



AMATEUR BOAT BUILDERS' ASSOCIATION

JULY/AUG '03

ABBA COMMITTEE

Geoff Leggatt,	President,	ph 9494 9999 (Wk)	9316 8624 (Hm)
John McKillop.	Secretary,	ph 9437 6666 (Wk)	9313 7442 (Hm)
Chris Davis,	Treasurer,	ph 9440 2317 (Wk)	9387 5042 (Hm)
Mike Beilby,	Newsletter,	ph 9397 6209 (Hm)	

Contact any of these four people for clarification of association activities.

ALL ABOUT THE STICKY STUFF

On Tuesday, 27 May we were addressed by Wayne Spencer of Summit Chemicals on the subject of epoxies and composite materials. Prior to Wayne starting we were privileged to view pictures of the South Australian Wooden Boat Festival at Goolwa taken by Geoff Rumsey. Although he no doubt missed a few, it certainly looked as if Geoff had tried to photograph every boat there, and all of them beautifully exposed and taken, too. Thanks, Geoff.

Wayne started his talk with an historical rundown on names, fibreglass being variously known as GRP (Glass Reinforced Plastic) in the '70s, FRP (Fibre ditto) later, with the general term, Composites now being in common use. He differentiated between Thermoplastics (PVC, polyethylene, etc), these being reversible and remouldable with heat, and thermo-set materials such as polyester and epoxy resins which are hardened by a chemical reaction and are not reversible.

Starting with polyester resins, he explained that these have a styrene monomer base (about 30 - 45%), have the hardener already mixed in but no reaction takes place until the introduction of a catalyst, usually 1 - 2% methyl ethyl ketone peroxide (MEKP). Epoxies, on the other hand, require the hardener to be added (but no catalyst) in quite significant quantities, from 1:1 to about 5:1 (resin to hardener), depending on the brand and type. Araldyte is a good example of the 1:1 type, although most types are better mixed by weight than volume. In neither sort can setting off or curing time be influenced by adjusting the catalyst or hardener ratio - manufacturer's figures must be followed fairly precisely. You need to choose the right product in the first place. I know, personally, that the only way to extend pot life (a common problem) is to keep the mix cool during use, even keep it in a bath of ice, if necessary. Certainly it's a good idea to use a container which leaves a lot of surface area of the mix to allow heat dissipation. After all, this is an exothermic reaction - meaning heat is

given off and this heat then precipitates an accelerated reaction.

An important point about epoxies is that users may become sensitised to the stuff and show up with rashes and what not. This effect is particularly likely with the slower setting types, whether the user has contact with the resin or not. Certainly contact should be avoided whenever possible, using gloves, etc.

A third type of resin which Wayne referred to is epoxy vinyl ester. Like polyester this is still styrene based and uses 1 - 2% MEKP as catalyst but has epoxy constituents as well. It's lighter than the other two, making it suitable for lightweight structures. He also referred to certain high-tech epoxies that can only be set off with heat. These are often used in carbon spars and even these awkward shapes can be "cooked" if a suitable oven or kiln is constructed. No mention was made, however, of the sorts of temperatures involved but one wouldn't expect them to be terribly high. The point was made that of the three types, epoxy bonds best to timber, something to be remembered by those of us who build wooden boats.

Since epoxy resins may break down in sunlight, phenolic resins have been developed which incorporate UV filters. However it is feared that these filters may break down at high temperatures so something that gets hot in the sun, such as a cabin top, is still best protected with light-coloured paint.

Then it was on to the reinforcement side of things. First we were shown chopped strand mat which, because of the size which holds the strands together, can only be used with polyester resin - epoxies won't dissolve the size and allow a proper "wet out". Then it was on to woven rovings, just like any textile cloth but with pretty large strands. (I know there's a wide range of woven rovings, including some quite fine and lightweight examples but Wayne only had

the relatively coarse, garden variety suitable for laying up conventional hulls.) He pointed out that a drawback to these woven rovings is the large hollows formed at the strand intersections, allowing resin-rich areas there while resin-poor areas occurred at the high spots. This reduces the strength of the matrix (but it's still better than chopped strand mat) and often leads to "print through" whereby the weave of the cloth becomes visible through the upper layers of resin.

Better again are the multi-axial fabrics, of which Wayne had quite a range, all set into display cards. These are stronger than woven rovings because the fibres are straight, lying only on top of each other rather than being bent into a weave. They are lightly held together at intersections by very light glass strands which contribute nothing to the strength. We saw samples of uni-directional (often specified in critical hull areas), bi-axial (like a weave but not actually going under and over), double bias and tri-axial (bi-axial with a third set of strands running at 45 degrees) and even quad-axial! These different sorts have different applications depending on where the stresses in the finished structure are expected to lie. It was pointed out that the glass (or carbon, or aramids like Kevlar) does the same job in the resin as steel reinforcing bars in concrete.

Lastly we looked at various sandwich fillers which give stiffness to a structure where needed (especially in decks and similar). The first of these was end-grain balsa which can be a little heavy because it absorbs a lot of resin) followed by PVC foam, both in a flat sheet and segmented to aid fitting compound curves, although it's necessary to fill the segment cuts fully with resin. Lastly there was aramid honeycomb material to provide minimum weight with maximum stiffness.

All in all, a very comprehensive talk which generated a lot of questions and discussion. Many thanks, Wayne.

A RIVETTING RADFORD 45

The June Toolbox Visit was to Dave Dyson's home in East Vic Park on the 7th. The project is a 45' (well, 47 with a stern addition, actually) steel cruising yacht. This is a huge exercise, much too big to go in any residential shed - it would require something in an industrial area with the problems of rent, travelling distance and so on, so it's in the open in his backyard. Since the steel hull/deck was all welded up in Queensland, it was already a water-tight proposition when he got it home after a five day haul overland (for which Dave drove the escort vehicle). That was about eight years ago and fitting out has been going on, off and on, since then. Now Dave is getting serious and working full time on the job, with hopes of completing it by May 2004. After that, he and his wife are over the horizon and off.

Dave actually bought the house with a view to the boat project, sensible man, and as such the house is a little off-centre on the block, giving road access straight down one side for a Haulcraft truck to get down and extract the hull without a crane being needed at all. This has already happened once, when the hull was trucked to Jandakot Airport where the steel was sandblasted and painted with an epoxy grey primer. This primer has been very successful in keeping the steel rust-free over the years. The hull still shows the ripples from welding and has still to be filled, although Dave has already tested a proposed filler on scrap, especially its flexibility under temperature changes, a major worry when about 3/4 of the boat is going to be covered in it. No one at 124 Westminster St is looking forward to the torture board work in fairing, incidentally.

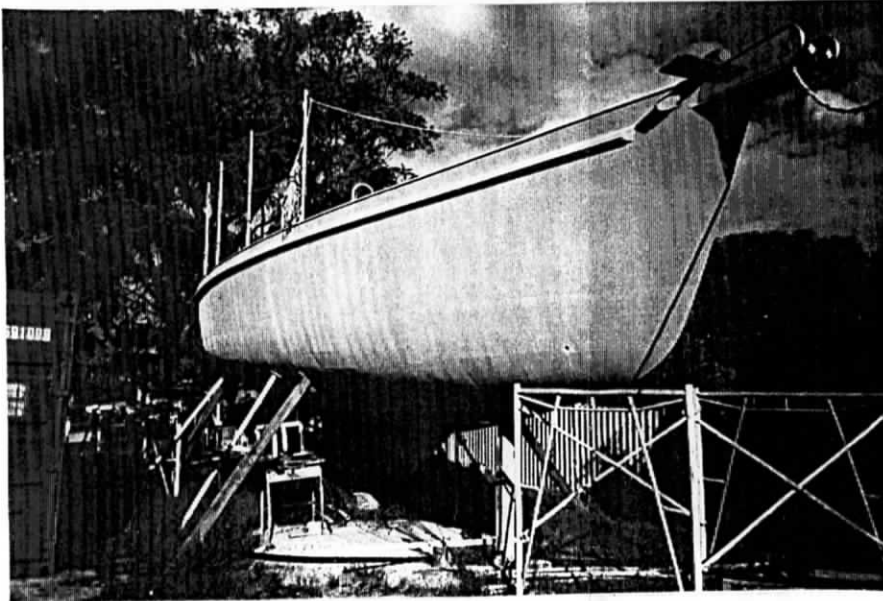
Another job for an outside contractor was the spraying of 75mm of foam insulation all through the hull to help it keep an even temperature. It will also deaden water noise. This was proven when ABBA members arriving late were unsure if anyone was on site because things were so

quiet. They didn't hear the chatter going on below deck at all.

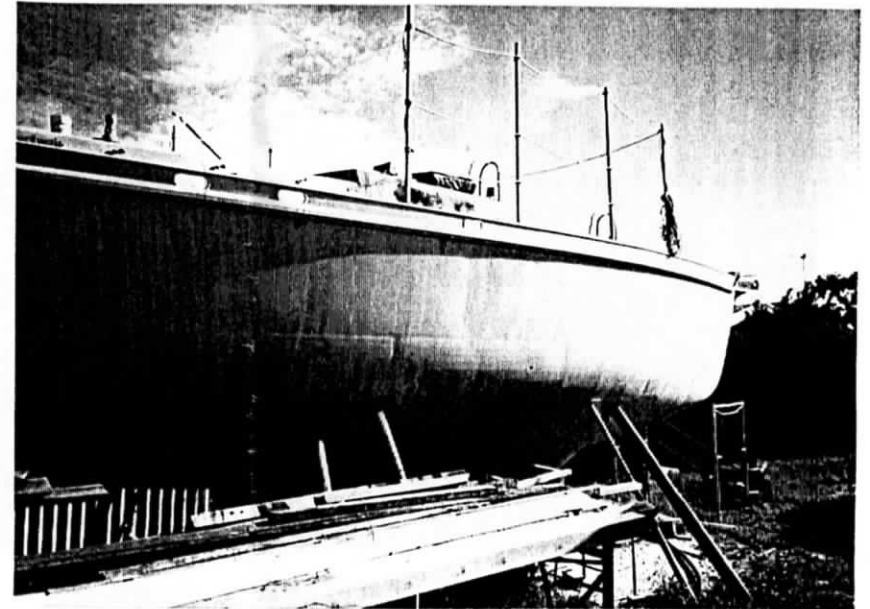
On deck many 316 stainless fittings have been successfully welded to the mild steel base structure, using 309 stainless rods. This includes cleats, stanchions and so on, but winches will be through-bolted, of course. Although the mast will be deck-stepped over the internal mast strut, it won't be a hingeing one - Dave figures it will be too big to lower easily, anyway. It and the boom are already hanging up in the roof at Taskers Sail Loft in North Freo, like several others, awaiting the completion of building projects (see last issue). In WA the boat will be kept at Fremantle S.C. so the mast can be a fixed one.

Although the prop shaft is in place the engines are yet to go in, under the cockpit floor, which is not a lifting one but Dave doesn't see this as insurmountable. There's an 18hp Kubota driving a 5kpa generator to go in astern of the 80hp Perkins drive motor. Dave plans to lift the motors aboard using a rigged samson post crane based at the mast step to get each over the side and down through the hatch into the saloon. Under the cockpit floor there's a centre rail welded in and each motor will be transferred to hang below a trolley which will run down the track so that it can be bolted in place. Oil changes will be carried out using an electric pump sucking through a modified sump plug. But believe me, there's not much room to carry out all that work. There's also a reconditioned Borg-Warner gearbox to go, and a feathering prop which can be set to free-wheel and drive a charging alternator when sailing, so the Kubota will get most of its work while in harbour. Twelve deep-cycle traction batteries will supply most of the electrical needs and these will be housed under the king-sized bed in the aft cabin (now don't crack any jokes about that, I don't want to know). All told there are three separate sleeping areas, but the V-berth in the forepeak is

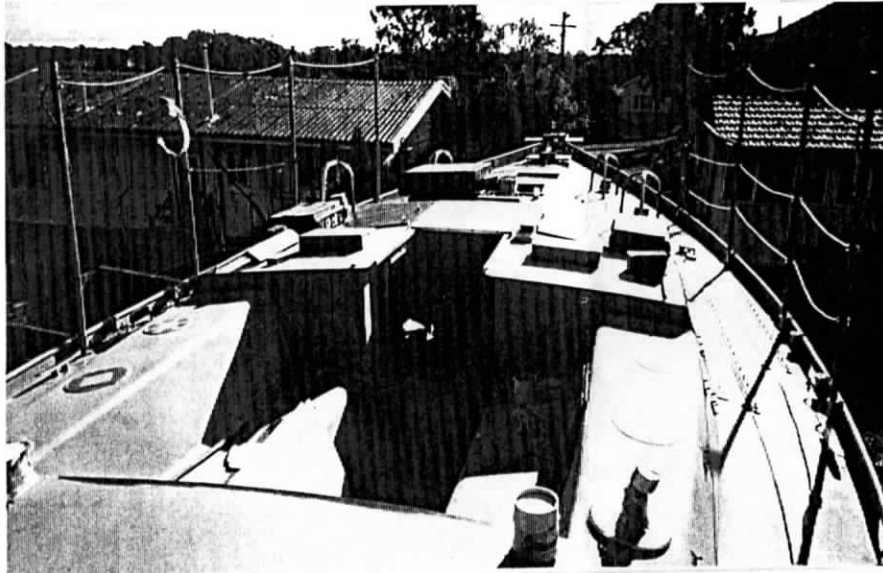
A BIG BOAT IN A SMALL SPACE



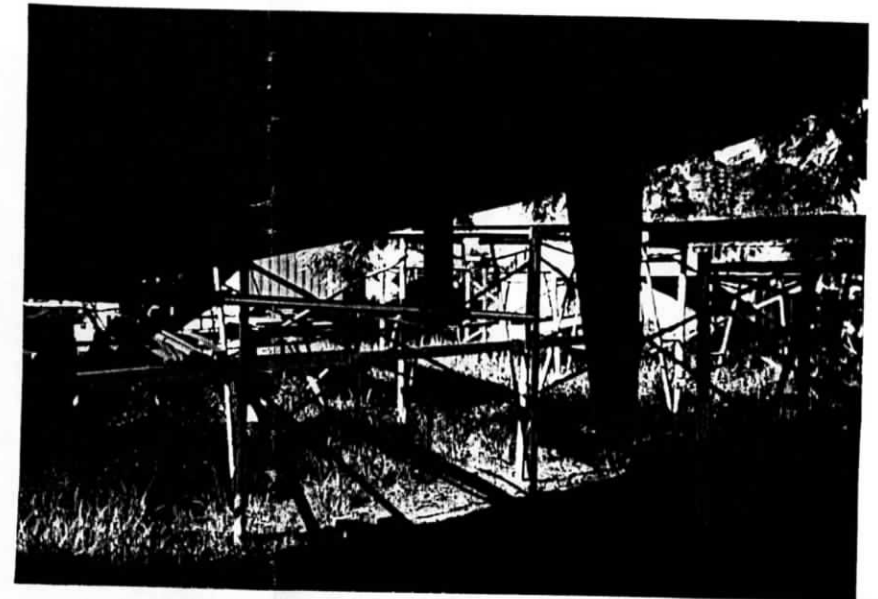
A very elegant bow will look great on the water.
S/S anchor roller, etc already in place.



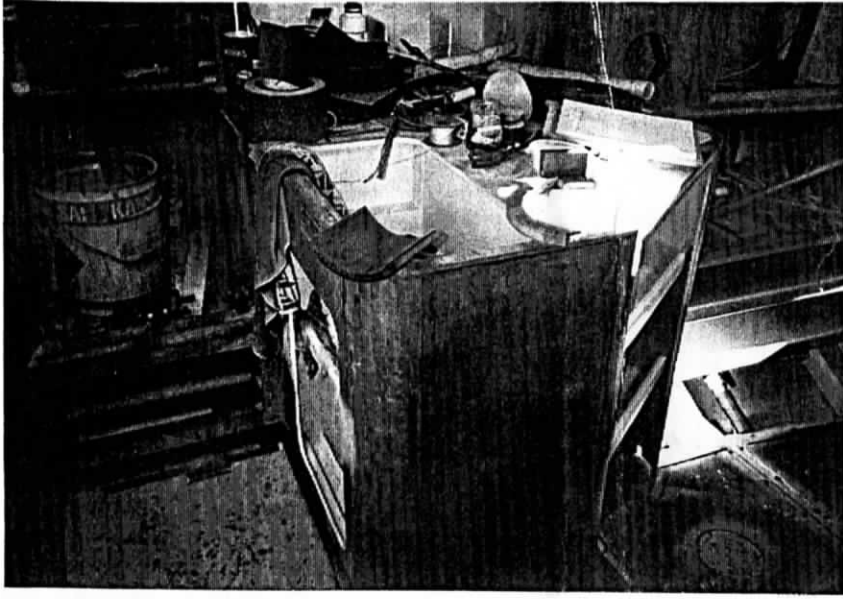
Low light accentuates the need for filling at this stage, but there's nothing very deep to be bogged here.



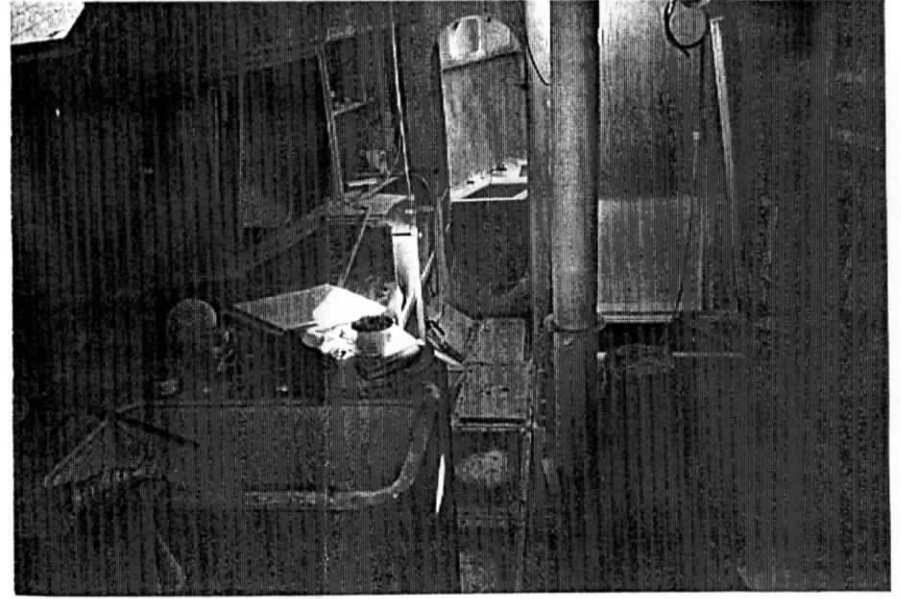
View forward from above the aft cabin. Temporary safety lines in place, some stainless stanchions welded in place, winch pads down, etc.



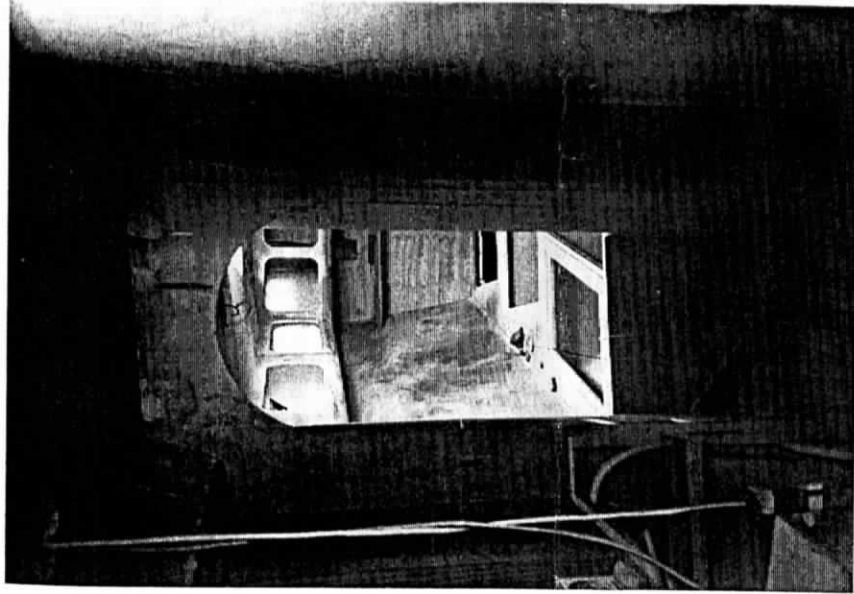
In deep shade, the prop shaft and rudder skeg, plus a lot of scaffolding.



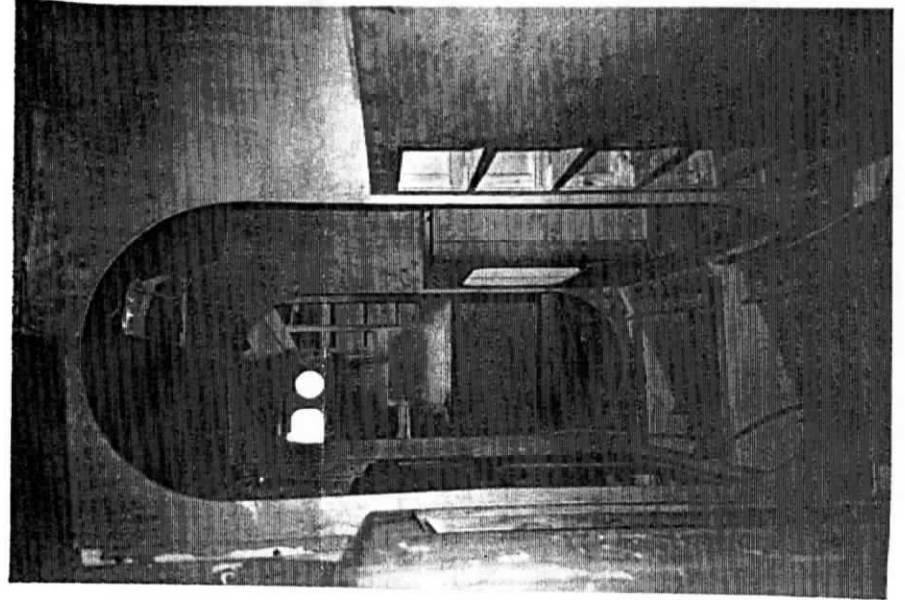
This shows Dave's solution to locker and cupboard corners with an off-cut sample on top - very neat.



Looking forward, past the mast strut, from the saloon. Looks a bit of a mess but most of the furniture is in place.



A narrow view into the forward cabin with the bathroom and laundry door dark on the right.



Looking aft, down the port side to the aft cabin. Floorboards up, engine to go in on left.

not expected to get much use, that will be mainly sail stowage.

Most of the cupboards and storage shelves are in place, including island cupboards to separate the galley, etc, and just need a bit of finishing off. I was particularly taken with the neat, rounded ply corners on many of these. It turns out that Dave has made these himself, using 10mm square strips of solid timber laminated up with 1.6mm ply each side in a mould giving about 3" radius - very neat. Under the cabin sole, various stainless tanks, there's storage for 600 litres of fresh water and a similar amount of diesel fuel.

This latter has to be hand pumped up to a header tank over the Perkins which will give between one and two days' running at a time.

There's no doubt this is going to be a very complete, live-aboard boat, even including a built in washing machine in the bathroom and a drying cupboard at the aft end of the saloon. What's also impressive is Dave's grasp of every little detail that goes into what will be, despite his hankering for the KISS principle, a very complex boat. It was a most impressive visit for which we were extremely grateful. Many thanks, Dave.

ADMINISTRATION

JULY EVENING MEETING This will be right at the end of the month, 29th in fact, at RPYC Junior Club, and we will have John Fitzhardinge Jnr to tell us about the restoration of "Thera". Back when I was a lad, Thera was regularly Cock of the Swan as a bermudan-rigged, centreboard, day sailer. Nothing could beat her under Bill Lucas in the mid-fifties. Bill sold her to John Fitzhardinge Snr and she was converted to a deep-keeler with cabin and was superseded by bigger boats like Flame and Panamuna. Thera was sold on to a couple more owners before returning to the Fitzhardinge family and was recently rebuilt from the keel up by John Jnr at his works in Dongara. She featured a couple of months ago in one of the papers, "The West", I think. We're very lucky to get John because he has to come a long way. Fortunately he can fit us in between a couple of meetings in Perth and we can get all the gen on a plank by plank, rib by rib rebuild, right from the horse's mouth. Don't miss it.

AUGUST TOOLBOX MEETING Saturday, 9th August will see us return to North Fremantle again, this time to see Fabrice Allez demonstrate construction in high tech. composites, notably epoxy-carbon involving vacuum bagging and resin infusion techniques. This is something one reads about and hears much of, but a demonstration will be far better. That's at New Challenge, Unit 2, 3 Coventry Pde, Nth Freo, at 2pm.

GENERAL We still intend to acquire a book on kayaks and canoes and have also added books on painting and fairing techniques to the shopping list. In the meantime we would remind members that these days, with no more Boat Books in Subiaco, the place to shop for all boating reading seems to be The Chart and Map Shop at 14 Collie St, Fremantle.

CALENDAR

Tues, 29th July, John Fitzhardinge talks on the restoration of Thera, RPYC Junior Club at 7.30 for 8pm

Sat, 9th Aug, Fabrice Allez demonstrates vac.

bagging with epoxy-carbon at New Challenge, 2/3 Coventry Pde, Nth Fremantle, at 2pm.

Monday, 20th Aug, Committee Meeting.

One only website for you this issue. Try <www.auroramarine.com> for answers to all questions about maintaining your boat, cleaning up fibreglass, cleaning decks, removing bilge smells, etc, etc.