MAKING A KAYAK

By Oliver Cameron
with Ole Wik

I've made quite a few kayaks. That's a big subject too.

If you're going out in the springtime with a dog team or you're pulling a sled with one or two dogs, and you plan to stay there through breakup and then come home or part way home on the water, you're going to build some kind of a boat when you get there.

If it's just downstream going home, you can do most anything. Make a raft. But if you want something that you can carry from one lake or watershed to another, for hunting muskrats or something like that, you'll want something light enough to carry. You can make what I call a "kaynoe", which is halfway between a kayak and a canoe.

Oliver in his small homemade "kaynoe", 1975.
Image: Sasha Wik

You make the wooden frame out of material you cut at camp. For the covering, you take some #10 duck that is long enough to make a small boat. It's not the same as 10-ounce canvas—it's heavier and more tightly woven.

I make them maybe 10" deep, depending on how I'm going to be using them, and 2-1/2 to 3' wide. As to length, a 10' boat that is reasonably wide and fairly deep will hold you and quite a bit of stuff besides. I prefer to make them least 12' long. That makes them a little heavier to carry and they move around a bit more if the winds are blowing, but they're a little more practical in the water.

Instead of depending on the keel for stability, I build depend on the gunwales[1] during construction. They come together and attach to a stem piece at both ends.

Interior of one of Oliver's boats. This particular craft is built more heavily than the one described in the text below. Image: Cameron family photos.

How to describe this without doing some drawings?

Bottom

I make a latticework for the bottom that takes the place of a keel. If you have a number of small strips of wood, they can be maybe 1/2" wide and about 1-1/4" thick from top to bottom. Place them side by side and spread them apart a little bit, so that the bottom framework is maybe 12 or 14" wide, depending on the width of the boat.

End Pieces

Then I set stem and stern pieces into the both ends of that frame. They are flat, maybe 3/4 to 1" thick, and as long as they need to be to reach up from the bottom to slightly above the gunwales. They slope up at quite a bit of an angle, maybe 60 degrees from the water that is ahead or behind them.

There are two ways to fasten the stem pieces to the bottom framework. The better way is to let the two outside members of the bottom framework come along the sides of them at the bottom, and then fasten them to it. The other way is to look around for a natural knee —a piece of wood that has the right curve where a root joins it so you can shape it to sit on top of the bottom.

Those stem and stern pieces need to be curved where they cut or cleave the water. A curve of 1 to 1-1/2" in the stem piece is probably enough. The curve is necessary so that each strake[2] will be a little longer than the one below. That way the contour of the side frame is such that the canvas will stretch tightly against the frame all the way up, and you avoid having slack canvas at the bow and the stern of the boat. If you didn't have that curve, the strakes would be more or less straight up and down where they come onto the end piece.

Gunwales

The gunwales then come together on those stem pieces. They are made of a piece of wood 3 or 4" wide. Their length determines how much wider the boat is at the top than it is at the bottom. I like to have them curve up towards the ends, starting pretty well in the center of the boat.

When I make the gunwales, the ends of them are tapered slightly so that the gunwales are not parallel. They're tilted a little bit toward the outside so that when you bend them together, they come up a little higher toward the front and back of the boat.

But if you put too much slope into the gunwales, there will be quite a bit of rise at the stem and stern. In that case you have another problem. In order to counteract that and have a little bit of rise only, your gunwale strip will have to be curved a little.

When you fasten your ribs in there, you won't have any tumblehome[3]—the ribs will come up and match the tilt of the gunwales. Canoes have tumblehome on the sides for ease of paddling, but they are tricky things. If you tip them too far, they'll flip on over, whereas a boat that has a side that extends straight out will continue to add stability in a tippy situation.

Ribs

You can make one or two rough frames out of any scrap wood that give you the cross-sectional shape of the boat. Fasten the gunwales and bottom to them temporarily. That gives you something to fasten the ribs into.

It's easier to work on if you are on a couple of horses fairly high. The frame can be either upright or upside down. You don't have to have nails—as a rule, I mostly tie it together.

If the boat is upside down, you can start by putting a rib in in the middle, made out of whatever material you can find. I usually use split willow. Some spruce will split nicely, but can be hard to find. Birch doesn't last as long as willow.

I fasten the ribs to the bottom framework. Then they bend in a gradual curve up to the gunwales. I usually don't have them coming up square where they join onto the gunwales—I usually make a short bend there.

Because of the taper of the boat, you will have trouble bending the ribs sharp enough right at the front. You can put in a solid piece right behind the stem to take the place of the ribs there.

Batten Strips

After the ribs are in and are fastened to the gunwales and the bottom frame, you put one or two batten strips where the ribs bend. Some people use a fairly wide, thin board and just put one in on each side on the outside of the ribs to support the canvas, but I usually use two or sometimes three. Otherwise your ribs are going to be pushing the canvas out a little bit.

If you use a batten strip 1" square and lay it on your ribs, then you can lay some cord or something across it and stretch it and see where you will need another strip in order to keep the cover away from the ribs.

Strakes

I usually tie the side strakes on. If you wrap a string along the side of the framework from stem to stern, it has to touch every rib all the way along so that the canvas will pull snug against the frame, rather than flopping loose there.

The width of your kaynoe would vary, since the front of it is curved perhaps four or five inches. When the strakes on the outside members of the bottom frame come onto the side of the stem and stern pieces, they have to taper to nothing where they join. You may have three or four strakes, all the same.

Thwarts

With the boat upright, I take a curved piece of wood to make a thwart so that the deck of the forward part is covered over. The curve gives you a little more room underneath, and lets the water run off. It's back a little ways, so that the cockpit would be 1/3 the length of the boat, located in the middle.

I put in another curved piece at the back. From the thwarts to both ends of the boat, I put in one, two or three strips running lengthwise to support the canvas.

Inwale[4]

Along the sides, in about 3 or 4", I put in a fairly sturdy inwale between those curved thwarts, running parallel to the gunwales. Then I usually put a block in somewhere between the gunwale and that part to stabilize them.

This image of David Bynoe's lightweight canoe shows a thwart lashed to the inwale. In Oliver's kaynoe, the thwart would be flush with the top of the inwale. Image: http://dbynoe.blogspot.com/2010/05/new-lightweight-canoe.html

Cockpit

A cockpit is handy for loading and unloading. The framework may be a piece of wood 1/2" thick and 3" wide. It fastens to another piece of wood of similar dimensions that fastens on the inside of the crooked thwart in such a way that it makes a uniform frame all the way around, to fasten your canvas too. The front and back are straight across.

There is no coaming[5] around the cockpit--just a 3/4" strip that covers the area where the skin is tacked down to the top.

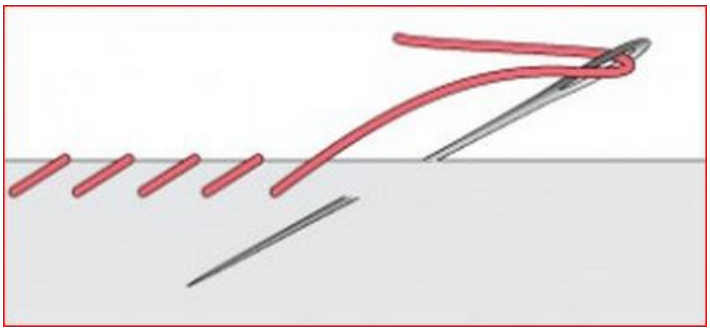
This image of Oliver's larger kaynoe shows the covered deck and the cockpit. This model does have a coaming. Image: Dorene Cameron Schiro

Canvas

When you put the canvas on, you fasten it to the top of those strips and put a matching strip on the inside of the curved thwart so that you have a framework. Your canvas tacks to the top of that all the way along. Then you can put a little strip over that if you want to. This gives you a sloping deck running from the cockpit frame down to the gunwale.

Cover the sides first, and then cover the deck. The sides will cover over the top of the gunwales and tack down, and the deck covering goes onto the sides.

You cut a wedge out of the canvas at the front and the back where it comes together on the bottom. That gives you a seam. Where the edges come together, you use a whip stitch.



Whip stitch.
Image source: http://dmc-threads.com/newsletter/stith-diagrams/

Or, if there's an extra thick piece in your frame, you can tack them on. I usually sew them all the way around the front and back of the boat. I add an extra strip of wood into the stem and stern pieces to protect the seam.

Sealant

After I've got the cover on, I cover the whole hull with lap cement, as used on roofs where the tarpaper laps over. If need be, you can thin it a little with gasoline or kerosene. You want it to penetrate the fabric. It will take a while to dry, several days. It stays a little bit flexible, whereas paint will get brittle and crack.

You will need maybe a quart. I would generally take maybe three pints. I'm just guessing—I usually have plenty of that stuff around.

Storage strap

After that I fasten a strap of webbing or something like that to the gunwale on both sides, across the front of the bow. I leave it a little bit loose so I can get hold of it to drag the vessel around or tie it to something or whatever.

I do the same thing at the stern, and I have others just ahead of and just behind the cockpit. I leave those loose enough that I can put an extra paddle or anything under them, so that they won't roll off into the water.

Paddle

You can get by with a single-bladed paddle, but I usually use a double bladed one. I make my own from a spruce tree. Some of them will split fairly straight, but most won't. If you can't find one, you'll have to hew the wood away.

Your handle will be such that you won't have to dip it too straight down to get it into the water. The diameter of the pole should be whatever is comfortable for you to hang onto, maybe 1-1/2".

The blade will be at least 4" wide. If your paddle is balanced across the center of the canoe, the blades start at least two feet from the side. The edge of the paddle should be fairly thin, but right at the tip I leave it kind of blunt, maybe an inch or so. That way I can poke things and push away from the shore, and in shallow water I'll use it like a pole.

Make the paddle blade 30" long. The shorter they are, the more often you have to make a stroke. With a longer paddle, you can reach farther ahead.

This is for a single piece of wood hewn down to make a paddle. If I just nail boards on each end of the pole, I use a fairly wide board and let it stick out quite a ways. It's not as good as a narrow paddle, because it catches more wind.

If you have the patience you can leave a ring area as you are hewing it out, a little ways toward you from the paddle, to shed water that runs down the pole to your hands. Otherwise you can wrap a fairly good sized rope around, or several layers of tape or whatever you have. No matter what you do, you'll get a little water coming down.

If I'm paddling a long ways, I fasten a pole on the front, right along the centerline of the deck, and let it come back well within my reach. That way I can rest my double-bladed paddle on that and get the pivot effect that is characteristic of a true kayak.

Note the pivot strip on top of the kayak. The paddler will expend much less effort than if he were to lift and dip the paddle at each stroke.
Image: http://www.artflakes.com/en/l/kayak

I always carry an extra paddle, not necessarily double-bladed. I keep it fastened inside the boat, for emergency use. Also it's a good idea to tie a string to your paddle and onto the boat or onto yourself. Then if you go over, at least you won't lose your paddle.

Spray Cover

A spray cover is a good idea. Do whatever you want to devise that.

Seating

I don't sit on my bottom with my feet stretched out. I sit on a roll of foam and such, with my knees bent back.

Have your dog sit behind you. If you have an extra-long cockpit, he can sit ahead of you. Just be careful what you put under there—nothing sharp like a can that can poke the canvas.

Storing the boat

For storage, I don't usually put the boat up high. Usually I just take it out of the water and turn it upside down. Sometimes I'll have a couple of poles lying there that I can set it on. It has to be out of the wind.

Bears like to play with kayaks. I keep mine up at the camp if I'm going to be away for any length of time.

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1) "The gunwale is the top edge of the side of a boat." (http://en.wikipedia.org/wiki/Gunwale)

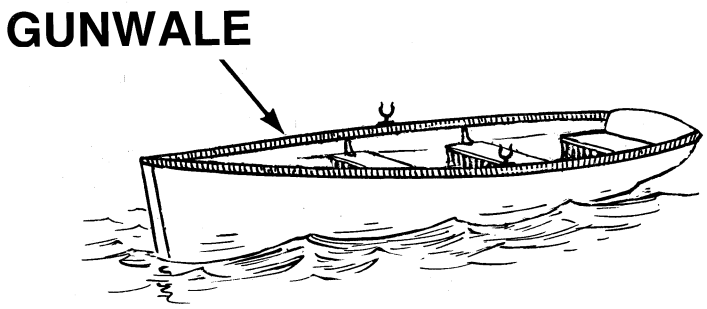

Image: http://m.ztopics.com/Gunwale/

2) A strake is part of the shell of the hull of a boat or ship which, in a wooden vessel, runs longitudinally along the vessel's side, bottom or the turn of the bilge, usually from one end of the vessel to the other. (http://en.wikipedia.org/wiki/Strake)

This image of an entirely different boat illustrates the varying lengths of the strakes where they join the curved stem piece at one end of the craft.
Image: http://home.gwi.net/seahorsepress/melonseed.html

3) In ship designing, the tumblehome is the narrowing of a ship's hull with greater distance above the water-line." (http://en.wikipedia.org/wiki/Tumblehome)

Image: http://redrockstore.com/canoeshop/definitions.htm

4) Gunwales may consist of inner and outer parts called "inwales" and "outwales". These two parts of the gunwale give rigidity and strength to the hull.
(http://en.wikipedia.org/wiki/Gunwale)

5) Coaming refers to the raised structure around the cockpit of a kayak.
(http://en.wikipedia.org/wiki/Coaming)

Example of a full coaming around the cockpit of a kayak.
Image: http://www.stolaf.edu/people/becker/baidarka/stitching.htm