to place the sides on the building form upside down, that is, with the matched edge for transom, up. Line up the aft or rear edge with the line marked on the planks 1 in. from the end of the building form. Use bar clamps to bend the cockpit sides against the building-form frames and nail ¾ x 1⅝ x 2-in. blocks to the building-form planks to hold the cockpit sides in place at frames C-C, D-D and E-E, as in Fig. 2-E. The sides are bowed from frame D-D forward but



straight between frames D-D and E-E.

To aid in locating the hull frames on the cockpit sides later; transfer all station lines drawn on the building-form planks to the outsides of the cockpit sides. Use a 2-ft. square to do this and draw the lines on the sides from the dot-dash line upwards only. Then fasten the two 12-ft. long ¾ x ¾-in. strips (deck supports) to the outside of the cockpit sides along the dot-dash deck lines with glue and #6 x 1-in. *fh* screws spaced 6 in. apart and driven through from the plywood side. Start at the center and work toward the ends bending the strip as you fasten it in place. Remember you are building the boat upside down so fasten these strips above the dot-dash lines or side of lines closest the bottom edge of the cockpit sides.

Short lengths of ¾ x ¾-in. stock are used as frame cleats to fasten the hull frames to the cockpit sides as in Figs. 3-A and 4. Cut and fit the cleats individually as you fasten them to the cockpit sides. The cleats must extend from the deck supports to about 2½ in. beyond the edges of the cockpit sides. This will allow some stock



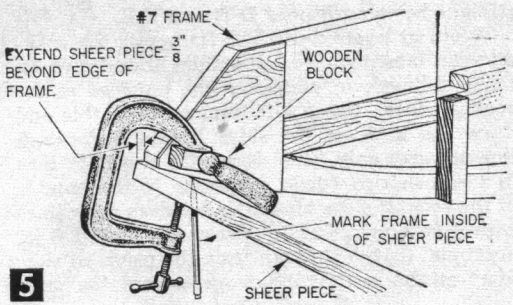
for trimming after frames are in place. The frame cleats at station lines #5 and 6 need not be beveled; all other cleats, however, must be beveled to conform to the curvature of the cockpit sides. Cleats for frames #8, 9, 10 and 11 can be beveled 2°. Determine angle of others with a bevel square held against the cockpit sides. Fasten these cleats to the aft side (toward the transom) of the station lines marked on the cockpit sides. Use glue and #6 x 1-in. *fh* screws driven through from the plywood cockpit side.

Your next step is to assemble the transom and hull frames to the cockpit sides. Starting with the transom, place it in the notches cut for it in the cockpit sides so that the plywood part of the transom is aft or toward the back. The 12° beveled bottom edge of the transom must be exactly 2 in. above the cockpit sides. Check with a 2-ft. square to see that it is at right angles to the center line on the 1 x 2-in. building frame member and 1 in. from the ends of the cockpit sides at the 17-in. end. Then fasten with glue and #6 x 1-in. *fh* screws through the cockpit sides into the transom.

Placement of the hull frames to the cockpit sides is fixed by the location of the frame cleats. All you need to do is be sure you assemble them to the forward side of the cleats. The ¼-in. trim allowance on the frame deck-beam members is for fitting each frame to the angle of the cockpit side. Fit the frames one at a time by placing them upside down on the top of the cockpit sides against the cleats. Center the frame and mark the angle of trim on the deck-beams from the cockpit sides. Then trim the deck-beam ends and again set the frame in position on the cockpit sides. This time the frame will slide down to the deck-support strips where you can mark them for notching to clear the deck supports. Notch the deck beams ¾ in. deep or deep enough to bring the 2-in. wide bottom frame member in contact with the edge of the cockpit sides. The top edges of the deck beams will be faired flush with deck supports later. Check to see that the center mark on each frame lines up with the building-frame centerline. If the cockpit sides and the ¾ x ¾-in. cleats have been accurately located, the frames will automatically be square with the longitudinal centerline and cockpit sides. Trim and fit each frame individually and fasten to the frame cleats with glue and one #8 x 1½-in. *fh* screw at each joint.

When you have all the frames assembled to the cockpit sides, install the ¾ x 1⅜-in. x 11½ ft. long aft chines (Fig. 4), in the precut notches marked X in the frames. Use a rasp to bevel the notches in frames #5 to 1. Position the chine so it extends 7 in. beyond #1 frame for trimming and fitting allowance at each end later. Fasten chines with glue and one #8 x 1½-in. *fh* screw at each joint. Place the screws ⅜ in. from edge facing center on #8 to transom frames so screws will not interfere with beveling the chine.

Lay out the longitudinal stiffeners (Fig. 4) on ¼-in. plywood and bandsaw to shape. Slide these in place between the upper and lower members of the frames and fasten to the ¾ x ¾-in. vertical frame members as in Figs. 2-A and 4 with glue and #6 x 1-in. *fh* screws.



Next, lay out and cut the sponson sheer clamps and bow piece as in Fig. 4. Fasten the curved and straight sheer pieces with glue and #8 x 1½-in. *fh* screws. Counterbore the holes for the screws in the outside edges about ½ in. so screw heads will not interfere with fairing later.

Since the hull framework is now in the upside-down position, the sponson sheer and bow pieces will have to be assembled to what is now the underside of the frames (actually the topside when the boat is finished). Clamp the two sponson sheer pieces to #7 frame and forward for marking location of notches. Use a C-clamp at #1 frame and two C-clamps and a block at #7 frame as in Fig. 5. Be sure to allow the sheer pieces to extend ⅜ in. beyond the ends of the frames for fairing off later. Then mark the frames for notching, remove the sheer pieces and saw the notches. Use a rasp to file the notches for a good fit with the sheer pieces and replace them, fastening with glue and one #8 x 1½-in. *fh* screw at each joint.

Place the bow piece in position (Figs. 2A and 4), and fasten it to the ends of the cockpit sides with clamps and blocks as you did the sheer pieces at #7 frame. The bow piece butts against the ends of the sheer pieces and is fastened to them with knee pieces (Figs. 2B and 4). Some trimming and beveling will have to be done on the knees and ends of the sheer pieces to get them to fit together properly. Also trim the ends of the aft chine to butt against the knees. Fasten the knees to sheer and bow pieces with glue and #8 x 2-in. *fh* screws and the aft chine to the knees and bow piece with a piece of ¾ x 1½ x 8-in. stock to what will be the top side (Fig. 4), and fasten with glue and #8 x 1½-in. *fh* screws.

After fastening the aft chines, your next step is to make up the curved tunnel-walls (Fig. 8A).

Since it would be almost impossible to lay out a curve to exactly fit the bent portions of the aft chines, make a cardboard template as in Fig. 8B and transfer the outline to ¾-in. stock. Saw the edge that will be in contact with the aft chine first and exactly on the line. Then place it on

6

Seconds after coming out of a left turn the camera caught this almost head-on view of Joe Michelini piloting his Airmarine Special. Joe won the American Power Boat Association's 1958 National Championship for Class F outboard hydros with this boat.

the aft chine and sight along the seam. If light shows through, sand the edge until you have a good tight fit. Saw the other curved edge about ⅛ in. oversize to allow for beveling the edge to the angle of the sponson frames.

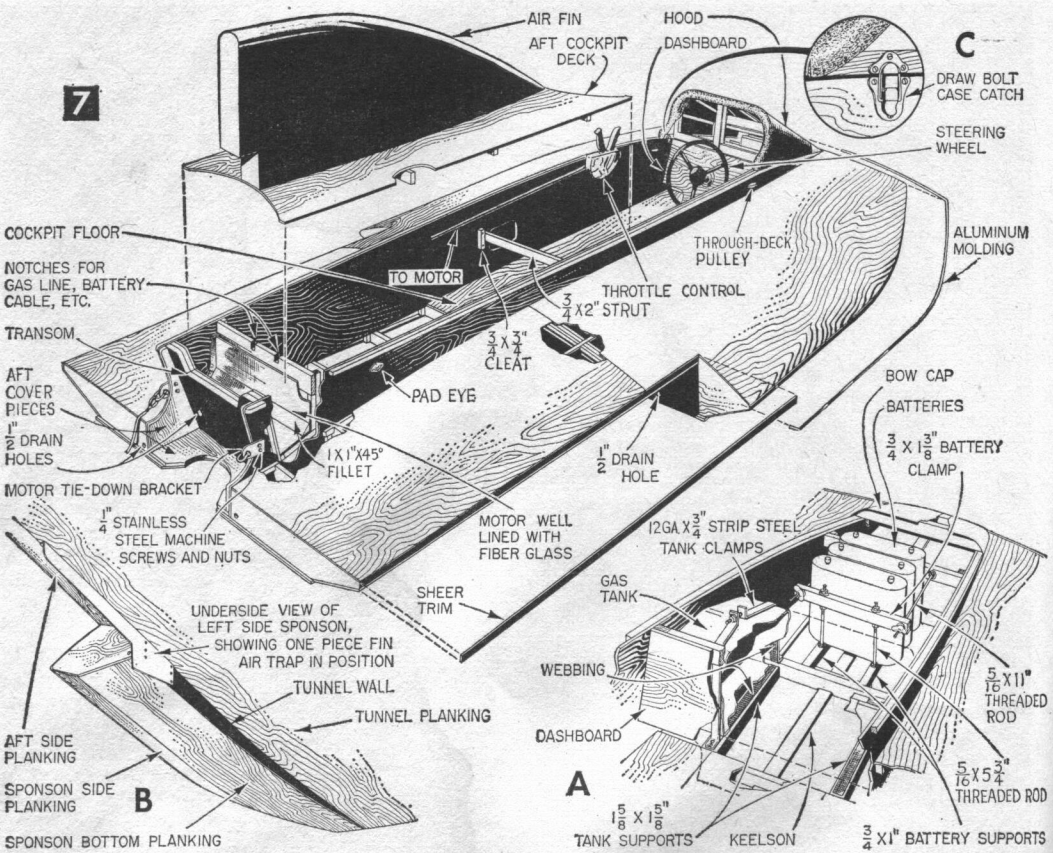
Fasten the tunnel-wall pieces with glue and #8 x 1½-in. *fh* screws driven through the aft chine from the underside. Drill pilot holes for the screws and place three of them between each frame to draw the tunnel wall tightly against the aft chine. Then drive screws through the tunnel wall into the sponson frames.

Install the ¾ x 1½-in. aft sheer (as shown in Fig. 4) next. These extend from #5 frame to 6 in. beyond the transom. Clamp in place on the underside of the framework and mark the frames for notching as you did for the sponson sheer pieces. Then remove, notch the frames and again clamp them in place, fastening with glue and one #8 x 1½-in. *fh* screw at each joint.

Following the same procedure, install the ¾ x 1½-in. sponson chines to frames #2 to 7 inclusive. Set them out about ½ in. beyond the corners of the frames so there will be enough stock to bevel and then provide a fastening surface for the sponson side planking. Taper the fore ends of the chines and fasten them to the sponson sheer pieces.

Beveling the chine and sheer pieces and fairing the various frame members so that the plywood covering will make gluing contact is your next step. Use a block plane and rasp to bring all these surfaces flush with one another. To determine the angle at which to bevel the forward frame members, bend a batten across the frames and sight along the underside. When planing the frame members do *not remove* too much stock and thus cause a low spot in the plywood coverings. Plane a bevel on the fore edge of the bow piece to provide a gluing surface.

After fairing the framework, rip the ⅜ x 1½-in. keelson and two ⅜ x ¾-in. tunnel battens, shown on each side of the keelson as detailed in Fig. 4, from ¾-in. thick stock 12 ft. long. Place the keelson across the frames at the center and the battens 6 in. apart at each side of the keelson as shown in Sec. B-B of Fig. 4. Clamp them in place, mark each frame for notching and then



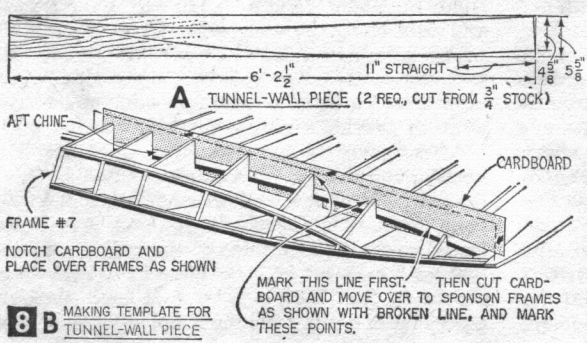
remove them. A portable electric saw set at ⅜-in. depth of cut will come in handy for cutting the notches. Simply make a series of saw cuts side by side the width of the notch. After cutting all the notches, saw cut both sides of the keelson notches and the outboard sides of the batten notches at 45° angle for weep holes as in Sec. A-A, shown in Fig. 4. Weep holes provide openings between frames so that water that has splashed into the hull can drain to the back of the boat and out the ½-in. drain holes through the aft transoms. The ½-in. drain holes are plugged with a cork when the boat is in the water. Fasten the keelson and battens to frames with glue and #6 x 1-in. *fh* screws. Use one screw at each batten joint and two at each keelson joint.

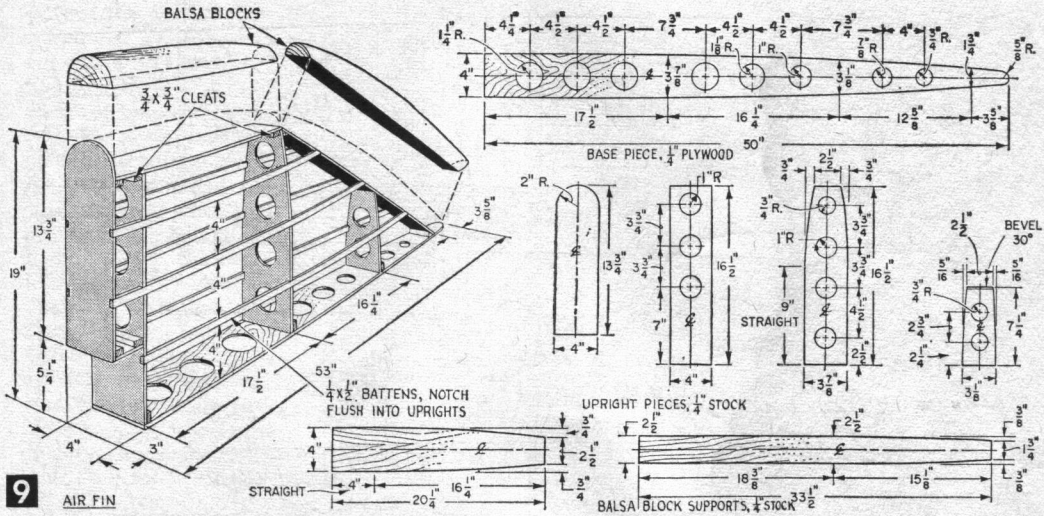
Next install the sponson battens following the same methods used when fitting the keelson. Center this batten between the sponson chine and tunnel wall and fasten to the fore end of the sponson sheer piece and sponson frames.

Lay out and cut the two aft transom pieces (as shown in Fig. 3) and fasten them to the aft ends of the cockpit sides, sheer and chine pieces with ¾-in. blocks as shown in detail in Fig. 2C. Cover the aft or outside sponson portion of #7 frame with a piece of ¼-in. plywood, fastening it with glue and #6 x 1-in. *fh* screws. After glue hardens, plane plywood edges flush with frames.

Planking. Fit and install the sponson and aft side planking (Fig. 11) first. To determine the size and shape of the sponson side planking, hold a piece of cardboard against the sponsons and draw a line along the sheer and chine pieces. Cut out the cardboard and transfer outline to ¼-in. plywood and saw out the piece slightly oversize to allow for planing later. No cardboard pattern is needed for aft side planking since it is rectangular in shape and measurements can be taken directly from framework.

When installing these side planks, have clamps, screws, drill, etc., at hand so you





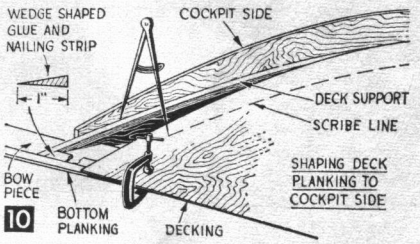
9

can work quickly before the glue sets up. Clamp the planking in place after coating all contacting surfaces with glue and fasten with 1-in. bronze Stronghold nails. Avoid driving nails along chine where they will interfere with planing the edges of the plywood flush with the chines later.

After the glue has hardened and you have the side planking edges flush with the chines, cut and fit the two pieces of sponson bottom planking and the large tunnel planking. Note in Fig. 11 that the three pieces of planking extend ¼ in. beyond the aft ends and that the tunnel planking is ½ in. wider from #7 frame aft than it is forward of #7 frame. Clamp these pieces in place without glue first to make certain everything fits well. Enlist the aid of one or two friends to help you install the large tunnel planking so the work of fastening it in place will be completed before the glue sets up. Use #6 x 1-in. *fh* screws spaced about 3 in. apart along the chines, bow and transom, and about 5 in. apart across the frame bottom members. Countersink the screws about 1/32 in. and fill with a lacquer-base, quick-drying surfacing putty and sand smooth. Plane the inside edges of the sponson planking flush with the tunnel wall and do not bevel the outer edges of the sponson or aft tunnel planking.

We covered the sponson bottom planks with one layer of fiber glass and resin and used only the polyester resin as you would lacquer on the tunnel planking. However, since many tedious hours of sanding will be required to give the polyester resin a good smooth finish, three coats of marine spar varnish may be used instead.

This completes the work on the bottom for the time being and you can turn the hull over to work on the top. To do this, crawl under the building form and remove the screws and diagonals that hold the five building-form frames to the 2 x 8-in. planks. Leave the frames between



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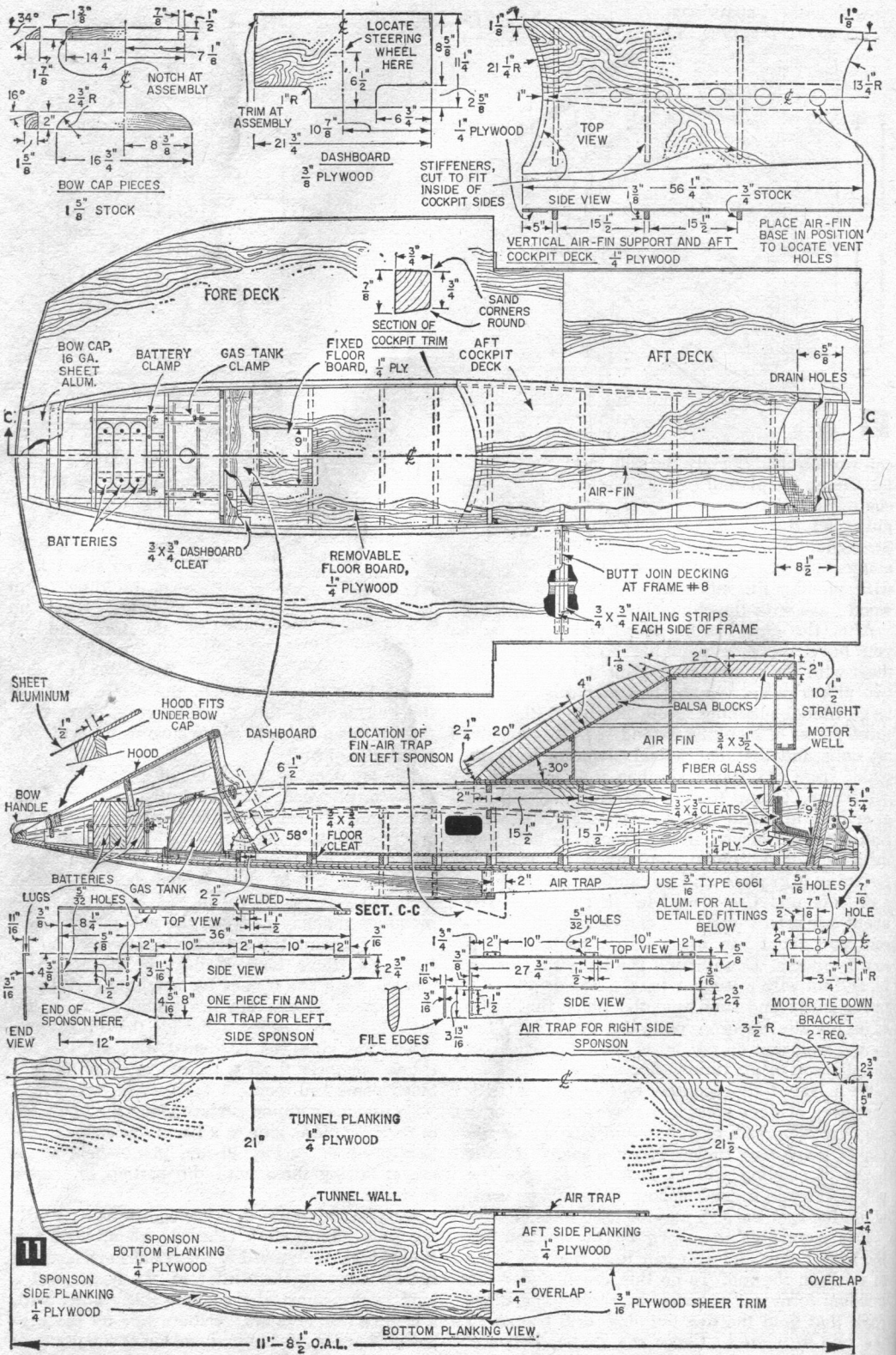
the cockpit sides and set the hull in the upright position with the tunnel planking resting on the 2 x 8-in. building-form planks. Block up the fore end. At this point apply two coats of Kuhl's *Three Way Preservative* to the entire inside of the hull. Follow this with two coats of varnish. Inspect weep holes to make sure water will flow to aft end of hull.

The top decking, which is cut from 8-ft. sheets of ⅛-in. plywood, must be butt-joined over the #8 frame. To reinforce the top members of the #8 frame, glue and screw ¾-in. strips to each side of the #8 frame as in Fig. 11. Then clamp the long ⅜ x ¾-in. deck batten extending from bow to stern (as shown in Fig. 4) to the frame members midway between the cockpit sides and aft sheer. Clamp the short deck batten extending from #5 frame forward next to the aft sheer pieces. Mark the frames for notching and install the battens as you did the tunnel battens. No weep holes are needed alongside the top battens. When the glue has hardened, fair all the top frame members flush with one another using a block plane and rasp.

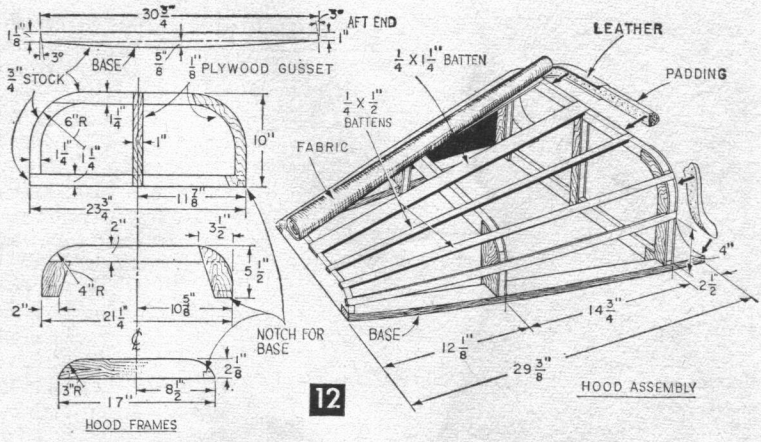
To provide a gluing surface along the fore edge of the bow piece, glue ⅜ x 1-in. filler strips to the bow piece as in Fig. 10 and plane them at an angle, fairing them with the battens and deck supports.

Installation of the decking comes next. Starting with the fore deck (Fig. 11), clamp a 4 x 8-ft. sheet of ⅛-in. plywood to the framework locating the aft edge on the center of #8 frame and a long edge against the cockpit side. Then with a compass or dividers, scribe a line on the plywood as in Fig. 10, holding one leg of the dividers


BOW CAP PIECES
1 5/8" STOCK
NOTCH AT ASSEMBLY
LOCATE STEERING WHEEL HERE
TRIM AT ASSEMBLY
DASHBOARD
3/8" PLYWOOD
1/4" PLYWOOD
TOP VIEW
SIDE VIEW
STIFFENERS, CUT TO FIT INSIDE OF COCKPIT SIDES
3/4" STOCK
VERTICAL AIR-FIN SUPPORT AND AFT COCKPIT DECK
PLACE AIR-FIN BASE IN POSITION TO LOCATE VENT HOLES
FORE DECK
SECTION OF COCKPIT TRIM
SAND CORNERS ROUND
AFT COCKPIT DECK
AFT DECK
DRAIN HOLES
BOW CAP, 16 GA. SHEET ALUM.
BATTERY CLAMP
GAS TANK CLAMP
FIXED FLOOR BOARD, 1/4" PLY
AIR-FIN
BATTERIES
3/4 X 3/4" DASHBOARD CLEAT
REMOVABLE FLOOR BOARD, 1/4" PLYWOOD
BUTT JOIN DECKING AT FRAME #8
3/4 X 3/4" NAILING STRIPS EACH SIDE OF FRAME
SHEET ALUMINUM
HOOD FITS UNDER BOW CAP
HOOD
DASHBOARD
LOCATION OF FIN-AIR TRAP ON LEFT SPONSON
BALSA BLOCKS
STRAIGHT
AIR FIN 3/4 X 3 1/2"
MOTOR WELL
FIBER GLASS
BOW HANDLE
3/4 X 3/4" CLEATS
FLOOR CLEAT
1/4" PLY
BATTERIES
GAS TANK
LUGS
5/32" HOLES
WELDED
AIR TRAP
SECT. C-C
USE 3/16" TYPE 6061 ALUM. FOR ALL DETAILED FITTINGS BELOW
5/16" HOLES
HOLE
TOP VIEW
SIDE VIEW
END OF SPONSON HERE
END VIEW
ONE PIECE FIN AND AIR TRAP FOR LEFT SIDE SPONSON
FILE EDGES
AIR TRAP FOR RIGHT SIDE SPONSON
MOTOR TIE DOWN BRACKET 2-REQ.
TUNNEL PLANKING 1/4" PLYWOOD
TUNNEL WALL
AIR TRAP
SPONSON BOTTOM PLANKING 1/4" PLYWOOD
AFT SIDE PLANKING 1/4" PLYWOOD
SPONSON SIDE PLANKING 1/4" PLYWOOD
1/4" OVERLAP
3/16" PLYWOOD SHEER TRIM
OVERLAP
BOTTOM PLANKING VIEW
11'-8 1/2" O.A.L.

against the cockpit side.

Remove the plywood, cut along the scribed line and then replace it on the framework. If the cut edge along the cockpit side fits snugly, mark the plywood along the bow and sheer pieces and again remove and cut to shape. Mark the locations of each frame on the planking so you will know where to drive fastening nails. With everything in readiness, coat the contacting surfaces with glue; then quickly clamp the decking in place and fasten with ¾ x .065 bronze Stronghold nails spaced about 1 in. apart along sheer, bow and deck support. Space the nails about 2½ in. apart along frame members. Follow the same procedure when fitting and fastening the other fore deck and two aft decks in place. When glue has hardened, plane edges of decking flush with sheer pieces.



The building-form frames between the cockpit sides can now be removed, and the cockpit trim pieces (Fig. 11) installed. Fasten with glue and #6 x 1-in. *fh* screws driven through from inside the cockpit sides. Taper the fore end of these trim pieces to fit against the deck.

Hood, Fin and Cockpit Interior. Work on the hood and bow cap (Figs. 11 and 12) next. Make up the hood as detailed in Fig. 12 first because it will be useful in fairing the two bow-cap pieces to size. The hood fabric and padding need not be put on until later. Fasten the hood to the cockpit sides with two case catches as in Fig. 7C. Make the two bow-cap pieces as in Fig. 11 from pine and glue and screw the fore piece to the hull bow and the aft piece to the cockpit sides with 2-in. metal angle brackets. Then, using a plane and rasp, fair the bow-cap pieces to blend in with the contour of the hood. Cover the cap pieces with a sheet of soft aluminum hammered to shape. Note in Fig. 11 that the aluminum extends ½ in. beyond the aft bow piece so the hood will fit underneath.

While the hood is in place, mark the location of the dashboard on the cockpit sides. The dashboard, which is made as detailed in Fig. 11, is fastened to the cockpit's sides with ¾ x ¾-in. cleats and to a small ¼-in. plywood floor board fastened between #3 and #4 frames as in Fig. 11. The large removable floor board extending from #3 to #8 frame can also be installed at this time. Fasten with a few #6 x 1-in. *fh* screws to each frame so that it can be lifted if necessary.

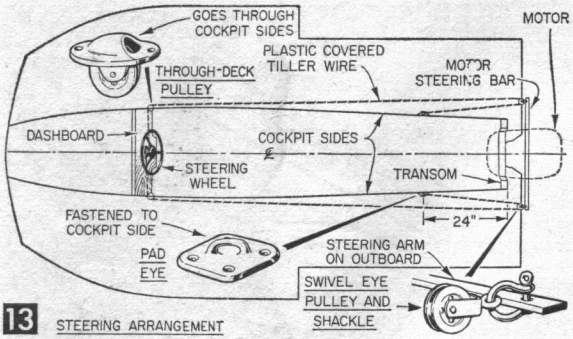
If you use the same gas tank we did, a 6-gal. surplus airplane deicer tank, make the tank supports and clamps as in Fig. 7A. Fasten the 1⅝ x 1⅝-in. tank supports alongside the inboard tunnel battens between the #2 and 3 frames. Fit and cut the 12 ga. x ¾-in. strip-steel clamps to suit the tank as in Fig. 11. Use a 1-in. strip of webbing between the tank and clamps to avoid metal-to-metal contact. If you cannot locate a surplus deicer tank, use an old Evinrude or Johnson 32, outboard motor gas tank. Fasten three 4-cell, dry batteries between #1 and 2 frames with supports and clamps as in Fig. 7A.

Now, going to the aft or transom end of the cockpit, make the aft cover pieces that fit on the cockpit sides and tunnel planking just aft of the transom (Fig. 7). Use ½-in. solid lumber or plywood for these pieces and fasten with glue and screws. Build the motor well inside the aft end of the cockpit just forward of the transom as in Figs. 7 and 11. Line it with fiber glass to make it watertight and drill two ½-in. drain holes through the transom to line up with the bottom of the motor well. Also drill ½-in. drain holes in #7 sponson frames as in Sec. A-A and B-B, as shown in Fig. 4. Use rubber stoppers in these holes when the boat is in the water. Holes through transom are left open so that water splashed into motor well will drain out.

To strengthen the #7 frame which must take most of the pounding at high speeds, install a ¾ x 2-in. strut between the cockpit sides as in Fig. 7. Install this strut in line with the deck supports at #7 frame as in Fig. 11 with ¾ x ¾-in. cleats fastened to the cockpit sides.

The aft cockpit deck and air fin (Fig. 7) are the next items to consider. Make the air fin first. Dimensioned detail and assembly drawings are given in Figs. 9 and 11. Glue the blocks of balsa to the front and top of the fin and use a rasp to form them round. Smooth with sandpaper.

Before covering the fin with muslin, make the aft cockpit deck as in Fig. 11 and place the fin on it to mark the vent hole locations. The width of the aft deck is determined by placing the ¼-in. plywood on the cockpit sides, and marking and cutting it along the cockpit trim. Cover the fin and hood with muslin, tacking it in place, and treat with three coats of nitrate or butyrate (airplane) dope. This will strengthen and shrink the



13 STEERING ARRANGEMENT

muslin tautly on the wooden frames. The muslin can then be painted.

Fasten the fin to the aft decking with #6 x 1-in. *fh* screws driven through from the underside of the decking into the ¾ x ¾-in. cleats on the bottom of the air fin. Do not use glue when attaching the aft decking to the cockpit trim pieces. Use only #6 x 1-in. *fh* screws spaced about 12 in. apart so it can be removed when the boat is stored.

Ripsaw the 3/16 x 1-in. sheer trim pieces from solid stock. Make these of mahogany if you intend to varnish rather than paint your boat. Otherwise spruce or oak can be used for the trim. Fasten the trim pieces with glue and ¾-in. nails and bevel the edges to conform to the curvature of the decks and planking. The ½-in. half-round aluminum molding that goes around the sponson sheer and bow (Fig. 7) is fastened with aluminum screws after the hull is finished.

MATERIALS LIST—RACING HYDROPLANE

No. Req.	Size and Description	Use
1	5/16 x 36" threaded rod	battery clamp
2	5/16" wing nuts	battery clamp
12	5/16" square nuts	battery clamp
14	5/16" plain washers	battery clamp
6 ft	12 ga. x ¾" strip steel	gas tank clamps
8 ft	⅛ x 1" cotton webbing	gas tank clamps
2	brass drawn-bolt case catches	hood
2	¾ x 2" metal corner brackets	bow cap
2	12-ft lengths of ½" half-round aluminum molding	sponson sheer
3 doz	#8 x 1" *fh* galv. screws	
4	¼ x 1½" stainless steel bolts	motor tie-down bracket
2	⅜" dia. pin shackles	motor tie-down bracket
10 ft	¼" shock cord	motor tie-down
1	2½ x 4 x 38" balsa	air fin
1	2½ x 4 x 21" balsa	air fin
1	safety throttle control	
1	3/16 x 8 x 43" aluminum plate (specs. 6061-T6) (available from Aluminum Distributors, Inc., Forest Park, Ill.)	air traps
1	4 to 6 gal. gas tank	
1	steering wheel with drum and bracket	
2	thru-deck or coaming pulleys	
2	swivel pulleys for steering bar	
2	coaming pad eyes for steering cable	
2	cable clamps	
32 ft	3/16" steering cable (steel with nylon or vinyl coating)	
1	bow handle	
1	air trap and fin (left sponson)	
1	air trap (right sponson)	

(above parts available from Airmarine, 6945 Stony Island Avenue, Chicago 49, Illinois.) Also available: special high-speed propellers, speed indicators and special pilot sponson fin.

Fittings and Finishing. Temporarily fasten the steering-wheel bracket to the dashboard to locate where to cut slots through the cockpit sides for the through-deck pulleys as in Fig. 7. Then remove the steering-wheel bracket and finish the decks and cockpit interior with five coats of marine spar varnish, sanding lightly between coats. If you paint your boat, apply one coat of primer followed by two coats of marine enamel.

While the paint is drying, work on the air traps (Figs. 7 and 11). Do not use ordinary soft aluminum for these. See Materials List for type and source of aluminum alloy. Lay out the air traps and motor tie-down brackets on the aluminum from dimension given in Fig. 11 and saw them out with a hacksaw or portable jigsaw. File or grind the lower edges of the fin and air traps to a blunt knife edge and have the ½ x 2-in. lugs welded along the top edges of the traps. Drill and countersink mounting holes and fasten the traps to the underside of the hull as in Figs. 7B and 11 with #8 x 1-in. *fh* screws.

Bolt motor tie-down brackets to cockpit sides as in Fig. 11. These brackets together with shackles and shock cord are used to tie the outboard motor down.

Reinstall the steering-wheel and through-deck pulleys and rig the steering gear as in Fig. 13, fastening the ends of the cable to pad eyes bolted to the cockpit sides. Install the bow handle, driving the screws down into the bow-cap pieces.

Use a racing-type throttle control that will automatically cut the motor speed if the driver is thrown from the boat, and fasten it to the left cockpit side as in Fig. 7. Run battery wires and gasoline lines from tank to motor in accordance with motor manufacturer's instructions. Cut notches in the upper motor well support as in Fig. 7 for these lines.

Since Airmarine was designed and balanced for a driver weighing 175 lbs. and a Mercury Mark 75 H Class F, 6-cylinder racing outboard motor, a change in driver weight or motor would upset the balance. To compensate for this, lead-bar weights can be screw-fastened inside the hull at the bow. The center of gravity at intermediate and high speeds of 70 *mph* and over, should be somewhere between #6 and 7 frames so that the boat will ride level with only the aft ends of the sponsons touching water. Experiment with motor tilt-pin setting and transom height settings by using shims under motor transom clamp.


AIRMARINE