

ATLANTIC KAYAK TOURS

Folding Boat Modifications

An Atlantic Kayak Tours instructional information flyer

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Folding kayaks are a special group of sea kayaks that have been around for over eighty years and have gained a large renewed following in the past few years. These boats are unique in that they have not changed much through the years. Most of the folding boats were designed as general purpose kayaks, not as sea kayaks. Folding boats have been used on most of the famous rivers throughout the world; have crossed the Atlantic ocean; gone to the Arctic and Antarctic and have paddled along almost every shoreline of the world. The information that follows covers different ways to modify your folding kayak to make it safer and more enjoyable. In that we have used Kleppers much more than the other folding boats, we have geared the information more toward Klepper owners but most applies to the other folding kayaks as well.

Klepper kayaks are well built kayaks, ready for long days of paddling; with a little work you can change the Aerius into an expedition kayak. Let me say from the start, that the expedition model is the Klepper model of choice for long trips, but they are not expedition ready. Sure, Hans Lindemann crossed the Atlantic in a non-modified non-expedition Klepper, but most of us are into enjoying our trips not just surviving them.

We will focus on modifying an expedition Klepper into an **expedition** Klepper. If you have the standard Klepper the first step is to keel strip the hull. Klepper has an information sheet on installing the keel strips. The 3" wide strips are much easier to install, but the 10" strip are better protection.

Most of the information here will be coming from the knowledge we have gained running our tours. Our equipment is not well cared for due to the volume we have and the amount of abuse it takes. We are very critical about the quality of the equipment we buy, since people are paying to use it and it reflects on our quality.

Numerous people helped develop these modifications over the years, and we duplicated and tried to improved upon them. By no means are they the perfect answer. You can change these ideas even more to suit your needs and to improve them. Let us know about your improvements.

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Rudder cables

The problem is that the pre 1986 Klepper rudder cables were not made of stainless steel and would rust, then break. The pre 1991 cables are made of stainless steel, but are not plastic covered (as the old ones were) so they can chaff your legs and damage equipment. The newest cables are the best rudder cables on any boat, but still can chaff your legs

The cable length adjustment point is on the foot pedal, not on the cable, so making fine adjustments with the spray deck on are difficult. When sailing on a long tack the rudder can be cocked to one side and the foot can get tired from pushing one foot forward for a long time. With this modification it is easy to adjust the cable so when the rudder is cocked your feet are still even.

The original cables are not field fixable and it is difficult to tell when they are wearing out. The newer cables usually break when the crimp gives out. This is fixable with a pair of pliers, but not

convenient while paddling, and potentially dangerous when sailing.

The modification is to make the cables out of pre-stretched line with a quick adjustment fitting on each cable. The pre-stretched line can be bought at any wind surfing shop. It is important that the line is pre-stretched. The Klepper shroud tightener (Klepper part #6028) works well as a quick rudder adjustment fitting. The line should be long enough to go from the cross bar to the foot pedal and back to an easy adjustment point between your knees and hips. Put closed S-hooks on the cross bar and tie one end of the line to it. The line goes through the rear coaming piece, through one set of holes in the tightener, through another closed S-hook (which will attach to the foot pedals) and back through the other holes in the tightener with a knot to keep it in place. Now this line is permanently attached to the cross bar and rear coaming piece. Crimp the hooks on the foot pedals a little so that the closed S-hooks **snap** onto the foot pedals. Don't over crimp or else the closed S-hooks won't fit.

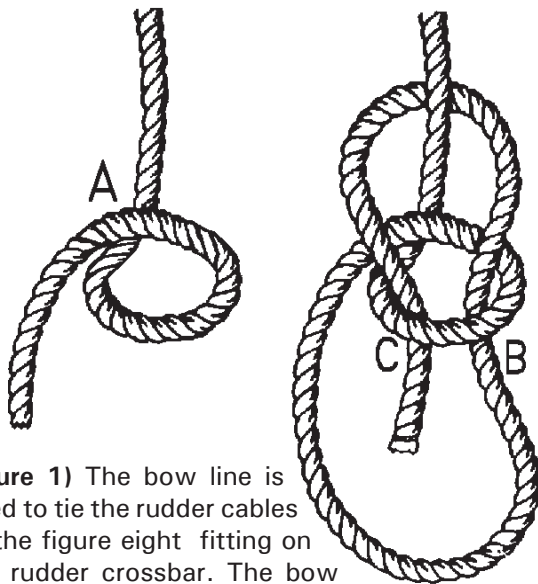


Figure 1) The bow line is used to tie the rudder cables to the figure eight fitting on the rudder crossbar. The bow line is one of the most useful knots for sea kayakers to know.

Make a loop with the standing part of the rope underneath (A). Pass the end through the loop (B), around the standing part of the rope and then down through the loop (C). The length of the bight depends upon the purpose for which the knot is required. Always back up all knots with a hitch.

Solo Conversion Seat

The Klepper solo conversion seat is a wonderful option. It is more comfortable than the regular seats and gives you lower back support. The original conception was for a seat that you could put in the center of the kayak for solo paddling. This arrangement works fine, but the seat has other uses as well.

For double paddlers where one of the members are either short or tall the solo seat can be a tremendous improvement. If you are much over six feet tall then you probably have problems with not enough room for your legs. If you put the rudder peddles in front of the number four rib, the rudder peddles may hit the back of the bow paddler. The solo seat can be put a few extra inches forwards of the regular position of the bow seat (see figure 2). This will permit the peddles to go further forward and the solid back rest will protect the bow paddler's back.

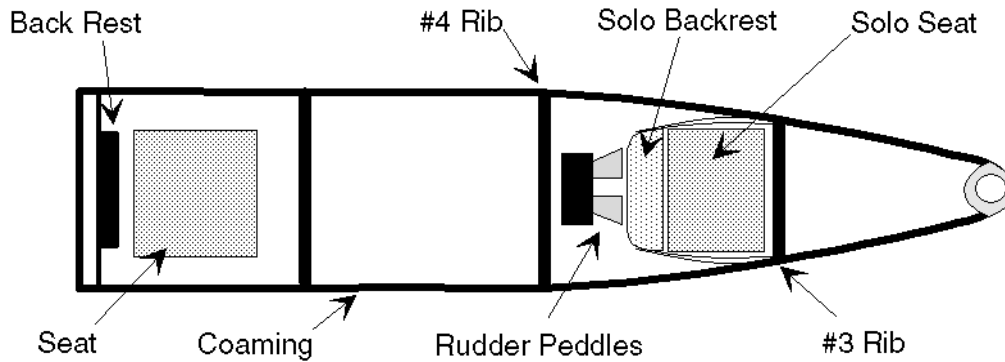


Figure 2) The full rudder peddle assemble is mounted in front of the #4 rib with the solo seat just behind the #3 rib. This gives the rear paddler about an extra six inches of leg room, needed for tall paddlers. The solo seat can also be adjusted so that the bow paddler can brace against the #2 rib with their feet.

Many bow paddlers find that the regular seat is too low. The coaming in the bow is higher than in the stern and can interfere with a normal paddling stroke. We usually provide an extra PFD for the bow person to sit on, to raise them up. You can get the solo seat without the cushioned seat attached. Then you can add a piece of wood between the wood seat and the cushioned seat. We find that an inch will raise most bow paddlers high enough up, but still keep the center of gravity low enough. If you want to save a little money don't buy the cushioned seat but use closed cell foam. Cut out a few pieces of foam and contact cement them together. Between the bottom two layers put a couple of pieces of bungee cord coming out the sides. Put the foam cushion on the wood solo seat and tie the bungee under the seat. With this arrangement you can vary the number of layers until you find the right height for the bow paddle. You can have custom foam cushions for each different person that paddles in the bow.

The regular rudder cables are not long enough to put the peddles up front for solo paddling. Granted, paddling solo from the center of the Aerius II, you don't need a rudder as much as paddling tandem. The Aerius II is a large solo kayak and a rudder makes paddling easier. The modified rudder cables will reach when fully extended. Fully extending the modified cables will make the adjustment point near the peddles and difficult to adjust with the solo

spray deck on, but it will work. You could have one set of cables for tandem paddling and another set for solo kayaking.

Capsize

The problem is that equipment stored along the gunwales and in the bow and stern will fall out and be lost or obstruct the re-entry into the boat.

The remedy is to; attach all equipment along the gunwales and put straps on the #2 and #6 ribs.

Rib straps are made so they prevent most equipment from falling out, but do not interfere with the loading and unloading of the boat. This is done by using one Fastex quick release buckle and two Fastex Ladderlocs. This assembly can be made for under \$5.00 and one hour of work for each rib.

Gunwale attachments are done by making straps with Fastex quick release buckles to run behind the gunwale and under the rod. Use two straps per item you are attaching. Make the straps long enough for the item you are attaching. If it is a small item like a sleeping pad only put the strap behind the gunwale and not under the rod. This will keep the item in place and up out of the way.

For carrying a camera/binocular bag a strap can be attached to the keel board with d-rings sewn into the strap. Use snap links to attach the bag to the d-rings.

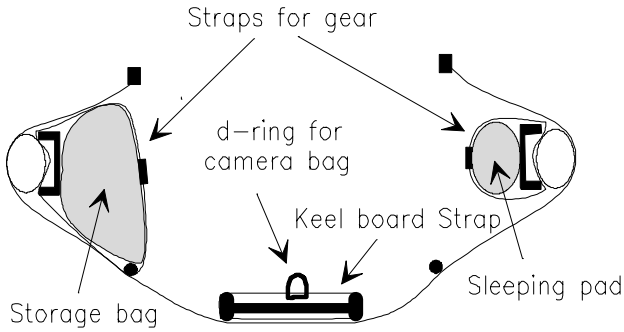


Figure 3) Mounting gear to the sides of folding kayaks allow more gear to be carried and prevents gear from floating around after a capsize. The keel board strap stays on the boat when folded up.

On multi-day trips when storage space is limited we use Voyageur's Caboose bags to carry our sleeping bags. The Caboose bag can get attached to the keel the ribs in front and behind the seat area. The Caboose bags replace the seats, which gives more storage room, flotation, and are more comfortable than the seats. Voyageur's Caboose bags have a hose to inflate the bag, but we use it to deflate the bag after stuffing the sleeping bag in. By inflating or deflating the Caboose the height of the seat changes. In calm conditions or when sailing it is better to be a little higher but when the conditions turn bad just let a little air out and the center of balance is lowered.

The problem with the nylon Voyageur's bags are the life span is short and the price is high. Voyageur's told us that sunlight and salt water will damage the bags. Bad combination for sea kayakers. The water proofing delaminates from the nylon so the seams will give out. If you wash the bags after each use and keep them out of the sun as much as possible the bags should last the average sea kayaker a long time. These are still the best bags we found for folding kayaks.

Rudder pull-up

All boats with rudders should have a pull-up and the Klepper is the only kayak with a rudder that does not offer a pull-up.

We have not found a perfect attachment method, but have been using a d-ring. The pull-up line must run through the rudder pin. Tie a line to the rudder pin and the other end attaches to the d-ring on the stern deck with a snaphook to prevent a lost rudder pin or rudder. Keep the line short enough so that the pin can not come out of the rudder unless the snaphook is unfasten. Check that the loop on the rudder pin is closed, so the pull up line won't fall out. Parachute cord works well as the pull-up line. Run the pull up line through a shroud line tightener, through the d-ring and back to the shroud tightener.

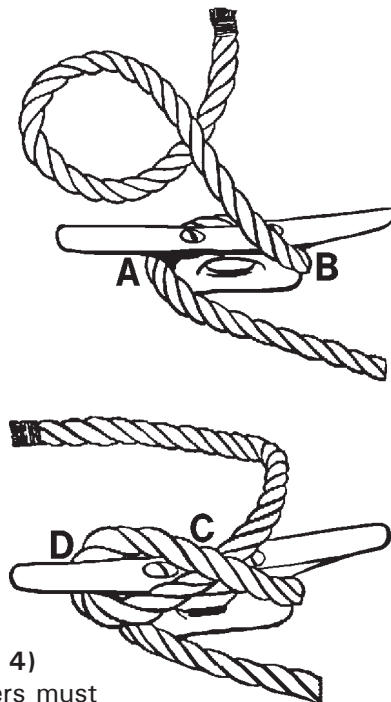


Figure 4) All sailors must know how to cleat off a line. Loop the running part around the cleat's far side, away from the direction of the pull (A). Then take a turn around the stem with the running part (B) and up and over the center (C). Slip a halfhitch over the horn of the cleat (D).

Sail Rig Modification

We use the sail rig mostly as a tool to help us cover miles with the least amount of energy and the most amount of fun. The standard Klepper sail rig is great for a day of sailing in a light boat, but if you are using it for an extended trip or in an exposed area, we like to set it up differently. The modifications is to run the lines differently.

The problems are that the sails cannot be taken down if the wind dies, gets too strong, or changes direction unfavorably. The remedy is to run the lines differently, and use a cleat board. The cleat board is a piece of 1x4 with four jam cleats and two J-bolts. Klepper sells both the jam cleats and J-bolts. To make the cleat board easy for the novice make the board with; In, J (Jib), M (Main), Out, and use different color lines for the jib and main halyards.

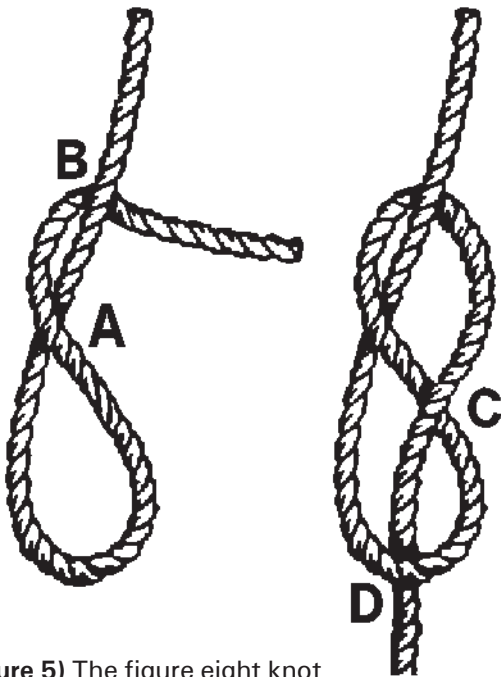


Figure 5) The figure eight knot is also called the perfect knot. It is used extensively by sailors to keep lines from running through blocks or rings. We use it to tie the main halyard off to the gaff. First make a bight (A) and lead the line around the standing end (B). Bring the line down and across the bight (C). The line goes through the bight (D) and is pulled tight.

We don't use the lee boards when sailing on extended trips. With the lee boards in place the bow person can not paddle. We find that when the boat is loaded heavy, it sits low in the water and tracks well enough. Not to say that we don't slip sideways. The convenience of not having to store the lee boards when not sailing, and being able to switch from paddling to sailing outweighs the slipping. If the winds are pushing us that much sideways it's time to paddle.

We usually take the battens, but don't always use them. The advantage of the battens are great, but they are difficult to install while on the water. The battens have to be removed in order to roll up the sail for storage on the deck.

In place of the proper method of tying the lower main sail to the mast, we attach lines permanently to the eyelets. This method allows us to tie as many or few as we need for the conditions at hand and facilitates the raising and lowering of the main sail. A longer line is permanently attached to the lower eyelet which wraps around the mast and is cleated to the lower center cleat as a boom down hall and to prevent the boom from coming lose.

The jib is stuffed into the paddle packet of the expedition Klepper when not in use. To raise the jib, just pull the jib halyard (marked "J" on the cleat board) and up goes the jib. If the foot of the jib has been moved "IN" then pull the "OUT" line and the jib moves out to the bow of the boat. This takes less than a minute, so jib sailing is always easily at hand.

When paddling, the main sail is attached to the paddle hold-downs on the side of the expedition Klepper. By keeping the main sail with the gaffhook as far forward as possible, the main sail does not interfere with paddling. To raise the main sail, unclip the rig from the paddle hold-downs and have the stern paddler unroll the rig. The bow person uncleats the main halyard and hands it to the stern paddler. The halyard goes through the gaff eyelet and the end of the line is tied into a thick knot (figure-eight works well) that won't pull back through the eyelet. The bow person puts the

gaffhook onto the mast, and pulls up the main sail. Next, attach the boom onto the mast and wrap the line from the lower main sail eyelet around the mast and tie the lower center cleat. It takes less than five minutes to raise the full sail rig

To roll up the main sail, align the boom and gaff and roll the sail around them using the main sheet to rap around the sail into a tight package.

Flotation

Most folding kayaks have sponsons along the gunwales which acts as flotation. The problem with this setup is that most folding boat owners use the sponsons as their only flotation. The sponsons will keep the boat from sinking but the kayak could full with so much water that when the paddler re-entered the boat it would not have enough free-board to keep the waves out. Figuring that you are not going to capsize a Klepper or Nautiraid in small seas, you must plan your flotation for the worst conditions you might encounter. The flotation does two things; 1) keep the kayak high enough out of the water to allow the paddler (two paddlers in a double) to re-enter the boat and pump it out without the wave breaking over the coaming and entering

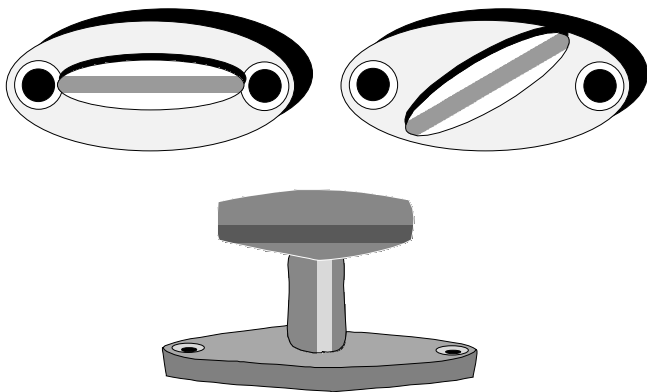


Figure 5) The T-fitting on the left is new and the T-fitting on the right is twisted and will break soon. You can try to twist it back into original shape using a pair of pliers. Twist a little at a time giving the metal time to recover before twisting more. At this point we would replace it as preventive maintenance.

the kayak, 2) reduce the volume of water to be bailed out. A completely swamped double would take thirty to sixty minutes to bail out. That could be well within the time for hypothermia to start if not in a dry suit or good wet suit. I'm not only talking about winter paddling but April, or May in the northeast.

How much flotation does a folding kayak need? That depends on the situations you are paddling in. If you are paddling in open water, you can't be sure of the conditions you will encounter that day, so always error on the side of caution. You can never have too much flotation! When sailing or paddling open water or cold water, I like the bow and stern to be full of flotation. A combination of flotation bags and storage bags with your gear in them works fine. Large flotation bags only cost between \$20 & \$40 apiece. Good storage bags cost between \$25 and \$60 apiece. If you don't want to spend that kind of money, then a group of plastic soda and milk containers tied together or in a large mesh bag works fine. There is no excuse not to have adequate flotation in your boat. Remember that the flotation should not be able to come out accidentally.

Klepper T-fittings

Klepper uses ten T-fittings (Klepper #5012) on the Aerius II and four T-fittings on the Aerius I. The T-fittings for the backrests have been an ongoing problem. The fittings would break for two reasons; 1) if the back rest is over twisted (leaned back or forward too far) the fitting would twist, 2) the metal of the backrest caps would cut into the fitting. The backrest caps have been changed from metal to plastic in 1987 and can easily be replaced (Klepper #7063 for outer cap and #7064 for inner cap) for about \$8 a backrest. In 1991 the backrests were changed again and have a metal bar instead of wood, which should stop the twisting problem. Don't bend a twisted fitting back into original shape unless the backrest won't sit properly. In that case with the backrest attached twist the backrest a little past its stopping point. If you over twist, the T-

fitting will break. Don't try to straighten the T-fitting, only twist it until the backrest sits correctly. We have added a set T-fittings to the back of the foot peddles as a good place to keep the spares. We usually have a repair kit with us, but by keeping the spares on the foot peddles we always have them and the screws at hand. At about \$4 apiece the T-fittings are not overly expensive but the longer they last the better. Lets hope Klepper can find a solution to the T-fitting problem, but until then we must learn to make them last as long as possible and how to fix them when they finally fail.

To replace them you need a Philip head screw driver. We carry both a Swiss Army knife and a Leatherman tool, both have a Philip head screw driver on them. If the screw has been varnished over, it can be difficult to remove. Use a knife to cut the varnish around the screw before trying to remove it. Do not strip the screw! Each time we replace a T-fitting we replace the screws to insure the screws don't strip. In the field if the hole in the coaming is striped use a piece of wood (a toothpick

works fine) by putting a small piece of wood into the hole then put the new screw in. To fix the coaming hole in the shop use a small amount of varnish or epoxy to coat the inside in the hole (don't full the hole just coat it) and let it dry. Coat the new screw with wax to help in the removal of the screw for the next replacement.

Repair Kit

All folding boats come with a repair kit of some type. Klepper's repair kit has patches to fix the deck, hull, and sponsons. We have assembled a more complete kit for long trips and a simpler one for day paddles. For short trips we carry some thin line (parachute cord), duct tape and the Leatherman. These three simple items will get you through most situations. With all of our field repairs on long or short trips we are only interested in temporary fixes. When we get home the permanent repair is done. Our complete repair kit is stored in the smallest size Pelican case. The Pelican case is

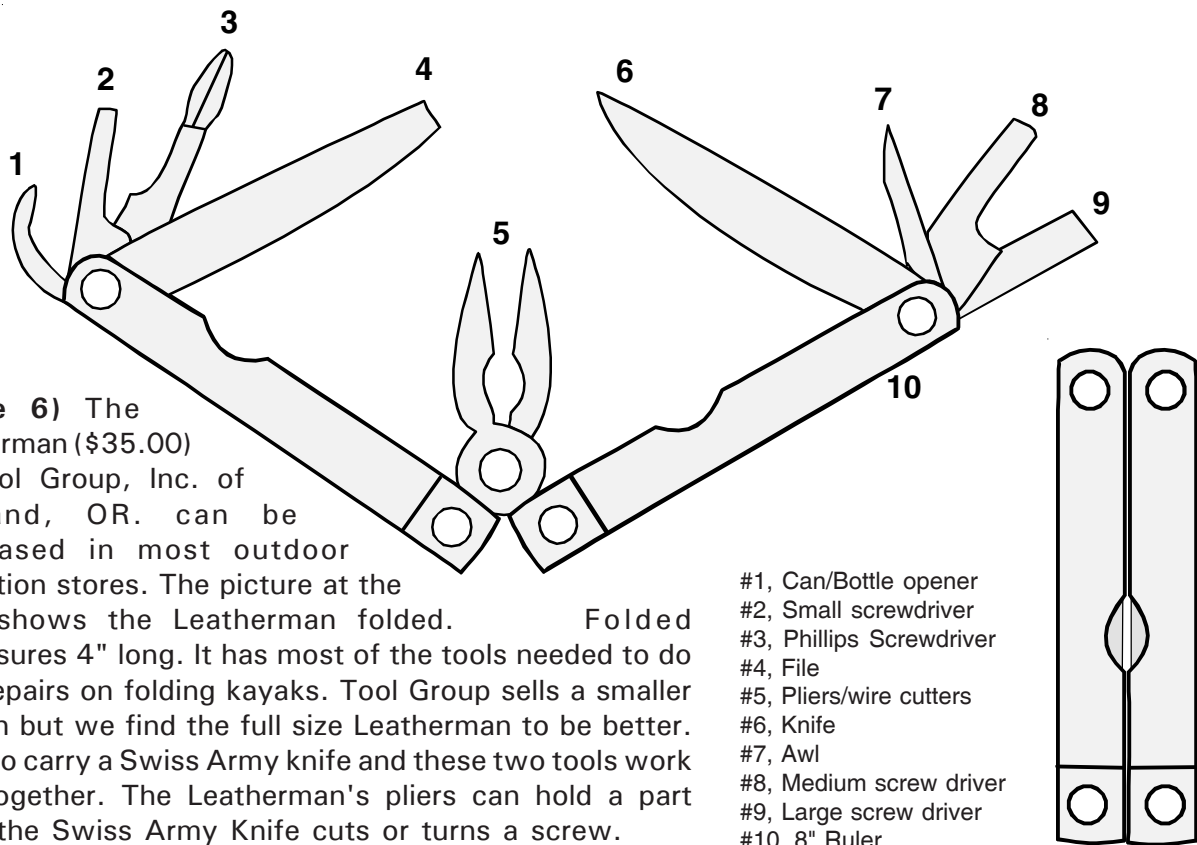


Figure 6) The Leatherman (\$35.00) by Tool Group, Inc. of Portland, OR. can be purchased in most outdoor recreation stores. The picture at the right shows the Leatherman folded. It measures 4" long. It has most of the tools needed to do field repairs on folding kayaks. Tool Group sells a smaller version but we find the full size Leatherman to be better. We also carry a Swiss Army knife and these two tools work well together. The Leatherman's pliers can hold a part while the Swiss Army Knife cuts or turns a screw.

- #1, Can/Bottle opener
- #2, Small screwdriver
- #3, Phillips Screwdriver
- #4, File
- #5, Pliers/wire cutters
- #6, Knife
- #7, Awl
- #8, Medium screw driver
- #9, Large screw driver
- #10, 8" Ruler

nearly unbreakable, compact, and water proof. It also makes a good first aid kit. Pelican sells its cases in gray or yellow and we use the yellow one to make locating it easier. The only items we don't keep in the Pelican case are the roll of duct tape, 50 to 100 feet of parachute cord, the Leatherman Tool, a spare rudder pin and a spare rudder yoke. The Leatherman Tool and parachute cord is kept in one of the Klepper side pockets. Because of the size of the duct tape we keep it in the stern of the boat usually in a zip lock bag. Don't buy cheap duct tape, it doesn't stick well and is not as strong as the good duct tape.

Sailing seat/Deck board

The problems are that; the seat cannot be used with the spray deck on, the seat hangs over the coaming, so it interferes with both paddlers strokes, and there is no place to mount a compass and other equipment on deck.

The remedy is to make a board which is both a sailing seat and a deck board to hold a compass, chart, flashlight, horn, and whatever you need. The attachment method for the deckboard is similar to the expedition spray deck (or the tuck under spray deck as it is sometime referred to). The expedition spray deck has a rope sewn into the edge which is tucked under the

coaming and sits into a groove in the coaming. For the deck board a (fiberglass) rod is used in place of the rope. The rod has greater holding power which is needed when the bow person is hiking out in a strong wind.

D-Rings

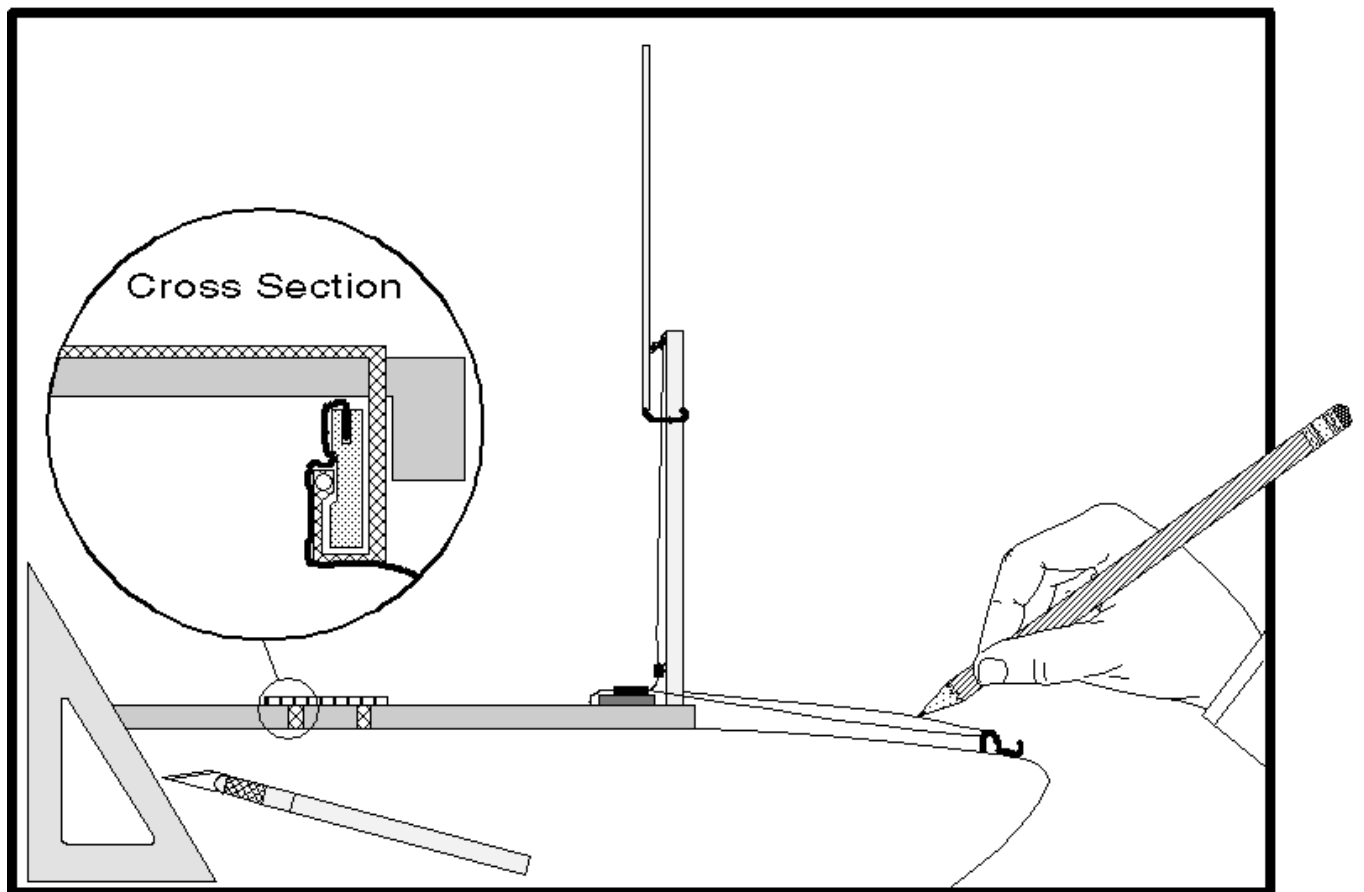
D-rings can be added by two different methods, stitch them on like found on new folding kayaks or glue them on like on inflatable boats. It depends on what purpose the D-rings are being used for. The glue on type of D-rings are much stronger. They gets glued onto the hull, so they are in the water a most of the time. We use the glue on type of D-rings as car tie down points for our non expedition Kleppers. The bow fitting on the non expedition Kleppers are not strong enough as a bow tie down.

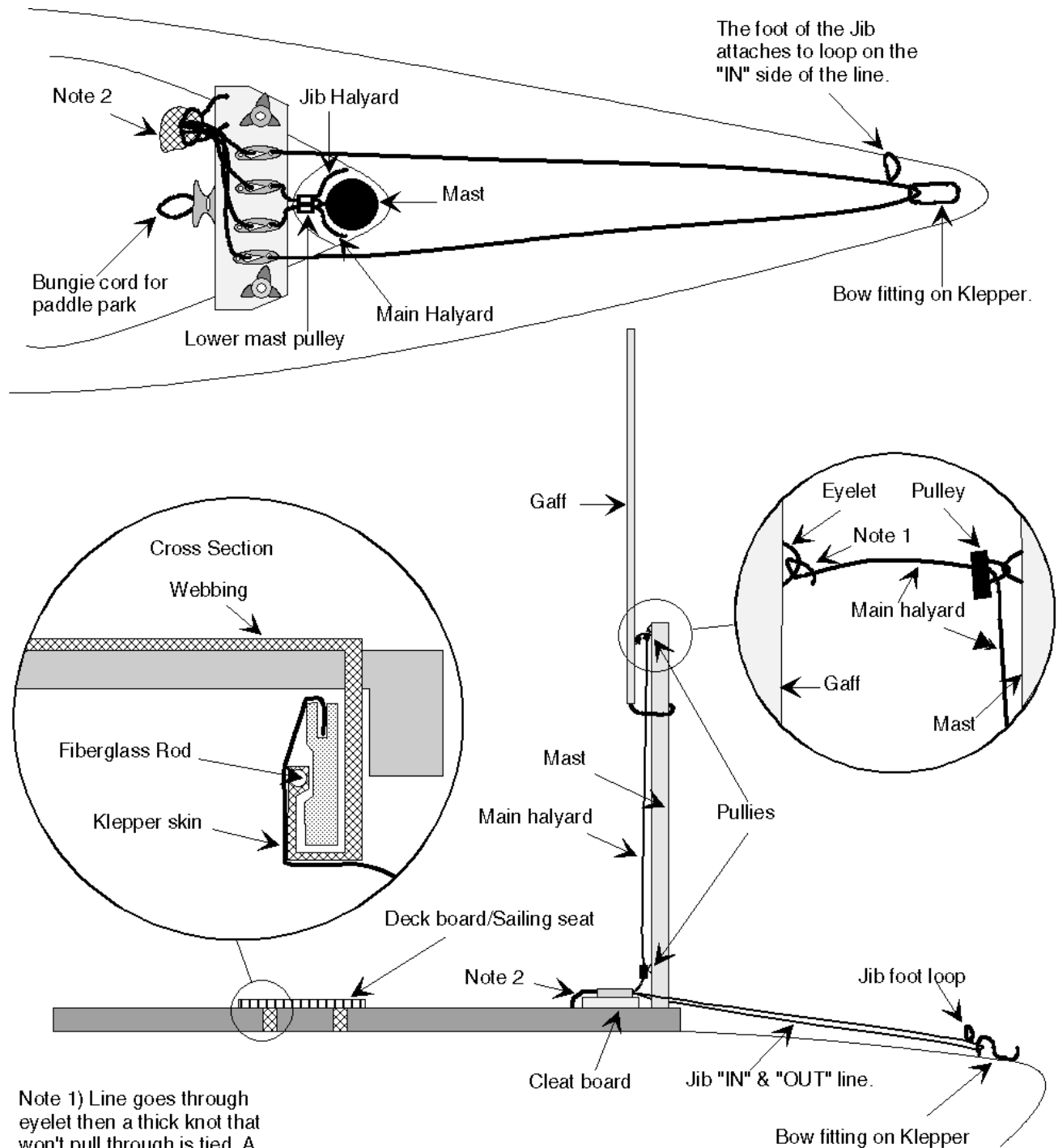
Use only top quality D-rings because some cheap D-rings will rust. We have found the Zodiac triangular D-rings to fit the best.

We add an extra set of D-rings about fifteen inches in front of the main stay D-rings. We use this to hold a PFD for the bow paddler when not in use.

Repair Kit Items		
<u>Qt.</u>	<u>Description</u>	<u>Note</u>
1	Chouinard Sawing kit	
1	Leatherman Tool	
1	Swiss Army knife	
	50' Parachute cord	
1	Aqua-Seal	fix hull damage quickly
1	Aqua-Seal accelerator	to quick dry Aqua-Seal
2	Klepper T-Fittings	with the screws
1	Klepper Shroud tightener.	for sailing & rudder cables
1	Rudder yoke	in case of a lose
1	Rudderpin	in case of a lose
1	Piece of hull material	from Klepper repair kit
1	Piece of deck material	from Klepper repair kit

Modifying Folding Kayak Drawings



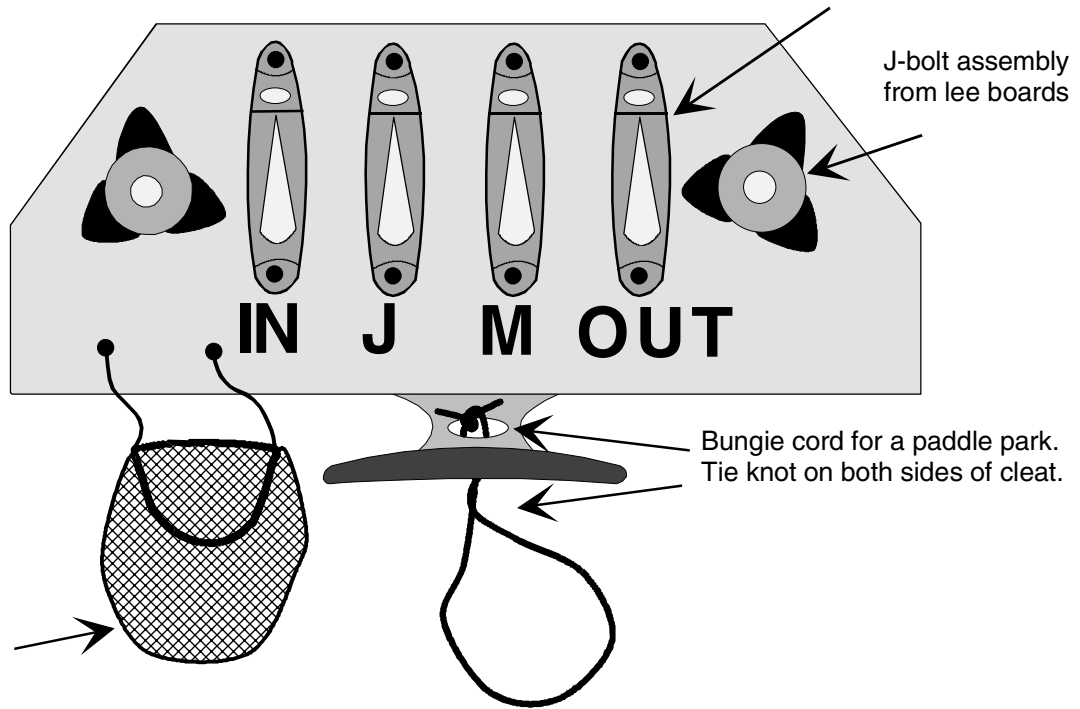
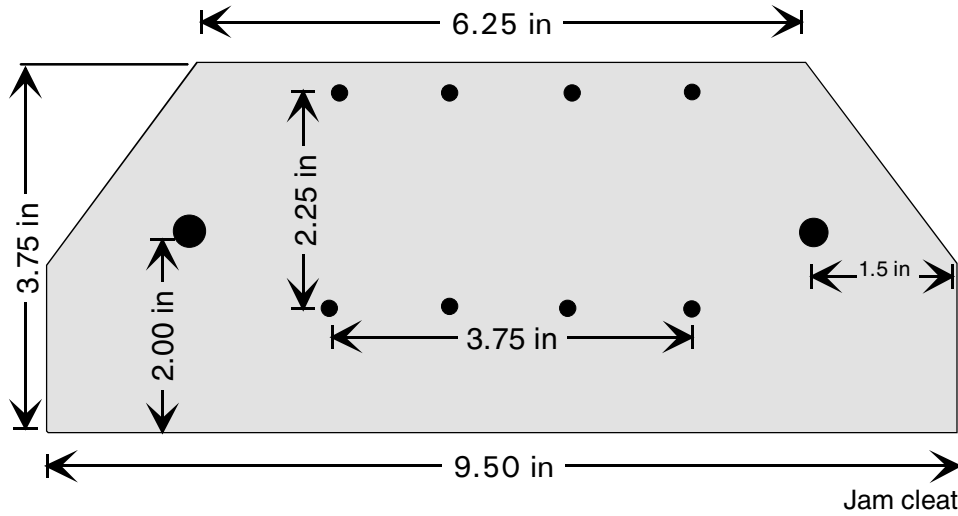


Note 1) Line goes through eyelet then a thick knot that won't pull through is tied. A figure-eight knot works well.

Note 2) For safety, the ends of all the lines should go into the stuff sack attached to the cleat board.

Tie an overhand knot at the end of the lines which goes through the cleats.

Modified Klepper sail rig		<div style="display: flex; flex-direction: column; gap: 5px;"> <div> Klepper coaming</div> <div> 1" nylon webbing</div> <div> Deck board/Sailing seat</div> </div>
07/13/93	Rev. C	
Bill Lozano Atlantic Kayak Tours, Inc. 320 W. Saugerties Rd. Saugerties, NY 12477		



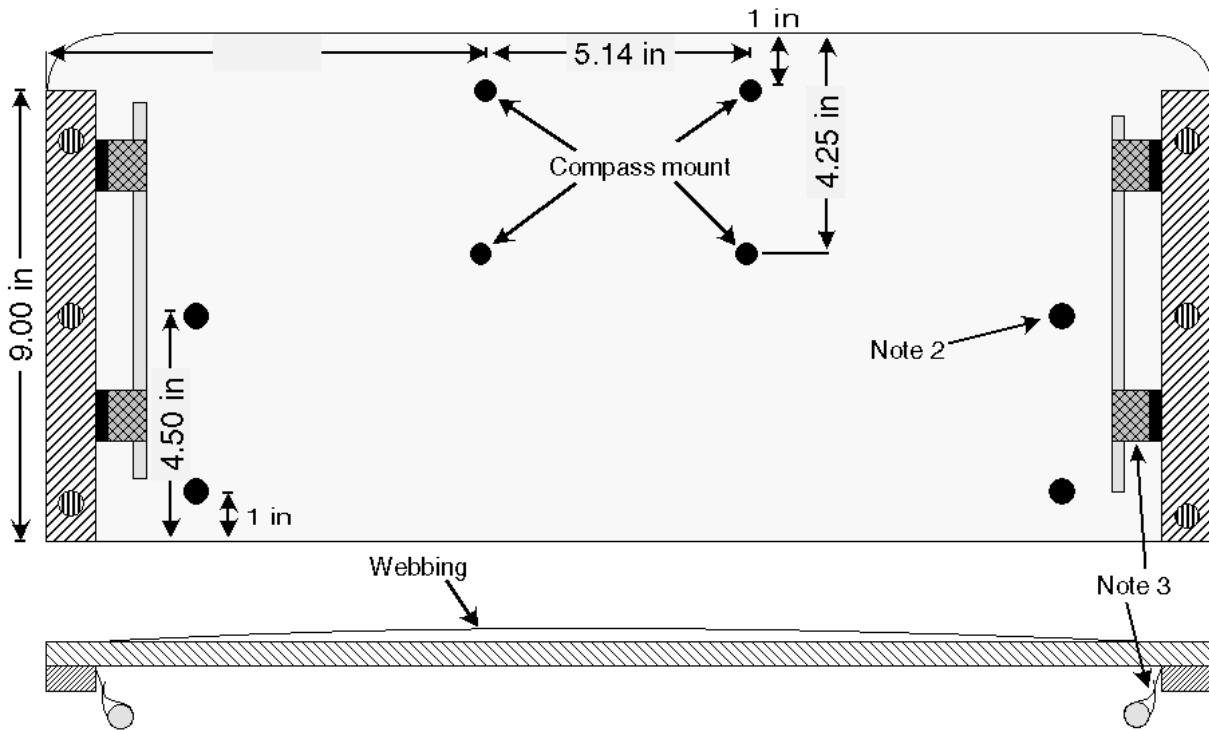
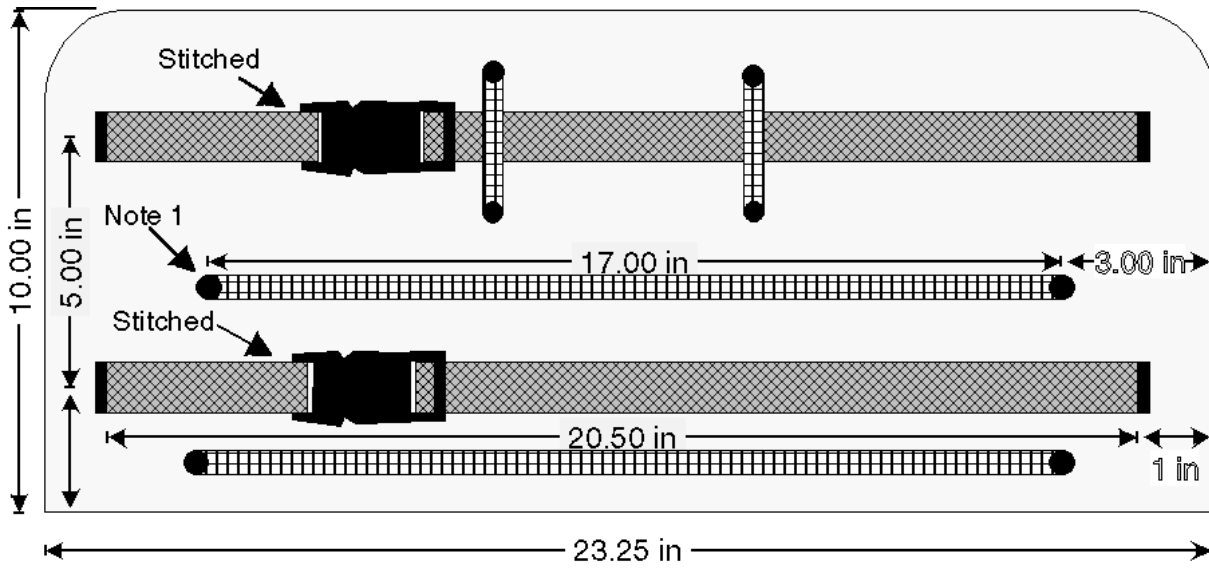
Notes

Note 1) Stuff sack to hold loose ends of lines for safety. A wide opening works best. Bag opening should not be able to close. To attach bag tie a knot under the cleat board.

Note) Jam cleats and J-bolts can be purchased from Klepper. The J-bolts are the same ones used on the lee board cross bar. The jam cleats must have a fairlead (same as the cleats Klepper sells).

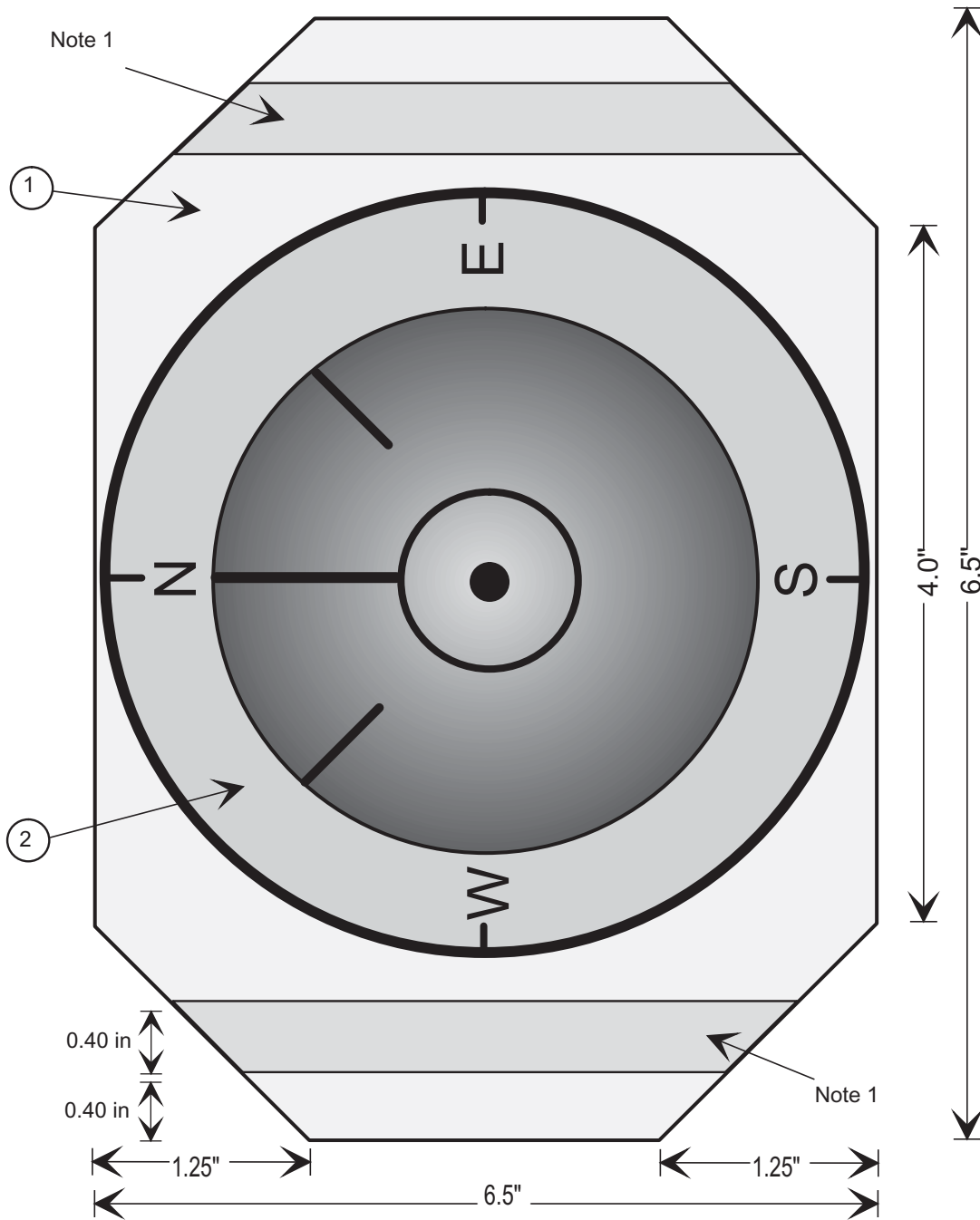
IN = Moves the foot of the Jib in.
 J = Jib halyard
 M = Main halyard
 Out = Moves the foot of the Jib out to the bow.

Cleat Board for Klepper sail rig		Hole drilled in wood 1"x4"x9 1/2" board
Updated 7/13/93	Rev. D	
Bill Lozano Atlantic Kayak Tours, Inc. 320 W. Saugerties Rd. Saugerties, NY 12477		



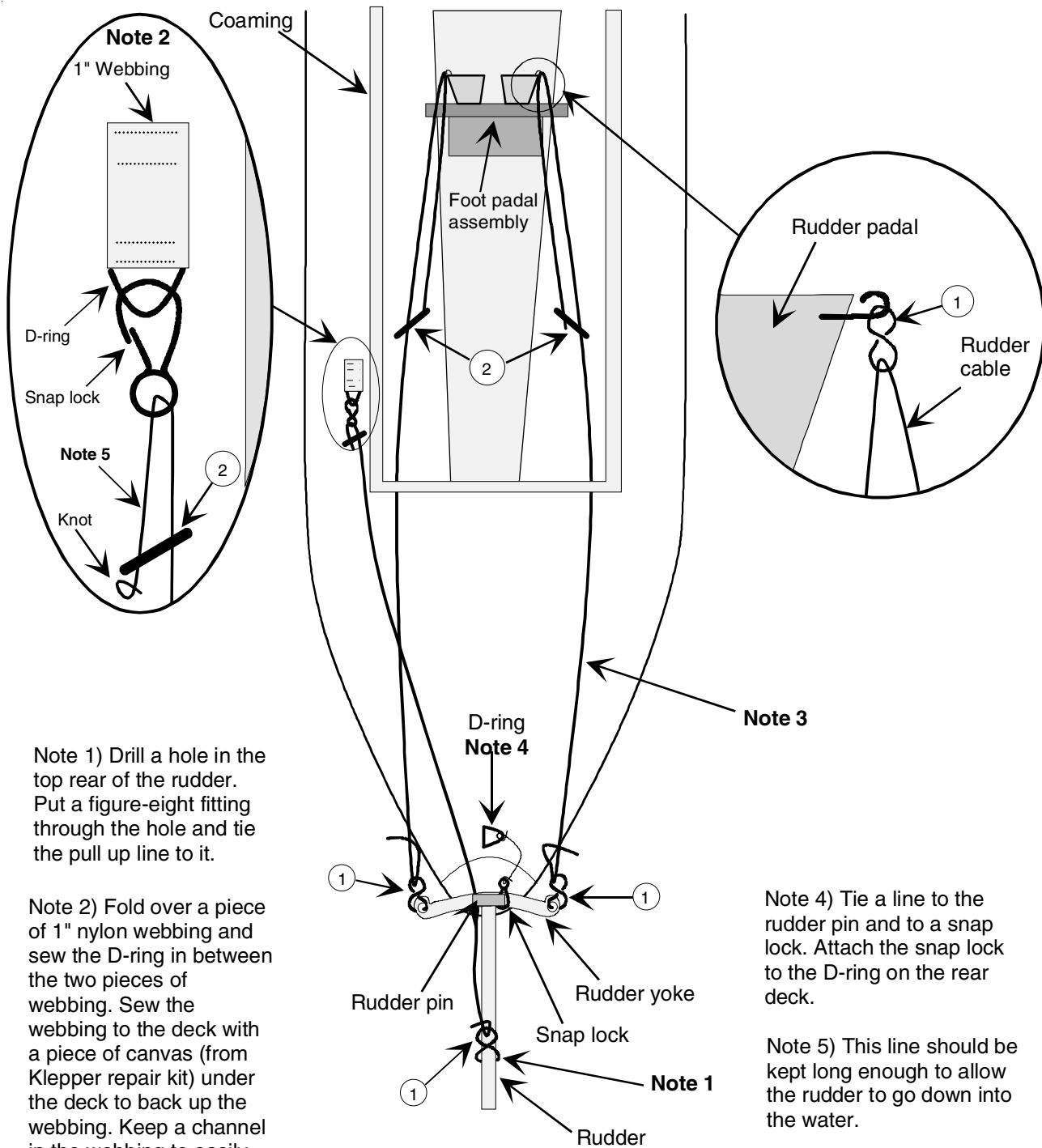
- Note 1) Bungee goes through hole and tied in a knot.
- Note 2) Add extra holes for flashlight, horn, or other equipment.
- Note 3) Webbing wraps around the rods and is stitched together.

Deck Board/Sailing seat for Klepper folding kayak		1/2" plywood	1" nylon webbing
05/16/89	Rev. C	1"x1/2"	Bungee cord
Bill Lozano Atlantic Kayak Tours, Inc. 320 W. Saugerties Rd. Saugerties, NY 12477		Hole cut/drilled in wood	1/4" rod (fiber glass)
		Brass wood screw 3/4"	Fastex side release buckle Catalog #61301



Note 1) A groove 0.15 inches deep should be cut into the wood so that the bungee cord on the sailing seat can hold down the compass board.

Compass Board		1) 1/2" plywood with marine vernish
Rev. A	06/13/89	
Bill Lozano Atlantic Kayak Tours, Inc. 320 W. Saugerties Rd. Saugerties, NY 12477		2) Sailer II compass from Aqua Meter Instrument Corp.



Note 1) Drill a hole in the top rear of the rudder. Put a figure-eight fitting through the hole and tie the pull up line to it.

Note 2) Fold over a piece of 1" nylon webbing and sew the D-ring in between the two pieces of webbing. Sew the webbing to the deck with a piece of canvas (from Klepper repair kit) under the deck to back up the webbing. Keep a channel in the webbing to easily run the pull-up line through it as in the blown up view.

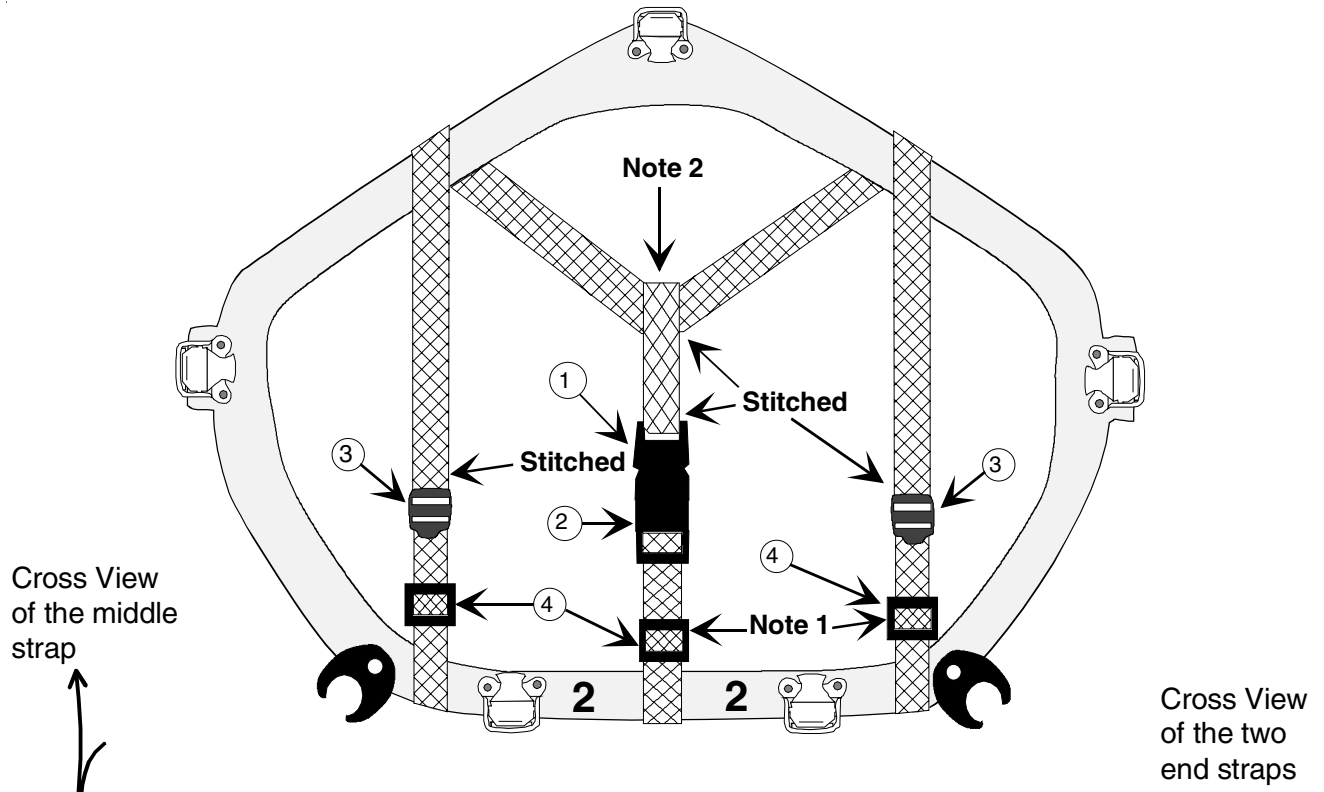
Note 3) Use 3/16" pre-stitched line for the rudder cables. Pre-stitched line can be purchased from most wind surfing shops.

Note 3

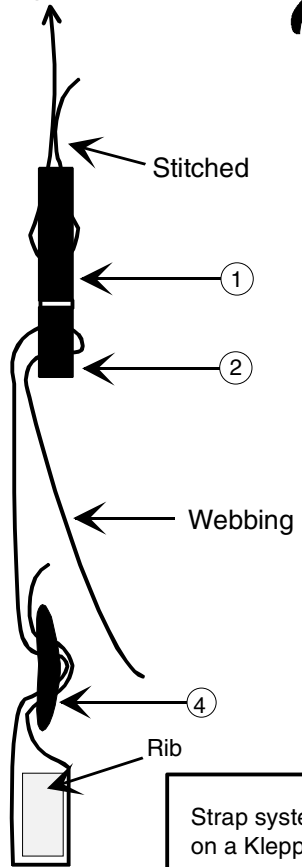
Note 4) Tie a line to the rudder pin and to a snap lock. Attach the snap lock to the D-ring on the rear deck.

Note 5) This line should be kept long enough to allow the rudder to go down into the water.

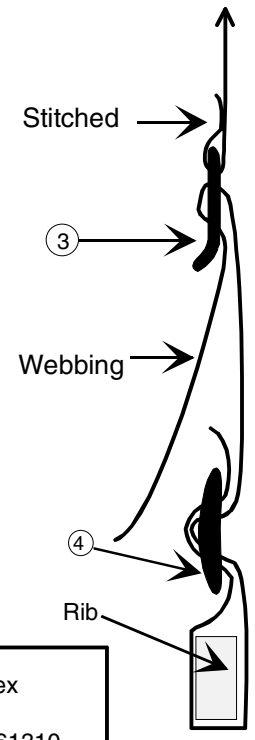
Rudder cable modification	 Stitching
Updated 07/27/90	Rev. C	Snap locks should be made of brass
Bill Lozano Atlantic Kayak Tours, Inc. 320 W. Saugerties Rd. Saugerties, NY 12477		① Brass figure-eight fitting ② Shroud tightener, Klepper part #6028



Cross View of the middle strap



Cross View of the two end straps



Note 1) Using the three bar slider in place of stitching facilitates its removal.

Note 2) This is a drawing of the # 2 rib. The assembly is the same for the # 6 rib, except for the angle of the top "V". The upper middle strap (which is attached to #1) should fold over the "V" strap and be stitched.

Note) Numbers inside the circles correspond to the numbers on the parts list below.

Strap system for rib 2 & 6 on a Klepper Kayak.		#1	#3 - Fasttex Ladderloc Catalog #61310
Updated 03/20/90	Rev. 1.1	#1 & 2 - Fasttex 1" side release buckle Catalog # 61301	#4 - Fasttex Three bar slider Catalog #61304
Bill Lozano Atlantic Kayak Tours, Inc. 320 W. Saugerties Rd. Saugerties, NY 12477		#2	1" Nylon webbing

Notes