

FLYER,

A 135 Cu. In. Class Hydroplane

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ABSOLUTE maximum speed, is the cry of many race drivers. For a race, they want a boat that will go fast—sufficiently fast to win; and if it will, other features of it do not matter.

The 135-Class Flyer is designed to give maximum speed, but maximum speed under normal competitive conditions. Factors of design giving straight-away speed, turning ability, and ability to ride rough water have been so proportioned that in an actual race a high peak of speed is reached.

Racing in the 135 cubic inch class has been steadily increasing in popularity to an extent that a general description of the class and its rules is unnecessary. This new Flyer has been particularly designed to meet competition in this class, the design

having been made since the announcement of the new boat measurement requirements in the 1936 rules. These new rules call for a boat not less than 13½ feet long (waterline length) and with a beam of not less than 4 feet, 4 inches.

As can be seen from the profile drawing, a perfect stream-lining has been achieved. The 135-Class Flyer has been designed on the principle of carrying most of the weight on the foreplane, so that a wide afterplane is not necessary. While length and beam are somewhat over the minimum prescribed, because of its shape it is, really, a small boat.

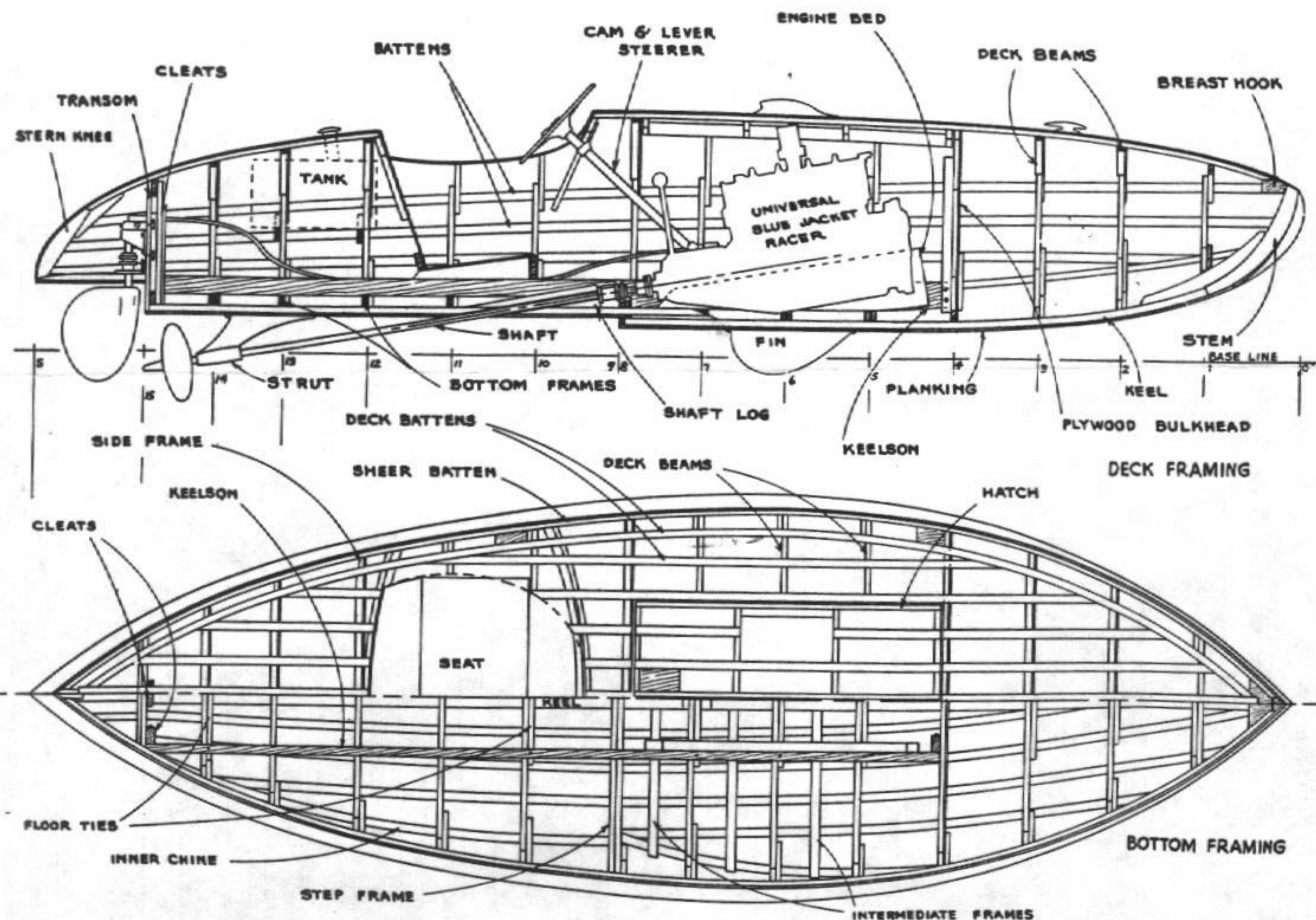
Construction is much more simple than it might seem offhand. The pointed stern is built similar to an upside down bow. The transom is used the same as ever, and serves as an additional bulkhead. No rabbeting, except in the stem, is required.

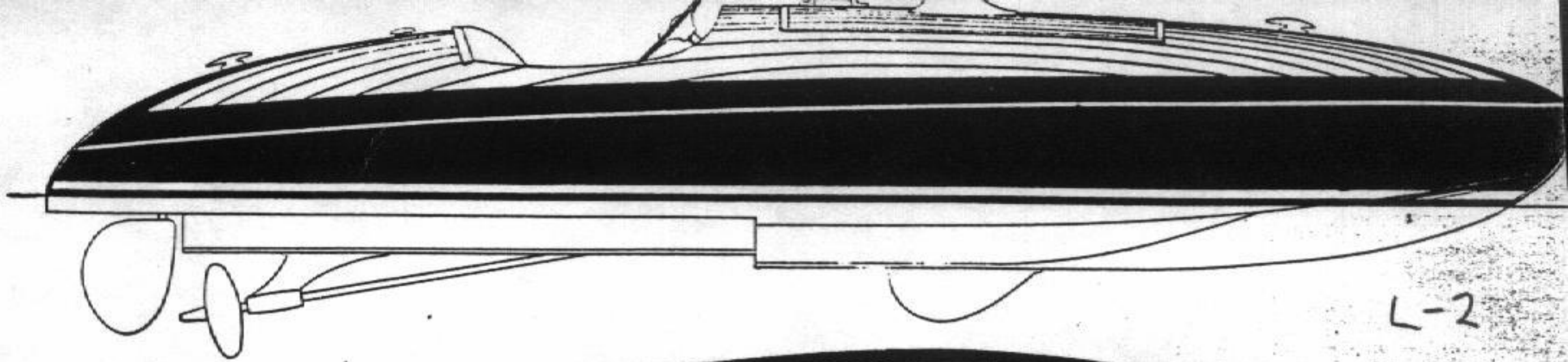
The type of construction called for is about as light as is practical considering the strength necessary and it is not advisable to build the boat lighter.

Among the motors specially well suited are the Gray Racing Four and the Universal Blue Jacket Racer.

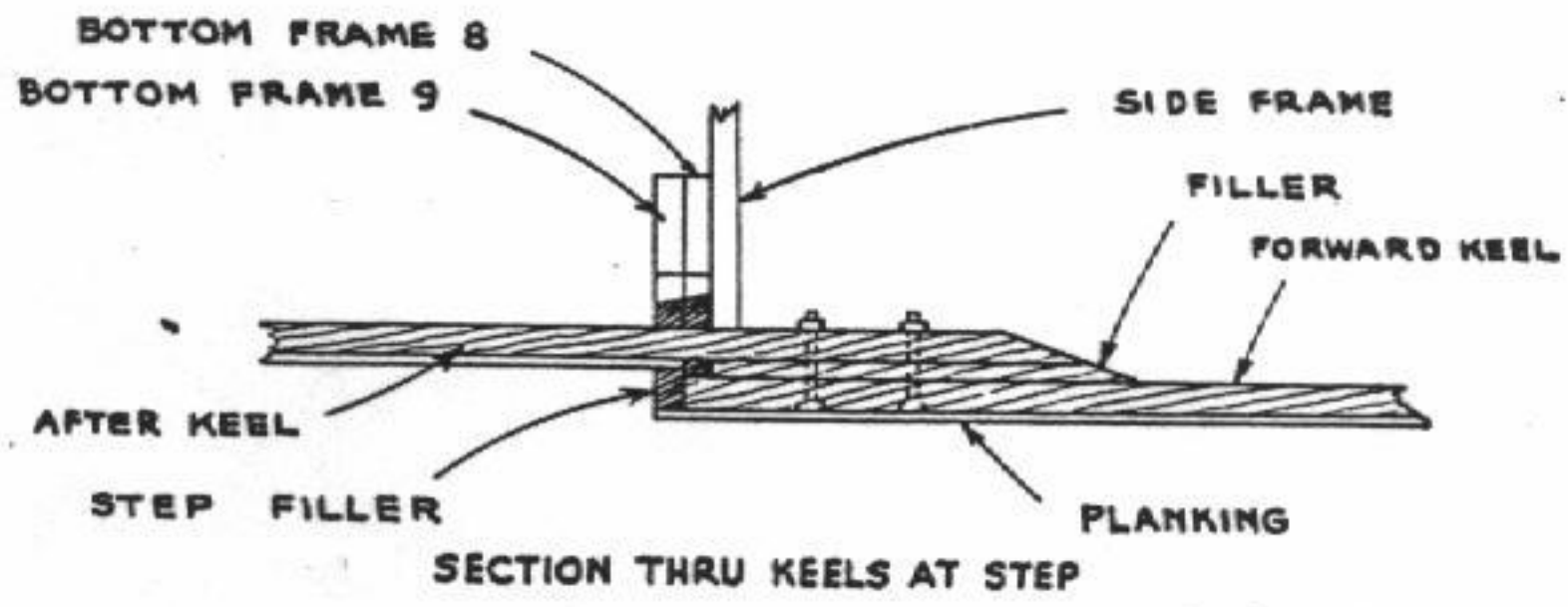
The most important measurements are as follows: over all length 15 feet, 2 inches; waterline length 14 feet, 8 inches; length of afterplane 5 feet, 8 inches; height of step 1½ inches; waterline beam 5 feet; beam of running surface, at step 40 inches,

An inboard construction profile and half deck and floor framing plans for 135 class hydroplane





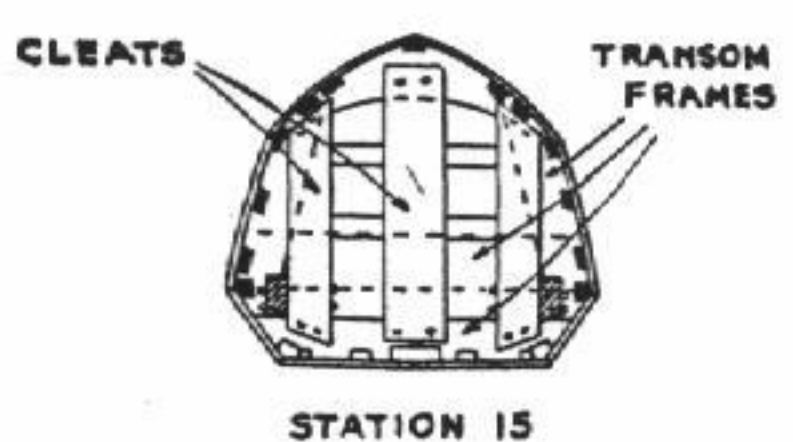
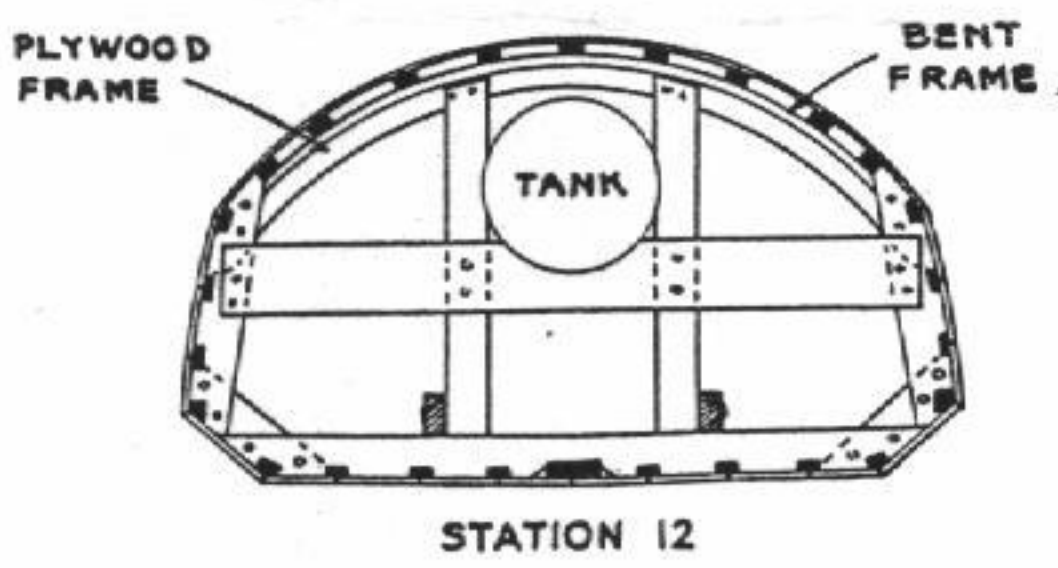
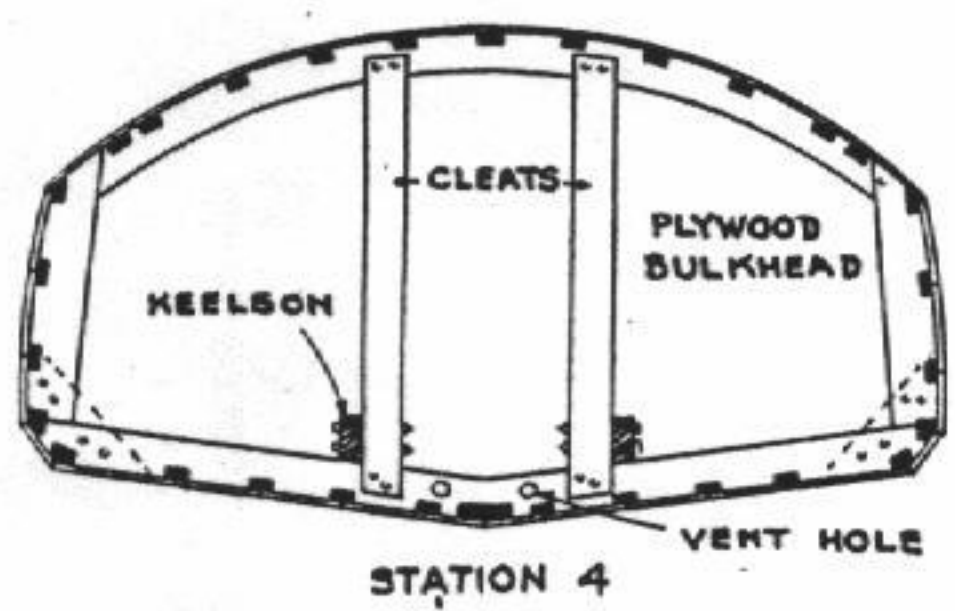
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Outboard profile and deck plan above with sections and details at the left

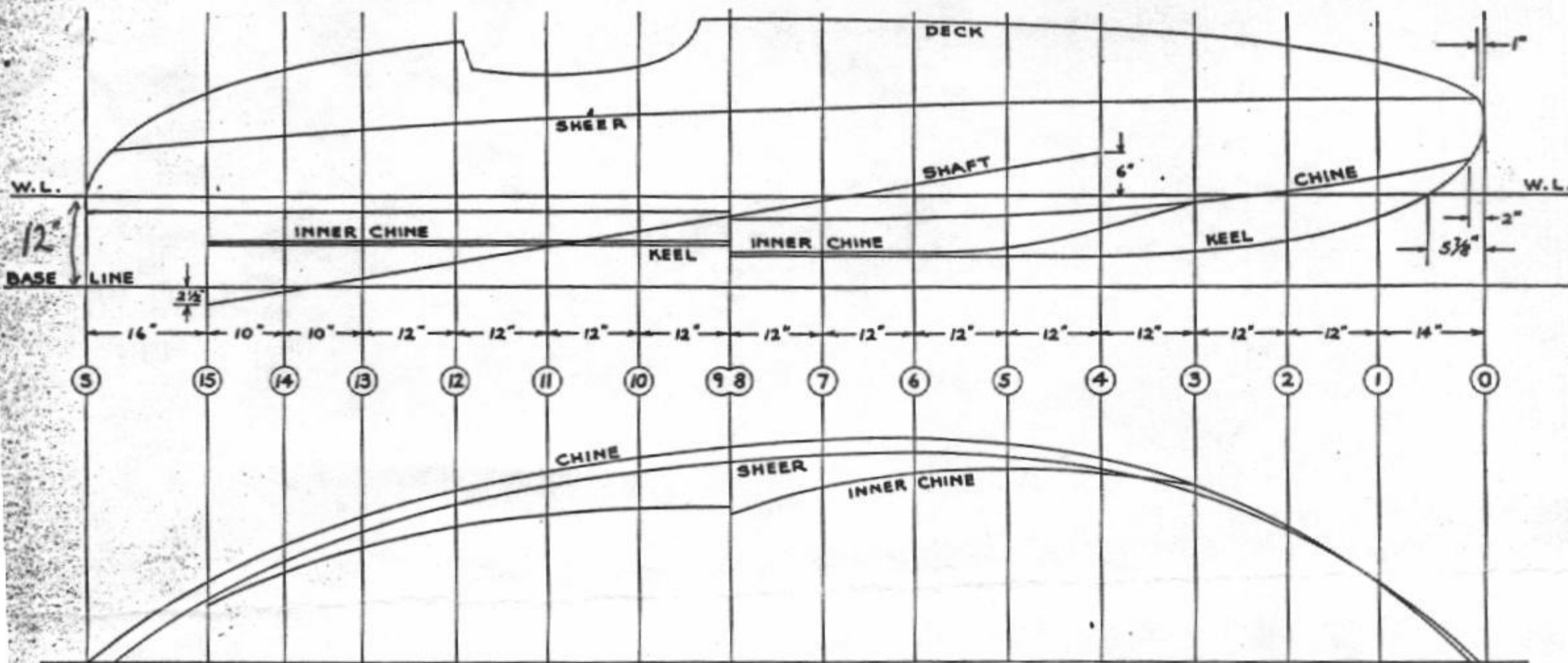
and beam at the transom should be 16 in.

The first thing to do before starting construction is to lay out lines for the entire boat full size on a sheet of wrapping paper that is at least 16 by 3½ feet. Start by drawing the base line about 4 inches from the edge; then draw the waterline in 12 inches from the base line. Next draw lines perpendicular to this base line to represent the locations of the various stations, taking measurements from the drawing. Now take the measurements from the table of offsets and draw the entire profile, using a bending batten. With the base line now representing the center line, draw in the plan (horizontal view). Using the perpendicular lines as center lines, next lay out the lines for the various stations in cross section. The deck frames and curves of the side frames can be laid out with the aid of a long piece of string tied to a pencil as a compass. The side frames will all be the same curve, using approximately the same curve as deck frames No. 6 or 7. Now make the proper allowance all around for the thickness of the planking and draw in the complete bottom, side and deck frames approximately as shown in the sectional drawings. By punching through the paper at the important points, using a marking wheel if desired, the frames can be marked onto the planks from which they are to be sawn.



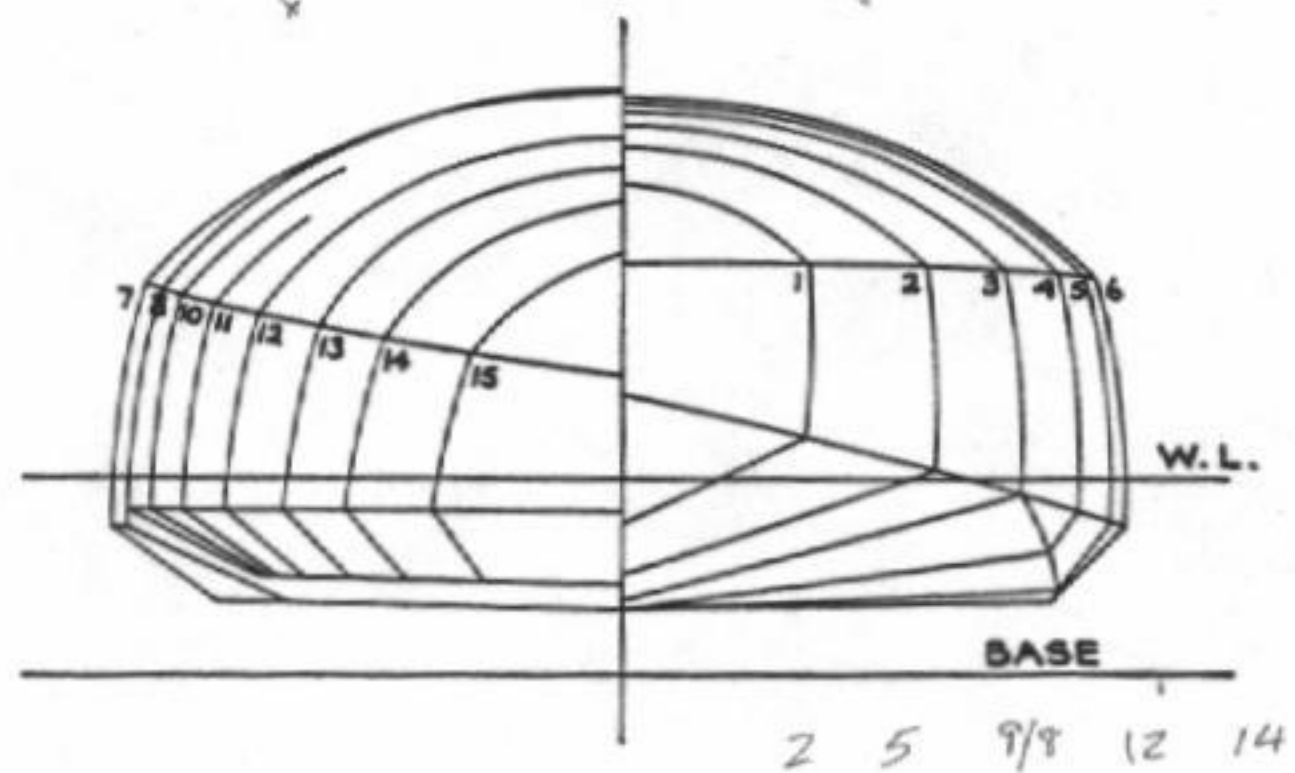
The boat should be built upside down on a framework built up from the floor. The essential part of this will consist of a keel form, a large plank, on which the keel, frames, etc., will rest. Take the measurements for this from your full-size drawing and allow for the thickness of the planking, keel, transom, stem and stem knee, all of which will be clamped to the form. Mark out the locations of the bottom frames on the form and cut notches to the correct depths, for the frames to rest in. Allow space for the after-keel to run forward to frame No. 7.

The bottom frames, except Nos. 1, 2 and 3, can each be cut out in one piece. The transom should be set up as shown in the drawings, with the transom frames screwed and glued to it, with waterproof glue. Step sections Nos. 8 and 9 should be screwed



and glued together. When all the frames are cut out, check them by placing them over the drawing before fastening the side and bottom frames together. They should be bolted with at least two 1 1/4 No. 10 brass machine screws. Cut notches in the bottom frames for the keel and then set up the frames, transom, keel, stem and stem knee in position on the form. The two keels should be bolted together, with the right size filler piece between. The stem will, of course, first have to be cut to shape and rabbeted to the right depth for the thickness of the planking to be used. The stem knee and stem should be fastened together, and to the keel, with 2-inch No. 10 screws. Fasten the keel also to each bottom frame and transom frame with 2-inch No. 10 screws.

In order to make sure that all frames are set up evenly it will be necessary to measure from the chine to the floor on both sides. The frames can then be held in place by clamping them to braces from the floor. Notches for the keel, chines, inner chines and battens should be cut into the frames, step and transom frame. Notches should be cut into the transom for the side battens and chines only. Chines and battens should be dressed down so that they do not notch into the stem more than three-eighths of an inch. The chine from the afterplane should run forward at least to frame No. 5,



in order to provide for extra strength. Screw the chines to the frames, transom frame, stem and breast hook with 1 1/2-inch No. 8 screws, and fasten the battens with 1 1/4-inch No. 7's. Use at least as many battens as shown in the drawings, so that the bottom planking, except on the beveled chines, will never be over six inches wide. Cut notches in the frames (except into No. 4) along both sides of the keel, for a waterway.

The intermediate frames of the foreplane can now be put in. They will run from inner chine to keel only. Use for these intermediate frames some of the same material that is used for battens. The

TABLE OF OFFSETS

STATION	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	S
HALF BREADTHS																	
SHEER		11	18	22-6	25-7	27-4	28	27-6	26-7		25-4	23-4	21	17-4	13-6	8-5	
CHINE		10-6	18-3	23-6	27-1	29-1	30	29-6	28-7		27-3	25-4	23	19-4	15-7	11	
INNER CHINE				23-6	25-2	25-7	25-3	23-4	20	21	20-6	20	18-3	15-5	12-4	8	
HEIGHTS																	
BASE TO KEEL		9-2	6	4-6	4	4	4	4	4	5-4	5-4	5-4	5-4	5-4	5-4	5-4	
BASE TO INNER CHINE				11-1	7-4	5-1	4-4	4-4	4-4	6	STRAIGHT LINE					5-6	
BASE TO CHINE	17	14-3	12-4	11-1	10	9-3	9	9	9	10	10	10	10	10	10	10	10
W.L. TO SHEER	13	13	13	12-7	12-5	12-3	12-1	11-7	11-4		11	10-4	9-7	9	8-2	7-4	6-1
W.L. TO DECK	13	17-7	20	21-3	22-1	22-6	23-1	23-3	23-4				20-4	18-7	17	13-7	

ALL DIMENSIONS IN INCHES AND EIGHTHS TO OUTSIDE OF PLANKING

The lines in profile and section above with the offsets table at left, necessary for laying down in full size

purpose of these frames is to prevent splitting of the planks at the points at which the greatest pounding is received.

The space between the transom and the stern should be made watertight, making the transom, in effect, a second bulkhead. The stern knee is much like the stem, but with no rabbet. Battens and chines will be fastened to it in the same manner as they were fastened to the stem.

Next bevel the keel and chines and fair the frames, transom and stem so that the planking will fit perfectly. Both planes should be carefully trued with a straight-edge. Fit the planks so that the seams come over the center of each batten. Before screwing down the planks place a strip of cotton flannelet soaked with marine glue over each batten and over keel, chines, transom, step and every joint that should be watertight. Seams below the waterline should be left open at least 1/16-inch to allow for swelling. Screw the bottom planking with flat head brass screws as follows: (1) double row into transom and transom frame, 1-inch No. 7, spaced about 1 inch apart; (2) into stem, 1-inch No. 7, spaced not over 1 inch apart; (3) into step frames and step filler, 1-inch No. 7, spaced 1 inch apart; (4) into keel, chines and frames, 1-inch No. 7, spaced 1½ to 2 inches apart; (5) into battens and inner chines, 7/8-inch No. 7, spaced 1½ to 2 inches apart.

The entire afterplane should be planked before the foreplane. Fit the step filler with plenty of glue and screw to the step before starting to plank the foreplane. Most of the side planks will have to be made in two pieces in order to secure a straighter grain. The decking and side planking should be screwed in the same manner as the bottom planking, except that 3/4-inch No. 6 screws should be used in the battens.

When the bottom and side planks are on, the boat can be removed from the form and turned right side up. It should then be well braced and held in the proper position until the decking is on, so as to prevent the two planing surfaces from getting out of line. This is important. Then the keelsons can be cut out and fitted over the bottom frames, shaped and spaced in accordance with the motor to be used. For some motors a separate engine bed, bolted to the keelsons, is necessary. Bolt the keelsons to cleats which are fastened to transom frames and frame No. 3. Also bolt them to the floor ties, all of which should be put in at this time. The shaft log can now be screwed to the keel and the shaft hole bored, unless this was done before the boat was set up. The shaft log should be of oak, or of the adjustable bronze type. It will be best to use a 7/8-inch Monel metal or steel shaft, as these cause less resistance than will a larger bronze shaft. The rudder will have to be installed with a special brace to a transom cleat, as shown. The steering gear can be of the cam and lever type, as shown, or any preferred type. The racing rules call for a throttle that will automatically shut off; use of a foot throttle, such as the usual automobile accelerator, is suggested.

The strut and fin should be bolted to the keel. A rubber bearing in the strut will give the least resistance and therefore the best speed. The strut will have to be cast in bronze from a special pattern and it will prove best to make the rudder the same way in order to have it properly stream-lined. The fin should be cast in bronze or aluminum and measure about 14 by 6 inches.

Screw the plywood bulkhead to station 4, and make a watertight joint all around by the use of cotton flannelet and marine glue. Two holes should be drilled as shown, for ventilation and to prevent water from staying ahead of the bulkhead. They should be plugged when the boat is in operation.

THE entire inside of the hull should be painted before the deck beams are all in place. Make the deck beams of 1/4-inch plywood with 3/4- by 1/2-inch oak pieces which are bent to shape and screwed to each frame. Battens should be fastened to the oak. This makes an exceptionally light, strong construction. The decking, except for the covering boards, should not be over 3 inches wide. Any number of battens may be used, according to the strength desired. The decking should be waterproof from the stem to the bulkhead. Instead of using a coaming of any sort the cockpit edges should be padded with kapoc and covered with the same material as used on the seat cushions.

Sand the entire hull before commencing the painting or varnishing. The bottom should be finished with at least three coats of special hard racing bottom finish.

To make a uniform and snappy appearance use all the same material for deck fitting and trim. Either aluminum, polished brass or chromium plated brass is recommended. The sheer molding should be 1/2-inch half-oval. Some of this half-oval can also be used to protect the stem.

Specifications

Planking: bottom 3/8 inch mahogany; sides and deck, 1/4 inch mahogany.

Frames: bottom and sides, 3/4 by 2 1/2 inch spruce, or 5/8 by 2 1/2 inch oak.

Deck Beams: 1/4 by 2 1/2 inch plywood reinforced with 3/4 by 1 inch bent oak; numbers 1, 4, 5, 6, 7, 15 and dash and seat back frames, 3/4 by 2 1/2 inch spruce or mahogany.

Floor Ties: 5/8 inch oak.

Chines: 1 1/4 by 1 1/4 inch spruce or 1 by 1 inch oak.

Inner Chines: 3/4 by 1 1/4 inch spruce.

Battens and Intermediate Frames: 5/8 by 1 1/4 inch spruce.

Transom: 1/2 inch mahogany.

Stem and Knees: 1 1/2 inch oak.

Keelsons and Engine Bed: 1 3/4 inch spruce or 1 1/4 inch oak.

Transom and Bulkhead Cleats: same materials as keelsons.

Seat, Seat Back and Bulkhead: 1/4 inch plywood.

Keels - 1 1/4" x 3 1/2" ~~oak~~ spruce
or mahog. L-4
1 x 3 1/2" if oak

