



SYKES RACING NORTH AMERICA
2009 Owner's Manual

Letter from the Managing Director
Sykes Racing North America, Inc.

Dear Sykes Customer:

It's with enthusiasm and gratitude to all our customers that I find myself writing this letter after being in business for more than six years. Sykes has been building boats for over forty years, and so we had every confidence that the quality of our boats would prove more than competitive in the very competitive North American market. Still, starting and growing a business is never a sure thing, especially for a product built on the other side of the world.

Video Clips:

Throughout this document you will find links to video clips that compliment the text and images. Just look for video blocks like this.

Video clips require either Windows Media Player or Quicktime to play. Various file sizes are offered.

Current Video Clips (Jan '09)

*Adjusting Slides
Adjusting Footstretchers
Attaching Quick-release Rigger
Replacing a Fin
Strapping down a Boat*

If there are certain techniques you'd like to see added, do let me know.

As we move forward through the next phase of business growth, you should have every confidence that the products that you know and love are only going to get better. We hope that you've also been happy with the service we've provide in the early years. Although it might seem that service should naturally get better as we become more established, we've found that improving service takes a lot more energy as we get more boats out there.

My personal goal is to not let service slip, and to make it easier, faster, and (whenever possible) cheaper for you to get top quality service on parts, accessories, and advice. This includes having more information on-line regarding rigging and maintenance. One way to do that is to update and expand this owner's manual, including what I think is the very neat audio/visual links that come with the text document.

If you have recommendations for us on ways we can improve products and services, I'm very eager to hear them.

Thank you for your support; good rowing and calm waters.

Thomas J Gallagher
Sykes Racing North America

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I. Introduction

Jeff Sykes and Associates has been building elite international-grade racing shells since 1966. Since then, we've become Australia's premier boat builder and the primary choice of Australia's leading crews since the resurgence of Australian rowing in the early 1990s. (Since the early 1990s, Australia has been second only to Germany in total medal count at the Worlds and Olympics and most of those medals have been won by crews racing in Sykes hulls.)

We don't market our boats solely on the accomplishments of the crews that have chosen to race our boats at the Olympics. That may be reason enough for some customers, but we understand that most of our customers are looking for numerous qualities in the boats they buy. Among them are:

- ergonomic ease of rowing and responsiveness to the good and bad things all rowers do
- stiffness and durability over years of heavy use
- quality of construction that is apparent in sharp clean lines and beautifully simple finish
- a degree of damage durability uncommon among light and stiff elite shells

This owner's manual is presented in a way that we hope makes it easy for you to get the most out of your Sykes for years to come. Some of the subjects covered in this manual will not cover older models and the fittings therewith, and if that is the case for you we ask you to contact us through www.sykesna.com.

It's important to remember that even with all the technological improvements in processes and materials, elite rowing boats are inherently fragile and require a degree of handling and care from the elements commensurate with the care that went into making your boat at the factory in Geelong.



Drew Ginn (left) and James Tomkins after winning the 2003 World Championships. They went on to win the Olympic Gold in 2004, and Drew has gone on to win World Championships in the M2- with his partner Duncan Free. Tomkins and Ginn selected Sykes after trialing other top international boat makes.

II. Owner Responsibilities & Safe Rowing

It's important for your enjoyment and safety that you observe the following rules before rowing your boat.

1. Before receiving your boat, insure your boat with a reputable agent by supplying them with the mould number, construction type (HC, HKCC, HKC, etc.), value, and serial number.
2. After unwrapping your boat, check the serial number card for accuracy of information: serial number and crew weight in particular.
3. Read this owner's manual and familiarise yourself with your boat
4. Check that your boat has the safety features and that they are in working order. These include the porthole covers, a rubber bowball, and heel restraints set at no more than 3cm from the stretcher board.
5. If rowing at night, ensure that you have suitable lights that comply with the local waterway regulations.
6. Make sure all nuts and bolts are tight.
7. Similar checks should be made at regular intervals, particularly with a new boat and after transport.

Compliance with these guidelines will help ensure that your boat is maintained in safe operating condition and that the manufacturer's warranty remains valid.



Sykes Racing North America is based in the Philadelphia region because of Philadelphia's prominence in and proximity to national regattas and events.

III. Understanding the Adjustments and Features

Some of the features described here may be different in boats built before 2007. Items such as porthole covers, the location of the slide wingnuts, and the wing riggers will be different in older boats. If you have an older Sykes and have a question about making adjustments, please email tom@sykesna.com (North American customers) or info@sykes.com.au (for Australian and other customers).

1. Serial Number Card

The serial number card can be found astern the stroke seat's footstretcher except in stern-coxed boats where it is under the splash-guard in the bow. It has the four-digit serial number for the boat as well as some other useful information:

1. year of construction (may not be the year it was delivered if it came in the first container of the year);
2. average weight of the crew for which it was built, which in 2009 boats and later is represented by a weight range using light- (L), mid- (M), and heavyweight (H) crews with variations therewith;
3. the weight of the boat (complete with back arms and electronics)
4. the boat's four-digit serial number
5. Mould number

Note: for the sake of simplicity, Sykes NA has combined some mould numbers in our literature and website, but the original factory designation will appear on the card. Those changes include: Mould 26H in our literature is mould 30 on the card, mould 13H is mould 23 on the card, mould 22, 22a and 24 are included in the mould 9 family in our literature, and mould 27L, M, and H are actually G, B, and A (which might give you some insight as to why we simplified the designation.)



The serial number card is located astern the stroke seat's footstretcher in all boats except stern-coxed boats, in which case it is under the splash-guard.

2. Riggers

Most folks will order the bolt-on wing riggers or the Quick-Release (RowFit) wing riggers. In both of these cases, the majority of folks won't need to use the back-arms (back-stays) on the sculling wing, but they all should use the back-arms on the sweep riggers. The primary reason for not using the back-arms is to make it easier to carry a single scull. Some folks might like to remove them for a slight reduction in weight, but must remember that without the back arms the boat will likely be under the FISA minimum weight. The exception to this is when rowing a pair as a double or a straight-four as a quad.

NOTE: That by keeping the back-arms on the boat, you may help reduce damage to your boat in an unfortunate collision.

Bolt-on Wing Riggers

There are three holes in the rigger foot to allow for a slight change in the position of the line-of-work along the length of the boat. Some boats have additional holes in the rigger flange for larger adjustments. It's *not* there to change the line of work relative to the rower (that's made with the adjustment in the footstretcher), but rather to adjust the trim of the boat after all else is set. (The trim of the boat is how much of the bow/stern are up/down during the stroke. If the bow is too high at the catch for your liking, move the riggers toward the bow.) Having said that, the factory setting is with the rigger the furthest in the stern, allowing for an additional two centimetres of adjustment toward the bow.

Note: Additional holes can be added to the rigger flange without weakening the boat. Contact us for assistance in this regard if you think you want to make a great adjustment to your rigger.

Bolting the rigger on is most easily done by holding a 10mm nut driver on the top side (bolt), and using a 10mm wrench or socket on the nut (bottom side). The two-finger tightening rule isn't necessary on wing riggers as the flange is dense and hard; you won't crush it. Rather, use the two-finger rule and then use some muscle to get another half turn out of the nut. If the nuts on the rigger loosen, they probably were not tight enough.

NOTE: The bolts and nuts should be on the rigger when you unwrap the rigger. You'll note that the bolt goes through the rigger from the top side, a metal washer and then a felt washer between the head and the rigger's metal. On the other side, you'll find a washer and a nut. If you don't keep the metal washer between the head of the bolt and the felt washer, you'll tear up the felt washer quickly. The felt washer is there to keep the metal washer from scratching the anodising on the rigger, and the anodising protects the rigger from corrosive elements.



Order of hardware on wing: bolt, washer, fibre washer on the top side; washer and nut on the bottom.

Quick-release Wing Riggers

The Quick-release feature uses a cam (the black tab) to put pressure on the drums that attach the wing to the bracket on the flange. So, it's important to recognise when the cam is engaged. The simplest visual we use is to place the tabs pointing away from the rigger, BUT with the tab pointing slightly downward rather

VIDEO CLIP:

Attaching a Quick-release
Rigger

.avi .mpg (big)

.mpg (small)



Quick-release cam in the disengaged position, not only pointed away but also 'flapped' downward.

change the position of the rigger. This is obviously more involved but can be done after consulting with us and if you are experienced with tools.

than upward, making them look like the landing flaps on an aeroplane.

After the tabs are all pointed outward and in the down (disengaged) position, line the drums on the bow-end up with the holes in the bracket. Then press the rigger flat on the bracket and line up the stern-end drums with the slots in the bracket. With your hand in the centre of the rigger slide it forward into the slot with even pressure on both sides. It may be a little awkward at first, as you might not be pressing the rigger into place evenly at first, but it should be easier to do with practice.

NOTE: There is no easy way to move the quick-release rigger fore and aft to affect trim. There is room enough on the boat's flange, though, to move the brackets fore and aft and thus

3-Stay Side-bolting Riggers

Fewer of our boats are made with this option, but about half of the eights are made with these traditional riggers. One advantage they have is the ability to move the entire rigger up and down, an adjustment that may increase the range of crews who can comfortably row the boat. You do lose the fore and aft adjustment of the wing riggers, though.

In the case of tightening the nuts on these riggers, you do want to be careful of over tightening. Unlike the coreless construction of the wing-rigger flange, you have both the timber core of the carbon-reinforced shoulders (ribs) and the honeycomb core of the hull itself to consider. Here, the two finger tightening rule is useful. You may also want to use a nut driver to tighten the nuts.

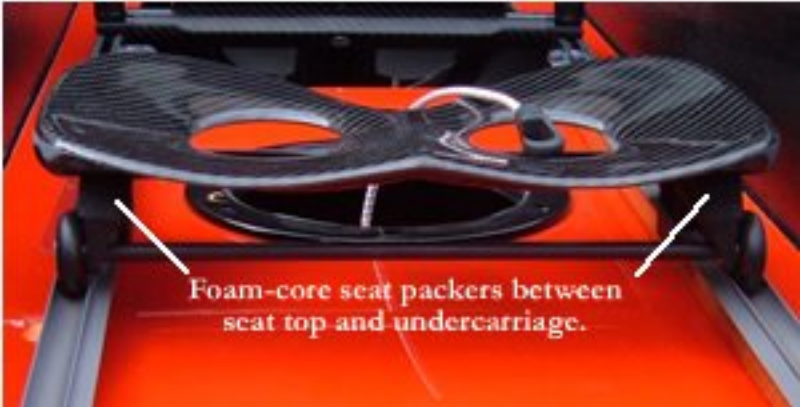
Out-rigging: spread and span adjustment and oarlock angle

The outrigging assembly includes the pin and Concept2 oarlock. The pins are traditionally made to have no pitch fore or aft or laterally, effectively zero degrees in all measurements. The span and spread on sweep boats comes with 4cm of adjustment, whereas the sculling come with the same range and thus a combined range of 8cm. All pitch angles should be compared to the rigger flange/gunwale.

VIDEO CLIP:
Adjusting the Slides
.avi .mpg (big)
.mpg (small)

3. The Seat and Slides

The seat has three primary components – the seat top, the undercarriage, and the seat packers. The latter is used to raise and lower the seat height and can be added or removed to change the height within certain constraints. In 2009, we're changing over to a solid pedestal packer from the foam-core seat packers. This is to reduce shearing of the screws that hold the undercarriage to the seat top.



You can add or remove packers from between the under-carriage and the seat top to adjust the seat height above the water.

The undercarriage is made up of two fixed axles, seat ledges on either end of the axles, and four sealed-bearing wheels. As such, it's best to remove the front chocks on the slides with a screwdriver rather than bang the seat off and on with the heel of your hand (as advised to do with the old double-action bogeys).

The slides are attached to the seat deck, each rail with two bolts running through the seat deck and tightened into place with wing nuts. The stern wing nuts are under the seat ledge on the foot-well side of the bulkhead. The forward wing nuts can be reached through the porthole and toward the bow about 15cm. All four are accessible while on the water.



The wing nuts on the stern end are accessible from the footwell.



The wingnuts on the bow end are accessible through the porthole in the seat deck and slightly forward.

VIDEO CLIP:
Adjusting the Footstretcher
Position
.avi .mpg (big)
.mpg (small)

4. Footstretcher

Attaching the footstretcher to the tracks is probably obvious, but there are a couple common mistakes some folks make. The first is trying to slide the footstretcher into place with the track bolts loosely attached to the footstretcher. It might seem like it will save time, but it's typically difficult. It's easier to slide each individual track bolt on to the stretcher tracks and drop the footstretcher down on the bolts and then put the stretcher nuts on to tighten it into place.

The second mistake is that the track bolts themselves have a rectangular head that is not square. So, when you slide the track bolts into the tracks, they should be lined up with the narrow side of the rectangle going into the tracks. If done the other way, the bolts won't slide fore and aft in the tracks easily.

The more involved attachment regarding the footstretcher is attaching the shoes to the shoe plate (Bakelite plate). There are four screws in the bottom of each shoe. The screws go through the shoe plates from the side with the countersunk slots. Three of the four slots have an arc to them that allows you to rotate the shoes (toe-in or toe-out). Once you determine how much toe-out you want, tighten down the screws with some elbow grease. If you're using a power screwdriver, most won't have enough torque to get the screws tight enough. (Whenever using a screwdriver, make sure that the head of the screw driver fits snugly in the screw head so that you don't strip the screw's head when tightening.)

Deciding on where to set the depth of the shoes is discussed later in personalised rigging, but attaching the shoe plate is rather simple, though there are several variations.

Sykes Plywood and Dreher Carbon Wide Boards: there are three bolts that come through the face of

The 2006 USRowing national team selection regatta; lightweight men's pair.



the footboard onto which the shoe plate drops. Tighten the shoe plate with a washer and nut on each of the three bolts. Note, none of these nuts need to be particularly tight to hold, so use of a nut-driver makes more sense than a wrench.

Sykes Carbon Footstretcher (pre-2009) for singles and M29 LW2x: the shoeplate's two bolts go through to the back of the footstretcher where there is a fender washer and nut for securing them.

Dreher Carbon Footstretcher (2009) for singles and M29 LW2x: there are two bolts that come through the stretcher board on to which the carbon shoe plate attaches. Tighten the shoe plate with a washer and nut on each of the two bolts. Note, none of these nuts need to be particularly tight to hold, so use of a nut-driver makes more sense than a wrench.

Note: for some folks the shoes may be too wide in the single sculls, and we have Dreher carbon footstretchers that have the shoe holes directly on the footstretcher itself. Shoe depth is adjusted by moving the whole foot board up/down on the cross bar.

Please note that with the larger shoe sizes it is possible to move the shoes down low enough that the heels can scrape/press on the bottom of the hull. This can cause damage to the interior laminate of the hull.

5. Others: Porthole Covers, Bow-Number Clips, Bowballs, etc.

With the introduction of FISA self-flotation requirements for boats in 2007, we went to using screw-in hard caps in the seat decks and the end decks. These caps are easy enough in most instances, but can take some lining up to get them to screw in evenly. We don't recommend attaching the covers with a string to the inside of the sealed compartments and don't provide them as such. In transport or windy conditions the heavy caps can ding up composite surface as well as easily tear away from the string and be lost.

Another important safety feature of your boat is the bowball. Please check it regularly to make sure it is on securely. The amount of force and damage that a boat can do is remarkable and can be deadly. Making sure your bowball is secure can save someone's life or at least terrible injury if misfortune should occur.

IV. Personalised Rigging

There are a lot of adjustments in the rigging of your boat. In most cases, you will have given us a sense of the range you wanted on your order form, but in the case that you bought a secondhand boat or one from stock, you should have a range of adjustment that is rather typical for the crew size listed on the serial number card.

There are three factors that will dictate the way you rig your boat for individual preference: ergonomics, load/gearing, and propulsive effectiveness. The latter is perhaps the least understood of the three and there isn't a lot of conclusive research to point rowers in the right direction. It pretty much comes down to how much catch angle and finish angle you have. It's apparent that these factors do affect boat speed and are important consideration. It's just that we cannot say what is optimal for all (or any) crews yet.

In this example, we assume an optimal catch angle of 65' and finish angle of 35', but you can insert whatever numbers you believe are most effective. (If you would like to know more of the arguments behind increasing or decreasing these angles, contact your local sales agent.) By catch angle, we're talking about the number of degrees past the perpendicular that the oar travels to the catch. Finish angle is the degree to which the oar passes astern of the pin. So 0' would see the oar perpendicular to the hull; 90' would be parallel to the boat.

We also assume that you have adjustable oars/sculls and that you have found a load on your oars that is comfortable and effective. Load is best expressed as a simple ratio of inboard to outboard lengths on the scull/oar.

NOTE: It's important that we're on the same pages regarding where these measurements are made. For example, C2 oars have a round end on the grip, whereas Crokers are rather flat on the end. To standardise between all makes we measure to the outside of where the pointing finger would be on the grip. We also refer to a difference in measured inboard and effective inboard. This is because measuring to the outboard side of the collar is not measuring to the fulcrum, which is necessary to get an accurate number on the loading. Since the difference between measured and effective inboard – the latter being about 2cm more on sculling boats and 2.5cm on sweep boats – is constant no matter all other dimensions, effective inboard needs to be used to calculate load/gearing.

We also make another set a relatively common assumptions about overlap, but get a little more specific to the size of the rower, whereas most rigging charts do not. The reason for this is that taller rowers with greater total reach can achieve greater angular reach with standard overlap measurements whereas there is no reason that the same overlap makes ergonomic or angular sense for shorter rowers.

By overlap in sculling, we mean the 'measured' difference between the combined inboard measurements and the measurement of the span (centre of pin to centre of pin). In sweep, 'overlap' is the amount by which the measure

inboard is greater than the spread (centre of pin to keel centre line). We suggest the following as good starting points:

	>183cm tall	>170cm tall	<170cm tall
Sculling	14cm	13cm	12cm
Sweep	30cm	29cm	28cm

Starting with this overlap measurement, move your footstretcher forward to where you are able to achieve a finish angle of 35 degrees where your hands and body are in position for the release. Set your footstretcher there.

NOTE: There are various tools that you can buy to measure angles at the pin for catch and finish angles, but it is also easy to measure two specific angles with just a tape measure and some hanger wire and high school trigonometry (here's one of those few chances in your life to use sine, cosine, etc.). If you need help with that, you can find several on-line calculators for determining the missing measurements in right triangles or just contact your Sykes agent. All you need to know is the pin angle (35 degrees in this example) and the spread.

Once you calculate the other leg of the triangle, you put a mark of the boat and pull a length of string between the pin and that mark on the boat (this is your hypotenuse) and then tape a piece of the hanger wire to the side of the boat or rigger so that you can touch it with the oar shaft while on the water.

So, you can first measure the finish angle off the water with the boat in trestles (slings), and then set the footstretcher on the water. When on the water, move forward on the slide to the catch position and measure the angle at the pin. If it's less than 65 degrees past the perpendicular, you'll have to bring the pin in and shorten the inboard so as to maintain the proper overlap. Not to belabour the point, but the matter of appropriate overlap for rowers of certain heights is also a rule of thumb to serve as a reference rather than a hard and fast number. You may find it easier at first to simply shorten the inboard if only minor modification is necessary to achieve your desired catch angle and range of stroke arc.

Shortening the inboard alone has a similar effect to moving the pins in and shortening the inboard, just not to quite to the same degree. Each shortens the radius of the arc and thus makes it easier to achieve greater angular reach, while moving the pin in has the added effect of bringing the centre of the radius closer to your reach as well.

If in the course of adjusting your stroke arc you had to shorten or lengthen your stroke arc, make note of the change and adjust the outboard length to maintain the ratio of inboard to outboard. This way you eliminate gearing as a possible cause for any difference you might feel in load after making these changes.

Note: when adjusting the outboard and total length of the oar to account for the changes in inboard, remember to use the effective inboard rather than measured inboard to calculate the ratio of inboard to outboard. For example: your original setup on a set of sculls may have had 280cm on the total length with a measured inboard of 87cm. That means the effective inboard is approximately 89cm, and thus a total length-to-inboard ratio of 3.15. If you shorten the inboard by 3cm to an effective inboard of 86cm, you should shorten the sculls to 270.5cm.

After you establish the appropriate starting point for where your span/spread should be and the location of the footstretcher to achieve the desired catch and finish angle, it's time to look at oarlock height. The height of the oarlock will enable you to have the appropriate blade depth while having your handle height at an ergonomically effective height.

Ergonomics is a matter of personal preference, but there is a good argument for the oar handle to be at the same height from catch to release (though achieving this precisely is quite impossible). There is also a good argument that the oar handle height should be low enough during the drive and draw that the elbows are low enough to engage the lats rather than the smaller shoulder muscles during the arm draw and that, of course, the wrists remain flat. Set the oarlocks to the height that allows you to have the elbows low and wrists flat with the blades squared and buried.

In the case of sculling boats, the standard Sykes rig comes with the starboard-rigger pin-block being 1cm higher than the port-side pin-block. If that is your preferred height differential then you should have the same number of spacers under each oarlock. (Sculling boats should also have two snap-in spacers per pin, while the sweep rigs will have one or two snap-in pin spacers.)

While adjusting the height of the oarlocks, you might want to make sure that pitch inserts for the oarlock are also as you want them. We typically use 4 degrees of aft pitch, but include pitch inserts for 1 through 7 degrees.

The last set of rigging adjustments you'll typically need to consider are at the footstretcher:

- (1) You'll want to make sure that your feet are high enough to get a horizontal drive but not too high to be uncomfortable. Most folks are comfortable having their knees about the height of their armpits at the catch when the shins are vertical.
- (2) You'll also want to make sure that the rake of the footstretcher is comfortable. Most folks are comfortable with a rake of about 42 degrees and so that is the usual angle you'll find set at the factory. Women often prefer flatter inclines and may like to start at 40 degrees.

Note: you adjust the angle of the footstretcher in most boats by extending/shortening the keel bracket on the footstretcher; shorten to make the angle steeper, and length to make it more shallow. If you do this to a significant degree, you may have to rotate the nylon tube ends that insert into the tube that braces the back of the footstretcher. You'll find that there is a simple wood-screw going through the tube and into the tube-end to hold it in place. Remove these screws, adjust the angle and then reinsert the tubes into the existing holes and into the nylon tube end.

In the case of the one-piece carbon footstretchers in the single sculls and lightweight women's doubles, you'll need to add or remove shims from underneath the keel attachment to change the angle. Remove shims to make it steeper and add shims to make the footstretcher angle more shallow.

- (3) You can make minor adjustments in the toe-out position of the shoes. This is typically a matter of personal preference, but may be necessary to adjust for folks with large shoes and deep settings on the shoe-depths. Otherwise the heel may press on the bottom of the hull.

By going through these steps you may find yourself in a different rig than you are used to, particularly if you are a shorter rower. We suggest that just because something might feel odd that it makes sense to take some time with it to see if it may in fact lead to great comfort and performance. We suggest that you'll find more success and greater performance if you don't marry the rig with which your boat comes or that you've been using for years. Some experiment will likely help you find a better fit for you/your crew or, at least, give you some confidence that the rig you have been using is pretty darn good.

V. Boat Maintenance

This section covers maintenance recommendations and some dos and don'ts for taking care of your boat over the months and years.

1. Seat and Slides

The first thing to note is that your Carl Douglas sealed-bearing wheels are maintenance free, and squirting them with WD-40 or some type of penetrating formula will likely dislodge the grease that is packed in the wheels and helps the bearings move with ease. Furthermore, whenever you remove the seat from the slide, it's best to remove the slide stops by removing the screw rather than force the seat off the end. Forcing the seat to pop off the front stops can damage the bearings in the wheels inside.

The wheels typically last many many years, but you should check them a few times a year for pitting or for blown-bearings. Indication that you should change the wheels include:

1. the wheel diameter is a millimetre or so smaller than a new wheel
2. the wheel has a slick grey residue on it when you touch it, indicating the packing grease is coming out
3. you can feel a light grinding in the wheel when you spin it in your fingers
4. there is a lot of wobble in the wheel itself between the centre of the wheel and the spinning outer section of the wheel

Lack of free spin in an older wheel may also indicate a bad wheel, but you should note that new wheels also do not spin freely as they are packed tightly with grease.

Also, look for uneven wear on the inside or outside of the wheel. Uneven wear indicates that the spread on the wheels might not be lining up with the centre of the rail. You can add or remove washers to line up the wheels with the rails.

Beyond that, do your best to keep sand and grit off of the slides/rails so as to reduce pocking in the rails and wheels during rowing. This is particularly important for those folks who use beach launching. Whenever you feel sand in the slide, stop rowing and clean the slide. Furthermore, when transporting your boat, bungee the seats down, and slide a plastic sheet or thick paper between the wheels and rails so as to reduce pocking that may result from the banging around of the seat on the slide on bumpy roads.

No regular lubrication is needed for the slide or seat.

2. Footstretchers and Shoes

The footstretcher assembly is another relatively maintenance free part. The shoes can wear-out over time, though the Gortex material (used in the New Wave shoes) handles the UV better and these shoes tend to last longer. If there is leather on your shoes, using a leather treatment before and after the summer season can help the leather last longer.

It is important, too, to make sure that you replace any missing hardware on the footstretcher – washers, nuts, etc. – and keep all of the moving pieces tight. Wiggling in the individual features of the footstretcher assembly will allow pieces to wear out faster.

3. Rigger and Out-rigging

The oarlocks on your boat will wear out with use. A good indication as to when to replace your oarlocks is when you can push up on the bottom of the oarlock where it is most thin.

Squeaking in the oarlock typically results from having the top nut too tight. It shouldn't be so tight that the oarlock doesn't swing freely. (Remember that the bottom of the two top nuts should be loose and the top (nyloc) nut should be tight on the very top, sandwiching the washers around the back arm together.)

To keep the rigger itself in good shape and with few scratches, don't pack loose riggers on top of each other with bear nuts and bolts rubbing against other riggers. Also, make sure to keep the fibre washers on the bolt-on riggers. They're there to keep the bolt's washer from scratching off the anodising on the rigger. The anodising is what protects that metal alloy against the elements.

4. Hull and Decks

Other than protecting your boat from cracks and scratches, you also want to protect your boat from UV exposure. UV exposure will cause the white gel coat finish to yellow and any polyurethane colours to dull more quickly. Excessive UV exposure to boats with a gel coat finish can promote crazing of the gel coat; though this is only superficial damage, it is expensive to fix.

UV exposure cannot be avoided when rowing, but whenever your boat is outside and not in use, it should be covered with a UV protecting cover material like Sunbrella. Make sure any cover can breathe and does not hold moisture against the gel coat finish. Water trapped against gel coat can slowly seep into the gel coat and cause it to bubble. Although this will not happen with a wet boat covered on a day to day basis, a boat stored wet for several months will incur this superficial damage.

A simple but often overlooked maintenance measure is to regularly wash your boat with soap and water. This

slows the build up of material that causes waterline stains and can slow a boat through the water if the build-up is bad enough. For folks in saltwater or brackish water this should be done at least on a weekly basis, and monthly for other folks.

A more time-intensive but equally important step is to polish your boat either by hand or with a buffer. This helps your boat keep its bright colours as well as remove contaminants from the surface. We recommend polishing your boat at least twice a year, and four times a year is certainly a good idea. More frequent polishing, however, can wear through the polyurethane paint finish (coloured boats) or gel coat over the years.

5. Other Items

It's quite common that you will lose hardware and perhaps some fittings over time, particularly in transport. For this reason, we recommend checking/tightening all fittings before and after transport. We also recommend that you keep certain spare parts on hand to make sure that you don't go too long with loose fittings. Also, it's important that you keep stainless steel hardware (labeled A2 or A4) on hand so as to avoid rusting, which can come from using zinc-plated hardware.

Pieces to regularly check after transport:

1. Footstretcher hardware: stretcher nuts, and nuts on the shoe-plate
2. Top-nuts on rigger pins
3. Steering assembly: tiller on bow-coxed fours, thumb screw on toe-steers, and the top-nut of the rudder head.
4. Rigger nuts and bolts

Spare hardware and fitting to have on hand (quantities given are per seat)

1. Footstretcher:
 - M6 stainless nuts (2)
 - M6 stainless washers (2)
 - Stretcher nut, wing nut, or tube nut (1)
2. Rigger (bolt-on):
 - M6 stainless bolts (2)
 - M6 stainless nuts (2)
 - M6 stainless washers (4)
 - M6 fibre washer (2)Rigger (quick-release)
 - QR cam (1)
3. Seat/slide:

- Carl Douglas Bearing Wheel (1)
4. Other (on a per boat basis):
 fin (1)
 rudder (1)
 rigger back arm (1 starboard and 1 port per boat)

6. Maintenance Schedule

Task	Salt- & Brackish Water	Freshwater
Rinse off hull	after each row	after each row
Clean off slides	before each row	before each row
Wash with Soap & Water	after each row and/or week	monthly
Check for loose fittings	before each row	before each row
Polish hull & decks	quarterly	twice annually
Replace worn/loose fittings	as they become apparent (see above text)	as they become apparent (see above text)

VI. Understanding the Materials, Construction, & Repairs

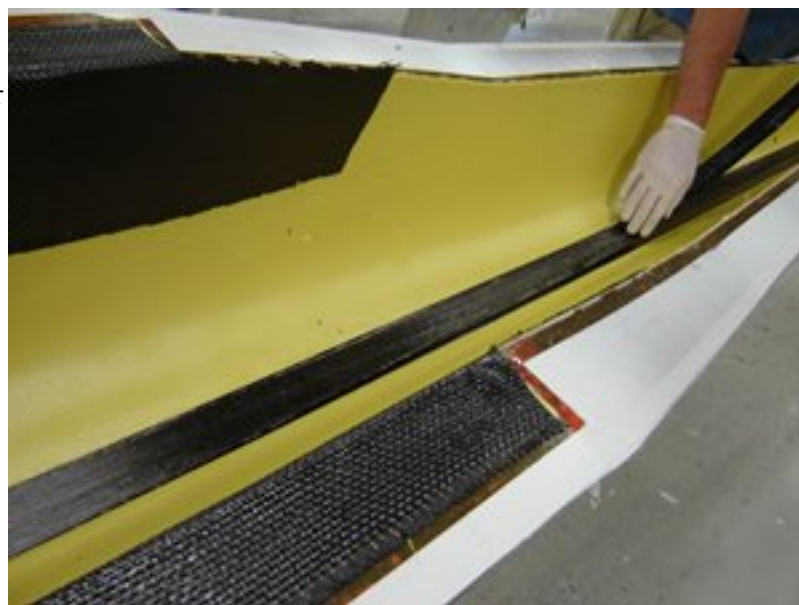
It is our hope that if you are not already familiar with the materials used in your boat that this will help you understand how wear and tear and even damage can affect your boat. There are basic repair ideas in the appendices of this manual.

Construction Classes and Material Characteristics

No matter what boat class (*id est* 1x, 8+) or size (lightweight crew, heavyweight crew) or hull shape, the materials used in the construction of your boat largely determine the strength, stiffness, durability, and weight of the end product. Understanding these materials and combination of materials used will help you in ordering a boat as well as taking care of it over the years.

In recent years, we've offered six different types of construction, abbreviated and described thus (in order of most to least expensive):

HC	carbon laminate on either side of a Nomex honeycomb core
HKCC	carbon interior laminate and Kevlar exterior laminate over a Nomex core
HKC	Kevlar laminate on either side of a Nomex honeycomb core, with addition carbon reinforcing on the keel and saxboards
HGC	Glass fibre laminate on either side of a Nomex honeycomb core, with addition carbon reinforcing on the keel and saxboards
SGC	Glass fibre laminate on either side of a Spheretex core, with addition carbon reinforcing on the keel and saxboards (<i>id est</i> Tracer single sculls)
GC	Glass fibre coreless laminate with addition carbon reinforcing on the keel and saxboards



The first three types of construction are all elite-level boats and are the majority of the Sykes boats out there today. This section focuses on those categories.

The construction of this HKC 4+ shows the primary Kevlar laminate (yellow material) with additional carbon fibre reinforcing along the saxboards and gunwale flange as well as along the keel line.

Both carbon and Kevlar are excellent materials for composite boats. Carbon is the best material for adding stiffness without adding much weight. When it fails (as in the case of damage), it does tend to crack and 'shatter' because it is so stiff. Kevlar tends to dent first before cracking, and its strength can really limit what would otherwise be more severe damage in a carbon laminate.

All damage can be mitigated by using woven laminates versus unidirectional laminates, and so we only ever use unidirectional fibres to reinforce woven fabric where stiffness is needed in a specific direction.

It's important to recognise that while carbon is noticeably more stiff than Kevlar in compression, under tension (pulling) the two materials have similar stiffness. For this reason, using Kevlar on the outer laminate provides similar qualities to fully carbon boats.

NOTE: While using Kevlar on the outside can also improve damage durability, repairing boats with Kevlar laminates does promote challenges. Most noticeably is that when exposed Kevlar is sanded, the sanded fibres fluff up into little 'fuzz balls'. Kevlar doesn't bond as well to some materials as well, and so it's rarely used in repairs.

The primary finishing material used on all of our boats is gel coat rather than paint. Spraying gel coat into the mould is the first step in making any boat, and its mirror-perfect finish is the reflection of the perfect surface of our moulds. The gel coat used on our boats is a blended epoxy gel coat that is much tougher than paint and has better colour resilience than traditional epoxy gel coats.

While it is possible to get gel coat finishes in non-white colours – we had used them for years to get non-white colours – since 2006 we've primarily been post-painting boats with polyurethane to get better colour matching and reduce fading over time.

There is no primer coat necessary for the gel coat finish nor for any post-spraying of other colours on top of gel coat. The gel coat itself is an excellent substrate on which to make repairs and on which to paint in necessary. If you are doing repairs on a painted boat, then you do need to sand through the paint finish to the gel coat before bonding and repair materials.

VII. Carrying and Transport Recommendations

Most small damage to boats occurs when folks are carrying boats, particularly by having the riggers and pins hit other boats, putting small punctures or scratches in the hull. Most substantial damage occurs during transport, when ends of boats get knocked off in tight turns, or boats come loose from trailer racks. It may be useful for us to share our experience on how we protect boats against damage during handling and transport.

1. Carrying Boats

Modern boats have few areas from which you cannot pick them up, but if there is an area about which you want to be careful it is the seat deck. While it's fine to pick up a single from the seat deck ledge, it's not recommended for fully rigged boats larger than a single.

The preferred common area to lift a boat is from the gunwales, either with the boat guts up or down. For a single scull, once you get the boat over head, it can either be carried on the shoulder (guts up) or head (guts down).

We don't recommend lifting/carrying pairs and doubles by the gunwales since it's simply awkward. Pairs and doubles can be lifted/carried, rigged or not, from the end decks. Carrying the boat a metre or so from the ends makes it very easy to carry and even maneuver on and off of tricky rack space.

Perhaps obviously, the same is true for carrying a single with two people, but it is also true for fours and quads. We don't recommend carrying a fully rigged four with two people regularly as it's rarely necessary. On the other hand, it may make sense to remove and replace a four from a tight rack space by lifting it from the end decks with two people. It's simply easier to evenly lift and roll the boat from the thinner ends and it's not so heavy that many rowers cannot manage the weight.

Eights are another story when they are fully rigged. We recommend using all hands and the eyes of your coxswain when removing/replacing an eight from a rack.

When carrying the bigger boats with smaller crews on whom the weight can be uncomfortable, we have found that it is easier for crew members to line up short to tall from one end to the other rather than by seat assignment. By lining rowers by height when carrying an eight, it is more likely that each crew member can carry the boat at the gunwales on their shoulders. When lining up otherwise, it is likely that the taller folks will have to carry more of a load.

When placing the boat in the water on beach and dock launches as well as dock recoveries, be mindful of

the fin and not hitting it on the dock or the solid substrate. This is particularly true with eights and four/quads, as placing/lifting the boat by the gunwales typically rotates the fin and rudder toward the edge of the dock.

2. Car-top Transport (1x and 2-/2x)

Car-topping a single (and in the case with longer SUVs and trucks, doubles and pairs) can seem a precarious endeavour, but it is really rather safe and simple.

You may want to transport you single on a Sykes car-top cradle, as they are design to minimise shaking and vibrations, provide a safe way to strap a single down on the end decks, and give a little more height and clearance for turning in traffic. It's not necessary to use a cradle, though, and a simple luggage rack is enough for transporting a single.

Note: all car-top transport does require a strong rack, not so much in the load that it is carrying, but in how well it is fastened to the roof under a lifting force. You should test your rack by lifting up on it with considerable force, at least enough to rock the vehicle. The greatest danger is that the significant force of the updraft on the boat could pull the boat and rack from the vehicle. Some folks also strap the boat to the front and back bumper or chassis to minimise this risk. If you do so, be sure not to pull the boat out of shape by making them too tight.

NOTE:Boat Straps (aka Ties)
Over time we have seen quite a bit of damage done to all makes of boats by hard boat straps. Sykes straps are softer and do not leave imprints in the paint or gel coat of boat.

When not using a cradle, you want to strap a boat down to the gunwales or the rigger flange. It's OK that the support is more central to the boat, since the mass of the ends of a single is so small, but you do want the racks at least 80cm apart so the main part of the cockpit is between the racks.

When transporting a double on the roof, you want a longer rack base (at least 1.5metres), like a ladder rack on a pick-up truck or roof racks on an SUV. (It's important to note that local highway safety standards likely will dictate what you can and cannot transport on top of your personal vehicle.)

For all car-top-carried boats, we recommend flags on both the bow and stern. Be particularly mindful of the forward over-hang on your boat so that when you pull into an intersection you have plenty of clearance from crossing traffic.

3. Trailer Transport

It's not the purpose of this section to discuss driving/towing boat trailers, but rather how to load and strap-down boats on to trailer racks.

We prioritise loading a trailer by the following:

1. Reducing both forward and rear overhang, and being mindful that the forward overhanging boats are plenty clear of the rear and cab/roof of the tow vehicle. This means considering the effect of jack-knifing when backing the trailer into place and how the rear gate of a tow vehicle could hit boats on lower racks. It also means being mindful of the vertical clearance of the boats that hang over the bed and cab of the tow vehicle. In a ditch (like coming out from a service station on to the street), the boats dip considerably.
2. Loading the longer boats, whenever possible, in the centre of the trailer and/or the right hand side. By doing so, this reduces the amount of swing out on the typically tighter right-hand turns.
3. Loading the boats as low as possible for the convenience of loading and unloading, reducing wind drag, and keeping the trailer's centre of mass lower and mitigating rollover risk.

VIDEO CLIP:
Strapping down a boat to a trailer
.avi .mpg (big)
.mpg (small)

In some cases, you may find that these priorities would suggest loading some boats with the stern forward. The stern deck is shorter and so thus the boat might fit on a lower rack when backwards, whereas forward the bow would hit the cab of the truck. You shouldn't have any concern that the boats are structurally compromised by traveling this way.

Eights and quads should be strapped down at the gunwales and trailers accommodate that. It's fine to strap the boat in more than two locations, but we do recommend that you make sure that you're not pulling the boat out of shape because any of the three or four racks on which the boat is sitting is out of alignment with the others. It's better to have a boat sitting off of a rack by shimming one end higher than to bend a boat to have it sit on all racks. If you have a trailer that you know to have uneven racks, you should have some wooden or plastic wedges/shims to use to raise the boats and, in the case of eights, support the centre of the boat.

When loading singles and doubles on most trailers, it may require strapping the boat down at least on one end deck. It's important that you have a packer cut to the shape of the end deck to do so, because you can often crush the crown of the end deck by strapping the boat down tightly. Avoid using any soft and shapeless pads like towels, as these can compress further and reduce the tension on the strap allowing the boat to move freely.

We recommend that you strap a single scull down to the gunwales where the back-arms mount just shy of the splash guard, while strapping down the stern deck on the other end. For doubles that don't fit well enough to be strapped on in two places at the gunwales, we recommend strapping the boat down at the stroke seats wing-rigger flange and the other end on the bow deck.

If you are using Sykes boat straps, which we do recommend, they have a padded buckle and so the buckle can rest against the boat. Align the buckle so that the strap tightens when you pull down on the end. Once you have it hand tight, we recommend you use a little more muscle to pull out a couple millimetres more of strap. Check the tightness of strap by seeing if the boat slides from side to side with measurable effort.

Wrap the excess strap around the rack a couple times on the outside and inside of the boat, so that that boat cannot slide sideways without hitting the extra strap. If there is any more strap, we use it to cinch the strap tighter still.

Please note, new straps have considerable elasticity in them and need to be checked soon after departure. In fact, we often pullover 30 minutes or so after departure to check all of the straps.

Appendices

1. Sykes Five-year Factory Warranty
2. Agreement on the Terms of Sale
3. Important Notice regarding 2-/2x and 4-/4x boat weights
4. Repair Ideas for Common Damage

Appendix 1. Sykes Five-year Factory Warranty (Applies to HC, HKCC, and HKC boats)

Jeff Sykes & Associates Pty Ltd - Sykes Racing, warrants its range of Carbon and Kevlar boats to be free from defects in workmanship and materials suffered under normal use (not being use contrary to the owners manual or other recommendations which may be given or made by Sykes Racing from time to time) for a period of **FIVE years** from the date of completion. No other warranty or guarantee of any kind or nature, expressed or implied, is made.

Our warranty does not apply to products arising due to normal wear and tear, or to any damage arising due to equipment improperly stored or installed, damaged in transit, that may be due to your misuse or neglect, any accident or improper maintenance, or any repair or modification without our prior written approval.

In the event of any claim under this warranty or otherwise with respect to our products, our entire liability and your exclusive remedy shall be the repair or replacement by Jeff Sykes & Associates Pty Ltd, or the refund of the purchase price paid by you. All warranty work will be done by us at such locations as we designate and all related packing, shipping, and transit charges shall be your responsibility.

Any items that are not produced by Jeff Sykes & Associates Pty Ltd such as electronic items will be subject to their manufacturer's warranties and will not be covered by the warranty of Sykes Racing. Bearing wheels, shoes, oarlocks, and oar grips are not included by the Sykes warranty.

In addition to any non-excludable conditions or warranties imposed by reason of the Trade Practices Act 1974, the Fair Trading Act 1985 and any other applicable legislation, this agreement is made on the following terms and conditions:

The customer acknowledges that the Equipment is manufactured to competition standards. This results in the Equipment being lightweight and fragile. The customer acknowledges that the Equipment is inherently fragile. The Equipment may be damaged by misuse. The customer agrees to read the Manual provided with the Equipment upon delivery and not to use the Equipment otherwise than in accordance with the manual. This warranty will be made void and of no effect where the Equipment is used otherwise than in accordance with the manual. Any warranty implied by law will to the extent permitted by law be made void and of no effect where the Equipment has been used otherwise than in accordance with the Manual.

Appendix 2. Agreement on the Terms of Sale

- 1) A customer may request a quotation for manufacture of rowing Equipment (“the Equipment”) by Jeff Sykes & Associates Pty. Ltd. / Sykes Racing (“J.S. & A”) by giving to J.S. & A. a signed and completed specification on the J.S. & A. Specification Sheet (“the Specification”).
- 2) J.S. & A. will give the customer a written quotation for the cost of building the Equipment in accordance with the Specifications selected by the customer.
- 3) A written quotation is open for acceptance by the customer within 30 days of the date it bears, unless it is earlier withdrawn or varied.
- 4) The customer may accept the written quotation by:
 - a) returning to J.S. & A. a signed copy of the quotation on which the Order section has been completed, and,
 - b) paying J.S. & A. a deposit of 10% of the contract price.
- 5) Upon receipt of an Order signed by the customer and the deposit, J.S. & A. will place the order in its list of jobs for construction. In the event that the Specifications fail to provide adequate details of construction, parts, rig, dimensions, fittings or any other matter, J.S. & A. may use and incorporate such suitable construction, parts, rig, dimensions, fittings, etc. as it sees fit to complete the order.
- 6) Unless otherwise agreed, time is not of the essence in filling the order. If the customer intends time of delivery to be a material factor, this fact must be stated in the Specifications. Unless otherwise agreed, J.S. & A. will not be responsible or liable for delays in manufacture or delivery and the customer expressly agrees that there is no binding delivery date for the Equipment.
- 7) Unless otherwise agreed in writing, the customer must first make payment in full of the balance of the purchase price, and such payment must be received by J.S. & A. and the funds constituting such payment must be cleared before the customer becomes entitled to take delivery of Equipment.
- 8) The customer shall be responsible for removing the Equipment from the premises of J.S. & A. and J.S. & A. shall not be liable in any way for any damage caused to or suffered by the Equipment once it leaves the premises of J.S. & A. The purchase price does not include, and J.S. & A. shall not be liable for, any delivery charges, packaging, insurance, or any special accessories, decals, painting, sign writing or finishing unless such items are contained in the Specification or are otherwise agreed to in writing.

- 9) The customer agrees to remove the Equipment from the premises of J.S. & A. not later than 7 days after becoming entitled to take delivery.
- 10) The customer agrees that J.S. & A. shall not be held liable for any loss or damage caused to or suffered by the Equipment after 7 days from the date that the customer is notified that the Equipment is available for collection, and the customer is advised to insure against the risk that the Equipment may be damaged as from that date.
- 11) In addition to any non-excludable conditions or warranties imposed by reason of the Trade Practices Act 1974, the Fair Trading Act 1985 and any other applicable legislation, this agreement is made on the following terms and conditions:
 - a) J.S. & A. warrants that the Equipment shall be free from defects in workmanship and materials suffered under normal use (not being use contrary to the Manual or other recommendations which may be given or made by J.S. & A. from time to time) for the period of time as detailed in the J.S. & A. 2005 Warranty statement for the particular class of equipment manufactured, namely.
 - I. The 2005 J. S. & A. Warranty statement for all Carbon and Kevlar Boats
 - II. The 2005 J. S. & A. Warranty statement for all Glass Honeycomb, Reinforced Fibreglass and Training / Racing Boats
 - b) This warranty is for the benefit of the customer only. J.S. & A. shall not be liable for any loss or damage suffered by a third party arising from any use of the Equipment howsoever caused.
 - c) Subject to clause 11a) J.S. & A. shall repair or replace, at its option, any item which in the opinion of J.S. & A. contains a defect in workmanship or materials within the warranty period and which is brought to its premises during the warranty period.
 - d) The customer agrees that he/she is solely responsible for transporting the Equipment to and from the premises of J.S. & A. upon a claim being made by the customer of defects in workmanship or materials. The customer shall pay all transportation, packaging, insurance and other charges arising from the return of the Equipment to J.S. & A. J.S. & A. shall not be liable for any loss or damage to the Equipment suffered during the period that it is left at the premises of J.S. & A. and the customer is advised to obtain insurance against same.
 - e) J.S. & A. shall not be liable for any personal injury, loss or damage or other injury, loss or damage caused

by neglect, misuse, collision, impact, alteration, improper maintenance, unsuitability of the Equipment for any person using it, incorrect assembly or adjustment, use of unauthorised or improper replacement parts, normal wear and tear or howsoever otherwise and further the customer agrees to use the Equipment at his/her own risk and J.S. & A. shall not be liable for any personal injury, loss or damage or other injury, loss or damage resulting there from howsoever caused.

- f) In the event that the Equipment is rented, leased or subject to any like arrangement J.S. & A. shall not be liable for any personal or other injury, loss or damage whatsoever whether suffered by the customer or any other party or parties.
- g) The customer acknowledges that the Equipment is manufactured to competition standards. This results in the Equipment being lightweight and fragile. The customer acknowledges that the Equipment is inherently fragile. The Equipment may be damaged by misuse. The customer agrees to read the Manual provided with the Equipment upon delivery and not to use the Equipment otherwise than in accordance with the manual. This warranty will be made void and of no effect where the Equipment is used otherwise than in accordance with the manual. Any warranty implied by law will to the extent permitted by law be made void and of no effect where the Equipment has been used otherwise than in accordance with the Manual.
- h) The customer agrees to read the Manual and any other written material provided by J.S. & A. immediately on taking delivery of the Equipment and further agrees to use, store, transport and maintain the Equipment in accordance with the Manual and any such material. J.S. & A. shall not be liable for any loss or damage resulting from the customer using, transporting, storing or maintaining the Equipment otherwise than in accordance with the Manual and such material.
- i) Items that are not produced by J.S. & A. such as electronic items will be subject to their own manufacturer's warranties and will not be covered by the warranty of J. S. & A. Bearing wheels, shoes, oarlocks, and oar grips are also not included by the J. S. & A. warranty
- j) Any warranty, term or condition implied by law or statute which can be excluded is hereby excluded to the extent permitted by law and the customer agrees that the express terms herein constitute the whole of the terms, warranties and conditions together with any non-excludable statutory, warranty, term or condition.
- k) Notwithstanding the above any warranty implied by law is limited in duration to the duration of this express warranty.

- 12) This written agreement comprises the whole of the contract between the customer and J.S. & A. All variations, alterations or additions to the contract shall be in writing and no oral or implied terms shall affect the operation of these written provisions.
- 13) *J.S. & A. retains and reserves ownership of and all rights in the design configuration, format, specification, shape, materials use and manufacturing methods of the Equipment. The Equipment is sold for use by the customer as a rowing boat only. The customer does not obtain any right or entitlement to use or exploit the design, configuration, format, specification, shape, materials use or manufacturing methods of the Equipment or any part thereof for any purpose related to or in connection with manufacture, sale, duplication, production of any replica, duplicate, copy, imitation, variation, development, derivation or the like. The customer agrees with J.S. & A. that it will not use or permit to be used the Equipment for or in connection with manufacture or production of any replica duplicate, copy, imitation, variation, development or the like of the design, configuration, format, specification, shape, materials use or manufacturing methods. The customer agrees in the event of breach of this clause or any part thereof to pay to J.S. & A. such sum as is equal to the whole of the loss or damage accruing to or suffered by J.S. & A by reason of or in consequence of or in relation to any such breach including (but not limited to) damages for loss of sales, economic loss, damage to trading position or market standing or reputation, interest and legal costs on an indemnity basis. The customer agrees that J.S. & A. may at its sole election in the event of manufacture or reproduction of any replica, duplicate, copy, imitation, variation, development, derivation or the like nominate that the customer pay by way of liquidated damages a sum equivalent to the profit of J.S. & A. on sale by it of an equivalent or comparable boat to that which was replicated, duplicated, copied, imitated, varied, developed, derived or the like, calculated on the basis of the list sale price for such equivalent or comparable boat of J.S. & A. as at the date on which J.S. & A. elects that such liquidated damages be payable.*

Appendix 3. Important Notice regarding 2-/2x and 4-/4x boat weights

When ordering boats for dual-purpose use i.e. 2-, 2x and 4-, 4x a decision has to be made as to the priority of use, which determines the laminate used to construct the hull.

For example, a coxless pair minimum weight is 27 kg the same as a double scull. We use a different laminate in the coxless pair, to assist in the minimisation of torsional twisting of the hull. The extra material used makes the hull heavier than the 27kg minimum weight when used as a double scull, due to the addition of two extra riggers.

If a double scull or quad scull is required to be made to the FISA minimum weights it has to be ordered to suit that purpose.

In most cases when dual use of the hull is required the boat is built as a 2-, 4- on FISA minimum weight and will be over the FISA minimum weight when the extra 2x or 4x rigger are added. Unless specified on the specification sheet at the time of order, this is how it will be constructed.

FISA RULE: Rule 32 Boat Weights *(as at August 2005)*

All boats used at Olympic regattas or qualification regattas, FISA World Championships, Rowing World Cup regattas, Regional Games and Continental Championships and all international regattas shall be of defined minimum weights

By-Law to Rule 32 – Boat Weights

1. Minimum boat weights are the following:

Type of boat	1x	2x	2-	2+	4x	4-	4+	8+
Weight in kg	14	27	27	32	52	50	51	96

2. The minimum weight of the boat shall include only the fittings essential to their use; in particular - riggers, stretchers, shoes, slides and seats. The minimum weight shall not include the oars or sculls, the bow number, any sound amplification equipment and loudspeakers or any other kind of electronic equipment.

Appendix 4 Ideas for Common Repairs

Although boats are fragile and damage relatively easily, you'll find that your Sykes holds up very well in normal use. Still, even the most careful user will likely experience one or two of the common dings and knocks that is covered in this section. It's important to note that you are probably capable of doing the structural repairs yourself and avoid the expense and inconvenience of sending your boat away to be repaired. You should also take comfort in the following:

1. Temporary repairs can be undone (with time and effort) to make for a more finished repair later.
2. Nomex honeycomb does **not** soak up water like a sponge, as a common myth states. Water that gets through a crack in the outside laminate will fill the damaged de-laminated area, but will drain and/or dry out itself if given the opportunity.
3. Repairs typically add no noticeable weight, particularly if you use the techniques described here on small repairs
4. Repairs are often stronger than what existed before the repair was done
5. Small damage creates no noticeable structural issues, much like a dent or ding in a car. Getting those small scratches and dings properly fixed, however, can be quite expensive since most of the labour is in the finishing work.

The repair techniques discussed here are used for numerous jobs, but the damage incident described are perhaps the most common.

If you are unfamiliar with how to mix resin or wet-out fibreglass, you should contact someone who does before doing repairs. This section does not cover any of the most basic techniques and does use common composite material terms without explaining them in detail.

Common Damage and Repairs

1. Puncture from rigger or other pointy objects

Appearance of damage:

These typically look like a slit or a like a couple triangular pieces are pushed in toward the core. They are usually only soft to press on in the immediate area of the damage – usually no more than a nickel in size.

Materials and Tools:

- | | |
|-------------------------------|------------------------------|
| - epoxy resin | - fairing filler |
| - fine woven fibreglass (9oz) | - rags/towels |
| - thin plastic (bags) | - packing tape |
| - 220 grit sand paper | - syringe & wide gage needle |

Instruction:

This can be a single-stage repair and can also be completed with a fast hardener used in the epoxy so it can be functional within hours in a warm dry environment.

1. Lightly sand the damage area with 220 grit paper to no more than 1cm wider than the puncture slit. Your sanding to rough up the gel coach finish or to get through any paint to the gel coat below.
2. Inject the damage area with a fluid mixture of epoxy resin and fairing filler using a syringe and needle. Inject into the immediate honeycomb around the damaged area in four directions until the resin starts to flow out of the hole or slit. You're trying to fill the de-laminated areas with the resin/filler mixture so that it rebonds the two laminates back together. Mind, you only want to add as much fairing filler to the epoxy so as to make it less dense and runny, but also runny enough that it can pass through the needle.

You shouldn't need to drill any new holes in the laminate to get at the core with the needle; the slit/hole should provide adequate access to the core. Take the needle into the surrounding honeycomb at as shallow of an angle as possible to prevent going through to the inside of the boat.

3. Wipe away any excess resin.
4. Cut off a small piece of fibreglass so that it will just fill any indentation left by the

damage. Wet it out with clean resin (not mixed with fairing filler) and press it into place.

5. Cut off another small piece of fibreglass slightly larger than the damage area. Wet it out and place it on the hole/slit.
6. Place a piece of clean plastic (like from a sandwich bag) over the last piece of fibreglass, and the plastic only needs to be slightly larger than the patch. Wad up the towels into a tight ball and place over the plastic. Tape the wad in place and then use tape to pull it down hard on to the plastic and the patch. The idea is to press the repair against the boat.

Post-cure Work:

1. Sand the patch smooth with the 220 grit paper. The better you did on filling in the dent and pressing down the patch, the less sanding you will need to do.
2. If you want to have a painted and polished finish, go to repair 4 described later.

2. *Dented deck crown from Improper Transport*

Appearance of damage:

This typically happens when folks strap singles and doubles to a trailer rack without an appropriate packer, which would likely be a solid foam piece cut to the shape of the deck. (Towels or other compressible materials are not advisable either.) What happens in the case of damage is that the core gets crushed and creased, but the top laminate is often not cracked. You'll see the dent/crease in the finish on the end deck, but you should also press to feel where it is soft, as the soft area can extend outside of the visibly dented area.

Materials and Tools:

- | | |
|-------------------------------|------------------------------|
| - epoxy resin | - fairing filler |
| - fine woven fibreglass (9oz) | - rags/towels |
| - thin plastic (bags) | - packing tape |
| - 220 grit sand paper | - syringe & wide gage needle |
| - drill and 1/8 drill bit | |

Instruction:

This can be a single-stage repair and can also be completed with a fast hardener in the epoxy so it can be functional within hours in a warm dry environment.

1. Lightly sand the damage area with 220 grit paper to no more than 1cm wider than the puncture slit. Your sanding to rough up the gel coat finish or to get through any paint to the gel coat below.
2. Drill holes along the length of the crease no closer than two centimetres apart. Make sure not to drill through the inside laminate, which you can do with a depth gauge (as on a router), or by taping off the drill bit to no more than 1/8-inch. The holes you make should allow you to reach within one centimetre of any of the soft bits under the laminate.
3. Inject the damage area with a fluid mixture of epoxy resin and fairing filler using a syringe and needle. Inject into the immediate honeycomb around the damaged area in four directions until the resin starts to flow out any of the holes.

Take the needle into the surrounding honeycomb at as shallow of an angle as possible to prevent going through to the inside of the boat.

4. Wipe away any excess resin.
5. Cut off a small piece of fibreglass so that it will just fill any indentation left by the damage. Wet it out with clean resin (not mixed with fairing filler) and press it into place. If more than one sheet is necessary, do so. Better to use too many than too few.
6. Cut off another piece of fibreglass slightly larger than the damage area. Wet it out and place it on the holes and the fibreglass being used to fill the dent.
7. Place a piece of clean plastic (like from a sandwich bag) over the last piece of fibreglass, and the plastic only needs to be slightly larger than the patch. Wad up the towels/rags into a tight ball and place over the plastic. Tape the wad in place and then use tape to pull it down hard on to the plastic and the patch. The idea is to press the repair against the boat, and so you might need to wrap it around the boat.

Post-cure Work:

1. Sand the patch smooth with the 220 grit paper. The better you did on filling in the dent and pressing down the patch, the less sanding you will need to do.
2. If you want to have a painted and polished finish, go to repair 4 described later.

3. *Fin bent or knocked out*

Appearance of damage:

If the fin is knocked off while rowing, you'll notice it by how the boat starts to slip and skid. If the fin is bent, this can be harder to gauge, but if one day you're all of a sudden not going straight, this could be the reason. Place a straight edge against the fin in several directions to see if there is a slight bend.

Materials and Tools:

- | | | | |
|---|------------------------------|---|-------------------------------|
| - | waterproof silicone adhesive | - | packing tape |
| - | vice grips | - | block of wood about 3cm thick |
| - | utility knife | - | replacement fin |

Instruction:

If the fin is already knocked out you can skip the first few steps. Give most silicone adhesives 32 hours to dry.

1. Lever the bent fin out of place by placing the wood block astern of the fin (remove the rudder if one is there and in the way) and grabbing the bent fin with the vice grips at the base of the fin. The block is there to give you a fulcrum as well as spread out the force on the hull so as to not damage the hull. You can stick a towel under the block, but it needs to be pretty solid so that the leverage action pops the fin out.

You can also slit the silicone with the utility knife to help the fin break free of the adhesive. Once the fin starts to lift, it comes out easily. If it is particularly stubborn, try lifting the fin at only the stern end.

2. Clean out the old silicone in the fin box with the pointed corner of the old fin or the new fin. The silicone on the outside should come off with some rubbing or using the knife like a shaving razor. If there is any water in the fin box dry it out with a towel and blow dryer.
3. Place the new fin in the box so it sits evenly. Tape off the fin and box 1/8-inch from where they join. you should have one piece of tape running the length of the fin on each side and a tape box around the fin box. Remove the fin.

The fin should be snug in the box and not wobble so you know it will be straight. If it is

VIDEO CLIP:
Replacing a Fin
.avi .mpg (big)
.mpg (small)

not snug, place a piece of packing tape over the bottom edge that slide in the box. It shouldn't take anything, but if it does, a couple strips of tape should make it snug.

4. Run a bead of the silicone adhesive along the fin box. Press the fin back in so that some of the silicone is under the fin and the rest squishes up along the sides and out over the edges. Use you finger to create a nice concave join along the fin and to wipe away all the extra adhesive. Wipe your fingers clean and remove the tape. You should have a nice, clean join just like when you first got the boat.

4. ***High-quality painted finish with in-can paint***

Appearance of damage:

After you finish your structural repairs and sand the patch smooth, it's not critical to paint the repair, but it does a lot to make it look good. The following instructions assume you don't have a compressor and spray gun, but rather have managed to find a good colour match in an auto parts enamel spray-can product. In the case of our white gel coat boats, Duplicolour's *Cloud White* is often an excellent match.

Materials and Tools:

- | | |
|---------------------------------|---------------------------------------|
| - spray paint | - 400, 1000, and 1500 grit sand paper |
| - high-build paint primer (can) | - paper of plastic for covering |
| - thin plastic (bags) | - packing tape |
| - 220 grit sand paper | - syringe & wide gage needle |
| - drill and 1/8 drill bit | |

Instruction:

This takes a few different days and a generally clean but well ventilated area where the temperature is over 55°F and dry. The warmer and drier the better.

1. Tape-off the area to be sprayed so as to reduce over-spray you'll get from the spray paint and the primer, but not so close that you might spray to the taped edge. You don't want to spray much beyond the area that you'll wet sanded with the 1000 grit paper (look below to gauge how much this will be based on your repair), and you want to make sure that when you are spraying that you won't spray to your tape line.
2. Wet rub/sand the smoothed over patch with 400 grit paper. (Wet rubbing means you're squirting the repair area and the paper with water from the squirt bottle. The point is to

keep the paper from getting gummed up and to rinse pieces away so they don't cut the surface as you sand/rub.) Sand within a 5cm radius of the patch.

3. Spray the area with the high-build primer, the first coat being very light. Wait 5 minutes and then add another coat. The objective is to fill all the little holes that you might have in your fibreglass patch. Let the primer dry during the course of the day or the next day.

Wet sand the primer with 220grit paper until it is perfectly smooth. You may see parts of the fibreglass patch, which is fine as long as any holes are filled in by the primer.

4. Wet rub/sand the smoothed over primer and patch with 400-grit paper. Sand within a 5cm radius of the primer. Wet sand with 1000-grit paper over the same area and to a slightly wider radius of about 5cm-10cm that you did with the 400-grit. This won't take out the cuts from the 400-grit and will give a nice transition area for the paint.
5. If you have not already, tape-off the area to be sprayed so as to reduce over-spray but not so close that you might spray to the taped edge. You don't want to spray much beyond the area that you wet sanded with the 1000 grit paper, and you want to make sure that when you are spraying that you won't spray to your tape line.
6. Clean the area of any bits and dust. For most folks a wax and grease remover will suffice.
7. Spray the paint on to a sample sheet of paper before spraying on to the boat to familiarise yourself with the rate of spray and the size of the fan. Most cans these days have a fanning spray nozzle, with which you may not be familiar, that reduces the chance for runs and sags. You want to spray left-right (or right-left) and be sure that the can is already moving when you depress the nozzle and that you release the nozzle before you stop your hand's motion.
8. The first coat should be a dusting pass. You want to spray the area lightly with a single relatively swift pass. This gives the base a little tack for following coats. Wait 3 minutes.
9. The second coat should be a slightly slower pass. It's best to start your hand over the outside of the taped-off area and as you pass over the repair to depress the nozzle. If your hand isn't moving as you start to spray you increase the chances that you'll have runs or sags. Wait 5-10 minutes.

NOTE: If you do get runs or sags at this stage it is best to wipe the area entirely clean with a paint-thinner-drenched rag and start all over after it dries.

10. The third coat should be a similarly slower pass, but this time you can go over the painted area in a couple passes. Keep each pass light and be sure to stop spraying at the end of each pass. After these two or three passes there should still be some translucency to the paint where you can still see the repaired area. Wait 10-15 minutes.
11. The fourth and possibly fifth coats is/are like the third, but you're looking to achieve an opacity in the paint. You're also hoping to keep the paint wet enough that there is at least a little flow to the paint so you get a glass-like finish. You don't want a rough finish over the repair, but it's OK in the area where the over-spray dusts-out over to the taped-off edges. This will be sanded out later. Wait 10-15 minutes.
12. After you achieve opacity, you still want to add a couple more wet coats. Especially if you get some imperfections that came from the dust settling in. These extra coats will give you some depth to wet-sand through to get a completely flat finish with no little craters or imperfections.

NOTE: If by chance you get some craters that look like fish-eyes, that's likely silicone or grease that you did not clean off originally. If you only have a couple you can work with it. If there are more, you may be wise to start over again. If there are only a couple spray a runny puddle the cans cap and use a detail brush to pick up some paint. Delicately fill the craters with the paint on the detail brush. There will be little bumps, but you can sand them out later.

Post-cure Work:

Once the paint is dry either later that day or the next you can wet sand the area.

1. Remove the tape, but you won't necessarily want to remove the plastic or paper yet.
2. Wet rub the entire area with 1500-grit paper until you remove all the over-spray and flatten the area that was sprayed wet. It is possible that you will sand through your paint work, which only means you just have to start over again from the prep work in the stages above, but can be pretty sure you'll get it right that second time.

By starting with the 1500-grit it will take you a while to get the proper finish but you'll have less chance of rubbing through your paint job.

We recommend writing squiggles with a permanent marker over the area that was sprayed wet, particularly if you have some small craters in your spray work. This will make it easier to see that parts you have not sanded enough yet and to avoid over sanding the areas that you have flattened with the 1500-grit paper.

3. Clean the area, give it a good look from all angles using the light to reveal any parts where you missed some over-spray or have some surface imperfections. If everything looks good, go ahead and buff it with your rubbing compound to remove the scratches from the 1500.