

# MAD RIVER CANOE SOLO WHITEWATER CANOE OUTFITTING GUIDE

Properly outfitting or setting up your canoe can make all the difference in terms of both safety and performance. Mad River Canoe offers a complete selection of tried and tested outfitting components to transform your canoe into a whitewater performance machine. This guide is designed to take you through the outfitting process.

This guide does not get involved with specific pieces of outfitting components but is intended to outline general techniques in terms of position and installation of outfitting. Most pieces of outfitting come with dedicated instructions for installation. For best results, you need to look at your outfitting as a “system,” not as a number of individual components. One of the purposes of this Guide is to lay out the entire procedure to allow you to integrate your component choices into an outfitting system.

Tools and materials you will need will vary with your type of canoe and the outfitting selected. A basic list of necessities will include: drill with appropriate bits, non permanent marker, measure, phillips-head screwdriver, adjustable wrench, sandpaper, knife with serrated blade or small saw, denatured alcohol or other mild solvent, and adhesive appropriate for your hull and selected components. The instructions included with your choice of outfitting should provide you with specific information such as bit sizes and other tools and materials required.

**Getting started:** One of the most important things you will want to determine is the balance point of your canoe. Weight in the ends of your canoe will have a greater impact on its performance than weight in the middle section of the boat. Accordingly, you will first want to install your end bags and perhaps move some thwarts before determining the balance point of your particular canoe.

**Thwart Positioning:** Most solo whitewater canoes come without a center thwart and with 2 thwarts positioned about 1/3<sup>rd</sup> of the way from each end. If your boat is so equipped, you can proceed to the next section. If your boat does have a center thwart, you'll need to remove it.

- 1) Remove center thwart. Measure 1/3<sup>rd</sup> of the length of the boat from one end and cut thwart to fit and install at new location.
- 2) Obtain a second thwart and hardware and install it 1/3<sup>rd</sup> of the way from the other end. This structure will give your boat added rigidity and strength to withstand potential pins and wraps.

**Flotation Bag Installation:** Determine the proper size end bags for your boat. Mad River Canoe provides fit lists to their dealers to make this an easy process.

- 1) Inflate the bags about 2/3<sup>rd</sup> to capacity and put in place in ends of boat. Push firmly up into ends. Once positioned, inflate bags fully. Remember that a float bag should not be drum tight. You should be able to depress bag with your finger to your second knuckle.
- 2) Place marks on gunwales and in center of hull even

with wide end of bags. Remove bags from boat.

**Flotation Lashing Systems:** The fastest way to destroy a flotation bag is to tie it into a boat just by using the grommets on the bag. Sooner rather than later, these tie-ins will get torn out and at the least will make it difficult or impossible to secure the bag again or at worst, the tear will extend into the air-cell of the bag. The installation of a lash system requires a modest cost and a minimum amount of time and is well worth it. Options range from a cord/strap-eye “lash-kit” system with optional keeper strap to mesh panel all-in-one systems.

### **Lash Kit Installation:**

- 1) Measure 6-8” intervals from canoe deck back to mark indicating end of float bag on each gunwale.
- 2) Hold strap eye centered over marks and mark mounting holes for each strap eye.
- 3) Using wood screws for wood gunwales and rivets for synthetic gunwales, install fasteners to secure strap eyes.
- 4) Cut off about 2’ of cord. Insert through tie-in in nose of bag. Re-insert float bags in boat. Reach up under deck and loop cord through grab loop at end of boat or other anchor. Tie cord off with some slack, don’t make loop drum tight.
- 5) Knot cord off to one strap eye and then weave cord back and forth over bag. Choice of pattern is yours, you can weave cord diagonally from eye to eye or run it straight across between eyes. There's no harm in doubling up cord crossing bag. At wide end of bag, run cord through tie-ins on bag corners and tie off, leaving some slack in cord running through tie-ins.

**Keeper Strap Installation:** End bags 48” or longer will be better secured by adding a keeper strap. A keeper is a 1” web strap that is anchored at the deck and runs over the center of the bag and down to a D-ring installed on hull at end of bag. The Keeper strap will keep your bag snug in end of boat and down tight against hull.

- 1) Install D-ring, centered on hull just behind mark indicating end of bag. Orient D-ring so that ring is 90° to +keel line of boat.
- 2) Anchor long section of strap to grab loop, carry handle, or deck of canoe.
- 3) Thread short section through D-ring installed on hull.
- 4) Clip buckle connecting strap sections and cinch down strap until it just starts to compress top of float bag.

**Mesh Retention Systems** such as the Float Bra from Mad River Canoe can usually be retrofitted to a boat with existing lash strap eyes or can be installed in new boats by first installing strap eyes as described previously. Advantages to this type of system are that the lash “lines” and keeper straps are integrated, the mesh panel distributes stress over a larger part of the float bag reducing abrasion, and there are pockets & paddle/painter holders are built in.

### **Determining Balance Point of Canoe**

Now that outfitting in ends of the boat has been installed, it's time to determine the balance point. Unfortunately, this is not something you can locate by simply measuring the length of your boat and dividing by two. Variations in hull laminations and the installation of end bags and

lashing systems will alter the balance point from boat to boat. The balance point will serve as a reference for placement of your pedestal and so is a critical part of successful outfitting.

Most boats are best paddled with trim ½-1” bow light. However, this can vary from hull to hull and from paddler to paddler. It's wise to do some comparative research about what is best for your particular boat. Check with your local dealer, talk to local paddlers, and/or consult your canoe's manufacturer for advice or insight. Once you've determined how you want your boat trimmed, proceed to determining the balance point.

- 1) Set up two supports and span them with a 2 x 4 placed on edge.
- 2) Invert your canoe & place gunwales down on 2 x 4.
- 3) Move boat back and forth until it balances on board.
- 4) Mark both edges of 2 x 4 on gunwales.
- 5) Lift boat off 2 x 4 and flip over. Mark center between 2 marks on gunwales. This will be the balance point of your boat.

**Pedestals:**The pedestal is the core of your outfitting. Most are crafted of minicell foam, a dense but soft foam that does not absorb water and is easily shaped for specific paddlers. Pedestals range from 6 to 9” wide and 12 to 24” long. Prior to installing pedestal, it's best to test fit to your needs.

- 1) Prior to installation, set pedestal on floor and straddle it with the knee pads you will be using in your canoe. Your weight should be pretty much balanced between your knees and the seat of your pants with a slight bias towards the latter. You should be able to relieve much of the weight on your knees by simply sitting back in the pedestal. You should be in firm contact with the pedestal both at your seat and along your thighs.
- 2) If the pedestal is too wide or too high, remove foam as described in box.

**Shaping minicell foam:** Starting with a hack saw blade, serrated knife or even an electric carving knife remove foam a little at a time. Be conservative, you can always cut more but it's a lot tougher to add material back. As you approach desired shape, fine tune shape with coarse sandpaper, surform rasp, or dragonskin metal sandpaper. For smoothest finish, use fine grit sandpaper and glaze final surface by passing a torch over foam.

### **Positioning Pedestal:**

- 1) Generally, you will want the center of your weight (i.e. your crotch) about 6-8” aft of the balance point. The actual measure would be determined by how you want your boat trimmed. To make boat more bow light, move pedestal farther back.
- 2) While straddling pedestal, measure distance from your crotch to front of pedestal. Make small mark aligned with your crotch on one side of base of pedestal.
- 3) Measure same distance back from balance point and mark hull. Place pedestal in canoe with mark on base aligned on mark in step 2. Trace pedestal base on hull.

- 4) Step back and sight across boat gunwale to gunwale. If any part of pedestal extends above gunwale line it's best to cut it down to below gunwale line to prevent pedestal from snagging on rocks and resulting in canoe getting caught and potentially wrapped.
- 5) Tape a pencil or marker to a small block of wood. Place on hull with point of marker on front surface of pedestal and trace hull configuration across pedestal.
- 6) Remove pedestal and cut base to conform to hull shape. Maximum pedestal to hull contact is necessary for greatest strength installation. Trim pedestal base until there are no gaps between hull and base and so that pedestal does not rock side to side.

**Footbraces:** Footbraces for open canoes are an open subject. Many paddlers do not use them and don't find them essential. Others feel the opposite. Pedestal systems exist with integral kayak-style footbraces. If your pedestal does not feature this option and you want to add footbraces, you're best off installing them before installing pedestal in canoe due to hardware required.

Most pedestals are too short for footbraces and this makes the addition of a foam extension a requirement. You can obtain foam blanks from your local paddlesport dealer. Extension should be same width as your pedestal and no less than 3” tall.

To mount footbraces to minicell foam you will also need a footbrace installation kit that includes full length through-rods, washers and hardware. Foam will not hold a simple screw-type installation. These kits utilize a rod passing completely through the foam. Due to the length of this rod, it's difficult if not impossible to install in a pedestal already in a boat.

- 1) Straddle pedestal and determine positioning for footbraces. Nominally, you'll want your foot to rest midway along the footbrace runner. This may need adjustment depending on how many different paddlers will use the boat and their sizes.
- 2) Hold footbraces against pedestal/extension and mark mounting holes. Push rod through foam paying attention to keeping rod straight and true so it will exit foam at opposite mark. Most kits include glue-on washers to support the through rod. Slide washers over ends of through rod and glue to foam with contact cement. Place footbraces on ends of rods and capture with locknuts.

**Minicell Footbraces:** An alternative is to glue minicell foam blocks to your hull to serve as footbraces. Be aware that these braces aren't usually a permanent installation but often break loose or wear down. This type of footbrace is best added after the pedestal is installed.

**Installing Pedestal:** There are two common methods to installing pedestals. One is to glue pedestal to hull without any thwart or other type of top support and the other is to glue pedestal and further brace it in place with a thwart. The advantage to the first method is reduction of entrapment potential, the pedestal is free standing with no thwart to potentially get entangled with. The

advantage of the second method is a stronger pedestal installation. The choice is ultimately yours. (If you're outfitting a polyethylene canoe, see below)

- 1) Place pedestal in position to test hull to base contact. If suitable, proceed to install as recommended in following chart.
- 2) Once pedestal is in place, fashion a bracing system to apply pressure on foam to keep firm contact with hull of canoe.

**Gluing minicell foam:** It's critical to select the proper adhesive to work with your canoe hull material. Here is a summary of the most appropriate adhesives and their recommended applications:

**HULL MATERIAL: ABS ROYALEX™**

**Adhesive(s): waterproof contact cement or urethane structural adhesive**

**Contact cement:** Rough up both surfaces, wipe clean with mild solvent. Apply thin coat of adhesive to both surfaces and let dry till barely tacky. Apply second thin coat to one surface and press in place. Alignment of pieces is critical as contact cement doesn't let you slide pieces into place. If installing on curved surface, fashion a brace to keep components in. Allow 24 hours to dry.

**Structural Adhesive:** Rough up both surfaces and wipe clean with mild solvent. Apply mixed adhesive to one surface and press in place. Structural adhesive will allow you to reposition a component if necessary but this will also require you to hold piece in place for several minutes or fashion a brace to hold in place. Allow adhesive to cure for 24 hours before use.

**HULL MATERIAL: COMPOSITE**

**ADHESIVE: Urethane structural adhesive**

**Structural Adhesive:** Rough up both surfaces. Hull surface must be sanded until all sheen is removed or if painted, until all paint is removed and underlying laminate is textured. Wipe clean with mild solvent. Apply mixed adhesive to one surface and press in place. Structural adhesive will allow you to reposition a component if necessary but this will also require you to hold piece in place for several minutes or fashion a brace to hold in place. Allow adhesive to cure for 24 hours before use.

**HULL MATERIAL: POLYETHYLENE**

**ADHESIVE: There is no really good glue for this material.** "Best" results have been obtained using hot-melt glue supported by additional permanent bracing. This will work for pedestal installation but not as well for knee pads and poorly for D-rings.

**Hot Melt Glue:** Rough up both surfaces and wipe clean with mild solvent. "Flame" polyethylene surface with small torch before gluing. Apply glue to component and press in place. Fashion a temporary brace to maintain position. With a pedestal installation, it's best to have a thwart precut and holes drilled in gunwales prior to gluing. Position thwart behind your position on flat surface of pedestal. Pedestal may have to be trimmed or you may have to glue foam to pedestal to obtain a bracing surface for thwart.

**Positioning Knee Pads:** Knee pads are usually made of minicell foam and can vary from flat ½" thick to shaped pads up to 3". Shaped pads such as Mad River Canoe's

Playboat or Contoured Knee Pads are recommended for more demanding whitewater or trips of long duration. They're both more comfortable and increase the stability of your paddling position.

- 1) With pedestal firmly in position, straddle pedestal and position selected knee pads under your knees.
- 2) Adjust angle and position for greatest control and comfort.
- 3) Trace knee pad position on hull. Do not install knee pads at this time until you have positioned D-rings anchoring thigh straps.

**Positioning D-rings and Thigh Straps:** Most paddlers find thigh straps set up in pairs (one for each leg) preferable to one long strap. There is less danger of entrapment and each strap can be adjusted independently. Thigh straps should have a quick release mechanism that is easily reached and operated such as side release buckles or hook and loop fasteners.

D-rings for thigh straps should be sized for the webbing used in your thigh straps, usually 1" to 2" wide. D-ring bases can be a pliable vinyl pad or a rigid vinyl plate. Generally, pads or plates can be used with Royalex™ hulls while plate d-rings work best with composite hulls.

- 1) Pedestal set-ups work best with individual right and left thigh straps with each thigh strap requiring 2 D-rings for installation. This arrangement provides individual adjustment of each strap and greater stability when paddling.
- 2) Thigh straps should be positioned so that they run across the lower part of your thigh. The interior anchor D-ring will be positioned close to the inside of the knee pad. The thigh strap should run up the interior of your thigh, across the top of your thigh at an angle and then level or better yet with a small degree of rise to the side of your canoe. Do not run thigh strap up over thigh and then down to an outside D. This poses a significant entrapment hazard. The exterior D's should be located no lower than 4 1/2" below the gunwale line of the canoe.
- 3) Orient D-rings so that the thigh strap will not be twisted but run flat from D to D. Trace outline of D-ring base on hull. Tape D-rings in place and install thigh straps to test positioning and release capability.
- 4) Check positioning of knee pads with D-rings. Note where traced lines intersect. The D-rings will be installed underneath the knee pads. In most cases, you won't have to worry about trimming or sanding knee pads to accommodate the anchor pads of the D-rings. Check to make sure that the actual D-rings are not blocked by any part of the knee pads.

**Installing D-rings:** D-rings require proper choice of d-ring anchor base and adhesive to best suit hull material. Please refer to box below for recommendations.

- 1) Prepare D-ring base as described for appropriate adhesive. When sanding base prior to applying adhesive, avoid or minimize sanding threads on base.
- 2) Place prepared D-ring in contact with hull. With soft pad bases, start from center of base and work

towards edges to avoid trapping air. With hard plate bases, start at one end of base and lower rest of base into position.

- 3) Apply pressure to make sure that edges of base pad are firmly in contact with hull. Allow 24 hours before use.

**HULL MATERIAL: ABS ROYALEX™**  
**D-Ring Type: Vinyl Pad**  
**Adhesive: Waterproof Contact Cement/Vynabond™**  
Proceed as described in instructions for gluing minicell foam to Royalex.

**HULL MATERIAL: ABS ROYALEX™ or COMPOSITE**  
**D-Ring Type: Vinyl Plate**  
**Adhesive: Urethane Structural Adhesive**  
Heat base plate by immersing in boiling water for 1 – 1 ½ minutes. Retrieve plate with tongs and using kitchen mittens press against hull in desired location. Plate will stiffen as it cools and conform to hull curvature. Proceed as described in instructions for gluing with structural adhesive.

**HULL MATERIAL: POLYETHYLENE**  
Currently there is no suitable adhesive available for consumer use. Given the amount of stress that can be exerted on a D-ring anchor and the limited size of the bonding area, hot melt glue should not be relied upon for installation.

**Installing Knee Pads**

- 1) After D-rings are in place, proceed with gluing installation as described in instructions for minicell foam and hull material involved.
- 2) If knee pads are placed on curved section of hull, fashion a brace or press on pads until preliminary cure is achieved and will hold pads flush against hull without gaps. Allow 24 hours before using.
- 3) **NOTE:** A really satisfactory adhesive for permanently installing kneepads in polyethylene hulls does not exist. You may get apparently good bonding using hot melt glue but this type of installation tends to fail under stress or over time. The best solution for kneepads in a polyethylene canoe would be to use a friction kneepad such as Mad River Canoe's Removable KneePad.

**Testing your Outfitting:** Properly installed outfitting improves your stability and control and it also potentially increases the entrapment hazard inherent in whitewater canoeing. It is your responsibility to test your outfitting in calm shallow water with assistance readily available. Get used to how your boat reacts to paddle strokes, body leans, hip snaps, etc. Flip your boat in both directions and use alternate hands to effect release. You should be able to locate the release buckles on your thigh straps without fumbling or looking. Practice releasing thigh straps with gloves on your hands to simulate the effects of cold weather and to prepare for cold weather paddling.

Once comfortable in shallow calm water, test system in deeper water with a mild current before moving on to whitewater. Never paddle alone.

Nothing substitutes for quality education and training. Consult your local dealer or paddling clubs for information on lessons and courses and continually practice your rescue skills.

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