

# How to Build the Lark

William Crosby, Rudder Magazine, Nov 1940

## Preface - August 2014 - RLM

This reissue of the Lark plans (originally designed in 1898) by Crosby and the *Rudder* magazine in 1940 represent the state of the art in small boat building before the changes brought about by technology after World War II. Waterproof glue is not used in the construction of *Lark* hull. Waterproof plywood had just appeared in the late 1930's and Crosby gives his best ideas for its incorporation in the building of *Lark*. Today the arc bottom of the *Lark* could be built in many ways: traditional, as in these 1940 plans, strip plank using fiberglass on both sides, cold molding of wood veneer or, foam core and fiberglass. Scantlings could be reduced producing a lighter hull. As the worlds first most popular small sailboat, the *Lark* holds a unique place in sailing history.

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## What is the Lark?

Lark was designed a number of years ago by Charles G. Davis and actually was the forerunner of the present day inland lake scow. So far as we know she was probably the first "skimming dish." For years amateur and professional builders have made boats from these plans and a conservative estimate would put the number of boats built at well over the 1,000 mark. Originally designed as a gaff-rigged catboat, she was accepted for a long time and built to the plans. Of late, however, the trend toward the jib-headed rig has been so distinct that few if any gaff-rigged boats have been built. As a result Lark has dropped off in popularity except for a few that have been built experimentally by amateurs. All of these boats have had the marconi rig.

Since there has been a demand for a small skimmer type with a modern rig, we have therefore redesigned Lark and brought her up to date. The original plans called for about 190 square feet of sail, which, you must admit is a lot of sail for a 16 foot boat. In redesigning her, we have reduced the sail area a little to about 157 square feet, which is still a tremendous amount, but since it is more efficient than the gaff rig, it should make an even faster boat.

Lark is 16 feet long and 6 feet wide. Draft without centerboard or rudder is between 5 and 6 inches. The deep outboard rudder draws about 21 inches but is easily taken off for shoal-water. With the centerboard down, in sailing position for windward work she will draw nearly 5 feet of water, but if the board strikes anything it will pivot upwards without doing any harm. The weight of the boat complete with everything aboard should come to around 450 to 550 pounds. The hull only should cost about \$30, perhaps a little more with good materials. Complete with rig, sails, etc, she would cost an amateur about \$200. A professionally built job would cost more than double this.

Lark is made for one purpose --speed. Comfort, dryness, seaworthiness and everything else go overboard with a big splash because she has none of these attributes. She is sporty, exceedingly fast little sailboat that will take a sailor to keep her going in a strong breeze. In a choppy sea she may poke her nose through the waves, and we have added a spray board on the forward deck to deflect some of the loose water. We would suggest extension spray boards that could be wing-bolted to this spray board when the water gets real choppy.

The cockpit is only a place to keep a bilge pump, a sponge and your feet. It's not meant to sit in and, if made any larger, you won't be able to sail Lark hard because you'll probably fill her up. Lark is not meant for sailing in strong southerlies on Great South Bay and similar places. She is meant for protected waters, mostly inland lakes. If figures don't lie, she should go to windward in good shape, but on a reach she will be a streak of lightning, and we doubt very much if there is a boat of her size or sail area that could stay anywhere near her. The heavy metal board should give her a lot of added stability and help you keep her on her feet in a strong breeze. This is just about the only "safety feature" in the boat for everything else is predicated on speed and speed only.

## FAQ on Lark Before you Begin Building

Before getting into the construction we want to answer some of the questions in advance. No, she cannot carry a jib. She has enough sail as it is and we would not advise changing the sail plan or area. She will not make an afternoon sailor for you, the wife and the kids. She is meant for one or two good sailors who don't mind getting wet. She is incapable of carrying an inboard engine, but could be equipped with an outboard and a small hatch might be provided in the after deck just ahead of the transom so that such a motor could be clamped on.

Probably the chief question will have to do with waterproof plywood. Lark was originally designed to have regular planking. Since the lines have not been changed, she'll still have to have regular planking because the bottom of the boat is distinctly a compound curve and you could not possibly bend waterproof plywood transversely and fore and aft to the radii shown. Plywood might be used for the deck and possibly the side pieces. It could play a part in the construction of the frames as will be pointed out. A straight piece of plywood might be used for the nose piece instead of the rounded steam-bent piece shown. A piece one inch thick could be band-sawed to the radius demanded in the plans. We would not advise plywood for the rudder. It might be used for the backbone if desired, but frankly we would prefer some lighter wood for this.

## Construction of Hull

### **Side Planks**

As for the construction, the first thing to do is to lay off the two side planks, using the dimensions given in the drawings. These may be of half-inch material. Mark off the distances apart for the stations and then from the straight top edge lay off the dimensions that spot in the fore and aft curve of the bottom of the piece. With a long batten, draw a fair curve through these spots and then saw to shape. Make two of these pieces. Station spacing is shown in the top drawing of this particular group. Start at the stern and work forward.

### **Backbone**

The backbone is composed of three separate pieces. It's best to make a duplicate drawing of this top group full size on the floor, then fit your three pieces to this to get the proper curve for the bottom and top. The dot and dash line in the drawing is a straight line and dimensions are given at each station either above or below this line. Draw in the curves on the floor full-size, using a long batten for this purpose. Then drive brads into this outline so that the heads protrude about an eighth of an inch. These should be about every foot. Starting with the material you intend to use for the after part of the backbone, lay it on these brads in the proper place and tread on it lightly. Then lift it up and you will see that the brads have made little indentations on the board. Use your batten again and mark the curves for the top and bottom. Also mark the straight line so you can use it later as a datum line. Saw off the extra wood outside the curved lines. Mark in the radius at the forward end of this piece and band-saw to shape.

Follow the same procedure with the forward pieces, cutting to shape and proper length. Note that these overlap the stern part of the backbone.

When finished, rivet or bolt them to the after piece, one on each side. At the required distance forward, rivet or bolt in the upright pieces at the distance show in the plans. This slot thus formed is for the centerboard. Forward of this the two pieces are bent outward gradually to form the mast step. A piece of oak two inches wide (or a fraction wider) is set up in the bottom here to take the foot of the mast. A square mortise should be cut in this before putting in place so that the square tenon on the foot of the mast will fit in.

The two side pieces are then brought together at their forward ends and securely riveted or bolted. The mast step piece should be about two to two and a half feet in length tapered slightly to take the curve.

The datum line you will have penciled in on this backbone -- that is the straight line -- will come exactly parallel with the top edge of the side planks when the boat is set up. The boat should be built upside down and the backbone piece together with the two side pieces set to match exactly, the datum line will have to be shored firmly in position so they cannot move.

## **Making the Frames**

The frames may be made in several ways. The outlines are given together with all dimensions, all of which are to the inside of the planking or decking. These drawings may be duplicated full size and the frames for the bottom and deck beams may be steam-bent to shape, clamped there and held until firmly set in position. Or they may be made of slightly heavier (deeper up and down) material and band-sawed to the desired curvatures. In this case, as with the steam-bent frames, they must be made over a full-sized drawing to be accurate. For steam-bending the frames need not exceed three-quarters of an inch square. With sawn frames, three-quarters wide by one and a quarter deep will do the trick. Be sure in this case that the grain of the wood runs from end to end and does not cut across at any point. The steam-bent frames should be of oak where the sawn frames may be made of any good hard wood.

If either type of construction is used, suitable gussets must be used at the chine and also at the junction of the deck beam otherwise they will not hold their shape. Make the bent or sawn frames as accurately as possible, then set the component pieces on the full-sized drawings and screw the gussets in place to hold the various parts firmly together. Gussets might be made from quarter inch plywood. Note that every frame in the boat must be made in two pieces, as the

backbone cuts the boat smack in half from bow to stern. The dimensions given in the sections or frames are given to the centerline out and you'll have to deduct the thickness of the backbone, in each case, from the width.

Yet a third way to make the frames would be to use very light waterproof plywood, one-eighth being ample. This is marked out to the exact shape of the frame and light sawn pieces of wood (not plywood) screwed fast around the edge to form the bottom, sides, and deck framing. This is shown in one of the drawings. These could be assembled as a solid unit and then sawed in two with proper deductions for the thickness of the backbone. In way of the cockpit the plywood could be cut down to give foot room and at such frames located under the deck, large lightening holes could be cut in the plywood. No matter what kind of frame you use, be sure to cut limber holes along the edge next to the lower edge of the backbone so that bilge water will run aft where you can get at it.

No matter what type of frame you decide to use, you will have to cut notches in the two outermost corners (chine and deck edge) to take the fore and aft stringers which are used for fastening the bottom, sides and deck in place. These pieces are specified at one inch square, but your notches will be less than this because the upper edge of the top one and the lower side of the bottom one will be planed off to take the curve of deck or bottom. They will notch one inch inboard, but the up and down dimension will not come that deep at the corners of chine and deck. These notches should be cut before setting the frames up.

## **Setting Up the Frames**

Your station marks should still be on the backbone pieces and, if you have not already done so, mark them on both sides. The inboard end of each frame will set up against the backbone piece with frames 1, 2, 3 and 4 so placed that their after faces are on the station lines and frames 5, 6 and 7 with their forward faces are on the station lines. The transom is, of course, set right on the after end of the backbone. It is the only one that is not cut in two.

These frames must be set square and true and the way to hold them to the backbone is by means of brass angles on each side, top and bottom, screwed to the backbone and bolted through the frame materials. In using screws be careful not to clutter up the centerboard slot by using them too long. Shore each frame in position firmly so it cannot move, particularly frame 1.

## **Installing the Nose Piece**

The next step is to get in the rounded nose piece. As already stated this may be made by steam-bending it round a form, or band-sawing it to shape from a piece of wood or even waterproof plywood. Frankly, we think the steam-bent job would be best and easiest, but we know how amateur builders feel about steam-bending. It really is not hard to do if you let the wood steam long enough.

The nose piece is secured to the backbone with two knees or triangular pieces as shown. It is also secured to frame 1. Once in place, the side pieces go on over it as shown, these parts being securely riveted together. Frame 1 will have to be notched a little deeper to take this nose piece.

## **Chine and Sheer Logs**

The fore and aft stringers should go in next. These are screw-fastened to each frame and to a cheek piece run around the transom just like a frame. At frame 1 they will come in and be screwed to the nose piece. The side pieces will go on next, but you will find that it is necessary to plane off a little on frames 1, 2 and 3 in order to get the side pieces to fit up flush against the side of the frames. No frame should just touch at one corner. You may also have to bevel frames 6 and 7 a little.

## **Bottom Planking**

Try a strip of your bottom material fore and aft and clamp it in place to every other frame. You will quickly see that you need a little bevel here, also on the frames. Using the strip as a pattern, plane off the frames until the surface of the strip and the surface of the frame come together flush. Then proceed to plank the bottom in the usual way. Since there is no actual keel on this boat, there will be one plank with straight edges right down the middle overlapping on each side as far as possible. Through this you will later cut a half-inch slot for the centerboard. The other planks out from this center plank will require a little fitting, but they are easy to do. The planking simply runs fore and aft in fairly wide sections.

Do not ask how far apart the seams should be left. This all depends on the dryness of the material or the amount of heat in your workshop. Naturally if the material is very dry, you must allow more for swelling. In any event, you won't have to caulk the seams. This is no canal barge. Instead plane off the edges of the planks before they go in place, so that they are slightly veed outboard. Put them on so that the inner edges just touch (if your material is not too dry or wet)

and the outer edges should be about 3/32 of an inch apart. Into this little crack put some elastic seam composition that will work out as the wood swells. After the boat has been in the water for a few weeks, tip her up on her side, scrape off the excess composition that has squeezed out, smooth her up and repaint the bottom. From then on, there should be little trouble with further material squeezing out.

Note that the end pieces forming the centerboard well extend down below the bottom of the backbone one half inch. The end wood of these pieces will come flush with the outside of planking. Both should be of soft pine which will swell up and prevent leaks more than a hard wood.

### **Fastening Planking and Deck**

Both planking and decking may be put on with any kind of fastening you desire. Frankly, we think that ordinary galvanized iron brads would do very well, as once they are set up in hard wood there is no chance of pulling them out again. They will save time and labor over screws and, if drilled for, the drill used should be considerably smaller than the nail to insure a good, tight, driving fit. The hole should not go in the full length of the nail either and you should have someone hold a chunk of iron in back of where you are doing the nailing in order to insure a good solid foundation. All such fastenings, including the deck, should be slightly countersunk with a nail set and puttied over. The opening for the cockpit and the mast in the deck should be cut as shown in the plans.

### **Canvas the Deck**

Heavy canvas should be stretched over the deck after the deck has been sanded smooth. The canvas should have some of the special glue under it to hold the material to the deck. Stretch it exceedingly tight and tack down around the edges with copper tacks. Use plenty of them. Then if you want the deck to be really "super," treat it with airplane dope before painting. This will stretch it as tight as a fiddle string. Cut holes for mast and cockpit through the canvas after it is well set. The edges of the cockpit should have some quarter-inch mahogany trim around it to cover the raw edges of the canvas. A small molding is run around the entire edge of the deck to cover the edge of the canvas there and the tacks that hold the canvas down.

## **Paint Hull and Deck**

The hull should be thoroughly sanded down and painted inside and out. Perhaps it would be better to paint the inside, particularly up forward, before the decking is all in place. The boat may be turned over as soon as the planking is all on.

## **Chain Plates, Rudder, Centerboard**

Chain plates for the shrouds should be installed as shown. Bolt them to the planking and use an extra thickness of wood on the inside. Do not use screws as they will pull out sooner or later and you will lose your mast. The forestay chain plate may be fastened up under the bow and bent around to take the lower end of the stay turnbuckle. Bolt this also in place. The rudder fittings are standard hardware available almost anywhere. The centerboard will have to be cut to shape by some shop where they have suitable equipment for this sort of work. DON'T make the board of wood. Make a plywood pattern, full size, and turn it over to your local boiler maker. Brass or bronze would be best for it, as this gives considerably more weight down low where you want it. Iron is not as heavy but it will serve. If iron is used in salt water, have it hot dipped galvanized after it is cut to shape and all the holes drilled.

The rig for raising and lowering the board is shown clearly in the plans. You'll need this, as the board is heavy and cannot be handled any other way. The pin for the board is located accurately on the drawing of the backbone. A three-eighths bolt with rubber washers under each side should do the trick. Do not set up so tight that the trunk is pulled together jamming the board.

## **Building and Rigging the Mast**

The mast is the usual square box construction which is simple and strong. Do not use screws, brads, or other fastenings to hold it together. You can do a good job with casein glue and it will stick far better than any nail or screw could possibly hold it. You don't even need these fastenings to reinforce the glue. Standard sail track is screwed to the after side of the mast. A three-inch length is bent over a half inch and screwed fast at the bottom with one screw, which allows you to turn it either way. When it is straight up and down, the bent part will hold the slides from dropping off the track. When you want to remove the sail, you turn it the other way and there is an opening which permits the sliders to come off the track. Below this is another short length of sail track (about two feet), which is used for the sliding gooseneck.

It is important that the mast be solid for about four feet up from the butt end and also in the way of all spreaders, tangs and the masthead sheave. If not the material will crush or split and your mast is done. The sheave at the masthead must be of aluminium or wood. Do not use a heavy iron or bronze sheave, as the upsetting moment is tremendous. In fact, on most small boats at present, nothing is used up there at all except a hole through the mast allowing you to haul up the sail as high as it will go. You then make the halliard fast and take up the slack by pulling down on the boom. This is the most efficient way of doing it and saves weight aloft -- an important factor in any small boat.

Do not use metal spreaders. Save every fraction of an ounce you can aloft. The sizes and the material of spreaders are given. Follow them. The angles used to hold the spreaders in place should be light also. The rigging is all specified. Follow it as closely as you can. In making the splices in stainless steel remember that it is quite slippery and you will need at least two more tucks than you usually make in galvanized iron rigging. If you do not do this the splice will pull out the first time you put a real strain on it. If you decide to use galvanized iron rigging, it should be one size larger than for stainless.

The tangs for the ends of the rigging on the mast have been explained times without number on these pages. They are made of 1/16 inch brass, about 3/4 inch wide. The plans on *Red Head* printed recently on these pages showed exactly how tangs should be made. They would be the same for *Lark*. (Page 30, October 1940)

## Mainsheet Rig and Sail

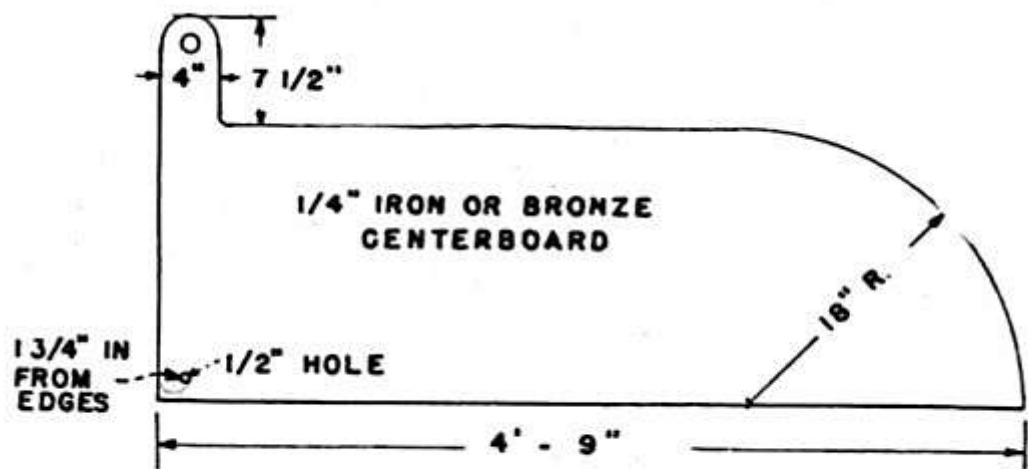
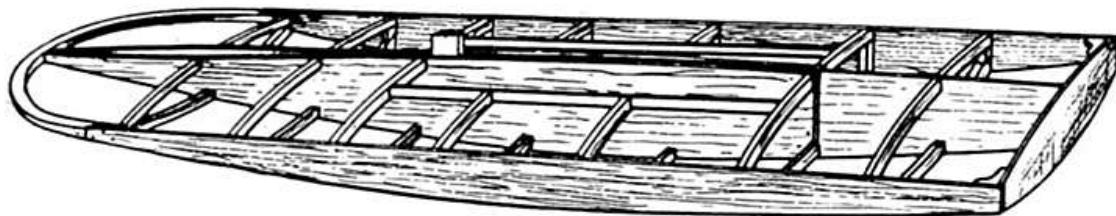
The mainsheet rig is the best that can be devised and is now widely used by many types of racing boats. It has the big advantage of trimming the sail to weather rather than simply pulling it down. By all means use this rig and get the most out of your *Lark*.

The sail should be purchased from an sailmaker advertising on these pages. They will be glad to give you prices on request. Sailmaking is an art in itself and this boat will not sail properly unless she has a good sail hung up there.

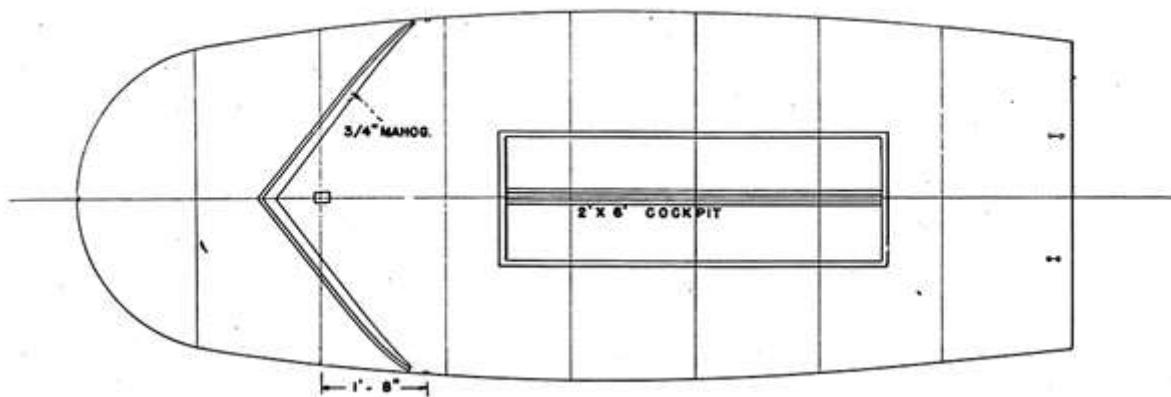
## Conclusion

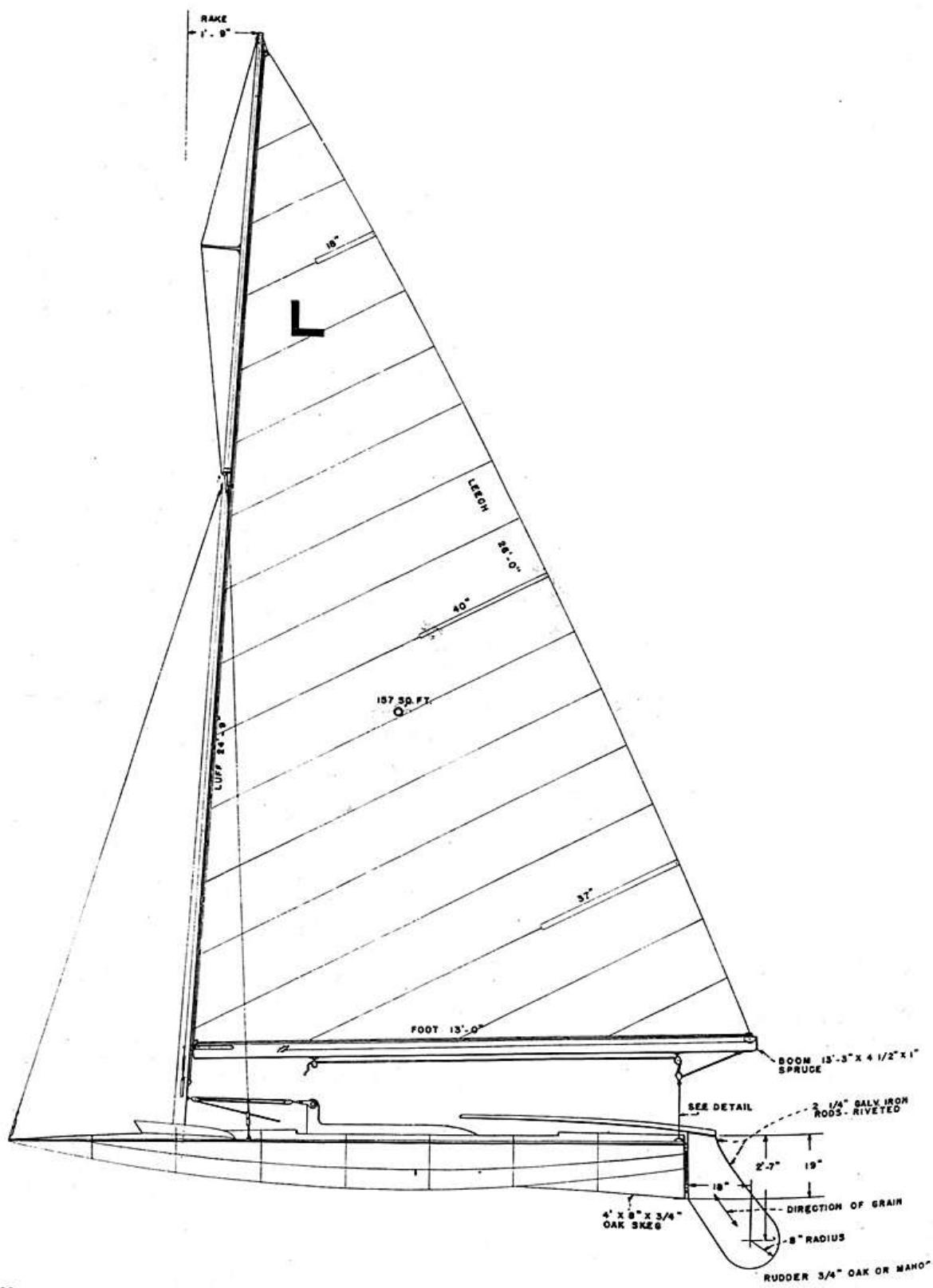
Please remember that *Lark* is designed for one purpose only --speed. In a breeze you've got to be a combination acrobat and expert sailor. You must expect to get wet and your regular sailing apparel should be a pair of trunks most of the time. Build *Lark* -- you'll be surprised -- but don't

enter her in any Bermuda Races.

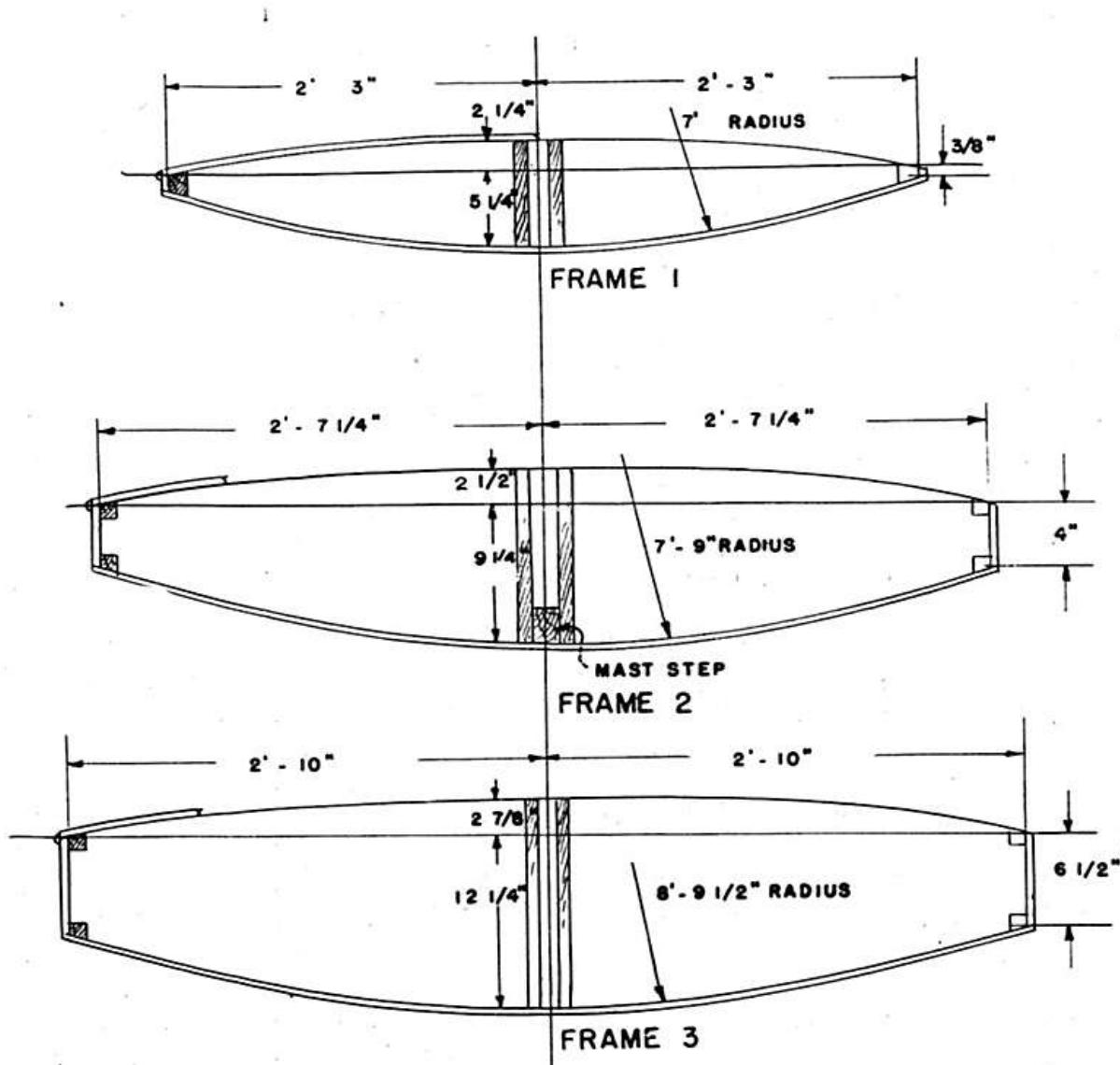


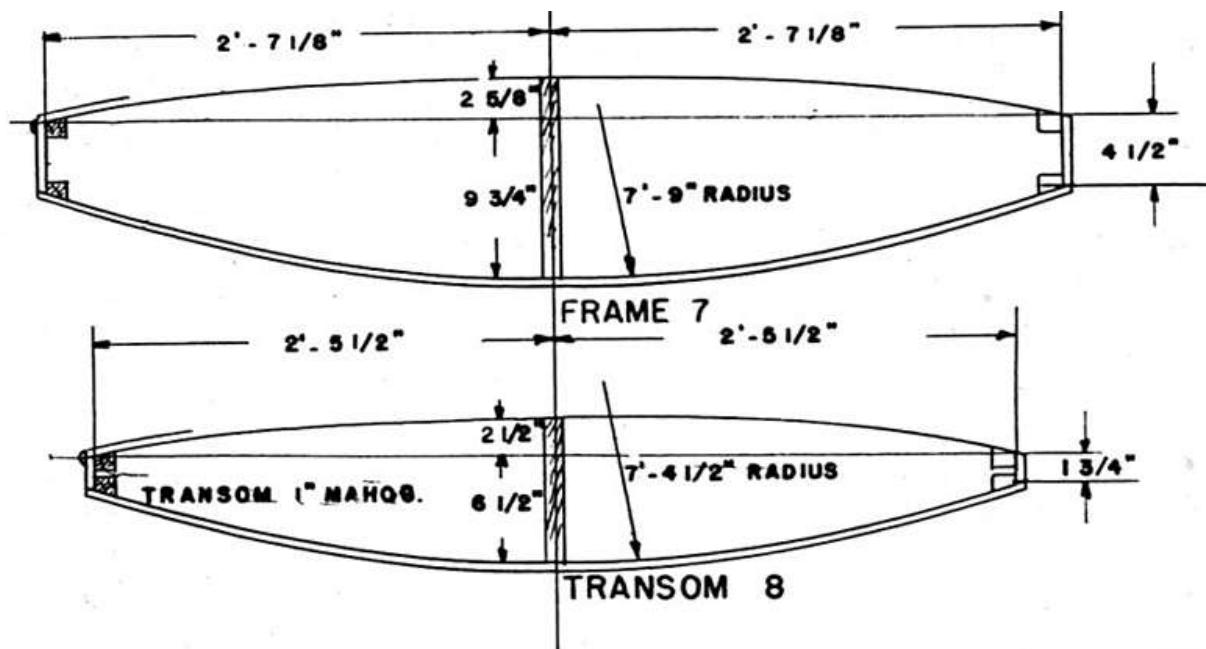
THE RUDDER



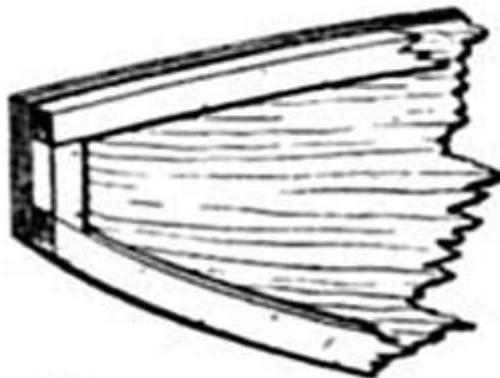




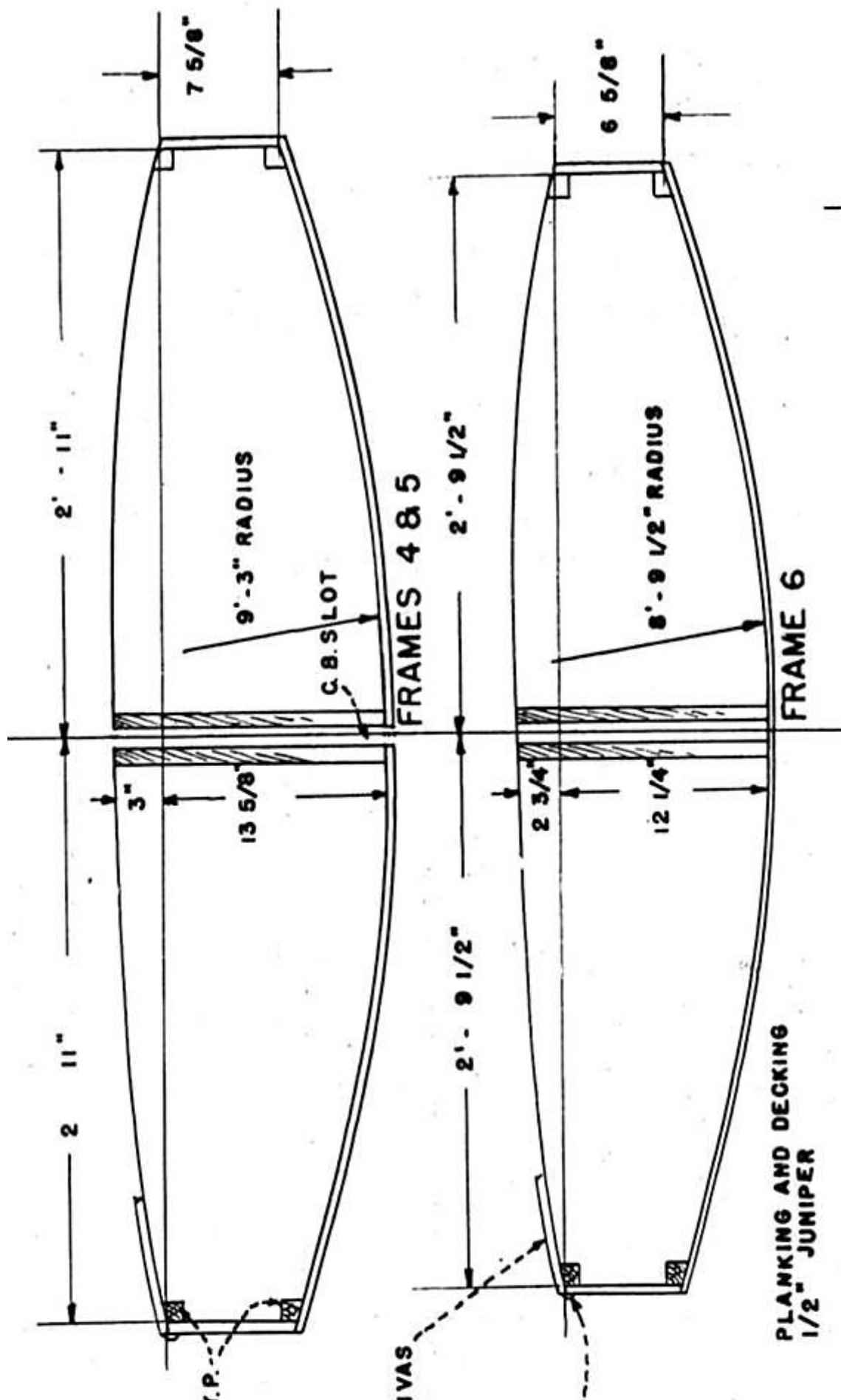




31



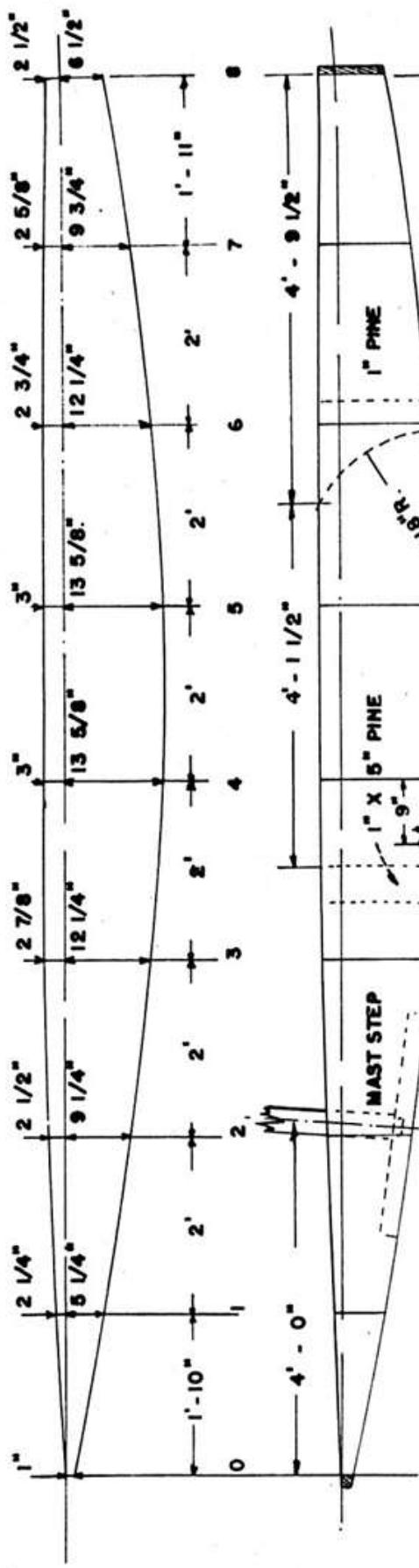
1" X 1" SPRUCE RIVETED TO 1/4"  
PLYWOOD THIS IS ONE WAY TO  
MAKE FRAMES SEE TEXT



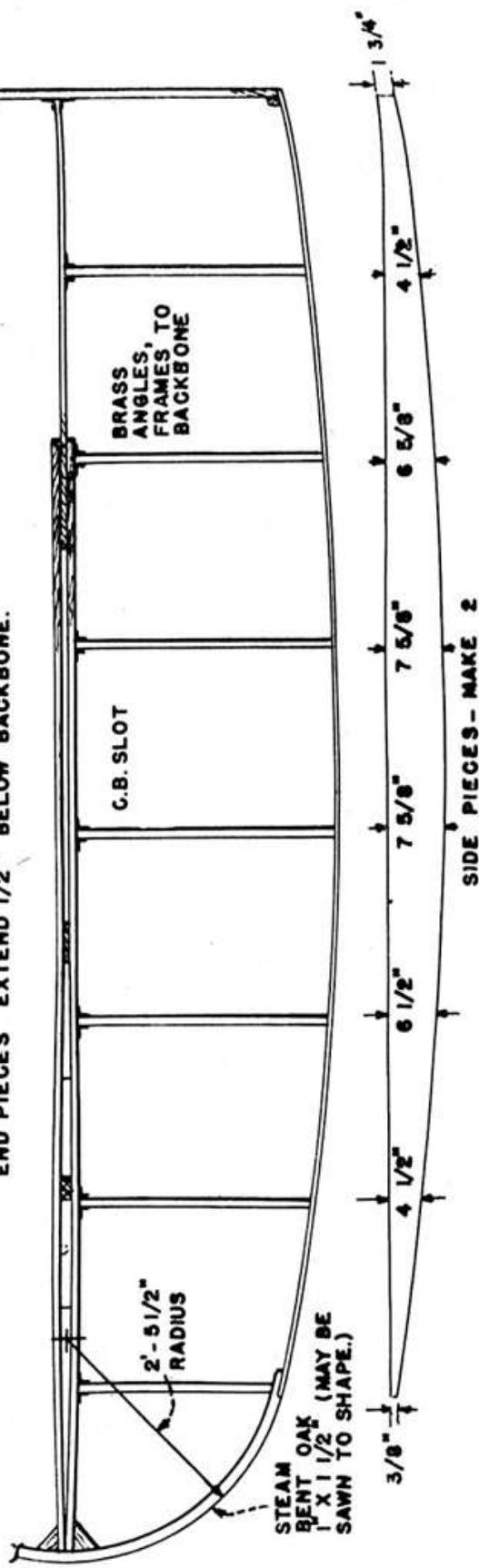
**PLANKING AND DECKING  
1/2" JUNIPER**

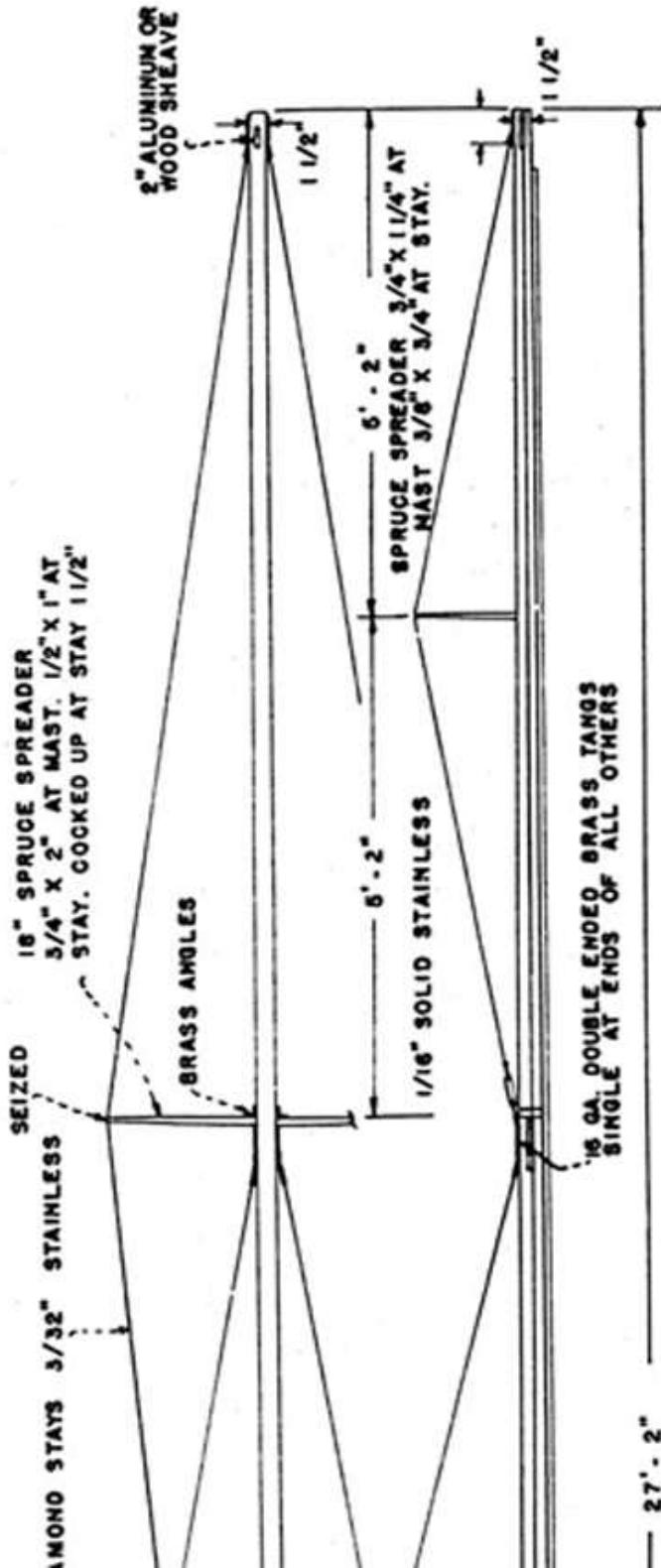
(Continued on page 60)

DIMENSIONS OF BACKBONE



END PIECES EXTEND 1/2" BELOW BACKBONE.





SECTION THROUGH SPRUCE  
HOLLOW MAST

