RUSTING BALLAST IN A FIN-KEEL HURLEY 22

This should be a non-problem! As we all know, the ballast in a fin-keel Hurley is encapsulated in resin, isn't it? In theory – yes, in practice – well who knows? You can only tell by cutting away a section of the internal moulding in the sea-toilet compartment to have a look.

Why did I do this?

After about 3 weeks of my Winter 2011 lift-out, I noticed some alarming tell-tale signs on both sides of the keel (Figs 1 – 2). Streaks of rusty water were draining out of the – supposedly solid – keel. How on earth could this be happening? How serious a problem was it? I did not know but clearly it needed attention. Rusting of the ballast is potentially serious as the volume of material will expand with rusting, with possibly serious consequences for the hull.

Figure 1 - tell tale signs

Figure 2

On scraping away the anti-foul and a layer of epoxy coating, each stream of rusty water was demonstrated to be coming from a small circular patch on the keel – about 1 cm is diameter (Figs 3 & 4). These looked as if a hole had been drilled in the keel at some time and then re-filled. The water was draining out around the edges of the fill. I don't know the reason for these holes but I do know that, in the mid-90s, the hull was blasted clean and coated in epoxy 'gel-shield' (pale green in the photos). It is my assumption that, at this time but for reasons which I can only guess at, a surveyor decided it was necessary to drill test holes in the keel. Maybe the rust problem was apparent even then.

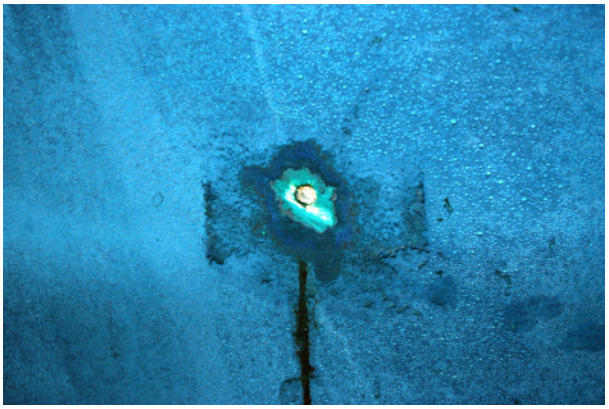

Figure 3

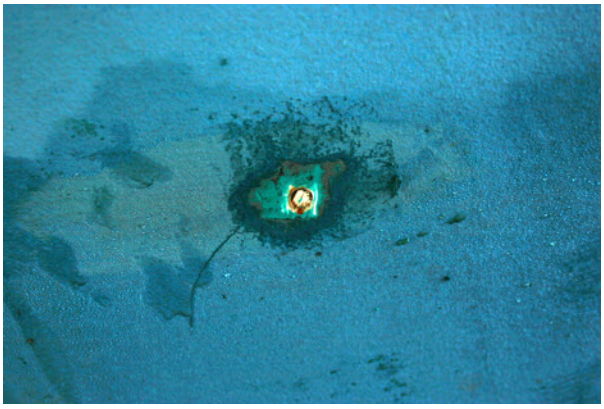

Figure 4

Checking in the bilge gave me no clue about what was happening but the answer was to be found in the sea-toilet compartment. At this point it will help you to study Fig 5. to understand the construction of the early 22s, especially those areas under the internal moulding which normally you cannot see.

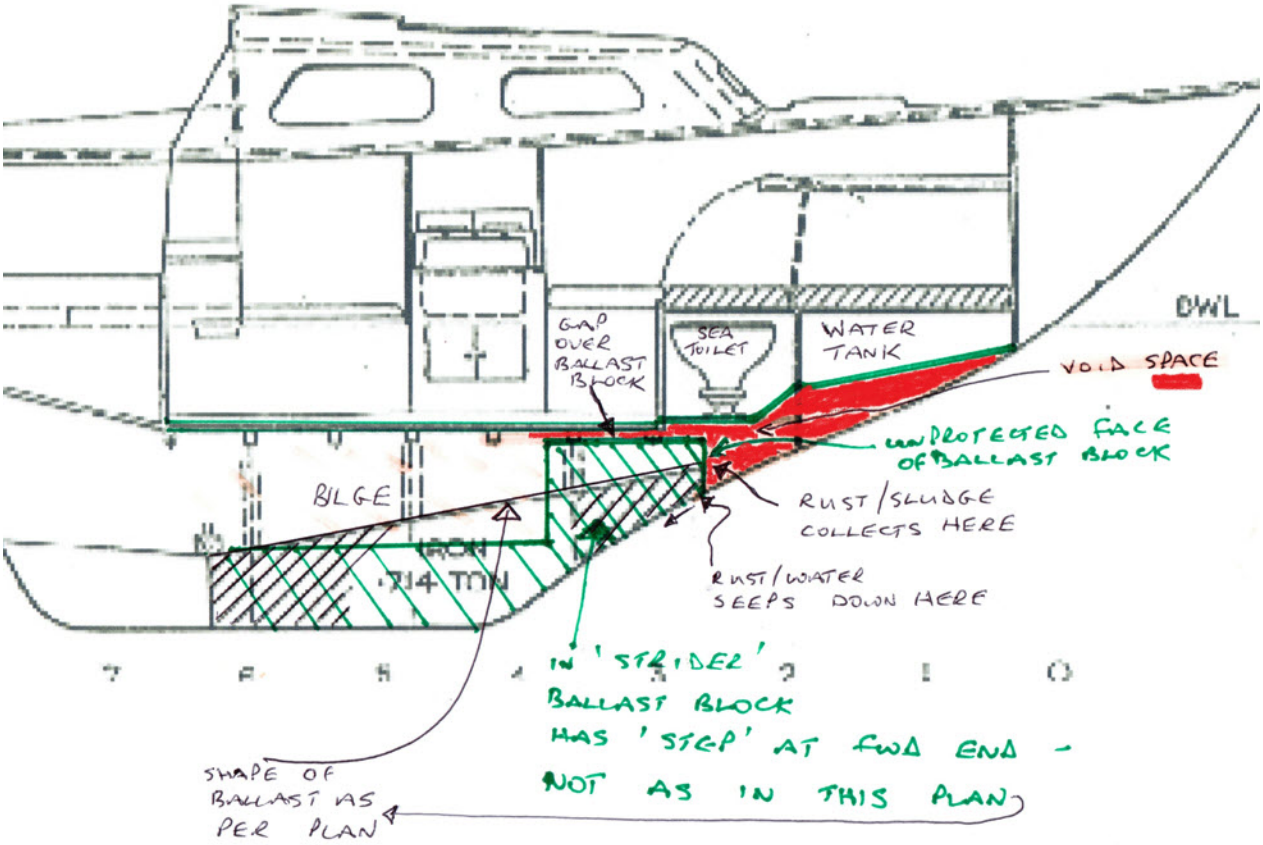

Figure 5

I had removed the sea-toilet in *Strider* shortly after buying her which made inspection easier. A previous owner had, again for unknown reasons, cut a circular inspection hole in the bottom of the compartment through which limited access could be gained to the void space which exists under the sea toilet and into which the forward edge of the cast iron ballast block faces. See Figure 6.

Figure 6 Sea-toilet compartment

If you squat in the bilge and face forward you will be looking at the forward section of the ballast block (coated in resin) which forms a step about 9 in high at its forward end. With a length of bendy batten pushed forward (or your fingers) - over the ballast and under the internal moulding – you can demonstrate that there is a gap between them. See Figure 7.

Figure 7 In bilge, looking forward. Stepped forward section of ballast block visible plus the gap above it

So if you get water in the bilge it could slosh around and penetrate forward, over the top of the ballast block, to sit in the void space. This would not be a problem if the ballast block were fully encased in resin. When I peered into through the inspection hatch, it seemed rather messy and rust coloured. When I put my hand through as far down as it could go – my fingers were quickly immersed in wet, oozy, rusty sludge. Yuk! See Figure 8.

Figure 8 Rusty sludge visible through inspection hole

The quantity of rust sludge was such that the source could only have been the cast iron of the ballast block, which for unknown reasons, was not protected by encasing in resin. This water and rust sludge was sitting in the lowest part of the hull moulding, as it runs down the leading edge of the keel, surely this was the source of the rusty water now finding its way to the outside world! The rusty water must have been running down between the ballast and the hull moulding – in those (presumably) tiny spaces where the encapsulating resin had not penetrated.

Clearly the only way to find the truth was to cut away the bottom of the sea-toilet compartment and have a look. For this I bought a Bosche multi-function tool, with saw attachments which vibrate rather than rotate (and won't take your finger off!). Note – if you do this – get the right type of blades!

See Figure 9 for the results of this. I have to say that I was impressed by the strength of the internal moulding. Also note that the sea-toilet compartment floor is reinforced with ½ in ply. I managed to just cut into this (because you cannot see where the ply begins…) – which made life rather harder.

Figure 9 Void space under sea-toilet floor. Front of ballast block visible. View looking aft. Reinforcement with ply just visible at top of picture.

I had to enlarge the cut in the GRP in order to actually get the floor out but finally it came – and revealed the full horror! See Fig 10.

Figure 10 close-up of rusty front face of ballast block (looking aft). White dust is resin, resulting from cutting out sea-toilet floor.

The forward section of the ballast block is clearly visible – poking into the void space under the sea-toilet. The block was covered with chopped-strand mat and resin on the top and sides – but not the forward face – a triangle of sides about 4 – 6 inches and going right down into the lowest part of the keel. This face was severely rusted. With a hammer and chisel I cut back the GRP/mat on the top of the block for about 3 inches back from the front edge, to expose the extend of the rust. See Figure 11.

Figure 11 Top few inches of ballast block – GRP mat removed to expose area of rust

After taking photos, I then proceeded to clean up the mess and to dry things out. I drilled out all the rusting spots on the outside of the keel, plus some additional holes at a lower level and allowed them to drain. A distressing amount of water drained out over a period of about 2 months. I recall that it had been a bitterly cold winter and that, maybe, the water in the keel had frozen and expanded, thus pressurising the pockets where it was trapped, causing the plugged holes to 'start' – i.e. leak.

I consulted Nick Vass who kindly came down to look and advised me on filling the space with resin – once all was as dry as it could be. The theory is to fill the space with polyester casting resin, which would drain down into the lowest void spaces between the ballast and the hull moulding, thus sealing everything and preventing any more water getting down there. Note that casting resin cures slowly and therefore does not heat-up or expand much and is therefore best for this application. We thought that the resin would actually get as far as the holes in the keel and drain out – thus proving that the whole 'drain path' had been filled. In the event this was not the case, so I may have poured resin over residual rust deep inside the keel – but there was nothing else to be done.

Before filling with resin, of course, I had to leave the holes in the keel open to drain until no more water emerged, then dry and fill them. To fill the holes I used Sylmaster Aquastick epoxy putty, (http://www.sylmasta.com/acatalog/TDS%20Aqua%20Epoxy%20Stick%2001.pdf) which is ok in wet environments and easy to apply.

Initially, I poured resin into the lowest part of the void space, so that it just started coming up the face of the ballast block – but only just – and also to a point a few inches forward of the ballast. See Fig 12

Figure 12 Front of ballast block painted with Hammerite and initial fill of casting resin – reaching a few inches further forward.

In order to keep the costs down and minimise the quantity of resin needed, Nick advised me to install a 'cofferdam' – basically a small bulkhead, just ahead of the ballast block. This I fashioned out of plywood and glassed into place with woven glass strip and epoxy resin on top of the first layer of resign (see Fig 13). Although it was a bit rough and ready, once fixed firmly, pouring the second batch of resin on the 'after' side of it, sealed everything up nicely.

Figure 13 'Cofferdam' glassed-in just ahead of ballast block

In order to provide a solid bed for the sea-toilet (having reduced the strength of the compartment floor by cutting it away), I placed two blocks of 4 x 2 timber on top of the ballast block, having confirmed by measurement that they would sit just under the sea-toilet floor and provide a direct foundation on top of the ballast. I then proceeded to fill up the whole of the space 'aft' of the cofferdam with resin. The resin came up and over the top of the exposed ballast block (which I had previously rubbed down and treated with Hammerite) and around the 4 x 2 blocks, thus making a complete seal of the ballast (see Fig 14) – something which the Hurley team should have done in 1968!!

Figure 14 4 x 2 supports for sea-toilet floor, captured in the second fill of casting resin, which has flowed all round the ballast block, top and sides, up to the top of the cofferdam.

Once all was complete, I fashioned some small pieces of plywood as brackets and, with SS bolts, reinstalled the sea-toilet floor. See Figure 15.

Figure 15 Plywood brackets bolted to internal moulding, to support sea-toilet floor

This winter's lift out will show if I have been successful in solving the problem. The problem for other fin-keel 22-owners is – whether you have the problem! Unless you get the tell tale signs on the keel, without a look under the sea-toilet you won't be able to tell. Perhaps ignorance is bliss.

Tim Sharman
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ADDENDUM APRIL 2013

The work above turns out to be something of an 'own goal'! The source of water in the void space was almost certainly the fresh water tank. In Strider there is a hole in the tank, port side, about an inch from the top, where the hose passes through on its way to the pump. When I renovated the tank several years ago, I sealed the space around the hose with Sikaflex. However, this had perished and there were gaps between the hose and the wall of the tank, though which both air and water were passing. The water was finding its way into the void space, by a route under the main moulding, which you cannot see. Also, I believe that when filling the tank, air was exiting though the gaps around the hose, resulting in the tank filling to the top - and then water being forced into the void, by the head in the filling pipe. All avoidable!