

HINTS AND TIPS ON STELLA MAINTENANCE



by

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This is as far as I have got as at January 2010 but if there is sufficient interest other areas I propose to cover are

1. Ruder repairs: Cheeks and drifts in blade.
2. Keel Issues. Replacing Keel Bolts, Floor Bolts and Scarf Bolts. Re-bedding keel.
3. Deck/ Coach roof repairs. Fixings, sheathing, rubbing stakes and toe rails.



4. Engine replacement. Stuart to Yanmar. Engine bearers, new floors and taking patterns.



5. Lastly and not strictly maintenance, building an epoxy ply tender.





Some time ago a request for information about maintenance issues made me realise that after maintaining my own Stella "Lys of Slaughden" for the last 20 years and doing almost all of the work myself, I have accumulated quite a bit of knowledge. This could be usefully passed on. I would stress that what is

below is just the way I do it. You may have your own methods with which you are happy. I am not trying to say my ways are the only proper way to maintain your boat.

When trying to do maintenance work you may have a rough idea about what you want to do but it is often a lack of knowledge about techniques and materials which are available which stops you from doing as good a job as you could.

Lys is No 96 and was built by Tucker Brown in 1965. I have seen some photographs at an exhibition in the Burnham museum showing some Stellas under construction. I cannot remember whether they were built in pairs or three at a time but I was told that heavy use of templates and a certain element of mass production techniques were made.

The Tucker Brown boats have a reputation in some quarters for being lightly built but as they were the original builders of La Vie en Rose No 1 in 1959, one would assume they used the original scantlings set out by Kim Holman. It may be that some of the other licensed builders increased the size of some of the timbers possibly being slightly doubtful about yacht based practices. Whatever the answer is I can only say that if you look after

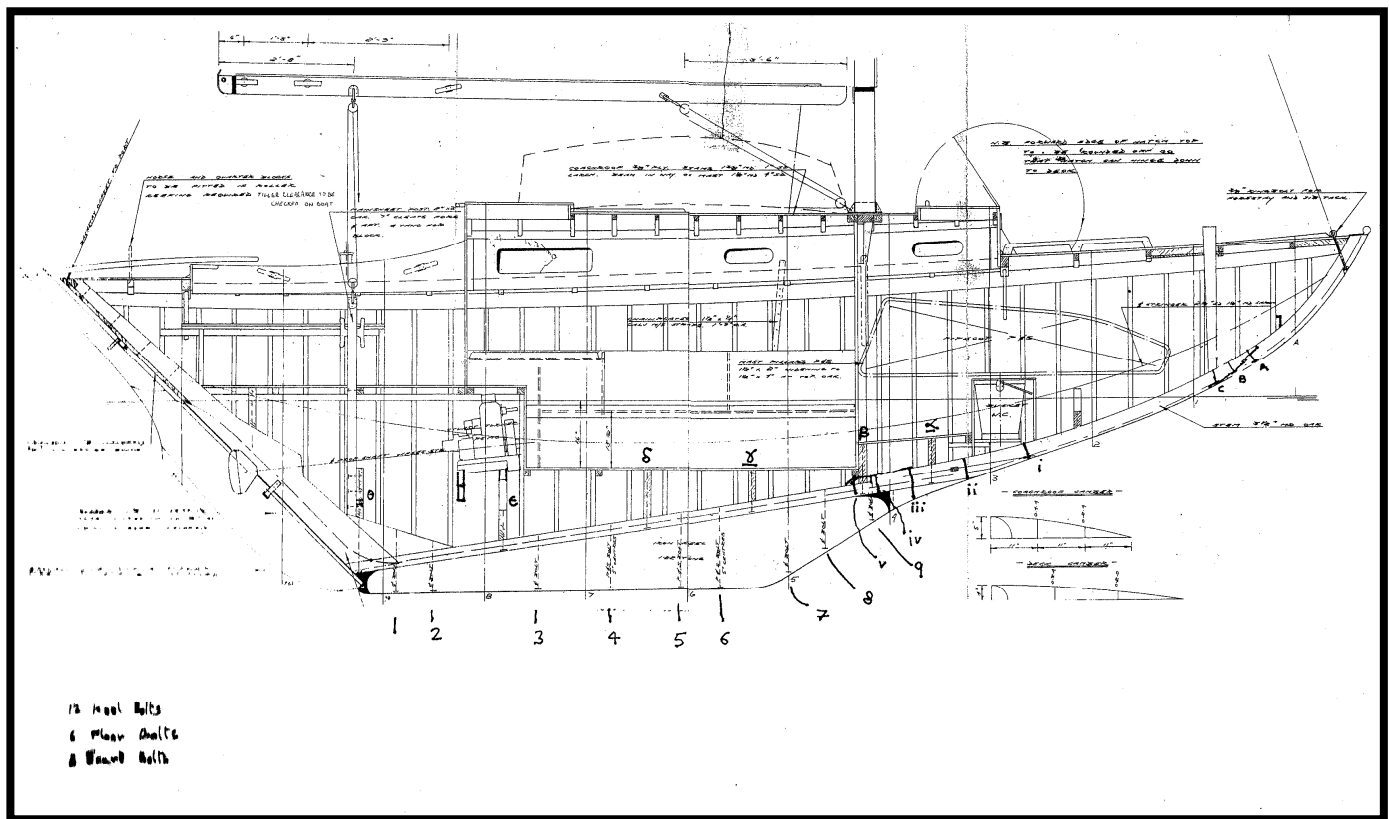


the boat, the original materials have proved perfectly adequate although of course after forty years some elements have passed their "sell by" date.

I have not made a detailed inspection of any other boats but have broadly found the construction of mine to be consistent with the designer's original drawing, although the stem or apron has been lengthened compared with the original drawing so that it extends into the saloon just beyond the bulkhead with the fo'c'sle.

When I carried out the work to the keel bolts I marked-up any alterations I found and marked the positions of the various keel, scarf and floor bolts on a copy of the plan. This is illustrated on the following page and shows the basic construction and outline of the boat.

Copies of the original plans are available for purchase from Holman and Pye in West Mersea and I would strongly advise anyone considering undertaking any serious repair work to purchase a copy. You then should have an understanding of how the boat was put together originally which makes life considerably easier. Unfortunately, you will find the scales are in imperial. Whether it is still possible to get imperial scale rules I do not know but it is not impossible to work it out. It just takes longer.



In common with most Stellas, Lys is made of best-quality rainforest having mahogany planking set on oak timbers. She is largely fastened using copper nails and rivets. Extensive use of mahogany faced plywood was made for the bulkheads and the internal furniture. The ballast keel is of iron and would have originally been attached using wrought-iron bolts. This material

is now almost impossible to get hold of and I regret to say that I had to use steel when the bolts were last renewed.

Compared with many Stellas she has led a relatively charmed life in that so far as I know she has never been raced that hard. You will certainly not find her name on that many trophies. She is one of the later ones and I understand that in 1965 there was still a waiting-list for Stellas. I know nothing about the first two years of her history, but she was registered in Maldon in 1967 by a Mr Wrighton. I was told somewhere along the line that he was connected with the high quality kitchens and was responsible for some additional joinery work inside but I was never entirely convinced by this. In 1969 she went down to Kent. While storm bound in Ramsgate one year in another boat I noticed she was on a list of boats "saved" by the Ramsgate lifeboat. In 1972 she was purchased by Keith Canell who kept her at Fambridge and generally looked after her very well until I purchased her in 1990. Since purchase I have refastened her below the waterline, repairing some ribs, renewed the keel and scarf bolts, re-bedded the keel, renewed the deck covering, toe rails etc, renewed the coach roof deck, fitted a new engine and replaced the rudder cheeks and fittings along with replacing the steel drifts in the rudder blade.

I do not pretend to have all the answers as there are numerous ways of doing things. **I would stress that the text given below is purely what did or did not work for me. Also any observations made about products are based on my own personal experience and problems experienced could be due to failings on my part rather than the product. Anyone doing work on a boat needs to make up their own mind as to whether what I did would be right for them or their boat. They should also satisfy themselves by making their own enquiries with regard to the suitability of any material or techniques used.**

PART I: GENERAL ISSUES

SKILLS AND TOOLS

I am a Building Surveyor and so possibly have a head start in that my work involves analysing problems about how materials behave and how to keep moisture out of structures. Even so when I first started boating I did not and still do not have wonderful carpentry skills. A careful structured approach is as important. Typical examples being marking things and recording what went where before you take things to bits and the old maxim “measure twice, cut once”.

Hand tools: You will find things a lot easier if you use sharp tools. I must confess that sharpening tools is something I have never been that good at and I still use a roller guide for sharpening plane blades and chisels but it gets the required results.

You do need various specialist tools for certain jobs and I will deal with these later but you can get by with a basic carpentry tool kit. My basic hand tool kit is as follows.

Saws: Hand saw set relatively coarse. I get it sharpened periodically. A panel saw will do and some are now so cheap that it is cheaper to buy a new one than get them re-sharpened. Tenon saw. Hacksaw (big one and junior). Put the blade in so that it cuts on the forward stroke. Larger blades have an arrow on them which should point forward.



Chisels (various), mallet, marking gauge, square and sliding bevel gauge. Brace and bits. 12"-14" plane, a small bull nosed rebate plane. The blade on this goes right to the edge. Being very small it is useful for getting into small areas and such things as cleaning up the edges of laminated rib repairs. A candle is a useful thing to have in your tool bag for waxing/lubricating mast tacks etc. Some carpenters use them on the underside of planes but for a boat builder I would express caution. If you are spreading wax

albeit indirectly, onto a surface you are intending to glue your chances of getting a good bond will be significantly reduced.

I tend to buy chisels and planes second hand from The Tool Shop in Needham Market as they are often slightly cheaper and the quality of the old steel is generally better.

A selection of hammers. Claw for general use, ball peen for rounding off the heads to the copper nails when riveting, club when serious clout is required and lastly sledge for knocking

out keel bolts. When hitting things try to make sure the impact is parallel with what you are intending to drive. This is not always easy when lying under the boat. Copper nails are very easy to bend. Also try and keep the head of the hammer clean. An occasional wipe with sand paper will help. I find a heavy hammer more useful as the momentum will drive much further and you will have to take fewer strokes. Trying to drive a keel bolt with a small hammer is a total waste of time and you are more likely to end up damaging the head. The same principle applies to most things as you scale it down but be kind to the boat and don't beat the hell out of it. If you are trying to drive something out and need to use a lot of force you should support the area immediately around where you are working to reduce the risk of local damage as much as possible. The use of flat headed punches of various sizes can help in making sure you get the force needed only where it is required.

If you are finding something difficult when driving a nail in, take it out and pre drill the hole to a size slightly smaller than the nail. It is always best to do this anyway as there is less chance of splitting the timber you are driving into.

Screwdrivers of various lengths and sizes. It pays to have a really large one with a hexagonal shape at the top of the shaft. If you fix a wrench onto this you can then use it to turn as you put all your weight onto the top of the driver to stop the blade jumping out of the slot. Always try and use the correct sized blade for the slot and make sure if possible that the shaft is at 90° to the slot. Once you have messed up the slot it is going to be a lot harder to move it so it is probably worth getting out of the boat to find the correct tool first time. Heat applied to a screw which is difficult to remove can help as can initially trying to tighten the screw, especially if you messed up one side of the slot already. Giving the screw a sharp tap with a punch can sometimes also do the trick.

A stilson wrench can be useful for unscrewing the fixings on skin fittings etc.

A decent vice and a *workmate* bench come in very handy. You can never have too many cramps although you don't need this many for most work. Ones which you can work one handed are useful. For smaller work you can improvise using things like the U shaped plywood one at the top combined with wedges. You do not have to spend large amount of money although if you are in for the long haul you will find them useful for years to come, if you look after them. This applies to the tool kit as a whole. With metal cramps you may need to protect the timber from marking by using small pads made of (ply) off-cuts which can usefully covered in packaging tape if you are gluing.

You would be surprised what you can do with timber wedges. With two pairs of folding wedges you can actually lift part of the boat to adjust blocks in the cradle etc. It just requires a bit of patience and care.



Power Tools: Power tools can be absolutely wonderful but need to be used with caution and not just from the health a safety point of view. Special caution needs to be used with things like electric planers, circular saws and belt sanders. It is all too easy to take off too much too quickly and I would suggest that these particular tools are only used for roughly cutting timber to size, if at all.

Drills: A good mains power variable speed drill, cordless screwdriver/ drill (Get one with two batteries if you can so you can charge one while using the other). For boat work a small manoeuvrable one is probably better than one of the big 18v ones. Jigsaw. (Read the labels about what the best blade is for what you want to do.



One of the most useful tools I have is a small table saw. This enables me to cut out timber to the dimensions I require making sure everything is at right angles to start with. This makes life so much easier. (Being used as bench at time of photo and not plugged in at wall. Guard raised to show blade) Mine is a very small one so I am struggling with anything over 3" but I can still do a lot. Rather than buying a purpose built table saw I bought a Makita circular saw and a Wolf multi purpose

bench where you can fit the saw to the underside. Technically Makita do not recommend using their saw this way but I have yet to have any problems.

I have yet to find a mechanical sander of any use on the boat and for sanding the planks always do it by hand with a block of wood.

Baby angle grinder/disc cutter. Useful for grinding the heads off old rivets. Wire brush attachment is also very useful for cleaning up the keel etc.

Safety wear Be sensible. Wear a mask. I gave myself a considerable hangover once when grinding off the head of rivets wearing an ill fitting mask. Be careful when working with solvents in confined spaces: for both health and fire reasons. Also wear eye protection when grinding etc. This is something I have not been very good at until recently because the glasses tend to steam up. Reading a tale in Classic Boat about someone who lost the sight in one eye has made me slightly more careful.

One area where I would fail with the green police is that I use a lot of disposable plastic gloves. If bought by the box they are not that expensive. It is a lot easier than cleaning your hands and if you change them immediately after doing a messy job there is less chance of spreading the muck elsewhere. Finally give your hands and face a good wash before having your lunch! Blowing your nose can also give you a good idea as to how much got past the mask.

MATERIALS.

Philosophy: This is a very pretentious heading but it is important to bear in mind that you are dealing with an old flexible traditionally built boat. Since they were built various new wonder plastic products have been invented some of which if used in the correct place are very useful but sometimes they are used inappropriately and can cause serious long term problems.

Epoxy is a typical example. It is great as a glue for people like me who rarely create perfectly matching wooden joints but if you allow it to get between two planks or bond them together you are likely to create a hard spot and stop the planks closing up when you put the boat in the water.

If in doubt seek advice. Read the product literature and if you are still unsure ring up the technical departments of the manufacturers. They are in my experience very helpful as it is not in their interest to have someone who is dissatisfied with their products.

Another thing which I have been guilty of on a number of occasions is using what I have to hand at the time not what is best for the job. I once bedded a bowsprit down on to a dinghy's plywood deck with Sikaflex as that was what was in the mastic gun at the time. I was not very popular when we had to separate the two with a hack saw blade the next time it needed to come off.

Something I have also come to appreciate in old buildings and boats is that the builders nearly always did something a particular way because of experience handed down over the years had told them that was what worked. In every generation there were always plenty of "Friday afternoon jobs" and you should not treat something with great reverence just because it is old. Even so before deciding to redo something differently it is worth having a think about what is there and why before discarding it. Many of the traditional methods and materials work just as well today as they did forty years ago but it can be a lot harder finding the materials.

Fastenings



So far as I can make out brass screws were originally used in the construction both in the hull and the internal furniture. I expect the quality of the brass used in screws in 1965 was probably much better than it is today. Some of the screws on Lys had lasted reasonably well but I am sure most Stella owners will have spent considerable time, like me, in trying to extract brass screws

which have gone pink. The zinc has wasted away from the alloy through electrolytic action. This causes the brass to become soft and also discolours and damages the surrounding timber. A dab of vinegar on the head of a festering screw will temporarily halt action on the surface.

When I first started doing work on Lys I replaced some damaged screws with brass which is something I now regret. I now have the slightly extreme view that brass screws should not be allowed onto the boat in any position but at the time I was not aware of a source of bronze other than in little very expensive packets in chandlers.

While it is true that silica bronze wood screws are more expensive than brass in the overall scheme of things they are not that expensive. Classic Marine at Woodbridge 01394 380390 www.classicmarine.co.uk stock them and other such items as copper boat nails together with their extensive range of traditional hardware. They have always been very helpful and their web site is an absolute mine of information about how metals behave in a marine environment, strength issues, gauges and sizes for wood screws and nails etc. I would say essential reading for any Stella owner.

After that commercial, I buy my screws direct from the supplier Anglia Stainless 01359 251414. You can even get things like 6" 20's for the really meaty jobs. They also supply stainless steel screws and coach screws, copper boat nails and roves and other fastenings. If you have got a bulk order they will probably do a delivery in the East Anglia and they do regular runs to the boatyards in East Anglia so you could always get them dropped off. For those in the south west Seaware Ltd at Penryn in Cornwall also supply the same and a copy of their catalogue is well worth having. 01326 377998.



Screw gauges work on the bigger the number the bigger the screw. A pair of callipers (digital from Maplin are the easiest) are useful for measuring screws you have taken out to compare against sizes given by the Classic Marine site/catalogue to identify what to reorder.

Just to annoy you nails are classed by wire gauge which works in the opposite direction. The larger the number the smaller the nail.

Stainless steel wood screws are slightly cheaper than bronze but have some drawbacks. Like bronze, stainless steel is an alloy and there are numerous types. The two most common in marine use are 316 (A4) and 304 (A2). If you have a choice in most cases it is better to opt for the 316 (A4). In order to resist corrosion stainless needs to be initially exposed to oxygen to build up a "passive" corrosion resistant layer. If it is in an underwater situation and there is not an adequate layer you can get crevice corrosion taking place (pitting). A S/S fastening under water may not perform any better than mild steel. This is quite a complicated subject. Find out

more on Classic Marine web site. I have a general policy of using bronze or copper fastening below the waterline and use stainless steel above where exposed to air (cockpit etc). Somewhere I have had some minor corrosion is in the S/S chain plate bolts where the bolt has been buried in the planking. This has been a problem with rust bleeding rather than a significant structural weakness (or so I thought: plank/deck repair completed 2009) although if ignored would become a problem. Also in my experience stainless steel is best left unpainted. If you cover it with paint it is more likely to bleed rust stains.

For reasons outlined above I would advise against replacing any keel bolts, scarf bolts etc with stainless steel. Stick to galvanised for scarf bolts and iron/steel for keel bolts.

You will have to get keel bolts made up at a blacksmith. Other galvanised bolts, coach screws etc I got from Seaware Ltd (see above). In connection with this Stellas were built using imperial measurements and most bolts now come in metric. This can cause some problems. If the nearest metric equivalent is larger you just drill a larger hole. In cases when it was the other way round I just sleeved the bolt with caulking cotton bedded in mastic and this has not caused any problems. There is an inch to metric conversion table on the Classic Marine web site/catalogue.

I will deal with copper nails and roves later when dealing with refastening.

Glues

Before using any glue check the manufacturers' product literature.

Brand names for glues have a habit of changing so the names given below may not be up to date.

PVA: Not suitable for below the waterline or external use. I would only use it for interior work if at all.

Cascamite (Extramite): Is a urea-formaldehyde resin. (UF) A dry powder mixed with water which produces a cream coloured glue. Will not withstand total immersion in water for prolonged periods. I think that it is probably what Lys's coach roof and deck were originally fixed down with although I believe the main structural element was the mechanical fixings rather than the glue. When I took the coach roof plywood off the bond was not particularly strong but the glue had only failed where the fixings had failed, presumably where the water had got in. In retrospect I think this is a good argument for its use, as the chances of getting a deck glued down with epoxy off without destroying the deck beams must be small. I have a feeling that our successors are going to curse the word epoxy.

Aerolite 306: (UF) I have only had direct experience of this glue once. A two part glue. The white powder is mixed with water to form a creamy consistency. It has the advantage that this mix can be kept in a pot to be used as and when required. When you glue up a joint you apply the resin to one side of the joint and an acid hardener to the other and then cramp up. Is classed as being water resistant rather than waterproof. Used by dinghy builders. Not suitable for permanently wet situations.

Balcotan: (PU) A one pot polyurethane glue which cures when exposed to the moisture in the atmosphere. No measuring and mixing required, a great bonus. I believe Rolfe and colleagues with Leonis (27) used it for fixing their new ply deck and I understand it worked well. It has the advantage that the timber does not need to be bone dry. It has a foaming action so has very minor gap filling capacity but if there are any foam filled gaps this is likely to lead to structural weakness. Unless you can be certain of your carpentry and are sure there are no gaps I would not use it in a situation where there are no mechanical fixings. It is waterproof and I understand from a shipwright can be used below the waterline. One problem I have had with my own experience is that the glue continues to foam out of the edges of the joint until the glue has set. This means than you cannot clean it off immediately after cramping up and before it sets. This is the easiest way with epoxy and other glues. They say that it remains slightly flexible when set and can be cut with a blade which is fine if you are going to plane of the joint afterwards. If however you are fixing down a deck and want to follow the easy option of painting the underside of the deck before you fix it down this could be a significant issue.

Resorcinol Glues. (RF) (Cascophen) Two pot system. I have never used it but the two older shipwrights I have used who both did an apprenticeship the old way used it in preference to epoxy. It has a disadvantage to the amateur in that it does not have the gap filling properties that makes epoxy so popular with the bodger. It is a very tough glue and is what they use to glue together exterior grade plywood. I believe it is what was used to glue Stella masts together. It is UV resistant. Unfortunately, it does eventually fail with age but I do not think you can complain when some of our masts are still going strong after 40 years +. I am told that if you stop the water getting into your mast and keep the varnish in good condition there is much less chance of the glue joints failing. Glue joint shows up as a black line.

Epoxy. Two pot system. Two brand leaders are West and SP. I have always used West but through habit rather than any belief it is superior. Epoxy is comparatively expensive but has the advantage that you can mix up fillers such as colloidal silica into it to get the consistency you require. They say you should not use it in temperatures below 5°. This can cause problems for winter projects but if you keep the glues by a radiator in the house before you take them on site this can help. In cold conditions the mix without any filler can be quite stiff and not very good for being absorbed into the wood. If you mix it with sawdust you can use it as a filler to repair dings in varnished wood although some experimentation may be required to get the correct colour match as the epoxy makes the wood go darker.



There is a lot of technical literature about doing jobs such as sheathing decks etc.. Do not mix too much glue at once especially during hot weather. The chemical reaction creates heat which makes it go off quicker. In hot weather the result can be that the mixture boils and will melt any plastic tubs you are using. (Margarine tubs are just as good as the expensive measuring pots the chandlers sell, assuming you are using pumps to ensure the correct proportions.)

Epoxy needs protecting from UV light. If filling (expensive and hard to sand) use it sparingly and for all type of work clean up as best you can before it goes off using thinners and a rag. This is a good policy for many materials not just epoxy. For epoxy acetone is much cheaper than epoxy thinners for cleaning up and is also less aggressive. Epoxy can be cut with a chisel when it is "green" but after it has set hard it is very hard to remove. Can be sanded but when it goes off a waxy substance known as an amine blush appears on the surface which clogs sandpaper and must be removed prior to over coating. It can be overcoated with more epoxy in green state without sanding.

I would strongly advise against the use of any form of epoxy coating on the planking as it will restrict movement in the planks and stop the boat taking up. I am aware that there are some clinker boats that have been painted with epoxy paints but this is not a practice I personally am happy with in a boat where the parts were designed to move in relation to each other. If you are working with epoxy near the planks, use cut up supermarket carrier bags to keep the glue away from the planks or to stop any timbers accidentally bonding together. Packaging tape is also good for masking and can save a lot of time cleaning up.

Over the years I have used quite a bit of epoxy and for some things like sheathing decks it is very good. However, looking back there are a number of areas where something else might have been better as well as cheaper. All too often I have fallen into the trap of using epoxy as that is what I had, rather than using what was best.

Oak can cause problems with a number of glues because of the level of tannic acid especially if it is green. Larry Pardey in his very good book "Details of Classic Boat Construction" has quite a lot to say about the failures of glued epoxy joints he has encountered. These mostly seem to be on boats in places such as the southern states and Med where there are a lot higher UV levels compared with the more temperate climate here on the East Coast

Marine & Industrial at North Walsham 01692 406822 are suppliers of adhesives, mastics etc and associated materials. Again their catalogue has lots of useful information with quite a large "hints and tips" section at the rear about how to do a good job. Some things can be bought individually but some things have to be bought by the box. I used them for all the glue glass cloth etc when doing the coach roof deck. If your chandler gives you a discount it may be cheaper to order through the chandler rather than direct.

Mastics/Sealants

Before applying any mastic or sealant think about what thinners you may need and how you are going to clean up. Also do the joints need priming? Read instructions where given!

For bedding most things down, such as toe rails, all you need is an ordinary **oil based mastic**. (left in photo) It is not expensive and so large amounts can be used and then squeezed out to



make sure you do not leave any gaps. You can then scrape off the surplus and apply it to the next section to be bedded down. Then clean off the area with white spirit and large amounts of toilet roll. Over more recent years I have found oil based mastic difficult to find in builders' merchants but found large amounts at a local timber merchant. I think the reason it is more difficult to get hold of is that more and more builders use frame sealants which cannot be cleaned up in the same way. I would not recommend the use of these acrylic based or silicone sealants.

Sikaflex is one of these wonderful modern glues/sealants and does have its uses where you want to obtain a really strong bond between two materials. Again for best results read the product literature carefully to make sure that you are using the correct type as there are several. It is comparatively expensive and, like epoxy, someone who wants to take the two-parts which have been glued together apart will not thank you. If you attempt to prize a joint apart it will often fail in the wood not at the joint. If you bed a keel down with it, next time you want to take the keel off you may well tear a section of the wooden keel with it!

Some clinker planked boat owners have used Sikaflex along the lands prior to launching to stop leakage. Often this works but equally if it gets into the lands and you have missed any bits it will stop the plank closing up. To my mind a much better pre launching solution is to mix up a 50:50 mixture of **grease and mastic**. Push this into any open lands and then clean off the surplus with white spirit. Allow to dry and then over paint. The grease stops the mastic from going hard and the mixture will squeeze out as the planks take up. The other problems with using Sikaflex for this is it is very hard to remove if you want to do so at a later date.

A one part polysulphide is often much cheaper than Sikaflex. It does have adhesive qualities but these are not as strong. I have used this for things like bedding in the glass for the windows in the coach roof and bedding the fore hatch down onto the coach roof deck. In both these cases it was important that a slightly flexible waterproof joint was formed. The thinners for cleaning up is quite aggressive and will attack other material. It is not a bad idea to wipe the area off with white spirit to remove traces of the thinners after you have finished cleaning up.

One of the disadvantages with oil based mastic is that over time it does eventually go hard and so if flexing, cracks will open up which can draw water in. In connection with this the best things you can do for your boat is take it sailing regularly in salt water. The salt in any water that gets into the inevitable cracks will inhibit **some** fungal decay. Connected with this the two most important issues so far as avoiding fungal decay are 1: Stop water getting in in the first place (keep varnish and paint in good condition) and 2: provide good ventilation to keep humidity levels low.

If you make sure there is a good seal on the underside of the wood you are bedding down with, say a 50:50 mix of varnish and turpentine, the mastic will take a lot longer to dry out.

Traditional Materials

Tallow: (Boiled down a sheeps' fat). It can be bought in a plastic sausage even at chandlers such as Fox's. What it is used for on a plastic boat I don't know but I use it in as a lubricant for wood

screws. It helps the screws to go in easier and in all but the hottest weather stays more rigid than Vaseline and grease so does not mark the wood to the same degree. All you need to do after having pre-drilled and counter sunk the hole, is push the screw into the sausage of tallow and it will come out with the grease in the thread. After the screw has been screwed in there will be a small deposit of tallow at the top which can be wiped away with a rag. If you are subsequently going to coat the wood it is probably best to go round with a rag and methylated spirits afterwards to remove any remaining grease. Using tallow should also help when the time comes to take the screw out. I normally keep my supply in a Tesco's bag in one of the bins beside the bunks in the saloon. I have not noticed any tendency for it to go rancid or smell and this is after four or five years.

Vaseline Perhaps not a traditional material but if smeared over and worked into any bronze or brass parts, such as seacocks or flagstaff sockets, it stops verdigris forming just in the same way as it stops corrosion to battery terminals. I tend to use a coating of ordinary grease when taking the seacocks to bits at lay up time. I then reassemble with grease in the spring, rub off surplus grease on the outside with a rag and then coat with Vaseline.

Red Lead Powder : This is available in tub format from Classic Marine. (see photo on next page) One tub will last you a lifetime. It is added to putty and gives it a bright orange colour.

Putty is a mixture of linseed oil and chalk and was traditionally used as a bedding compound and for filling caulked seams below the waterline. (Where planks meets stem, keel and sternpost on Stella) The point of the red lead powder is that it makes the putty toxic to marine borers. I have also known birds to eat putty in extremely cold weather. Putty which has gone hard can be rejuvenated by adding a small amount of linseed oil. A messy job.

Up until about 1990 you used to be able to buy red lead primer paint which was the standard primer used in traditional boat-building presumably for the same reasons. In my experience it was quite tenacious at sticking to wood. Out of curiosity I added some red lead powder to a white wood primer and produced a rather fetching salmon pink primer which has stuck to the boat quite well, although this may have more to do with the paint rather than the addition of the powder. Obviously **the powder is toxic** and appropriate precautions need to be taken when handling . Make sure it does not become airborne and get inhaled.

Genuine Turpentine: This was the traditional thinners used for paint and is extracted from pine trees. It should be bought just for the smell alone. Over the last 40 years its role has been replaced by turpentine substitute and white spirit, which by comparison are fairly foul smelling although are very much cheaper. You can buy turpentine at a good decorator's merchant (Kent Blaxhill) and the most economic way is in a gallon can (Bird Brand). Given its price it does not merit use as a standard thinners but something I have noticed is that a varnish brush kept in a pot of genuine of turpentine for a few days does not clag up in the same way one in white spirit does.

My main use for turpentine is in conjunction with linseed oil. Sometime ago I read an article in Classic Boat (CB64) by a Swedish man who had a waterlogged pine 55 sq m. He used turpentine as a vehicle for displacing the water out of the wood and getting oil back into the planks. While I cannot be absolutely certain about this my limited experience indicates that a mixture of linseed oil and turpentine can put life back



into wood which has become fibrous as a result of the oils being displaced. My wife's 15 ft clinker-built day boat with small oak ribs spends most of her time afloat and so the ribs in the bilges had become heavily waterlogged. All the good seemed to have gone out of the oak ribs in the bilges and the wood had become very stringy. We had to replace a number of the ribs as they had split right along the grain of the wood but over the last four years we have taken the boat out over the winter and given the bilges a regular soaking with a mixture of boiled linseed oil and turpentine gradually reducing the quantity of the turpentine. It is quite surprising how some of the timber which was very soft and stringy is now quite hard.

I also use the mixture for touching up the varnished section of exposed ribs and planking underneath the side decks between the benches and the bulkhead at the front of the cockpit on Lys. The varnish had become slightly damaged in places but I was not that keen on hot air stripping this relatively complicated structure so I just gave it a coat of about 50:50 turpentine and boiled linseed oil. You do not get the same form of high quality gloss as you do with a varnish and the surface is not particularly hard wearing. At the beginning of each season I have just given the area a light sand and then a coat of turpentine and oil and it seems to stay in a reasonable condition.

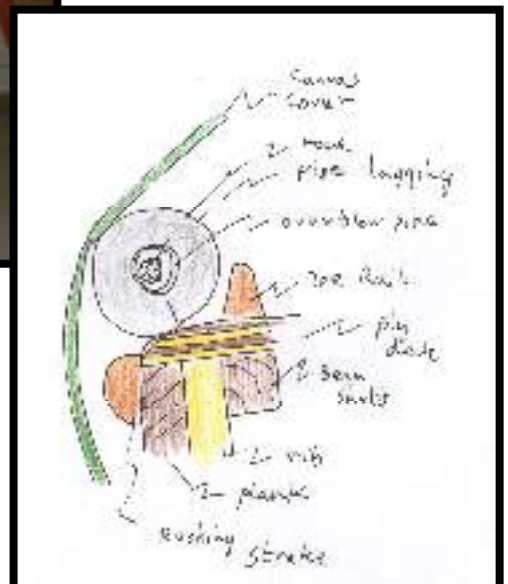


Linseed oil: This is an oil which comes from pressing the seeds from the flax plant and comes in two types, raw and boiled. I have had relatively little to do with raw. In one of his books Claude Worth talks about soaking a newly made dinghy in the raw linseed oil, but the minor drawback was that you then had to leave it for six months before you could apply any finishes. Also in my experience oily surfaces, if left exposed for long periods of time, attract dirt. Boiled linseed oil by comparison forms a skin on the surface after a few days. It is important with boiled that it is applied in a thin coat or that the surface is wiped clean after application as otherwise the skin which forms on the surface will be too thick and soft and will easily peel away. I have outlined the use of this material to strengthen dry wood under the previous heading. I use a 50:50 mix to give areas of exposed galvanised metal on the boat a coat, notably the mast step, anchor and chain which remains on the deck. It helps to stop rusting, although if the anchor gets hard use like mine the protection does not last that long, but that may not bother many of you.



Traditional varnishes were a mixture of linseed oil turpentine and shellac. Unfortunately modern ones are made from hydro carbons. As an experiment and as I had the boat in a shed a few years ago I coated the bare wood of the

coach roof sides and all the mouldings toe rails etc in a 50:50 mix of boiled linseed oil and turpentine until such time as it would take no more. I then left it for six weeks occasionally cleaning off the surfaces with methylated spirits to get rid of



any excess oil. I then varnished the surface with an Epihanes varnish designed for teak. The finish was very good although I have to report that the areas which were subject to slight abrasion from the winter cover did not stand up particularly well. I spoke to an Epihanes rep prior to doing this work and he was quite doubtful so any shortcomings are on my part not on theirs. The mast and the areas which were not subject to abrasion are still in very good condition. The thinking behind this work was that if any water does get in through the varnish because of the oil it will not get sucked in to the same degree.

Something I have been trying in winter 08/09 to reduce cover abrasion on the toe rails and rubbing strip is placing pipe lagging around the edge. This is set on plastic overflow pipe which has a rope running through it attached to the pulpit and pushpit. Some plastic cable clips are needed to keep it in place. The success of this will depend upon your toe rail/rubbing strip detail. I can report so far so good.

Paints and Painting

Everyone has their own pet methods but the secret of a good finish is in the preparation. Do not follow that well known male technique "if all else fails read the instructions on the tin"! Here are some general points.

Two pot paints and varnishes (Polyurethane and Epoxy) : They are expensive and can produce a high quality finish. Having said this they are very hard and require a stable substrate. An old flexible clinker boat does not provide this and to my mind the only place these products have on a Stella is for a paint as a coating over an epoxy sheathed deck to protect the Epoxy from UV light or in the case of an epoxy primer as a primer for the metal keel.

Traditional one pot paints

Whilst I would not say you should not have a dark coloured boat, the dark colours absorb more heat from the sun encouraging movement in the planks. This makes it harder to keep the finishes in good condition. Dark colours also tend to make any imperfections more obvious.

The marine paints are, I believe, more hard wearing. This may be of significance if you are in a marina and the fenders are grinding against the side 24hrs a day. This may be of less significance on a swinging mooring. I only have a small pick up buoy on my mooring attached to a long length of rope which allows the chain to stay in the mud when not in use. The chain is pulled up to deck level over a bow fender. In this way I avoid a large mooring buoy rubbing against the bow planking. This arrangement may be more difficult if your mooring is in very deep water.

I am a cheapskate and for the white use B&Q non drip gloss. (Not the "Value" range) I also add about 10% undercoat to the mixture. This removes some of the high gloss so it does not show up the glitches. It does make the paint slightly softer but when it comes to rubbing down it makes the paint chalk rather than clag the sand paper.

When fitting out I start by sanding the antifouling. I know you should not dry sand antifouling but I always find that wet sanding leaves a residue which is hard to clear. (Dry sanding and

burning off antifouling paint is not recommended by manufacturers for health and safety reasons as there is a risk of inhaling toxic fumes and particles. This applies not only to you but also your neighbours. If you must do it, wear the relevant protective gear and make sure you have a high quality mask. Do it when other people are not around.) I sand quite aggressively to try and reduce the build up of paint even though I use a self eroding antifouling. (I buy sand paper by the roll from a decorator's merchant.) I then touch up any bare areas with a antifouling primer. Next I sand the topside starting with the top plank and working may way downwards.

Having cleaned off with a brush, vacuum cleaner and tack rag I start painting on the blue top strake. I don't worry that much about getting small bits of paint on the white plank below although you can use masking tape. Providing the bits of blue paint are small they can be over painted with white. Similarly it does not matter if you get small bits of white on the land of the blue plank. Nobody ever sees this when the boat is in the water as it is facing downwards.



With regard to brushes cheap disposable brushes are fine for primer and antifouling and disposing of them is probably cheaper than using lots of thinners. I am not sure what our green colleagues would have to say about this.

For gloss and varnish I have come to the conclusion its worth spending a bit more money on decent brushes and cleaning them out. It takes a long time but there is nothing worse than picking out bristles from the paint as you go along.

The next thing I do is the first coat of antifouling. This I apply with a gloss roller. I then go along the lands with a brush to make sure they get a coating and make sure any gaps in the lands get filled up. Antifouling paint is relatively soft and should not cause problems when they take up. I do not worry about painting right up to the waterline at this point.

Having white topsides also enables me to cheat with a boot top. I like to have the waterline where it should be with a boot top above. The problem is that a boot top can look awful if is not of a constant height and exactly parallel with the waterline. Visually the best form of boot top is one which is taller at the ends and partially follows the line of the shear but this is very difficult to do well on a clinker boat. I use quite a tall white boot top which you cannot



distinguish from the topsides unless you are within a few feet as the photo shows. Consequently I do not have to worry that much about a wavy top line to the boot top.

I lightly scribed the waterline into the planks with a hacksaw blade some time ago but the paint needs cleaning out every few years or so. Last of all I apply the final coat of antifouling with a roller. I then paint up to the waterline using a well loaded brush. You should always try and paint up to a line as gravity will help to keep the paint the right side.

As a general point bear in mind that when the boat is in the water very few people are going to get closer than about 10' from the boat so you do not need to worry about minor imperfections that are obvious when you are right up close in the boatyard.

Varnishes

Again this is one thing we all have our own view about. Personally I have got on best with the International Original varnish although I am sure the Blakes equivalent is probably just as good. One thing I can say with certainty is that if you do not follow the instructions on the tin particularly about the number of coats it is unlikely to last.

Mast and Rigging

The original masts are solid, glued together in two halves with a number of scarf joints. Resorcinol glue was used which may be getting toward the end of its life expectancy. If you can keep the water out you are much less likely to have a problem. I believe some have failed around the goose neck because of wracking strains. Quite a number, mine included, have a tendency for the glue joint to fail at the heel. I had assumed this was due to compression loads but mine opened up for about 3" after a particularly strong gybe when I would have thought the compression loads would not be so severe. The next winter I cut the joint with a hack saw blade put some wedges in, added epoxy and then clamped it up prior to re-varnishing and have not had any problems since.

Some of the galvanised fittings such as the spreader boxes may be getting a bit old and thin. I have had many of mine replaced in stainless but making complicated patterns of this type does not come cheap. Galvanised will be cheaper, but not a lot.

With regard to shackles and pins going into these fittings try to make sure that the pin is the right size for the hole. If it is too small it will gradually enlarge and wear an uneven oval hole in the tang.

With regard to racing set up, my boat is very rarely at the front of the fleet so mine is probably not the best advice for racing. Even so, be kind to the boat and **do not tighten things up too much. All you will do is bend the boat.** A number of the go faster boats have large purchases on the backstay and seem to spend quite a bit of time pumping. Polaris seemed to go as well to windward as any of these boats and she had no means of adjusting her backstay.

The **spreaders** are designed as struts which take some of the loads on the cap shrouds back to the mast in the form of compression. These loads should pass directly down the spreader.

In order to be efficient the spreader should bisect the angle which the cap shroud forms as it passes over the spreader tip. According to Kim Holman's plans this is about 5° **above** horizontal. All too often I see Stellas with spreaders which are drooping well below the horizontal. This is especially the case where signal halliards are attached to the underside of the spreaders. In this position when the loads come on the spreader tip the tendency will be for the cap shroud to fold the spreader down further. If the spreader breaks the mast will go. Also the drooping in the spreader will allow small amounts of slack into the rigging which can encourage considerable snatching forces in rough weather. Most seem to get away with it but why take the risk if you do not have to?



My solution to this is to have the spreaders held in their correct position by whipping twine connected to brackets screwed into the mast and top side of the spreader. It also has the advantage of discouraging birds from sitting on the spreaders but for the purists I am sure it must hinder my speed to windward.

If you are leaving the boat the **rigging screws** should either be wired up or set up with split pins even in the first few weeks of a season when you may still be tuning. Otherwise you risk losing the mast. I do not trust locking nuts. With a rigging screw put two or three turns on one of the threads before you connect the other. If they have an equal number of turns the barrel can come off both threads at the same time and roll off into the drink. Open barrel rigging screws have the advantage that you can see how much thread is left in the barrel.

All rigging screws with the possible exception of the backstay should have a toggle between them and the chain plate as on the adjacent photo. This allows the bottle screw to articulate in any direction so that it is always parallel with the force which it is being imposed on it. This is particularly important



with a forestay as there are considerable sideways forces as well as fore and aft.

Split pins should be the right size for the hole they are going into. According to Rod Stephens (Desirable and Undesirable Characteristics of Offshore Yachts), in length excluding the head they should be about $1\frac{1}{2}$ times the diameter of the object they are going through, no more. As bought in chandlers they are almost certainly too long. When they have been cut to the correct length, round off the sharp edges with a file. Sticking a pin which is too long through and then spreading it through 180° weakens the pin. (as seen at bottom of photo on previous page) It creates sharp edges and makes quick removal in an emergency difficult. The shortened arms of the pin only need to be spread though about 20° (10° on each side). You should then put a small gob of silicone sealant between the arms to prevent the pin from closing accidentally. (Silicone yet to be inserted to those in the barrel in the photo and they need spreading a bit more) Some rigging tape round the pin protects items including your ankles from the pin. In a rigging screw ideally the split should be in a horizontal position so that if the barrel rotates the arms lock against the barrel at the same time.

All my shackles, blocks etc above gooseneck level are wired and taped up each spring when I put the rigging on after giving the mast two coats of varnish. Stainless steel rigging is supposedly only good for ten years. I have a rolling programme of replacement so that the cost of replacement is spread over several years rather than coming in one big hit. Taking the rigging off the mast enables you to check it over the winter. You would also be amazed how much dirt comes out of the running rigging when you wash it. It is also softer and kinder on the hands if you wash it once a year.

Setting up the rigging, start with the forestay and back stay to get the desired alignment. There should be no weight on the topping lift at this point. Then work on the cap shrouds. You can run a tape measure up on the main halyard assuming it is not blowing too hard or just use the halyard itself to check the distances are equal but this pre supposes that your boat is the same shape both sides and has not pulled up. The distance from deck to block should be approximately the same although there is a 5mm variation between my port and starboard lowers. When you have done this then work on the lowers so that the mast at rest is about straight both fore and aft and side to side. Looking along the aft side of the mast from the fore hatch can give you a good idea. If you are on a mooring, row round the boat and check it from a distance.

When you go for your first sail check the leeward cap shroud when going to windward. It should not be tight but there should not be excessive slack in it. Tighten it half as much as you think it needs. Then go on to the other tack and go through the same process. When your happy with the set up you can then put the pins in/ wire it up on a permanent basis. If you get the boat going well one year and the set up seems right, record the distances between the pins at deck level and the top of the rigging screws so that you can recreate the settings although you should still check whether it looks right. It is pointless setting up the rigging on land as the boat will almost certainly change shape when it goes in the water.

I am sure one of the serious racing brethren can probably supply more comprehensive information on tuning up your boat.

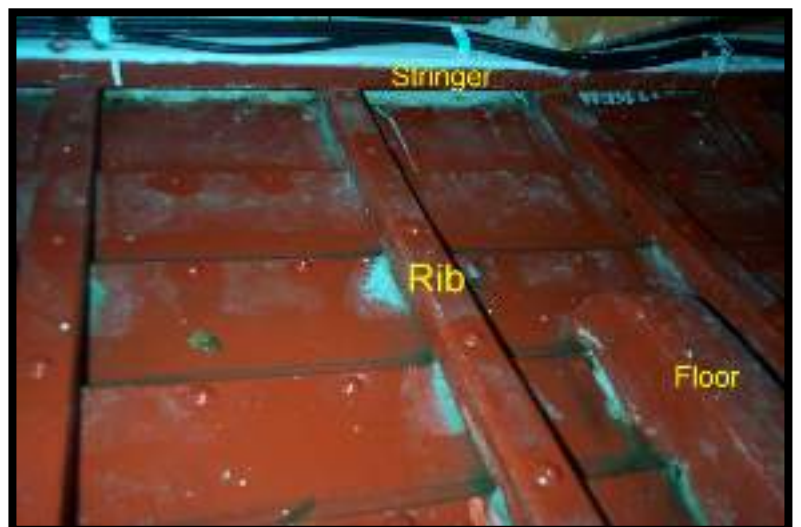


PART II: Specific Projects

REPAIRING BROKEN RIBS AND REFASTENING

Leaking

I would like to think that all Stella owners are aware how clinker (lapstrake: America) planking keeps the water out or not as the case may be and why they leak when they first go back in the water. They rely on the two overlapping parts of the planking known as the “lands” being connected together by rivets. In Viking days these would have been wooden tree nails or trunnels but by the time Stellas came along these had been replaced by copper nails and roves.



The two planks are riveted when the wood is dry. When the boat is placed in the water the planks swell up and close tight against one another. When the boats come out the planks dry out and open up again. Thin mahogany planking as found on most Stellas dries quite rapidly. Laying up out of the wind and strong sunlight will help prevent over drying and shrinkage. When working inside the boat ashore, try not to let rubbish drop down into the lands as if this is sufficiently hard it could stop the planks closing up. This is unlikely to happen if the interior has been painted and the boat is just out over winter.

The copper nails should last at least 30 years but may waste away over the years. Electrolytic corrosion can take its toll but this is not usually bad unless something is seriously wrong. The subject of electrolytic corrosion is very complex and will depend to some extent on where you keep the boat. Lys has never had an anode and I have never noted significant problems. My advice would be if you have got one replace it when half of it has gone. It should be bright when the boat goes back in the water and should not be antifouled. If you have not got any problems leave things as they are. If you start bonding things up you may actually start a problem where there was not one before. You are far more likely to have problems in marinas because of all the stray currents from other boats wired up to the mains. If you change location keep the condition under close review. Make sure the battery main switch is off if you are leaving the boat. Also be careful with automatic bilge pumps that they are not discharging current into the bilge water.

Allowing the boat to dry out seriously does not do the boat any good as once a timber has split or opened up along the grain as a result of shrinkage the two parts may swell back up but they will never bond back together again. Also the shrinkage will place strains on the nails and the timber around the nail holes. Even so don't panic if you have a severely dried out boat. It is probably best to try and get the planks wet before attempting any work. This can be done with a hose from inside and leaving wet sacking inside: but clean it out before you do for reasons explained above as you will be forcing water down through the lands. An alternative and possibly slight extreme solution is to sink the boat, although take the furniture and engine out first! You may also have to wash a considerable amount of silt out of the boat after doing this. An alternative halfway house is leaving it in a cradle where it will only float for a short time at the top of each tide.

The copper nails are also more likely to be fatigued on a boat which has been subject to hard stresses either through years of general hard racing or by cranking up the rigging which bends the boat. Assuming the nails are OK the boat should be able to stand up to being driven quite hard but it's always wise to be kind to the boat where possible. After launching allow the boat to take up for at least a week before driving it hard and ideally you should allow the topsides to get wet with a few gentle sails before taking her out in a blow.

If she leaks a lot when you launch her, one solution can be to fill a bucket of **fine** sawdust and turn it upside down and push it under the boat with a boathook. Turn it the right way up. This forces the saw dust out which then gets stuck in the lands and swells up. As the sawdust is soft it does not damage the planking. I have had to do this once after burning off the bottom. It was if someone had turned off the tap. You can put a boat in a mud berth to take up but beware mud caulking which washes out under way. **When putting a Stella in a mud berth always**

make sure you lash the tiller well in a central position. If you have not and she slides backwards you can easily break the rudder.

After I had burnt the bottom off it took about four years to get the boat back to where it was leakwise before I started. If you are worried before launching and you can see obvious gaps between the planks you can mix up some oil based mastic with some grease and rub it in to the gaps. (See Mastics and Sealants) Over the years as paint builds up you are less likely to get problems. The planks on the turn of the bilges often look like they are open but do not leak because the planks are hard up against each other on the inside edge.

Although an electric bilge pump may be a necessary for those who do not have the luxury of living near their boat, I have never liked them for two reasons. Firstly if your not there you have no idea how badly the boat is leaking and secondly from my Jonah perspective electrical terminals in the bilges connected to a battery is a recipe for problems.

The bulk of normal taking up should take place in the first 12 hours. If it has not taken up within a week it is unlikely to do so although small dribbles can take two or three weeks to completely disappear. My boat in optimum condition normally takes between 1 and 2 pumps a week. I have a cockpit cover and I would advise anyone to do the same so as to keep the fresh water out.

If you still have a significant leak, trace it back to where it is coming in by drying the lands with a sponge/tissue. Mark where the problem is and then have the boat out or put it on the posts and have a look outside. A further dab of grease and mastic may work in the short term of if a rove head looks suspect try tightening up some of the nails. Serious repair will have to wait for the winter unless it is desperate. Try to avoid having the boat out of the water in the summer heat if you can.

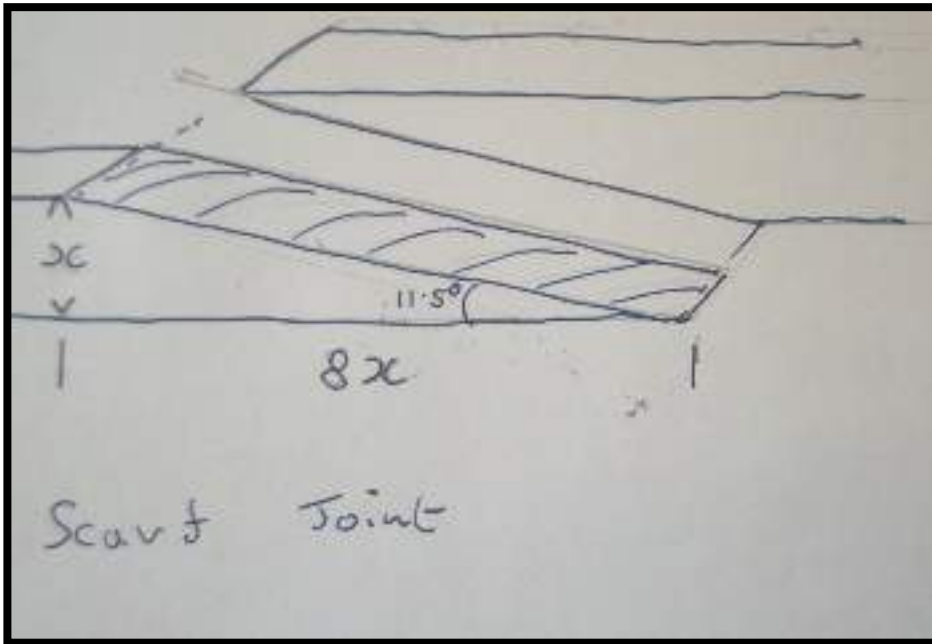
Replacing Ribs

You may find over time that localised stresses placed on the hull have caused some of the oak ribs to crack. The most vulnerable places are on the turn of the bilge and on the reverse tight turn around the engine bearers. When the rib is first steamed and bent into position, the wood structure on outside edge of the turn is placed under tension while the inside edge is under compression. When a crack occurs it will tend to start from the area under tension which gives first and moves towards the area under compression. If you have got just one hairline crack leading from the outside edge toward the middle of the rib it is probably nothing to worry about although you should keep the condition under review. If it goes right through the rib it is of more concern. You basically have four options. One is to do nothing in which case it is likely that the damaged rib will create a weak spot and put more strain onto the ribs on either side encouraging them to crack which is likely to lead to a leak.

The second option is to “double” by putting a sister rib alongside the damaged one for two or three planks vertically either side of the damaged fastening. This has the attraction that it can often be accomplished without taking too much furniture out. The disadvantages are that you

are adding another set of nail holes into an already weak area and aesthetically it looks like a bodge.

The third solution would have been to cut out a large proportion of the damaged rib and steam a new one into place. The difficulty with this is that originally the ribs would have been put in before the deck was added or the stringer put in. This means that with a shape such as a Stella which has a reverse curve or an S shape section it is impossible to get a complete new rib in. Therefore you can only put the lower or upper half in as required making a scarf joint at a point where there is no turn in the rib.



Scarf joints are a means of joining two timbers together using an angled joint. Traditionally they are set at a length of at least eight times the height of the joint. Most joints are glued but some are mechanically fixed as well.

The ribs on a Stella should be about 7/8" deep and so the length of the scarf joint for a rib should be at least 7" long. Scarf joints are quite difficult to cut in situ to give

an even matching joint. A tenon saw with a rigid blade should help in keeping the angle of the joint parallel with the base but often there is not sufficient room for a saw of this size. If you mark the ends of the joint top and bottom using a square and then draw a straight line between the top and bottom on both sides of the rib, this should help you to check whether your saw is running true. On a work bench with a mitre saw cutting small scarfs is relatively easy but doing so with sheets of ply is more complex and will be covered elsewhere.

Returning to the issue of the long rib repair it will be necessary to steam the timber. You will need to use green oak not seasoned. You will probably need to get this direct from a sawmill and you should be looking for relatively straight grained and **knot free** timber. I use Shrubland near Ipswich. Cut the timber to size and then place it in a steam box.



My **steam box** consists of half of an old large aluminium boom bought from the dump. This is blanked off by the goose neck at one end but a rag would do. The boom is wrapped in old curtains etc to

reduce heat loss (partly removed in photo). Steam is provided by an electric steam wall paper stripper where the hose is inserted well into the boom and then the end stopped up with rag. The stripper has the advantage of having safety cut outs etc.

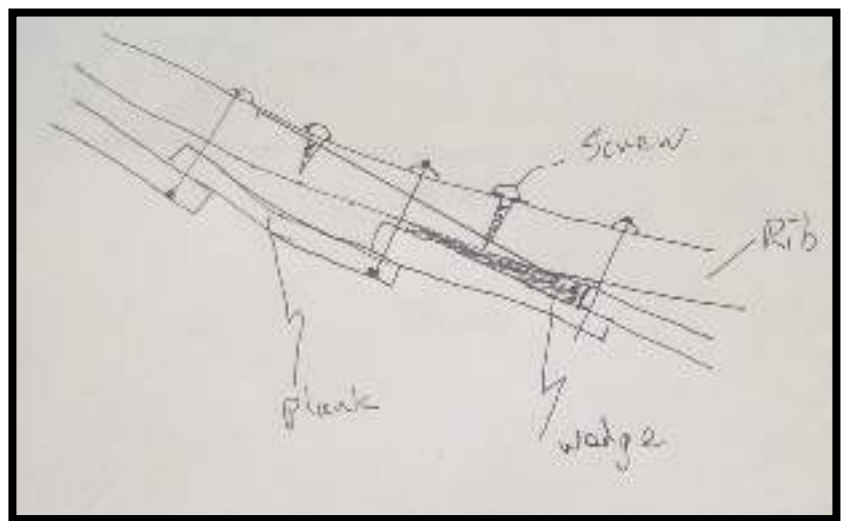
How long you cook your timber for will depend on its size but for a rib I would guess it will be at least 40mins and possibly as much as an hour. I have only done smaller dinghy ribs.

When the timber first comes out of the steam box it is very flexible but cools rapidly losing its flexibility. The timber needs to be worked into place as soon as possible. You should therefore get everything ready and everybody in position before taking the timber out of the box. Wear gloves and if you can get someone who passes the timber up to the person who is going to fit it so much the better. You need at least two people for the nailing. Ideally you should have worked out how you are going to keep the timber in the desired shape using struts under the deck, coach roof or wedges under the stringer etc prior to taking the timber out of the box.

Once you have got the timber into place drill through the existing nail hole in the land up into rib. Use a drill bit just smaller than the copper nail that you are going to put through. This nail should be the next size up (larger) from the one that came out. Once you have put the nail through with someone holding the rib in place on the inside it should keep the rib where you want it in the short term. You can then go onto another part to keep the rib in place as it cools. Probably three or four nails will be adequate to start with. You then rivet up the nails as will be discussed later. You can then put in the other nails at your leisure.

If you are doing a number of ribs choose the one which has the least bend in it first, as this is least likely to crack and will be more tolerant of your slow first attempt. If you have got a difficult one the timbers may crack in which case you have to start again. Reasons for cracking can be the timber is not green enough, you have not cooked it long enough or you have taken too long getting it into position. If your timber has a knot in it you are wasting your time. Green oak will produce large amount of black tannic acid which will stain your hands and is difficult to remove.

Returning to the issue of a scarf joint in a rib repair, I have only ever done complete rib repairs in a dinghy. You will not be able to glue a green oak scarf joint (Balcotan might work) so it will need a mechanical joint fix. Logically it would seem sensible to have a nail running through the centre of the scarf so you should plan the centre of the scarf to be over a land. The top and bottom of the scarf will also need fixing. Logically this could be done with screws from above. The holes will need to be pre drilled and round or pan headed screws will probably be better than countersunk as the latter would tend to split the thin part of the



scarf. The holes for the scarf would probably need to be pre drilled. For a rib the screws will probably be $\frac{3}{4}$ " 6's or 8's. The placement of a small wedge (shown in sketch above) under the rib where there is a gap between the rib and the plank should reduce any tendency for the bottom of the scarf joint to try and open up. This should be made up before you start to put the rib in. Ideally the scarf joint should be glued but in practice this may not be that easy especially with green oak. This would be my solution. If someone knows better please let me know

One of the reasons, why I do not know, is that with my rib repairs I chose the fourth and to my mind easier option. The laminated rib repair using seasoned oak and glue. Like a sister rib repair it has the advantage of being relatively localised but is not an obvious repair and does not create another set of holes in the plank.

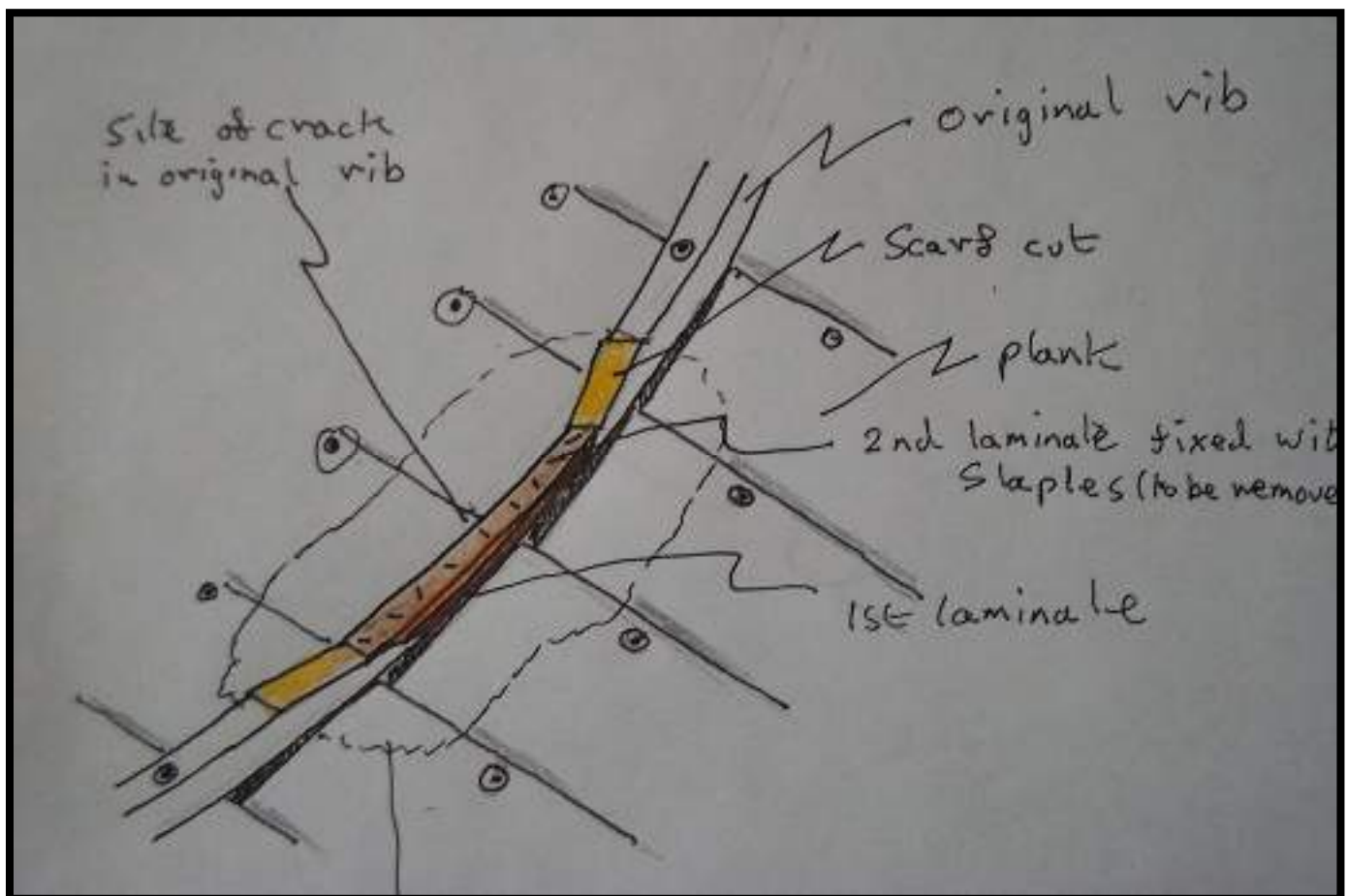
The split in your rib will almost certainly be at a nail hole. I would suggest that you need to cut out the damaged rib back in such a way that the scarf joints at the top and bottom of the repair are centred over the nail holes for the lands immediately above and below the nail hole you are repairing. If there is something like a stringer in the way you will have to cut out a larger area although the stringer can help when it comes to clamping the laminates down later on. From memory I cut the rib at a right angle to start with to "chop it out". I then cut the angled scarf joints afterwards as this gave you more room to work with.

The next thing you will need to do is cut out some laminate strips of oak. A table saw produces nice even strips. I used strips which were 5mm thick, using 5 layers. (See photo on next page) By the time you have added the glue this makes them slightly larger than the original but once you have cleaned /planed up the rib and finished it the dimension should be about right. With regard to the thickness if they are too thick they will not bend easily and will not take a standard 8mm staple while if they are thinner you will need more laminations.



Measure the distance between the two scarves at the bottom of the original rib following the line of the boat. Assuming you are using a 1:8 ratio for your scarf, for a 5mm thick strip this will give a scarf joint which is 40mm long for each laminate. If you added this figure twice to the length between the scarves you have the length of your first laminate. Cut the scarves. Watch out that the second one you cut is a mirror image of the first and not an exact copy. (\ / not \ \). I

know it sounds obvious but it is all too easy to do. Something which may help in this and other situations is if you mark hatches on the timber which is to be cut away as waste before you get the saw out. That way you are less likely to cut out the wrong piece.



In some ways the first laminate is the most difficult one to fix. Place cut up shopping bags (dotted line above) under the scarves of the cut ribs to stop the glue bonding to the planks. I used epoxy as glue. The timber will need to be dry if using epoxy. Applying a thin neat coat of

epoxy to both of the surfaces to be glued. Allowing it to soak in can help to ensure a good bond. I then mixed in colloidal silica to the epoxy to form a mayonnaise consistency to give it a gap filling ability if required. This will only need to be applied to one surface. Before getting the glue out place the first laminate in place and check the fit. You will also need to design some form of strut to keep the laminate in place following the curve of the hull while the glue goes off. Wedges covered in packaging tape may help. This all sounds easy and is so when you have not got any glue. When you add the glue it all becomes terribly slippery and will not stay in place so do a dry run first. In the case of the first laminate you only add the glue to the surfaces of the scarfs. A judiciously placed staple in each scarf will help to keep it in place but you cannot do this until it is all set up. Clean up any excess glue so that it does not interfere with the placement of the next laminate. The staples should be removed after the glue has gone off.

The process is then repeated except for the next laminate you spread glue on the surfaces of the lamination as well as the scarf and staple it to the laminate below using a staple gun. You will need plenty of force to ensure the glue is pushed out. For the second laminate you may still need a strut to keep the laminate to the correct curve although with 5mm wide strips after two laminations this should not be essential. The laminate strips are best left with a sawn finish as this gives the glue a rough surface to attach to. You will need to remove the staples before laying the next lamination.



When you have finished with the laminations you can then use a rebate/bull-nose plane to clean the ribs up to the correct size and required finish prior to putting in the fastenings in the normal way. Sand paper will work instead of a plane. It just takes a lot longer.

Refastening

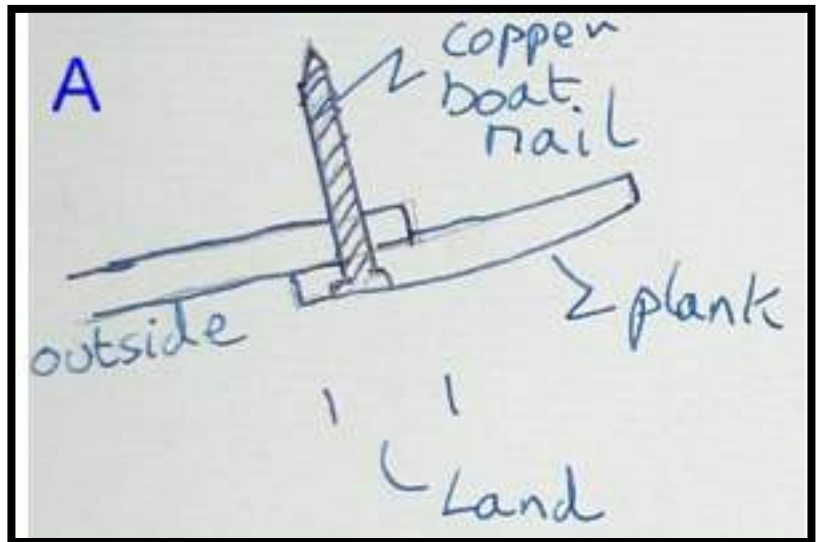
With age electrolytic corrosion can cause the copper nails and other fixings to waste away. Generally the copper is fairly resistant but the combination of ageing nails and excessive drying out placing stresses on the nails can cause planks to leak. Any boat will leak to some degree especially when working to windward. You can try to solve the leaking by methods described earlier or by tightening up the nails. One or two can be done by drying out the boat on the tide but for anything more than a few you will need to take the boat completely out of the water. I would also be careful about just doing a few on the tide as it is just possible that your works might actually make things worse! If your efforts do not have any success you need to take some nails out to assess what condition they are really in.

I refastened Lys below the waterline over four winters. She was not leaking significantly but I have to say that there were a number of rove/rivet heads which were quite corroded and if you had pushed the rove with a screwdriver it would probably have come off without too much effort. In retrospect I do not think that the refastening was strictly essential when I did it as only

about 10% of the nails showed significant signs of wastage. Even so, as with keel bolts, it is a lot easier to get the old nails out when they are still in reasonable condition.

The basic fastening process is described briefly in the related drawings A-D shown on the next few pages.

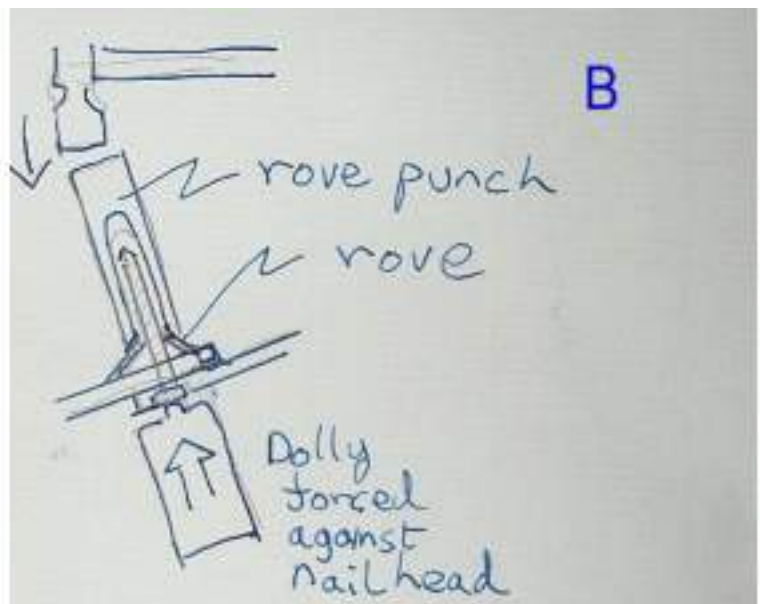
In the case of refastening you will need to remove the old nails. I found the quickest way to do this was to grind the heads of the old nails/roves using a baby grinder fixed with the appropriate disc. Wear a mask as the air in the boat will become laden with copper dust. Wear eye protection. I tended to work on the basis of doing all the fastenings for the ribs on one plank and then on the next plank down only those fastenings between the ribs. After you have refastened these you reverse the process thus making sure that large areas are never completely free of fastenings.



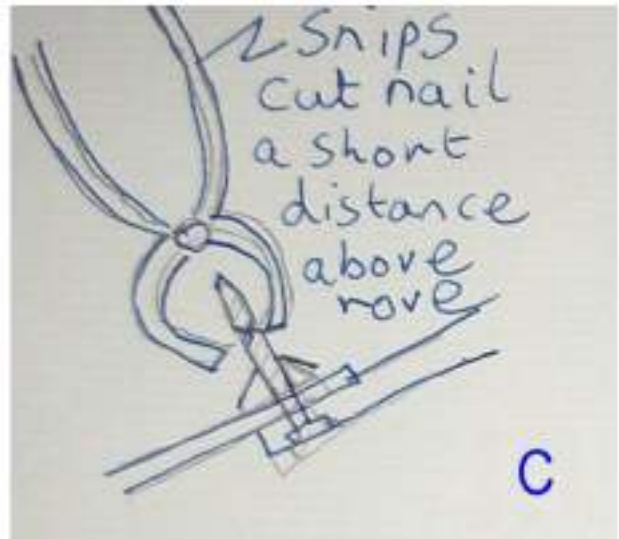
After you have ground off the heads you should be able to see the square section of the nail through the rove. Prise off the roves with a screwdriver without gouging the rib/plank. Sometimes there is not enough space to get the grinder in and you may have to cut the head off with a hacksaw blade. In these cases it is hard not to mark the ribs.

You should then be able to knock the nail out with a punch sufficiently far to be able to draw it out from the outside using a claw hammer. Place a pad under the hammer head as if your planking is as soft as mine you will easily mark it. Increase the size of the pad as the nail gets longer. Mole grips may be useful in drawing the nail out if you loose the head.

The nails which are most difficult to draw are those embed through the stringers and to a lesser degree those running through the ribs as the material they are running through leads to friction. The fixings which just pass through the planks do not normally cause problems.



You will probably need an assortment of thin punches to drive the longer nails out. When you hit them initially try to make sure the force is parallel with the nail. If you hit it and it moves, but there is no sign of movement outside, you have bent the nail! Start drawing it rather than driving it as soon as you can get at it outside as you are less likely to bend the nail in the wood. With Lys there were about three nails where quite a bit of wood came out with the bent nail. In these cases I had to glue a peg in to replace the lost timber. I then cut the peg under the rib and in the land with a hacksaw so that the planks were again free to move. Grain to peg and plank should be parallel to reduce chances of splitting.



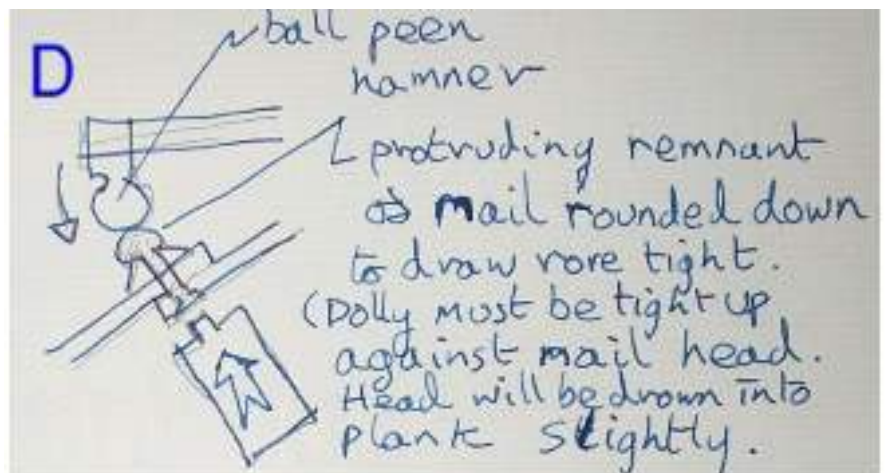
If for any reason you do need to hit something on the inside of the boat exceptionally hard try to have someone on the outside pushing up against the planking say with the head of the hammer (the heavier the better) with a cloth round it to prevent the adjacent planking from flexing unduly.

The new nails going in will need to be the next size up from those that came out. (See materials section). Nails are bought by weight so if you are doing a lot it is cheaper to have a box of each of the three lengths needed; planks, ribs and stringers. Nails going through the stringer will normally be a larger size.

One thing which is difficult when refastening is communication between the person on the outside and the inside. It may help if you number the planks inside and out with chalk. Chalk is also useful for marking things that you are going to come back to etc or which nails are stringers or ribs (as seen from outside).

Refastening is a two person job. If you have a long suffering "dolly bird" it will pay you to minimise the time they spend on site by preparing things. There is nothing worse than standing around in a cold boatyard. I split my refastening over four winters,

starting in the fore peak, then salon starboard, saloon port and finally the cockpit. Of course all the furniture had to come out. This was quite daunting the first time when dealing with all the



old brass screws but once you have replaced them with stainless or bronze the next time it needs to come apart it can be done very quickly. I used to prepare say four planks on a Saturday, grinding the heads off, knocking out the nails and making sure all the equipment was ready. On the Sunday we would refasten that section. Once you get going it does not take that much time but you waste a lot of time initially getting into the swing of things.

Some people put all the nails in first producing a porcupine effect. This is something I would not recommend for two reasons. Firstly, it makes it more difficult to work out which nail you are on when communicating between inside and out and secondly if you scratch yourself on a copper nail, the wound will be sore and slow to heal.

Have a vacuum cleaner on board and try to clear up as you go along so as to reduce the chances of dirt getting into the lands.

If your planking is as soft as mine you do not need to countersink the nail holes. If when you are tightening down the nail with the ball hammer the rove moves sideways you have bent the nail and you will need to take it out and start again. Technically you should use the next nail size up but I just added a dab of grease and mastic before putting the same size replacement nail in and have not had any problems.

You will reduce the chances of future corrosion to the rove heads if you ensure that they have at least one coat of primer and two coats of (danboline) bilge paint. Each spring before launching I have a look over the roves and if any of them are corroding I clean them off with a wire brush and give them a touch of *Danboline*. The number which need doing should reduce over time.



The tools needed for refastening are slightly specialist but you can improvise to some degree. The blacksmith's punch is not essential but a punch which enables you to accurately place force on the head of a nail is. When putting the nail in initially, tap it with a punch to drive it into the planking. The

person on the inside should be pushing down with the head of their hammer against the nearby planking/rib to reduce flexing. The blacksmiths punch can also double as a dolly for light work but does not have enough mass.

I had my dolly made up by a blacksmith but the main function is to be able to place a heavy mass up against the head of a nail so as to provide inertia to resist the impact of the hammer blows at the other end of the nail. The heavier the better but the tip must be no larger than the nail head.

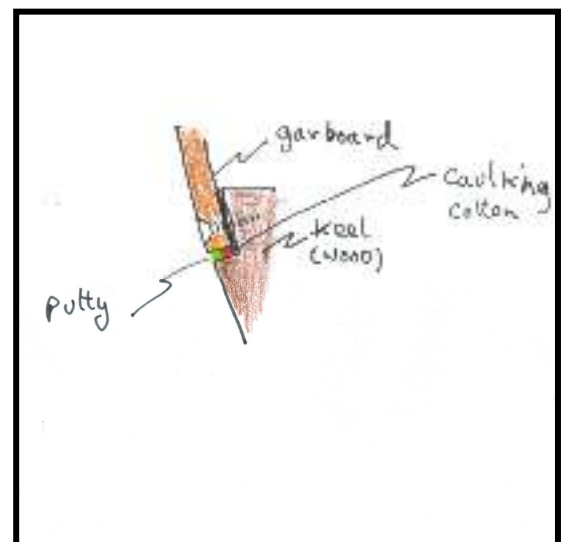
I made the rove punch up out of a cut of coal chisel which I then drilled out. A much simpler method is to use the barrel of a small rigging screw preferably not the open type. The snips I have are a lot easier to work than ordinary pincers but pincers will do. After you have cut the nail you may need to give the rove another hit with the rove punch prior to tightening up. Tightening up is done with a ball peen hammer, not in the photo. You can get by with an ordinary hammer but it is a lot harder to burr the top of the nail nicely. The person holding the dolly may like a pair of gloves to cushion the impact when they are holding the dolly up against the nail. On the outside they should be able to see the nail head be drawn into the plank as you tighten up on the inside. Don't overdo it.

Sometimes you need to drill a long thin hole which is too long for standard size drill bits. A solution can be a bicycle wheel spoke. The end is hammered flat and then cut with a file to simulate a drill bit. If you use the drill bit for as far as you can go, this will act as a guide for the spoke but do not push too hard otherwise the spoke can bend and veer off course.

The hood ends (where the planks meet the stem and transom) together with the garboards were fixed on my boat using copper (ring shank?) nails. When I bought the boat **brass** screws had been inserted between the copper nails. Whether they were original or a latter addition I am not sure but not surprisingly the brass screws had started to decay although the copper nails were still fine. As is often the case the screws were too far gone to come out without breaking up so on a surveyors recommendations I sparingly added some additional silica bronze screws to these areas and the floors although there was not a lot of space left in the hood ends to put these fastenings.

Seams

I tend to refer to the joints between adjacent planks as lands while the seams are the points where the planks ends (hood ends) and garboard meet the rebates in stem, hog(keel) and sternpost. The planks will be fixed to the stem/keel with nails and screws as outlined above. A waterproof joint is created at this rebate by packing it with caulking cotton. I think it is unlikely that you will have to touch the caulking cotton unless it has become dislodged or loose. When the boats were built putty (with red lead?) would have been used as the seam compound to keep the cotton in place and to allow for



some degree of movement when the wood “takes up”. As already outlined putty dries out with age. As with mastic this tendency can be reduced if you make sure that the wood into which you are putting it has a coat of primer. This reduces the tendency of the oil in the putty to be drawn into the wood.

It is quite common for this putty to crack with ages and it may occasionally need replacing especially if you have burnt off the bottom. When it comes out it can sometimes bring some of the caulking cotton with it. If this is hard and brittle it may need to be replaced.

I am not an expert on caulking and have only replaced small sections. I would suggest you do further research before tackling this job but hopefully the information below will point you in the right direction.

The caulking cotton is forced in, ideally with a caulking iron although any flat metal which is flat enough to force the cotton in rather than divide like a knife will do but it should not damage the edge of the rebate/plank. The cotton comes in strands and you need to twist a number of strands together so that the rope going in is about the same width as the seam. The correct size rope can be created using a hand drill and a bent nail to twist the strands round. The rope is put in at points along the seam leaving small loops hanging out. The loops are then pushed in so that the cotton is compressed longitudinally. Finally it is “firmed up” ideally with a concave or grooved firming iron. Do not overdo it! Bear in mind how dried out the boat is and how much the wood is

going to swell up. If the boat is badly dried out you risk damaging the garboard if you pack it too tight. Ideally you should be looking for a nice even pressure along the seam. Too much pressure at one point will leave gaps elsewhere when the boat takes up

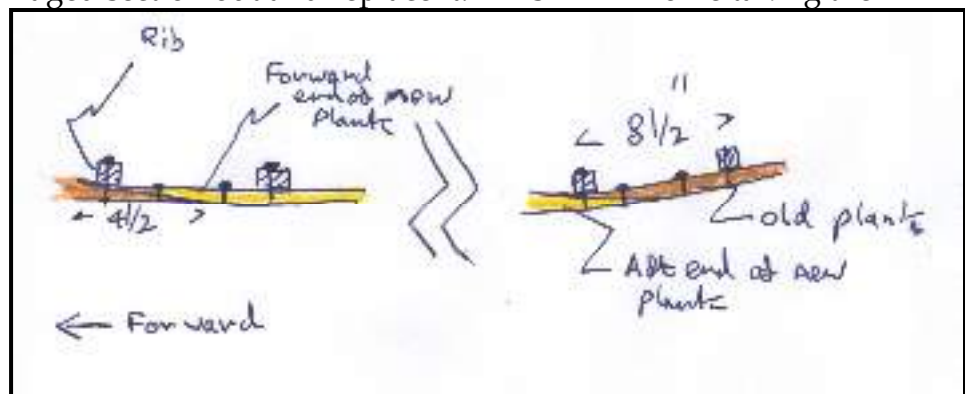
Some people use a modern synthetic seam compounds such as polysulphides to cover the joint rather than putty. If you are doing this read the instructions about application before you start caulking. You might have to use a special primer on the seams before you start.

I have always used putty. It is cheap, readily to hand, works and is easy to replace.

Plank Repairs

If you have a plank which has split through impact damage or along the nail holes, the only proper way is to take the damaged section out and replace it. This will involve taking the fastenings out where the plank is to be removed and then cutting scarf joints in the planks. These should again be on a ratio of at least 1:8 so with 9/16th” planking will give a scarf about 4½” long.

When making a scarf on



the outside of a boat such as on planking or rubbing strakes make sure the thin edge on the outside is always on the aft end of the scarf.

The reason for this is that if you did it the other way round, when you graunch alongside something there would be a tendency for the plank to catch and the scarf to open up. Given that you spend more time going forwards rather than backwards the way shown is the sensible way to do it.

Also when you are deciding where to cut, think about where the nail fixings will be in relation to the scarf. Last winter I found some rot in the deck due to water getting in round the port aft chain plate. Interestingly the pine beam shelf was sound but the mahogany packing piece which goes between the plank and the beam shelf was significantly rotten. This was allowing a small degree of play in the chain plate making the leakage worse. There was some very localised rot in the plank but the only way to get at the packing piece was by taking a section of plank out. When doing this repair I positioned the front edge of the scarf just in front of a rib so that I could use the support of the rib to help keep the front part of the scarf together when it came to the gluing up.

The other point you need to consider is are there any scarfs close by either in the same plank or adjacent planks. You should avoid having scarfs close together as this can cause a localised weakness.

Next you need to think about the issue of how long is the section you are going to replace. Whilst it is tempting to only replace the damaged area, if you put in a short board it won't take up the smooth curve of the planking and will form a flat hard spot. There may be some cases where a short repair can be justified (See below) but for an important highly visible area such as the shear strake I would say 4' is about the minimum length.



Cutting the scarfs in the planks is not easy. The aft one is a lot easier as you can cut away the waste in front. Unfortunately I seem to have lost the photographs for this job but the adjacent photo shows the first trial run scarf I cut in the waste of the plank to be cut out. For a rear scarf the part at the front would be the waste. I used a small fine toothed saw. The mahogany is fairly soft and cuts quite easily but trying to make sure the cut is in a parallel plane across the full width of the plank is far from easy. If you are using an epoxy glue you can get away with minor

variations. The forward scarf is harder still. You also need to make sure that you are not cutting into any ribs or adjacent planks.

With regard to finding replacement timber good mahogany is becoming increasingly hard to find. As a general rule replace like with like if you can. I ended up using sapele which is quite a bit harder. Look for timber without knots. One or two small ones may be acceptable if your

plank is not subject to a large amount of twist. Get a section which is slightly longer than the piece you need and then if there are any knots you can make sure they will not coincide with any fixings. Also it needs to be slightly wider than the deepest part of the plank. The top edge of the plank is likely to be curved vertically so you are measuring top of top to bottom of bottom. If you can get the old plank out it can be used as a template to a limited degree **but do not cut the new plank to exactly that size**. You can cut the top edge of the plank using the old template as this will probably not be visible in the same way as on the outside where a fair line is so much more important. Cut the front scarf first and offer it up. I then temporarily fixed this in place using two wood screws set into pre drilled holes in the planking going through to the rib. It is important to make sure the new plank is in the correct plane before you drill these holes. The screws went through a timber pad to spread the load evenly across the plank. (see photo on next page) The holes can be filled in when you have finished.

Once this is in place you can bend the plank round and accurately mark up where the aft scarf needs to be. Take the plank down and cut the aft scarf and at the same time mark where the bottom edge of the plank should be using the old plank as a template but do not cut it out yet. Fix the plank back up applying the same system of screws and pads at both ends. When you have done this get a long batten probably about $\frac{1}{2}$ " x $\frac{1}{2}$ " possibly larger. It needs to be sufficiently flexible to bend and hold a curve but not so that it will distort easily. By laying this along the lands of the planks on either side you hopefully should get a fair curve which should be approximately consistent with the line you marked up from the old template.

If you are dealing with a plank below the waterline a fair line is not nearly so critical but if you are working on the sheer strake any unfairness in line will be that much more visible. Ideally you need to be able to stand back and view the batten from a distance but this is not always possible in a boatyard. With a less visible plank you can probably cut along this line but with the sheer strake I would still leave a bit so that you can do the final adjustment with a rebate plane when the plank is fixed and glued in place.

When you are happy with this, mark the top edge of the plank below on the new plank from the inside. Take the plank down and sand and paint the inside surface with primer but do not sand or paint the land or the surfaces that are to be glued. Glue up the scarfs using packaging tape to mask areas or a thin film of plastic such as cut up fertilizer bag between areas that you do not want bonded such as the land and between the plank and the rib. (only necessary in the glued areas) Also between the pad on the outside and the face of the plank. Grease the screws you are using with the pads to fix the plank in place while the glue goes off. Hopefully the plastic can be pulled out after the glue has gone off and the screws removed. Even so I still went along the land with a junior hacksaw blade to clean it out. If a bit of bag still remains between the plank and rib it really does not matter but it must be removed from the land. **The refastening comes after the gluing, not at the same time.**

You now make your final adjustment with the rebate plane but make sure you leave enough wood for the bottom edge of the nail heads. The holes for the nails in the new plank will be made by drilling from the inside out through the old nail holes in the plank above and below. Make sure that you drill at 90° or on a slope so that the drill comes out through the new plank well above the bottom edge.

You can then nail up the plank in the normal way described earlier. It is then just a matter of sanding. Over the years the hard edge of the plank may have been rounded off by sanding and I would say it would be best to make a similar adjustment to get the plank to blend in. With an important plank such as a shear strake using a "torture board" for sanding combined with several coats of undercoat will make the new plank blend in that much better. A torture board is a strip of flexible plywood of the same width as the plank which is about 3ft long. Handles are screwed in at either end and a long strip of sandpaper is fixed to the face. You then run this along the face of the plank to achieve a smooth fair finish on the face. The reason for the name is that is very hard work on the arms!

A thin dab of grease and mastic inserted into the lands before the final coat of paint should stop severe leakage while the boat takes up.



In certain cases there may be a justification for putting in a short plank. In 2007 when the boat was being laid up and put in the cradle, unknown to the boatyard one of the metal support pads of the cradle had rotated into a vertical position so that when the boat was lowered this caught one plank which it split and also made a gouge in the bottom edge of the plank above. Fortunately they realised there was a problem fairly soon and so there were no damaged ribs.

The difficulty was as the internal photograph shows (after repair but before re-fastening) that the top edge of the plank was underneath the stringer. When I re-fastened the boat the only areas I could not do were the nails directly underneath the stringer as you have no access to the roves from above. The only way to replace these fastenings would be by placing blocks between the stringer and the plank which you then screwed into. Given this difficulty I considered it would be better for them to put in a short length rather than having to pack out under the stringer from for a considerable distance. It has created a very slight flat spot in the plank but it is not obviously visible and you have to look hard to find it. You could allow for the curve to some degree by shaping the thickness of the plank very slightly. This is very similar to a process I believe known as scrubbing which is commonly used when fitting carvel planks although in that case the curve is from top to bottom not from side to side.



The top photograph also shows how the damaged bottom edge of the plank above was cut out with chamfered edges and a new piece was later glued in. Whilst this repair may not be considered to be strictly correct but I am happy to report that it has not caused me any problems and has not shown the slightest tendency to leak.

“That’s all folks”

I hope you have found the information useful, but I would again stress that these are just my way of doing things and you need to make up your own minds.

If there is a positive response to the story so far I will complete the other areas but it may take some time to finish.

I am quite happy to answer questions from class association members, initially by telephone but I fully accept that there are other ways of doing things and am not interested in getting into correspondence about how “I did not want to do it like that”. If anyone feels there are any factual errors by all means contact me so that they can be corrected.

All photographs and drawings by John Sparks except cover photo by “Jolie Brise” on www.yourboatpix.co.uk and Kim Holman’s original Stella Section Drawing on page 2 printed with permission of Holman & Pye

28th January 2010

John Sparks, Shotley, Suffolk.