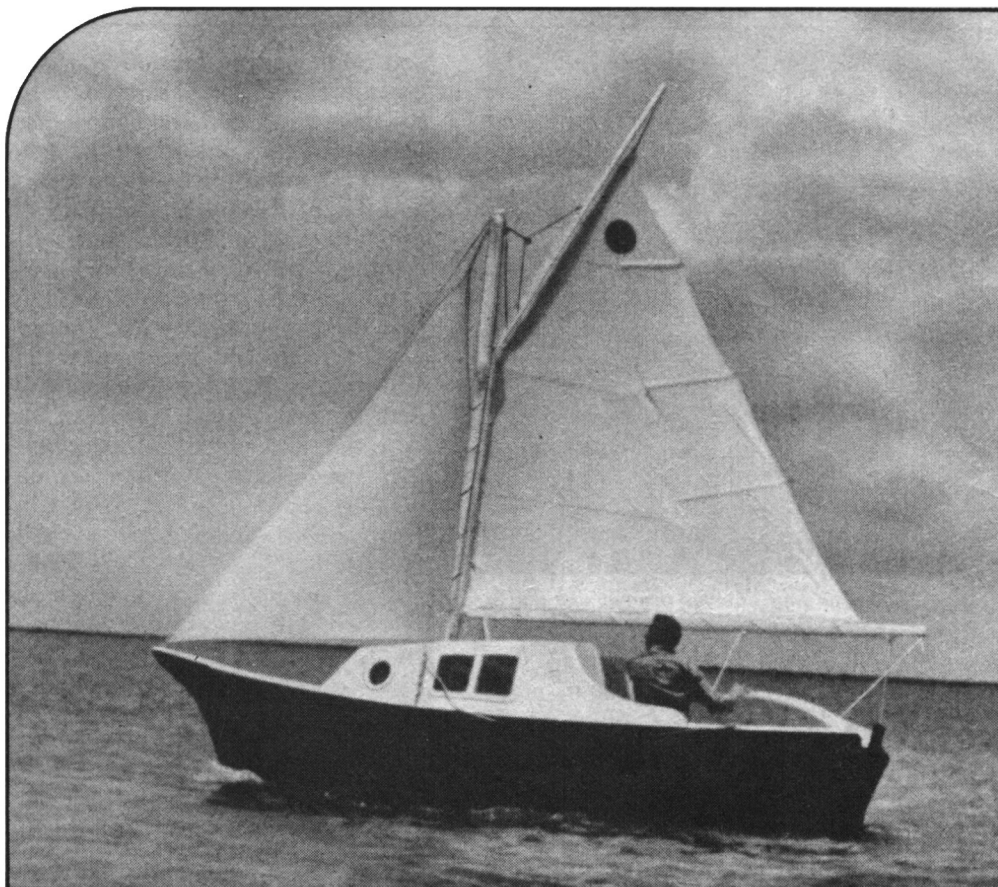


# Blue Moon

**You can enjoy many pleasant hours on this overnight cruising sailboat—it's easy to build from readily-available materials for under \$500**



**B**LUE MOON is a 16' cruising sailboat that can be built, complete with sails and fittings, for just about \$500. In spite of its diminutive size, it sleeps two comfortably on 6'4" berths, and there's sitting headroom in a cabin that has space for a chemical toilet and a small stove.

This is a simple boat to build, using lumber and plywood available in most lumber yards, and hardware and fittings that can be found in any large hardware store. The cost of \$500 included (in the winter 1972-73) clear fir framing, exterior grade plywood, plated screws and bolts, fiberglass cloth, resin and tinting colors; epoxy and enamel paints; all fittings; mast, boom and gaff; 8-oz. canvas sails; Plexiglas for ports; rope, chain, and even the anchor.

Blue Moon is a stable boat, yet it sails with a nice turn of speed in 10-15 mph winds. It will ghost along nicely in less, and gives a secure performance in 20 mph winds.

## Construction Notes

Clear fir is used for framing. It

is cheapest to buy 1x8's or 1x10's and have the 1x2 and 1x4 framing ripped out. The 2x4, 2x6 and 2x8 material also was clear fir. The small amount of hardwood used can be any close-grained type.

Ordinary hand tools are needed for construction, plus a power hand or table saw, a band saw, and a power drill with disc sander attachment. A belt sander would be desirable. Most important are a number of "C" clamps (3" to 8" sizes) and a pipe clamp or two.

## The Lines

A working space of at least 12' x 20' is needed, with a level wood or concrete floor. The full size lines should be drawn on this floor, or on large sheets of paper taped to the floor. The boat can be built on top of these lines, or next to them, so a constant check can be made to the full-size dimensions.

To lay out the full size lines, start with the base line, which measures 15'1½" from "O" to "T." Next measure 11¼" from "O" to establish "S." Then measure 6¾" from "T" to establish "(t)." Bend a good 1x2 batten from point "S"

to "(t)," with the batten touching the base line at "(x)." This establishes the bottom or chine line, and all side and hull perpendiculars start from this curved line. Now fix all main and intermediate frame points on the base line. It is now easy to draw in other profile lines of the boat. In the same manner, the dimensions for width are fixed.

*Note that all measurements on the plans are to the outside of the framing.*

## Centerboard and Case

On the full size lines, lay out the centerboard and centerboard case dimensions as shown on the plans. The exact curve of the centerboard case bottom can be taken by template from the lines. Construct the case from ½" plywood, with ¾" hardwood front and back posts. Attach 1x2 bunk platform supports from the inside of the case side panels with 1½" #10 flat head screws before assembling the case.

The whole assembly, including the centerboard and pivot bolt, should be temporarily screwed and bolted together and checked for

accuracy before final glued assembly. The centerboard itself can be made of  $\frac{1}{2}$ " plywood, or  $\frac{3}{8}$ " aluminum.

#### Stem and Stem Knee

Cut the stem from 2x6 stock, and bevel as shown on the full size lines. Notch for 1x2 sheer clamps and chines. Make a template of stem and transom knees, and cut from 2x6 stock. Assemble with  $\frac{1}{4}$ " plywood gussets, using glue and 1" #10 flat head screws.

#### Transom

The transom cutout for the outboard motor can be in the center, as shown on the plans, or to one side so that the motor need not be removed in order to install the rudder. The transom is made up of 2x4's and  $\frac{1}{2}$ " plywood. Cut the plywood to the inside dimensions of the transom, as shown on the plans. Cut and fit the 2x4 members and plywood gusset. Glue and screw together with 1" and  $1\frac{1}{2}$ " #10 flat head screws.

#### Skegs and Keel

Lay out and cut the front skleg

from 2x6 stock, and the after skleg from 2x8 material. Do not cut skegs to exact length at this point; leave extra on the ends past points "O" and "T." The skegs will be cut to proper length after the bottom panels are installed.

The keel is a 1x6 cut to the length of the curved bottom line. Bevel as shown for the stem and transom. The keel is slotted between frames #3 and #5 to receive the centerboard case. This bolts to the keel, and extends below it to end flush with the  $\frac{1}{4}$ " plywood bottom. The slot in the keel is  $1\frac{1}{4}$ " wide and  $47\frac{1}{2}$ " long.

#### Frames #3 and #5

Make up frames #3 and #5 to the dimensions shown on the plans. Do not include the cabin framing on frame #3 at this time; do use a temporary brace to hold it to the proper width at the sheer. Use  $\frac{1}{4}$ " bolts to bolt frame members together.

#### Preliminary Assembly

Bore  $\frac{1}{4}$ " bolt holes in stem, stem knee and keel; transom, transom

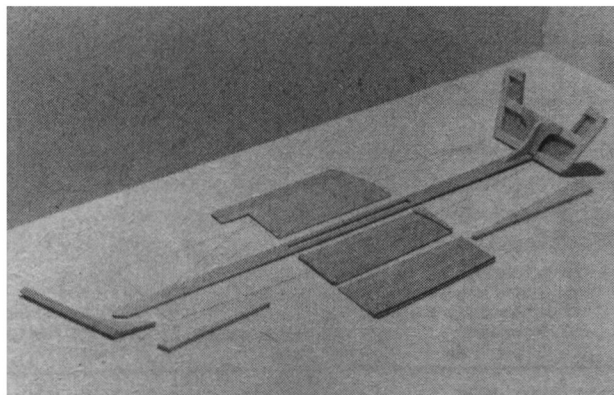
knee and keel; centerboard case and keel, and frame #3. Counter-sink all holes in the keel. Using the floor as a base line, bolt all these elements together. Now bolt on frame #5, then bend the sheer clamps and chines of 1x2 stock into place, and attach with  $\frac{1}{4}$ " bolts and lag screws. Check alignment and fairness of curves.

Disassemble, brush everything clean, and reassemble with glue, tightening all bolts and lag screws into place. Do *not* glue the skegs in place at this time.

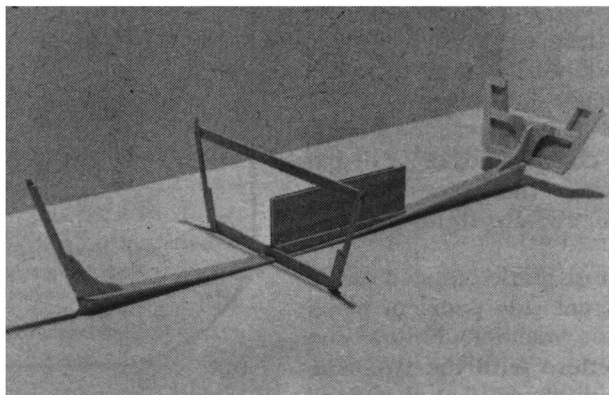
Make up and install the balance of the main and intermediate frames. Be sure to bevel frame sides so the side panels will lie flush against them.

#### Bunk Platform Seat Supports

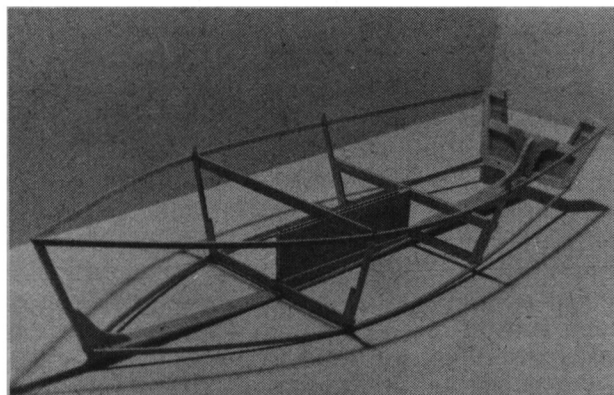
Refer to plans for positions of bunk and seat stringers. Cut and fit in place the  $\frac{1}{2}$ " plywood seats and the  $\frac{1}{4}$ " plywood bunk platform. The bunk platform is in four pieces: a forepeak triangle, and middle section that fits around the centerboard case, and two side



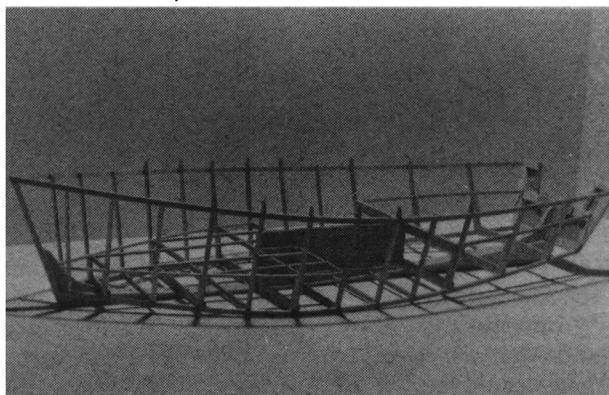
1. Illustrated in this view is the slotted keel, CB and CB case, stem, skegs and transom.



2. Here is a mock-up of the keel, CB, stem, transom, skegs and frame #3 set in place.



3. Frames #3, #5 in place with sheer and chine stringers. Working space should be at least 12 x 20 ft.



4. Stage of construction showing main and intermediate frames, bunk and some seat stringers in place.

# Blue Moon

panels that follow the curve of the sides.

## Cabin Framing and Deck

Cut, fit, and bolt together the cabin and deck framing pieces, using  $\frac{1}{4}$ " and  $\frac{3}{16}$ " bolts. Then disassemble this framing so that side and bottom panels can be installed. Leave the deck beams and 1x6 deck stringer in place, as these help the hull hold its shape.

Care must be taken to install bulkhead #5a at the proper slant. The cabin side stringers are  $\frac{3}{4}$ " x 1", and may need soaking in hot water to enable them to take the required bend.

## Side Planking

The sides are four panels of  $\frac{3}{4}$ " plywood, with two panels on each side spliced between frames #3a and #4. Each splice is backed with 1x6 splice blocks.

Clamp one piece of plywood to the front of the hull so that an end is centered between frames #3a and #5. With a pencil, mark sheer, chine, and stem lines on the panel, then remove it and cut it to shape, leaving a little extra on each side of the mark. Reclamp it in place, and drill screw holes every 6". Use 1" #10 flat head screws along chine and sheer clamp, and  $1\frac{1}{2}$ " #10 flat head screws in the frames. Do not snug the screws up tightly at this time.

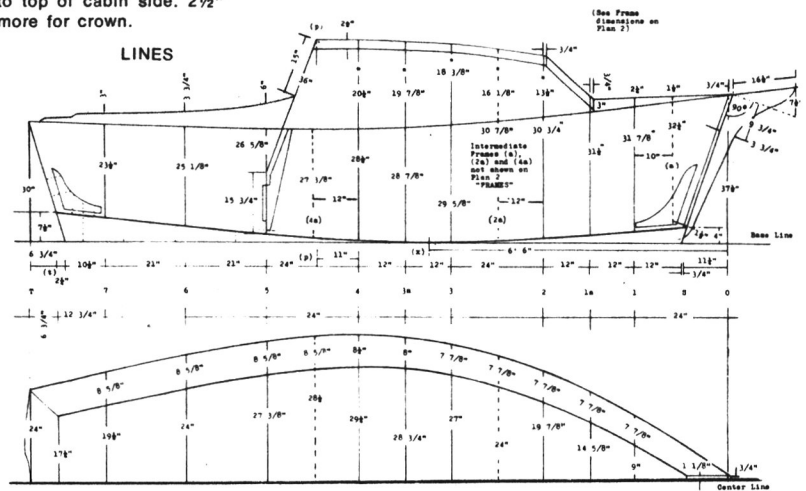
Now clamp, mark, cut, and screw the other front side panel in place in the same manner. Follow the same procedure with the two rear panels, making sure that they butt snugly against the front panels. Make splice blocks of 1x6 to fit tightly between sheer and chine; the plywood ends are fastened with a double row of screws to these blocks.

Remove all four side panels, countersink all screw holes, clean off all sawdust, and glue and screw them back in place. Cover screw heads with a good wood dough. Now turn the boat over.

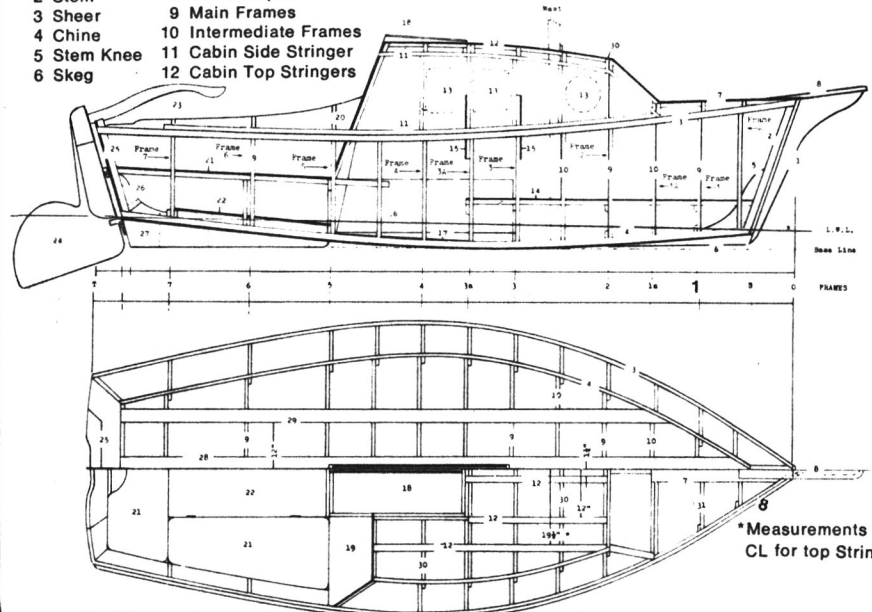
## Bottom

Unbolt and remove the two skegs, and then install the two bottom stringers, fastening them at

\*All of the dimensions are perpendicular measurements from the sheer line to top of cabin side.  $2\frac{1}{2}$ " more for crown.



- |             |                        |
|-------------|------------------------|
| 1 Cutwater  | 7 1x6 Deck Stringer    |
| 2 Stem      | 8 1x4 Bowsprit         |
| 3 Sheer     | 9 Main Frames          |
| 4 Chine     | 10 Intermediate Frames |
| 5 Stem Knee | 11 Cabin Side Stringer |
| 6 Skeg      | 12 Cabin Top Stringers |



- |   |                                       |                                      |
|---|---------------------------------------|--------------------------------------|
| 13 $\frac{1}{8}$ " Plexi Ports                        | 17 $\frac{1}{2}$ " ply Flooring       | 22 $\frac{1}{2}$ " ply Cockpit Floor |
| 14 Bunk Platform $\frac{1}{4}$ " ply on 1x2 Stringers | 18 Sliding Hatch Opening              | 23 Tiller                            |
| 15 $\frac{1}{4}$ " ply Gusset                         | 19 $\frac{3}{8}$ " ply Cabin Bulkhead | 24 Rudder                            |
| 16 Centerboard Case                                   | 20 Coaming                            | 25 Transom                           |
|   | 21 $\frac{1}{2}$ " ply Seats          | 26 Transom Knee                      |
|   |                                       | 27 Skeg                              |
|   |                                       | 28 1x6 Fir Keel                      |
|   |                                       | 29 1x4 Bottom Stringer               |
|   |                                       | 30 Cabin Top Beams                   |
|   |                                       | 31 Deck Beams                        |

each frame with two  $1\frac{1}{4}$ " #10 flat head screws.

Bevel all edges of the chines and transom so bottom plywood will lie flat, then install the bottom panels in the same manner as the sides. The splices will be between frames #4 and #4a.

Sand the bottom smooth after it has been glued and screwed permanently, and round all edges and chines and transom. Apply fiberglass over the bottom, and about 7" up the sides. The resin can be tinted to the desired color.

Bolt the skegs in place, with silicone rubber sealer as a bedding

compound and in all holes. Trim the after skeg to the rake of the transom, then turn the boat right side up. At this point the interior of the hull should be given two coats of semi-gloss white enamel.

## Cabin Sides and Top

Now the cabin framing can be glued and bolted in place. Bevel all edges of the cabin top and front. Use  $\frac{1}{4}$ " plywood for the cabin sides and front, marking and installing these in the same manner as the hull sides and bottom. The coaming must be spliced between frame #5 and #6, and it is built up between frames with another piece of

$\frac{1}{4}$ " plywood so that overall coaming thickness is  $\frac{1}{2}$ ".

The cabin top is made of two pieces of  $\frac{1}{4}$ " plywood, with the splice down the centerline of a top stringer. Fill all holes and seams with wood dough, sand smooth, then fiberglass the entire top. Carry the glass down 2" on all edges.

#### **Cutwater and Bow Sprit**

Add a length of  $\frac{3}{4}$ " stock to the stem, and fair this into the angle of the bow so that it is  $1\frac{1}{2}$ " wide along its face. Make up the cutwater of 1x6 plus  $\frac{3}{4}$ " plywood stock, as shown on the plans. It is attached to the stem with glue,  $\frac{1}{4}$ " bolts, and lag screws, and one  $\frac{1}{2}$ " eye bolt. Now the front skeg can be cut into a curve that fairs into the cutwater.

The bow sprit joins the 1x6 deck stringer between the stem and frame #a. It is at an angle to follow the sheer line. The bow sprit is glued, bolted and lag screwed to the deck stringer and the top of the cutwater. An eye bolt is used at the forward end of the bow sprit for the jib stay turnbuckle.

#### **Decking**

The  $\frac{1}{4}$ " plywood decking can now be attached. Bevel the sheer clamps and other edges so the plywood will lie flush. Cut the decking from two panels, with the seam down the centerline of the deck stringer. Glue and screw as with other planking. Fill all holes with wood

dough, and round off edges. Fiberglass the deck, carrying the glass 2" up the cabin front, and down 2" over the edges of the sheer clamps.

#### **Companionway Sliding Hatch**

Cut the companionway door from  $\frac{3}{8}$ " plywood so that it covers the opening in bulkhead #5a. Strips of plywood can be used to make up slides on each side of the bulkhead, into which the companionway door will fit.

Make up the sliding hatch assembly as shown on the plans. Note that  $\frac{1}{2}$ " angle aluminum is screwed to the 1x4 fore-and-aft hatch stringers that run between bulkhead #5A and frame #4a. The 1x6 at frame #3a is cut to the curve shown on the plans, and the 1x2 hardwood stock used for the ends of the hatch is cut to the same curve.

#### **Exterior Painting**

Paint the cabin top, hatch, door, front, and deck with two coats of gloss white enamel. The hull is given two coats of resin (tinted black) and then one coat of black epoxy. Seats and cockpit floor are painted white, and a boot top stripe can be added.

#### **Mast, Boom, and Gaff**

The mast is made of three 14' lengths of 1x4 clear fir cut to a width of  $2\frac{3}{4}$ ", clamped and glued. Edges are rounded  $\frac{1}{2}$ ". The mast fittings are three eye bolts at the top for  $\frac{1}{8}$ " wire stays; one double block on an eye bolt for mainsail

halyards; one single block for the jib halyard; three cleats for halyard tie-off, and one eye bolt near the boom for lacing tie-off.

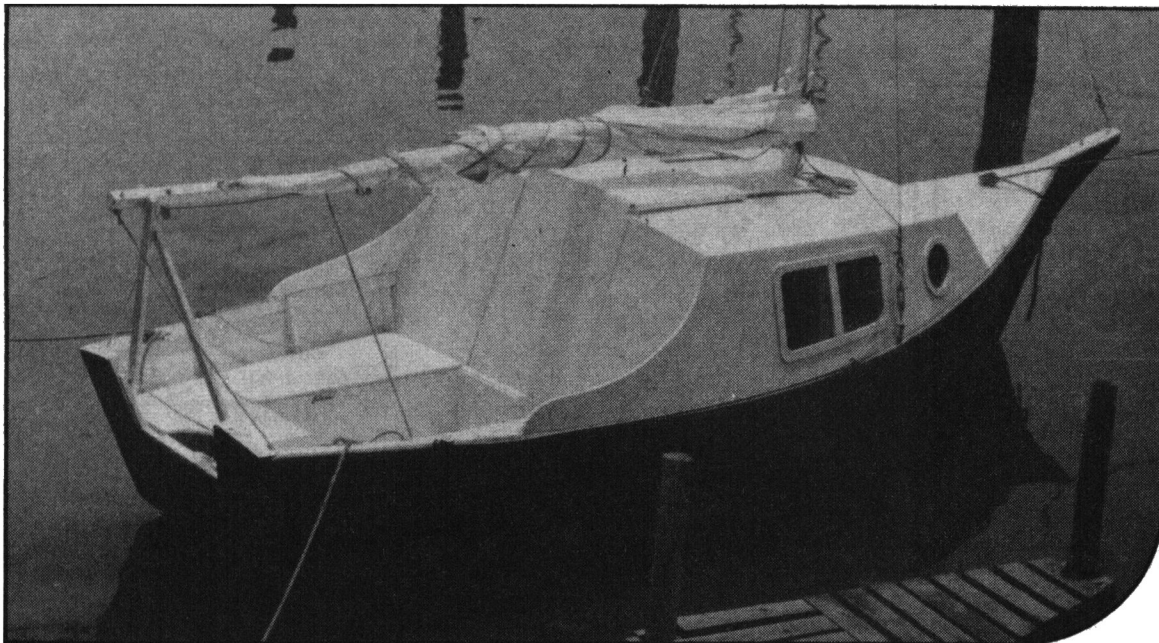
The boom is clear  $1\frac{1}{2} \times 2\frac{1}{4}$ " fir, with the edges rounded. A shackle on an eye bolt is fitted to the front to make the gooseneck, an eye bolt alone and two eye bolts with blocks are attached to the bottom of the boom. The main sheet runs from the eye bolt at the end of the boom to a block on the port side of the transom, across to one on the starboard side, then back up to the two blocks on the bottom of the boom.

The gaff is  $1\frac{1}{2} \times 1\frac{1}{4}$ " clear fir; gaff jaws are of hardwood or yellow pine glued and bolted to the gaff. Gaff fittings are an eye bolt for the throat halyard; two eye bolts with  $\frac{1}{2}$ " line and a block in between for the peak halyard, and one eye bolt at the bottom for sail tie-off.

Chain plates are  $3/16$ " plated steel. These attach to the hull in front of the square ports. Stays are  $\frac{1}{8}$ " wire rope with 8" turnbuckles on sides and 6" turnbuckle on the jib stay. All halyards are  $\frac{1}{4}$ " manila or Dacron, and sail lacing is  $\frac{1}{4}$ " Nylon.

#### **Sails**

The sails are made up of 8 oz. cotton canvas, 36" wide, or of Dacron sailcloth in 36" width. Ten yards are used for the mainsail, and six yards for the jib.



*Completed boat showing cockpit, sliding hatch and the companionway door.*

# Blue Moon

Tack the material on the floor, overlapping edges one inch. Rough out the dimensions with a pencil, leaving 4" all around. Seams should run parallel to the foot of the sail.

The 6' luff that laces to the mast should be raked back 6" from the perpendicular, and the 6" roach in the leech of the sail can be drawn by bending a batten to the curve.

Sew the three horizontal seams, then remark sail accurately, leaving 1½" extra on the leech, 2" extra on the foot and gaff lines, and 3" extra on the fluff. Hem all these edges, and sew a ¼" manila or Dacron line into the luff. Cut material for accommodating 1¾" battens that are 2', 2½', and 3' in length. Sew these pockets on line with the seams.

The jib is made in a similar manner. Sew a ¼" manila or Dacron into the 11' leading edge. Sew a strengthening triangle in all corners of both sails.

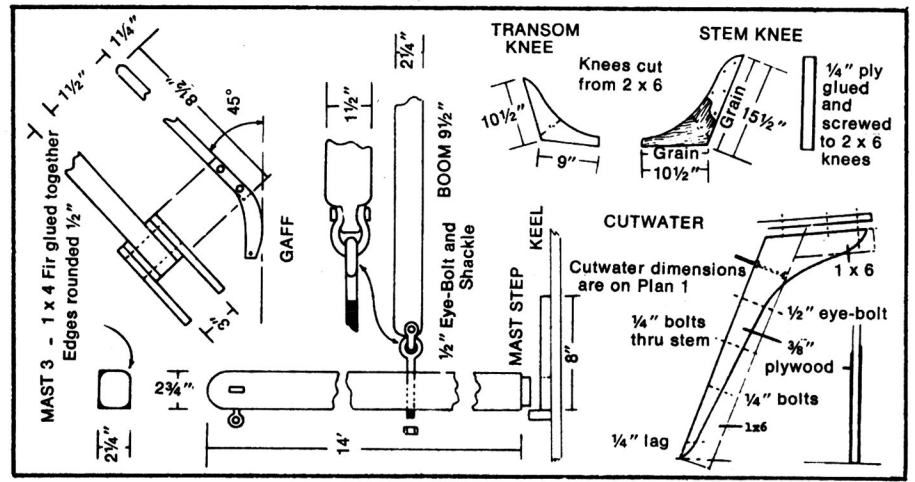
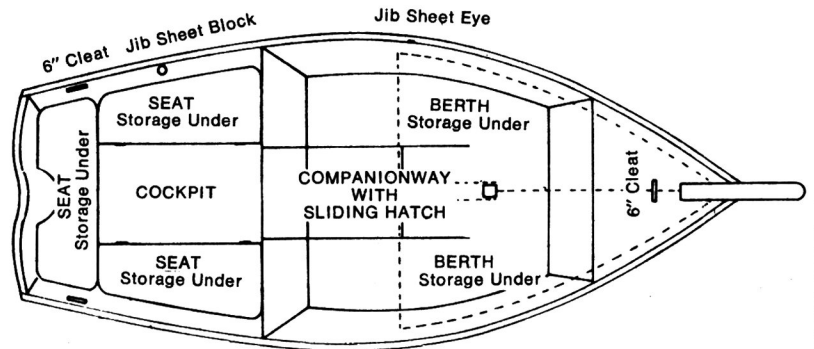
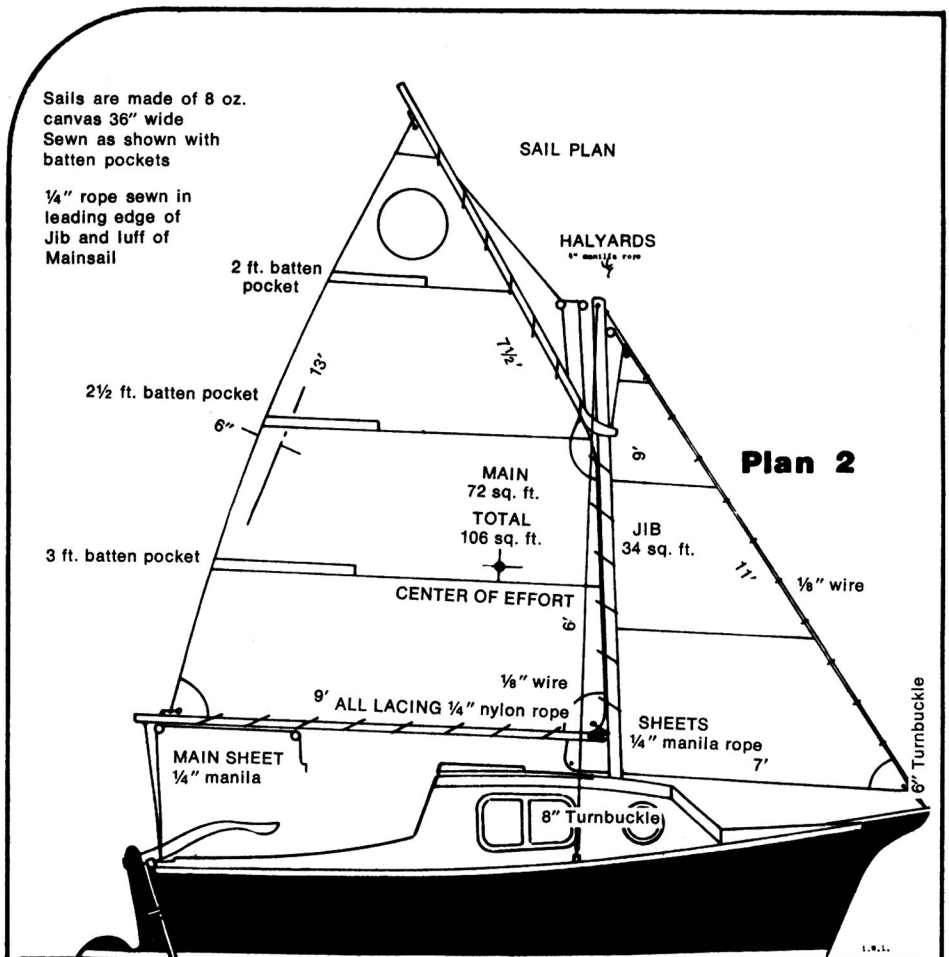
Use ⅜" grommets in all corners, and spaced 12" on the luff, gaff line and foot of the mainsail, and on the leading edge of the jib. Jib snaps are tied through the jib grommets with stout twine or marline.

The Blue Moon insignia is a 15" Bahama Blue cloth circle sewed on both sides of the mainsail.

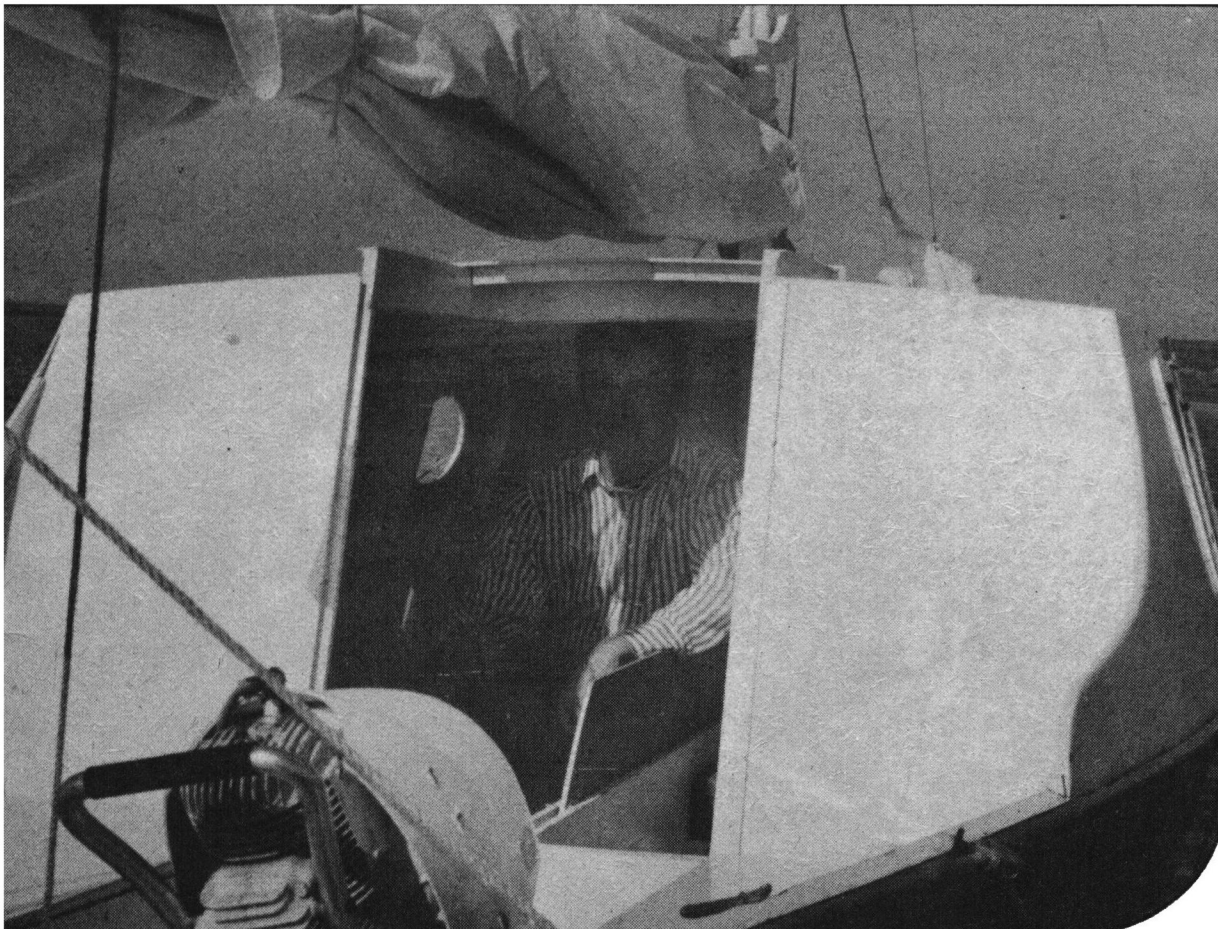
## Miscellaneous

The Plexiglas ports are approximately 11" square, but follow the top and bottom curves. The round port is 8" in diameter. Plywood facings 1¼" wide are screwed on the outside, and ⅜" Plexiglas set in silicone rubber sealer is screwed to the inside.

Foam rubber 4" thick is cut to fit the bunk platform, and side seats in the cockpit are hinged to provide storage underneath. Rub rails are 1x2 mahogany, bolted through the sheer clamp. Inside ballast is 150 lbs. of sand in bags placed in bow.



*Interior of cabin. Blue Moon will sleep two comfortably in 6'4" berths with sitting headroom in an 8'6" cabin. Cabin also has room for stove, chemical toilet.*



### BILL OF MATERIALS

Quan.	Size and Description	Use
<b>Clear Fir ripped from 1x10'sx16':</b>		
26	1x2x16'	Sheer, Chine, framing, stringers, etc.
16	1x4x16'	Frames, bottom stringers, mast
3	1x6x16'	Keel, cabin top beams, deck beams, splice block

#### CLEAR FIR

1	2x4x16'	Transom
1	2x4x10'	Boom and Gaff
1	2x6x12'	Stem, front skey, stem and transom knees
1	2x8x12'	After skey, 2 bulkhead knees and tiller

#### HARDWOOD

1	1x4x8'	CB front and back posts, sliding hatch runners, gaff jaws, etc.
2	1x2x16'	Philippine Mahogany for rub rails
<b>PLYWOOD SHEETS: Exterior Grade (AC)</b>		
12	4x8x1/4"	Side and bottom planking, cabin sides, top, deck and gussets
3	4x8x1/2"	CB and CB case, rudder, seats, flooring
1	4x8x3/8"	Cabin bulkhead, companion way door

#### BOLTS, LAG SCREWS and SCREWS (Approx. numbers) All plated steel

1/4" Bolts	1 1/2"-35; 2"-36; 2 1/2"-15; 3"-10; 3 1/2"-10; 4"-22; 4 1/2"-10; 5"-4; 5 1/2"-4; 6"-8.
1/4" Lag Screws	2 1/2"-26; 4"-2; 6"-2.
3/16" Bolts	1 1/2"-42; 2"-32; 2 1/2"-30; 3 1/2"-6.
1/2" Bolt	10 -1.
1/2" Eye Bolt	10"-1.
4 Gross 1"x#10 f.h. screws; 2 gross 1 1/2"x#10 f.h.; 1/2 gross assorted screws (1 1/4"-1 3/4"-2 1/2")	

#### FITTINGS (Galvanized)

36'	1/8" wire rope
6	1/8" wire rope clamps
6	1/8" wire rope thimbles
1	3/16"x1 1/2" flat plated steel for chain plates

3	6" cleats
6	4" cleats
5	Single pulleys
1	Double pulley
2	Swivel pulleys for jib sheets
8	1/4 x3" Eyebolts
4	1/4 x2" Eyebolts
1	1/2"x3 1/2" Eyebolt and Shackle for Boom
10	1 1/2" Snaps for Jib
1	3" Snap Jib Sheets
1	12 lb. anchor
6'	3/8" chain
2	1/2" Pintles for rudder
2	8" Turnbuckles
1	6" Turnbuckle

#### FIBERGLASS and RESIN

9 yds.	50" Fiberglass cloth
4 gals.	Resin
1	Black, 1 White and 1 Red 1 1/2 oz. tinting colors
2 gals.	Acetone (clean up)
<b>GLUE and PAINT</b>	
1 gal. can and 1 qt. can of	Weldwood powder glue
2 gals.	Semi-gloss White enamel
1 gal.	Gloss White enamel
1 qt.	Red Epoxy
1 qt.	Black Epoxy

CANVAS	8 oz. 36" wide
10 yds.	Mainsail
6 yds.	Jib

#### ROPE

150'	1/4" Manila Rope
35'	1/4" Nylon Rope

#### PLEXIGLASS

As needed for four square and two round ports.