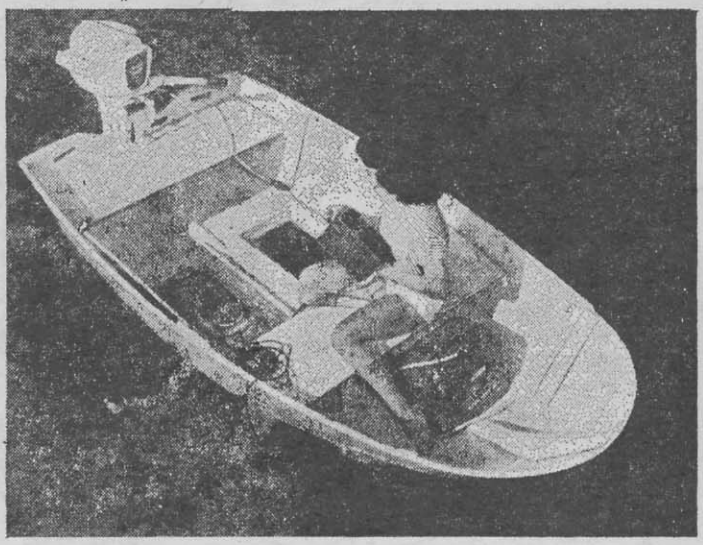
Glass Bottom Boat

or Conversion





See-through windows are conveniently located between seats for easy viewing as demonstrated by pretty Pat Nelson, (sitting in the boat) and Scuba diver Bill Ray (underneath the boat). Both photos were taken at Florida's world-famous Silver Springs.

Underwater fun and adventure can be yours when you build this glass-paneled gadabout or add glass "windows" to your present boat. Here's how

By WILLIAM D. JACKSON
Craft Print Project No. 306

GLASS panels in your boat will open up a colorful new world of underwater excitement.

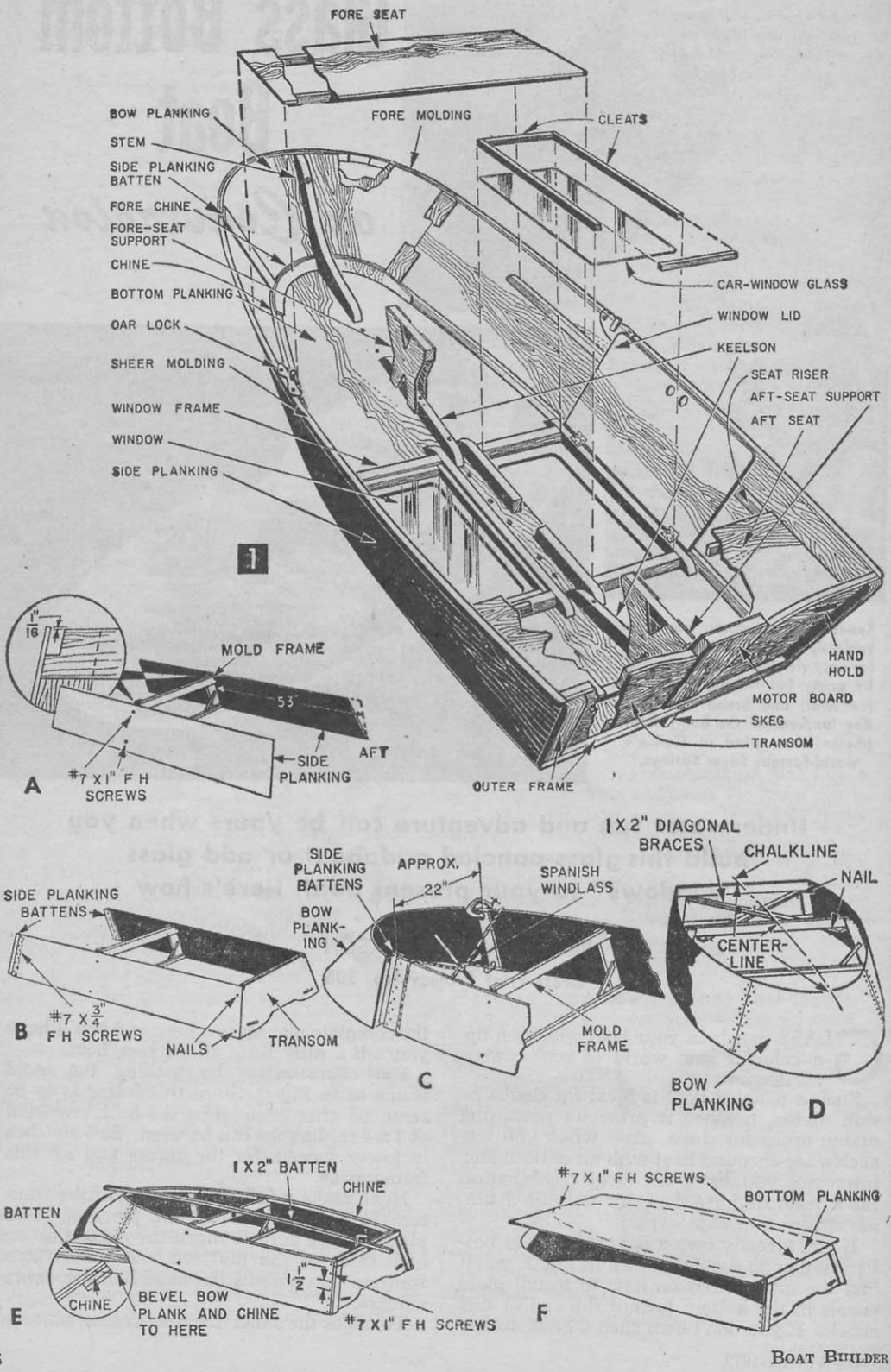
Such a paneled boat is ideal for Scuba or skin divers, because it previews promising diving areas for them. And when you use such a see-through boat with an underwater intercom, you have an ideal combination for a team diving effort, for unlimited fun, adventure and exploration.

If you already own a boat with a flat bottom similar to the one shown in Fig. 1, you'll find the instructions on how to install glass panels in the bottom toward the end of this article. If you don't own such a craft, follow the complete plans given here and you'll have yourself a nifty little all-purpose boat.

Start Construction by making the mold frame as in Fig. 2. Since this frame is to be removed after completing the hull, any kind of 1 x 4-in. lumber can be used. Saw notches in lower corners for the chines and set this frame aside.

Next, make a full-size drawing of the transom (Fig. 2) on a 20 x 48-in. piece of ⅜-in. plywood. Be sure to mark the centerline on both sides of the plywood and then shape transom. Do not saw out hand holds or chine notches.

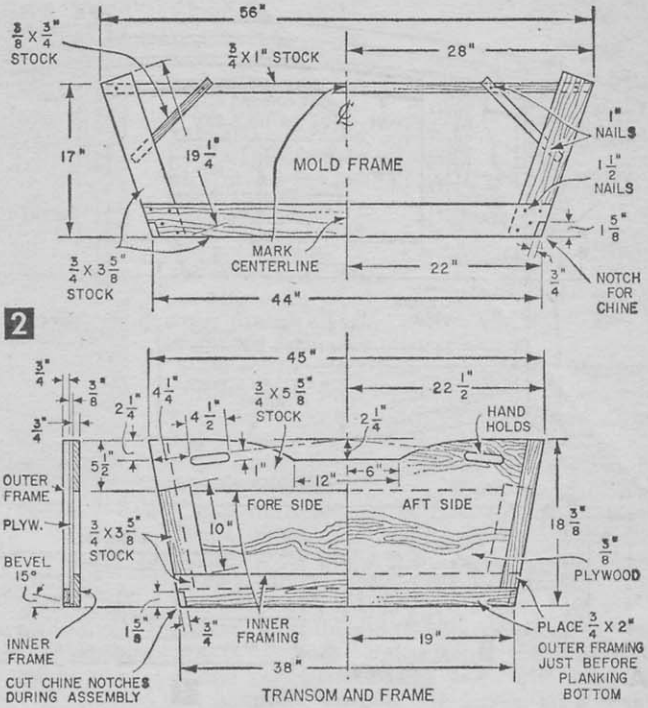
To make the inner transom frame, place a


FORE SEAT
BOW PLANKING
STEM
SIDE PLANKING BATTEN
FORE CHINE
FORE-SEAT SUPPORT
CHINE
BOTTOM PLANKING
OAR LOCK
SHEER MOLDING
WINDOW FRAME
WINDOW
SIDE PLANKING
FORE MOLDING
CLEATS
CAR-WINDOW GLASS
WINDOW LID
KEELSON
SEAT RISER
AFT-SEAT SUPPORT
AFT SEAT
HAND HOLD
MOTOR BOARD
SKEG
TRANSOM
OUTER FRAME
1
1/16
MOLD FRAME
53
AFT
SIDE PLANKING
#7 X 1" F H SCREWS
A
SIDE PLANKING BATTENS
#7 X 3/4" F H SCREWS
NAILS
TRANSOM
B
SIDE PLANKING BATTENS
APPROX. 22"
SPANISH WINDLASS
BOW PLANK-ING
MOLD FRAME
C
1 X 2" DIAGONAL BRACES
CHALKLINE
NAIL
CENTER-LINE
BOW PLANKING
D
1 X 2" BATTEN
CHINE
BATTEN
1 1/2"
CHINE
BEVEL BOW PLANK AND CHINE TO HERE
#7 X 1" F H SCREWS
E
#7 X 1" F H SCREWS
BOTTOM PLANKING
F

length of 1 x 4-in. stock along the bottom edge of the transom and a 1 x 6-in. piece along the top edge. Place these pieces on the poorest side of the plywood so that the good side will be facing out. Mark each end of the 1 x 4-in. stock and the top and ends of the 1 x 6-in. stock along the edges of the plywood transom and saw the pieces to shape. Then replace and clamp them on the transom. Saw two 10-in. lengths of 1 x 4-in. stock for the sides of the transom inner frame and place them on the top and bottom frame pieces. Align them with ends of plywood transom. Mark lower ends of side pieces for cutting at an angle to fit against the bottom frame member and mark the top frame member for notching to receive the side pieces. After cutting and fitting the four frame members, fasten them to the plywood transom with waterproof glue and double row of #7 x 1-in. *fh* screws spaced 3 in. apart and driven from the plywood side.

After the glue dries, lay out and cut the hand hole locations as in Fig. 2. First drill 1-in. holes at each end through both plywood and inner framing and then saw out portion between the holes with a keyhole or coping saw. File and sand the corners smooth for a comfortable hand grip. Use a portable saw or a bench saw to cut the 15° bevel along the bottom edge of the transom. Do not install the outer frame pieces now.

Next, lay out and cut the two side planks from ¼-in. plywood as in Fig. 3A. Because it would be very difficult to bend a single thickness of ¼-in. plywood for the bow of the boat, the bow planking is made up of two



STATEMENT OF USES

TYPE: Flat bottom dingy with glass windows built in bottom.

USES: For exploring underwater marine growth, treasure hunting, or just fishing on protected waters.

LENGTH: 9 ft. 5 in.

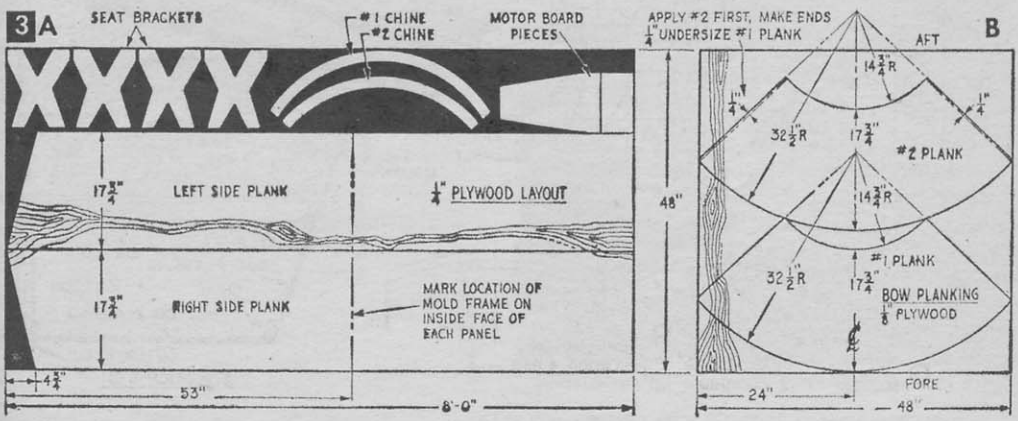
BEAM: 56 in.

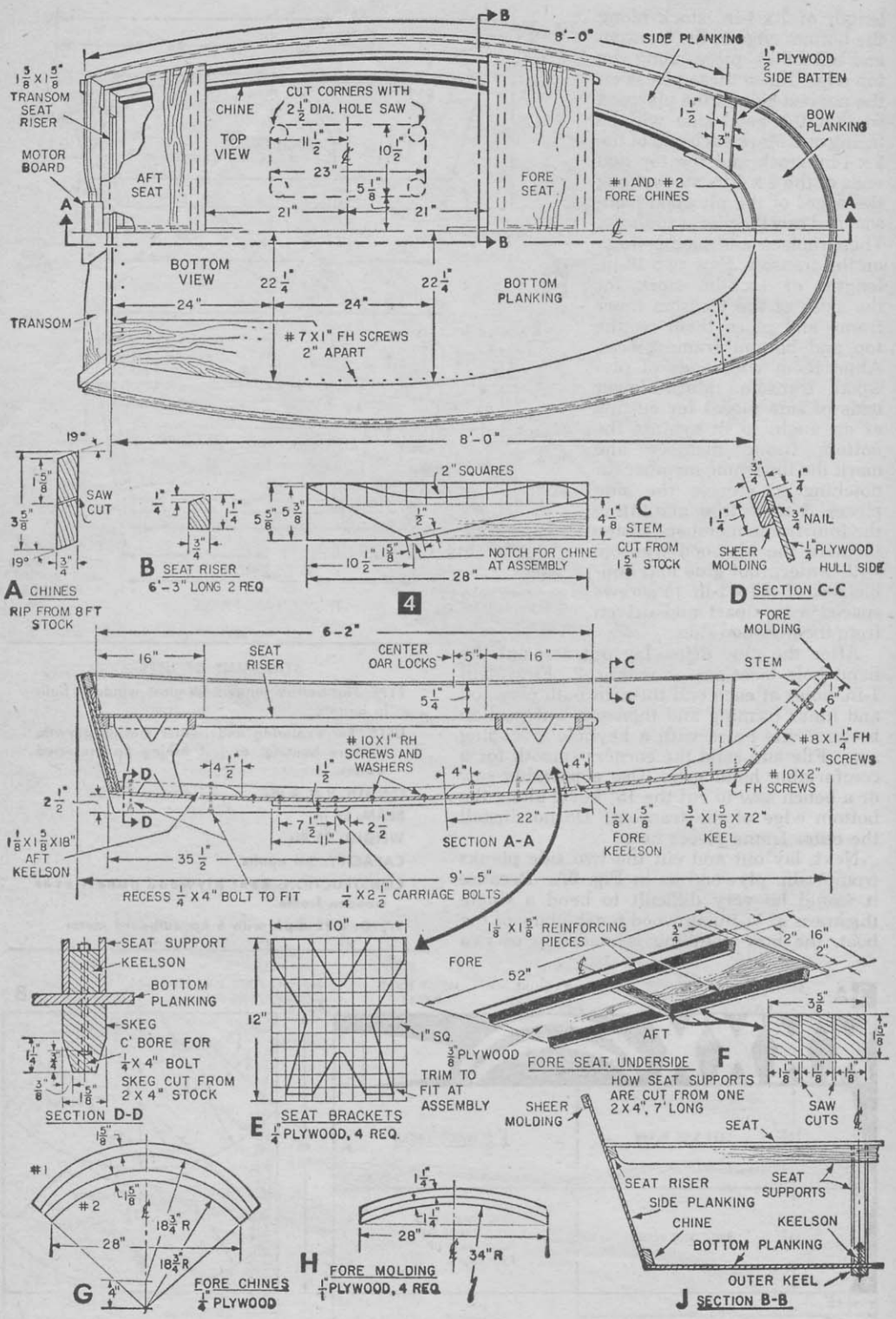
WEIGHT: 95 lbs.

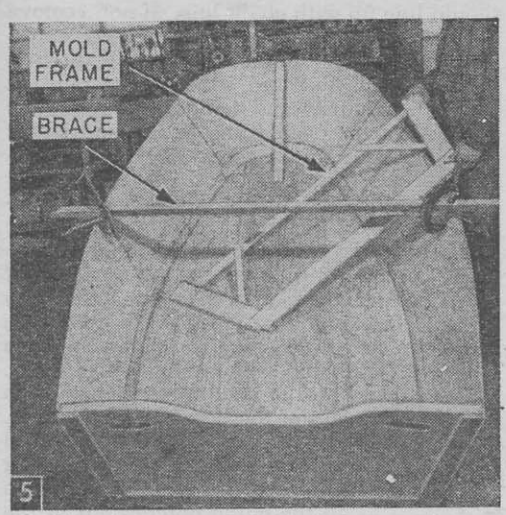
CAPACITY: 3-4 adults.

CONSTRUCTION: Bent plywood panels over wooden frame.

SPEED: 8-12 *mph* with 6 *hp* outboard motor.



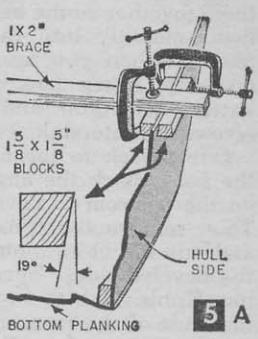

8'-0"
SIDE PLANKING
1" PLYWOOD SIDE BATTEN
BOW PLANKING
1 3/8 X 1 5/8" TRANSOM SEAT RISER
MOTOR BOARD
CHINE
TOP VIEW
CUT CORNERS WITH 2 1/2" DIA. HOLE SAW
AFT SEAT
FORE SEAT
#1 AND #2 FORE CHINES
BOTTOM VIEW
BOTTOM PLANKING
TRANSOM
#7 X 1" FH SCREWS 2" APART
A CHINES
RIP FROM 8 FT STOCK
SAW CUT
B SEAT RISER
6'-3" LONG 2 REQ
2" SQUARES
C STEM
CUT FROM 1 5/8" STOCK
NOTCH FOR CHINE AT ASSEMBLY
4
D SECTION C-C
3/4" NAIL
SHEER MOLDING
1/4" PLYWOOD HULL SIDE
6'-2"
16"
SEAT RISER
CENTER OAR LOCKS
5"
FORE MOLDING
STEM
#10 X 1" RH SCREWS AND WASHERS
#8 X 1 1/4" FH SCREWS
#10 X 2" FH SCREWS
SECTION A-A
1 1/8 X 1 5/8 X 18" AFT KEELSON
FORE KEELSON
3/4 X 1 5/8 X 72" KEEL
9'-5"
RECESS 1/4 X 4" BOLT TO FIT
1/4 X 2 1/2" CARRIAGE BOLTS
SEAT SUPPORT
KEELSON
BOTTOM PLANKING
SKEG
C' BORE FOR 1/4 X 4" BOLT
SKEG CUT FROM 2 X 4" STOCK
SECTION D-D
10"
12"
1" SQ.
TRIM TO FIT AT ASSEMBLY
E SEAT BRACKETS
1/4" PLYWOOD, 4 REQ.
1 1/8 X 1 5/8" REINFORCING PIECES
FORE
AFT
52"
3/8" PLYWOOD
FORE SEAT, UNDERSIDE
F
HOW SEAT SUPPORTS ARE CUT FROM ONE 2 X 4", 7' LONG
SAW CUTS
SHEER MOLDING
SEAT
SEAT RISER
SEAT SUPPORTS
SIDE PLANKING
CHINE
KEELSON
BOTTOM PLANKING
OUTER KEEL
J SECTION B-B
#1
#2
18 3/4" R
28"
G FORE CHINES 1/4" PLYWOOD
34" R
H FORE MOLDING 1/4" PLYWOOD, 4 REQ.



Clamp brace across hull sides before removing mold frame.

layers of ⅛-in. plywood glued together at assembly. Lay out and cut the bow planking as in Fig. 3B. Be sure to cut the straight ends of the #2 piece ¼-in. less than the #1 piece so that when bent, the two pieces will be the same length.

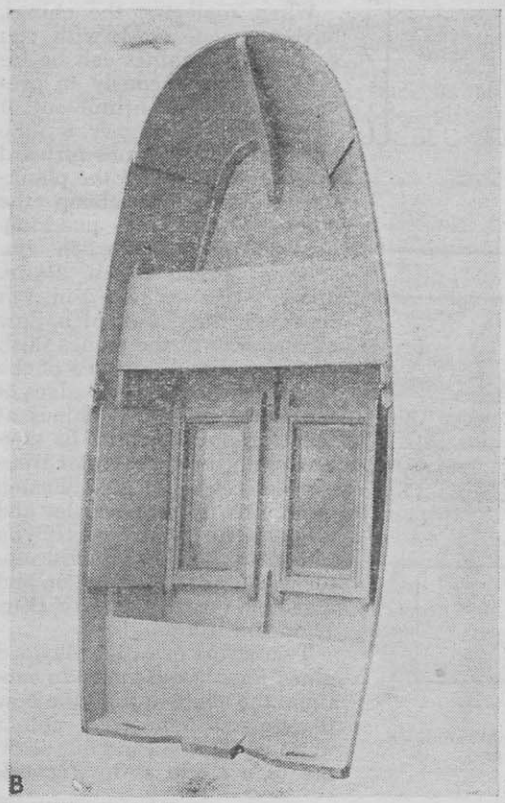
Assembly. No building form is needed. Simply have someone hold the mold frame upside down and upright on the floor while you locate and fasten the side planking to the mold frame with two screws (Fig. 1A). Have the bottom edge of the sides about 1/16-in. above the bottom member of the mold frame to allow for beveling later.

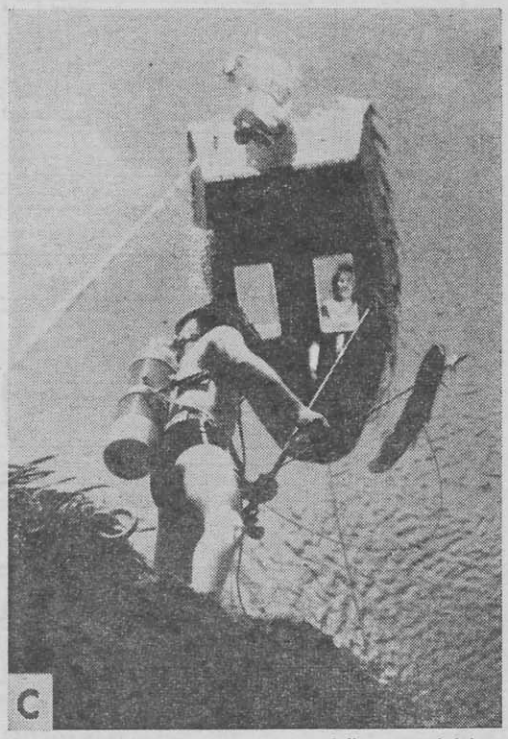


Now, have your helper hold the transom in place between the sides (Fig. 1B) while you temporarily nail them to the transom.

To fasten the fore ends of the side planking to the curved bow planking, glue and clamp the planking battens (Fig. 4) on the inside of the side planks as in Fig. 1B and fasten with #7 x ¾-in *fh* screws. Drive screws from outside of planking spacing them about 2-in. apart in a double row.

Now, with the aid of your helper, bend the #2, ⅛-in. bow plank around the fore ends of the side planks (Fig. 1C), and clamp to the planking battens. Tie a rope around the fore ends of the two side planks and pull





Diver shows his observer a successfully speared fish.

The two windows offer plenty of viewing area.

them together so the bends of the side planks flow smoothly into the curve of the bow plank. When you are satisfied that it fits properly, fasten bow planking to planking battens with glue and three #7 x ¾-in. *fh* screws. Countersink screw heads flush.

Going back to the aft or transom end of the boat, mark the amount of bevel needed on the transom to have the sides fit tightly. Then remove the transom, plane the bevel and cut the chine notches to conform with the beveled sides. Spread a neoprene sealer like Kuhls *Sealtite* on with a putty knife on the ends of the transom and contacting surfaces of the sides. Fasten with three #7 x 1-in. *fh* screws in each side plank.

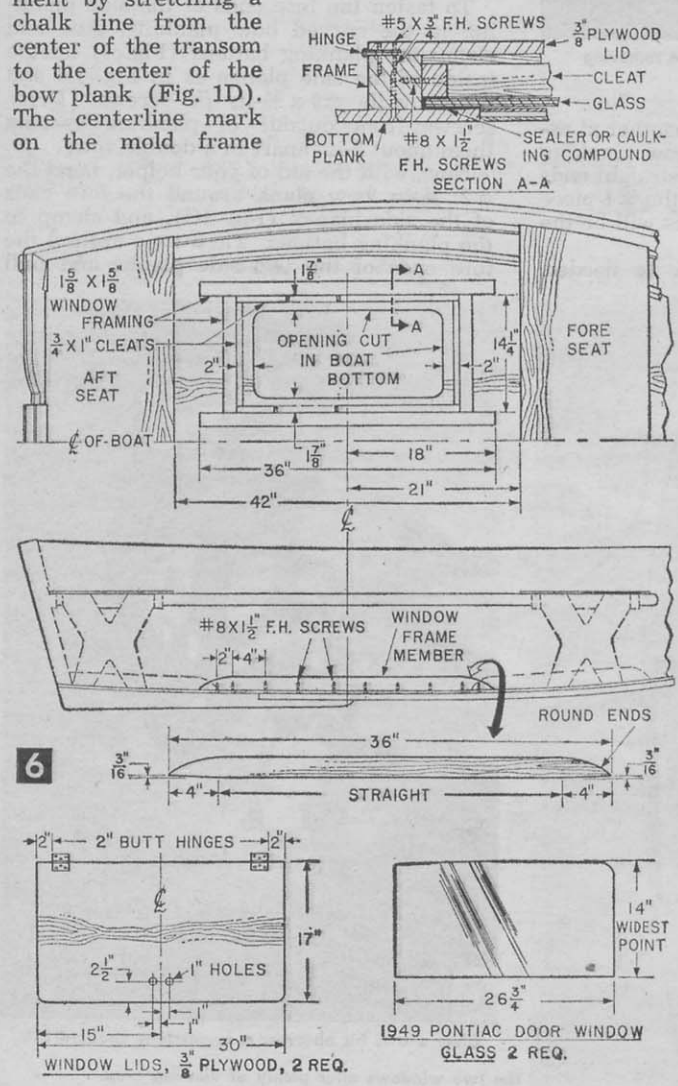
Right now, before the sealer on the transom or glue on the bow planking seams has a chance to set up, check the hull for alignment by stretching a chalk line from the center of the transom to the center of the bow plank (Fig. 1D). The centerline mark on the mold frame should line up with chalk line. If not, remove the screws holding the mold frame and reposition it. Check the top and bottom of the hull with the chalk line and, if necessary, pull the hull in alignment and temporarily nail two diagonal strips from transom to mold frame as in Fig. 1D. Then fasten sides to transom with screws (Fig. 1E).

The second layer or #1 piece of bow planking can now be installed. First bend over the #2 bow planking to see that it fits properly. Then coat the entire contacting surfaces of the #1 and 2 bow planks with glue and clamp the #1 plank in place. Fasten with #7 x 1-in. *fh* screws spaced 1½-in. apart along the edge where it joins the side planks. Use ¾-in. nails clinched on the inside to fasten the top and bottom edges of the bow planks together.

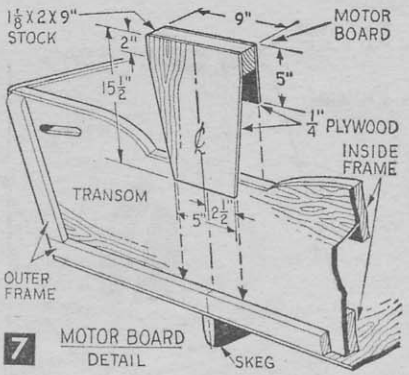
Next, set your circular saw for a 19° bevel cut and rip the two 8-ft. long chines as in Fig. 4A. Place them in the chine notches cut in the mold frame and transom and mark a pencil line on the inside of the side planks along the edge of the chines. Then remove the chines and coat the contacting surfaces of the sides and chines with neoprene sealer. The pencil line will serve as a guide when applying the sealer.

When replacing the chines, have someone work with you so that both chines can be installed simultaneously to prevent wringing the hull out of shape. With a hammer, tap the aft ends of the chines forward until they fit against the planking battens and clamp the chines to the side planking. Fasten with #7 x 1-in *fh*. screws, spaced about 2½-in. apart. Use #8 x 1¾-in. *fh* screws at the chine notch. Saw off the ends of the chines flush with the outside surface of the transom. The exposed edges of the side planks and chines at the transom can now be covered with the three outer transom pieces (Fig. 2). Fasten them with neoprene sealer and #8 x 1¼-in. *fh* screws. If you intend to use an outboard motor with this boat, make up and assemble the motor board (Fig. 7) to the transom.

Two strips of ¼-in. plywood glued together are used to continue the chine around the bow planking. These strip chines must be laid out and cut as an arc of a circle as in Fig. 4G.



However, since each boat built will vary slightly in shape and size, make patterns of the chine strips from corrugated cardboard and fit them in place around the bow. The needed alterations can then be made on the patterns before transferring the shapes to ¼-in. plywood for cutting. Fasten the #2 strip chine along the bottom inside edge of the bow planking with glue so that it fits up to the side battens. Then glue and clamp the #1 chine over the #2 chine and allow it to overlap the side battens as in Fig. 4. The ¼-in. void between the two chines at the side battens can be filled with a mixture of glue and sawdust, or the side batten can be beveled beforehand at that point.



7 MOTOR BOARD DETAIL

When assembling, clamp the chines to the bow at the center and work toward each end, fastening with 1-in. nails spaced 1½ in. apart. Clinch the nails over on the inside.

Then place a batten across the hull as in Fig. 1E. Temporarily clamp or nail it to the transom and bend it down over the mold frame until it touches the bottom edge of the bow planking. This will give you an idea of how much and at what angle you will have to fair or bevel the bow plank edges and chine to provide a flat surface to which the bottom planking can be fastened. Use a jack plane to bevel or fair the chines back to and including the transom. A 5-ft. batten placed athwartships will indicate the angle of bevel required for fairing the side chines.

To make the stem, first draw it full size on cardboard and cut it out for use as a fitting pattern. Hold the stem pattern against the inside center of the bow planking and check to see if it seats tightly against the underside of the batten. If not, make any alterations needed on the pattern and transfer its outline to a piece of 1⅝-in. thick stock. After band sawing the stem to shape, fasten it to the inside center of the bow planking with glue and four screws as in Fig. 4. Do not fasten stem to batten. Instead, remove the batten so the hull will be ready for installation of the bottom planking.

Use a full 4 x 8-ft. panel of ⅜-in. plywood for the bottom. Position the aft edge of the plywood flush with the outside of the outer transom framing. Then temporarily fasten the plywood with two screws as in Fig. 1F. Mark the underside of it around the outside of the bow and side planking. Then remove and saw it to shape, cutting just outside of the penciled line.

Apply neoprene sealer to the chines and transom and contacting surfaces of the bottom planking, and replace the plywood on the hull with the same two screws used previously. Continue fastening the planking with screws as in Fig. 4. Allow the neoprene sealer to cure at least 48 hours before planing the edges of the bottom planking flush with the sides and transom.

Now turn the boat hull right-side-up. The keel and skeg on the bottom are best installed later. Before removing the mold frame and diagonal braces, clamp a brace across the sides as in Figs. 5 and 5A, to prevent the sides from springing inward. After removing the frame, fill the four screw holes with *Plastic Wood*.

Saw a 15° bevel on a 43-in. length of 2 x 2-in. stock for the transom seat riser (Fig. 4) and notch each end to clear the side members of the inner transom frame. Fasten the riser on the inside with a #8 x 1¾-in. *fh* screw at each end to the inner frame and from the outside through the plywood transom with six #8 x 1¾-in. *fh* screws. Rip the two 74-in. long seat risers as in Fig. 4B and fasten to the side planking with #7 x 1-in. *fh* screws spaced about 4 in. apart and driven from the outside of the planking.

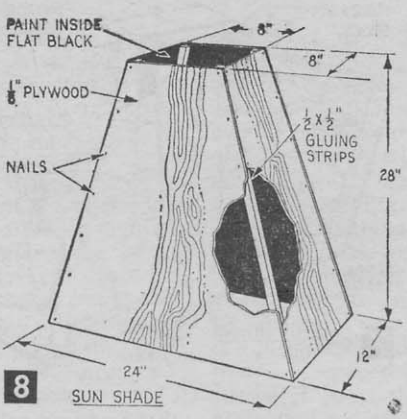
Next, rip the 1⅛-in. wide fore and aft keelsons from 2 x 4-in. stock and drill the ¼-in. holes for carriage bolts as in Fig. 4.

When making the ⅜-in. plywood seats, take the length dimensions directly from

MATERIALS LIST

Amt. Req.	Size and Description	Use
2	⅜" x 4' x 8' fir exterior plywood	bottom planking
1	⅜" x 20" x 45" fir exterior plywood	transom
1	½" x 6½" x 18" fir exterior plywood	transom seats planking battens
1	¼" x 4' x 8' fir exterior plywood	side planking
1	¼" x 12" x 30" fir exterior plywood	fore molding
1	¼" x 4' x 4' fir exterior plywood	bow planking
1	¾" x 5⅝" x 12" fir	transom, molding, seat visers
1	¾" x 3⅝" x 8' fir	chines
1	¾" x 3⅝" x 12' fir	transom frames
1	¾" x 5⅝" x 8" fir	mold frame
1	¾" x 3⅝" x 8' fir	keel, window cleats
1	1⅝" x 5⅝" x 36" fir	stem
1	1⅝" x 3⅝" x 10' fir	skeg, keelson, seats
2	1⅝" x 1⅝" x 12" fir	window frames, aft seat support
2 gross	#7 x 1" fh screws	
4 doz.	#8 x 1¼" fh screws	
4 doz.	#8 x 1½" fh screws	
3	#10 x 2" fh screws	
6 doz.	#10 x 1½" fh screws	
6	#10 x 1" rh screws	
2	¼" x 4" carriage bolts	
5	¼" x 2½" carriage bolts	
1 box	#14 x ¾" nails	
1 box	#14 x 1" nails	
2	door windows from '49 Pontiac	
1 qt.	neoprene boat sealer	
1 lb.	Weldwood glue	
8 yds.	4" fiber glass tape and resin	

your boat so that the seats fit snugly between the hull sides. After fitting them in place, mark a pencil line on the undersides along the seat risers and remove them to glue and screw the 1⅛-in. reinforcement pieces shown in Fig. 4F to the underside. Then replace the seats and fasten them to the seat risers with four #7 x 1-in. *fh* screws at each end. The brace clamped across the sides can now be removed.



Now turn the hull upside down and place it on a couple of sawhorses or boxes. Make the skeg and keel as in Fig. 4. Then, while you hold the skeg tightly in place straddling the centerline on the bottom planking, have your helper crawl under the boat and mark the location of the ¼-in. holes, drilled through the bottom, on the skeg. When boring these holes in the skeg, be sure to drill them square to the edge of the skeg that contacts the bottom planking. Otherwise the holes will not line up properly with the holes in the aft keelson. Apply neoprene sealer to the contacting surfaces of the skeg and aft keelson and bolt them in place loosely at first so that the keel can be placed in the notch cut in the skeg. Follow the same procedure when bolting the keel and fore keelson in place as in Fig. 4.

Make the four ¼-in. plywood seat brackets as in Fig. 4E and trim to fit when installing them under the seats. Fasten with glue and 1-in. nails. Make the sheer molding as in Fig. 4D and fasten to the outer top edge and sides of the side planking with glue and ¾-in. nails. The sheer molding around the bow planking is made up of two layers of ¼-in. plywood as in Fig. 4H. Follow the same procedure you used to make the bow chine.

Before painting your boat, apply 4-in. wide fiber glass tape along the outside where the bottom planking joins the sides and transom. When dry, give the entire boat two coats of primer followed by one coat of marine enamel of the color you desire.

Installation of Glass Bottom. Although we used two pieces of automobile safety window glass taken from the doors of a '49 Pontiac, window glass from other makes of cars could be used as well. Since the size of the window openings in the bottom of your boat must be determined by the size of the glass you purchase, obtain the glass first. In our case we made the openings in the bottom of the boat 10½ x 23 in. which allowed about a 2-in. overlap all-around the glass.

Lay out the window openings on the inside bottom surface of your boat between the fore and aft seats as in Fig. 4. First use a 2½-in. dia. hole saw and electric drill to cut four holes at the corners of the window opening. Then use a keyhole saw or portable jigsaw to cut the openings. Place glass over openings so that glass overlap is equi-distant on all sides and draw a line on the bottom around the glass.

Make the window frames (Fig. 6) of 2 x 2 in. stock (actually 1⅝ x 1⅝ in.) so that their inside dimensions will clear the glass by ⅛ in. on all sides. Then fasten the frames to the bottom with neoprene sealer or caulking compound and #8 x 1½-in. *fh* screws spaced 4 in. apart and driven from the outside of the bottom.

To make a watertight seal between the glass and the bottom planking, coat the inside of the bottom planking around the opening with a uniform layer of neoprene sealer or caulking compound about 1/16-in. thick. Place the pieces of glass in position on the sealer but do not press the glass down to embed it in the sealer. Instead, allow the glass to stand for about one hour and it will embed itself in the sealer. Secure the glass within the frame with ¾ x 1-in. cleats fastened to the frames with #8 x 1½-in. *fh* screws as in sec. A-A in Fig. 6. Put a layer of sealer under the cleats where they contact the glass before installing them.

To protect the glass and enable you to walk over the glassed area when not using the windows for viewing, make the lids as in Fig. 6 and fasten to the window frames with hinges.

Underwater viewing will be greatly improved by making and using the sun shade shown in Fig. 8. This is simply a lightweight box that excludes the sunlight at the top of the glass windows. An umbrella or black photographer's cloth draped over your head would improve underwater viewing.

Although a 6 *hp* outboard motor is used to power the boat, oars will come in handy for maneuvering in shallow water. Bolt the oar locks to the side planking and sheer molding as in Fig. 4 to complete the boat.

• To obtain enlarged plan for building Glass Bottom Boat, Craft Print No. 306, see handy order form on last page of this issue.

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or Conversion





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