Technical Meeting – 2 September 2020

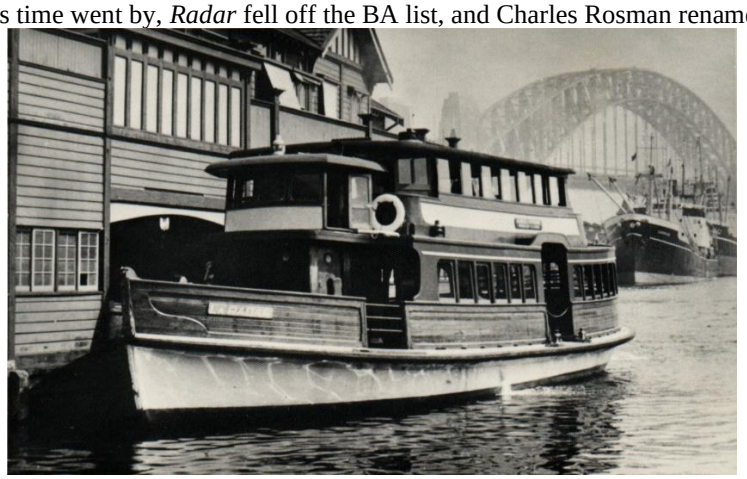
Sean Langman, Managing Director of Noakes Group, gave a presentation on *Ferry* Radar *Preservation: a Link to a Once-working Harbour* as a webinar hosted by Engineers Australia with Phil Helmore as MC on 2 September. This presentation attracted 70 participants on the evening.

Introduction

Sean began his presentation by saying that the Rosman ferry *Radar* has been restored to full working order, and will comply with all AMSA's NSCV requirements.

Radar was built in 1947 which, coincidentally, was the same year in which the floating dry dock (which Noakes has also restored) was launched. Many people have asked the question 'Why preserve old kit, rather than building new?' Sean said that he believes firmly in the basic naval architecture and engineering which went into these vessels and, as they worked then, there is no reason why they shouldn't continue to work now, as well as showing the links to the past.

The new ferry was launched as *La Radar*, because the name *Radar* was already registered with the British Admiralty in 1947. As time went by, *Radar* fell off the BA list, and Charles Rosman renamed his ferry *Radar.*



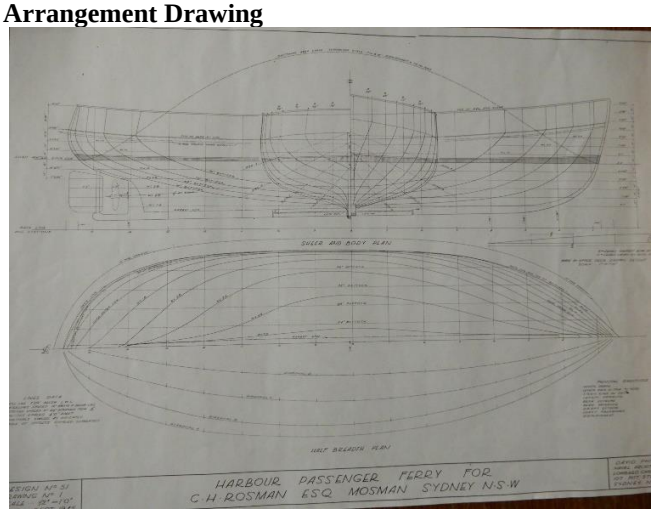
Radar at Circular Quay circa 1950
(Photo courtesy Graeme Andrews)

Radar* and *Rodney/Regis/Regalia

Radar (foreground) and *Rodney/Regis/Regalia*
(Photo courtesy Noakes Group)

Here Sean showed a photo of two Rosman ferries, *Radar* and *Rodney/Regis/Regalia*. *Rodney* became famous when she took out a party of spectators to watch the American heavy cruiser, *USS Louisville,* depart Sydney Harbour on 13 February 1938. Many passengers crowded onto the upper deck and moved to the starboard side to see as *Rodney* passed *Louisville.* Turning in *Louisville's* wake off Bradley's Head, *Rodney* capsized and sank with the loss of 19 lives. She was eventually raised and refitted, being born again as *Regis* and, subsequently, *Regalia* [*For further details of the* Rodney *incident, see the* From the Archives *column*—Ed.]

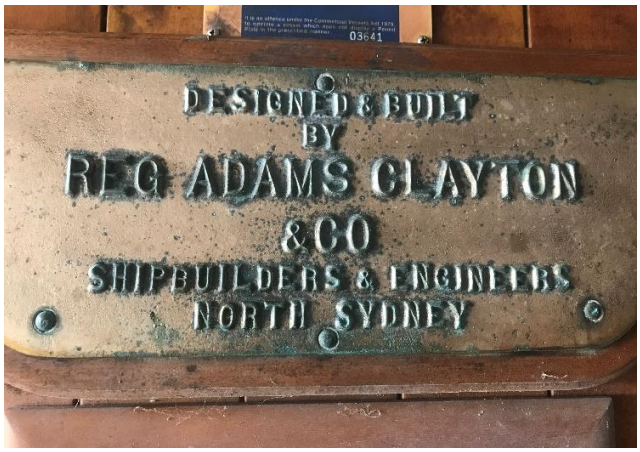
Lines Plan and General Arrangement Drawing



Lines plan of *Radar*
(Drawing courtesy Noakes Group)

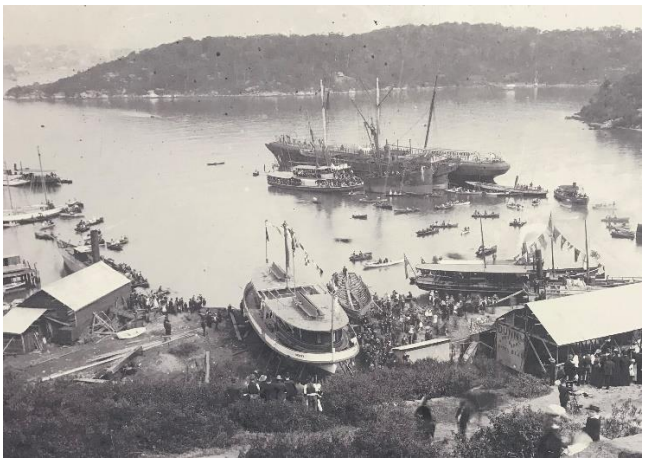
The lines plan and general arrangement drawing of *Radar* are being used today to input data and to analyse her stability. In addition, they are scanning her hull shape to see how much (if anything) has changed and how to incorporate that into the stability data.

Radar was built by Reg Adams, Clayton & Co., Shipbuilders and Engineers, at North Sydney — right at the current Noakes site where she was restored. Reg Adams, Clayton & Co. was famous for the many timber seagoing trawlers which the company built [*including a number of Danish seiners which operated out of Eden for many years*—Ed.]



Radar's builder's plate
(Photo courtesy Noakes Group)

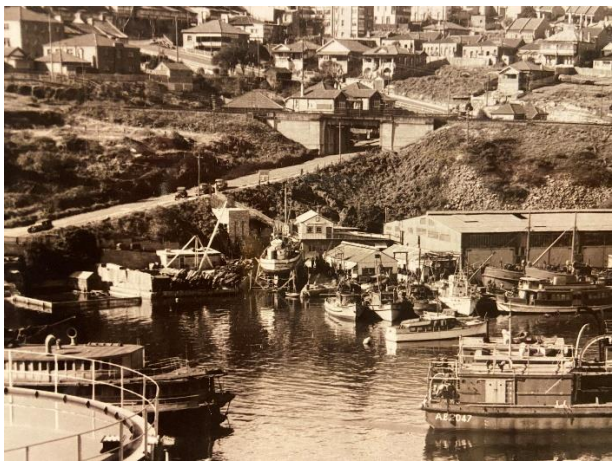
Berry's Bay in 1892



Berry's Bay in 1892
(Photo courtesy Australian Register of Historic Vessels)

Here Sean showed a photo of Berry's Bay in 1892. The large vessel on the slipway in the centre of the photo is exactly where *Radar* was built by Reg Adams, Clayton and Co., and subsequently restored and re-launched by Noakes Group. In the centre background are the training ships HMAS *Tingira* and *Sobraon*, moored alongside each other.

Berry's Bay in 1947



Berry's Bay in 1947
(Photo courtesy Noakes Group)

Radar can be seen on the right-hand side of the photo of Berry's Bay in 1947, berthed alongside the big shed. The little white building in the centre of the photo is the same one from which Sean was making this presentation. The slipway in front if it is where *Radar* was built.

Berry's Bay in 2018

Berry's Bay in 2018
(Photo courtesy Noakes Group)

The photo of the Noakes site at Berry's Bay in 2018 shows that the little white building is still there (top centre), and illustrates the diversity of craft which they handle. Of note are the following:

- *Kurrewa IV* ex *Morna* (top, blue sail cover), designed by William Fife III and built by Morrison & Sinclair at Longnose Point, Birchgrove, on Sydney Harbour in 1913. She competed in six Sydney–Hobart yacht races and won line honours in four. She is now being restored for her 110th anniversary in 2023.
- LLCs (two, upper centre), the LHD Landing Craft (LLC) which were purpose-built for the RAN's Landing Helicopter Dock (LHD) ships.
- *Warren* (centre), Noakes' tug which they use to move their vessels around.
- *Proclaim* (centre), ex-Nicholson Bros ferry, also built by Morrison and Sinclair at Longnose Point, and now part of the Rosman fleet.

- STS *Young Endeavour* (lower centre, blue cover at bow), the British Government's bicentennial sail-training gift to Australia, in refit.

Radar on Sea Trials

Radar on original trials in 1947
(Photo courtesy Noakes Group)

Charles Rosman ordered a new ferry from Reg Adams, Clayton & Co. following the *Rodney* incident. *Radar's* purpose was to be more stable than *Rodney* and so she had more beam, and the wheelhouse was purposely low to enable her to pass under the Roseville Bridge, where no other ferries at the time could go—this would expand the Rosman services. The upper-deck bulwarks were set inboard, and sloped inwards (making them difficult to climb over) and did not extend so far aft as those on *Rodney*. Stability tests had shown that, if *Rodney*'s upper-deck bulwarks had been set inboard (limiting the number and transverse movement of passengers), she would not have capsized.

***Radar* with Top Deck Enclosed**

Radar with top deck enclosed in 1955
(Photo courtesy Noakes Group)

Radar had the top deck enclosed by about 1955. However, the stability book had not been updated since she was built! Noakes have therefore had to go through everything. They have lowered the centre of gravity from this photo, and therefore have betterer stability characteristics. Due to the refit construction, the vessel will not have any bilgewater, and so there will be no unaccounted free surface effects.
The sponson band always rusted and, in the photo, you can see rust streaks below the sponson on the white topsides.

Radar in 2010

Radar in Rosman livery in 2010
(Photo courtesy Noakes Group)

Radar was much loved as the Northwood ferry. Thousands of children travelled to and from school in her, and she was also used as a spectator vessel for the 18 ft (5.50 m) skiff fleet.

Refit 2013

Radar sponson refit in 2013
(Photo courtesy Noakes Group)

Radar had been well built, with hardwood planks and frames. The decks were planked with teak which Charles Rosman had obtained from HMAS *Adelaide* for the decking on the ferries *Radar, Regal* and *Royale.* However, the teak decks were attacked by corrosion of the steel dump-spike fastenings, and the hardwood sponsons and stanchions were attacked by corrosion of the steel rod fastenings; other fastenings in the vessel were bronze and copper. Under the deadwoods was a lead shoe, which had been cast on site.
Radar came into Noakes' yard in 2013 to have her sponsons replaced. However, when they removed the sponsons, they found electrolytic rot had affected the stanchions as well. The planned sponson refit turned into a seven-year refit of the whole vessel!

Electrolytic Rot

Electrolytic rot
(Photo courtesy Noakes Group)

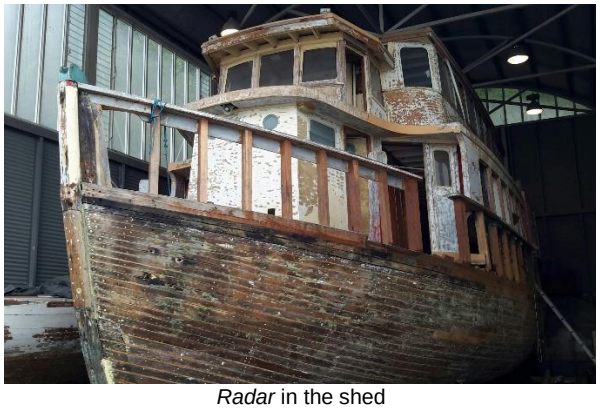
Steel is a ferrous metal and corrodes. The insert in the photo shows a halo of corrosion around the steel fastening. As the electrolytic current passes through the corrosion, it degrades the timber. Timber vessels are living things, and react to their environment and electrolytic rot. The sponsons on small monohull ferries are wide so that, when they come alongside wharves and roll, their superstructures don't hit the wharf.
The refit started with the sponson band but, when removed, they found that every single stanchion behind the band was affected by electrolytic rot, and the topmost planks had also been degraded, so that the superstructure had separated from the primary ribs and stringers. The refit escalated!

Refit 2019

Radar refit in 2019
(Photo courtesy Noakes Group)

Noakes had five ferries in service, and did not need *Radar* to meet the demands of the various schedules. So, they signed a commitment to have her back in service for the Biennale of Sydney in 2020. Since its inception in 1973, the Biennale of Sydney has provided a platform for art and ideas, showcasing the work of nearly 1800 artists from more than 100 countries. Today it is considered one of the leading international contemporary art events, recognised for commissioning and presenting innovative thought-provoking art from Australia and around the globe.
When removed from the water, the vessel had a significant hog in her keel (visible in the photo). They made the sheer line look OK and, with the conversion from wet-wood to dry-wood construction (of which, more later), she has ended up with a slight hog.

***Radar* in the Shed**



Radar in the shed
(Photo courtesy Noakes Group)

So they moved *Radar* into the shed. The top two planks in the photo are showing the extent of the electrolytic rot, looking like charred patches where the sponson band came off.

Foredeck Work

Foredeck work on *Radar*
(Photo courtesy Noakes Group)

The stanchions all had to be replaced, and here the boilermaker is boring a hole for a 316 stainless steel fastening. They would have preferred to put laminated timber frames in the bow but, having to work to a timeline, they ended up putting stainless steel frames in the bow section. Also visible in the photo is the massive stempost.

Internal Structure

Internal structure on *Radar*
(Photo courtesy Noakes Group)

The photo shows the new deck clamp, the ribs and the fore-and-aft stringers, all bronze fastened, with roved copper nails holding the planks.

They ended up changing the structure of *Radar* from wet wood to dry wood construction. I wet wood construction, the planks are stacked on top of each other and, on the outside, the seams are caulked with oakum and/or cotton, hammered into the seams with a caulking iron, then payed with putty. When back in the water, the timber swells with the wood and tightens on the cauking in the seams.

Splining and Sheathing

Splining between *Radar*'s planks
(Photo courtesy Noakes Group)

Sheathing *Radar*'s hull with GRP
(Photo courtesy Noakes Group)

They deliberately left *Radar* out of the water for a long time to completely dry the timber for the change to dry wood construction. They then ran a spline saw down each seam to remove all oakum and/or cotton, tar, read

lead, etc. The seams were painted with Everdure, and then gluefibre mixed with a high-temperature expoxy payed in, and a softwood spline driven into each seam. This gives a monocoque external shell, and the internal ribs, stringers, etc. are just coming along for the ride.
The big problem is the interface of the garboard planks with the keel. The rabbet has been adzed out on each side of the keel, and the edges of the garboard planks fit into it. However, the slight hog in the keel means that the rabbet is no longer in a straight line and the garboards don't have a perfect fit. They ended up having to back-fit from the inside, using silicon-bronze screws, rather than twisted copper boat nails, so she is not all rove fastened. The planks were glued onto new ribs, and so there is a combination of new and old methods. This gives low maintenance and a longer lifespan.
The monocoque shell is sheathed on the outside to ensure the total exclusion of water, but the GRP sheathing does not gain any structural credit.
They recycled as much as possible of the original sponson. On the topside there is a slight tumblehome, and it tapers forward and aft. Many shipwrights said that the only one who could replace the sponson as original was Old Bert. However, they used an adze to get the shape, and used a massive steam box to bend the sponson, infused everything with epoxy and gluefibre, and built up the correct shape.

Forepeak

Forepeak on *Radar*
(Photo courtesy Noakes Group)

The tank in the background of the forepeak photo is the black-water tank. The only access to the forepeak is through a watertight bulkhead, and they have painted the whole of the compartment gloss white with an epoxy finish. All seams were done with a large brush, keeping the water out. If the compartment filled with water, the water would find its way into the timber which would swell and could lead to failure. They have sufficient layers of GRP to cope, and so this will be OK, and they will have no internal free surface from bilgewater.
The athwartship floors down low are through-bolted to the keel and help to support the garboard planks (so that there is no flexibility) and to transfer the loads upwards.

Engine Overhaul

Sean with the overhauled Gardner 8L3B
(Photo courtesy Noakes Group)

Reinstalling the engine
(Photo courtesy Noakes Group)

Sean really enjoyed this refit, because of the engine in particular. *Radar* was originally fitted with a Gardner 8L3 engine. However, they had numerous Gardners onsite, and they picked an 8L3B which is basically the same as the 8L3, but 40 years newer and has 50 hp (37 kW) more power. They sent several engines to Dave Shaw of Shaw Diesel in Auckland, New Zealand, for overhaul, and he did a fantastic job on them.
There are few changes to the engine from original, except that the engine controls are better and, to fulfil safety requirements, they had to fit various guards.
To reinstall the engine in the vessel, they had to build a special lifting frame to go through the side entry and down through two decks. Sean, being a rigger by trade, loved this bit! In the reinstallation photo, you can see the marriage of different timbers on the sponson band; some original and some new oregon.

Mechanical Works

Mechanical works on *Radar*
(Photos courtesy Noakes Group)

More mechanical works on *Radar*
(Photos courtesy Noakes Group)

All mechanical works on board are to AMSA's NSCV requirements. They went to the trouble of fitting stainless steel pipework for longevity. The Gardner engine sits in a stainless steel bath which captures everything, and nothing goes into the bilge. The old adage used to be that you never had to do an oil change on an English engine, you just kept pouring oil in! The original concrete ballast was left in the bilge, and everything went in over the top.

The Artwork

Artwork on *Radar*
(Photo courtesy Noakes Group)

The artwork on the vessel is a statement of inclusiveness, and the amalgamation and marriage of two cultures. In the Pacific, tattooing was done by women, on women. Each piece of the artwork on the vessel tells a specific story from a particular area of Australia or the Pacific. There has been a massive displacement of shipbuilders (men's art) from Sydney Harbour, and women's indigenous and Pacific art, and Sean loves the fact that the art on *Radar* has been applied by a man—himself!

Radar Re-launching

Radar's re-launching ceremony
(Photo courtesy Noakes Group)

Sean has great affection for *Radar*. She was re-launched on 4 May 2020, which is Sean's mother's birthday, with an indigenous women's ceremony, from the same place she was launched in 1947. The photo shows that there was no social distancing at the ceremony. Following the launch, COVID-19 restrictions slowed operations significantly.

The Noakes Team

Radar's refit team
(Photo courtesy Noakes Group)

Noakes had a team of 38 people working on the refit, with all manner of trades, and all working to a condensed time frame to have the vessel completed in time for the 2020 Biennale of Sydney which took place in June through September.

Statistics

The statistics of the refit make interesting reading:

- Total labour hours (since June 2019) 5000
- Labour cost $500 000
- Hours worked (last 4 weeks) 3000
- Trades working on the refit 35
- Apprentices working on the refit 8
- Specialist contractors engaged 5
- Materials purchased and contractor costs (since start of refit) $320 000
- Approximate value of refit $1.2 million

- Refit commenced May 2013
- Time vessel out of water 2473 days = 6.8 years

The apprentices learned a lot of valuable new (to them) skills.

Radar's street value is nothing like the $1.2 million price tag, but her heritage value is enormous. They are now trying to find a place to do her original ferry runs. Rosman is the only company now running timber ferries on Sydney Harbour, and people love getting on board, but not getting off! There is a line from the Sydney Opera House to the Harbour Bridge where cruise ferries have to wait for a wharf allocation. Sean has been in the situation (as master of the vessel) where the allocator has asked how many passengers he has to disembark, and after advising 160, the passengers don't want to disembark! Imagine running a steam tram down Flinders Street in Melbourne—everyone would want to get on and not off!

The intent is to use *Radar* as a spectator vessel for the 18 ft (4.55 m) skiff fleet.

There has been some pushback about the artwork and the colour scheme. However, the artwork was specially for the Biennale of Sydney, and the intent is to revert to the Rosman colour scheme after the Biennale finishes.

Radar back in operation for the Biennale of Sydney 2020
(Photo courtesy Noakes Group)

Conclusion

The Rosman ferry *Radar* has been restored to full working order. She currently has a Certificate of Operation for 50 passengers, while she completes AMS's NSCV requirements for a larger number of passengers. Complying with mechanical requirements has ben straightforward. They have moved some ballast forward from aft, and the lightship will be lighter and the vertical centre of gravity lower than before. Complying with stability and flooding criteria for Class 1E will be interesting following her upcoming inclining experiment.

Questions

Question time was lengthy and elicited many more interesting points.

The certificate was subsequently posted to Sean, and the "thank you" bottle of wine delivered via an eGift card.

Sean's presentation was recorded, and is now available on the RINA YouTube channel (see *The Internet* column).