Speedy Two-Cockpit Outboard Runabout



With one person aboard Ace will go 32 mph with 16 hp stock Evinrude outboard motor.

By WILLIAM D. JACKSON
Naval Architect

BRAND NEW hi-lift bottom design and hi-strength longitudinal beam construction make *Ace* years ahead in outboard runabout speed and performance. Propelled with a 16 *hp* stock *Evinrude*, Ace has easily outrun conventional boats powered with 25 *hp* outboards. We found the one we built could do 50 *mph*—when teamed up with a 40 *hp* Mercury that had a quickie lower unit.

The wetted or planing area of the hull with one person aboard is only about one square foot! With five persons aboard and powered with a 25 *hp* outboard, *Ace* planes on the after quarter portion of hull bottom. Chines are beveled for safe turns at high speeds.

Ace is an ideal boat for backyard builders because no building form is required to make it. This feature also makes it an excellent boat for pre-cut boat kit sales if you are interested in going into the boat building business on a part or full time scale. Its subassembly construction also lends itself to mass production of completed boats by the assembly line method.

Subassemblies. Starting with the transom (Fig. 2), make a full-size layout of transom frame on building paper. Then transfer the frame shapes to ¾-in. stock with a toothed dressmaker's wheel, or make a series of punch marks along frame outlines with an awl. Saw out the frame parts, cutting the long edge of the transom-knee notch at a 12° angle. Transfer patterns and saw out the

STATEMENT OF USES

USES: Speedy two-cockpit outboard runabout for towing water skiers and general family boating pleasure.

LENGTH: 12 ft. 4 in. overall.

BEAM: 5 ft. 9 in. overall.

DEPTH: 27 in. forward, 15 in. aft.

WEIGHT: 200 lb with all equipment aboard except motor.

SPEED: 32 mph with 16 hp stock Evinrude outboard motor (one person), 36 mph with a 25 hp outboard motor and 50 mph with a 40 hp Mercury having a quickie lower unit.

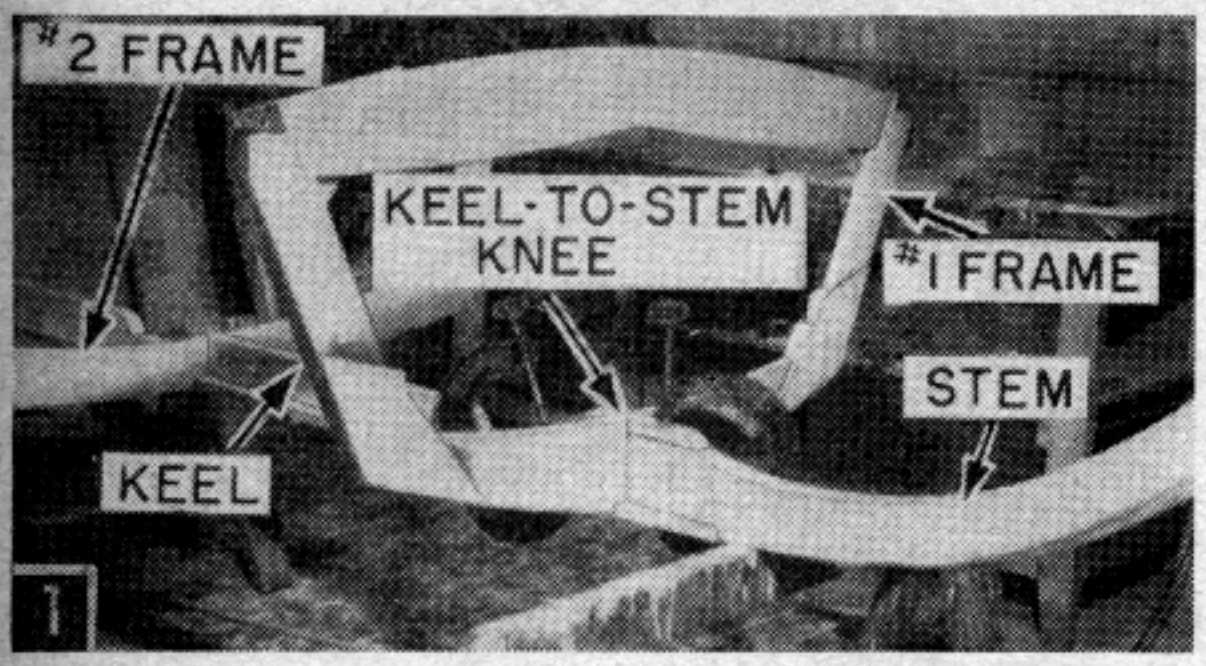
CAPACITY: 5 persons.

CONSTRUCTION: New advanced hull design with plywood planking over high strength, two-frame, longitudinal-beam designed frame. Seats become integral part of hull providing additional strength. An excellent mass production design for those who wish to enter the boat-building business as a part- or full-time venture.

Craft Print Project No. 233

¾-in. plywood transom backing and fasten the frame pieces to the plywood with glue (*Weldwood* or *Elmers* Waterproof glue) and #8 x 1½ *fh* screws. Do not fasten the wedge-shaped pieces at the center until the keel and knee is assembled later. Cut the transom outer frame and set aside for assembly later.

Make the #1 and 2 frames and beams (Fig. 2) next. Draw full-size patterns on paper, transfer to ¾-in. stock and saw out as you did for the transom. Use paper pattern to align frame pieces when assembling with the ¼-in. plywood gus-



Keel-to-stem knee is first temporarily clamped in position so that adjustments in alignment can be made if necessary.

setts. Use glue and #6 x 1-in. *fh* screws or, to save time, 1-in. *Anchorfast* annular grooved nails. Place filler blocks between all gussets as in Fig. 2.

Lay out the stem (Fig. 3) full size on paper and transfer to 1⅝ x 7⅝-in. stock in two pieces for the core of the stem. Join the two pieces with glue and a ¼-in. plywood spline. Then, with the same paper stem pattern, transfer two complete stem outlines on ¼-in. plywood and saw these two, one-piece stem shapes to size. Sandwich the core between the two pieces of plywood using glue and about six *Jorgensen* boat-type C clamps for pressure. Drive eleven #6 x 1-in. *fh* screws through each plywood side, spacing the screws as in Fig. 3 so they will not interfere with beveling of stem later.

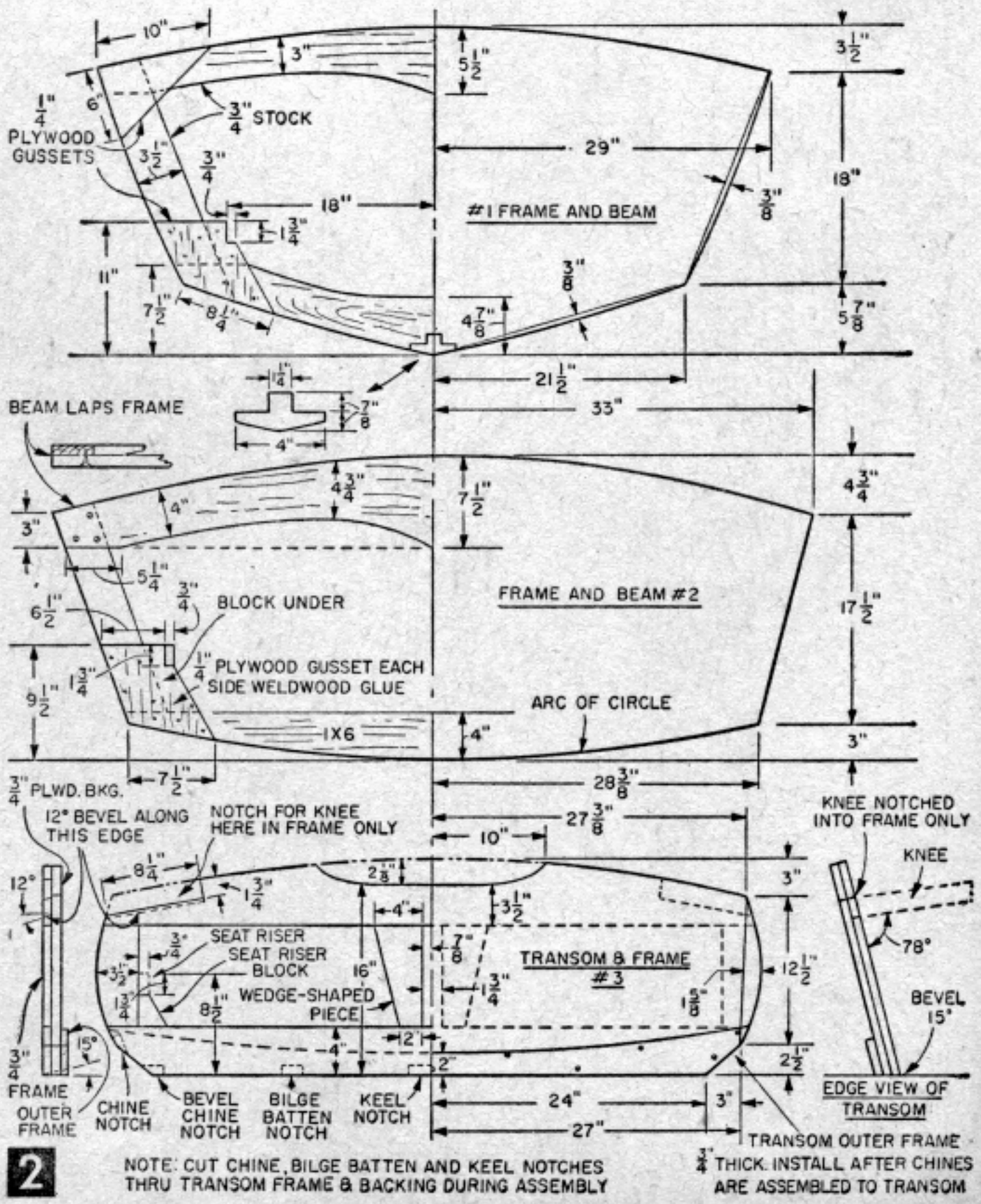
Make a full-size paper pattern of the coaming plate (Fig. 3), then mark and saw out two coaming plate shapes from ¾-in. stock and two from ¼-in. plywood. Glue and clamp these pieces together to make up one right- and one left-hand coaming plate with the plywood on top. Now, make the forward deck beam (Fig. 3) and after the glue on the coaming plates is dry, assemble the plates at the bow with a ¼-in. plywood gusset. Be sure to have the plywood grain running as in Fig. 3 so it can be bent slightly when assembling the coaming plates to the deck beams. Use glue and 1-in. Anchorfast nails for fastening the plywood gusset. Notch the forward deck beam for the coaming plates (Fig. 3) and assemble with glue and #8 x 1½-in. *fh* screws. Notch the coaming plate assembly at the bow end and the top of the stem to fit together, but do not permanently assemble at this time.

Make the keel assembly (Fig. 4) next. Cut the keelson exactly 8 ft. long and taper the fore end. Saw the upright pieces from 2 by 4 in. stock and fasten to the keelson with glue and #8 x 1¾-in. *fh* screws. The second upright piece is glued only and not screw-fastened to the first upright.

Make up one keel knee and two bilge knees (Fig. 4). Cut the bilge batten pieces to size (Fig. 4) but do not fasten together until assembling to the framework. Make up the transom quarter knees (Fig. 4) from 1⅝-in. thick solid stock and set them aside until the various subassemblies are to be put together. Rip the sheer clamps, chines, carlins and bevel chine battens (Fig. 6), from solid stock on a circular saw.

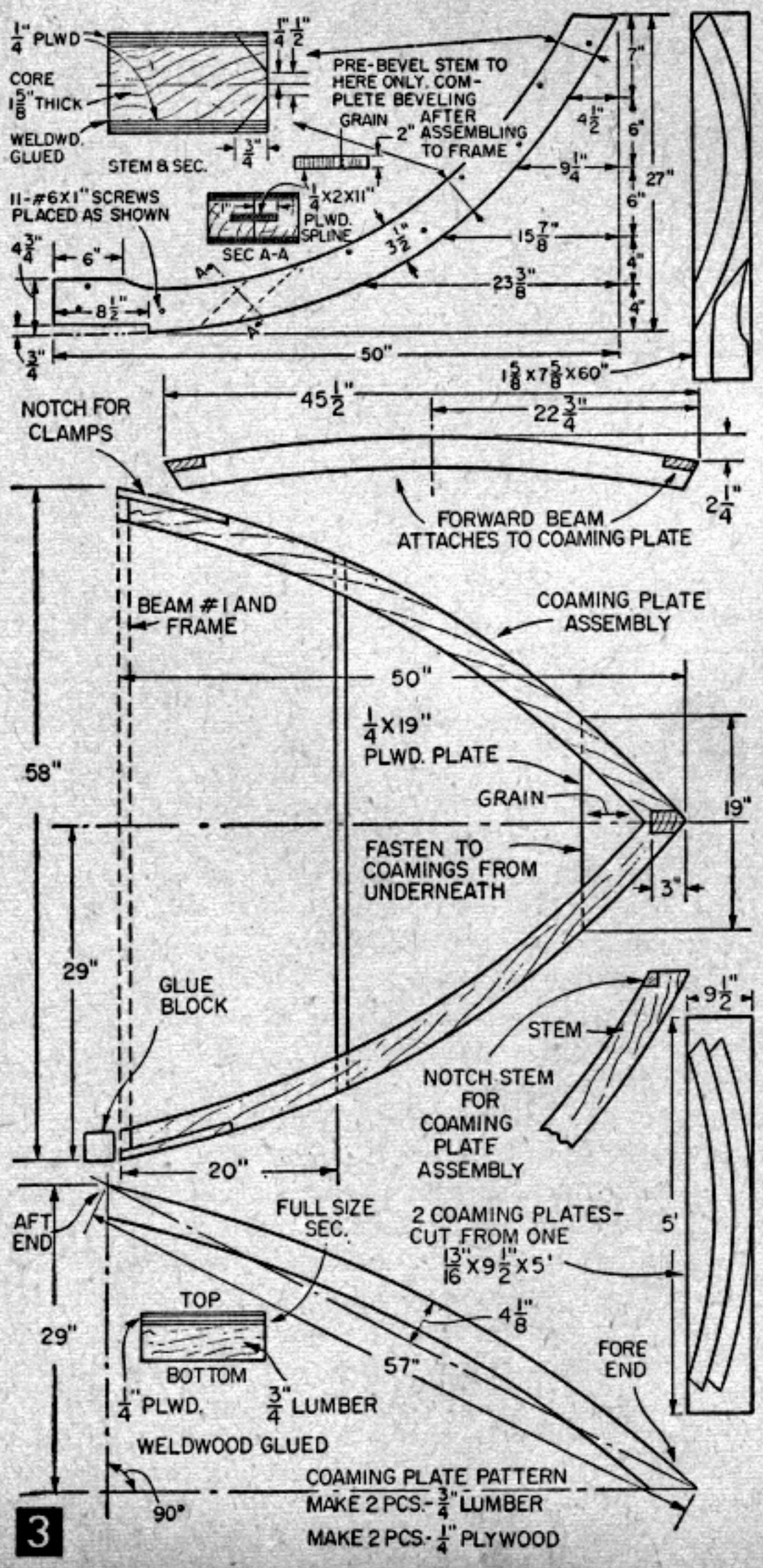
The seat may be glued up from ¾-in. thick solid stock as in Fig. 6 or a single piece of ¾-in. plywood may be used. Also layout and saw the seat benches (Fig. 4), and assemble with 1¼-in. wide filler blocks.

General Assembly. With all of the above subassemblies complete, you are now ready to start assembling the hull frame work. Notch the #1 frame for the coaming plates and temporarily assemble the stem, keel-to-stem knee and #1 frame with clamps as in Fig. 1. The ¼-in. plywood tie bar that holds the forward ends of the coaming plates together will have to be bent slightly to fit coaming plates to notches on beams.



Slide the keel in position on the stem and fasten with glue and two 8 x 1¾-in. *fh* screws. Notch the transom for the keel and permanently fasten the transom to the keel and keel knee with glue and #8 x 1½ *fh* screws. Be sure the centerline of the transom is square and in line with the centerline of the keel before fastening. Install the two transom quarter knees to the transom with three #8 x 1¾-in. *fh* screws driven from the outside of the transom backing. Locate and fasten the #2 frame to the keel with glue and two #8 x 1¾-in *fh* screws. Check center marks on #1 and 2 frame beams with a chalk line stretched from the center of the stem to the top center of the transom.

The sheer clamps are installed next. Notch the #2 frame, bend and clamp both sheer clamps in position before fastening (Fig. 5). Alter notches on coaming plates and transom knees if needed so that sheer clamp can be faired to blend with



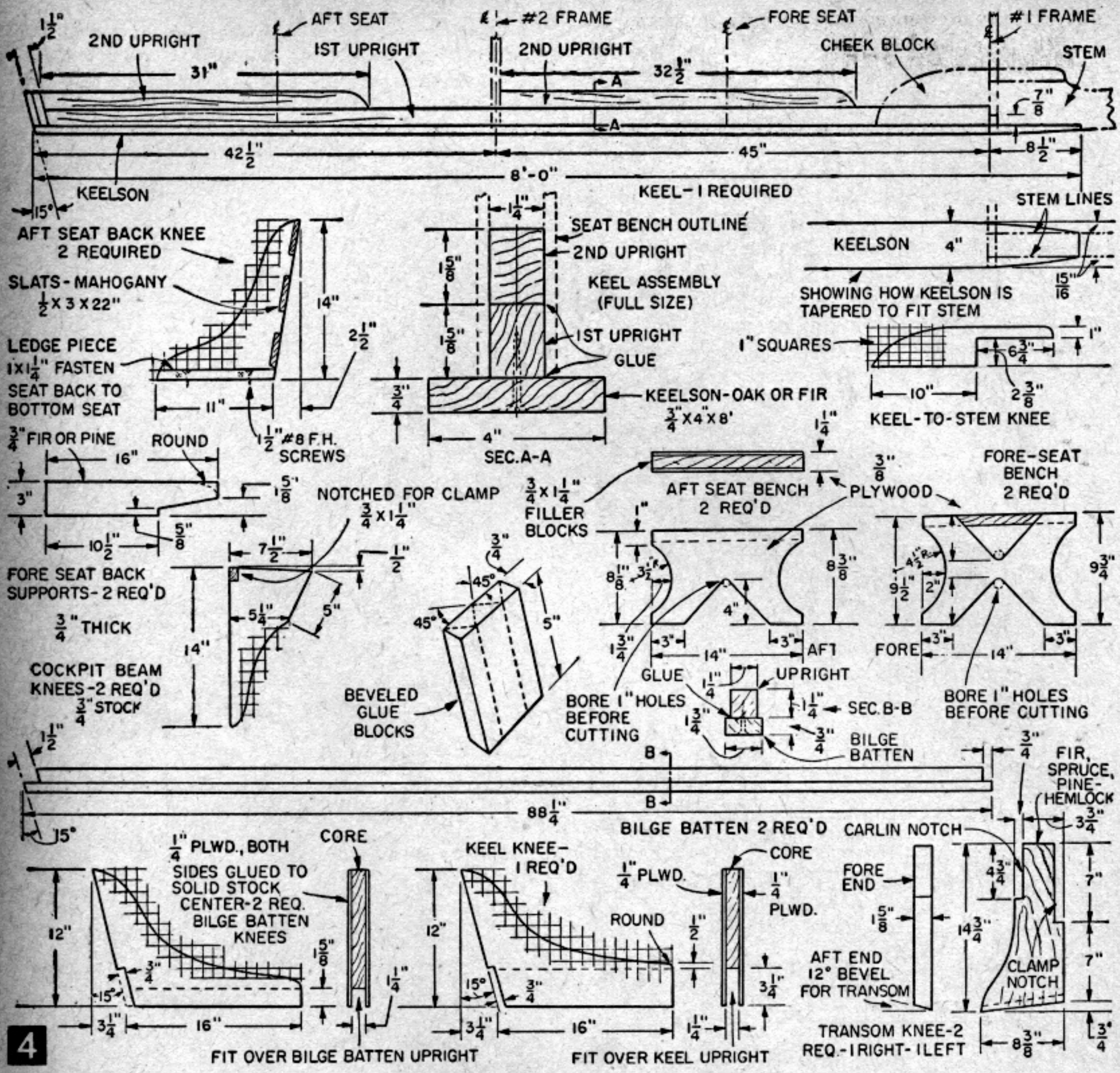
MATERIALS LIST—ACE

No.	Size and Description	Use
	PLYWOOD (Exterior)	
1	⅜" x 4 x 8' fir	bottom
2	¼ x 4 x 8' fir	sides, seat benches gussets, bottom
2	¼ x 4 x 8' mahogany (one side sound)	decks
1	¾ x 18 x 56" fir	transom
	LUMBER	
2	¾ x 1¼" x 14' oak or fir	sheer clamps
2	¾ x 1¾" x 12' oak or fir	chines
1	¾ x 4" x 8' oak or fir	keelson
2	1⅝ x 3⅝" x 10' (stock 2 x 4") fir	keel and bilge batten upright
2	¾ x 1¾" x 8' oak or fir	seat risers
2	¾ x 1¾" x 7' oak or fir	bevel chines
2	¾ x 1¾" x 8' oak or fir	bilge battens
1	¾ x 5½" x 16' oak or fir	frame and transom bottoms
1	¾ x 7½" x 4' oak or fir	
1	¾ x 3½" x 14' fir	frame sides and deck batten
1	¾ x 9½" x 10' fir	frame beams
1	¾ x 9½" x 5' fir	coaming plates
1	¾ x 11½" x 10' pine	seats
2	¾ x 3½" x 10' pine	seats
1	1⅝ x 7½" x 12 fir	stem core and transom knee
2	¾ x 1¼" x 8' oak or fir	carlin
1	¾ x 7½ x 8'	cockpit beam and knees
2	9/16 x 1¼" x 14' mahogany or fir stained	sheer molding
2	9/16 x 1¼" x 10' oak	outer keels
1	1" x 6 x 5' mahogany or oak	spray rails
1	⅜ x 2" x 10' mahogany	cockpit coaming
	FASTENINGS & FITTINGS	
1 gross	#6 x 1" fh screws	
3 gross	#8 x 1" fh screws	
4 doz.	#8 x 1¼" fh screws	
3 doz.	#8 x 1½" fh screws	
4 doz.	#8 x 1¾" fh screws	
½ lb.	1¼" galv. shingle nails	
	Anchorfast boat nails available from Steel Sales Corp., 3348 So. Pulaski Road, Chicago 23, Ill.	
1	15" steering wheel with dashboard bracket	
25 ft.	¼" tiller rope	
4	tiller-rope pulleys	
2	lifting handles (transom)	
1	bow lifting handle	
1	combination bow light (optional)	
	Fiberglass tape and resin in kit form for this boat available from the Castolite Co., Woodstock, Illinois.	

curve of coaming plates. Again check frame centers with chalk line and if everything is in line, fasten sheer clamps with glue and #8 x 1¾-in. *fh* screws. Use one screw at #1 and 2 frame and three screws at fore and aft ends of sheer clamp. Countersink screws well to allow some stock for fairing later.

Then remove the keel-to-stem knee (Fig. 7), glue and reclamp until dry. Also glue and nail short beveled glue blocks (Fig. 4 and 5) into corners where stem and keel join frames. Fasten the seat risers to the pre-cut notches in the frames with one #8 x 1¾-in. *fh* screw. Provide small blocks to support the seat risers at the transom (Fig. 2).

From here on the hull is built in the upside down position. Place the frame on two saw horses so that it will be supported by the seat risers as in Fig. 7. Mark and notch the frames and transom for the chines. Temporarily clamp the chines in place, and bend and mark the fore end of the chines for the correct bevel to fit the stem. Carefully cut the fore end of the chines to the correct angle and fasten to the stem with two #8 x 1¾-in. *fh* screws. Use one screw at



each frame and two at the transom.

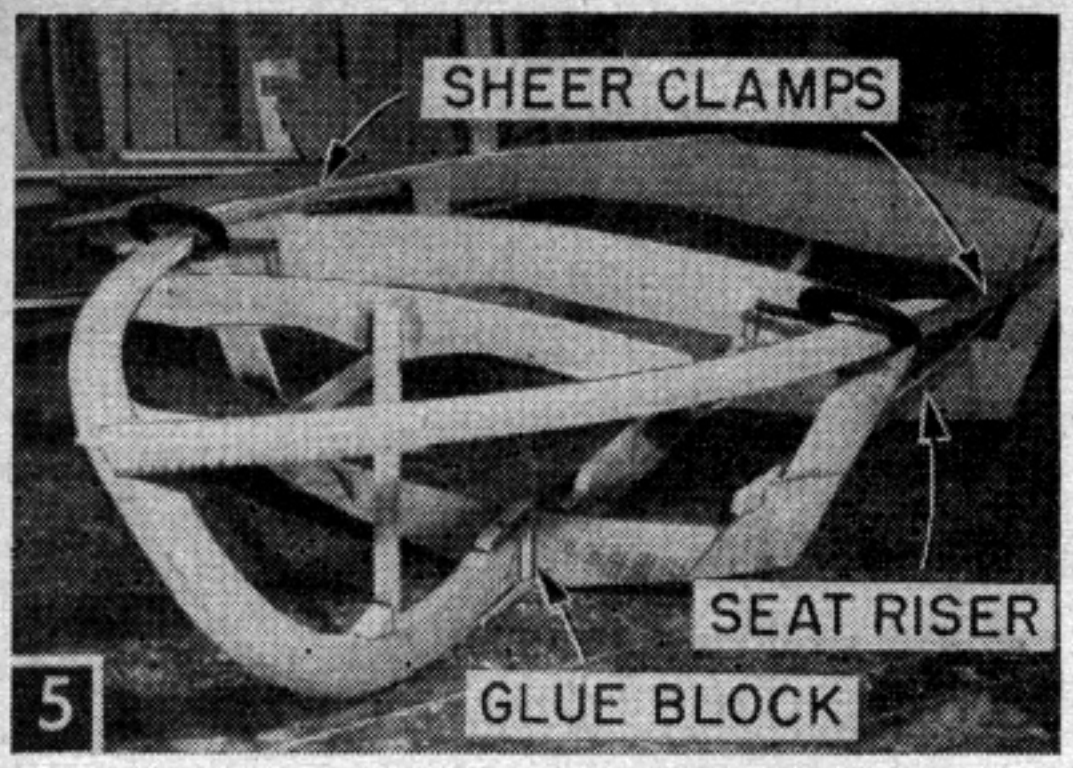
Install the bilge battens next. Because the bilge battens have a slight twist when assembled to the frame, it is best to fasten the 1¼ x 1¼-in. bilge upright to the batten after assembling to the frame. First notch the #1 and 2 frames and transom for the ¾ x 1¾-in. batten. Then further notch the #2 frame *only* for the 1¼ x 1¼-in. bilge batten upright.

Coat these notches with glue and place the upright in position, butting it against the transom and #1 frame. Coat the entire contacting surface of the bilge upright with glue and set the bilge batten into the notches and on top of bilge upright. Fasten the batten to the transom and frames with two #8 x 1¾-in. *fh* screws at each joint, then clamp the upright to the batten with several C-clamps. Fasten the batten and upright together with #8 x 1½-in. *fh* screws 6 in. apart.

Finish the bilge batten assembly by installing transom knees. Use glue and #6 x 1-in. *fh* screws through the plywood of the knees and #8 x 1¾-in. *fh* screws through the ¾-in. plywood transom backing. Glue and nail short lengths of beveled glue blocks on each side of the knees as in Fig. 8. While you are working at this end of the frame, also glue and screwfasten the previously cut wedge-shaped pieces to the transom on each side of the transom knee.

The bevel chine battens are next placed in position. Lay out the batten locations (24 in. on centers from the keel) on the #2 frame and transom, and cut the batten notches. Place the battens in the notches overlapping the chine and mark the long tapering cut where the batten will join the chine. Remove and saw cut on the line and at a slight angle determined by the angle at which the chine is in relation to the batten. Then glue and screwfasten to the transom and frame with two #8 x 1¾-in. *fh* screws at each joint, and two #8 x 1½-in. *fh* screws where the batten meets chine. Fig. 9 shows complete frame.

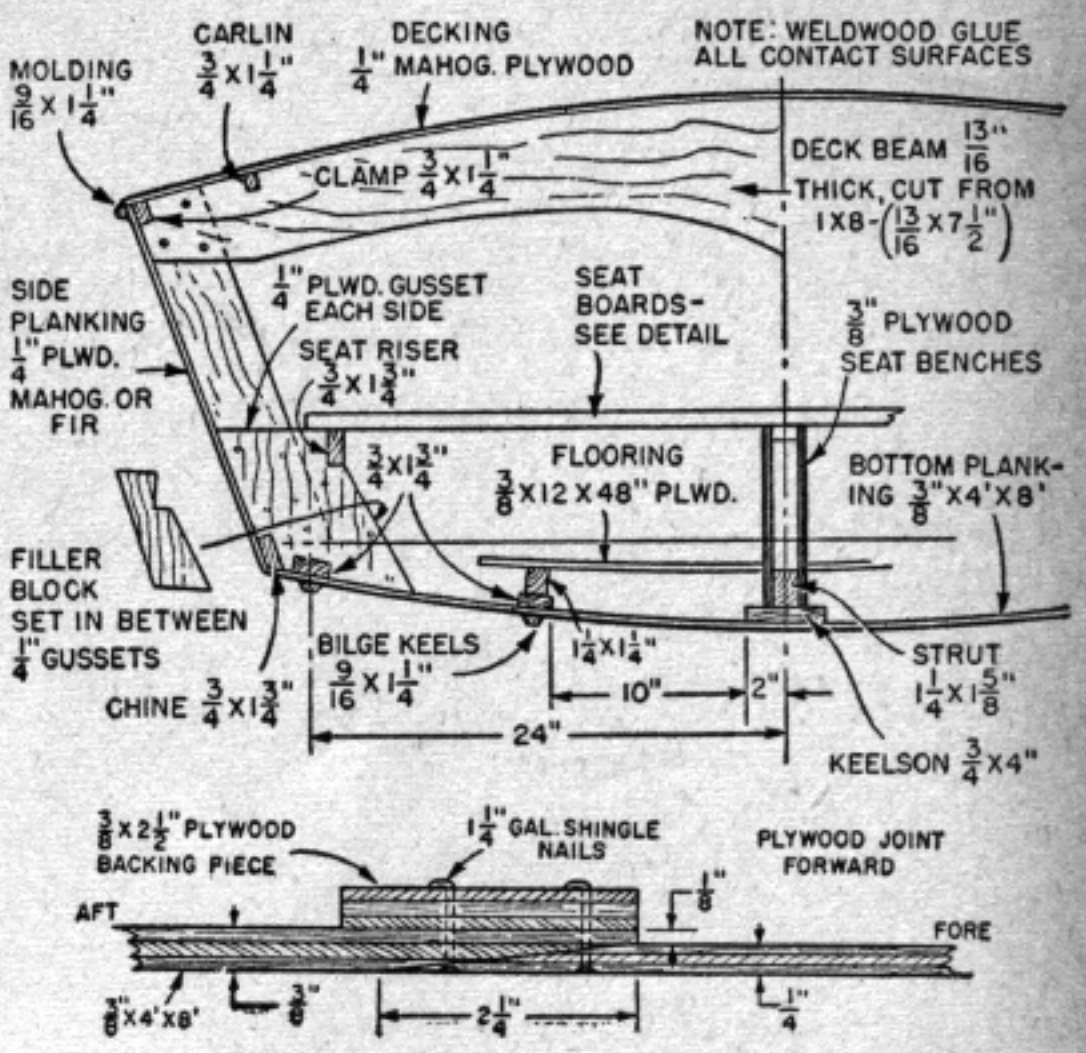
Your next step is to trim and fair the frame to prepare it for planking. A jack plane and wood rasp can be used, however, a *Porter-Cable* portable power plane will save considerable time

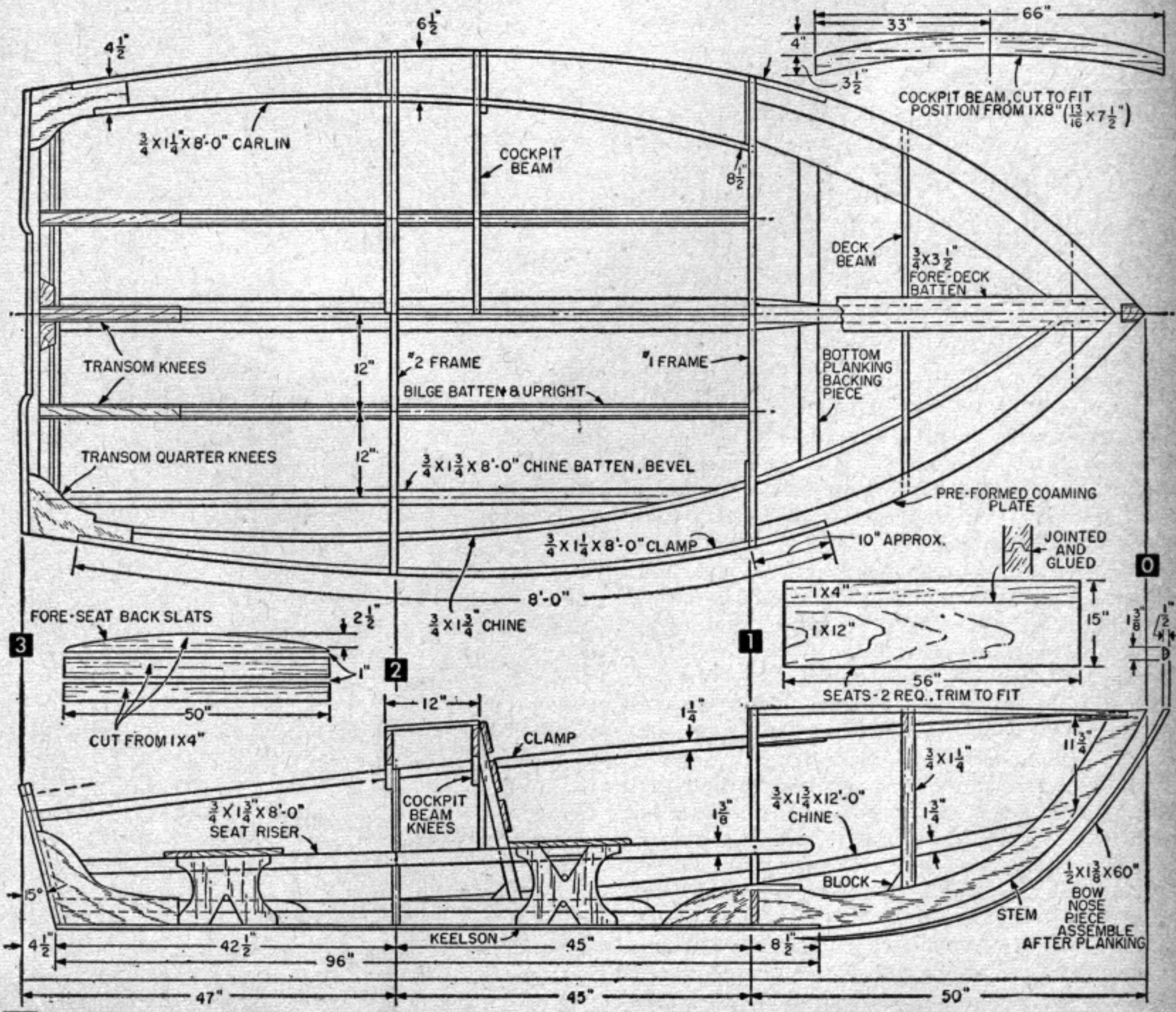


When sheer clamps are in place keel-to-stem knee is permanently fastened in position. Beveled glue blocks strengthen joint.

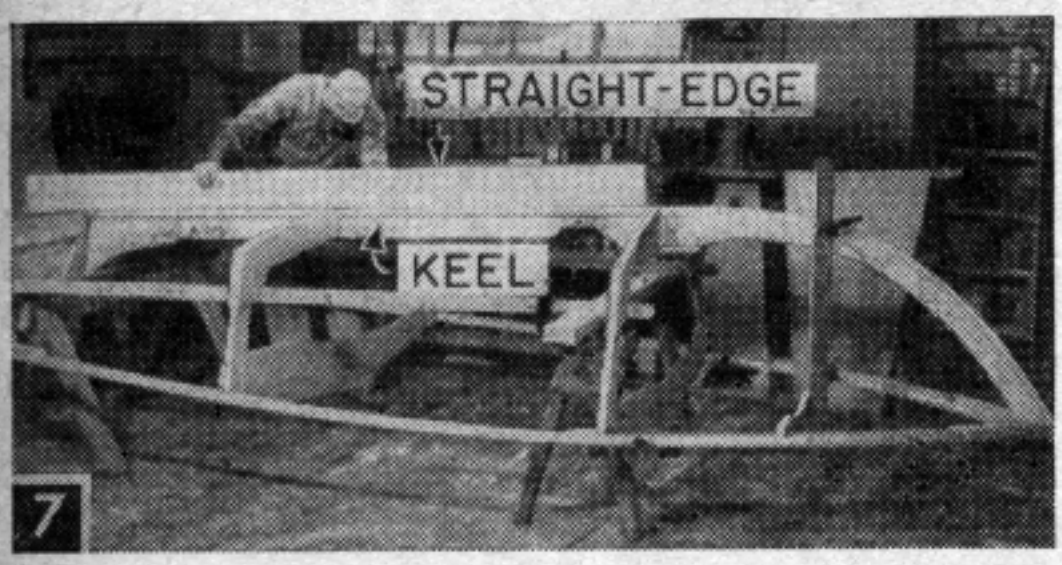
and effort. Plane the bevel chine and chine at an angle to provide a fastening surface for the bevel-chine planking. When fairing, be sure to check the keel for straightness from #1 frame to the transom with a straight edge as in Fig. 7. Even a slight deviation of 1/16 in. will cause galloping, rendering the hull worthless. Plane any humps and hollows out of the keel and battens, making them flush with transom bottom.

If you are going to sell this boat make that aft section flat! Your reputation will depend on it.

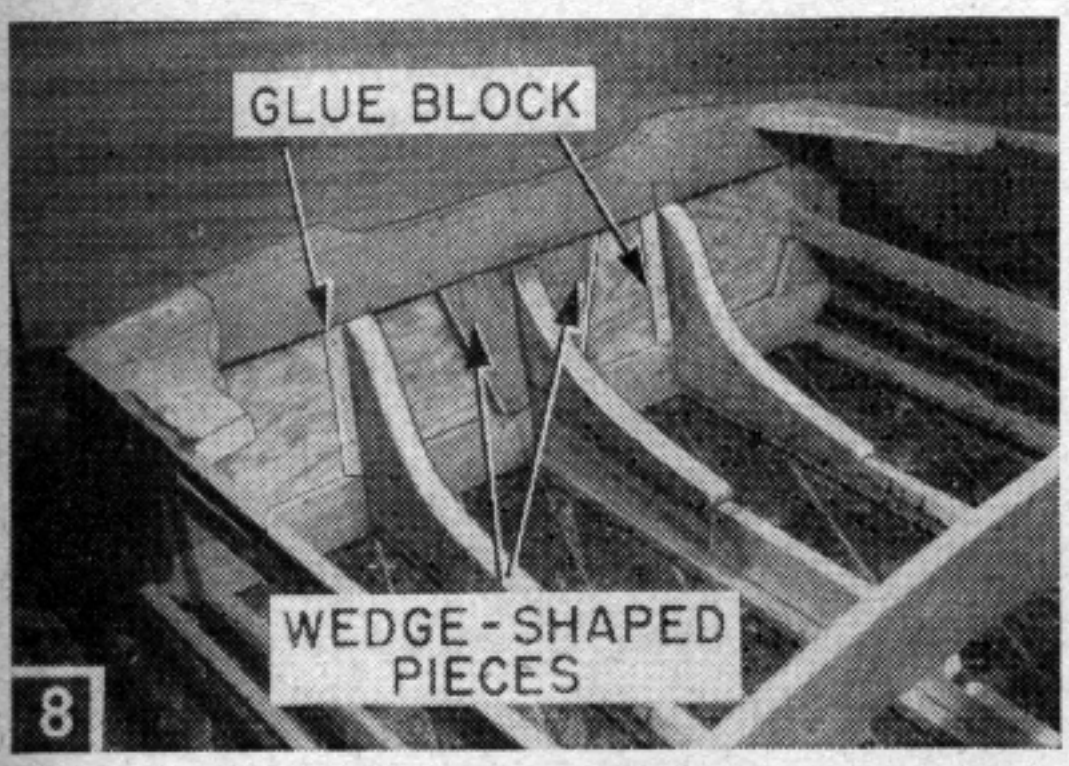




6



Testing keel for flatness with a straight-edge.



Glue and nail bevel glue blocks to each side of bilge-batten knees.

Attach the transom outer frame to cover the keel, batten and chine notches, after first coating the contacting surfaces with Kuhl's *Bedlast* (no glue). Then fasten with eleven #8 x 1¾ *fh* screws.

Planking the Framework. Starting with a 4 x 8 ft. sheet of ⅜-in. plywood, plane a long ¼ x 2¼-in. bevel along one of the 4 ft. edges. Mark and cut a 30 in slit in the center of the 4 ft width, starting at the beveled edge as in Fig. 12. Place the plywood on the frame bottom, centering it with the beveled edge forward. The bevel is used for joining to the two forward pieces of plywood planking at the bow. Clamp the plywood to the frame along the bilge battens. The cut edges along the slit should close completely.

If the plywood does not lie flat against the keel and #1 frame, remove and enlarge the slit width slightly. When the planking is clamped tightly at all points, climb under the frame and pencil mark the plywood along both sides of the keel, frames and battens. Then remove the plywood and drill spotting holes in the middle of the pencil lines, at each end of the various marked parts. Draw pencil lines connecting the drilled holes on the outside of the plywood and you will have guide lines to drive screws through the planking and into the center of the frame members.

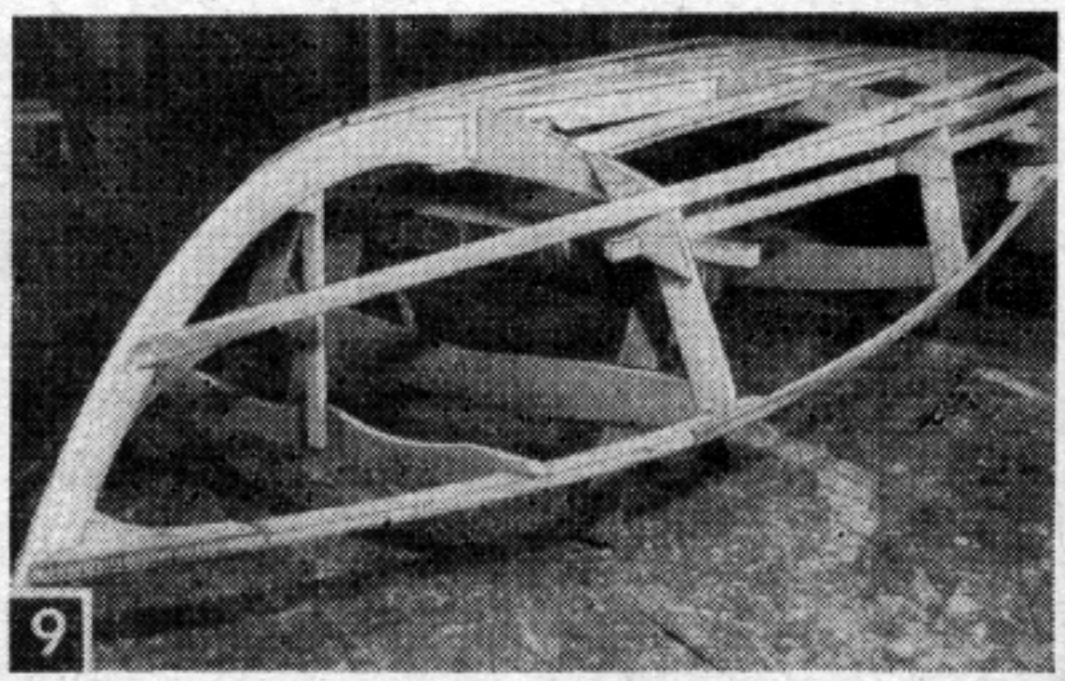
Coat all contacting surfaces of the frame with glue except the transom edge, which is coated with Kuhl's Bedlast. Replace the plywood, again clamping it down. Fasten permanently, through drilled and countersunk holes, to the framework with #8 x 1-in. *fh* screws spaced 2½ in. apart. Place a double row of screws along the transom and keel. To reinforce the joint where the bottom planking must be joined at the forward end, glue and clamp two ⅜ x 2½-in. plywood pieces to the under or hull interior side (Fig. 6).

The two triangularly shaped pieces of bottom planking at the bow are of ¼-in. plywood. First place a piece of heavy wrapping paper over one of the two areas to be planked and mark it along the stem center, chine and far edge of bevel on ⅜-in. planking. Make the mark along the chine slightly oversize to allow for trimming. Cut the paper to size and transfer outline to ¼-in. plywood twice to make the two pieces needed. Saw plywood pieces to size and plane or sand aft edge to a 2¼-in. knife edge bevel.

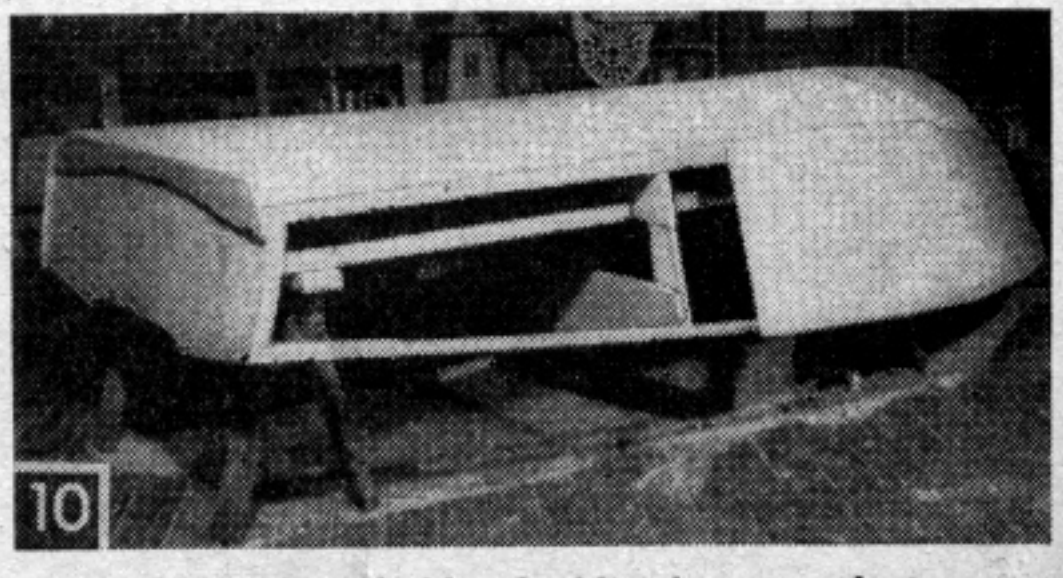
To make the plywood flexible enough to bend to the shape of the stem, cover the plywood with heavy rags saturated with hot water for about 15 minutes. Coat contact surfaces of ⅜ planking, stem and chine. Then clamp ¼-in. plywood planking in place one plank at a time. Fasten with #8 x 1-in. *fh* screws along stem and chine. Use 1¼-in. galv. wire nails clinched along beveled seam as in Fig. 6.

If you are going to build several of these boats for sale use 5/16-in. thick plywood in sheets large enough to cover the entire bottom. Carefully cut and fit a master pattern first, then use pattern to layout all other bottoms.

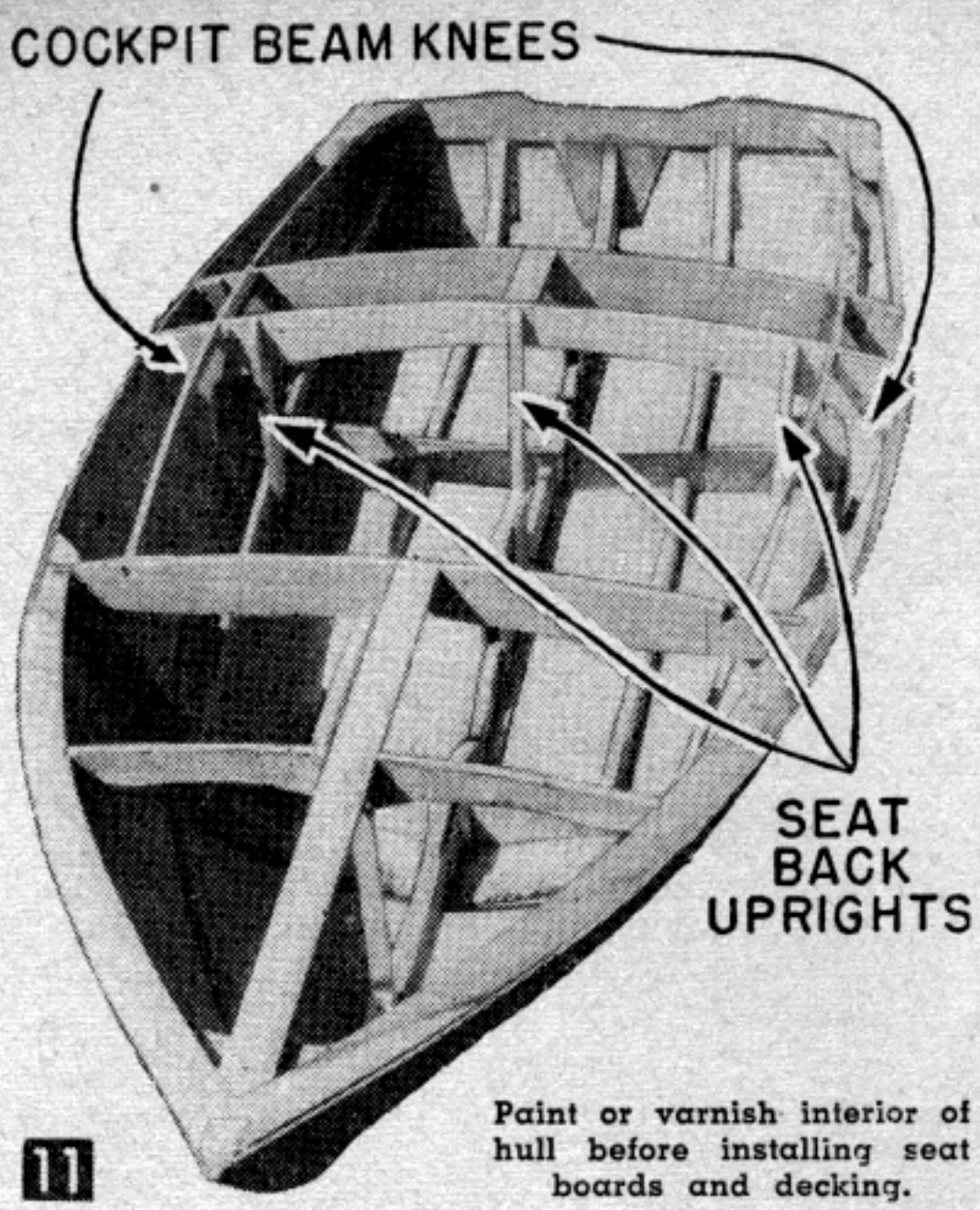
For the bevel chine planking, first plane the long edge of a ⅜-in. thick strip of plywood 7½ ft. long, so that it will fit tightly against the edge of the bottom planking. Hold this strip in place on the frame and mark along the chine. Saw to



Completed framework. Subassemblies are put together without the aid of a building form.



Aft section of side planking is put on last.



11 Paint or varnish interior of hull before installing seat boards and decking.

shape and fasten to frame with glue and #8 x 1-in. *fh* screws spaced 2½ in. apart. When the glue dries, fair the edges of the planking flush with chines.

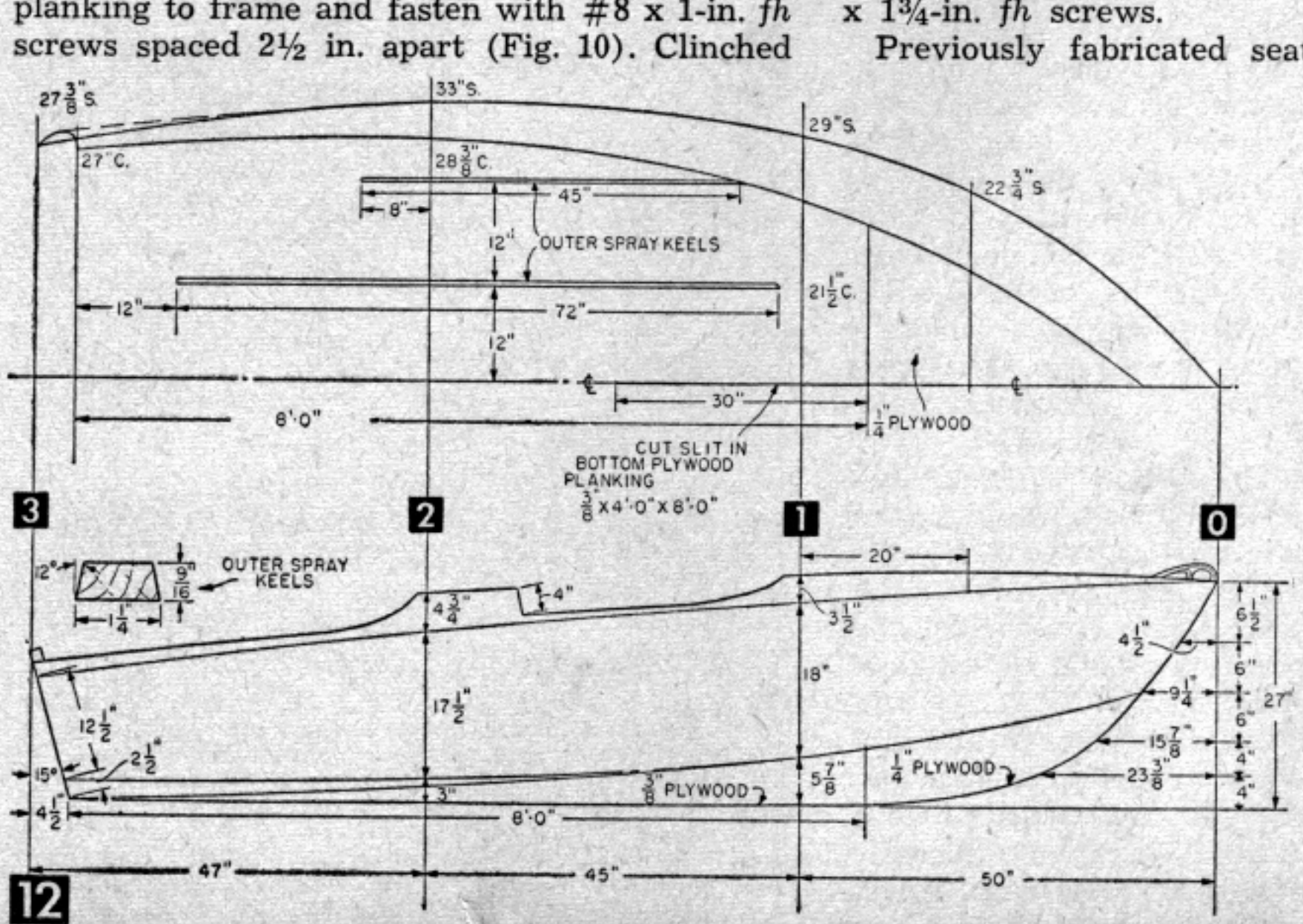
For the side planking, cut two 4 x 8 ft. sheets of ¼-in. plywood lengthwise. Starting at a point about 8 in. forward of #2 frame, clamp one of the 2 x 8 ft. pieces to the chine and sheer clamp. Then bend the plywood around to the bow and have someone mark it along the chine and sheer clamp. Remove and cut to shape. Coat contacting surfaces along sheer clamp, frame and stem with glue and along chine with Bedlast. Reclamp planking to frame and fasten with #8 x 1-in. *fh* screws spaced 2½ in. apart (Fig. 10). Clinched 1¼-in. galv. nails can be used along the sheer clamp instead of screws if you prefer.

Install fore planking on the other side next, then aft section planking using the same procedure and method of fastening. The joints where the two side pieces join are not beveled as were the bottom pieces. Merely butt the edges together and reinforce with a glued-and-screwed ¾ x 2-in. plywood backing piece. Finish by trimming flush at chines and stem. Coat the edge of the stem with Bedlast and fasten the bow nose piece (Fig. 6) with #8 x 1½-in. *fh* screws. Plane the sides of the nose piece to blend with the planking. Sand all corners and joints. Now turn the hull right side up and trim side planking flush along the sheer clamp.

For a permanently watertight hull, cover the chine, transom and forward keel and stem seams with 3-in. fiberglass tape and *Castoglas* resin. Complete instructions for application of fiberglass tape are included with material when you purchase it (see materials list). After tape is applied and resin has hardened, taper the edges of the tape with a disc sander. (Caution. If fiberglass is to be used, do not use Bedlast on chine seams because it will not adhere to the wood. Use glue instead.)

Interior Fitting. The forward decking must be supported at the center of the hull with a deck batten (Fig. 6). Notch this batten flush into the #1 frame beam and deck beam. Then fit it flush with the coaming plates at the stem. Fasten with two #8 x 1¾ *fh* screws at each joint. Make up the cockpit beam (Fig. 6) and beam knees (Fig. 4) and install in the hull 12 in. forward of the beam on #2 frame. Fasten beam knees to side planking with three #8 x 1½-in. *fh* screws driven through from outside of planking. Fasten carlins flush into measured notches (Fig. 6) cut in beams and transom quarter knee, using #8 x 1¾-in. *fh* screws.

Previously fabricated seat benches are now fastened in position (Fig. 11) on the keel uprights with glue and 1¼-in. galv. nails. Make three forward seat-back uprights and fasten to the cockpit beam and seat risers at the sides and keel upright as in Figs. 6 and 11. Then fasten seat back slats to uprights. Cut the seat boards to conform to the side planking. Merely fit in place at this time, then remove and set aside until inside



of hull is varnished or painted.

The design and construction of these seats makes them serve as two additional hull frames, which makes this craft lighter in weight and considerably stronger than conventional craft.

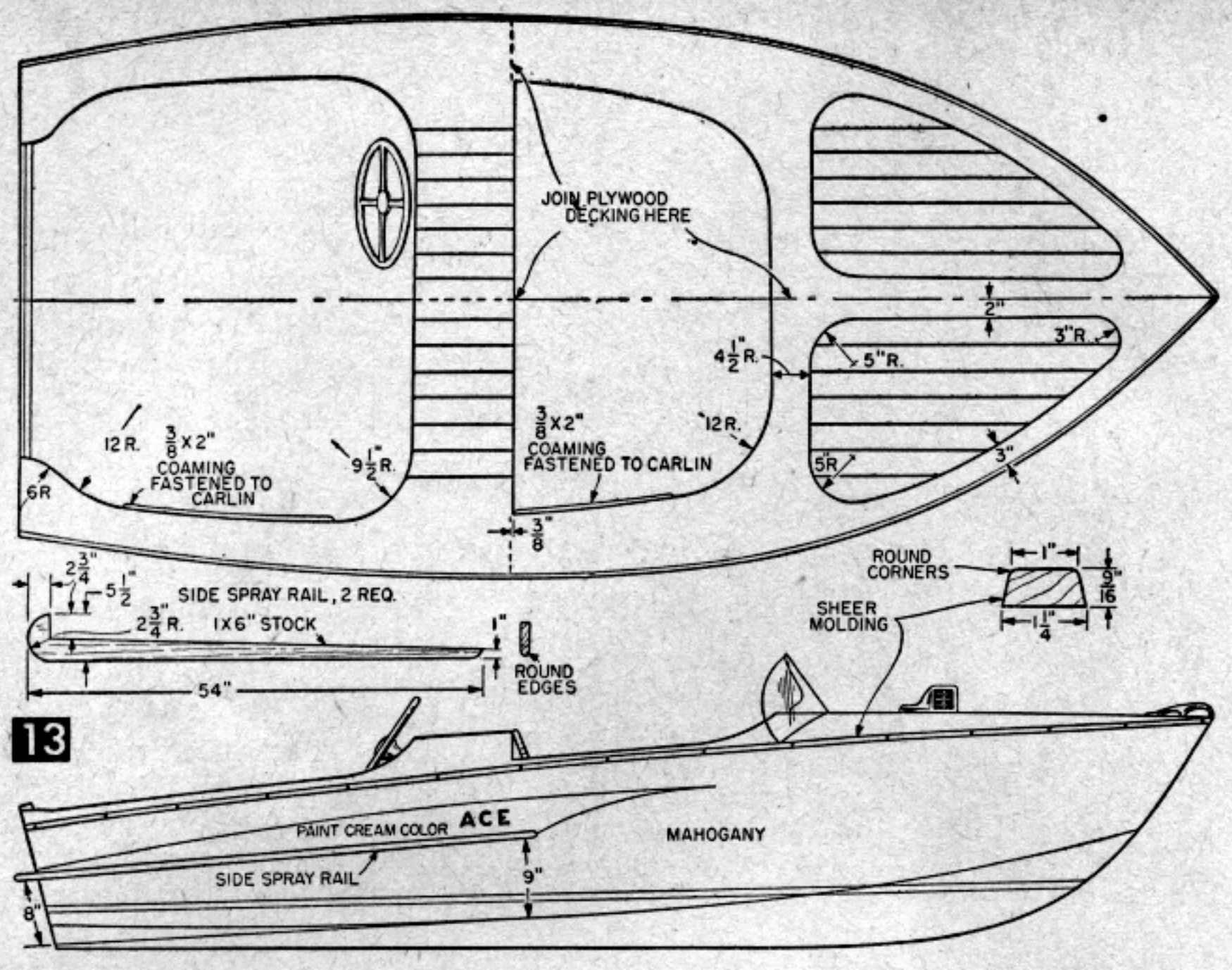
Exterior Fitting and Deck Planking. Although side spray rails are not needed on *Ace* because there just isn't any spray even at high speeds, they do snap up the overall appearance of the boat.

Make two rails as detailed in Fig. 13 and fasten through the plywood side planking with #8 x 1-in. *rh* screws spaced 6 in. apart. Use steel washers under screws heads so that screws will not pull through plywood sides. The outer spray keels (Fig. 12) do help divert any spray and aid in lifting the hull out of the water when planing. Fasten keels on the bottom directly over the bilges and bevel chines with glue and #8 x 1½-in. *fh* screws spaced about 6 in. apart.

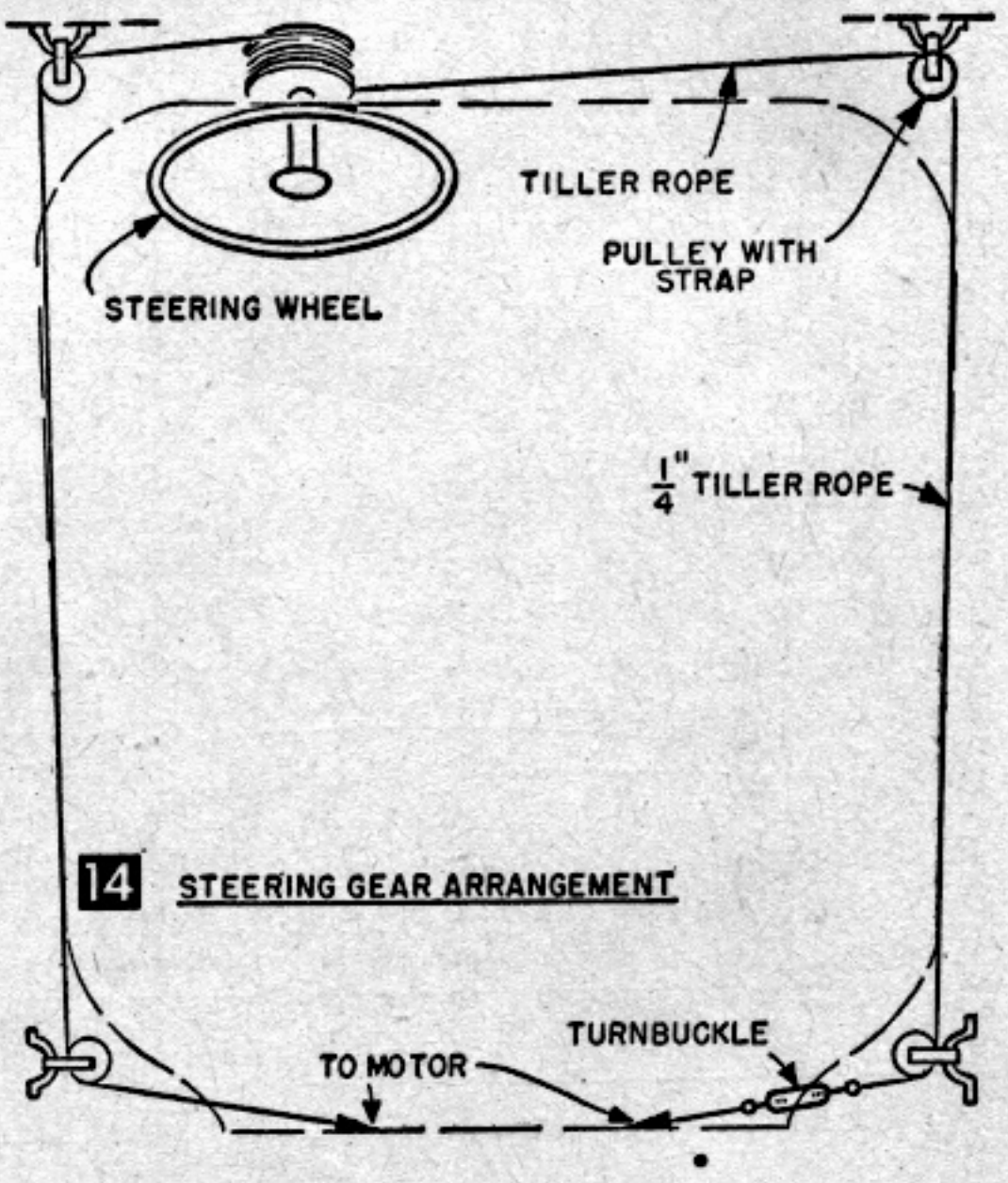
The best looking deck material is, of course, African-mahogany faced ¼-in. exterior plywood. Philippine mahogany is a second choice and Douglas fir an inexpensive third choice. Regardless of the type of plywood selected, plank the decks with four pieces of plywood joined as in Fig. 13. Place the plywood on the hull, mark as you did when planking the bottom and sides and saw cut to shape. Fasten with glue and #6 x 1-in. *fh* screws. Attach four ⅜ x 2-in. cockpit coaming pieces along sides of cockpit where decking is flush with carlin (Fig. 13). Cut sheer molding from solid stock as in (Fig. 13). Fasten with glue and #8 x 1¼-in. *fh* screws spaced 8 in. apart.

If mahogany plywood is used for the deck, apply mahogany wood filler as you would a paint. Then, after allowing to set for 10 to 15 minutes, remove excess filler by rubbing across the grain with clean burlap. Allow 12 hours for filler to dry and apply two coats of Boatlife *Plasticlear*. Then paint the bottom and sides of the hull with one coat of enamel undercoater or primer followed by a second coat of equal parts of primer and enamel mixed together and a third or finish coat of high-gloss enamel (Fig. 13).

Bolt a 15-in. steering wheel with dash mounting bracket to the #2 frame beam and hook up



13



14 STEERING GEAR ARRANGEMENT

control wires to your outboard motor as in (Fig. 14). Fasten a bow handle forward and two lifting handles on the transom. You can add a wrap-around *Plexiglas* windshield as in (Fig. 13).

● Craft Print No. 233 in enlarged size for building Ace is available at $1.50. SPECIAL QUANTITY DISCOUNT! If you order two or more craft prints (this or any other print), you may deduct 25¢ from the regular price of each print. Hence, for two prints, deduct 50¢; three prints, deduct 75¢, etc. Order by print number. To avoid possible loss of coin or currency in the mails, we suggest you remit by check or money order (no C.O.D.'s or stamps) to Craft Print Dept. 212, SCIENCE AND MECHANICS, 450 East Ohio Street, Chicago 11, Illinois. See coupon on page 192. Now available, our new illustrated catalog of "196 Do It Yourself Plans," 10¢. Please allow three to four weeks for delivery.



ACE

With one person aboard Ace will go 32 mph with 16 hp stock Evinrude outboard motor.



