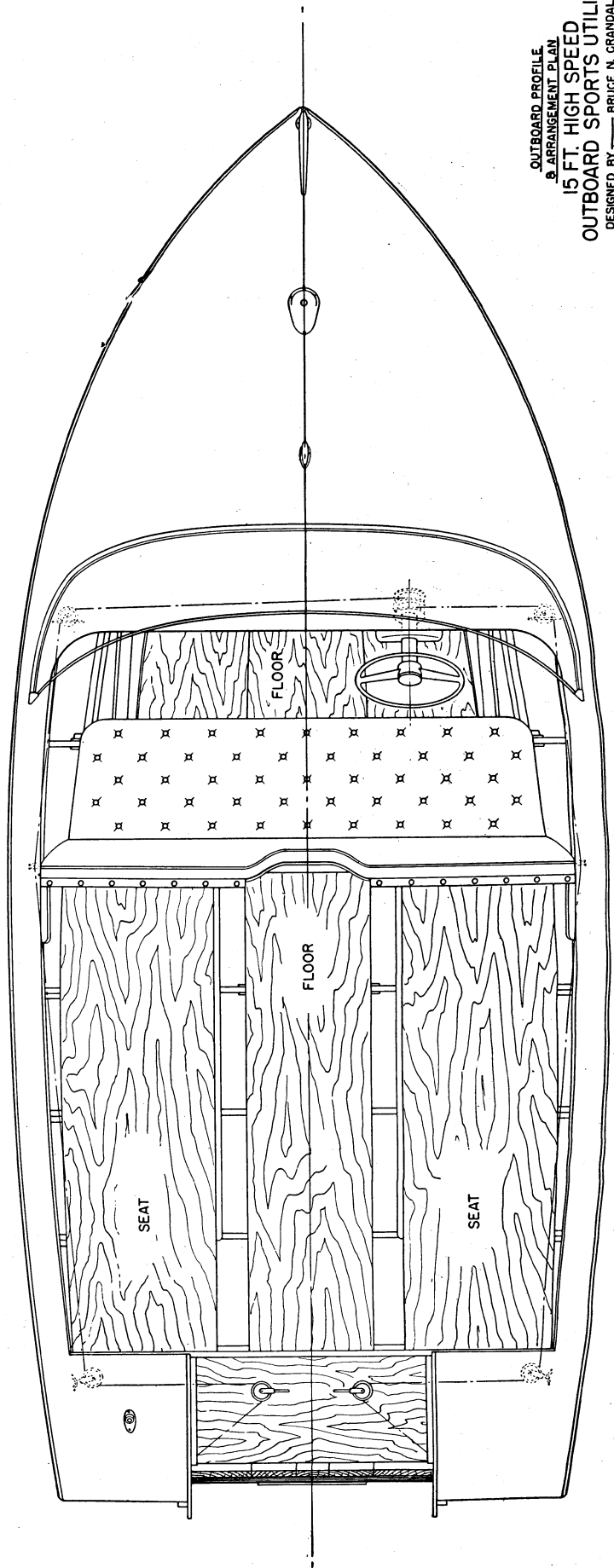
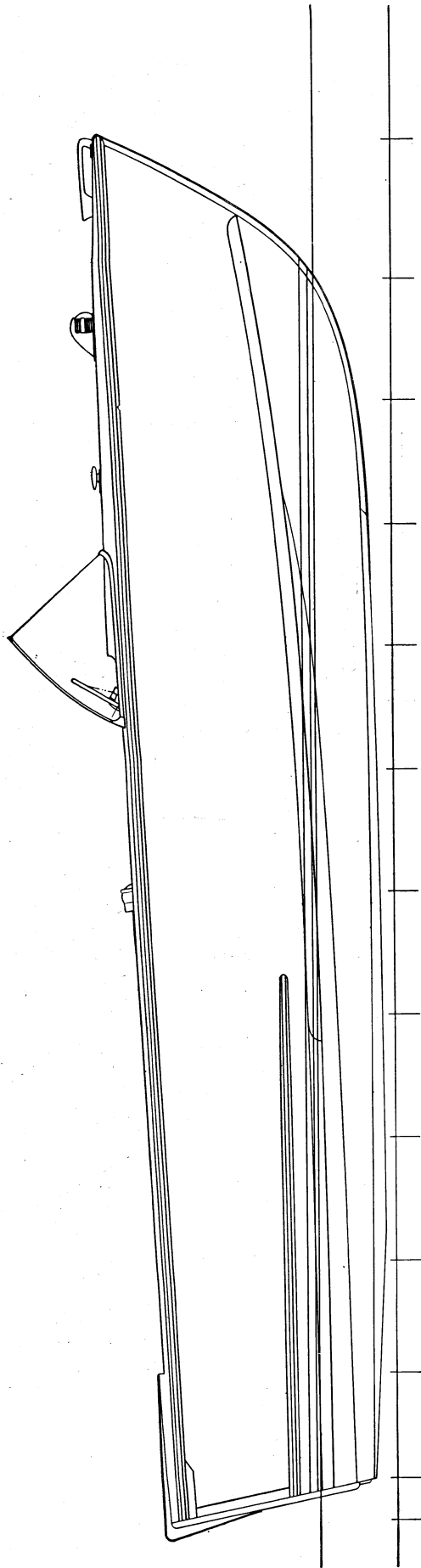




OUTBOARD PROFILE
& ARRANGEMENT PLAN
15 FT. HIGH SPEED
OUTBOARD SPORTS UTILITY
DESIGNED BY — BRUCE N. CRANDALL

15' HIGH-SPEED OUTBOARD UTILITY

Sheet plywood can
more than hold its own
when it comes to
a design offering both
speed and load

By Bruce N. Crandall

HERE IS A NEW DESIGN that offers a remarkable combination of speed with soft riding and load-carrying ability. It is a convex-V-bottom, developable-surface, high-speed type designed for planing speeds in rough or choppy waters. Large nontrip chines, extra beam and flare and good banking and handling characteristics make it exceptionally safe for its size.

This boat features a somewhat new type of soft-riding, high-speed bottom design, which was developed as a result of a certain amount of experimentation and model testing. As compared with my previous, semiround, high-speed bottom designs, it represents an attempt to increase the boat's efficiency as much as possible with a heavy load, and also at low planing speeds, without affecting its efficiency at higher planing speeds or interfering with the soft-riding or handling characteristics.

One of the inherent advantages of designs for sheet-plywood construction is that it is possible to reduce suction drag by causing the water to break clear at the chines as well as at the transom; and my principal reason for wanting to develop a new type of plywood design was to take the fullest advantage possible of this characteristic. With any boat, at high planing speeds a good proportion of the water breaks clear at the transom; and if the planing surface ends at the transom with a sharp break, there is little or no suction drag there. But at lower planing speeds

and with heavy loads, much of the water is thrown off from the sides of the planing surface and must break clear with a sharp break at the chines to prevent suction drag there. Round-bilge boats are at a considerable disadvantage in this respect, as a lot of suction is caused as the water is drawn around the turn of the bilge and up the side, near the transom. Fiber-glass-plastic designs are all at a somewhat similar disadvantage; since they cannot have an absolutely sharp break at the chines or even at the transom, they produce some suction drag at both places.

My previous, semiround, high-speed bottom designs were apparently also suffering from some suction drag at the chines, especially at low planing speeds and with heavy loads. In this new design, the amount of round (or convexity) in the after part of the planing surface has been reduced just enough to eliminate the last vestiges of suction drag near the chines at planing speeds. Because the amount of round (or convexity), as well as the depth of dead rise, contributes (though in a different way) to soft riding, it was found advisable to increase the dead rise slightly to keep the boat equally soft-riding. Similarly, because suction drag at the chines produces a higher banking angle on turns, it was necessary to use large beveled chines on this design for equal safety.

The performance of the test boat was very gratifying, as it tended to uphold all of my theoretical decisions. The water breaks completely clear at the bevel chine at all normal planing speeds and does not even touch the spray rails except in rough water or with a heavy load. The surfaces

formed by the bevel-chine planks add extra buoyancy and stability in displacement condition and extra planing surface for quick planing even with a load; after planing speed is reached, they ride entirely clear and cause no drag.

The test boat was run all summer with a 65-hp motor, which I considered to be about average, in power and weight, of the motors with which the design will be used. It was tested under all loads and many water conditions and was run at full speed through all kinds of wakes, to see if any possible flaws could be found in the design. The results were so satisfactory that I intend using the same basic bottom lines for several new plans in the future. A runabout version of this design is already finished; large-scale blueprints of it are now available.

The banking angle is somewhat reduced as compared with that of my semiround bottom designs or of various round-bottom planing boats. I consider it, however, an ideal banking angle for a boat with large nontrip chines. One advantage is that, because the banking angle is not being influenced by suction, the boat cannot lose its bank suddenly in the middle of a turn, as can happen with some round-bottom designs. The owner of the largest marina in our area tested the boat considerably himself and said afterward that it was the best-performing outboard boat he had ever seen. One reason I used a 65-hp motor for the testing was that on our chain of lakes where the testing was done, there are large numbers of outboard boats of just about this size and slightly smaller that are powered with 75-hp out-

board motors. I was interested not only in the actual speeds of the design but also in comparing it for speed and efficiency with as many other types of designs as possible of the same general size and weight. Chance may have played a part in this—but I never found another outboard boat that could keep up with me, although I ran alongside many with 75, 80 and 85 hp. As a result of all this, I am more convinced than ever of the superiority of developable-surface plywood designs.

I was asked by quite a few people who saw the test boat in action if it would be put into production or if it *could* be put into production. Like other sheet-plywood designs, however, it is well adapted to amateur construction but, compared with round-bottom lapstrake boats or fiber-glass-plastic ones, it would be generally expensive for factory production because of labor costs.

The arrangement plan shows seating space for up to nine people. However, the normal load limit for a boat of this sort would be about six people even in calm water and about four when it is rough. This type of seating arrangement was chosen so that the load can be moved forward and aft and from side to side to suit various conditions and speeds. This arrangement is also adaptable to various uses, such as fishing, skiing and skin diving, and is suitable to various motors. Hand-starting motors are easily accessible, and the seats and deck do a good job of hull bracing.

Any other arrangement can be used, however, to suit special needs, provided that the steering position is not moved forward of the location shown. For certain types of fishing, for example, it is often desirable to have the driver's location near the fore-and-aft center of the boat, with plenty of open space surrounding him. For water skiing, the location shown for the forward seat gives on the average about the right fore-and-aft balance; but for just plain boat riding, the speed will be increased in most cases if some of the weight is placed aft. The runabout version of this design has two cockpits, with walkway between, each with full-width seat. Also, the front seat is farther aft and the size of the non-trip chines and the overall beam increased to make this runabout version suitable for motors up to 100 hp.

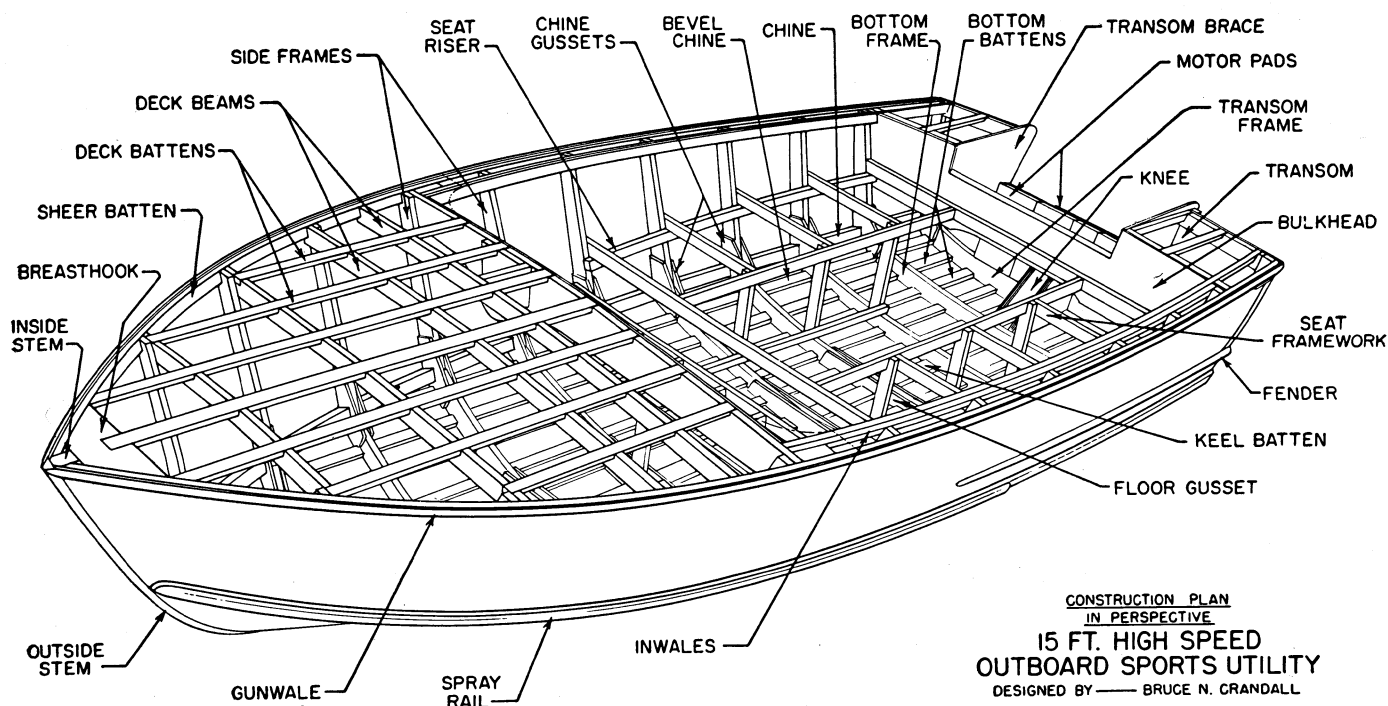
The approximate speeds that can be expected with various-horsepower outboard motors and various loads are as follows:

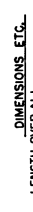
	Two	Four
Motor	Persons	Persons
20-hp	21 mph	16 mph
25-hp	24 mph	20 mph
30-hp	26 mph	23 mph
40-hp	30 mph	28 mph
50-hp	33 mph	31 mph
60-hp	36 mph	34 mph
70-hp	38 mph	36 mph
80-hp	40 mph	38 mph

These speeds are based on a hull weight of 530 lbs. with an allowance of 150 lbs. per person and an allowance for the average weight of motors

and fuel. They also assume a nearly correct propeller-and-gear ratio and the most advantageous fore-and-aft and side-to-side weight distribution. They are calculated speeds, based on a complicated series of calculations, and do not necessarily represent the exact speed obtainable from any certain make or model of motor. The actual test runs with the 65-hp Mercury showed speeds, as a result of both speedometer and timing, of approximately 37 mph with two people, 35 with four and 33 with six, all of which agrees very well with the calculations. The speed table is included here as an aid in selecting a suitable motor or in determining whether or not your present motor is well suited to the design. The speeds are figured for single motors, and dual-motor installation of the same total horsepower would usually be somewhat slower.

As with any developable-surface design, there is a very wide choice of materials that could be used for planking. For example, any type of wood planking could be used instead of plywood, and straight planks can be applied without spiling. The weight of 530 lbs. given in the Lines Plan is based on the use of $\frac{3}{8}$ " plywood bottom with $\frac{1}{4}$ " sides and deck and on the use of spruce for most of the framework, with some oak. The choice in plywood will range from standard exterior-grade Douglas fir to the more expensive types of marine plywood—including various kinds of mahogany and overlaid ply-





LINES PLAN
15 FT. HIGH SPEED
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wood, such as Harborite and Weldwood Royal Marine Duraply. The drawing of the Construction Plan in perspective is included as an aid in understanding the other plans, particularly the Construction Plan and Construction Sections.

It will be best to reproduce the entire Lines Plan full size before starting construction, especially if you have had little or no previous boatbuilding experience. Use a sheet of plywood or heavy paper or a section of smooth floor for this work. Start by drawing the base line with the aid of a string stretched tight. This can be used also as a center line to save space, as there is no harm in superimposing the plan and profile views. Next, draw and label all the station lines, buttock lines and waterlines. And finally, draw the entire plan and profile views, using the measurements in the Table of Offsets and appropriate bending battens for drawing the lines. The Table of Offsets is simply a table giving the measurements exactly straight up from the base line or, in the case of the half breadths, straight out from the center line. After the plan and profile views are completed, the Body Plan can be drawn, with the measurements taken from your full-size plan and profile drawings. Both sides of each station, of course, must be drawn on the Body Plan. This whole procedure is called lofting, or laying down the lines, and is described more fully in boatbuilding books such as *Boatbuilding* by Howard I. Chapelle and *Small Boat Construction* by Robert M. Steward.

If you have had enough previous boatbuilding experience and wish to short-cut the work, besides the Body Plan it will be necessary to draw only the rabbet line, stem and transom in profile view and enough of the plan view at the stern to get the measurements of the expanded transom and its bevels.

In drawing the Body Plan, you can draw the stations with a bending batten measuring a little less than the thickness of the planking you intend to use. Thus, as you proceed with the lofting, you can at the same time deduct the thickness of the planking to show the exact frame dimensions. The lines for the outside of the planking can be drawn very lightly, and those for the inside, representing the actual frames, can be drawn more heavily, or in color, along the other side of the bending batten. The curvature of all deck beams is shown on the Lines Plan, and they can be drawn on the Body Plan with the aid of a template. You can then check the fairness of the deck by drawing a deck center line

on the profile view. There need not be any deduction for deck thickness. Later, the frame curvature and measurements can be transferred to the frame material and the entire framework checked and assembled over the Body Plan.

As an alternative, each station on the Body Plan can be drawn on a separate sheet of heavy paper. This will avoid confusion and will simplify the process of transferring the shapes to the frames themselves. One method of transferring is to prick through the paper onto the material from which the frames are to be cut. With each station drawn this way on a separate sheet of paper, the inside lines of the frames can be put on the drawing and the chine and floor gussets shown too.

Some of the transom construction will have to be drawn on the plan and profile views so that you can determine the shape and size of the expanded transom. It is best to draw this separately, then onto the plywood from which the transom will be cut. The bevels on the transom and transom frame can also be determined this way. All the frame bevels can be determined roughly from the full-size plan and profile drawings, and any construction details can be drawn in from time to time as seems necessary. After the drawings are completed, you will probably want to draw another base line on the profile and Body Plan drawings above the sheer to represent the floor of your shop.

All of this lofting, or laying down the lines, is a long and perhaps tiresome job; but it is very important from the standpoint of doing better and more accurate boatbuilding, and it prevents mistakes later on. The larger and more expensive the boat, the more worthwhile it becomes to do the complete lofting job yourself. For those who do not want to tackle the lofting job, I am offering a full-size drawing along with the large-scale blueprints of this boat. The full-size drawing consists of the complete Body Plan (both halves) drawn to the inside of the planking plus the inside stem and expanded transom full size. Also included is a scale drawing with dimensions of the keel form. A similar full-size drawing is available for the runabout version.

Assemble the frames, gussets and deck beams, using resorcinol glue, or other waterproof glue if preferred. Side frames can, if you wish, be left long enough to reach the floor of the shop and can be fastened there and cut off later. The gussets can be fastened to the frames with 1" corrugated nails or with 1" No. 7 or 8 screws. The deck beams at Stations 1,

2, 3 and 4 can be put into place now or after the hull is turned right side up. They should be fastened to the side frames with 2" No. 10 machine screws or bolts or with 1¼" No. 7 or 8 screws. All these fastenings must be set far enough in to allow for the chine notches and for the bottom-, sheer- and keel-batten notches. The center line should be marked on the floor gussets while the assembled frame is in position over the full-size drawing.

The transom and transom framework can be assembled in the same way as the frames, screwing from the transom into the framework and using 1" or 1¼" screws, depending on the transom thickness. The height of the transom cut, as well as its width, will depend on the motor you intend using. The transom stiffener is bolted to the transom with 5" bolts and ordinarily should be about 5½" below the transom cut.

Temporary crosspieces should be fastened across the tops of the side frames and the center line marked on these pieces and on the deck beams if they are in place. Now, if you wish, you can bevel the frames, taking the bevels from the full-size plan and profile drawings. Notches for the keel batten can also be cut into the bottom frames and gussets and into the transom frame—but not into the plywood transom itself. The inside stem and forefoot should be drawn full size on the plan view and then the parts cut out and assembled as shown on the Construction Plan. They are fastened to each other with 5" bolts. The stem and forefoot are also reinforced with plywood cheekpieces glued and either screwed or nailed to both sides.

The hull is best built upside down on a framework supported from the floor, or on two larger timbers if built where there is no wood floor. The most convenient method of setting up the hull is on a keel form, or backbone, on which the keel batten, frames, transom assembly and forefoot will rest. The keel form should be made from an 8" or 10" plank, whose measurements are taken from the full-size profile drawing after the thickness of the planking, keel batten and forefoot is deducted. Notches in the keel form are cut to receive the frame assemblies at the proper locations. It will be noted from the Construction Plan that the frames are all placed just ahead of the station lines. Nail uprights at each station, and set up the keel form at a height convenient for working.

Station lines and center line should be marked on the floor if possible. The keel form must be perfectly straight, correspond to the center line

on the floor and be well braced in position. The frames are set into the notches in the keel form and are checked to see that they are plumb and centered correctly over the center line and station lines on the floor. You can then brace them in position by temporarily fastening them to the floor. The keel batten may now be fitted into position in the notches and the inside stem and forefoot fastened in position and braced. The transom-knee measurements should be worked out on the full-size profile drawing. The knees will be fastened to the inside motor pads, transom stiffener and keel batten with 1¼" and 1½" No. 8 screws closely spaced. The transom assembly must of course be set up in position, lined up with the rest of the boat and braced to the floor.

When everything is lined up and looks reasonably fair, the keel batten can be permanently put into place and fastened to the transom frame, bottom frames and forefoot with 1½" No. 8 screws, two at each station and several into the forefoot on the center line. Resin glue can also be used here, as well as in such notches as those for the battens and chines. The notches for the chines can now be cut into all frames and the transom frame, but not into the plywood transom itself. The chines are also notched a little way into the inside stem. The chines are made from two ½" pieces, to facilitate bending and at the same time give sufficient bearing for the screws from the bottom and bevel-chine planking. Resin glue should be used between the two layers. Clamp one of the chine pieces in position before cutting the chine notches, to make sure of getting a true curve and the proper bevels. While cutting the chine notches and putting the chines into place, be sure that the frames stay at right angles to the keel form and that the stem and transom also stay in proper alignment. The chines can be fastened with 1¾" and 2" No. 10 screws.

After checking to see that the side frames are still plumb and on the station marks, you can now cut the notches for the sheer battens. Do this in the same way as the chine notches, by first clamping a batten in position to check the fairness and to get the right bevels. The sheer battens can be fastened with 1" No. 7 or 8 screws to the side frames and with 1¼" No. 8 into the stem.

Now will come the tedious job of fairing the entire framework and checking all the bevels so that the planking will fit perfectly. Many battens bent around the hull in various directions and clamped in position will aid in the procedure. Sighting

along them will show various imperfections in the beveling and any irregularities or unfairness in the hull form. Some time during the fairing job, the bottom battens and bevel-chine battens can be notched into position and fastened with 1½" No. 8 screws. If the forward ends of the bottom battens do not want to bend into position, they can be tapered down in thickness and soaked until they bend easily. As there is very little need for the strength of the battens far forward, where there is no pounding, they could be cut off where the bends become too difficult; but this is likely to result in unfair spots' showing up in the planking, especially if the planking is soaked or steamed to make the bend forward.

Limber holes should be cut into the bottom frames and floor gussets next to the keel batten. The inside stem and forefoot should also be beveled at this time. This bevel must be just enough everywhere so that when the planking is in position it can be covered by the outside bent stem. The keel batten, chines and bevel-chine battens will also have to be beveled. The fairing job is always one of the most important in boatbuilding, as any slight unfairness will show up in the finished boat. It will be well to make a final check of the planing surface before the bottom planking is put on. It will be noticed from the Table of Offsets that the rabbet line, for example, should be absolutely straight from Station 7 aft.

In most boats, it is necessary to put on the side planking first, because the bottom pieces have to lap over the sidepieces at the chine for a good part of the length of the boat. But because a separate bevel-chine plank is used in this boat, it is possible to put on the main bottom planking first. This will be a considerable advantage—because, especially if ¾" plywood is used for the bottom, the most difficult bends of all are at the forward ends of the bottom planking; and with no side planking in the way, plenty of room is left for clamps to hold the bottom planks in place as they are put on. Before starting to fit the main bottom planks, be sure that the entire framework is well braced in position and, particularly, that the stem is well fastened down—as otherwise the whole shape of the boat could be changed as the bottom is put on. Because this is a developable-surface design, a pattern can be made for the bottom pieces from a sheet of heavy building paper held in position and marked. The plywood bottom pieces can be cut from the paper pattern and then clamped and held in posi-

tion for the final fitting.

The two large sections of the bottom are first fitted against each other along the center line (center of the keel batten) about as far forward as Station 3 and should come to the bevel-chine line or center of the bevel-chine batten on each side. They will also have to be fitted to the side planking forward of the point where the bevel-chine plank feathers out, just ahead of Station 3.

For making the seams watertight, either a soft-setting liquid marine glue (or sealer) such as Kuhls Avio or a hard-setting waterproof resorcinol resin glue such as Elmer's waterproof glue can be used. From the standpoint of future repairs, the combination of soft-setting liquid marine glue and all-screw fastenings is the best. If you use hard-setting glue, you may as well use corrugated nails such as Anchorfast to hold the planking, except in locations where screws are necessary to pull the planking into position. More careful fitting is necessary if hard-setting glue is used, because it is not so good a filler. In any case, enough glue should be applied so that a little will squeeze out when the planking is fastened down tight.

The planking can be fastened with flathead screws about as follows: 1) into chines, bevel-chine battens and keel batten, ⅞" No. 6 or 7 spaced not over 2" apart; 2) into transom and transom framework, a double row of 1¼" No. 7 or 8 spaced about 1½" apart; 3) into inside stem and forefoot, 1¼" No. 7 or 8 spaced not over 1½" apart; 4) into sheer battens and bottom battens, ⅞" No. 6 or 7 spaced 5" or 6" apart. It will not be necessary to fasten into the frames on either the sides or the bottom. Screwheads should be left flush or countersunk very slightly, to be covered later with Plastic Wood, Wood Dough or a similar product. Wood should be compressed under each screwhead. If corrugated nails are used instead of screws, the length and spacing should be about the same as for screws. Fastenings should be staggered, particularly along all longitudinals, to prevent splitting.

You will find ⅝" plywood much easier to bend and fit on the bottom than ¾", but it is often difficult or impossible to obtain. If you are using ¾" thickness, it will be easier to make the bottom out of 8' lengths rather than full-length pieces, especially if you are working alone. In this case, a splice can be made between Stations 5 and 6, and the forward sections will then be relatively easy to handle. A ¾"-plywood butt strap about 6" wide should be fitted to the keel batten and bevel-chine battens

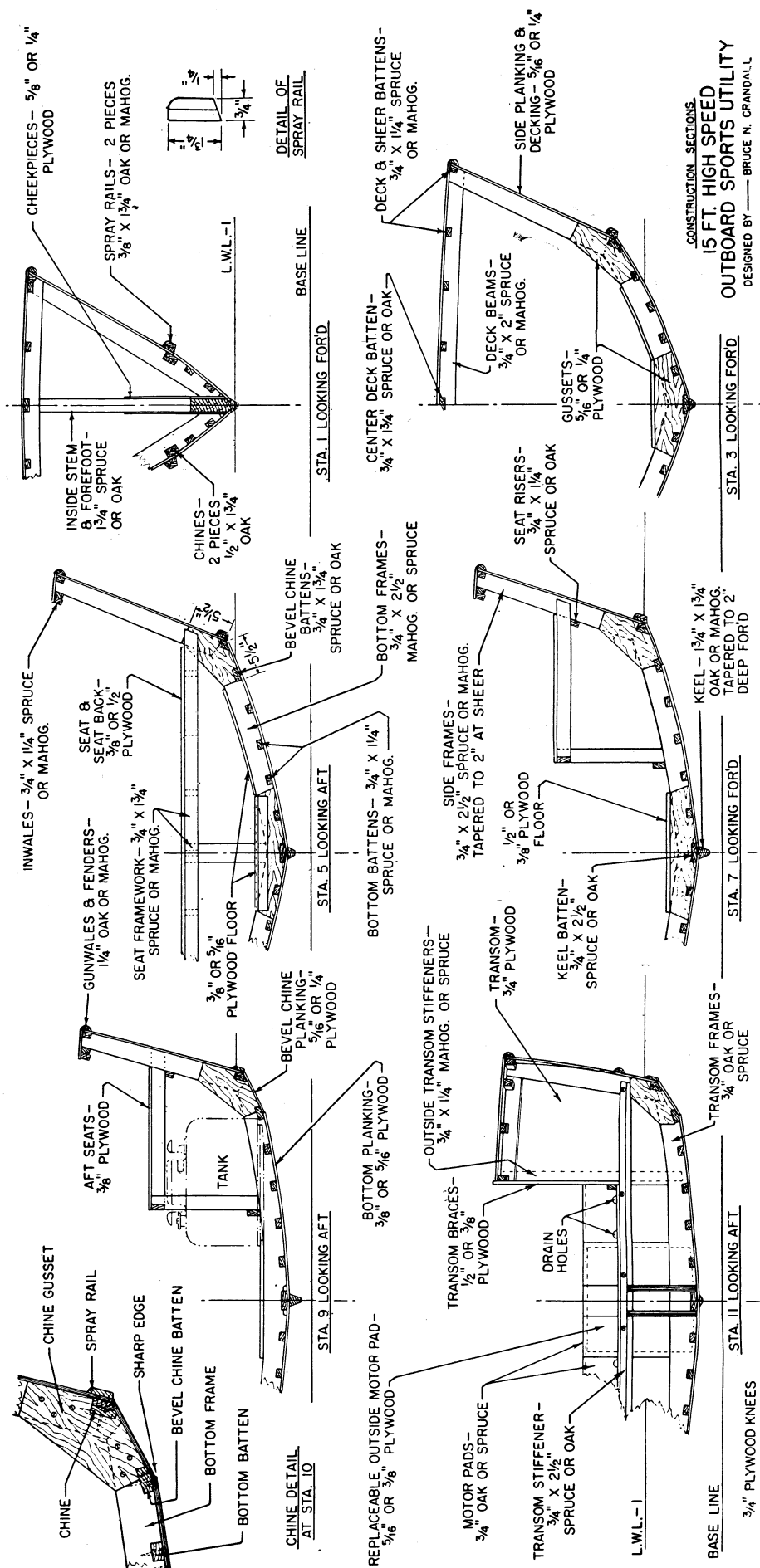
on each side and notched $\frac{3}{8}$ " into the bottom battens. The bottom battens should then be reinforced between Frames 5 and 6 with extra batten pieces screwed to them. Plenty of glue should be used all over the butt straps and the bottom pieces fastened to them, preferably with 1" No. 10 machine screws and nuts spaced $1\frac{1}{2}$ " to 2" apart along the seams.

The forward ends of the bottom planking will have to be soaked in hot water ahead of time both for the fitting and before the planking is put permanently into place, especially if $\frac{3}{8}$ " thicknesses are used on the bottom. The surfaces of the chines, keel batten, bevel-chine battens, stem and forefoot and transom and transom frame should be coated with glue just before the planking is put permanently into place.

After the bottom planking is in place, the side planking will go on. It has to be fitted to the bottom planking forward of the point where the bevel-chine plank will feather out, ahead of Station 3. Otherwise, there is no fitting at all to the side planking, and it can lap over any amount, to be trimmed off later along the stem, transom, chine and sheer. It is much better to use full 16' lengths of plywood for the sides, for any kind of splice except those made by the plywood factory will show up as unfair in one way or another. If factory-scarphed pieces are used, they should be placed so that the feather edge on the outside points aft.

After the side planking is in place, it is trimmed down flush with the chines. Next, the bevel-chine pieces are fitted against the bottom planking along the bevel-chine line. The surfaces of the transom, transom frame, chines, bevel-chine battens and stem must, of course, be coated with glue each time before a section is put on, and the size of fastenings and spacing can be as already described. Fastenings from the bevel-chine planks into the chines must be carefully spaced as far outboard as possible, so that they do not protrude through the chines and tend to split them. The edge of the bottom planking at the bevel-chine line should be left as sharp as possible to permit a clean break.

The planking should next be dressed down to a $1\frac{3}{4}$ " width along the stem, forefoot and center line all the way aft, to receive the outside bent stem and keel. If the outside stem is made of one piece rather than laminated, it will have to be steamed to be bent into position or soaked a long time in hot water. A laminated stem will be much easier to bend and is recommended, particularly if white oak is not obtainable. The two



pieces are bent separately and glued together with resin glue. Even with a laminated stem, some soaking will be required with most woods. The keel is tapered forward and bent into position to fit the outside stem as shown in the Construction Plan. The keel will also taper aft to about $\frac{1}{4}$ " deep at the transom. The keel line on the planking and the face of the inside stem and forefoot should be coated with glue before the outside stem and keel are put into place. The bent stem is fastened to the inside stem and forefoot and the keel to the keel batten with 2" No. 12 and $1\frac{3}{4}$ " No. 10 and smaller screws, all on the center line. Screws should also be put into the keel from the keel batten after the boat is right side up.

The outside stem is cut on a bevel, with just a $\frac{1}{2}$ " or $\frac{5}{8}$ " stem face left, to which the stem band can be fastened later. The excess planking should be trimmed off at the transom and along the chine line. The spray rails should be installed now, while the hull is still well braced in position. The spray rails are laminated to make bending easier and preferably should be glued together and to the hull with resin glue. The outside lamination will extend aft only to just past Station 7, while the inside will extend all the way to the transom to protect the edges of the bevel-chine planks. The spray rails can be fastened to the chines with $1\frac{1}{4}$ " and $1\frac{1}{2}$ " No. 8 screws spaced about 4" apart and to the inside stem with 2" No. 12s.

The boat can now be removed from the keel form and turned right side up. The inside can next be given a coat of wood preservative and then painted before other work is started. Deck beams, if not already in place can be installed now, along with the intermediate deck beam, breasthook, deck battens and inwales. The bulkhead at Station 10 should be only partial, so that there is complete access to the inside of the transom below. When fastening the inwales to the frames, take care to miss the screws that fasten the sheer battens. $1\frac{1}{4}$ " No. 7 or 8 screws are large enough to fasten the inwales to the frames and also for fastening the double inwales together and the gunwales to the sheer battens.

The whole deck surface, including the sheer line, should be carefully faired and given the correct bevels before you start to apply the decking. The self-draining motor compartment and transom braces should be installed about as shown, but sufficient width must be allowed to suit the motor or motors you will be using. The transom braces should be

fastened to the sides of the motor pads and above to the transom and outside transom stiffeners with $1\frac{1}{2}$ " No. 8 screws spaced about $1\frac{1}{2}$ " apart. The decking is installed in two halves, with a seam on the center deck batten. The decking need not be in full lengths, and a good place for the splicing is between Stations 4 and 5. It will be easier to fasten the forward deck to the battens than to the deck beams. Most of the decking can just as well be fastened with corrugated nails as with screws, but it should be well fastened around the transom, as it is an important part of the transom bracing. The gunwales are installed after the decking is all in place, as they are used to cover the edges of the deck plywood.

The half-oval brass or aluminum molding that is used for the stem band can also be used, if desired, on gunwales and fenders.

Large-scale blueprints ($1\frac{1}{2}$ " to 1') made from the original drawings shown here are available for \$8.75 a set. The full-size drawing of the Body Plan described earlier in the article is available with the blueprints, both for \$25. Large-scale blueprints ($1\frac{1}{2}$ " to 1') are available for the runabout version for \$8.50. For the runabout version, these blueprints with full-size drawing of the Body Plan are \$24.50. Send orders to Bruce N. Crandall, c/o SPORTS AFIELD Boatbuilding Annual, 959 Eighth Ave., New York, N.Y. 10019.

List of Materials

Woods	No. Pieces	Size
Plywood: mahogany, Douglas fir or other	2	$\frac{3}{8}$ " or $\frac{5}{16}$ " x 4' x 14'
Bottom, floor, drainboard and motor pads	1	$\frac{3}{8}$ " or $\frac{1}{2}$ " x 4' x 8'
Transom braces, seats, seat backs and floor	2	$\frac{3}{16}$ " or $\frac{1}{4}$ " x 4' x 16'
Sides, bevel chines and deck	1	$\frac{3}{16}$ " or $\frac{1}{4}$ " x 4' x 8'
Gussets, dash, cheekpieces, bulkhead and deck	1	$\frac{3}{4}$ " x 2 $\frac{1}{2}$ " x 5 $\frac{1}{2}$ "
Transom and knees		
Sitka spruce, mahogany, Douglas fir, white oak, yellow pine or red oak	2	$\frac{3}{4}$ " x 12' x 16'
Side frames, bottom frames and deck beams	18	$\frac{3}{4}$ " x 1 $\frac{1}{4}$ " x 16'
Bottom, deck and sheer battens, outside transom stiffener, inwales and the like	6	$\frac{3}{4}$ " x 1 $\frac{3}{4}$ " x 16'
Bevel-chine battens, seat framework, center deck batten and the like	1	$\frac{3}{4}$ " x 2 $\frac{1}{2}$ " x 18'
Keel batten, transom stiffener and seat braces	1	$1\frac{3}{4}$ " x 6' x 8'
Inside stem, forefoot and breasthook		
White oak, mahogany, red oak, Douglas fir, yellow pine or other	1	$1\frac{3}{4}$ " x 1 $\frac{3}{4}$ " x 11'
Keel	4	$\frac{3}{8}$ " x 1 $\frac{3}{4}$ " x 16'
Outside stem and spray rails	4	$\frac{1}{2}$ " x 1 $\frac{3}{4}$ " x 16'
Chines	1	$\frac{3}{4}$ " x 8' x 12'
Transom frame and motor pads	3	$1\frac{1}{4}$ " x 16'
Gunwales and fenders (half round)		
Fastenings	Quantity	
Monel, bronze or brass	2 lbs.	
Anchorfast or similar nails		
Flathead wood screws		
$\frac{7}{8}$ " No. 6 or 7	7 gross	
1" No. 6 or 7	1 gross	
$1\frac{1}{4}$ " No. 7 or 8	3 gross	
$1\frac{1}{2}$ " No. 8	2 gross	
$1\frac{3}{4}$ " No. 10	1 gross	
2" No. 12	1 gross	
Flathead or carriage bolts $\frac{1}{4}$ " x 5"	9	
Machine screws and nuts 2" No. 10	16	
Oval-head wood screws for stem band and fittings	optional	
Fittings		
Steering wheel (with optional steering equipment)	1	
Windshield	1	
Bow light	1	
Stern pole and light	1	
Bow cleat	1	
Bow handle	1	
Miscellaneous		
Soft-setting liquid marine glue	1 qt.	
Resorcinol resin glue	1 qt.	
Resin primer (sealer for fir plywood)	2 qts.	
Wood preservative (optional)	1 gal.	
Marine paint and spar varnish	3 qts.	
Half-oval brass or aluminum molding	optional	

Kinds of materials are listed generally in order of preference.

*Approximate net size.