

AE1 Incorporated

Finding Australia's First Submarine

Commemorating the memory of those lost in HMAS AE1

Bringing peace of mind to their descendants

Preserving Australia's Naval Maritime Heritage Founding

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SUBSUNK

HMAS AE1

14th September 1914

Search Area Recommendation

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10th February 2012

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Executive Summary

1. This document summarises the collective work of a number of volunteers who have worked cooperatively to assess the range of possible scenarios that could have led to the loss of HMAS AE1, with a view to identifying primary, secondary and tertiary search areas. [2.1]
2. AE1 was one of the first batches of E class submarines built 1911 to 1913. Her predecessors, the D class, were the first submarines designed by the Admiralty with saddle tanks containing external main ballast tanks. The E class were significantly larger at 800 tons displacement dived, fitted with two eight cylinder diesel engines for power on the surface and to charge the two battery banks; the batteries powered two electric motors when dived. Vickers Ltd, now BAE Systems, built AE1 and AE2 at Barrow in Furness, UK during 1913. [3.3]
3. The design was robust, with good sea keeping qualities, reserve of buoyancy and stability. [3.1] This was the infancy of the submarine as a weapon system, so the E class contained a number of firsts for British submarines; the first to be fitted with Wireless Telegraphy (WT) sets for transmitting and receiving messages on the surface [3.6], gyrocompasses [3.4], (a great improvement on the magnetic compasses fitted to earlier classes) and the first (and last) fitted with broadside torpedo tubes firing on either beam. [3.2.7] Some things however, remained unchanged - there were minimal creature comforts for AE1's crew of 3 officers and 32 men.
4. The surfaced passage to Australia in early 1914 was a world record for submarines at the time. It was particularly arduous and very demanding on the crew who made frequent repairs to the main engines; engine clutches, and in AE2's case, changed two propellers en route. They were under their own power for more than two thirds of the 12,000 nautical miles from Portsmouth to Sydney.
5. After a docking in Sydney in June, the submarine refit and crew rest were truncated by the onset of war in August 1914. AE1 and AE2 sailed from Sydney in late August to join the Australian Fleet dispatched to take over German New Guinea. The colony was centred on the town of modern day Rabaul. [5.1]
6. Following a successful Fleet entry into Rabaul on 11th September and the surrounding anchorages, naval landing parties and troops were landed to take over the colony and disable the WT station being used to support the activities of the German Pacific Squadron. [5.7] The principal heavy ships - the armoured cruisers SCHARNHORST and GNEISENAU, remained unlocated. AE1 and AE2 were ordered to patrol the southern approaches to Rabaul to guard against these ships attacking the Australian Fleet's anchorages.
7. AE2 and HMAS YARRA undertook the first patrol on Sunday, 13th September 1914. Contrary to orders AE2 did not arrive back until after dark, (sunset was at 1750) and received a public rebuke from the Admiral for their tardiness. [5.4] It was during this patrol that late in the afternoon YARRA sighted an unidentified steamer off the south coast of

Duke of York Island. The Commanding Officer's declared intention to investigate was countermanded by RADM Patey, possibly because of the need to have YARRA available for other duties.

8. AE1 was directed to undertake the second patrol on Monday 14th September in company with HMAS PARRAMATTA. [5.5] AE1 had a significant defect on the starboard shaft. [3.5] We assess that this defect arose from a defective starboard main engine clutch – AE1 had experienced numerous failings of this clutch on the passage to Australia. Whilst her technical staff was familiar with dismantling and fixing the clutch, they would have required external workshop support to manufacture replacement toggle bolts to refit the clutch. On the delivery trip from Singapore, HMAS SYDNEY had twice manufactured these. From an exchange of signals between SYDNEY and the engineering staff supporting AE1 from the depot ship SS UPOLU, we assess that SYDNEY once again carried out this task and transferred the bolts to UPOLU during the course of 14th September. [3.5.3]
9. Full power was available on the surface from both diesels; however, the starboard shaft would be unavailable for going astern on the surface and completely unavailable when dived. This was a significant defect and we find it extraordinary that AE1 undertook a potentially hazardous war patrol in this condition, particularly as AE2 was available and serviceable. [3.5.4]
10. AE1 sailed at 0700 in the morning of the 14th and received a reminder from the Admiral to be back by dark. We assess this instruction so directly given would have been a significant factor in AE1's decision-making later in the day. [5.5.4]
11. After rendezvousing with her consort and a brief exchange of signals about orders for the day, AE1 and PARRAMATTA parted company; PARRAMATTA headed south to the ordered patrol line off Cape Gazelle. AE1 was the senior officer of the two, and apparently without further explanation, headed off to the northeast, contact was soon lost. [5.5.4]
12. Later in the day, PARRAMATTA turned northwards from her patrol line off Cape Gazelle in an endeavour to relocate AE1. She reported that at 1430 she was 'close to the submarine' in a position two miles to the east of Duke of York Island. Visibility was reported at five nautical miles in an afternoon haze, common in this part of the world. [5.5.2]
13. It is not apparent how PARRAMATTA was able to relocate AE1. In one report, Rear Admiral Patey indicates that they were exchanging signals by WT. This probably would have required AE1 to have rigged her WT mast on top of the conning tower and strung up the aerials. This was not only a time-consuming and difficult task for the small crew, but most significantly, would also have prevented AE1 from diving – not a suitable arrangement for an encounter with the enemy. None of the signals reported by PARRAMATTA to have been passed between the two ships was recorded in any other vessel in the Fleet, tending to suggest that instead of WT, flashing light, or megaphone were used. Use of WT communications by AE1 remains one of many unknowns, but we consider it unlikely.
14. PARRAMATTA moved away, turning back at 1520 after losing sight of the submarine and AE1 was not seen again. PARRAMATTA assumed that she had headed for Rabaul (Simpson Harbour) and herself turned north, circumnavigating Duke of York Island before

anchoring off Kokopo (Herbertshohe) on the southern side of Blanche Bay, several miles south of Rabaul for the evening. [5.5.2]

15. AE2 was awaiting the return of her sister ship; arrangements had been made to repair the defect on the starboard shaft that evening. At 2015 Lieutenant Stoker, the Commanding Officer of AE2, raised the alarm.

'8:15 pm HMAS AE2 to HMAS AUSTRALIA Submit had AE1 a destroyer scouting with her today. She has not yet returned to harbour' (HMAS AUSTRALIA signal log 14th September 1914).

16. After checking with PARRAMATTA and conferring with Lieutenant Stoker, the Admiral ordered a search. [5.6]

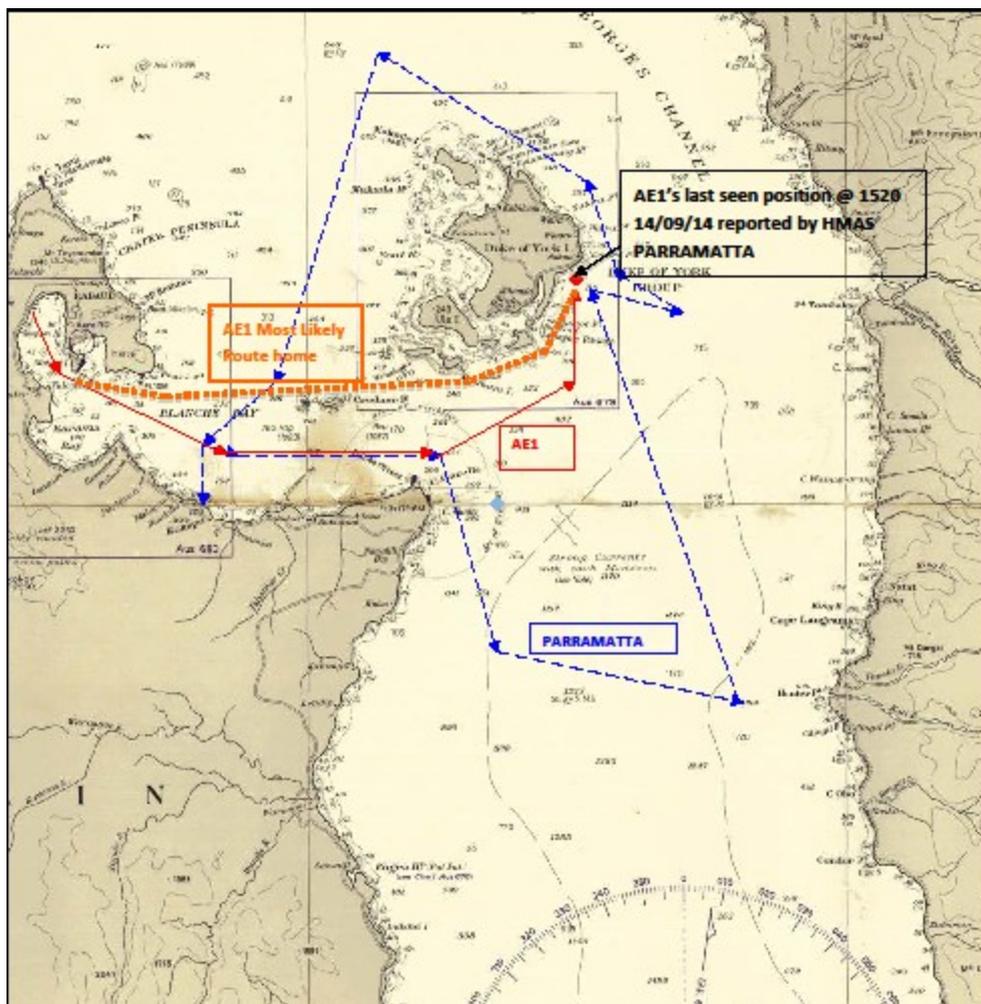


Figure 1 – AE1 & HMAS PARRAMATTA's estimated tracks during the patrol on 14th September 1914

17. PARRAMATTA sailed at 2320 and was joined by YARRA. Together, these ships, using searchlights and flares retraced AE1's potential course back to Rabaul, passing to the east of Duke of York Islands anticlockwise, with PARRAMATTA then searching out to the north-west for some 30 miles and YARRA to the west coast of New Ireland, in the hope of finding AE1 floating disabled on the surface. They were joined by HMAS ENCOUNTER at first light on the 15th, (circumnavigating Duke of York Islands S and E about) until 1045 when she returned to anchor in her role in support of landings ashore. ENCOUNTER reported an oil slick but no other sightings. The oil slick subsequently dispersed and was believed

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at the time to have come from one of the passing ships, no precise location for the slick was recorded. HMAS WARREGO also joined the search for a brief period on the 15th. YARRA entered Mioko harbour at 1300 to search and ran aground on an uncharted rock while leaving via the NW passage. Motorboats were used to search the shoreline of Duke of York Island and the coastline of New Ireland nearby. [5.6]

18. In a brief period of several hours, AE 1 had vanished, without leaving any trace, debris, bodies, distress message, or persistent oil slick. The local people have a handed down story of a 'monster' (a submarine?) that approached their location in a cave on the southern side of Mioko Island, the western entrance to Mioko Harbour, situated on the southern side of Duke of York Island. The 'monster' approached the reef stopped and then moved away to the north-east before disappearing. It is time stamped and bracketed by two stories; one recalling ENCOUNTER's bombardment of German shore positions on the morning of the 14th and an 'evil spirit' that rose like a small ball of fire out of the sea - one of the flares fired by the searching ships on the evening of the 14/15th September?
19. We have endeavoured to assess a range of scenarios explaining AE1's disappearance against these largely negative clues. [6.6] What follows is knowledgeable supposition, weighing the balance of probabilities, not certainty or fact. We simply do not know.
20. The St George Channel/Blanche Bay area was under the influence of the southeast monsoon that blows regularly at this time of the year. As a result, there is strong current flowing through St George's Channel towards the northwest at speeds of up to three knots. This very large body of water is channelled upwards from the very deep waters of St George's Channel by the rapidly shoaling waters in the approaches to Duke of York Island and hits the near vertical faces of the surrounding reefs near Mioko Island. First-hand accounts describe the water boiling in a maelstrom as it endeavours to make its way around the obstruction. The current separates into two main streams, flowing NNE then NNW along the eastern shore of Duke of York Island and the second to the W/NW between Credner and Kabakon Islands. Some flows through the narrow entrance between the reefs into Mioko Harbour (in combination with the tidal stream), exiting from the NW entrance. [6.5.1]
21. We assess that on the balance of probabilities, AE1 deviated from her orders on the 14th in order to investigate YARRA's sighting made the evening before, of a steamer near Duke of York Island, believing it to be a German vessel. We think it is most likely that AE1 departed from the last seen position given by PARRAMATTA to return to Rabaul at about 1530; the trip would have taken two hours and 25 min, giving her a little time to spare before arriving at sunset at 1750. En route she may have been tempted to approach the entrance to Mioko Harbour to check for any sign of the steamer. [6.6.2]
22. This would be a dangerous course of action for AE1; the sun, setting low in the west would be reflected off the water, making off-lying reefs and outcrops difficult, if not impossible for observers on AE1's low bridge to see. The current and south-easterly wind combining to push AE1 towards the danger of the reefs, the several minutes taken to stop the diesels, declutch the port diesel, engage the port electric motor (the starboard motor was not available, believed to be due to the faulty main engine clutch), to obtain astern power and time then taken to stop the submarine compounded the hazard. [6.5.1]

23. AE1's command team were inexperienced in independent operations and in operating in tropical reef areas. By today's standards, they had had minimal operational training as a command team, such training did not exist – submarines were in their infancy and a war was on the way! It therefore seems likely that they may well have unwittingly placed themselves in a position of danger by approaching too close to the reefs of Mioko Island.[5.1]
24. In this situation it is easy to imagine them being set by the current beam on to a reef outcrop in a sliding impact due to the headway still on the submarine, an impact that cut through the thinner plating on the external ballast tanks situated in the saddle tank on one side of the submarine. These tanks would then partially fill with water, causing the submarine to list heavily, making it difficult for the crew to retain their positions and manoeuvre the submarine clear of the ongoing danger. The flooded tanks would also reduce AE1's reserve of buoyancy and stability. With the dangerous reefs still in close proximity, reduced astern power and manoeuvrability (because of the defect on the starboard shaft) and difficult conditions for the crew, the submarine was then very vulnerable to any further factors that reduced stability or reserve of buoyancy. [6.6.3.9]
25. We assess it is most likely that a further such factor intervened; perhaps a breach in the pressure hull at the bulkhead encasing the annulus in the pressure hull that accommodated the broadside tubes that may well have absorbed much of the force of the grounding(s), perhaps a jammed helm, perhaps a further impact with a reef outcrop, pinned there by the current, perhaps a failure to restore full buoyancy following a trim dive earlier in the day. We don't know, but we assess that a further combination of factors sufficed to cause a loss of buoyancy and/or stability, sending AE1 to the bottom. It is possible that the crew managed to shut the conning tower hatch; although this would have been difficult given the list and rapidly developing situation. [7.1]
26. We considered a range of other scenarios; bow on grounding, dived grounding, run down by a surface ship or sunk in action with an armed German steamer. All of them are possibilities but none fitted the limited facts as well, none passes the 'sanity check' as highly. [6.6] All scenarios are discussed in the body of the report.
27. Our conclusion is the same as Commander John Foster RAN Rtd, whose dogged research and dedication precedes our efforts and stands as an example to us all. We are of the view that AE1 was likely lost due to grounding on a navigational hazard in the Mioko Harbour region.
28. From this analysis, we are able to recommend a search area that takes account of the likely grounding area, direction of drift as the submarine settled on the bottom and impact of the bottom topography on the final position. [7.2] The primary area is about 5 Sq NM of which 15-20% is deeper than 300 metres. The secondary area is approximately 62 Sq NM of which about 87% is deeper than 300m. The tertiary area is approximately 40 Sq NM of which about 78% is deeper than 300m.
29. We note that, irrespective of whether the loss of AE1 was due to a navigational error as we conclude, or by enemy action – sunk by the KOLONIALGESELLSCHAFT, as we discount - there would be considerable overlap of the likely location of the loss, which adds weight to the recommended search areas.

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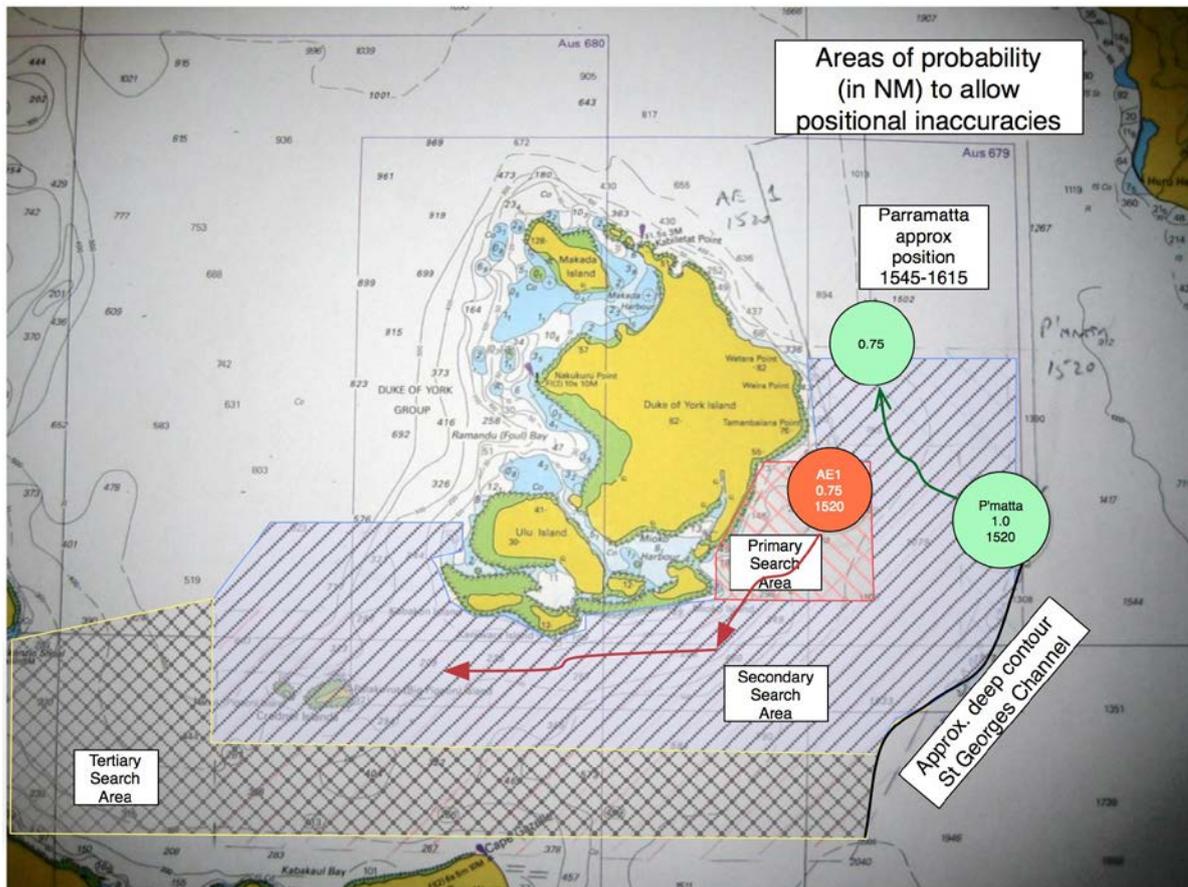


Figure 2- Recommended Search Area

30. Finding the submarine may be the only way to solve the puzzle. We have searched diligently through the records and reminiscences, we assess that there are no undiscovered sources of truth as to what happened on that day - that all died with the crew of AE1.
31. These recommendations will provide a firm foundation to develop a Search Plan using modern technology for a comprehensive search. A separate Report will be made on a Search Plan which will enable soundly based costs to be estimated with confidence for inclusion in a Proposal to the Australian Government to find AE1.
32. It is time to marshal the technology and find AE1. Given the resources and this technology, we are confident that AE1 will be found in our search area.

(End of Executive Summary)

AE1 Inc Search Area Committee Report

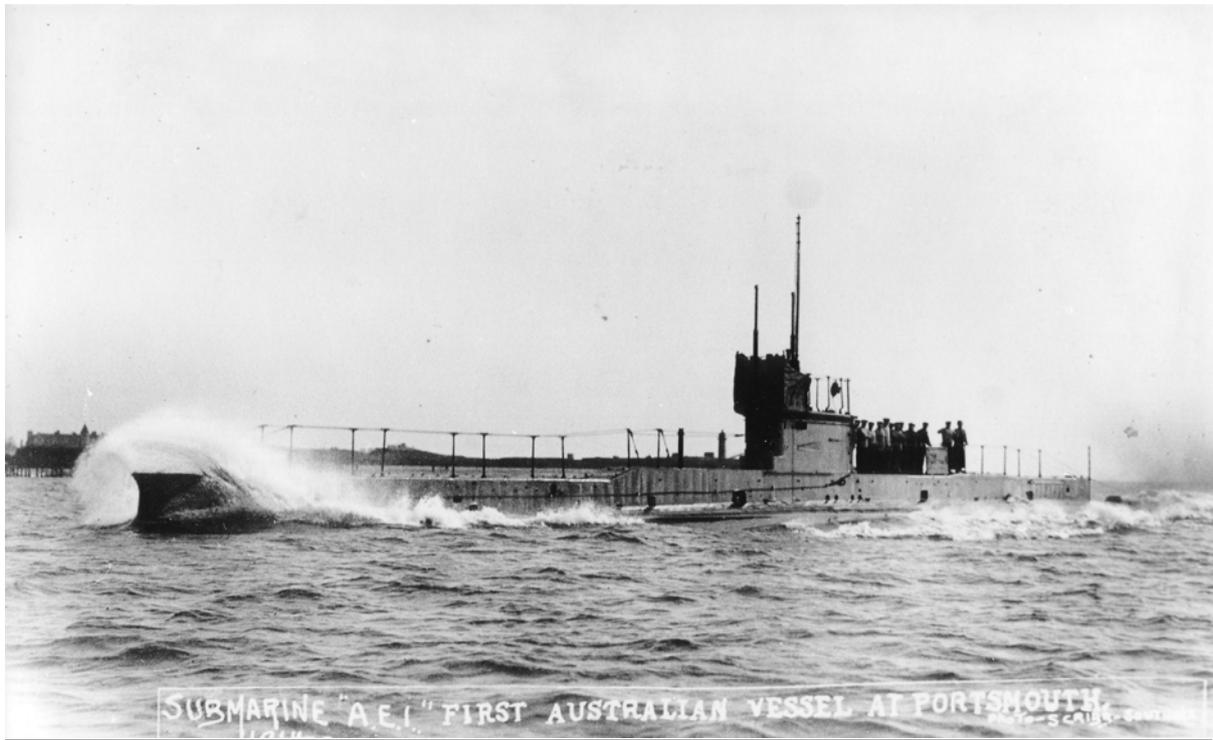


Figure 3 HMAS AE1 at Portsmouth UK 17th February 1914

AWM P01075.041

Section 1 - Purpose

1.1 This Report has been prepared in order to provide a summary of the research work of the AE1 Search Committee with a view to better directing future searches for AE1.

Section 2 - Background

2.1 Acknowledgements

The Search Committee acknowledges the dedicated and invaluable work undertaken by a number of researchers. These efforts have been freely and unselfishly made available and have significantly eased the task of trying to reconstruct the events surrounding the loss of HMAS AE1.

2.1.1 Darren Brown

Darren Brown's extensive work in UK and Australian archives has uncovered many of the original ship logs, signal and wireless telegraphy (WT) logs and other documents that have contributed to his construction of a timeline (Annex B). This compendium of research and the time line produced from it has proved an invaluable foundation for the work we have undertaken.

2.1.2 Peter Richardson

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Peter Richardson's research, particularly the work he has funded by professional researchers in the German archives has added a significant and important dimension to our understanding of the German context of this puzzle.

2.1.3 Gus Mellon

Gus Mellon's work as a long-term member of AE1 Inc has provided continuity, a reconstruction of events, an invaluable summary of the earlier searches and an excellent basis for further research. The environmental data that he has identified will be important as we move to undertake searches.

2.1.4 Tim Smith

Tim Smith's experience as a maritime archaeologist, professional researcher, familiarity with maritime sources and role as the leading maritime archaeologist on AE2CF's team has been invaluable in uncovering some hitherto un-researched data.

2.1.5 Richard Arundel

Richard Arundel's specialist knowledge of naval communications and historical research into the WT capability of AE1 has been most useful in understanding this aspect of the situation surrounding the loss of AE1.

2.1.6 David Nicholls

David's skills as a specialist navigator and experience as a submarine Commanding Officer underpin the construction of the geographical plot at Annex C that provides the foundation for much of this analysis.

2.1.7 Ian Noble

Ian Noble has been indefatigable as a tireless reader at the Australian War Memorial and National Australian Archives in Canberra.

2.1.8 John Foster

John Foster's extensive research and search efforts have set the precedent for our efforts. His book, 'Entombed but Not Forgotten', published in Sydney in 2006 contains a huge amount of research that underpins his efforts to locate the wreck. Whilst we may differ with some of his conclusions and take issue with some of the technical aspects, we are indebted for his dedication and recognise his role as the forefather of our work. After a long journey, we have essentially reached the same conclusion.

Further details about these contributors are set out in Annex A.

2.2 Sources of Information and Relevant Issues

2.2.1 Lack of Comprehensive Documentation.

There are significant gaps in the availability of original documentation. Much of the original German colonial documentation appears to have been destroyed, or not surprisingly, never made it back to Germany. Given the gaps in the official records, we have directed significant effort to obtain informal records of events, such as those in original diaries and letters from descendants.

2.2.2 Ship's Logs

These documents are the formal record of events affecting the ship. Whilst underway they were maintained on the bridge by the officer of the watch and provide a summary of movements, positions, and interaction with other units. Whilst at anchor, the ship's log was normally maintained by gangway staff under the supervision of the officer of the day. Once completed the logs were forwarded to higher authority for assessment, archiving, and storage. A poorly written or dirty log was considered a poor reflection on the ship. Given its importance as an historical document and scrutiny by higher authority, many ships chose to rewrite it, producing what is called a 'fair' version of the 'working' log. The difference between a 'fair' and 'working' log can generally be quickly detected in the quality and uniformity of the writing and absence of stains. The potential for details to be amended or omitted in transcribing from the working to the fair log must be borne in mind in evaluating the contents of a fair log.

2.2.3 Reports of Proceedings (ROP)

In today's Navy, these are formal, monthly reports of activities undertaken by the ship, rendered by commanding officers to their higher authority. They are routinely scrutinised and are another measure used to assess the performance of the ship and her commanding officer. The reports are then archived. Accordingly, significant attention is paid to the drafting in order to reflect well on the ship; in some circumstances they may be incomplete or biased in the way they present information and should be interpreted accordingly. In 1914 only the Fleet Commander, RADM Patey submitted an ROP. It appears that the smaller ships and submarines did not submit regular monthly ROPs. PARRAMATTA wrote a specific report covering the loss of AE1 and ENCOUNTER wrote a report covering the few days in charge during HMAS AUSTRALIA's absence.

2.2.4 Signal Logs

These logs record the receipt and transmission of messages to and from a ship. At any one time there could be several signal logs in use; on the bridge and its associated signal deck; they recorded messages received and sent by flashing light, flag signals, and semaphore. This distinguishes them from the WT office logs; these were maintained for each circuit of messages received and sent by wireless and are discussed further below. Where an admiral was embarked, it is likely that his staff maintained their own dedicated signal logs of messages to and from the admiral.

2.2.5 Flashing Light Signalling

Two methods were used to pass messages between ships by flashing light using Morse code; an omni directional light or signal projectors. The omni directional light was mounted high on the ship's mast and used for passing messages to a group of ships in close proximity, such as an anchorage. The signalling lanterns or projectors were directional, reasonably discrete and generally, only the intended recipient would read and log the message. The effective range for both methods was limited and varied depending on the size of the light/lantern and visibility conditions at the time. Messages sent and received by flashing light would be recorded in the bridge signal log.

2.2.6 Megaphone (Voice Trumpet)

The use of megaphones between ships in close company was not unusual. This would quite often be CO to CO and it is quite possible that these conversations were either inaccurately recorded or not recorded at all.

2.2.7 WT Signal Logs

WT logs were maintained for a particular WT circuit. Messages were passed by Morse code. Since the sets operated at medium/high frequencies, friend and foe alike could intercept these messages. Cipher or code could be used where the subject matter warranted. It appears that the RAN ships were operating only one WT circuit for conducting operations, most messages were passed unencoded and were sometimes recorded in more than one ship's WT log. There could be multiple addressees, messages were addressed to one or more 'action addressees' and also passed 'for information' to other ships. It does not appear that the RAN had introduced date time groups or the precedence used in contemporary naval signals.

2.2.8 Diaries

2.2.8.1 Aubrey Hodgson MBE

Aubrey Wilfred Donald Hodgson (Chief Petty Officer) MBE was a naval signalman loaned to the merchant ship AORANGI, his AWM records, including his diary is at:

<http://cas.awm.gov.au/item/3DRL/6032>

[Australian War Memorial - 3DRL/6032 - Hodgson, Aubrey Wilfred](#)

Further details are discussed at para 4.4.1 below.

2.2.8.2 Dr Fred Hamilton

Dr Fred Hamilton was the medical officer of the UPOLU, the depot ship to AE1 and AE2. His diary was presented to the Mitchell Library, State Library of NSW in 1964 by Fred Hamilton-Kenny. Tim Smith transcribed the relevant sections on 19 April 2011.

2.2.8.3 SBLT Henry Hastings McWilliam

McWilliam transferred to ENCOUNTER on 15th September 1914 before AUSTRALIA left for Sydney, and re-joined AUSTRALIA on 20th September, after she unexpectedly returned to Rabaul. His diary is available in the AWM at 1DRL/0467.

2.2.8.4 LCDR Cyril John Percy Hill

LCDR Cyril John Percy Hill HMAS PARRAMATTA, diary and private papers available at <http://cas.awm.gov.au/item/1DRL/0350> Australian War Memorial 1DRL/0350 (Private Papers collection) Hill, Cyril John Percy (Lieutenant Commander, RN).

2.2.8.5 LCDR Gerald Ashby Hill

LCDR Gerald Ashby Hill's papers contain a copy of HMAS YARRA's log book and observations by HILL. These are available at AWM 1DRL/0351.

2.2.8.6 Engine Room Artificer Class (ERA) II Petty Officer Henry James Elly Kinder

Kinder was a member of AE2's crew and wrote an excellent account of his experiences undergoing submarine training in the UK, AE2's passage to Australia and in the Dardanelles. He survived imprisonment, returned to Australia very ill and died in 1964. A typescript copy of the diary is held in the AWM at PRO1466. Fred and Elizabeth Brenchley¹ record that his grandson, Mr Ross Kinder, of Nundah, QLD, holds the original.

2.2.8.7 Chief ERA J Marsland

Marsland appears to have been one of the passage crew on AE1; his diary describes the voyage to Australia only. A copy was published in the Naval Historical Review, December 1974.

2.2.9 Charts & Hydrographic Reference Books

The charts and hydrographic publications in use by RAN ships in 1914 have been provided by the Australian Hydrographic Service and used as the basis for the geographical reconstruction at Annex C. The assistance of the Hydrographic Service is gratefully acknowledged.

¹ Brenchley, Fred & Elizabeth, *Stoker's Submarine*, Sydney 2003, p 268.

Section 3 - Relevant Technical Description of AE1 and Material State

3.1 Principles of Submarine Stability & Control Relevant to Our Inquiries

3.1.1 First Principles

A submarine must be neutrally buoyant when submerged; it floats like an airship underwater, displacing its weight in water. It must also be balanced fore and aft.

- x The control surfaces (hydroplanes) can then provide effective control when underway dived.
- x Internal compensating tanks provide the capacity to adjust the bodily weight and trim tanks forward and aft adjust the longitudinal balance whilst dived.
- x Ballast tanks (internal and external) provide buoyancy whilst on the surface; these would normally be full of water when dived.
- x The amount of water in various internal compensating/trim tanks depends on the density of the seawater, quantity/weight of stores, fuel, oil, water and personnel carried and their disposition in the boat.
- x Regular adjustments, called 'trimming', must be made using these compensating tanks whilst dived to maintain neutral buoyancy and fore and aft balance.
- x There must be a sufficient capacity in these tanks to cope with a range of loaded conditions – e.g. fully stored, armed, and fuelled at the start of a patrol to no weapons, little fuel/stores/water at the end of a patrol.
- x And a range of water densities.
- x This is part of the challenge for the designer.
- x Each boat is marginally different, depending on variances in the construction.
- x Fixed lead ballast is added to the keel to adjust for these variances, to adjust for different water densities and provide some reserve for growth in weight during the life of the SM - e.g. adding a gun.

3.1.2 Trimming

Following a period in harbour when the submarine embarked fuel or stores, adjustments were made to the compensating tanks to offset the changes in weight; this is called 'putting on the trim' and could only be an approximation. This uncertainty is resolved as soon as possible after leaving harbour, when a submarine would normally conduct a 'trim dive' to ensure that it had a good trim.

3.1.3 Stability Data

According to in the Royal Navy's Book of Reference (BR) 3043 Chapter 4, the first batch of E boats (AE1 and AE2 were part of this group) displaced 796 tons submerged and 665 tons surfaced. The reserve of buoyancy was 21.5% (143 tons), with a surfaced transverse metacentric height (GM) of 20" (508 mm) and dived righting arm (BG) of 10" (254 mm). These terms are explained at http://en.wikipedia.org/wiki/Metacentric_height. Compared with contemporary single hulled submarines these are quite respectable figures, giving a good sea keeping capability and relatively good (for a submarine) capacity to absorb damage.

3.1.4 Dimensions

AE1 was 178 ft (54.2m) long, maximum beam of the pressure hull 15 1" (4.6m) (increased to accommodate the broadside tubes), a maximum beam at the 'saddle tanks of 22' 6.5" (7.1m), a draught of 12' 6" (3.9m). The freeboard from the surfaced waterline to the superstructure (the casing in current parlance) was 6 ft (1.82m) and the bridge deck (top of the fin) was 12 ft (3.65m). The distance from the top of the raised periscope to the keel was 36-37 ft (10.9m), resulting in a practical periscope depth of ~ 32 ft keel depth. These figures conflict with diary accounts of periscope depth of 22 ft – this depth may have possibly have been measured from the surfaced waterline, rather than the keel?

3.2 Structure, Fuel Tanks, and General Arrangements

3.2.1 Sources

Michael W D White, *Australian Submarines - A History*, Appendix I, page 217 ² - the Technical Detail of The E Class Submarine, the Specification for construction of AE1 ³ and BR 3043 – The development of HM Submarines from Holland No.1 (1901) to PORPOISE (1930) ⁴ are the primary sources for this summary. Michael Rikard- Bell, a practicing naval architect and experienced submarine mechanical engineer has assisted with interpretation of the General Arrangement drawings and Specification for construction of AE1. Michael has a dynamic, computer based stability model of AE1; this has been useful to evaluate the impact of damage arising from a grounding.

3.2.2 Hull Plate and Riveted Construction

The specification⁵ contains detailed instructions regarding the standard of materials to be used in the construction of the hull. The hull plating was mild steel, measured by its weight per square foot, so thicknesses are approximate. Different weight plate was used depending on the diameter or beam of the hull. At the widest beam, the plating was approximately 12 mm thick, ranging down to 9.5 mm at the narrowest beam sections at the bow and stern. There was an extensive system of internal supporting ribs and backing plates (butt straps) to the longitudinal riveted seams. This arrangement resulted in a strong hull with a maximum operational depth of about 180 ft (55m). BR 3043 advises that the necessity to go deeper during wartime service eventually led to the E class being classified as 200 ft boats. ⁶The collapse depth is not known, however a depth of 300-400 ft is probably a reasonable extension from this figure.

3.2.3 Fuel Lubricating Oil and Tank Arrangements

3.2.3.1 Fuel Tanks

There were six internal fuel tanks distributed throughout the length of the SM, carrying 42 tons of 'Broxburn fuel', named after the district in Scotland where this shale oil was extracted. This provided a maximum range on the surface of 3,225 nautical miles at 10 Knots.

² White, Michael W.D, *Australian Submarines A History*, AGPS 1992.

³ Specification for Building The Hull of A Twin-Screw Submersible Boat (AKA AE1).

⁴ BR 3043 is available online at <http://www.rnsubs.co.uk/Boats/BR3043/contents.php>

⁵ Specification for Building The Hull of A Twin-Screw Submersible Boat (AKA AE1).

⁶ BR 3043 para 4.12.4.

3.2.3.1.1 Fuel Characteristics

The Australian Naval Representative UK's Report number 52 dated 23rd Jan 1914 ⁷ details the preparations for the delivery voyages including a significant amount of information on the fuel and lubricating oil requirements obtained from the relevant Admiralty experts. The figures used below are quoted from this Report. Supplies for refuelling the submarines with Burmah fuel in lieu of Broxburn shale oil was arranged by the Admiralty as far as Batavia. It is implied that a sample of Australian supplied shale oil had been tested in 1911 and found satisfactory in lieu of Burmah or Broxburn fuel for refuelling in Australia. So, it is likely that AE1 was carrying similar Australian supplied fuel when lost. The flash point of Broxburn shale oil was given as not less than 150 degrees F and Burmah oil approximately 200 degrees F.

3.2.3.2 Lubricating Oil Tanks.

3.2.3.2.1 Lubricating Oil Characteristics

Vacuum oil No. 2 was to be shipped to the refuelling ports, as it was not available from the trade. In lieu of this, Henry Wells' Oil No. 108 was recommended, alternatively, Vacuum Company's DTE Heavy Oil was widely available, including in Sydney. The latter had the following characteristics:

- a. Specific gravity at 60 degrees F is 0.9.
- b. Flash point by Pensky Martin Close Flash Apparatus 395 degrees F.
- c. Viscosity by Redwood No. 1 Viscometer 613 seconds @ 70 degrees F (a range of further readings is given in the document).

The Naval Secretary's letter to RADM Patey Commanding HM Australian Fleet giving instructions for the passage from Singapore to Sydney advised that there were 6,000 gallons of Vacuum No. 2 oil at Sydney and recommended that HMAS SYDNEY should carry this in lieu of purchasing the oil in Singapore.

3.2.3.2.2 Fuel & Lubricating Oil Consumption

The consumption of Broxburn Shale oil at an SOA was given as 4 1/6 gallons per mile and of Burmah Oil at the same speed as 5.5 gallons per mile. The consumption of lubricating oil was approximately 1/10 of the fuel for Broxburn shale oil and 1/8 of fuel consumption for Burmah oil.

3.2.4 Keel Arrangements

AE1 was fitted with a substantial and extremely strong, boxed section keel weighing 52 tons. The centre section of the keel weighing 10 tons could be dropped to lighten the submarine, to assist in surfacing if in extremis whilst dived. ⁸ This required release of a dog on the forward end of the drop keel by operation of a hand wheel accessed via a small manhole in the bilges; given the difficult access, this would not be a simple or quick operation, particularly if the submarine were experiencing a large bow down/up or list angle.

3.2.5 Ballast Tank Arrangements

⁷ Extract from #52 Report of Naval Representative dated 23rd Jan 14; Navy Office file 14/1398, DB images SDC 15260, 262, 264, 266, 274, 276 and 278.

⁸ BR 3043 para 4.15, para 30.2

3.2.5.1 AE1 was fitted with eight external ballast tanks, numbered from forward, odd numbers to starboard, even to port, incorporated in the saddle tanks secured to the sides of the pressure hull. Two main ballast tanks were positioned forward of the broadside (beam) torpedo tube and two aft. Tank capacities measured off the General Arrangement drawings were, #1 – 12.3 tons, #3 - 13.2 tons, #5 – 14.1 tons, and #7 - 15.2 tons. Analysis using the computer based stability model developed from the General Arrangement drawings indicates that flooding two of the large external main ballast tanks (situated in the saddle tanks amidships) on one side would result in a significant list, but would not place the upper conning tower hatch under water or cause the submarine to sink. Unlike the Oberon class submarine, these tanks were not open to the sea but were flooded via screw down valves sized according to the capacity of the tank. ⁹

3.2.5.2 There were five internal ballast tanks identified by letters A-E. These tanks could be flooded by two means, a connection to the main line, (an internal trimming system) or through Kingston valves fitted in the pressure hull bottom of the tank. ¹⁰

3.2.5.3 The total ballast tank capacity was 141 tons; 110 tons in the external tanks, the balance in the internal tanks. ¹¹ Only the external tanks, i.e. 110 tons could be blown quickly with high-pressure air in the event of a flooding emergency. If the flooding amount exceeds 110 tons the submarine will sink despite having fully blown its external main ballast tanks.

3.2.6 Steering and Hydroplane Arrangements

3.2.6.1 Hydroplanes

AE1 was fitted with forward and after hydroplanes to control the depth. These were operated by hand wheels in the control room, hydroplane motors in the control room then drove rod gearing to mechanically move the hydroplanes. Kinder's diary describes the arrangements well.

3.2.6.2 Rudder

The single rudder was operated by one of three steering wheels; on top of the fin, in the conning tower and in the control room. A similar arrangement of steering motor and mechanical rod gearing was used to move the rudder in response to the movement of the wheel. Michael Rikard-Bell observes that the system would lock up if more than one wheel were engaged.

3.2.6.3 Assessment of the System

Gus Mellon's analysis of the arrangements set out in the drawings ¹² notes that the Acme style opposing lead screws on the rudder crosshead, directed through long lengths of rod gearing with numerous bends, knuckle joints and 'worm and worm wheel' gearing and mechanical linkage arrangements for the rudder crosshead make for a complex mechanical system vulnerable to failure. The rudder crosshead itself is very short (due to space constraints where it is located), giving little turning moment compared to the size of the rudder. Any degree of wear, lack of greasing, ingress of grit/dirt/verdigris or initial mis-alignment when setting the devices in their final positions, will incur side-loading forces, which can lock the opposed lead screw arrangement solid, under high loads. When the rudder is turned hard over the 'feathering' effect across the surface of the rudder will also contribute to make it very difficult to bring the rudder back to centre. The shaft

⁹ 48 SPECIFICATION FOR BUILDING THE HULL OF A TWIN SCREW SUBMARINE BOAT, para 53.

¹⁰ Ibid, para 54.

¹¹ BR 3043 Para 4.17.1

¹² Vickers Drwg 2823 - Bridge Strg Gear Arrmnt.jpg, Vickers Drwg 2512 - Arrgt Strg n Hydroplanes.jpg

and bearings for the lower rudder are set eccentric (i.e., not in the vertical plane, but canted forward) again due to space constraints. This adds further eccentric loadings onto the upper and lower bearings of the rudder shaft. These bearings also appear to be very small in length to diameter ratio, compared to what one might expect to see in such a circumstance.

3.2.6.4 Handling On The Surface

The submarines may have been difficult to handle at slow speeds on the surface; Henry Kinder's diary of the voyage to Australia notes that special arrangements were arranged for the transit of the Suez Canal:

'The speed limit for big boats passing through is five knots but owing to submarines being so hard to steer at slow speed on engine power, the Captain had permission to travel at ten knots.'

Alternatively, this may not refer to a steering problem but rather, Kinder may be referring to the difficulty of running the diesels at the slow speed necessary to propel at five knots.

3.2.7 Beam or Broadside Torpedo Tubes

3.2.7.1 Structure of Pressure Hull in Way of Broadside Tubes

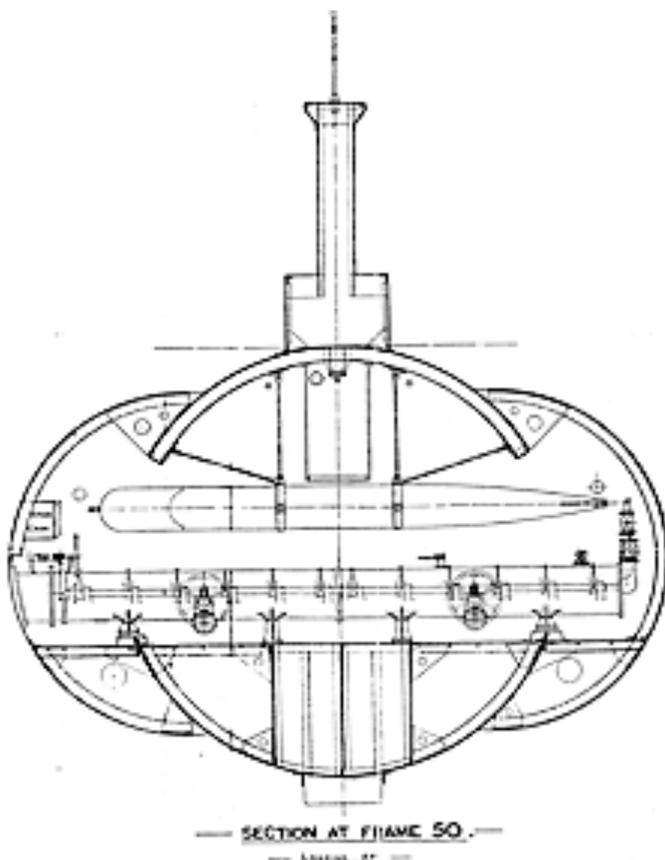


Figure 4 Cross section at Frame 50

The construction of the pressure hull around the beam torpedo tubes is of interest in the beam on grounding scenario, where the outer end of the tube or the pressure hull annulus constructed to accommodate the tubes may be struck. The athwartships bulkhead forming the bulge to accommodate the broadside tube comes out from the pressure hull at frame #54, to the line formed by saddle tank skin, where there is a right angled seam, the bulge then follows the outer line of the saddle tank for 6 frames ($6 \times 21" = 126"$ (3.95m) before another seam joins it to the after athwartships bulkhead at frame #48 (frames were numbered from aft). Scantlings and plating appear to be as for pressure hull - as one would expect; it is the pressure hull.

3.2.7.2 Outer Tube Fabrication

The outer lip ends were steel castings of A quality. ¹³ Br 3043 para 4.12.2 contains the following information:

'In way of the broadside torpedo tubes in the E Class the pressure hull was cut away and the externals built to pressure hull strength. The plating amidships was 19 lb reducing to 10lb at the ends, with a 19 lb doubler fitted in way of the broadside tubes'. . 'To accommodate the beam tubes in the E Class the pressure hull in the vicinity of the tubes had to be extended out to the saddle tank plating as shown in Plate 15'.

3.2.7.3 Tube Arrangements Internal to the Pressure Hull

Inside the pressure hull, the tubes had horizontally divided, hinged halves, BR 3043 advises that *'the top half opened by worm and quadrants operated by two handwheels to each tube'*. The halves were secured together by toggles and wing nuts to allow them to be opened up and reloaded by dropping the torpedo down into the tube. In lieu of a bow cap there was a slide valve inset from the outside of the saddle tanks, the mouth of the tube at the skin of the saddle tank was tapered horizontally in such a manner to avoid the forward speed of the submarine throwing the torpedo off course. ¹⁴

3.2.7.4 Conclusions on Vulnerability

Overall, the broadside tubes would appear to be a source of strength, rigidity and support to the outer plating of the 'saddle tanks', rather than vulnerability. However, the forward corner/seam of the pressure hull annulus built to accommodate the tubes would be vulnerable as its shape could provide a single point to absorb the force of the grounding focusing these forces on a point of the pressure hull, if this were to fail then the pressure hull would be breached.

3.3 Propulsion Arrangements

3.3.1 Main Engines

AE1 was fitted with two 8-cylinder diesel engines. Although these were the best engines then available, they were not trouble free, requiring regular maintenance and frequent repairs whilst underway. The diesels were termed the **'main engines'**. The diesels propelled the submarine on the surface and provided the power to charge the batteries.

3.3.2 Main Motors/Generators

An electric motor was fitted on each shaft, these provided the power to propel the submarine on batteries, the only form of propulsion when dived and could be re-configured as generators, driven by the main engines to recharge the batteries when on the surface. These motor/generators were called the **'main motors'**.

3.3.3 Propulsion & Generator Options

The main engines could be used whilst on the surface to propel the submarine ahead and/or charge the batteries via the main motors. The main engines could not run astern, to go astern whilst on the surface the main engines had to be disconnected from the propeller shaft using a clutch (discussed further below) and the main motor used to provide astern power. Changing from

¹³ Specification, p9, para 16.

¹⁴ White, Michael W D, *Australian Submarines – A History*, AGPS, Sydney 2006, Jim Ekin, *Technical Details of The E Class*, p220.

ahead propulsion on main engines to astern propulsion on main motors would typically take a couple of minutes to achieve. Where the submarine expected to be manoeuvring, e.g. entering harbour or coming alongside it would stop propelling on the main engines and switch to the main motors prior to commencing the manoeuvre.

3.3.4 Batteries

AE1 had two battery banks, each containing 112 cells; each cell weighed 940 lbs (420 kg). These provided energy to drive the submarine at 10 knots for just over 1 hour or 2.5 knots for 12 hours.¹⁵ The entire battery was in the centre compartment, mostly forward of the broadside tubes, with some cells just aft of the tubes, but still in the centre compartment. The cells were covered with deck boards for use of the crew moving about, these were then covered with canvas, to keep salt water away from the cell tops. Effectively, people walked on the battery tops in the centre compartment. The switchboard was also in the centre compartment, forward of the periscopes, on the starboard side.¹⁶ This is a significant factor in later considerations of a beam on grounding.

3.3.5 Clutches

The main engines had a claw clutch coupling placed at the flywheel (after) end of the engine, connecting it to the main motor. Arrangements differed between different build standards of the E class. AE1 had a hand-operated clutch on the flywheel end, followed by a supporting shaft bearing connected to the main motor. This clutch is termed the '**main engine clutch**'. An intermediate shaft led from the main motor aft to another claw coupling style of clutch, situated beneath the bilge and pumps. This clutch was driven by an electric motor and is termed '**the main motor clutch**'. This clutch was attached to the propeller shaft that led aft to a three bladed propeller.

3.3.6 Propulsion and Generator Options

On the surface, it was possible to use the entire output of each main engine to drive the propeller; with both the main engine and the main motor clutches 'in' and the main motor de-energised. Alternatively, it was possible to divert some of the main engine energy to charging the batteries by configuring the main motor as a generator; this configuration was termed a 'running charge'. Finally, it was possible to open the main motor clutch and use all the output of the main engines to charge the batteries; 'termed a 'standing charge'. To change from diesel (main engine) drive to electric drive, (main motor) the main engine would need to be de-clutched using the hand operated main engine clutch. The main motor then needed to be energized to propel either ahead or astern as required, with power drawn from the batteries.

3.4 Aids to Navigation

3.4.1 Equipment

AE1 was fitted with the following navigational equipment:

- x An Admiralty provided magnetic compass;
- x A Sperry gyrocompass; and
- x A Forbes impeller log.

3.4.2 Magnetic Compass

¹⁵ White, Michael W D, *Australian Submarines – A History*, AGPS, 1992, p222.

¹⁶ Kinder, Henry, *diary*, AWM, PR01466.

The magnetic compass was mounted in the conning tower, which was a bronze casting to provide an improved magnetic environment. None the less, the presence of the long, steel mass of the pressure hull made magnetic compasses in submarines notoriously unreliable. The compass should have been 'swung' or recalibrated on arrival in Sydney, although no record has been found of this occurring.

3.4.3 Gyro Compass

AE1 was also fitted with a first generation Sperry gyrocompass. Besant reported an accuracy of +/- 3 degrees in his diary of AE1's delivery voyage to Australia. The compasses were reportedly unreliable, with frequent defects recorded in various E boat logs, requiring the attention of specialist representatives from Sperry onboard on some occasions. The compass was fitted with an alarm to alert the navigator that it was wandering. We assess that at the start of WW1, AE1 and AE2 were the only vessels in the RAN to be fitted with gyro-compasses.

3.4.4 Impeller Log

The submarine was fitted with a 'Forbes log' driven by a small impeller underneath the submarine to register speed through the water. This could then be converted to distance run for dead reckoning (DR) navigation calculations. This equipment would have required regular calibration, and might achieve an accuracy of +/- 10%. The AE2 diary for the voyage to Australia records difficulties with the Forbes log.¹⁷ There are also numerous entries in other E class ship's logs indicating trouble with the Forbes logs. If the Forbes log failed, then the navigator could resort to rev/speed tables to gauge speed through the water and hence a DR of distance travelled.

3.4.5 Navigational Procedures

The submarine was able to determine (to 'fix') its position by observing bearings of known objects visual from the bridge or either periscope and plotting these on the chart. The low height of eye of approximately 17 ft (5.2 m) from the bridge would limit the visual range to the horizon of approximately five nautical miles to the horizon (the height of the object being observed would increase the range from which it can be observed from the submarine's bridge). Between fixes, the submarine's position would be calculated by DR using the compass and log outputs. Where tidal stream data was available, this could be included to develop an Estimated Position (EP). As indicted above the accumulation of errors in the speed, direction and tidal stream data resulted in an expanding area of uncertainty around the submarine's position, termed the '**pool of errors**' in modern day parlance (it is doubtful that this practice was followed in 1914).

3.4.6 Celestial Navigation

When surfaced, the submarine could use a sextant to obtain celestial observations of the sun, moon and stars when visible and the horizon could be sighted, to provide an input to the navigational calculation.

3.5 Defect on the Starboard Propulsion Train

Stoker's account indicates that AE1's starboard shaft was not available on diving and that arrangements had been made for rectification on her return to harbour on the 14th.

3.5.1 Starboard Engine Clutch Jammed In

¹⁷ HMA Submarine AE2 Diary of events on passage Portsmouth to Sydney, p1, DB Image SDC15118.JPG

Whilst the nature of the defect is not explicitly stated, it is most probable that the starboard engine clutch was defective and jammed in. This was a mechanical problem that the AE1 and AE2's engineering staff would have been well versed in fixing; AE1 experienced a number of engine clutch failures on the voyage to Australia. A problem on the starboard main motor electrical functions could cause the same result but this seems less likely; depending on the problem, it is likely that fixing a main motor defect at an anchorage would not be a simple matter and would probably need outside specialist assistance. Nor were there any other instances noted of problems with the main motor.

3.5.2 Impact of This Defect

The defect had no impact on AE1's ability to propel ahead on the surface using both main engines. The defect had major implication for power available and redundancy in all other situations:

- x Astern power on the surface was reduced to the port shaft only; so a 50% power reduction and no redundancy.
 - o In the event of a delay in disengaging or defect with the port engine clutch, the submarine had no astern power on the surface.
- x On diving, the submarine had only the port shaft for ahead or astern power.
 - o A delay in disengaging or defect with the port engine clutch would leave the submarine without propulsion power, dived.
- x In the event of a control surface failure leading to a large bow down angle/depth excursion, standard operating procedures include the use of full astern power to take the headway off, reducing the effect of the jammed control surfaces, and assisting in correcting the bow down angle.
 - o The submarine's depth is then reliant on trimming or main ballast adjustments.

3.5.3 Had The Defect Been Rectified?

RADM Patey reported that Besant told him in a personal interview on 12th September that AE1 would be ready for operations on the 14th. However, there is no indication in any of the records that AE1 had corrected this defect prior to sailing on the 14th; we are reliant on Stoker's account that the defect remained extant.

3.5.4 Contemporary Perspective

Although the rigorous training and procedural methodologies [which were developed from the experience of these early submarine crews] were not available to Besant, from a contemporary submarine operator's perspective, his decision to go to sea with this defect in the face of a possible action with enemy surface ships is inexplicable if not extraordinary.

- x This is particularly so given that AE2 was available and serviceable to undertake the task.
- x It is difficult to understand why AE1 did not spend another day at the anchorage to fix the clutch.
- x It is possible that the stores to do this were not available on the morning of 14th September.
 - o SYDNEY's signal log records a signal at 1425 on 14th September, requesting a receipt for the transfer of 'submarine stores' by 2000 (before she sailed that evening).

- It is surmised that the ‘submarine stores’ referred to may have been the toggle bolts required to repair a faulty main engine clutch, responsible for the defect on the starboard power train discussed above.
- SYDNEY had been the escort ship for AE1’s delivery voyage from Singapore to Sydney and had previously manufactured these bolts to repair a similar defect during the delivery voyage.
- SYDNEY’s deck log records the transfer of an ERA to UPOLU at 1030 on 13th September, possibly to assist in the repairs (see 5.3 below).
- This is supported by Stoker’s contention that, arrangements had been made to repair the defect on return to harbour on the evening of the 14th September.
- x Stoker observed in his report on the loss, ¹⁸ that:
 - “This defect would prevent the starboard propeller being used when diving, but beyond limiting the underwater speed, would only slightly affect the handiness of the boat and could not be taken to account for her loss”
- x This appears to be a gross understatement of the impact of the defect and perhaps, an attempt to cover for a lapse of judgment in his lost friend and senior officer.

3.6 Communication Arrangements

3.6.1 Wireless Telegraphy (WT)

3.6.1.1 AE1 & 2 was fitted with Type 10 tx/rx prior to sailing to Australia; the installation included the casing mounted WT mast (we hold a photograph of AE1 departing Portsmouth on 2 March 1914 with the WT mast raised). A medium frequency transmitter/receiver, (tx/rx) is described in OU 5155 - W/T Handbook Type 10 Sets (Submarines), a photocopy of the manual is held in the RAN Seapower Centre. However, since OU 5155 was not issued until well into 1915 (the Admiralty number is G.17325/15) it could NOT have been available to either AE1 or 2 in 1914 and very doubtfully to AE2 in April 1915. Nevertheless, an operating document or operator’s equipment guide of some kind would have been necessary. The OU page 5 draws attention to The Wireless Telegraphy Manual, Vol 1 (1912) for practical application of wireless telegraphy.

3.6.1.2 John Foster records research revealing that the Fleet WT Officer, Lieutenant FG Cresswell reported to the Secretary by note that the equipment had not been used until arrival in Cairns and had still not been properly installed some weeks after arrival in Australia. AE1 & 2’s crew did not originally include a trained Telegraphist sailor to operate the WT set and Cresswell recommended appointment of a Telegraphist to each boat to operate this new equipment; Besant agreed this in July 1914. ¹⁹ Accordingly, Telegraphist Cyril L BAKER joined AE1 before sailing for PNG. John Foster records that Baker came from Launceston, Tasmania and was the first Australian submariner trained in wireless telegraphy. ²⁰

¹⁸ Stoker Letter dated 16th October 1914.

¹⁹ National Archives of Australia_MP 472/1, 5/14/9165 - papers related to delivery voyage of submarines, Besant letter to Naval Board dated 6th July 1914.

²⁰ Foster, John, *Entombed but Not Forgotten*, Australian Military History Publications, Sydney 2006 page 70, 112.

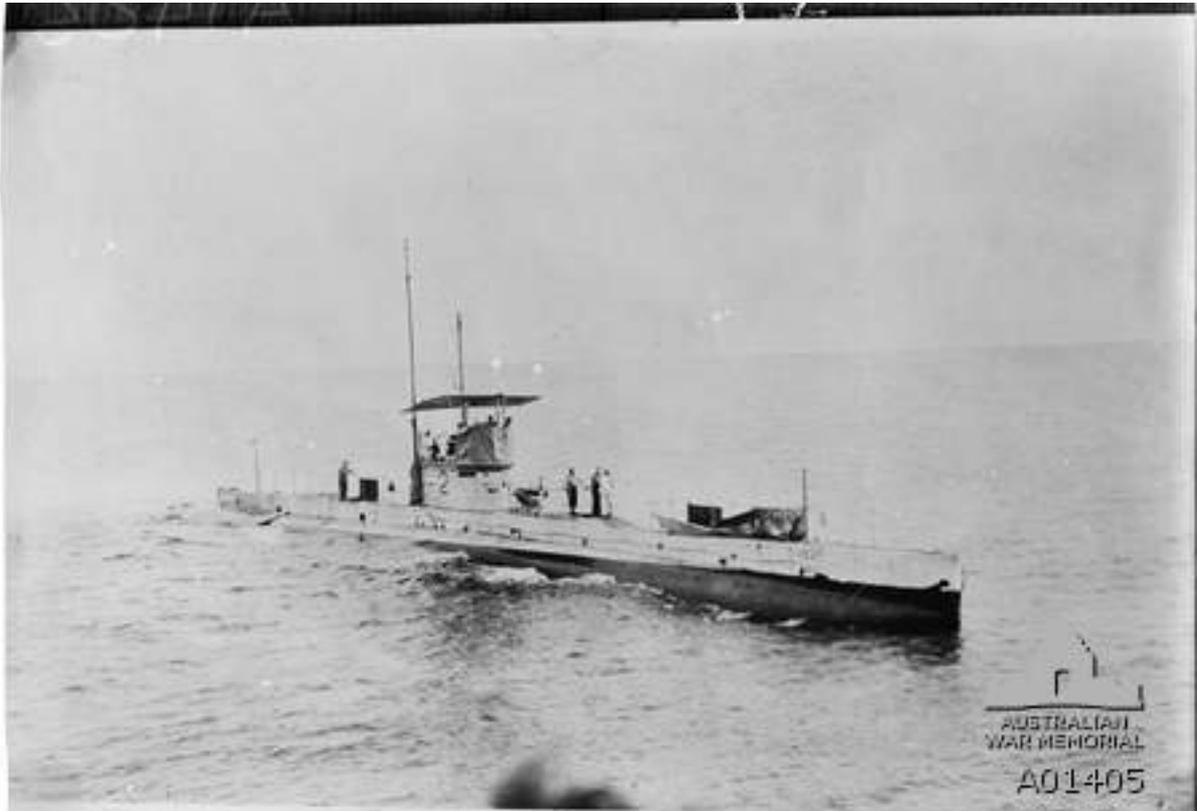


Figure 5 — AE2 Enroute Australia with WT and Signal Mast raised, no aerials rigged AWM 01405,

3.6.1.3 The Marconi Type 10 set was pre-valve consisting of primitive components - oscillator, transformers, capacitors, resistors and impedance coils that created an unstable lower Medium Frequency M/F band signal with a range of 30 to 120 miles (depending on atmospheric/ionospheric conditions). Some components were very fragile, such as spark detectors that required constant cleaning or adjusting. The aerial system was vulnerable to 'brushing', or earthing due to brine encrustation, sea matter, loose connections, or broken or frayed wire strands. The handbook indicates decreasing transmission power output may reduce this effect but the process also leads to damping or inaudibility of received signals. Messages were sent by Morse code.

3.6.1.4 Chapter V pages 19/20 of the Handbook describes the "Collapsible Mast" for diving purposes and describes a "two-throw" or "three-throw" 30 foot mast. The submarine had to lower the mast prior to diving. It is assessed that the sets fitted with this style of mast retained a limited range; perhaps to the horizon whilst on the surface with the WT mast stowed. The "W/T Handbook for Type 10 (Submarine) Sets 1915" on page 19 (chapter V) states:

"The great advantage of this arrangement (the typical rig approved for submarines) is that boats can signal up to a limited range with the mast collapsed."

3.6.1.5 AE1 and 2 WT aerial arrangements fitted on build were quite different to those set out in the handbook. This paragraph describes the original 'as built' installation of a casing mounted WT mast. From the available photographs and drawings, it has been deduced that the following arrangements were made:

- x The WT mast was in one complete length, not telescopic.
- x The WT mast was mounted on the casing, immediately aft of the fin.
- x In the raised position, the aerial mast was held in place by four wire stays led down forward and aft to eyebolts on the Port and Starboard saddle tanks and to a bracket at the top of

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the after end of the fin.

- AWM photo H11559 taken at Garden Island after arrival in Sydney shows the WT mast and wire stays and aerial post on the fore casing.
- AE2's aerials are not rigged, AE1 is inboard and her after aerials, including the after spreader are visible (see description below).

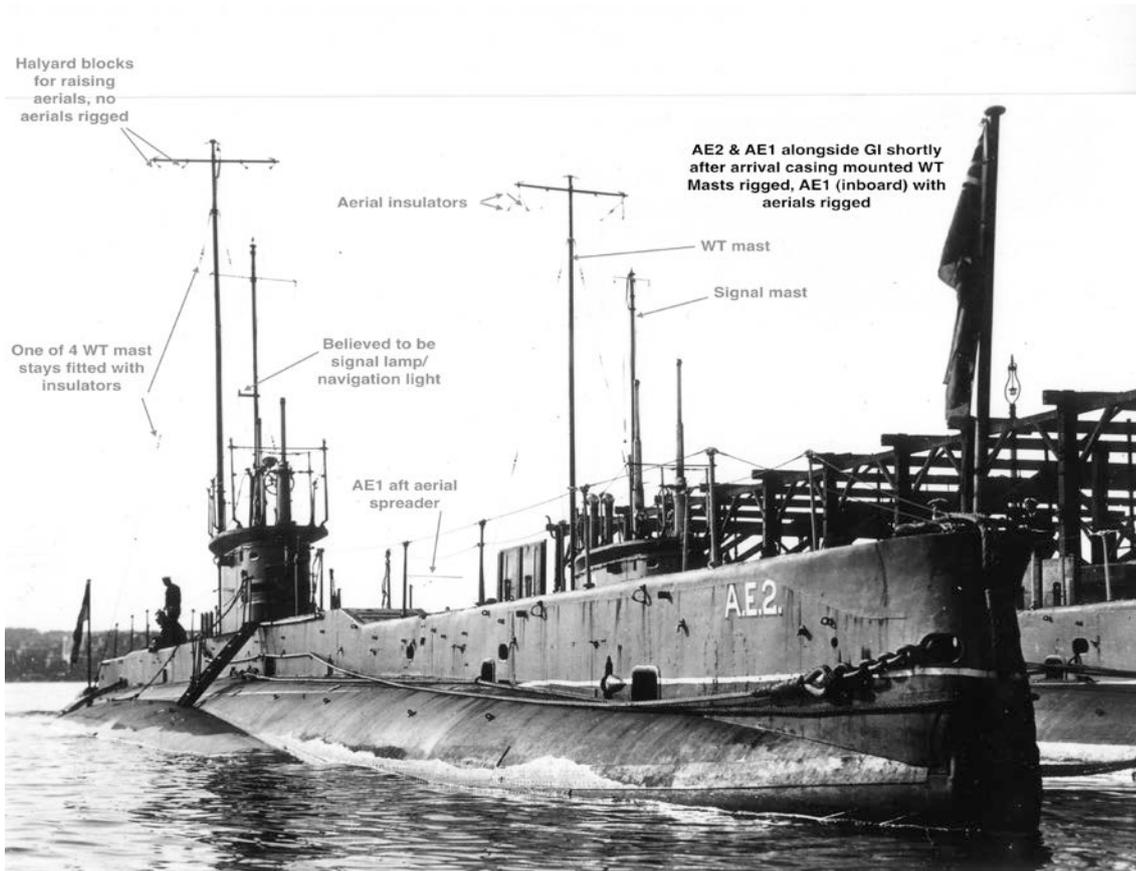


Figure 6 – AE2 & AE1 alongside at Garden Island with WT and Signal masts rigged in the ‘as built’ configuration

AWM H11559

- x The mast could be removed and stowed, probably under the casing.
- x The aerials consisted of two sets of twin wire spans mounted over each side of a yardarm at the top of the WT mast, thence down to insulators attached to a spreader positioned over the forward and after casing.
 - The spreaders were attached to a post mounted on the forward and after casing.
 - Each spreader was fitted with steadying stays led down to the casing.
 - The WT posts were held in place with wire stays.
- x The aerial was connected to the WT set by a wire run to an aerial post on the fore casing, this aerial post connection led down through the pressure hull to the WT set.
- x It is surmised that the aerial runs would be completely unrigged when the aerial was stowed and hoisted up after the WT mast was raised.
- x Rigging the aerial would have therefore entailed a lengthy operation to remove the WT mast from its stowage, rig the stays and halyards, manhandle the WT mast upright, secure the stays, lay out the aerials, haul up the aerials, rig the aerial posts on the forward and after casings, tension the fore and aft aerial runs and rig the spreader steadying stays. This would have been a major evolution, requiring a well-coordinated team:

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- o Taking perhaps 45-60 minutes?
- o Limited by sea state or an angle on the submarine.
- o Requiring a party of 10-12 men.
- x Unlike the installation described in the handbook, AE1 and 2 would have likely had no WT capability with the aerial mast stowed.

3.6.1.6 Photographs of AE1 and AE2 taken after the docking in Fitzroy Dock 3-24th June 1914 and during the PNG deployment indicate that the WT mast arrangements in both submarines were modified, perhaps during the docking:

- x The WT mast was moved to the top of the fin, displacing the signal mast.
- x This allowed the mast to be hinged and lowered along the top of the fin, supported by a bracket on the after casing prior diving, rather than unrigging and stowing it.
- x It was fitted with a yardarm for flag hoists. This function was previously carried out by the signal mast (see para 3.6.2 below).
- x The all-round white light mounted on the signal mast, used as part of the navigation lights and for signalling was relocated to the new mast.
- x The aerial arrangements appear to have been simplified to a single span on each side of the yardarm, hauled up by halyards fitted to the WT mast.
- x The spreaders were led straight to strong points on the forward and after casing, dispensing with the aerial posts on both casings.

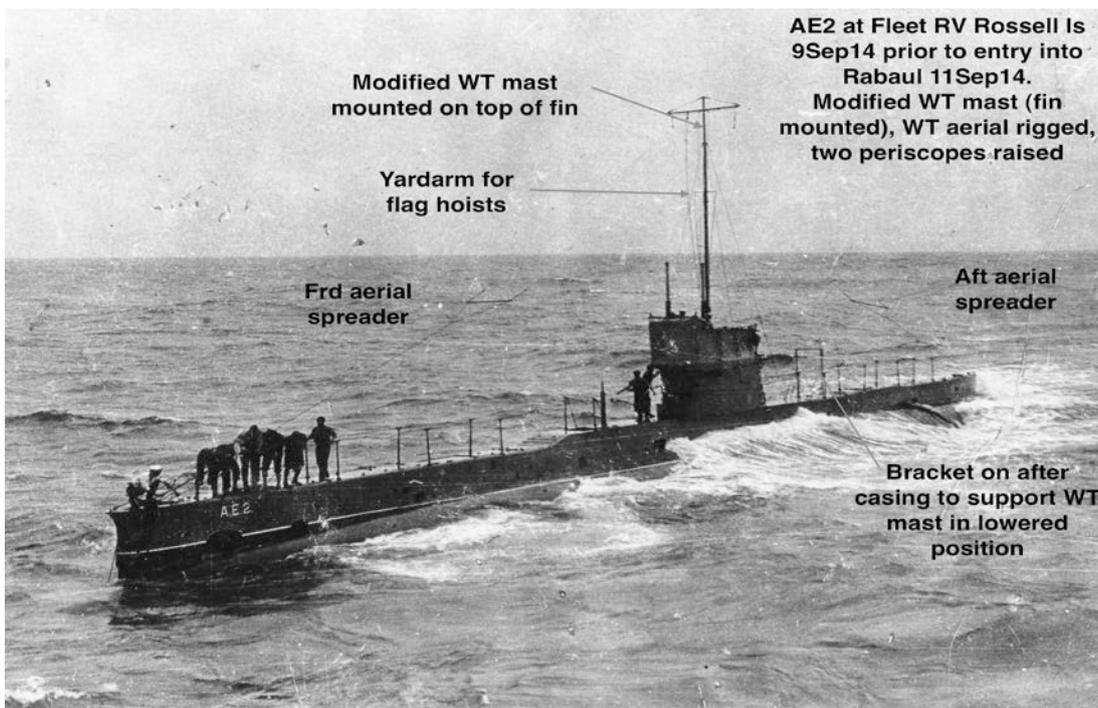


Figure 7 AE2 9th September 1914, on passage to Rabaul, WT mast rigged from top of fin AWM A01939

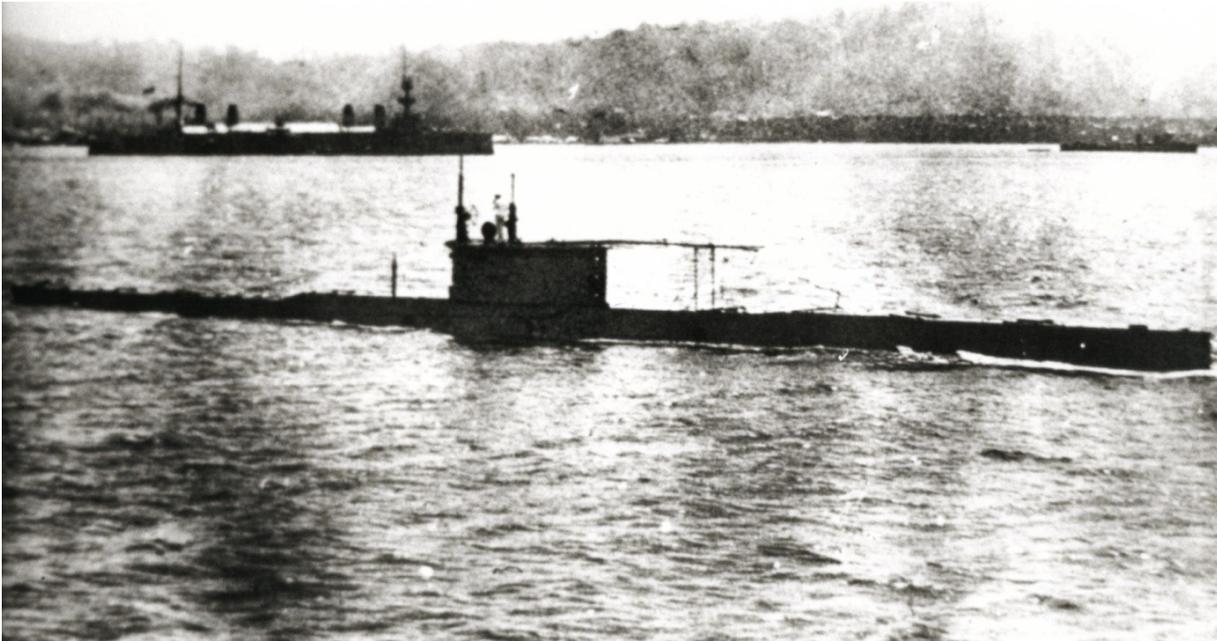


Figure 8 — AE2 Entering Rabaul Harbour September 1914, WT mast stowed on top of fin and supporting bracket on after casing.

AWM A01404

3.6.1.7 This arrangement is a significant simplification and probably reduced the time taken to rig the WT mast and aerials to 20-30' with 10-12 men. The submarine was still unable to routinely dive with the WT mast raised; to do so would likely cause the destruction of the WT mast as it was dragged through the water. This risk of damage could only be acceptable if a dive was necessary to save the submarine. The arrangement would have had no transmission or reception capability once the mast was lowered - it is assessed that the aerials were removed and stowed prior to diving. Perhaps there was some limited ability to transmit with the mast lowered but there is no evidence about it.

3.6.1.8 After reviewing the Submarine Type 10 WT Handbook with a Weapons Electrical Engineer's eye, Ian Noble concludes that the set would have required careful adjustment to perform satisfactorily and would be unable to change frequency or aerial arrangements easily or without complex adjustments and setting to work.

3.6.2 Flashing Light

3.6.2.1 All Round Light

Flashing light was the only option other than the WT set available to AE1 for communications over a distance. AE1 was originally fitted with a hinged signals mast aft of the after periscope, carrying an all-round Morse signalling lantern that also served as an all-round white light as part of the navigation lights, mounted on a platform part way up the mast.²¹ As discussed above, it is surmised that the signal mast was displaced by the modified WT mast and that the signalling capability (yardarm for flag hoists and white light for Morse code) was transferred to the modified WT mast.

3.6.2.2 Aldis Light

²¹ Source A page 219.

Alternatively a hand held lantern (generically termed an 'aldis light' after the name of the early manufacturer) could be rigged on the bridge and connected to ship's power supplies. Various sizes existed; it is believed AE1 was fitted with 6" (150 mm) aldis lamp with a typical maximum daylight working range of 5,000 yards. This equipment was operated by a Signaller; AE1 & 2 each carried one such sailor.

3.7 Periscopes

3.7.1 AE1 was fitted with two periscopes, one low power and the other had both low and high SRZHU 7KH\ ZHUH DERXU 23 III (?P) QRQJ GLDPHWHU RI PDLQ WXEH 5Q' (140 PP) UHGXFHG WR 3Q' (90 mm) for the top 4 ft (1.2m). They were raised by electric motor and power trained using a ½ hp motor. The periscopes retracted 8 ft (2.4m) but still remained clear of the top of the fin as this photo of AE2 entering Portsmouth harbour illustrates; the forward periscope is the higher of the two, the after most mast stretching out of view is the signals mast.

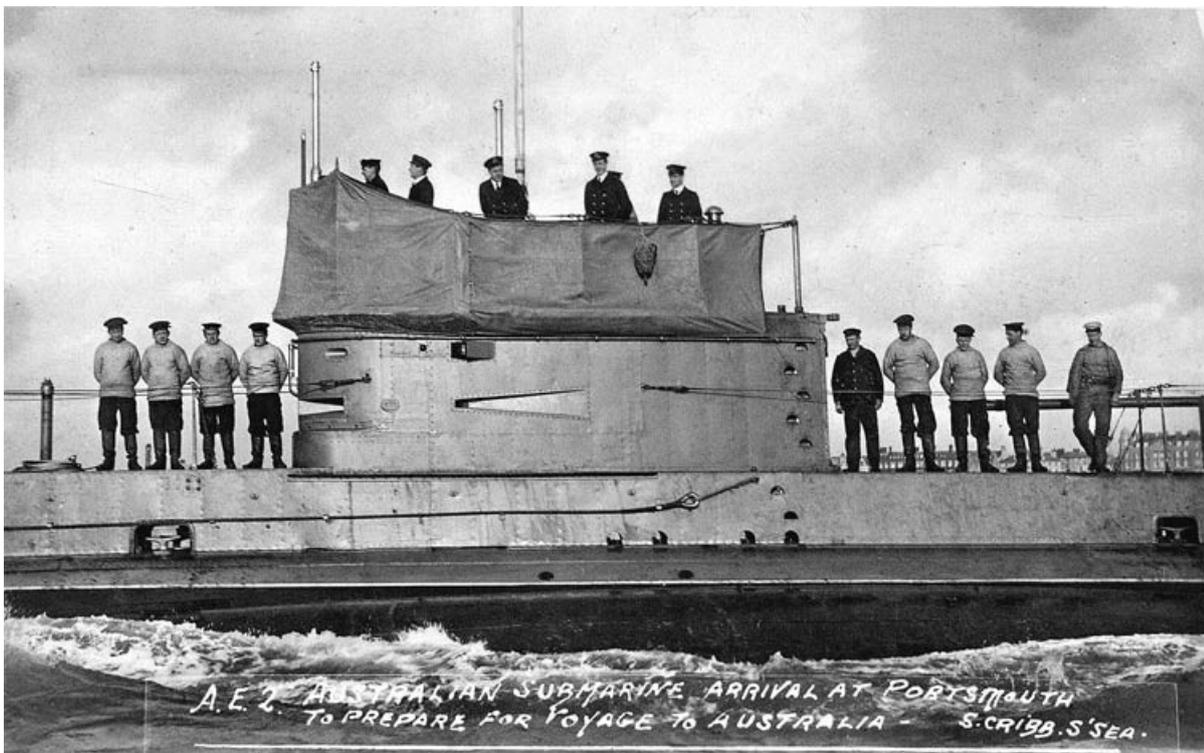


Figure 9 — AE2 Entering Portsmouth Harbour

AWM P01075.042

The periscopes were supported by individual periscope standard, heavy, cast tubes bolted to the top of the conning tower. This photo of E17's fin [below] illustrates these, (note there were differences in the layout of the conning tower between AE1 and E17):



Figure 10 Fin of E17 at RN Submarine Museum, Gosport

Note, the two upright tubes on top of the conning tower are the periscope standards; the forward (left hand) standard also houses the arrangements for the upper steering wheel.

Section 4 - Key Personalities

4.1 LCDR Thomas Fleming Besant

David Nicholls has translated the cryptic notes used in Besant's RN service record:

Besant was born in December 1883; he joined the RN in January 1898 aged 15 and was appointed to the Training Ship HMS BRITANNIA (moored in the river Dart). He was awarded his midshipman's certificate (3rd class pass – 675/1000) gaining 4 months seniority on passing out on 15 May 1900. He served as a Midshipman in a number of ships for the next three years.



Figure 11 LCDR Thomas Besant

4.1.1 Service Record

During his career Besant:

- x Served as a Midshipman in HMS (?), AMPHITRITE, and GLORY, arriving back in England on 8th May 1903 for Seamanship exam on 15th May 1903 and to commence Sub-Lieutenants courses on 26th May 1903.
- x He passed his Sub-Lieutenant's courses (not CO Designate. Courses) as follows:
 - o Seamanship 1st class pass (904/1000) 15th May 1903
 - o Navigation (part 2?) 3rd Class pass (675/1200) September 1903

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- Pilotage 2nd Class pass (820/1000) December 1903
- Gunnery 3rd Class pass (601/1000) March 1904
- Torpedo 1st class pass (175/200) April 1904
- x Name noted 'to qualify for N (or SM?) duties April 1904.
- x Following an appointment to HMS RUSSELL (DUNCAN Class, pre-DREADNOUGHT Battleship) he was awarded his Watchkeeping certificate in February 1905.
- x Appointed to HMS THAMES (SM Depot Ship) for SM Instruction (January 05 – May 06) promoted to Lieutenant during this appointment (31st December 1905).
- x Appointed to HMS THAMES additional for SM command May 1906 – November 1907 [the annotations under Special reports/Service indicate that he was associated with C12, he was 23 years old; there is no report on his professional ability for this period.
- x C12 was laid down at Vickers in November 1906 and commissioned in January 1908 so it might be that he was 'standing by her' for some of the time under construction.]
- x November 1907 – August 1912. Returned to Surface Fleet duties HMS BONAVENTURE, HMS KING EDWARD VII, and HMS HERCULES.
- x August 1912 – June 1913 appointed to HMS VULCAN (actually a Torpedo Boat depot Ship) annotated 'for Submarines – C30 in Command'.
- x June 1913 – September 1913 appointed to HMS DOLPHIN 'additional for S/Ms'.
- x 15th September.1913 (Appointment List 1725) appointed to HMS PRESIDENT for loan to the RAN for Command of S/M AE1.
- x 31st December 1913 – promoted to Lieutenant Commander (after the obligatory eight years as a Lieutenant – which every RN Officer completed).
- x Since formal submarine command courses ('Perisher') did not start until 1917, it is assumed that the time in HMS THAMES, at the time of his association with C12, included some form of pre-command /CO Designate course.
- x The comments on his professional ability from August 1910 are almost all 'VGI' (Very Good Indeed).
- x July 1913 comment 'excellent CO of SM & VG Div. Leader; strongly recommended (presumably for promotion or perhaps for further command/overseas duties?)

4.1.2 Social Factors

David has also observed that his father was a Naval Storekeeper; Besant would probably have struggled (socially) against his junior officer peers in the mainstream Royal Navy of the early 1900s. Hence perhaps his early move to volunteer for submarines in April 1904. His 1st class pass in Torpedoes as a Sub Lieutenant would have helped his cause for submarine service. For all the above reasons (and the general exuberance of a young man in command), his enthusiasm for wartime success may have influenced his judgment in relation to the potential operational impact of material defects. All, of course, conjecture.

4.1.3 Contemporary Assessment of Besant's Level of SM Experience

Whilst cited by Stoker as an experienced submarine commanding officer it would appear that other than the period when undertaking submarine training, Besant had little seagoing experience in submarines as a junior officer and about 10 months (August 12-June 13) in command of C30 prior to his posting to AE1. From research into C30's activities whilst Besant was in command it appears that the submarine operated from a depot ship in Dundee or the Tay River and normally had a surface escort whilst underway, relieving C30 of much responsibility for independent navigation. Even allowing for the infancy for the submarine arm and expediency in the run up to war, by contemporary standards this is a very short time so that he had only limited submarine and command experience.

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4.2 LEUT The Hon Leopold Francis Scarlett

4.2.1 Scarlett was born in March 1889; he joined the RN in January 1904 aged 14 years 10 months and was appointed to BRITANIA. He was awarded his midshipman's certificate (granted 3.5 months seniority) on passing out on 15th May 1905. He served as a Midshipman in a number of ships, each evaluated his performance as follows:

- x HMS GOLIATH (CANOPUS class Battleship) 15th May 1905 – 5th March 1907 (Conduct Very Good Indeed, other Qualities/Attributes Very Good. Intelligent but slow.)
- x HMS ROXBURGH (DEVONSHIRE class cruiser) 6th March 1907 – 5th August 1907 - All qualities/Attributes Very good. Languages - French; zealous, very strong.
- x HMS SWIFTSURE (lead ship of Battleship class) 6th August 1907 – 15th September 1908. All qualities/attributes now Very Good indeed; zealous, promising, recommended, (*presumably for promotion to Acting Sub Lieutenant?*)



Figure 12 LEUT The Hon Leopold Scarlett

4.2.2 He obtained a 2nd class pass in his Seamanship examination in July 1908 and commenced Sub-Lieutenants courses as an Acting Sub-Lieutenant on 21 September 1908. Scarlett may have been back-classed since he did not finish this course until 17th December 1909 when he was promoted to Sub-Lieutenant, with seniority of 30th July 1908. He passed his Sub-Lieutenant's courses as follows:

- x Seamanship (July 1908 2nd class 850/1000)
- x Navigation (September 1908 part 1)
- x Pilotage (February 1909 2nd class 804/1000)
- x Gunnery (December 1908 1st class 850/1000)
- x Torpedo (March 1909 2nd class 159/200)
- x Navigation (December 1909 Part 2: A 2nd class; B 2nd class)

4.2.3 He was noted as a volunteer for submarines in November 1909 with the annotation that "he will be required to serve a period in a seagoing ship before being selected."

4.2.4 He was appointed to HMS HIBERNIAN (KING EDWARD VII class Battleship) 29th January 1910 and on 7th August 1910 and was awarded his Watchkeeping Certificate. All qualities/attributes/skills Very Good Indeed. Thorough knowledge, good judgement.

4.2.5 He was appointed to HMS MERCURY (SM Depot Ship) for SM Instruction 8th August 1910 and re-appointed for service in submarines on promotion to Lieutenant 30th October 1910, followed by an appointment to HMS FORTH for submarines 25th July 1911. This was followed by an appointment to HMS CORMORANT (Gibraltar) for submarines in August 1911. His brief service record completed by Captain Hall, on completion of submarine training:

"General conduct Very Good Indeed; all other attributes/skills Very Good. Has done very well under training in submarines. Considered promising."

4.2.6 A report on service in submarines (written December 1912) by Lieutenant Lewis (possibly a SM CO) All skills and attributes Very Good Indeed. Thorough Knowledge. Good Judgment. This appears to cover his time served in submarines attached to HMS CORMORANT.

4.2.7 He was invalided via Navy List 7682 September 1912; respiratory infection required him to be sent home (presumably from Gibraltar) when fit to travel due to tuberculosis of the lungs. He left on SS MEDINA on 21st December 1912, arriving home on 23rd December 1912, admitted to RN Hospital HASLAR for 6 weeks on 28th December 12, declared 'unfit' on 4th January 1913 and listed for re-survey at HASLAR on 7th July 1913 (6 months). He was placed on the books of HMS VICTORY for a final period of sick leave from 22nd December 1912 to 3rd July 1913 (194 days) and placed on retired list (unfit - tubercle of lungs) on 13th June 1913.

4.2.8 On 25th September 1914 Scarlett's record notes receipt of a letter from Navy Office Melbourne stating that Lieutenant. Scarlett 'entered temporarily into the RAN for war'. The last notation on his record is:

'Lost in Submarine AE1 [report received 19th September 1914] on or about 19th September 1914'.

4.2.9 His RAN record noted his date of entry (as a Lieutenant) as 10th August 1914 (Gazette No. 74/14) with the same date of entitlement to Submarine pay. His RAN record shows the date of his seniority as a Lieutenant in the RN as 27th December 1911 (his actual date was 30th October 1910).

4.2.10 Contemporary Assessment of Scarlett's Submarine Experience

It is not clear from his service record, which seagoing submarines he served on during the 13 months appointed to CORMORANT. His warm personality was appreciated and remarked on by several commentators (Stoker and Hamilton to name a couple), but he could not be regarded as an experienced seagoing submariner.

4.3 LEUT Charles Lewis Moore

4.3.1 Moore appears to have been a term-mate of Scarlett although Moore graduated six months ahead of Scarlett on completion of their training as Acting Sub-Lieutenants. Notwithstanding, both were appointed for submarine training in August 1910, though in different SM training ships.

4.3.2 Born in Dublin in 1888, Moore joined the RN January 1904 aged 15 (hence a term mate of Scarlett) and was appointed to the Training Ship Britannia (moored in the river Dart). He was awarded his midshipman's certificate (granted 1.5 months seniority) on passing out on 15th May 1905 he served as a Midshipman in HMS LEVIATHAN (DRAKE class cruiser) 15th May 1905 – 26th November 1906; HMS BACCHANTE (CRESSY class cruiser) 27th November 1906 – 17th February 1908 and HMS BULWARK (LONDON class Battleship) 18th February 1908 – 15th September 1908 (Conduct Very Good Indeed, other Qualities/Attributes Very Good. Good Judgement).

4.3.3 Having completed Seamanship examinations in July 1908 (second class pass 882/1000), he commenced Sub-Lieutenant courses as an Acting Sub-Lieutenant on 21st September 1908 and was promoted Sub-Lieutenant on completion with seniority of 30th September 1908. The date of completion of this course is unclear on the records – probably 17th June 1909: He joined HMS BLACK PRINCE on 2nd August 1909 for watch keeping training.

4.3.4 He passed his Sub-Lieutenant's courses as follows:

- x Seamanship (Jul 08 2nd class 850/1000)
- x Navigation (September 08 part 1 A3, B3)
- x Pilotage (December 08 2nd class 799/1000)

- x Gunnery (April 09 1st class 509/1000)
- x Torpedo (October 08 2nd class 164/200)
- x Navigation Part 2 – not noted

4.3.5 He was noted as a volunteer for submarines in April 1909 and again in September 1910.

4.3.6 Moore was appointed to HMS BLACK PRINCE (DUKE OF EDINBURGH class cruiser) 2nd August 1909 – 14th August 1910 and was awarded his Watchkeeping certificate in August 1910. All qualities/attributes/skills Very Good Indeed. Thorough knowledge, good judgement.

4.3.7 Following this he was appointed to HMS ARROGANT (Submarine Depot Ship), for submarine training 15th August 1910, re-appointed for service in submarines on promotion Lieutenant 1st April 1911 and appointed additional for Submarines 11th November 1911 on completion of submarine training.

4.3.8 He was admitted to RN Hospital HASLAR (Scabies) 29th May 1912 for 10 days and again on 25th June 1912 for Tonsillitis for 10 days.

4.3.9 Moore was loaned to RAN for three years Submarine service 14th Oct 1913. His fitness report rendered by Commodore Keyes in August 1912 noted the following:

“General conduct, attributes/skills (Submarines) Very Good. Zealous and Attentive.”

By CMDR Palmer January 1914: 2 x very Good Indeed and rest very good. *“Keen and capable.”*

Last notation on record; *‘Reported missing in Submarine AE1 [report received 19th September 1914] on or about 19th September 1914’.*

4.3.10 Moore was unmarried; his next of kin was his father who had been in the Army (Colonel) and who may have been serving in Ireland when Moore was born (Dublin 23rd August. 1888). His family lived in Minehead, Somerset at the time of Moore’s entry into the navy.

4.3.11 Contemporary Observations on his Level of Submarine Experience

It is not clear from his service record how much submarine sea time Moore accumulated in the 1 year 11 months between qualifying and being loaned to the RAN, with time out for two bouts of illness warranting hospitalisation. Although the 3rd hand on AE1 he may have actually had more sea experience than Besant or Scarlett! In any case, his level of experience was fairly brief by today’s standards.

4.4 LEUT Henry Hugh Gordon D'acre Stoker

Stoker was born in February 1885 in Dublin; he joined the RN in January 1900 aged 15 and was appointed to BRITANNIA. He was awarded his midshipman's certificate, passing out on 30th May 1901, gaining 3.5 months seniority. He served as a Midshipman in a number of ships for the next three years.



Figure 13 LCDR Hugh D Stoker as a POW in Turkey after the scuttling of AE2 in 1915
Photo HG Stoker Autobiography *Straws in the Wind*

4.4.1 Service Record

- x Served as a Midshipman in HMS IMPLACABLE (FORMIDABLE Class Battleship commanded by Prince Louis of Battenberg), arriving back in England (from the Mediterranean) on 1st August 1904 having completed Seamanship exam on 30th July 1904.
- x He commenced Sub-Lieutenants courses on 4th October 1904.
- x Promoted Sub-Lieutenant 10th July 1904.
- x He passed his Sub-Lieutenant's courses (not CO Designate Courses) as follows:
 - o Seamanship 1st class pass (902/1000) 30th Jul 1904.
 - o Navigation (part ?) 3rd Class pass (No score noted) 29th November 1904.
 - o Pilotage 2nd Class pass (822/1000) March 1905.
 - o Gunnery 2nd Class pass (719/1000) 11th July 1905.
 - o Torpedo 2nd class pass (163/200) 18th August 1905.
- x Following an appointment to HMS JUPITER (MAJESTIC Class Battleship) 12th September 1905 – 15th August 1906 he was awarded his Watchkeeping certificate in December 1906 (Awarded Board of Trade Master's certificate September 1907).
- x Appointed to HMS MERCURY (SM Depot Ship) for SM Instruction (15th August 1906) and re-appointed for service in submarines on promotion Lieutenant (31st December 1906).
- x Appointed in command submarine A10 16th January 1909.
- x Appointed in command submarine B5 1st January 1910.
- x Appointed in command submarine B8:
 - o 25th July 1911 – August 1911 Home Fleet.
 - o August 1911 – October 1913 Gibraltar.
 - o B8 Inspected by VADM Brook Oct 1913 'Managed SM very well'.
- x Personal report by CMDR Harvey at same time (relinquishing command); all qualities 'VGI' (Very Good Indeed). "Very clever; good judgement; good SM Officer'.
- x Appointed HMS DOLPHIN for AE2 –October 1913.
- x Appointed AE2 In command 7th November 1913 - May 1915.
- x Personal report January 1914, all 'VGI' by CMDR Palmer (promoted LCDR 31st December 1914 and re-appointed in Command).

4.4.2 Various notes are appended to his record in relation to the loss of AE2 in the Dardanelles, including reference to a report by the American Ambassador (Istanbul?); also

reference to his incarceration as a POW, his escape attempts and his strength of character in refusing to give an undertaking to the Turks not to attempt further escapes. A report by VADM Commanding Eastern Mediterranean dated 30th January 1916 notes: 'AE2 was in very efficient condition and reflects the greatest credit on him' (Stoker).

4.4.3 Stoker continued a successful career in the RN:

- x Appointed in Command K9 10th February 1919.
- x Gazetted for DSO on 22nd April 1919 'DSO awarded in recognition of his gallantry in making the passage of the Dardanelles in Command of HM Australian S/M AE2 on 25th April 1915'.
- x Invested with DSO at Buckingham Palace 12th June 1919.
- x Brought to the Notice of the Admiralty – Gazette 17th October 1919.
- x Recommended for promotion by CDRE Hall.
- x Recommended for promotion by RADM Dent December 1919.
- x Promoted Commander 31st December 1919 and re-appointed K9 in command.
- x Appointed HMS VICTORY 1st February 1920 for unemployed time (not to exceed six months).
- x Placed on half pay 23rd April 1920.
- x Placed on retired list (own request) 2nd October 1920.
- x 25th January 1922 Commuted £165 for £2150-15-6 (remaining?) leaving £200 per year.
- x 10th September 1922 Granted approval to reside abroad.
- x Rejoined RN on outbreak of WW2.
- x Appointed HMS CAROLINE for duty with Chief of Staff Belfast 21st October 1939.
- x Granted Acting Rank of Captain whilst holding this appointment.
- x 23rd January 1940 – Appointed CAROLINE in command.
- x For duty as COS to Flag Officer in Charge, Belfast - in continuation (admitted to Belfast Military Hospital 28th - 31st May 1940 for removal of in-growing toenail).
- x 31st July 1940 – Appointed HMS MINOS in command and Naval officer In Charge (NOIC) Lowestoft (Central Depot of the Royal Naval Patrol Service WW2).
- x Two incidents occurred whilst in command, the first (21st November 1941 – grounding of HMS ROWANTREE) resulted in a 3rd Sea Lord's displeasure from the Board of Inquiry outcome.
- x The second (MGB 89 fired upon by MGB 320 on 20th April 1942) Board of Enquiry revealed bad staff work and laxity in operational matters in the office of NOIC Lowestoft.
- x 27th July 1942 – Appointed PRESIDENT (additional) for duty inside the Admiralty as DPD (?) Naval Officer's Section.
- x Reverted to rank of Commander.
- x April 1944 – Requested appointment as War Diarist to Allied Naval Commander, Expeditionary Force (ANCXF).
- x 28th April 1944 - Appointed to HMS ODYSSEY (actually Collingwood Hotel at Ilfracombe) for War Diary Duties on staff of ANCFX.
- x 11th May 1944 – Granted Acting Rank of Captain.
- x 24th October 1944 – Appointed HMS PRESIDENT additional for duties inside Admiralty with Director of Service Conditions. (Granted Acting Rank of Captain WHTA).
- x 01st December 1945 - Dispersed (to be released Class A); 26th January 1946 Released; 27th January 1946 Reverted to Retired List – granted IOS Rank of Captain.

4.4.4 Since the submarine command course 'Perisher' didn't start until 1917, it is assumed that the time in HMS MERCURY included some form of 'pre-command /CO Designate' course, prior to

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taking command of A10. The comments on his professional ability from August 1906 to the loss of AE2 are almost all 'VGI' (Very Good Indeed).

4.4.5 Social Factors

His father was a Surgeon in Dublin; they lived in Stephen's Green – a very smart address in Dublin. Early reports as a young officer comment on his zeal, athleticism (good at games), loyalty and reliability. He was clearly highly regarded as a submarine CO.

4.5 LEUT William H F Warren

4.5.1 Role

LEUT William H F Warren RAN was the CO of Parramatta during the time of AE1's loss.

4.5.2 Letter to his Brother

The AWM holds a letter from Warren ²² to his brother recording the outbreak of war and the deployment to Rabaul. David Nicholls read the letter and reports that it records Warren's opinions related to the RAN's preparations for war and broad descriptions of operations en route to New Guinea and whilst on station in the Rabaul area. The letter is quite critical of the execution of maritime preparations for war and of the execution of Rabaul operations. The more remarkable aspect of the letter is that it fails to mention the loss of AE1 in any regard; even though the period covered by the letter clearly encompassed that loss.

4.5.3 Death

Commander Warren was to die under tragic circumstances at Brindisi. A virulent fever had laid low most of the Australians since their arrival in the Adriatic. Early in April 1918, Warren entered the Naval Hospital at Brindisi for treatment and had recovered when he collapsed whilst taking a walk in the hospital's grounds. When he was found some time later, he was dead. He had drowned in a few inches of water. ²³ At the time, he was the Commander of the Australian Destroyer Flotilla, indicating a successful naval career in the interim. ²⁴

4.6 Other RN/RAN Personnel

4.6.1 CMDR Frederick Campbell DARLEY RN, served in HMAS AUSTRALIA, his diary is held in the AWM (Acc N: 1DRL/0232) and comments on the loss of AE1:

Transcript of 4th and 5th Paragraphs, Letter 10 of CMDR FC Darley RN (HMAS AUSTRALIA) dated 30th October 1914 to "Aunt Marion", (AWM 1DRL/0232)

No one knows what happened to the submarine – some say she was sunk by a small steamer called the "Colonial" or some such name which Jackson found a few days later on a reef and burnt to the water's edge, and on deck was a mounting for a pom-pom and a lot of empty cylinders scattered around; again she may have found a reef or uncharted (sic) rock (New Britain etc, is very imperfectly charted.)

Stoker the Captain of AE2 does not believe she tried to dive for exercises and never came up, or that there was an explosion. I know this much, there are a lot of trees, quite big ones in the water

²² AWM link <http://trove.nla.gov.au/work/32027997>

²³ <http://www.navyhistory.org.au/hmas-parramatta-first-born-of-the-commonwealth-navy/>

²⁴ Navy Office file 1918/89/544/1 letter advising the Governor General of his death dated 19 April 1918.

floating about. I saw two large ones myself. She may have hit one of these and damaged her horizontal rudders; this might have caused her to dip suddenly, but everything one thinks of seems improbable (sic) as any other theory. The sad disaster cast quite a gloom over the Squadron – none of the work we have had has helped to buck us up much.

Original of letter signed "Erick"

Transcribed by Ian Noble at the AWM, Canberra on 4th May 2011.

4.6.2 LCDR Gerald Ashby Hill

LCDR Gerald Ashley Hill served in HMAS YARRA. His papers are held in the AWM under 1DRL/0351. Hill's diary is expansive; it appears that he writes with his memoirs in mind. In pages 61-65 he indulges in some speculation as to the cause of AE1's loss, but does not add any new information to our understanding:

"Before closing this chapter I must hark back to submarine A. E. 1. Many rumours of course were afloat as to the cause of her disappearance chief among which was that she had been sunk by a small enemy steamer mounting a 3 pdr gun. In support of this theory, a craft of this description ashore on Elizabeth reef not far distant from Rabaul, while a gun was found on the seabed just under her bow.

Nothing of course is ever likely to be known now which would lead us to the truth concerning her end and that of the very gallant men she entombed. But there is very good reason to suppose that she came by that end through an explosion the origin of which is hard to say. I can only add that her loss cast a gloom over the entire fleet a gloom which would not have been as heavy and lasting had we known they had met their deaths as every Soldier or Sailor in his country's service hopes to do when death comes his way."

Transcription from photographs of diary taken by Ian Noble May 2011.

4.6.3 LCDR Cyrill John Percy Hill served in HMAS PARRAMATTA, his diary is held in the AWM (Acc N: 1DRL/0350) and comments on the loss of AE1. Ian Noble reviewed the documents in May 2011 and advises that the records are quite legible and readable, and there is nothing unexpected in the diary. In summary relevant entries contain:

- x Page 37: September 14th - Monday Last sighting of AE1 [bottom of page.
- x Page 41: 15th – 17th September 1914: Search for AE1 (no detail); "YARRA's" encounter with reef.
- x Page 45: 17th – 20th September 1914: Friday 18th, "PARRAMATTA", "WARREGO" find "KOLONIALGESELLSCHAFT".
- x Page 49: 21st – 24th September 1914: Wed 23rd, " PARRAMATTA" finds MEKLONG at Mioko; 24th September: 40 prisoners from " KOLONIALGESELLSCHAFT ".
- x Page 53: 24th September – 1st October: Nil and end of relevant entries.
- x Patey's Oorder No 1 dated 7th August 1914: "To attack and destroy German ships in Simpsonhaven and Matupi Harbour and to destroy W/T station at Rabaul". (1 page).
- x Patey's Oorder No 3 dated 8th September 1914: "Occupation of Rabaul and Herbertshohe, New Britain". (4 pages)

The above pages are the order of presentation and none are missing, despite the page numbering. There was nothing new or unexpected in the diary.

4.6.4 SBLT Henry Hastings McWilliam served in HMAS AUSTRALIA and ENCOUNTER during

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the period, his diaries are held in the AWM in DRL/0467. Ian Noble reviewed McWilliams's diary, reading in detail pages 54 – 59, the ones that mention AE1.

McWilliam transferred to HMAS ENCOUNTER on 15th September 1914 before AUSTRALIA left for Sydney, and re-joined AUSTRALIA on 20th September 1914, when she unexpectedly returned to Rabaul. Judging by his language style, his diary appears to have been written reasonably close to the dates he describes. Overall, this diary does not reveal anything new; excerpts of relevant entries on pages 55-56 (15th September), 57 (16th September) and 59-60 (18th & 19th September) include:

- x Page 55: "Still no sign of the submarine. Apparently, in the course of enquiries about the submarine, a noise like firing of guns in the distance appeared to have some bearing on the subject. I remember having distinctly heard it, thinking it was "SYDNEY's" 12 pounder at about 8-15 yesterday evening. Several other people in the ship [ENCOUNTER] heard it, Merewether, Quick and Macdonald.
- x "There are all sorts of theories as to what happened but a favourite one is that an armed launch attacked her."
- x Other entries on that page about AE1 refer to the search.
- x On page 57, on 16th September, the author mentions that 7 of the crew of 3 officers and 32 ratings are "supernumeraries" (sic).
- x On page 59-60, on 18th September, the author refers to the search and finding the steamer aground and on fire, and "WARREGO's investigation and what she found. He then states: This may explain the submarine mystery. Evidently she [KOLONIALGESELLSCHAFT] ran aground and her crew set her on fire and put off to the shore."
- x On 19th September, the author mentions the search for KOLONIALGESELLSCHAFT's crew.

4.6.5 Petty Officer Henry James Elly Kinder RAN

Kinder was an ERA in AE2, who maintained a regular diary that provides a good insight into the events of the day. His papers are held at the AWM, reference PR01466. His diary adds a couple of points to the record:

- x Kinder advises that the last communications between PARRAMATTA and AE1 was by megaphone.
- x Some oil was found in the vicinity of where AE1 was last seen.

4.6.6 Engineer LEUT Alec Broughton Doyle RAN

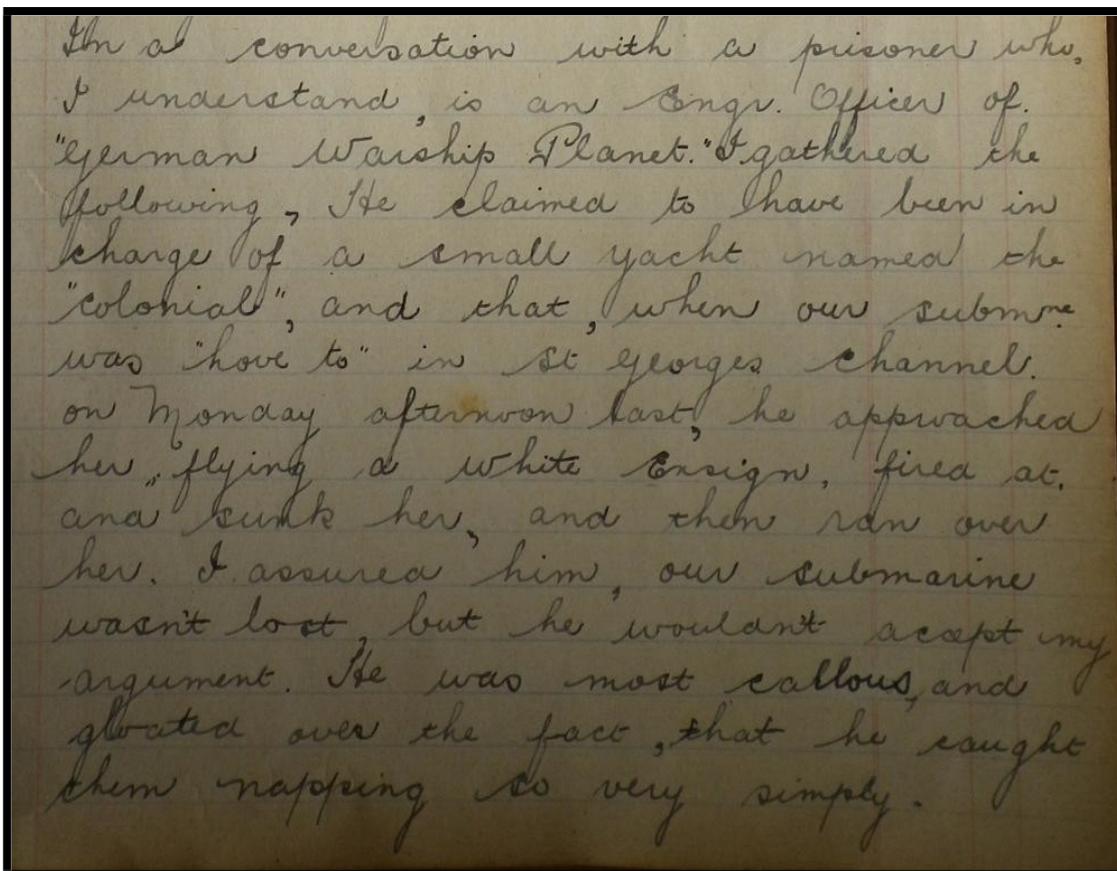
On 17th September 1914 Doyle, the Engineer Officer of HMAS PARRAMATTA, wrote an acerbic and highly critical letter to a friend, criticising the RN senior officers in command and Besant's conduct on the 14th. Doyle went on to have a highly successful career in the RAN; principally in repair and ship construction. He was admitted as a Commander of the Order of The British Empire as a Captain in 1937. In 1943 he was promoted Rear Admiral and became the 3rd Naval Member and Chief of Construction. The letter's lack of balance appears studied and deliberate, undoubtedly reflecting Doyle's heartfelt frustration; it is difficult to gauge how much weight to place on it in hindsight, he does restate the German steamer theory for the loss of AE1:

'Incidentally we have strong reason to suppose a small gunboat to have been lying in D of Y Island observing all our frantic dashing to & fro & probably waited till submarine got quite close & then just biffed off at her & sunk her.'

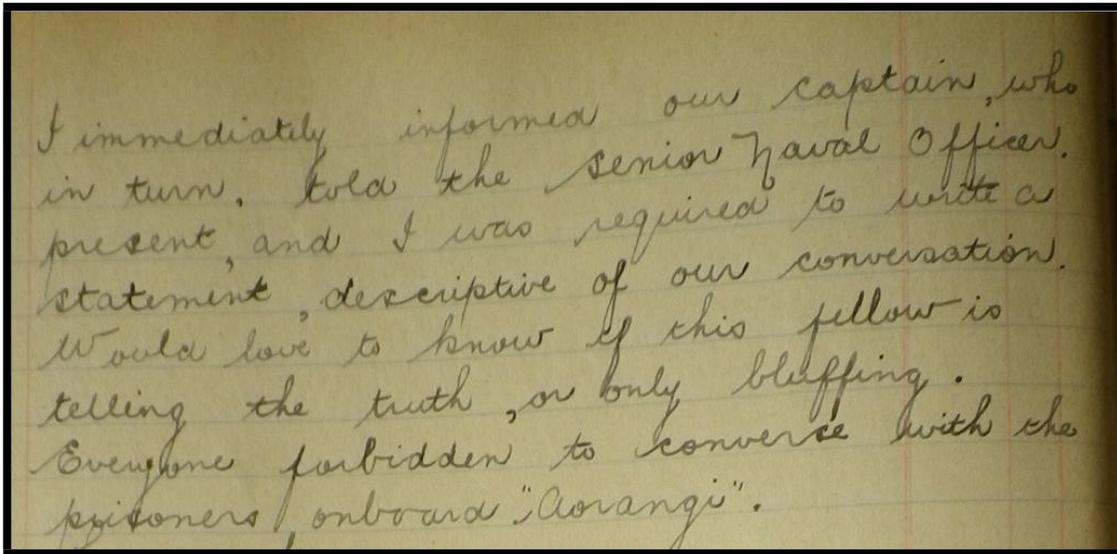
4.7 Signalman Aubrey Hodgson

4.7.1 Aubrey Hodgson was an RAN signalman temporarily attached to the NZ passenger liner and supply ship SS AORANGI. In later years, Aubrey Hodgson lived in Sydney. His son advised Gus that he had undergone submarine training and was part of the spare crew for AE1 and AE2. He became the President of the Submarine Society in Sydney and was later admitted as a Member of the British Empire for his life's work. Hodgson's submarine background made him a particularly useful and interested observer of the activities of the submarines and circumstances of AE1's loss. His diary entries are incorrectly dated; placing the loss of AE1 a week later, possibly the date he made the entries.

4.7.2 Hodgson records in his diary that he had an unsolicited conversation onboard AORANGI in Rabaul harbour with Petty Officer Reuschel, who was one of the German Navy members taken prisoner. Reuschel claimed that he was in charge of the German colonial steamer, the KOLONIALGESELLSCHAFT and boasted that KOLONIALGESELLSCHAFT had sunk AE1. Here is Hodgson's diary entry:



In a conversation with a prisoner who, I understand, is an Engr. Officer of "German Warship Planet." I gathered the following. He claimed to have been in charge of a small yacht named the "Colonial", and that, when our submarine was "hoi to" in St Georges Channel, on Monday afternoon last, he approached her, flying a white ensign, fired at, and sunk her, and then ran over her. I assured him, our submarine wasn't lost, but he wouldn't accept my argument. He was most callous, and gloated over the fact, that he caught them napping so very simply.



Figures 14 & 15—Aubrey Hodgson's diary entry concerning Reuschel's boast of the sinking of AE1 Image Darren Brown

The account as relayed by Hodgson is the primary basis for the theory that KOLONIALGESELLSCHAFT was responsible for the loss of AE1:

It is an unsolicited exchange and a credible sequence of events to cause the loss of AE1. It correctly identifies Monday as the day of the loss.

- x It is difficult to understand why Reuschel would have invented a link to KOLONIALGESELLSCHAFT, an unlikely vessel for a fabricated story and by then, languishing on a reef some 70 miles to the west.
 - o According to other German prisoners KOLONIALGESELLSCHAFT was enroute from Madang to Rabaul and only made it as far as Cape Lambert where she ran aground.
 - o If so, why should Reuschel choose KOLONIALGESELLSCHAFT as the platform for a fabricated story, a ship that in theory did not reach Rabaul?
 - o He also happened to choose a ship that we know had an armed party and 1 pound Nordenfelt gun onboard?
- x Or did Hodgson fill in the gaps to create a good story? If so, he did so in a plausible and verifiable fashion, having allegedly reported his conversation to his CO, etc.
- x Reuschel's account is credible; AE1 was vulnerable to a weapon such as a 1" Nordenfelt and had few defences except to dive, during this process she would have been very vulnerable to ramming. However we have been unable to find any corroborating evidence that KOLONIALGESELLSCHAFT made it to Duke of York Island or committed the deed.

4.7.3 Inaccuracies in Hodgson's Diary

There are numerous errors in dates and inaccuracies in Hodgson's diary when compared to an account constructed from the ships' deck logs and other official records. It appears to have been written well after the event and based on second hand information, as opposed to the impression given that it is the observations of an alert signalman observing the day's events and writing them up. The extent and nature of these errors cast doubt upon the credibility of the whole. A critique is at Annex D.

4.8 HMAS AUSTRALIA, RADM George Patey and His Staff

4.8.1 In the Australian Centenary History of Defence, volume III, David Stevens records a forward looking, positive remark on the attributes of submarines sparked by the purchase of AE1 & 2 attributed to RADM Patey [later promoted to VADM]:

“With submarines as fists and aeroplanes as eyes, the naval service appears to be at the commencement of a new era”.

4.8.2 RADM Patey did not have a submarine specialist on his staff; indeed the RAN’s general failure to prepare for the induction of submarines noted by Michael White ²⁵ meant that Besant was the senior submarine specialist - Patey called on Stoker for advice following AE1’s loss. RADM Patey clearly had an interest in submarine operations; despite the pressures of controlling the landings and he personally interviewed Besant on 12th September 1914 regarding the readiness of AE1.



Figure 16 RADM George Patey
National Library vn3890862

“I personally interviewed Lieutenant Commander Besant on Saturday, 12th September, and questioned him as to the state of his Submarines. He stated that they were both all right, but that he would like Submarine A.E.1 to remain in harbour until Monday, 14th September, to make good minor defects. This I approved of, and he did not go out until the morning of the 14th September.” ²⁶

4.8.3 There appears to have been no special arrangements made for submarine operations, such as were made during the Allied landings at Gallipoli in April 1915, e.g. a submarine WT guardship. Nor were arrangements made for the rest and recreation of their crews; the nominated depot ship, the UPOLU was manifestly inadequate and inappropriate for its role. This was belatedly recognised by Patey in his report on the UPOLU rendered to defend the RAN against a damages claim by UPOLU’s owners. ²⁷

“SS UPOLU Unsuitability as tender for Submarines

Submitted for the information of the Naval Board. I concur in the report of the Court of inquiry contained in enclosure (N; E.191 of 17th October 1914) as to the unsuitability of the S.S. “Upolu” as tender for submarines, or for any other purpose as a Naval Auxiliary.”

4.8.4 Patey was clearly concerned about the vulnerability of the submarines; his directions for them to return before dark and personal intervention when AE2 failed to adhere to his direction on returning from patrol on 13th September demonstrated this:

“The captain’s orders were that the boat was to be back in harbour by six pm but we were running a bit late. A signal from the flagship told him to be on time in the future.” ²⁸

²⁵ White, Michael W D, *Australian Submarines – A History*, AGPS 1992, p28.

²⁶ VADM Patey letter NAVY 14/7658 dated 23rd September 1914.

²⁷ Vice admiral Commanding HM Australian Fleet letter 14/8600 dated 28 October 1914.

²⁸ Extract from the diary of Henry Kinder, ERA AE2.

Besant would have no doubt learned of this public rebuke for Stoker. He was reminded as he sailed on the next morning; having requested permission to proceed in accordance with previous orders, AE1 received the following response:

"From Flag, Approved. See that you return before dark. 0703" ²⁹

Besant would have been highly aware of the need to adhere to this instruction to return by 1750.

4.9 Dr Fred Hamilton-Kenny

4.9.1 Dr Fred Hamilton-Kenny was the medical officer on the UPOLU, the depot ship for AE1 and AE2. He socialised with the officers of AE1 and AE2. From remarks in his diary he apparently had time on his hands and maintained a frank account of events surrounding the disappearance of AE1.

4.9.2 In his diary Hamilton-Kenny records that Stoker believed AE1 had been attacked by a German steamer, (gaps in deciphering the handwritten diary are indicated by question marks):

"Stoker said to me he thought the enemy had got them – two small German boats COMET & PLANET are in these waters – Point Gazelle is where AE1 was last seen & afraid might? have taken? place from a creek or behind a corner & a 3 pound shell pumped into her" ³⁰

Later entries record rejection of the official line of mishap as the source of AE1's demise:

"Stoker still believes she was spotted by the enemy – he scoffs at any idea of internal explosion or a floating mine or a rock." ³¹

4.10 Lieutenant Emil Joseph Lauer

4.10.1 This information has been provided by Peter Richardson. Lieutenant Lauer was a German infantry reservist appointed by the German Governor Haber to take charge of a party of 12 armed reservists and ordered to proceed from Madang to Rabaul by the KOLONIALGESELLSCHAFT. There is a slight confusion with his name in the records; with Emil and Ernst in the documentation. In according with the births and deaths registry at Neumagen, it is possible that he was baptised Joseph Ernst but called himself Emil Joseph.

4.10.2 His title was Katasterkontrolleur/Landmesser, Oberleutnant d. Res. He was born on 25th May 1877 at Neumagen in Prussia (Preussen), since 1969, this has been known as Neumagen-Dhron ist eine Ortsgemeinde im Landkreis Bernkastel-Wittlich in Rheinland-Pfalz. He died on 25th September 1915, killed in action at the battle of Ypres. His rank and unit at that time is recorded as Oberleutnant d.R. 3. Oberelsäss. Inf. Rgt. Nr. 172.

4.10.3 His father was a man of standing in the community; Nikolaus Lauer was the Mayor (Bürgermeister) Bürgermeisterei of Neumagen 1876-1902.

4.10.4 It is frustrating at this point that we have been unable to locate Lt. Lauer's report to Governor Haber on his doings on the 'KOLONIALGESELLSCHAFT'. If found it may provide some

²⁹ Signal log HMAS AUSTRALIA 14th September 1914, Darren Brown image IMPG 2436.jpg

³⁰ Dr Fred Hamilton-Kenny diary 29th August 1914 – 26th February 1915, MO SS UPOLU, Presented by Fred Hamilton-Kenny to Mitchell Library, State Library of NSW, 1964 (transcribed by Tim Smith on 19th April 2011), p68, Wednesday 16th September 1914.

³¹ Ibid, p 81 Thursday, 17th September 1914.

of the timeline answers that we are searching for, in particular, whether the 'KOLONIALGESELLSCHAFT' was the 'steamer' seen by YARRA on Sunday afternoon, 13th September and whether the 'KOLONIALGESELLSCHAFT' subsequently attacked AE1. Although it is not clear given the sequence of events, how such a report would have become available to the German Governor writing his report in Sydney on 30th October 1915 – perhaps Lauer had the opportunity to write it before being deported to Germany, or it may have been cited in anticipation?

4.10.5 Lauer appears to be a man of dedication, zeal, energy and initiative; he managed to avoid internment in Australia, return to Germany, rejoin the German Army and was killed in action on the Western front – all achieved in just over a year from the grounding of KOLONIALGESELLSCHAFT.

4.11 Petty Officer Reuschel

4.11.1 This information has been provided by Peter Richardson, gleaned from Aubrey Hodgson's reference in his diary, Reuschel's POW record at Liverpool Camp in NSW where Reuschel was registered as an alien on 23rd November 1916 and contact with his niece in Germany. Many years ago after reading Aubrey Hodgson's diary, Peter located Reuschel in the 'SS Murex' shipping list. Interestingly, Reuschel was transported to Sydney with a number of other senior German prisoners and not the rank and file. His name was in fact misspelled; his full name was Wilhelm Gustav Edwin REUSCHEL - Machinist Mate or Petty Officer, on his gravestone O.B. Masch. Mt. = that should translate into: *Chief Machinist Petty Officer* or *Chief Machinist Petty Officer Second Class*.

4.11.2 Peter has been investigating an unconfirmed suggestion that Reuschel was in Rabaul Hospital (Namanula Hill) recovering from typhoid at the time of AE1's loss. How he ended up as a prisoner on the SS AORANGI and where he was taken prisoner in Rabaul is unknown. Reuschel is believed to have been from the German steamer, PLANET (as recorded on his internment records at fig 2 below), Reuschel may have been in Mioko at the time the KOLONIALGESELLSCHAFT pulled in, joined the crew or heard the story of KOLONIALGESELLSCHAFT's action with AE1 there, he has never been confirmed as being on the KOLONIALGESELLSCHAFT.

4.11.3 John Foster dismisses Reuschel's possible involvement on the basis that he was recuperating from typhoid at the time of the action and would not have been able to assume command from Captain Banzleben, the captain of KOLONIALGESELLSCHAFT in any case.³² It is not clear how Foster was able to confirm Reuschel's illness. Nor does it explain why Reuschel would invent such a story, or how he managed to come up with such a credible account.

4.11.4 Reuschel died of the Spanish flu in February 1920, he would only have just settled in after he got back from Liverpool POW camp before he died.

4.12 Governor Haber

Aubrey Hodgson commented on the arrival of Governor Haber onboard Aorangi as a prisoner:

"The German deposed Governor was brought onboard to await passage to Sydney. He has 3 servants and large amount of luggage.

³² Foster, John, *Entombed But Not Forgotten*, Sydney 2006, p 73.

He is a dapper little man, with fat bloated face, large blossom nose, tremendous corporation, wearing a high collar, which I fear, must be a serious menace to his ears. He appears genial natured, and has a "satisfied and self-confident" air with him. He dines in his cabin, and has every comfort that can be extended, and a stalwart Frenchman stands guard over his apartments" ³³

Section 5 - Reconstructing the Sequence of Events

5.1 The Deployment to Rabaul

5.1.1 Level of Operational Work Up In AE1

Diaries and records on AE1 were lost with her, but AE2 can be looked at instead. According to PO Kinder's diary AE2 had minimal dived experience:

- x The dived trials post build in January 1914 appear to be the only occasion that AE1 dived prior to deployment to New Guinea.
- x These trials were combined with the engine trials and conducted in one day.
- x No operational work up was conducted in the UK; the 10 days spent in Portsmouth were employed preparing for the delivery voyage.
- x During this period, the gyrocompasses and WT sets were fitted.
- x The hydroplanes were removed prior to sailing from Portsmouth for the voyage to Australia to prevent damage in bad weather, so diving was not possible.
- x After arriving at Australia on 24th May 1914 AE2 (and presumably AE1) conducted a number of dives alongside to check for leaks and at least one trip outside Sydney Heads, presumably after the docking and refitting of the hydroplanes, where they dived for an hour.

5.1.2 Preparations for Deployment

AE1 and AE2 completed a docking in Fitzroy Dock, Cockatoo Island 3rd - 24th June 1914 ³⁴ and were refitting in Sydney when war was declared. The refits were truncated; AE1 and AE2 were hastily readied, completing their refits on 8th and 10th August respectively. The requirement for a depot ship was met by chartering the SS UPOLU on 18th August (discussed further below).

5.1.3 The Transit

AE1 sailed for Rabaul on 28th August and AE2 five days later. PO Kinder in AE2 records that they made a slow passage northward in company with UPOLU, arriving in Port Moresby on 5th and 6th September for fuel and provisions, sailing on the 7th to rendezvous with the main Fleet at Rossell Island on 9th September, prior to their entry into Rabaul on 11th September. The AWM photograph J03241 of AE1 at the rendezvous with HMAS AUSTRALIA and HMAS YARRA in the background is one of the first shots of the modified, fin mounted WT mast. ³⁵ It is worth noting that there would have been no opportunity to work up and little time for dived operations to induct the new members of the crew; including LEUT Scarlett who had recently joined AE1 in Sydney as the First Lieutenant.

5.1.4 Support Arrangements in Rabaul

³³ Aubrey Hodgson, diary 22nd September 1914, Australian War Memorial - 3DRL/6032 -Hodgson, Aubrey Wilfred.

³⁴ John Jeremy, former MD of Cockatoo Dockyard advised by Email 160949May11, that the dates are recorded in the original docking books, now held at the National Archives at Chester Hill; there are no details of the work undertaken.

³⁵ White, Michael W D, *Australian Submarines – A History*, AGPS 1992, p31.

Signal traffic indicates that both submarines were being supported by the engineering staff who had stood by the submarines during building (see para 5.3.2 below). They were embarked in UPOLU.

5.1.5 Trim Dives

The patrol on 14th September was AE1's first period underway after arrival in Rabaul, whilst there is no record of AE1 embarking fuel or stores on arrival, (this would not have been essential if fuel and provisions had been embarked in Port Moresby on 5/6th September). It is judged to be highly likely that Besant would have conducted a trim dive as soon as convenient after sailing and clearing the anchorage. This may explain why PARRAMATTA lost contact with AE1 after their exchange of signals early on the morning of 14th September and why AE1 made ground to the NE (the best course for diving is beam on the prevailing sea).

5.1.6 Operation Orders, Patrol Orders and Correspondence Issued By RADM Patey

Patey's Sailing Order No: 3 covered the deployment of the Fleet to PNG and is extensively quoted in his Report of Proceedings covering this period.³⁶ The Sailing Order did not include any special arrangements for submarine operations or communications. Ian Noble advises that:

- x Patey's report is in AWM E 181 File 1777 and file 1771.
- x AWM Personal Record 3DRL/0053 contains RADM Patey's letters in 17 folders.
- x Of the 17 folders only Folders 6 and 7 were relevant by time and location, and only General letter No 26 in Folder 6 included anything of relevance to our research.
- x The contents of Folder No 5 pre-dated AE1's loss.
- x Folder No 7 contained General letters Nos 28, 29 (Oct 1914), 30, 31, 32 (November 1914) and 33 (5th December 1914).
- x Patey sent this long series of letters at frequent intervals to the Secretary of the Commonwealth Naval Board of Administration in Melbourne.
- x General Letter No 26 of 20th September 1914 includes ENCOUNTER's Letter of Proceedings as an attachment.
- x Pages XVIII and XIX of Letter No 26 report the loss of AE1, and Page XXVI mentions the KOLONIALGESELLESCHAFT.

³⁶ Vice Admiral Patey, G, *Report on the Participation by the Australian Seagoing Fleet in the Operation*, p 37. AWM 33, 483047.

5.2 Geography and Weather of the Area

5.2.1 Geography

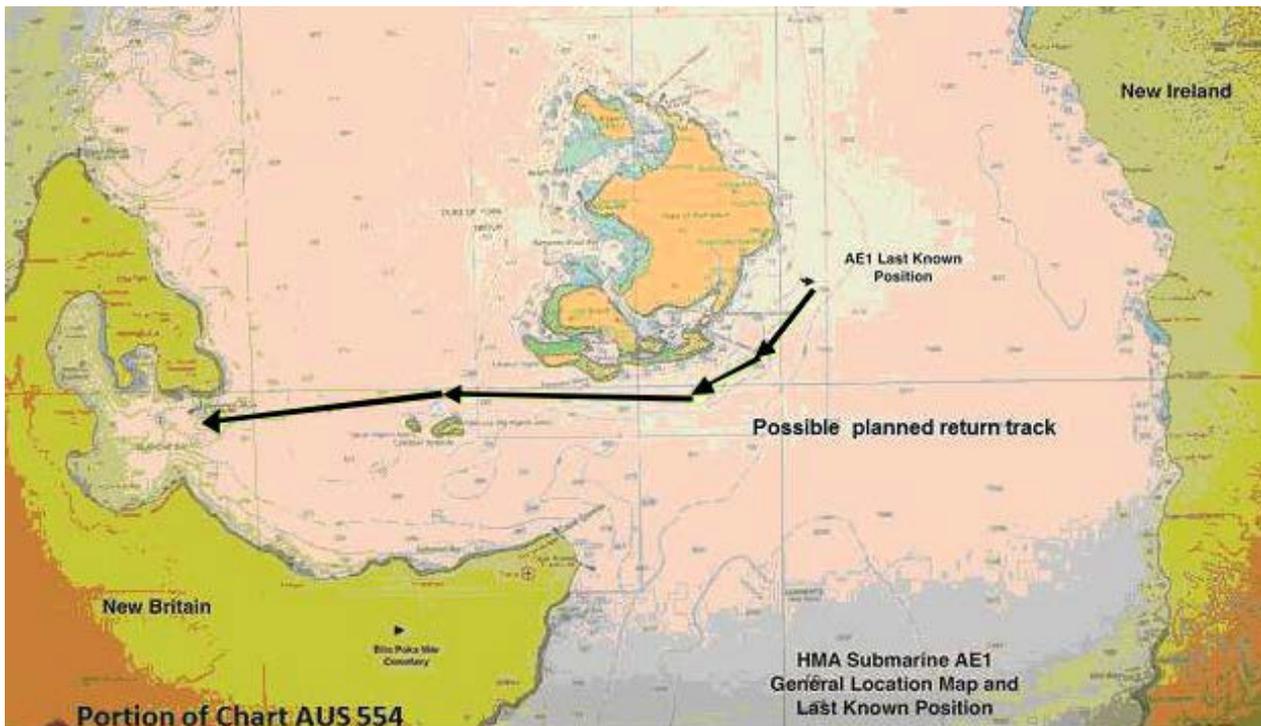


Figure 17 General Location Chart

David Nicholls' General Operations Plot reconstruction above, details the geography and relevant environmental data.

5.2.2 PNG Climate

The German Protectorate of New Guinea covered the area bounded by Latitude 1° - 8° South and Longitude 141°-156° East. The climate is essentially tropical, it is however equable, with plentiful and regular rainfall. The NW monsoon begins in late November, when the rainy season begins and lasts until March/April, frequent thunderstorms with heavy downpours occur, the weather is hot and oppressive. Towards the end of April the SE monsoon sets in, days are usually bright and clear and the wind although often boisterous, is generally a steady breeze, making conditions more pleasant than the rainy season.³⁷

5.2.3 Climate Madang

Madang as the departure port for KOLONIALGESELLSCHAFT and is sufficiently close to Raboul to be of interest. At 5° South, Madang seems to have remarkably stable weather:

- x The average temperature in September is 31°C, with an average range of 1°C.
- x September is the second driest month (after August).
- x The winds are light and very consistent; (data for 1914 could not be found), however averaging the mean wind velocity for 13 years between 1944-1982 produced an average wind speed from these years of 7.3 Km/h, with a standard deviation (SD) of

³⁷ Mackenzie, S S, *The Australian At Rabaul - The Capture and Administration of the German Possessions In The Southern Pacific*, 10th Edition, Sydney, 1941. Ch 2.

1.6 Km/h and a maximum sustained winds speed of 15 Km/h (7.5 kn) with an SD of 1.8Km/h.³⁸

5.2.4 Climate Rabaul

Climate records for Rabaul at 4° South indicates that it has very similar weather to Madang:

- x Data for 1914 could not be found, however averaging the mean wind velocity for 13 years between 1948-1979 where data was available produced an average wind speed from these years of 12.3 Km/h, with an SD of 1.8 Km/h and a maximum sustained winds speed of 22.1 Km/h (11 kn) with an SD of 2.6 Km/h. The winds are light and very consistent.

5.2.5 Climate Melbourne

As a 'sanity check' a similar set of records from the same tutiempo website was computed for Melbourne:

- x Using records for 13 years for those years where a full data set was available, the mean wind velocity was 19.2 Km/h with an SD of 2 and maximum sustained wind speed was 34.3 km/h with an SD of 2. This appears to be a credible result.

5.2.6 RAN Ships' Weather Observations

The weather recorded in HMAS ENCOUNTER's deck logs for the period 11th - 16th September 1914 is influenced by the fact that much of her time after 12th September was spent in harbour supporting the troops ashore. The predominant wind is from the SE, generally force 2-3 (4-10 kn). HMAS WARREGO spent more time at sea, analysis of her deck log for the period 14th - 16th September 1914 is consistent, a predominant wind SE, force 2-3 and records a maximum of force 5 (17-21 kn) at midday on 16th September 14 (ENCOUNTER recorded this at force 4, 11-16 Kn). In conclusion it seems that AW1 had SE winds at about 10 knots or so at time of loss.

5.3 Support Arrangements in Rabaul

5.3.1 Based on the signal traffic and the diary of Dr Fred Kenny- Hamilton, it appears that AE1 and AE2 were based on the UPOLU, which served as the depot ship and accommodated the engineering support team of LCDR D P Herbert RAN and LEUT H G Patterson RN. UPOLU was manifestly inadequate for the role and reverted to her original owners shortly after the PNG deployment. The RANR Commanding Officer's Report of Proceedings for the ship's period in service reads like a G&S comedy.³⁹ It is understood that the owners sued the RAN over the state of the ship, it appears that a Board of Inquiry held to investigate the situation supported the CO's assessment of the very poor state of the ship and its machinery, and these were strongly supported by RADM Patey who added several additional issues to the long list of defects⁴⁰ It is likely that the workshops of major fleet units such as SYDNEY and ENCOUNTER were used to provide engineering support. SYDNEY had acted as the escort for AE1 and AE2's passage from Singapore to Sydney and had 'turned up' (manufactured) toggle bolts to repair defective engine clutches during this passage.

³⁸ www.tutiempo.net

³⁹ Commanding Officer SS UPOLU Report of Proceedings, NO File 15/3315, dated HMAS PENGUIN, Garden Island, 26th December 14, image IMG_0415-0418.jpg

⁴⁰ VADM Patey letter 14/8600 dated 28th October 14, SS "UPOLU" Unsuitability as tender for Submarines.

5.3.2 SM Engineering Officer Support.

5.3.2.1 This information was provided by Gus Mellon. There were two engineering officers assigned to the construction and subsequent operations and maintenance of AE1 and 2. LCDR (later CMDR) Douglass Phillips Herbert RAN was the senior of the two men, assisted by Engineer LEUT Halliday Gunning Patterson RN (HGP). Neither served at sea as submarine crew, but proceeding to sea in the submarines when required to attend at sea trials, etc.

5.3.2.2 Darren Brown constructed a timeline, which show the following specific entries for LEUT Patterson:

- x 14th September 1452 hrs local - SYDNEY sent message to UPOLU; LCDR. Coleman to LEUT. Patterson; can you let me have receipt note for submarine stores before 2000 hrs, (HMAS SYDNEY signal log).
- x 14th September 1525 hrs local - LCDR. Coleman to LEUT. Patterson, can you let me have receipt note for submarine stores before 2000 hrs, (AUSTRALIA Signal log).
- x 14th September 1550 hrs local - AUSTRALIA sent message to UPOLU; Engineer LEUT of submarines is to repair onboard Flagship without sword. (*Implying that a rebuke is in store, but not a court martial!*).

5.3.2.3 Since SYDNEY had been supplying submarine stores and lube oil to UPOLU for the submarines, it might be reasonable to assume that they also supplied machining/ workshop services as well. Although SYDNEY left port later that day, it is possible that her workshops had turned up the toggle bolts to repair a defective main engine clutch (if that was the defect on the starboard power train) and sent them across by ship's boat prior to her departure. Besant's account of AE1's voyage from Portsmouth to Australia records seven instances of defective clutches. The port clutch had four toggle bolts; on arrival in Darwin, all were found to be broken, and SYDNEY turned up replacement bolts.⁴¹ This could be the explanation for the request for a receipt for 'submarine stores' sent by SYDNEY on 14th September noted in para 5.3.3.2 above, alternatively (and less likely), SYDNEY may have still been carrying some of the submarine spares transferred to her for the delivery trip. Interestingly, SYDNEY's deck log records the discharge of an ERA to UPOLU at 1030 on 13th September, possibly in connection with repairs?

5.3.2.4 There is much less likelihood that ENCOUNTER had a hand in any repair work on that day, given her mission and her location at anchor in Herbertshohe following her bombardment of German positions in support of the Australian landings.

5.3.2.5 Both officers were carried in the submarine support ships and both were at Rabaul, billeted in UPOLU rather than PROTECTOR, as the signal traffic in the timeline at Annex B shows.

5.3.2.6 LCDR Herbert was known to be a good engineer and was lauded as such by both Stoker and Besant; he had a long and distinguished career in the RAN, retiring as a CMDR after WW II.

5.3.2.7 In 2010 Gus Mellon found CMDR Herbert's surviving son living in outer suburban Melbourne and he kindly reviewed the few papers that he still had belonging to his father. They were mostly letters, small artefacts, etc - no diaries - and there was nothing in them that pertained to the technical status of the submarines.

⁴¹ Foster, John, *Entombed but Not Forgotten*, Sydney, 2006, p19.

5.3.2.8 LEUT Patterson has proved a much bigger challenge. He was born in Brazil of British parents and he later returned to the UK and joined the RN as an engineering officer through what subsequently became Royal Naval Engineering College (RNEC) MANADON, near Plymouth. He volunteered for 3 years' service with the RAN (May 1913 to July 1916) for submarine construction duties and was accepted. He had a continual problem with his mess bills and their payment, as well as his conduct in other ways, which let him down consistently. His RN service record stated that the Australian Commonwealth Naval Board called for his resignation due to such accumulated offences (in 1916) and went off to seek his fortune in the Americas. Through the kind offices of a gentleman in London who is a keen amateur genealogist with a specialization in the area of British emigrants to Brazil, parts of his trail was found, all the way through to his death. He travelled into and out of Brazil to the west coast of America (Alameda, San Francisco and possibly other locations) several times. He appeared to have married, possibly in the USA, though no subsequent record of his wife after the 1930 US Census was found.

5.3.2.9 He returned to the UK (wife-less) prior to the outbreak of WW2 (September 1938), where he re-applied for and was eventually (1940) granted a commission, serving throughout the war in various naval engineering capacities, where he was once again lauded for his engineering abilities but despaired of his lack of "officer-like qualities". He was released from naval service in April 1945 and his death certificate had him living at the Naval Club, 38 Hill St, Westminster, when he died from cancer of the oesophagus, at St Thomas's Hospital on 28th October 1949. What he did for most of those last four years, we are not sure. Immediately before his death however, he was working for MI6, as the operator of a motor launch which was running agents into Bulgaria, as part of the hopelessly compromised, Kim Philby led, 'Operation Valuable' - he certainly had a chequered career!

5.4 AE2 & YARRA Patrol 13th September 1914

5.4.1 HMAS AE2 and YARRA conducted the first patrol on Sunday, 13th September. Kinder notes that AE2 took the first patrol in lieu of AE1, the latter had 'engine trouble'. He records an uneventful 'glorious' day, with glassy seas and picturesque coconut palm covered islands. Stoker provides few details in his autobiographical account.⁴² It is not apparent whether AE2 dived during the day. We have been unable to locate YARRA's signal, WT or deck logs to add to this picture.

5.4.2 At 1730, YARRA broke off the patrol SE of Point Gazelle and headed back towards the anchorage at Herbertshohe. At 1800 she sent a signal reporting the sighting of a steamer off Duke of York Islands and advised that she was proceeding to investigate. However, the Admiral's focus and concern was on the landings underway around Herbertshohe and WARREGO and YARRA were tersely ordered to proceed in accordance with previous orders (to support the landings); the steamer would have to wait for another day! There are no details recorded on the steamer's size, position or heading.

⁴² Commander HG Stoker, DSO, RN, *Straws In The Wind*, London 1925, p 64.

5.5 AE1 & PARRAMATTA Patrol 14th September 1914



Figure 18 - HMAS PARRAMATTA

AWM 301140

5.5.1 Communications between AE1 and PARRAMATTA

5.5.1.1 We have been unable to determine if AE1 had stowed her WT mast prior to sailing on 14th September 1914 in order to be able to dive quickly if required, or to conduct a trim dive. No WT messages from her are recorded in any of the ships' WT logs on the 14th September. Nor have we been able to locate PARRAMATTA's signal or WT logs.

5.5.1.2 Patey's Report of the loss of AE1 dated 17th September 1914 ⁴³ indicates that the aerial was probably rigged and the set working at 1430 when the last message was exchanged with PARRAMATTA:

"PARRAMATTA" and Submarine A.E.1 were in communication by wireless at 2.30 p.m. and when A.E.1 asked "PARRAMATTA" what he considered the visibility was. So that there is no doubt he was all right up to that time.'

5.5.1.3 Stoker implies in his account that AE1's WT was working: ⁴⁴

"....Admiral signalling by wireless for information. No reply could be obtained from AE1."

5.5.1.4 WT contact would explain how PARRAMATTA was able to steam directly to AE1's location having lost visual contact with her earlier that morning. However, it is not clear how Patey came by this information, as he indicates in the same report, he had not had the opportunity to talk with the CO of PARRAMATTA:

'I had to leave Rabaul at noon on 15th September, so have had no opportunity of seeing the Captain of "PARRAMATTA."

5.5.1.5 Nor do the reports from PARRAMATTA confirm this advice that AE1 and PARRAMATTA were in communication by WT during the afternoon of 14th September. Few, if any records of WT signals being sent from or to AE1 and AE2 can be found in the signal logs of the other

⁴³ Navy file 14/7429, Darren Brown images 373306_0028, 29 and 30.jpg

⁴⁴ H. G. Stoker DSO, Commander RN, *Straws In The Wind*, Herbert Jenkins, London, p 64.

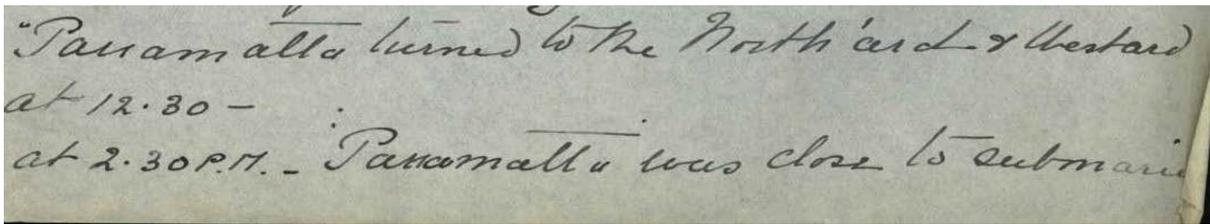
participants. One of the few was a message from AE2 to PARRAMATTA was logged in ENCOUNTER's signal log at 1230 on 16th September:

"Have wireless mast rigged and will look for you every half hour"

5.5.1.6 On balance it would appear possible that PARRAMATTA and AE1 were in WT contact during the course of the patrol on 14th September, but we lack conclusive evidence to confirm this likelihood.

5.5.2 Last Sighted Position

5.5.2.1 LEUT Warren's Report of Proceedings of PARRAMATTA on Monday 14th September 1914 does not actually give a definite position for AE1's last sighting, simply stating that 'At 1430 PARRAMATTA was close to submarine':

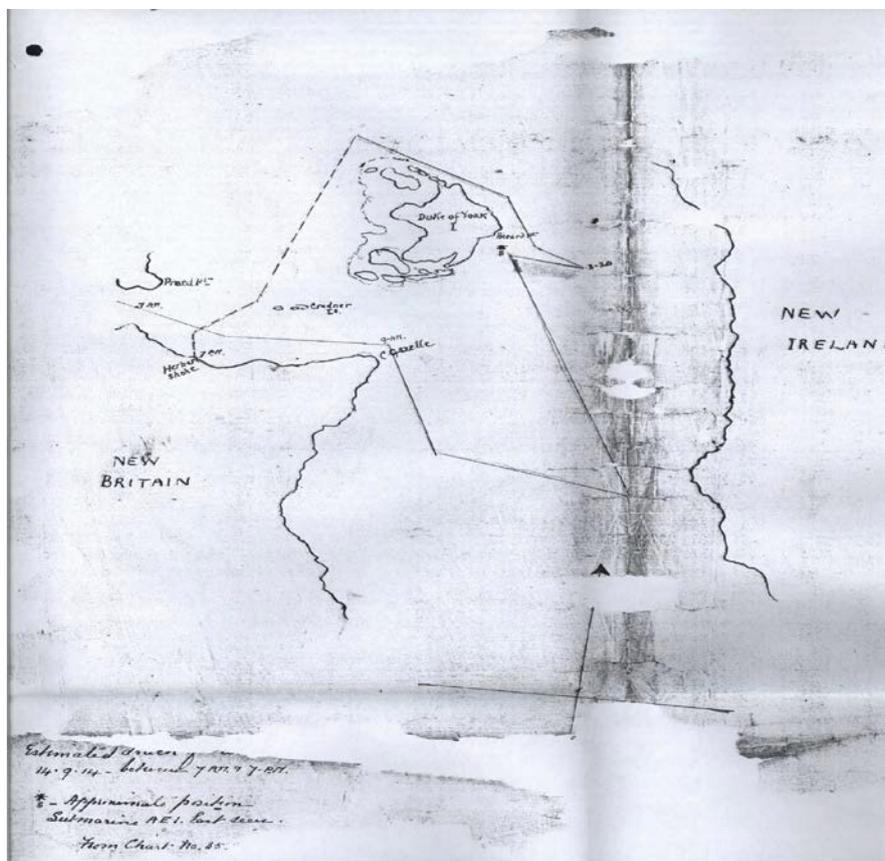


*"Parramatta turned to the North and Westward at 12.30 -
at 2.30 P.M. - Parramatta was close to submarine"*

Figure 19 –LEUT W H F Warren's original manuscript Report of Proceeding of HMAS PARRAMATTA for 14th September11

Image Darren Brown

The tracing of the chart attached to LEUT Warren's Report of Proceedings of HMAS PARRAMATTA on Monday 14th September 1914 provides the only firsthand record of AE1's 'last sighted' position.



This tracing is a reconstruction, rather than a precisely plotted position based on fixing both PARRAMATTA and AE1 simultaneously.

5.5.2.2 The covering letter to this report dated 21st September at Rabaul advises that it is:

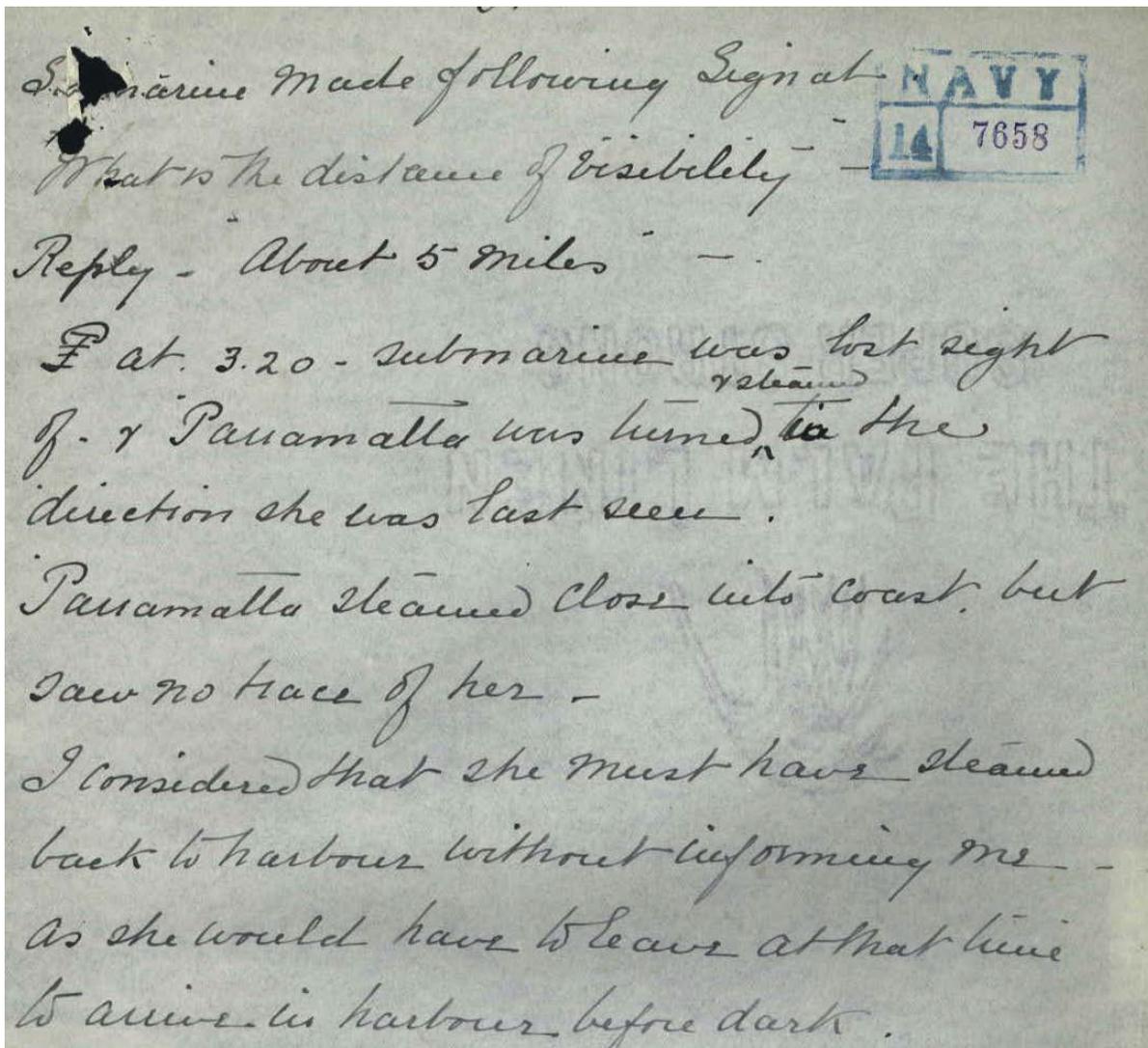
'accompanied by tracings shewing estimated courses of PARRAMATTA on that date & approximate position of Submarine A.E.1. when last seen.'

The asterisk S in the legend at the bottom left hand corner refers to the symbol S on the chart, this is identified as:

'Approximate position Submarine AE1. Last seen.'

From Chart No. 35.'

5.5.2.3 Page 3 of LEUT Warren's Report of Proceedings of HMAS PARRAMATTA on Monday 14th September 1914 continues, 'At 2.30pm Parramatta was close to submarine...' next paragraph 'At 3.20 submarine was lost sight of...'



Submarine made following Signal - NAVY
14 7658
What is the distance of visibility -
Reply - About 5 miles -
I at 3.20 - submarine was lost sight
of. & Parramatta was turned ^{steamed} to the
direction she was last seen.
Parramatta steamed close into coast, but
saw no trace of her -
I considered that she must have steamed
back to harbour without informing me -
as she would have to leave at that time
to arrive in harbour before dark.

A manuscript letter dated 21st September 1914 covered the Report of Proceedings:



!!!L7058

In reply please quote

No.

b.MR.\$...! (?... {!}...
at... 2k? .. a...c...!...
.....-!t... &... ..t... 091 (/-

To The Vice Admiral
Commanding H.M.A. Fleet:
(Through Command (10))
Sir I have the honour to submit the following
Report on proceedings of H.M.A.S. Parramatta
on Monday 14th September 1914 accompanied
by tracings showing estimated courses
of Parramatta on that date, & approximate
position of Submarine A.E.1. when last
seen.

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All records contain the caveat 'approximate' – ergo we are dealing with a reconstruction and should consider the last sighting position as a probability area, rather than a precise position.

5.5.2.4 Likely Navigational Accuracy

PARRAMATTA should have been within visual fixing range of the Duke of York Island, allowing for a compass error of up to 5 degrees, (it is not known what sort of compass PARRAMATTA had, it appears to have been a magnetic compass; Besant's diary of the voyage to Australia reports AE1's gyro compass had an error of +/- 3 degrees⁴⁵ this may be typical for the earlier gyro compasses). The position reported by PARRAMATTA should have been within about 1 nm of the reported position after allowing for fixing and plotting errors.

5.5.2.5 Even allowing for the traditions of the 'Silent Service' and 'stiff upper lip stoicism' of the era, Warren's Report is remarkably abbreviated and short of any elaborating detail about the incident, AE1's appearance, movements or state. In the absence of any formal inquiry into the loss, it is the only firsthand record survives today. PARRAMATTA was 'close to submarine' at 2.30 pm. The 'last seen time' is reported in PARRAMATTA's ROP as 3.20 pm; PARRAMATTA then continued in her ROP that she headed back close to the coast and saw no further sign of her.

5.5.3 Subsequent Discrepancies In Last Seen Position

5.5.3.1 At approximately 2140 on 14th September PARRAMATTA advised AUSTRALIA⁴⁶ that AE1 was last seen at 1530, this is marginally different to PARRAMATTA's initial report that records a last sighting at 1520. Nothing much turns on this discrepancy.

5.5.3.2 At 2310 HMAS WARREGO (Commander D) having been ordered by Patey to search for AE1, asked AUSTRALIA for the last seen position, after a 2 hour delay AUSTRALIA advised 'St George's Channel' – an area, rather than a position.

5.5.3.3 In response to a query from ENCOUNTER on the last sighted position, at 0820 on 15th September, PARRAMATTA advised, that she had last seen AE2 at 'Waira Pt., Duke of York Islands, 1530 hrs on 14th September.⁴⁷ This appears to be some distance to the north of the position plotted on the tracing accompanying the ROP.

5.5.3.4 Patey's Report of Proceedings of the Fleet Operation to capture PNG continues this air of imprecision, by advising that AE1 was last seen at about 1530 between Waira and Jaquinot Pt. (the latter is further south and west of PARRAMATTA's reported position on the tracing).⁴⁸

5.5.4 Hypothesis For AE1's Movements 14th September 1914

5.5.4.1 It is difficult to be precise about AE1's behaviour on the 14th - since we have no firsthand accounts to counter any incorrect assertions by us; much of what we are left with is conjecture. We will never know why AE1 deviated from the instructions issued for patrolling (and followed carefully by Stoker in AE2 the previous day).

5.5.4.2 One line of supposition is that Besant chose to look for the steamer reported by YARRA

⁴⁵ Foster, John, *Entombed But Not Forgotten*, Sydney, 2006, p 20.

⁴⁶ HMAS AUSTRALIA Captain's signal log.

⁴⁷ HMAS ENCOUNTER Captain's signal log.

⁴⁸ Darren Brown image IMG2144.

on the previous day to the south of Duke of York Island. If so, the southern side of the Duke of York Island was the logical place to investigate:

- x It could be interpreted that Besant chose to view the instructions to PARRAMATTA as not pertaining to him - 'what orders do **you** have' and headed off in search of yesterday's steamer, action, glory and prize money?
- x It is strange that as the senior officer of the two he did not take charge of PARRAMATTA (as Stoker appears to have done the day previously with YARRA). This dissociation with the orders given to PARRAMATTA could explain it.
- x On the other hand, AE1 could have been wrestling with a defect or series of defects (e.g. a diesel/main motor or gyro) that caused him to part company and not cover much ground at all, only making it to AE1's 1430 position during the course of the day.
- x AE1 could be expected to conduct a trim dive shortly after 0900, perhaps turning to the north east as the best course for diving (beam on to the sea) and would have lost contact with PARRAMATTA during this evolution.
- x We have been unable to definitively establish how the signals between AE1 and PARRAMATTA were passed. One possibility was by flashing light or megaphone – this could explain the absence of WT traffic in other ship's logs, perhaps AE1 had stowed the aerial in order to be able to dive at short notice, this would remove her WT capability.
- x Flashing lights would require them to be reasonably close, say less than 5,000m and possibly explains why there were so few messages between them.
- x The stowed WT aerial would prevent a distress message being sent quickly after an accident.
- x On the other hand, we have Patey's report that AE1 and PARRAMATTA were exchanging messages by WT on the afternoon of the 14th September 1914. This would also explain how PARRAMATTA was able to relocate AE1 so readily on the afternoon.

5.6 The Search

5.6.1 The search mounted by the RAN ships was not well coordinated; no instructions were issued regarding a datum or allocating specific areas to the various units.

- x AUSTRALIA was first alerted to AE1's failure to return by a signal from Stoker in AE2 at 2015.⁴⁹
- x YARRA and PARRAMATTA sailed after 2300 to commence the search; ENCOUNTER joined the search for the period 0525-1045 and WARREGO after 0900 on the 15th.
- x AUSTRALIA and SYDNEY sailed for Sydney pm 15th, leaving ENCOUNTER in charge of the search.
- x Several ships had to request the last known position and status of the search; they seemed to have largely used their own judgement on where to search.
- x Predictably, given this lack of central coordination, ambiguity crept in over the last known position.
- x Nonetheless, the areas searched appear to have covered the areas most likely to contain AE1, and any wreckage or debris, albeit the strong currents experienced in the area would disperse these during the hours of darkness.
- x A detailed discussion of the search conduct is contained in Annex C.

⁴⁹ HMAS AUSTRALIA signal log 14th September 1914, Darren Brown image IMG2450.jpg

5.6.2 It appears from the signal traffic that the direction of the search was largely left to the participants. For example, the decision for YARRA and PARRAMATTA to search 30 nm to the northwest was made by these ships, not RADM Patey. A WT message from PARRAMATTA to the Flag logged at a time of 0442 records:

*'Submit passed around Duke of York Islands, nothing seen to North with "YARRA" could motor schooner proceed and examine Credner and Duke of York Island and N.E. Coast New Britain at daylight while we search seaward to N.W.'*⁵⁰

RADM Patey's report claims this as his initiative:

'On the morning of the 15th September, nothing having been seen, I ordered the "PARRAMATTA" and "YARRA" to make a sweep 30 miles to the N.W. of Duke of York Island. In this, they were joined by "WARREGO", who was returning from an expedition to Kawieng (sic). Nothing was seen.'

5.6.3 AUSTRALIA made 3 unanswered WT calls to AE1 on the evening of the 14th as concerns mounted for her safety.

5.6.4 The signal traffic on the morning of 15th September illustrates a level of confusion. For example, ENCOUNTER sailed as ordered at 0525 to look for AE1 from her position as guardship off the Beehive Rocks in the entrance to Rabaul. By 0720 RADM Patey realised he no longer has a guardship on station and he inquired as to her position and actions. ENCOUNTER responds (to an unlogged signal) - 'I am searching for submarine in accordance with your orders'.⁵¹ This is as pointed as a subordinate can be to a senior officer! The response comes quickly, at 0755 Flag directs ENCOUNTER peremptorily, 'Return to harbour at once'. And the inevitable conclusion to this exchange, relayed by YARRA to ENCOUNTER at 1028, 'Rear Admiral wishes to see Captain on anchoring'.

5.6.5 By 1415 on 15th September, when PARRAMATTA returned to anchor in Simpson Harbour the search is effectively over, apart from motor boats and a motorised schooner.

5.6.6 If RADM Patey or ENCOUNTER had come to a conclusion as to AE1's position when lost they did not record it.

5.7 Events Ashore

5.7.1 The command and control arrangements for what was a joint Army-Navy operation were imprecise by today's standards. Naval forces were controlled by RADM Patey in HMAS AUSTRALIA, Colonel Holmes ('the Brigadier Commanding Australian Forces') remained in HMAS BERRIMA and was in charge of arrangements ashore; Patey steered clear of these arrangements. The single WT circuit operated by the ships provided the real time interface between the two commanders, who also met on a couple of occasions during the engagements ashore. In the event there were some excellent examples of local commanders acting on their own initiative to fill the gaps – with very successful outcomes.

5.7.2 The actions ashore commenced soon after the RAN force arrived off Rabaul and Herbertshohe on the morning of 11th September 14. SYDNEY had earlier embarked 50 men from the naval contingent carried in BERRIMA; 25 of these were landed at Herbertshohe, the remaining 25 were transferred to WARREGO and YARRA for landing at Kabakaul (6.5 km east of

⁵⁰ HMAS AUSTRALIA signal log 15th September 1914, Darren Brown image IMG2461.jpg

⁵¹ HMAS AUSTRALIA Captain's signal log 15th September 1914.

Herbertshohe). It was believed there were two wireless stations, one operational, sited inland from Kabakaul, and the other under construction, inland from Herbertshohe. The two landing parties were directed to capture their respective WT stations.

5.7.3 One party of 25 under LEUT R G Bowen landed unopposed at 0700 on jetty a little east of the Kabakaul pier. 12 men from WARREGO and YARRA reinforced LEUT Bowen. The party moved inland, soon encountering the German defenders and fighting ensued. WARREGO and YARRA responded to a call for reinforcement by landing an additional 59 men armed with a variety of weapons (cutlasses, pistols and some rifles), under Lieutenant Hill from YARRA. At the same time, further reinforcements were called for and two companies (100 men) from the naval contingent on BERRIMA also landed and reached the firing line at 1300. By 1900, the wireless station was in their hands, with the equipment still intact – *'an affair of continuous good luck, used promptly and to the full by the men concerned'*.⁵² The good news finally reached Patey at 0100 on 12th September 11. The action is well described in the Official History of Australia's Involvement in the War 1914-1918, Volume IX Chapter 3 and Volume X Chapter 5.

5.7.4 The party of 30 under SBLT C Webber looking for the second WT station under construction landed at Herbertshohe unopposed at 0600 and set out on the road to Toma, 6.4 Km away. Having reached the halfway point without opposition or discovering any signs of a WT station, Webber decided that he had overshot the station or the information was erroneous, since his force was not large enough to maintain contact with the shore party guarding the wharf, he decided to return to Herbertshohe. That afternoon, as concern at the lack of news from Webber mounted, a military detachment of four companies of infantry, a machine gun section and a naval party from SYDNEY with a 12-pounder gun landed at Herbertshohe at 1530 to regain contact with Webber. Webber returned at nightfall and the force garrisoned at Herbertshohe.

5.7.5 The next day, on 12th September BERRIMA re-embarked some of the forces ashore in Herbertshohe and proceeded alongside the Rabaul pier at 1800. A force of infantry and naval reservists was landed and secured Rabaul unopposed. The British flag was hoisted at a ceremony at Rabaul at 1500 13th September 1914.

5.7.6 The ships' signal logs for 13th September are busy with messages concerning the landings and movement of forces ashore. YARRA's sighting of a steamer at 1800 arrived during a period when the shore parties appeared to still be under threat, causing the Admiral to curtly reinforce his orders to the destroyers (WARREGO, YARRA, and PARRAMATTA) not to pursue the steamer and to support the landings at Herbershohe.

5.7.7 In the early hours of 14th September Lt Col Watson, ashore at Herbershohe, was ordered to advance at 0600 on Toma with 4 companies of infantry and a machine gun and field gun landed by ENCOUNTER, in order to arrest Governor Haber. ENCOUNTER advised Watson that captured sketches showed the enemy positions and that ENCOUNTER intended to shell these with 6" 'lydite' at 0600 in support of this advance. At 0830 ENCOUNTER advised the Admiral that 48 rounds of 6" had been fired. The signal logs indicate that the day was a busy one providing support to this advance and anxiously waiting for news. At 2143, Lt Col Watson signalled via ENCOUNTER that he had successfully occupied Toma at 1500 and had returned to Herbertshohe at 1830. The Governor had surrendered and arrangements had been made for him to report to Herbertshohe at 1100 the next day, 15th September to negotiate the terms. Watson complimented ENCOUNTER on the accuracy of her shelling; it appears to have had a dramatic impact on the negotiations with the Governor.

⁵² Jose, Arthur, W, *The Official History of Australia In The War 1914-1918*, Vol IX, Ch 3, Sydney, 19

5.7.8 This concluded the fighting ashore. Negotiations on the terms of capitulation continued until 17th September and the formal laying down of arms by German forces occurred on 21st September at Herbertshohe. Colonel Holmes managed these operations. In the meantime Admiral Patey had other matters to concern him; the loss of AE1, the whereabouts of the German Pacific Squadron and the need to prepare major Fleet units for the escort of the first AIF convoy to the Middle East to name but a few.

5.8 Formal Inquiries & Reports

5.8.1 HMAS ENCOUNTER's Board of Inquiry

Shortly after AUSTRALIA sailed from Rabaul on 16th September Patey directed CAPT C. La P. Lewin, RN, the Commanding Officer of ENCOUNTER, to conduct a Board of Inquiry and to call LEUTs Warren, the CO of PARRAMATTA, and Stoker, CO of AE2, as witnesses. AUSTRALIA returned to Rabaul at short notice on 19th September in response to (false) reports that the German Pacific Squadron was enroute New Guinea. This unexpected return may have served to nullify the orders, in the event it does not appear that the Board of Inquiry was held and no records have been found.

5.8.2 RADM Patey's Report of 17th September 1914

5.8.2.1 RADM Patey rendered a three page report to the Naval Board, dated 17th September 1914⁵³ including the statement that AE1 had been in contact with HMAS PARRAMATTA by WT at 1430. It is not clear how Patey obtained this information; he advises that he had not had an opportunity to speak directly with LEUT Warren (due to ship movements). If the Patey report is correct (corroboration has not been found), then AE1 had the WT mast rigged and a working WT set at 1430. A functioning WT capability in AE1 would have significant implications:

- x Since AE1 was essentially heading for Rabaul, it is judged most unlikely that Besant would have lowered the WT mast for what was intended to be a surfaced passage back to her depot ship, UPOLU.
- x If AE1 was forced to dive to avoid gunfire the WT mast would have had to be left up - in the knowledge that it would probably be carried away (but better to lose the WT mast than the submarine).
- x In the event of grounding whilst surfaced enroute Rabaul with the WT mast up one could reasonably expect that AE1 would have sent a distress call - presuming the mast survived the grounding and someone was listening?
- x On the other hand it could argued that if Besant intended to do a check dive, then he would have lowered the WT mast, dived, had a fatal accident of some sort and there would have been no distress call.
- x A practice dive at this time of day is considered unlikely by Stoker (and contemporary submarine operators), particularly given the instructions to be back by sunset was reinforced so directly by AUSTRALIA's approval to proceed that morning.

⁵³ Navy Office file 14/7429 dated 17th September 1914.

5.8.2.2 RADM Patey concludes that:

9. The weather was fine but hazy, the sea smooth, no enemy in the neighbourhood, so I can only think that she made a practice dive on her way back to harbour, and through some inexplicable accident failed to return to the surface. The water is very deep in the vicinity, i.e., from 200 to 300 fathoms.

This conclusion is heavily qualified:

10. I have interviewed Lieutenant Stoker of Submarine A.E.2, but he can throw no light on what might be the cause. In his opinion, her motive power could not possibly be entirely disabled, nor could any internal explosion have occurred. She cannot have been in collision as there were no craft in the immediate neighbourhood. If she struck on any underwater danger and so foundered, some traces would have been found.'

5.8.3 RADM Patey's General Letter # 26 dated 20th September 1914

5.8.3.1 RADM Patey wrote a series of 'General Letters' to the Secretary of the Navy. AWM Personal Record 3DRL/0053 contains RADM Patey's letters in 17 folders. Of the 17 folders only Folders 6 and 7 were relevant by time and location, and only General letter No 26 in Folder 6 included anything of relevance to our research. The contents of Folder No 5 pre-dated AE1's loss. Folder No 7 contained General letters Nos 28, 29 (Oct 1914), 30, 31, 32 (Nov 1914) and 33 (5th December 1914).

5.8.3.2 Letter # 26 dated 20th September 1914 from Rabaul covers the loss of AE1, discovery of KOLONIALGESELLSCHAFT aground on the reef and it forwards a copy of HMAS ENCOUNTER's Report of Proceedings whilst in charge in Rabaul during HMAS AUSTRALIA's absence. The letter contains some new advice on the loss of AE1 and finding of KOLONIALGESELLSCHAFT and is the first record of HMAS ENCOUNTER's Report that has been found.

5.8.3.3 Page 18 of this Report covers the loss of AE1. It includes advice on the loss of AE1 that is marginally different, or not contained in the earlier Report:

'At 3.30 p.m. "PARRAMATTA" saw Submarine AE1 to the South East of Duke of York Island apparently returning towards harbour. This is what A.E.1 should have been doing.

This is the last definite intelligence of her whereabouts.

I have not had the opportunity yet to interview the Captain of "PARRAMATTA" – he apparently stayed out for a last look around, returned to Herbertshohe, and was relieved by "YARRA" for the night patrol at 7.0 p.m.'

5.8.3.4 We know from PARRAMATTA's Report of Proceedings (see para 5.5.2.1 above) that he lost sight of the submarine at 1520. Further, LEUT WARREN made no comment in his report about AE1 'returning to harbour'; he presumed this was what she he had done.

5.8.3.5 It is unfortunate that RADM Patey had still not interviewed the Captain of PARRAMATTA prior to writing this letter. One is left wondering whether fresh information has caused the subtle but significant changes in his account, or the passage of time is blurring his recollection of events or he is adjusting his account to cast his actions in the best possible light!

5.8.3.6 Letter # 26 continues:

'At 8.0 p.m. as Submarine A.E.1 had not arrived in harbour, I ordered "PARRAMATTA" and "YARRA", burning navigation lights and using searchlights as necessary, to proceed to search.'

5.8.3.7 As discussed further below at para 5.8.8 this is incorrect, the orders for the search were not issued until later in the night and the first ship, PARRAMATTA, sailed to undertake the search at 2320.

5.8.3.8 Fresh details on the area searched without result are provided; the statement on the complete absence of oil seems to overlook ENCOUNTER's report of an oil slick, subsequently dismissed as a slick from a passing ship:

'The outlying Islands and their coasts, also the coasts of New Ireland and New Britain and all the neighbouring waters, have been searched for an extent of 30 miles. Not the least trace of the Boat, nor of escaping oil, has been found. I deeply regret to report that there does not seem the least prospect of Submarine A.E.1 being afloat.'

5.8.3.9 It is clear that RADM Patey still expected that a Board of Inquiry would be conducted by Acting Captain Lewin in ENCOUNTER:

'I have directed Acting Captain Lewin of "ENCOUNTER" to hold an enquiry and report the result. I am also furnishing a separate report on this regretful incident.'

Further research in his subsequent letters held in the AWM collection indicates no report of ENCOUNTER's inquiry so it is assumed that none was ever held.

5.8.3.10 Page 26 the letter covers the discovery of the KOLONIALGESELLSCHAFT and also adds some critical new details:

'With reference to the report of the finding of the wreck of KOLONIALGESELLSCHAFT, this craft belongs to the exchequer of the Protectorate of German New Guinea; "SYDNEY" passed this spot at noon on 15th September, the day after the loss of the Submarine and there was no wreck there then. The KOLONIALGESELLSCHAFT must have gone ashore on one of the nights 15th, 16th or 17th September. Subsequent investigation shews that KOLONIALGESELLSCHAFT was from the westward and not the eastward, and therefore it does not appear possible to connect her in any way with the loss of Submarine A.E.1. The wreck was examined on 19th September by Commander (D) and the King's Harbour Master.'

5.8.3.11 What Admiral Patey meant by stating that the KOLONIALGESELLSCHAFT came from the westward, not the eastward, is unclear. She came from Madang, which is to the westward of where she grounded so perhaps he meant that. On the other hand perhaps he meant to indicate her direction of travel at the time of the grounding, although the wreck could also have swung around with the tidal stream before she was discovered. RADM Patey clearly discounted the possible effect of the tide as he considers it conclusive evidence that she was not involved in the loss of AE1.

5.8.4 HMAS ENCOUNTER'S Report of Proceedings by Acting Captain Lewin.

5.8.4.1 RADM Patey's letter # 26 forwarded a copy of Acting Captain Lewin's Report of Proceedings dated 19th September 1914, covering activities during AUSTRALIA's absence from noon on 15th September. The following extract from page 1 of the Lewin Report covers the completion of the search for AE1 and finding of KOLONIALGESELLSCHAFT aground on the reef:

'The PARRAMATTA returned on the afternoon of the 15th from her search for the submarine and reported having seen no trace anywhere; search was made in conjunction with YARRA over a

10th February 2012

large area 30 miles to the Northward of Duke of York group of islands, the latter group was searched by YARRA ’

It, continues on page two and three:

At 7 p.m. on the 17th ENCOUNTER, WARREGO and PARRAMATTA weighed and proceeded at ten knots to the west side of the Gazelle Peninsula, ’

On returning to Rabaul the Destroyers were sent on ahead with a view to searching ATALIKLIKUN Bay but finding a small steamer ashore near the beacon on the reef on the north west point of the Peninsula, WARREGO sent a boat to examine the wreck and found it was the KOLONIA or KOLONIAL; she had been abandoned and was on fire, apparently by design. In the bow was a pedestal and mounting for a gun, the pivot was quite bright, as it is evident that the ship had not been long on the reef and the gun but recently removed; further a used one pounder cartridge was picked up on board of her and I am strongly of opinion that this steamer is connected in some manner with the mysterious disappearance of A.E.1. I have sent NUSA⁵⁴ with Lieutenant Commander Jackson on board, conveyed by WARREGO, to search that part of the coast and to obtain any information he can as to the whereabouts of the crew of KOLONIA; it is possible that they may have taken the crew of A.E.1 with them. The ENCOUNTER and two destroyers returned to Rabaul at 6.30 p.m. ’

5.8.4.2 Lewin’s report continues with details of the search for AE1 on page 3 and 4 and information on the theory of a German steamer involvement in the AE1’s loss:

‘In addition to the search for the submarine A.E.1 by the destroyers, the New Ireland coast was closely searched from Matakin River (Lat 3° 55 S) southward to TAMBAKAR point, also the coast from C.TAVUI to PRAED POINT in the crater peninsula by the Chief Officer of the “Berrima” in the “Nusa” while Lieutenant Commander Jackson made a most minute search of the whole of the Duke of York group. In neither case was any (sic) traces found, but Lieutenant Commander Jackson obtained information from a native that a small steamer had been in there at a previous date and I would suggest that on his return from examining the North west coast he be sent over again in the Duke of York group to see if he can obtain any further information concerning this small steamer and anything about her and whether she was carrying a gun at the time.

5.8.5 HMAS WARREGO Deck log and Other Records

Whilst it does not provide a precise position for the wreck WARREGO’s fair deck log provides sufficient information on her course and position to reconstruct her track and assess the most likely position of KOLONIALGESELLSCHAFT. The resultant position is consistent with that ascertained from HMAS ENCOUNTER’s log. We have not found copies of WARREGO’s signal or WT logs and are reliant on ENCOUNTER’s records; these are fair versions of these logs.

5.8.5.1 The Lewin Report does not give a date; ENCOUNTER’s deck log and Captain’s signal log confirms that the sighting took place on 18th September.⁵⁵

5.8.5.2 Reconstruction of the grounding position using both ENCOUNTER and WARREGO’s deck logs points to a position on the outer reef of Cape Lambert close to the light (... *near the*

⁵⁴ NUSA was a small German Government vessel commandeered by the ANMEF

⁵⁵ HMAS ENCOUNTER fair deck log 18th Septembert14, Darren Brown image IMG0 3571.jpg

beacon...) marked on the modern chart. The reconstruction under by CMDR David Nicolls RAN Rtd summarises the situation.. Based on this reconstruction it would appear that KOLONIALGESELLSCHAFT grounded on outer edge of the northern extremity of the reefs to the north of Cape Lambert, close to a 13.5 m (42 ft) high beacon marking the extremity of the reef. The grounding is most likely to have occurred at night, as by day it would be very difficult to miss seeing the beacon. This Report is specific that only one used cartridge case was found – contrary to some of the diary accounts of multiple cartridge cases. Nothing turns on the number of fired cartridge cases, as even one shot through the pressure hull would have been sufficient to put the AE1 at grave risk.

Hypothetical Tracks of KG 13 – 16 Sep. with Track of WARREGO/ENCOUNTER in the course of discovering the Wreck of

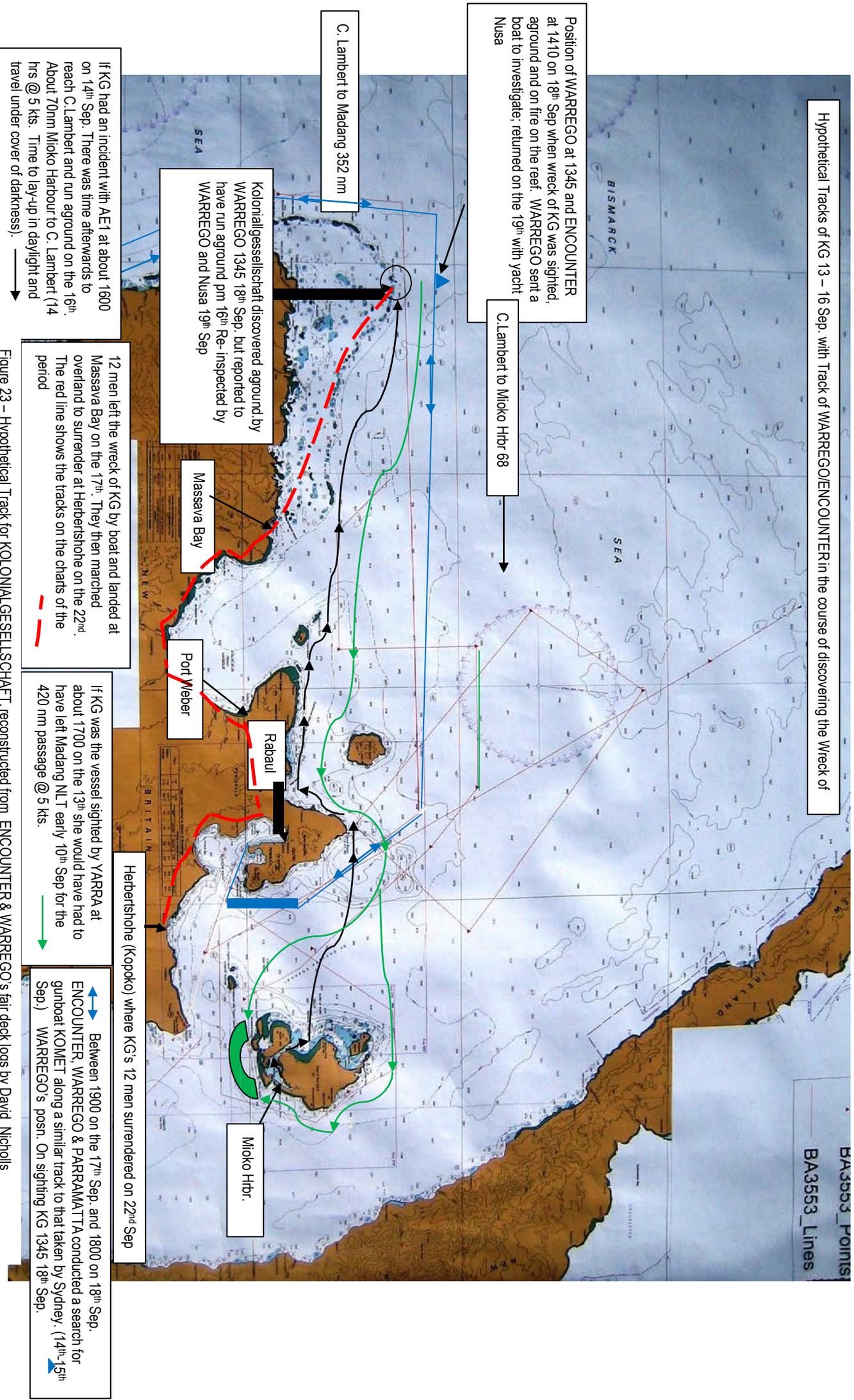


Figure 23 – Hypothetical Track for KOLONIALGESELLSCHAFT, reconstructed from ENCOUNTER & WARREGO's fair deck logs by David Nicholls

5.8.6 LEUT Stoker's Report

5.8.6.1 Stoker's report rendered from Suva on 16th October 1914 considered four possible causes for the loss of AE1:

5. I consider that there were four possible explanations of her loss:-

(a) That she had broken down and got set away by currents. The search carried out disposed of this.

(b) Sunk by enemy. No big enemy ship believed to have been about. If sunk by gunfire from York Island, destroyer would have heard. If sunk by gunfire from small steamer fitted with gun, it must have been in vicinity of York Island and submarine could have run ashore and at any rate some of the crew saved.

(c) Sunk by internal explosion. No reason can be thought of in support of this, and some wreckage or bodies should have been found.

(d) Sunk while diving. This would appear to be the only remaining explanation, but it is difficult to understand why she should have been diving at this hour. She was 25 miles off harbour and had to be at anchorage within 2½ hours, and her speed returning would not have

exceeded 11 knots. Also if a practice dive was thought necessary it would probably have been carried out in the early morning.

When leaving harbour A.E.1 was believed to be in working order throughout, with the exception of the starboard main motor which was defective and could not be used. Arrangements for making good the defect on return to harbour had been made.

This defect would prevent the starboard propeller being used when diving, but beyond limiting the underwater speed, it would only slightly affect the handiness of the boat and could not be taken to account for her loss.

Figure 24 –Extract from LEUT Stoker's Report on the loss of AE1

Image Darren Brown

5.8.6.2 Stoker's dismissal of an action with a German steamer at para 5(b) above is not agreed – it is possible to construct many credible circumstances where the submarine would be unable to be 'run ashore' or 'some of the crew saved' – see section 7.3 below. His rationalisation of the impact of the defect on the Starboard propulsion train is also questionable; see section 3.5 above for more details on the impact. Further, Stoker quite fails to discuss the possibility that AE1 was

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lost due to navigational hazard.

5.8.7 LEUT W H F Warren's Report

5.8.7.1 As discussed above in section 5.5.2 when considering the last seen position, LEUT Warren submitted an undated, 3 page manuscript Report and covering letter. The letter and report were faithfully retyped, dated 21st September 1914 and submitted under a covering letter from HMAS WARREGO (Captain D) dated 21st September 1914. ⁵⁶

5.8.7.2 Warren's report gives no indication of the means of communicating with AE1, or how he was able to quickly relocate AE1 at 1430 in the hazy conditions of reduced visibility then pertaining. We have been unable to locate any of PARRAMATTA' signal, WT or working deck logs. The fair deck logs give no indication of the means of communication with AE1. These missing documents would be a high priority target for future research. A search of the AWM, National Archives, RAN Heritage Collection and RAN archives facilitated by the RAN Seapower Centre and Curator of the RAN Heritage Collection has proved fruitless.

5.8.7.3 PARRAMATTA was AE1's escort for the day; no doubt Warren would have been at pains to avoid any blame for failing to execute this task effectively. This could perhaps offer some explanation for the brevity of Warren's Report and official unwillingness to consider any suggestion that AE1 had been lost in action with a German steamer – something that could have been avoided by a more attentive escort. As discussed at section 5.5.2 above, LEUT Warren's Report seems brief to the point of obfuscation.

5.8.8 Inaccuracies in Patey's Formal Report About the Search

5.8.8.1 Patey's report is inaccurate in the timing of the search; it was not ordered at 2000 and did not begin until several hours later. The following sequence is reconstructed from AUSTRALIA's fair WT logs:

- x At 2015 AE2 alerted HMAS AUSTRALIA to AE1's failure to return:

'From: HMAS AE2 (to) HMAS Australia, submit; had HMAS AE1 a Destroyer scouting with her today. She has not yet returned to harbour'

- x At 2025 AUSTRALIA signalled PARRAMATTA inquiring after AE1's whereabouts.
- x At 2140 a boat was sent to bring LEUT Stoker, the CO of AE2, across to AUSTRALIA to see RADM Patey.
- x It was not until sometime later that a search was ordered.
- x ENCOUNTER was advised by Flag at 2230 that the destroyers (YARRA and PARRAMATTA) were proceeding to search for AE1.
- x PARRAMATTA's log records that she weighed and proceeded in search of AE1 at 2330.

5.8.8.2 Far from the search beginning about 2000, as Patey's Report implies, the first ships did not start the search until 2330. This could have been up to 7 ½ hours after AE1 was lost (1600 to 2330). Although he would not be the first senior officer to put a positive spin on a report of a disaster, his inaccuracy raises doubts about the precision of other key sections of his report. Even allowing for the exigencies of the war, it is extraordinary and unusual given the number of unknowns that he did not ensure that a formal inquiry was held.

⁵⁶ Navy Office file 14/7658.

5.9 Informal Commentaries

5.9.1 The Rumours

The informal commentary in various diaries of participants in Rabaul at the time records the commonly held belief that a German steamer was responsible. This view was also held by CAPT C La P Lewin, RN, the Commanding Officer of HMAS ENCOUNTER who reported this perspective in his ROP submitted to RADM Patey when HMAS AUSTRALIA returned to Rabaul on 19th September. The suggestions do not appear to have been formally addressed in any of the official reports.

5.9.2 Local Observations

5.9.2.1 Gus Mellon advises that there was an oral legend passed down within the people of Mioko Island, which was subsequently related to John Foster after he had been "inducted" into the tribe. Foster refers to it in his book.⁵⁷

5.9.2.2 By the time Foster was taken to the Haus Tambuan and made a member of the tribe; he had had an association with these people for some years. He had arranged for his Rotary Club at Murwillumbah to purchase and assist with the installation of earthen water tanks (berms, for want of a better descriptive term) and the fitting of water tank liners (similar to a plastic, aboveground backyard swimming pool)... The purpose of this was to increase the drought resistance of the DoY islanders, who suffered serious and continuous water shortages during the dryer summers. Foster had also formed a strong friendship with Father Bernie Miller, the local parish priest (now dead), who was also highly regarded by the islanders and who no doubt lobbied on John's behalf.

5.9.2.3 When Gus accompanied John Foster to Rabaul in early 2007, Gus separately discussed these matters with Bruce Alexander, an Australian, and the (then) owner of the Hamamas Hotel, who had lived there for over 25 years and was also a well-known and widely liked local politician for the Rabaul district. Bruce was of the opinion that the Mioko islanders were genuinely grateful to Foster for his assistance with their water problems and that the induction of a 'white fella' into the tribe was no small matter to them, as the induction was widely known locally and could have led to strong criticism by other tribal. As to whether they told Foster something that they thought he might like to hear, in the sure and certain knowledge that they could never be gainsaid. Bruce Alexander's opinion was that this was quite possible, as the peoples of New Britain and PNG in general are adept in managing complex relationships.

5.9.2.4 As recounted in Foster's book, the Mioko people knew there was a big fight going on between the Germans and the British and were concerned about the effect it might have on them. Early on 14th September 1914 they heard the sounds of HMAS ENCOUNTER's 6" guns off Herbertshohe and, being afraid, had gathered at their traditional place of refuge, a shallow sea cave under a low cliff at the eastern edge of Mioko Island. They told Foster that on the afternoon of that day, they saw the 'devil fish' approach the fringing reef, stop, go backwards, and then disappear. Their oral account was "time stamped" by the fact that went on to say that during that night (of the 14th-15th) they also saw evil spirits flying in the night sky. These were taken by Foster to be the searchlights and star shells/flares fired by the searching ships during the early morning hours, as they scoured the DoY coastline. When questioned by the ANMEF searchers, the local people did not say anything; this is understandable, given the uncertain circumstances of the time.

⁵⁷ Foster, John, *Entombed But Not Forgotten*, Sydney, 2006, p86-102.

5.10 The KOLONIALGESELLSCHAFT

5.10.1 Technical Description

5.10.1.1 Design

John Foster's research indicates that the KOLONIALGESELLSCHAFT was built for a German expedition up the Sepik River, led by Dr Behrman of Madang. Once the expedition was completed KOLONIALGESELLSCHAFT was handed over to Dr Gebhardt, the District Officer at Madang for use as a patrol boat. The KOLONIALGESELLSCHAFT's Certificate of Survey⁵⁸ issued at Hong Kong on 19th January 12 states that she was single screw steamship built in 1911 in Hong Kong by Ulderup & Schluter for the German Government. She had a single, 180-psi boiler driving a triple expansion engine manufactured by the builders, of 125-horse power. The ship was built from wood, with hardwood frames, teak planking, reinforced by three steel bulkheads, giving a gross tonnage of 73.3 tons. Michael Rikard-Bell estimates that she would have had a loaded displacement of 153 tons (169 tonnes) and a draft of 4' 3" (1.3m).



Figure 25 –KOLONIALGESELLSCHAFT at Karajundo, 20th July 1913 – Exploration of the Sepik River

Source:-Peter Richardson from the Bundesarchiv Dr. Thurnwald Photo Collection

⁵⁸ Darren Brown image IMGP 2832.JPG



Figure 26 - KOLONIALGESELLSCHAFT, Exploration of the Sepik River, Malu, 20th September 1913
Source:-Peter Richardson from the Bundesarchiv Dr. Thurnwald Photo Collection

5.10.1.2 Fuel and Water

It seems likely that the boiler was wood fired, since coal would not be available on the Sepik River. This assumption is supported by the baulks of timber apparently being loaded onboard in Figure 26. Wood is not as effective as coal as a fuel and this would have reduced her performance. Further, Michael Rikard-Bell observes that the ship was probably not fitted with a condenser, discharging spent steam rather than recycling it and hence requiring to refill with fresh water for boiler feed at regular intervals. This would not be a problem on a freshwater river but would be an issue at sea. Overall it is assessed that KOLONIALGESELLSCHAFT had only limited sea-keeping ability.

5.10.2 John Foster's Research

5.10.2.1 John Foster records the results of his research into KOLONIALGESELLSCHAFT in his book; ⁵⁹ he cites assistance from:

- x Mr Ken Humphreys of Caloundra, a retired PNG officer who had completed much research into the administrative and shipping activities of the German colonies.
- x Herr Karl Baumann of Fassburg, Germany, an expert in German colonial history with access to a number of relevant reports.
- x A report produced by Herr Fritz Hoyer, postmaster at Frederich Wilhelmshaven (modern day Madang) and a military reservist who took passage in KOLONIALGESELLSCHAFT, under the leadership of Lauer.

⁵⁹ Foster, John, *Entombed But Not Forgotten*, Sydney, 2006 p71-78.

5.10.2.2 Based on Hoyer's account, John Foster concludes that the KOLONIALGESELLSCHAFT departed Madang on 9th September 1914 and was delayed on passage by bad weather, only managing to reach as far as Cape Lambert on 16th September 1914, where it ran aground (an overall speed of advance of less than 2 knots). He concludes that it could not have been involved in the loss of AE1.

5.10.2.3 Hoyer's account reports that KOLONIALGESELLSCHAFT only carried a crew of two: - a master and a machinist. In this case KOLONIALGESELLSCHAFT was not set up for continuous steaming and probably anchored or went alongside at the end of each day's steaming. Regular stops for wood for fuel and fresh water for the boiler would have also been required (see para 5.10.1.2 above). Allowing for the time lost at the beginning and end of each day a daily distance run of 50 nm, i.e. 10 hrs at 5 knots seems reasonable. In this case KOLONIALGESELLSCHAFT would cover the 350 nm between Madang and Cape Lambert in 7 days, this is consistent with Hoyer's account that they sailed from Madang on the 9th and ran aground on the reefs north of Cape Lambert on the 16th.

5.10.2.4 Alternatively, provided these crewing, fuel and water issues were overcome, our geographical reconstruction at Annex C shows that it was possible that the 'steamer' sighted but not investigated by 'YARRA' on the evening of the 13th September could have been the 'KOLONIALGESELLSCHAFT'. The geographical reconstruction shows that provided KOLONIALGESELLSCHAFT departed Madang no later than 10th September 1914 and proceeded continuously at a speed of advance of 5 knots, there was sufficient time for KOLONIALGESELLSCHAFT to travel from Madang to Duke of York Islands on the evening of 13th September 1914, attack AE1 on the evening of 14th September and then travel to the vicinity of Cape Lambert where it was recorded as running aground on 16th September 1914. For this to be possible the party of reservists would have had to provide watch keepers and the stokers to run the steamer continuously and sufficient stocks of wood and water carried. This is possible although it seems unlikely for a vessel that was designed as a riverboat.

5.10.2.5 Accurate weather conditions for the passage from Madang to Rabaul for the period 9th - 16th September 1914 are not available, the voyage would have been conducted heading into the predominant SE winds which is described as sometimes 'boisterous'. Climate data for Madang and Rabaul indicates that prolonged windy/rough weather would be unusual. Nor do any of the RAN ships' deck logs record high wind speeds, for the period 12th -16th September 1914, the typical wind noted was 4-10 Kn from the SE, with one observation of a maximum wind speed of 17-21 kn on the 16th. See para 5.2 above. This means the sea would have been relatively calm for most of the time.

5.10.2.6 The theory that KOLONIALGESELLSCHAFT steamed to Duke of York Islands in time to be involved with the loss of AE1 assumes that Herr Hoyer's account that this did not occur is wrong. HMAS WARREGO's investigation of the wreck of KOLONIALGESELLSCHAFT revealed that KOLONIALGESELLSCHAFT had run aground on the 16th. The key distances and timings are:

- x The distance from Madang (*Friedrich Wilhelm Harbour*) to Rabaul is 420 nm.
- x KOLONIALGESELLSCHAFT (at 5 kts) would have taken just under 4 days for the voyage to Duke of York Islands (DoY).
- x YARRA reported sighting a steamer/yacht in the vicinity DoY at around dusk on the 13th – she was ordered not to pursue, by the Flag.

- x If Hoyer is correct and KOLONIALGESELLSCHAFT sailed from Madang on the 9th, she had sufficient time to reach the Duke of York islands at dusk on the 13th.

5.10.2.7 Peter Richardson's research into the KOLONIALGESELLSCHAFT has been unable to verify when the vessel left Madang.

5.10.3 KOLONIALGESELLSCHAFT Crew and Passengers

5.10.3.1 Based on Herr Hoyer's account recorded by John Foster, the Captain of the KOLONIALGESELLSCHAFT was Captain Banzleben who was assisted by a 'machinist'. The party of reservists was 13 strong, under the leadership of 'Surveyor' Lauer; all up a party of 15 men.

5.10.3.2 Peter Richardson's research has confirmed the movement by direction of the Governor of German New Guinea of a party of ex infantrymen enlisted as reservists from Wilhelmshaven (modern day Madang) to Gazelle Peninsula on KOLONIALGESELLSCHAFT.

Haber's detailed Report on the War in German New Guinea⁶⁰

I had sent instructions to the District Office in Friedrich Wilhelmshaven via Administrator Täuffert who had left aboard the New Guinea Company's steamer "Siar" on August 27th, and was headed to Dutch New Guinea, to conscript 12 furloughed infantrymen for the armed forces who were skilled in the bush environment - military officers if possible.

They were to be sent to the Gazelle-Peninsula at once, possibly on our Government steamer KOLONIALGESELLSCHAFT.

Late at night on September 20th, I received a message while in Vunadidir, that Lieutenant of the Reserve Lauer had arrived on the KOLONIALGESELLSCHAFT together with 11 white men.

The steamer had run aground at Cape Lambert.

Their detachment was said to be on the march to Taulil.

Since the people could no longer return on the KOLONIALGESELLSCHAFT, I sent instructions to Lieutenant of the Reserve Lauer to betake himself to Rabaul or Herbertshöhe together with his people under the flag of truce, and to surrender to British Military Authorities.

I sent message to the latter and pointed out that the white people who had arrived from Friedrich Wilhelmshaven had not yet been enlisted in the Armed Forces of the Protectorate.

This small group was however armed with 88-guns and carbines, and also carried a machine gun with them.

With reference to that, these people were turned into prisoners of war by the British Military Authorities. A report by Lieutenant of the Reserve Lauer on this expedition is included.'

5.10.3.3.1 Corroboration is provided by Governor Herber's account that it seems that the vessel had the manpower and perhaps the motive to attack the AE1. Petty Officer Reuschel may have been one of the patients captured in Rabaul hospital, he is not named in official reports - only four of the eight names that were captured from Rabaul Hospital are known. Dr. Kohl-Larsen's

⁶⁰ File Bundes Archive 1001/2613 The War in New Guinea 1914 Vol. 3 see Vol 4, January 15th - July 15th, Includes a Report by Gov. Haber on the War in German New Guinea. A III 323/15

reports have not been found. He treated 8 sailors from the SMS PLANET at Yap Island, where they had contracted the disease, typhoid. Unfortunately, Kohl-Larsen gives no names. Reuschel's involvement is discussed further at para 4.11 above.

5.10.3.3.2 We have been unable to establish that Reuschel was one of the German patients captured at the Rabaul Hospital, or how he could have become aware of KOLONIALGESELLSCHAFT's possible action with AE1 on 14th September 1914. He could have picked the story up from the reservists ex KOLONIALGESELLSCHAFT; the time difference between Reuschel telling his story to Aubrey Hodgson and AE1's disappearance on the 14th is sufficient for this scenario to be credible. According to Hoyer's account, the reservists disembarked from the KOLONIALGESELLSCHAFT on 17th September 1914, went to Masava Bay (a tidal station) by boat and then overland to Toma on 21st September 1914 where they found the Australians in occupation. They formally laid down their arms at Herbertshohe the following day and so probably arrived onboard AORANGI as detainees on the same day, 22nd September 1914.

5.10.3.3.3 So by the time Reuschel was captured, processed, and sent to the AORANGI the party of reservists from KOLONIALGESELLSCHAFT would probably have also been onboard. Reuschel could have simply repeated the story that he had been told of the KOLONIALGESELLSCHAFT action. Alternatively, but less likely, he may have been a member of the reservists on the KOLONIALGESELLSCHAFT or finally, he may have made up the whole story to upset his captors. Given the inconsistencies with dates in Hodgson's diary (see Annex D – Annotated transcript of Hodgson's Diary), it is difficult to precisely date the diary entry of the exchange between he and Reuschel – the same entry records the departure of the Squadron to take over Madang, this occurred on 22nd September 1914. This is the same day that Lt Lauer and his party of reservist is believed to have surrendered at Herbershohe..

5.10.3.3.4 Reuschel's Assertion

We have not located an official report as such, only a personal reference in the diary of Aubrey Hodgson, RAN signalman on the supply vessel, 'AORANGI'. He spoke with Reuschel when he was brought onboard. It is believed that Reuschel spoke good English. It appears that Reuschel told Hodgson the story without any prompting, Hodgson responded by saying that AE1 was not missing. Reuschel insisted that he had sunk her with the KOLONIALGESELLSCHAFT. Reuschel said he saw the submarine 'hove to', ran up the white ensign on the KOLONIALGESELLSCHAFT, approached the AE1, fired a shot into her and then rammed her with the KOLONIALGESELLSCHAFT.

5.10.3.3.5 Hodgson says that he told his Commanding Officer of the conversation and that his CO instructed Hodgson to write a report on the matter for submittal to the senior naval officer present and told his crew not to converse with any of the German prisoners. If Hodgson did report it to his CO there does not appear to be any record of the report; the next day Reuschel was transferred to another vessel. We have been unable to corroborate any elements of Hodgson's account. The account is a credible sequence leading to the loss of AE1. The weight that can be placed on the account is offset by the numerous factual errors and confused dates in other sections of Hodgson's diary (see Annex D for details of these). As John Foster observes, it is hard to imagine circumstances whereby a German Naval Petty Officer would find himself in command of this coastal steamer.

5.10.3.3.6 An alternative explanation is that Reuschel was captured in Rabaul hospital where he had been one of the German Navy survey ship PLANET's crew members recovering from typhoid and picked up the elements of this story concerning the existence of KOLONIALGESELLSCHAFT from prisoners taken from KOLONIALGESELLSCHAFT, the rest

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was his imagination.

5.10.3.4 Haber's report is supported by Patey's report to the Naval Board and was quoted by Benjamin Evans AWM.⁶¹:

On September 20th a detachment of one officer and eleven reservists reached German headquarters from Port Weber. They had left Madang (Friedrich Wilhelm Harbour) for Herbertshohe in the Government steamer KOLONIALGESELLSCHAFT, in response to the proclamation calling up men liable to serve in the armed forces of the Protectorate; the steamer had stranded on the reefs at Cape Lambert (on the north coast of New Britain), and the contingent had marched along the coast to Port Weber. They had with them a machine-gun. The circumstances were reported by Haber to the officer commanding the garrison at Herbertshohe, and the party was sent in under a flag of truce to surrender.

5.10.3.5 Use of The White Ensign

The fact that the KOLONIALGESELLSCHAFT allegedly used a white ensign to get close to AE1 constitutes a legitimate 'ruse de guerre'; provided the German colours were flown prior to engaging AE1. Suggestions that this constituted a war crime and hence justified the elaborate cover up implied in erasing KOLONIALGESELLSCHAFT's involvement are not considered justified, given the rules of war then prevailing.

5.10.4 Nordenfelt Quickfiring Gun on the Vessel.

5.10.4.1 These weapons were quite common and widely used from the 1880's through to the end of WW1. An evaluation by the Defence Science and Technology Organisation (DSTO) confirms that at close range when brought to bear in direct fire mode, a 1" (i.e. a 1 pounder gun such as found on KOLONIALGESELLSCHAFT) Nordenfelt gun would have penetrated AE1's pressure hull and cause internal damage, not to mention sweeping the decks clear of men. AE1 carried small arms, but these weapons would have been no match for a quick firing 1" Nordenfelt gun. Also, the German detachment had other weapons with them.

5.10.5 Discovery of the Wreck of KOLONIALGESELLSCHAFT

5.10.5.1 WARREGO sighted the wreck of KOLONIALGESELLSCHAFT aground and on fire near the beacon on the northern extremity of the reef to the North of Cape Lambert at 1345 on 18th September 1914.⁶² WARREGO sent a boat and boarding party to examine the steamer. ENCOUNTER recorded what they found in his ROP submitted on the return of Patey on 19th September 1914:

*" she had been abandoned and was on fire, apparently by design. In the bow was a pedestal and mounting for a gun, the pivot being quite bright, as it is evident that the ship had not been long on the reef and the gun quite recently removed; further a used one pounder cartridge was picked up on board of her and I am strongly of the opinion that this steamer is connected in some manner with the mysterious disappearance of A.E.1."*⁶³

⁶¹AWM Wartime Issue 16 Summer 2001.

⁶² HMAS WARREGO deck log 18th September 1914, DB image IMPG3346.jpg

⁶³ HMAS ENCOUNTER ROP, 19th September 1914, p2, 3, DB images 110713_IMG_2204, 110713_IMG_2205

5.10.5.2 WARREGO's reports stated that the KOLONIALGESELLSCHAFT had a five barrel 1" Nordenfeldt in the hold (along with barbed wire and native trade goods, including tobacco) and that there were used "one pounder casings" on the deck. They also noted that there was a mount on the deck, but no gun. Patey's Report included advice that on the mounting 'one part had quite a bright pivot' reflecting recent use. ⁶⁴ Reports vary on how many used cartridges were discovered. Contrary to ENCOUNTER's report quoted above that only one used cartridge case was found, John Foster quotes a second hand report by CMDR F C Darley of HMAS ENCOUNTER that 'a lot of empty cartridge cases' ⁶⁵ were found. There is also a suggestion that these could have been the result of ammunition 'cooking off' in the fire in a report by Patey, see para 5.10.5.3 below. What ever the number of cartridge cases, there is evidence that the gun had been mounted until recently and possibly fired.

5.10.5.3 Patey reported the finding of the KOLONIALGESELLSCHAFT in his Letter #26 ⁶⁶ to the Secretary of the Navy:

"With reference to the report of the finding of the wreck of KOLONIALGESELLSCHAFT, this craft belongs to the Exchequer of the Protectorate of German New Guinea. "SYDNEY" passed this spot at noon on 15th September, the day after the loss of the Submarine and there was no wreck there then. The KOLONIALGESELLSCHAFT must have gone ashore on one of the nights 15th, 16th or 17th September. Subsequent investigation shews that KOLONIALGESELLSCHAFT was from the westward and not from the eastward, and therefore it does not appear possible to connect her in any way with the loss of Submarine A.E.1. The wreck was examined on 19th September by Commander (D) and the King's Harbour Master."

5.10.5.4 Patey also mentions the finding of KOLONIALGESELLSCHAFT in his ROP titled 'Participation By Australia Seagoing Fleet in The operations. ⁶⁷ The ROP does not appear to be dated; the final page deals with events occurring on 10th December 14, so it was probably submitted in late 1914 before AUSTRALIA left the Australia station enroute UK. The report adds some fresh details:

"The only find was the wreck of the KOLONIALGESESELLSCHAFT ashore on fire, and abandoned near the beacon on the reef on the north-west point of Gazelle Peninsular. This craft belongs to the Exchequer of the Protectorate of German New Guinea, bound from Papua to Rabaul, ran ashore on the afternoon of 16th September. Her crew and passengers abandoned her on 17th September, landing at Masava. She was set fire to on being abandoned. When examined, tents, barbed wire, and trade tobacco were found onboard her, also 1-pounder cartridge shells evidently exploded by the fire. The dismantled gun was found in her hold."

5.10.5.5 Herr Fritz Hoyer, the Madang postmaster and one of the German Army reservists onboard the KOLONIALGESELLSCHAFT records that she ran aground on 16th September 1914. ⁶⁸

5.10.6 NUSA

⁶⁴ Patey's Report – AWM File 1777 and 3 DRL/0053.

⁶⁵ CMDR Darley letters, AWM 1DRL/0350

⁶⁶ VADM Patey letter # 26, HMAS AUSTRALIA at Rabaul, 30th September 1914, DB image 110713_IMG_2187, 2194.

⁶⁷ VADM Patey, Participation By Australia Seagoing Fleet in The operations., p54, 55, DB Images IMG2140, IMG2143

⁶⁸ Foster, John, *Entombed But Not Forgotten*, Loftus, 2006, p75.

5.10.6.1 HMAS WARREGO was sent back from Rabaul with NUSA in tow on 19th September 1914 by ENCOUNTER to inspect the wreck and endeavour to locate KOLONIALGESELLSCHAFT's crew.⁶⁹ WARREGO'S deck log shows that they spent 50 minutes inspecting the wreck and two hours inspecting the nearby coastline before WARREGO again took NUSA in tow and proceeded at 12 kn for Rabaul. ENCOUNTER's Captain's Signal Log records that WARREGO signalled the results at 1700:

"Investigation shows steamer struck reef accidentally, was then fired. The crew landed locally and then proceeded by boat to Toma. Planters interviewed state that she came from New Guinea bound for Rabaul, was ignorant of its doings previously to its striking, so if it had anything to do with Submarine HMAS AE1 they cannot have let anything out about it"

Efforts to locate any more detailed records of this investigation have proved fruitless to date.

5.10.6.2 Ian Noble's research reveals that NUSA was a 60 ton official German yacht captured by HMAS WARREGO in Kavieng on 14th September 1914. She was towed back to Rabaul by WARREGO, armed and pressed into service with a crew from HMAS BERRIMA, under the command of LCDR John Metcalf Jackson. There are no records in the AWM regarding NUSA. "The Official History of Australia in the War of 1914 - 1918", Vol IX "The Royal Australian Navy" by AW Jose makes one mention of the ship and that is on page on 112. Although AWM photographic records refer to HMAS NUSA, no substantive evidence that NUSA was ever commissioned into the RAN has been found. Colonel Holmes declared that she was to be known as HMAS NUSA when he directed LCDR Jackson to take command and proceed to New Ireland to search for the SMS KOMET, possibly to add a more official status to the expedition.⁷⁰ There are also 5 files in the NAA, which refer to NUSA, but only in the context of its actual seizure and the subsequent action in Prize Courts.

5.10.6.3 Regarding LCDR Jackson, the only reference is in an AWM file entitled "Official History - Biographical and Research files". This file (AWM43 - A416) has biographical information on 12 persons named Jackson, including J M Jackson. It lists him as a LCDR RN (1st Apr 1913), and as a CMDR from 24th Nov 1915. It shows him as posted to WARREGO from AUSTRALIA on 27th Aug 1914, to HMAS UNA on 17th Oct 1914, to PENGUIN on 1st Dec 1916 and as Kings Harbour Master Rabaul from 1st – 10th Oct 1914. It further states: "He was left at Rabaul as KHM and appointed by Col Holmes in command of the NUSA to capture the SMS KOMET. It also notes him as in command of UNA from Nov 14 – Nov 16. He died in England between 24th Feb 25 and 1st Mar 26.

5.10.6.4 Since KOMET was apparently captured on 10th October 14 some distance from Rabaul, he appears to have been in command of NUSA from about 9th October until he was posted to UNA on 17th October.

5.10.6.5 His Personnel record in the NAA shows that he was temporarily appointed to the RAN Permanent Naval Forces on 27th August 1914 with his RN seniority as LCDR of 1st April 1913, and that he was promoted to A/CMDR on 23rd November 1915 and confirmed on 30th June 1916. He reverted to the RN on 1st July 1917. It also corroborates his postings as above and his appointment as KHM Rabaul, but makes no mention on his appointment to NUSA.

⁶⁹ HMAS ENCOUNTER ROP, 19th September 1914, page 3, DB image 110713_

⁷⁰ Mackenzie, S S, *The Official History of Australia In The War 1914-1918, Volume X – Rabaul*, Sydney, 1941, Ch 8, p130.

Section 6 - Possible Causes for the Loss of AE1

6.1 Introduction

There are a range of possible scenarios that could have led to the loss of AE1. In a situation where we do not have conclusive evidence this range of scenarios and the probability attached to each cannot be definitive. None the less they do provide valid input to setting out the search area and attaching priority to those areas. What is fairly certain is that the AE1 sank on that passage from SE of the DoY Island to Rabaul. If it had been disabled on the surface then the ships searching would have found her.

6.2 Hull Failure/Internal Explosion Leading to Uncontrolled Flooding

6.2.1 Internal Explosion

One possible source of hull damage could be from an internal explosion of some sort.

6.2.2 One of the embarked torpedo warheads could cause this level of damage; but no incidents of these torpedo warheads exploding are known. Each torpedo tube would normally have been loaded and left dry until prepared for firing. There seems to have been little reason to prepare or to launch one of these weapons. The reload torpedoes were stowed adjacent the tubes, the warhead was not fitted but stowed in racks adjacent to the torpedo and only fitted prior to being loaded in the tubes. Overall this seems an unlikely source of an explosion.

6.2.3 There are a number of records of battery explosions in E class submarines caused by a build-up of hydrogen gas. These killed or injured a number of crewmembers, but did not rupture the pressure hull or cause the loss of the submarine. This is therefore assessed as an unlikely cause for the loss.

6.2.4 An explosion of sufficient force to rupture the pressure hull would quite possibly have been heard and noted by the natives on Duke of York Island and possibly other RAN units. It would certainly give rise to a significant debris field and oil slick.

6.2.5 An internal explosion is therefore assessed as an unlikely cause of the loss.

6.3 Sunk in an Action with KOLONIALGESELLSCHAFT or another Armed German Steamer

6.3.1 Cause and Effect

It might be argued that it was theoretically possible that the KOLONIALGESELLSCHAFT came out of Mioko Harbour, fired into and then rammed the AE1. The detachment on the German vessel had a usable gun that was capable of holing the AE1's pressure hull. Also the detachment was carrying small arms. However we do not consider this is credible given the KOLONIALGESELLSCHAFT 's low power and insufficient endurance in water, fuel or crew to compete this open ocean transit from Madang, against the prevailing SE monsoon in the time scales required. It is doubtful that a 153 ton displacement, low powered, wooden hulled river/coastal steamer could sink AE1 by ramming while AE1 had full buoyancy, notwithstanding that she was heavily built, with teak planking on a hardwood frame and had three internal steel

bulkheads.⁷¹ However a ramming whilst AE1 was in the process of diving to avoid gunfire could initiate a sequence that could have proved fatal:

- x Whilst in the process of diving a SM's stability is much reduced - an impact even from a small wooden steamer could have caused AE1 to take on a significant angle - say to roll heavily and/or take on a steep bow down angle.
- x If combined with a heavy trim (either bodily heavy, or more significantly, heavy by the bow) then a fatal depth excursion would be the likely result.
- x The impact of a collision on AE1 whilst diving would have caused it to roll heavily; this would explain why the steamer could have survived the impact without major damage.

The normal recovery procedure from a steep bow down angle is to apply full power astern to take the way off and reduce the effect of the bow down angle. AE1 was apparently restricted to the port main motor only whilst dived due to a defect on the starboard power train, possibly the main engine clutch; this would have been a significant limitation in this situation. Also the need to declutch the port main engine from the main motor would have taken at least two minutes; this would have exacerbated the difficulty in regaining control⁷². AE1 could, therefore, have exceeded its crush depth if rammed while diving.

- x A submarine experiencing a loss of control and depth due to a bow down angle must then catch a stopped trim (neutrally buoyant) whilst it sorts out the control problem that led to the depth excursion, or blow main ballast and surface.
 - o If the SM's trim is bodily heavy then even after stopping by going astern it will continue to sink - either quickly pumping out sufficient water to catch the trim or blowing main ballast are the only remedies in this situation.
- x In extremis, if catching a stopped trim is not possible then blowing main ballast and returning to the surface is the final remedy, this would not be favoured if an armed enemy remained close by.
- x If a bow up angle can be achieved then full power ahead can be used to assist the surfacing process - once again the loss of the starboard main motor in AE1 would make this option less effective as only the port shaft was available.
- x AE1 had a relatively shallow maximum diving depth (180 ft or so) and apparently a small pumping capacity (noting AE2's difficulty to quickly correct a trim discrepancy on the day of its loss in the Sea of Marmara in 1915).
- x In the case of a 'crash dive' at little notice to avoid an attack from a steamer, there would be a short period where AE1 would not have propulsion available at all until the port main engine clutch was opened and the port main motor energized to propel ahead.
- x So it is possible to construct a credible scenario that AE1 was hit by shellfire, initiated a 'crash dive', was rammed whilst in the process of diving and without propulsion, leading to a loss of control and either hit the bottom at speed if in shallow water or exceeded their

⁷¹ KOLONIALGESELLSCHAFT Certificate of Registration, Goddard & Douglas, Hong Kong, 19th January 12, Darren Brown image IMG2832.JPG

⁷² Foster, John, *Entombed But Not Forgotten*, Sydney, 2006, p69-70 notes that the changeover from ahead propulsion on the main engines to astern on the main motors took two minutes.

crush depth in deep water further offshore.

- x If the pressure hull had been holed by gunfire then water flooding in through these holes would quickly add to the loss of buoyancy, overwhelm the crew and cause an uncontrolled descent to the bottom.
- x Depending how quickly the flooding equalized pressure the internal and external pressure, the hull and fuel tanks could remain intact, militating against a large debris field or oil slick.
- x In these circumstances a stream of bubbles and some oil and diesel fuel would probably be the only external indicators of the submarine's position.

6.3.2 A Possible Sequence of Events

A possible sequence of events in this scenario would have been:

- x KOLONIALGESELLSCHAFT sailed from Madang for Rabaul on or before 9th September (John Foster records that Herr Fritz Hoyer, the Madang postmaster and a member of the reservist records that they sailed on 9th September 1914)⁷³ with the armed party of German reservists onboard under the command of Lieutenant Lauer. Given the urgency of the journey, KOLONIALGESELLSCHAFT carried stocks of firewood and fresh water for the 4 day journey until re-supply was possible at Mioko Harbour.
- x After becoming aware of the Allied invasion of Rabaul, KOLONIALGESELLSCHAFT diverted and hid inshore near Mioko Harbour on the Duke of York Island.
- x The KOLONIALGESELLSCHAFT may have been the steamer sighted by YARRA on 13th September 1914, but there were other German steamers later discovered in Mioko Harbour.
- x On the 14th September the KOLONIALGESELLSCHAFT observed AE1 patrolling south of Duke of York Island; AE1 was following up YARRA's sighting the previous afternoon.
- x Lieutenant Lauer prepared his team, made up a false white ensign and moved to intercept AE1 as she was returning to Rabaul on the afternoon of 14th September.
- x Approaching with the Duke of York Island (and perhaps the setting sun) behind him, Lauer was able to get close under the flag of deception, before opening fire with the Nordenfelt gun, small arms and machine gun, forcing AE1 to dive.
- f AE1 had no deck gun or means of defence against this type of attack and was not in company with any of the Navy surface ships at the time.
- x The Nordenfelt gunfire pierced AE1's pressure hull and KOLONIALGESELLSCHAFT added to AE1's problems by ramming the submarine as it was in the process of diving.
- x AE1 rolled heavily under the impact, lost control, flooded via the shell hole(s), the hull ruptured by the ramming, or the open conning tower hatch and sank to the bottom.
- x KOLONIALGESELLSCHAFT retreated inshore and escaped under cover of darkness, heading back towards Madang, before running aground near Cape Lambert on 16th September.
- x Alternatively, perhaps Lauer realized that the maritime battle was lost and decided to join the Governor inland, getting rid of KOLONIALGESELLSCHAFT by grounding in a location consistent with a passage from Madang to Cape Lambert and setting it on fire to destroy any evidence of their involvement.

⁷³ Foster, John, *Entombed But Not Forgotten*, Sydney, 2006, p76.

- x When captured Lauer and his party suppressed the story in order to maintain their non-combatant status, constructing an alibi that they had been delayed by bad weather and had only got as far as Cape Lambert, in order to avoid interrogation or being taken as POWs.
- x Few others apart from Reuschel, who picked up the story from members of the KOLONIALGESELLSCHAFT crew and relayed it as his own, knew of the incident.

6.3.3 Lieutenant Lauer's Fate

If this was the scenario then Lauer's plan worked. He was not interned as a POW and quickly returned to Germany where he apparently re-enlisted to fight on the Western front as he was killed at the battle of Ypres on 25th September 1915. The story of KOLONIALGESELLSCHAFT's voyage to Rabaul died with him.

6.3.4 The Likelihood of This Scenario

This scenario is mainly circumstantial and runs counter to the weight of evidence presented in the official reports, the Hoyer account and the assessment by John Foster who located material and second hand accounts that we have been unable to access. We have yet to uncover primary source material to substantiate the KOLONIALGESELLSCHAFT scenario. In particular, the search has been unable to find any additional information on:

- x The movement of KOLONIALGESELLSCHAFT for September 1914.
- x The report prepared by Lauer on his activities whilst onboard (Lauer's report was cited as an attachment to the Governor's report) but it has never come to light.
- x The composition of the party onboard KOLONIALGESELLSCHAFT, along with diaries or other records of their activities.
- x Corroboration of the account of the Madang postmaster, Herr Hoyden.
- x Records of the interrogation and handling post capture for all these German personnel.
- x Weather conditions experienced 9th - 16th September 1914 covering the route KOLONIALGESELLSCHAFT would have taken from Madang.
- x The movements of Reuschel and how he came to know of the postulated engagement with AE1.

6.3.5 Conclusion – Possible but Improbable

We are at a loss to explain why there has been no subsequent claim made by German authorities or the individuals involved. It was certainly spoken about anecdotally and was judged to be most likely by Stoker if we accept Kenny-Hamilton's diary record of his conversations with Stoker [despite Stoker discounting this possibility in his official report to RADM Patey]. It is also difficult to explain why there were no accounts amongst the natives living near Mioko Harbour of an engagement between a German steamer and a submarine – John Foster established a trusted relationship with the local people and spent some time researching this aspect without success.⁷⁴ There is real doubt that a low powered river steamer with a crew of two could muster the resources - firewood and fresh water for her boiler and crew endurance to make a four day open ocean voyage at five knots to achieve this scenario. Even if the crew was, assisted by the army reserve detachment onboard (some of them may have had the necessary skills) the power, fuel and water limitations would not have been so easily overcome.

⁷⁴ Foster, John, *Entombed But Not Forgotten*, Sydney 2006, Ch 11.

6.4 Run Down by HMAS PARRAMATTA

6.4.1 The proposition that HMAS PARRAMATTA inadvertently ran down AE1, possibly when she returned towards the last sighted position, or on her track northward was one of the many possibilities floated at the time. This scenario would have required alignment of a number of factors:

- x AE1 would have had to dive between 1430 when she was in sight and safe and 1520 (when PARRAMATTA reports she lost sight of AE1).
 - o This seems an unlikely occurrence. It is only possible if it occurred when AE1 was dived and this was unlikely. Apart from other factors PARRAMATTA took a route back to anchorage north around DoY Island and AE1 likely went south about. Their two routes did cross west of DoY Island but there is no evidence that they actually did cross.
- x PARRAMATTA inadvertently ran over the dived submarine.
 - o Under this scenario the impact did not cause any significant damage to PARRAMATTA but was sufficient to cause AE1 to lose control and end up flooded or crushed and unable to surface, on the bottom.
 - o It would have required a 'freakish' combination of events to achieve this outcome; PARRAMATTA, at 750 tons was slightly lighter than AE1 when the latter was dived.
 - o The submarine would have to flood but remain largely intact to explain the lack a persistent oil slick from the sunken submarine.
- x AE1 failed to avoid the approaching ship – although all ships are obligated to keep a good lookout, the overriding obligation is on the submarine to avoid the ship in this situation.
- x PARRAMATTA's deck log records that she was stopped from 1545-1615 on 14th September 11. Could this have been to investigate the impact? Having noted nothing amiss Warren put the bump down to a collision with a submerged log that were common in the area.
 - o *'I know this much, there are a lot of trees, quite big ones in the water floating about. I saw 2 large ones myself.'* ⁷⁵
- x The possibility of a collision between PARRAMATTA and AE1 was not canvassed in any of the official reports.
- x It seems strange that PARRAMATTA's ship's company did not subsequently air the possibility. However, if the bump had been accepted as a collision with a floating log they would not necessarily make the connection – for example, Alec Doyle's acerbic letter written on 17th September (discussed at para 4.6.6) makes no mention of this possibility.
- x John Foster came across reports relayed third hand of an account said to be from the crew of PARRAMATTA of a collision with something solid at dusk, on 14th September but the position of the impact (near the Beehives Rock off Simpsonhaven) is a further source of doubt and Foster dismisses it as a possibility. ⁷⁶
- x A report of PARRAMATTA's next docking following this period showed nothing amiss.
- x PARRAMATTA had a draught of 9 ft (2.74m). ⁷⁷ AE1's periscope depth was a keel depth of ~ 32-34 ft (10.2+m), ⁷⁸ this depth places the top of the casing at ~ 14.5 ft (4.5m), the top

⁷⁵ Darley F C CMDR RN of HMAS AUSTRALIA, *letter to Aunt Marion*, 30th October 1914, AWM 1DRL/0232, transcribed by Ian Noble at AWM, 4th May 2011.

⁷⁶ Foster, John, *Entombed But Not Forgotten*, Sydney, 2006, p84, 85.

⁷⁷ http://www.awm.gov.au/units/unit_10632.asp

⁷⁸ Henry Kinder's diary p4.

of the fin at ~ 8-9 ft and the top of the lowered periscopes just beneath the surface, since the periscopes could be retracted 8ft (2.44m)⁷⁹ but remained~ 9 ft (2.7m) proud of the top of the fin. In normal circumstances, with AE1 on an even keel at periscope depth PARRAMATTA would have passed over the casing, without striking the submarine, but would have hit the retracted periscopes/periscope standards and may have just clipped the top of the fin. The periscopes and standards would probably have served to absorb the impact, protecting the upper hatch and would have certainly done great damage to PARRAMATTA. This picture would alter drastically for the worse if AE1 was shallower than this or had a large angle on the submarine e.g. diving to avoid collision, when the after casing could be significantly closer to the surface for a short period.

6.4.2 Conclusion on Loss Due To a Dived Collision with PARRAMATTA.

Whilst the alignment of factors to result in the loss of AE1 in such a collision seems improbable, the search area should cover the likely impact area of this eventuality.

6.5 Navigational Incident

6.5.1 Contributing Factors

6.5.1.1 Likelihood of a Navigational Error

An error in navigation resulting in a grounding and sinking is a possible cause of the loss. This patrol was possibly one of AE1's first without an escort or consort. AE1's last sighted position was close to the coast, with adequate fixing marks available to avoid such a problem, but the haze had reduced the visibility. She had about 24 nm to the anchorage in Simpsonhaven – about 2 hours and 10 mins @ 11 kts. Moreover, for the first 6 or 7 nm AE1 would have an opposing current (reportedly 2 – 3 kts) and thereafter a crossing current. So the speed made good would have been less; allowing for these currents, AE1 would have needed about 2 hrs and 25 mins to make the passage. She needed to depart the last seen position no later than 1525 in order to be alongside by sunset at 1750. And the Admiral had reminded Besant when he sailed that morning not to be late!

6.5.1.2 Environmental Factors

At this time of the year at 1550, 2 hours before sunset the sun would have been low on the western horizon and AE1 was headed west.

6.5.1.3 Oceanographic Factors In The Vicinity of Mioko Harbour

The German and British charts used at the time of the invasion in 1914 both showed extensive fringing reefs around the entrance to Mioko Harbour. The reefs were well-formed and visible from close range at that time. Early versions of the British and American Pacific Sailing Directions or Pilots, dating back to the sailing days of the late 18th century also noted the strong current flows of up to 3 knots in St George's Channel. This makes the south eastern corner of Mioko Island forming the western entrance of Mioko Harbour a particularly difficult and challenging spot. The large body of water moving northwest by the current faces a significant obstruction as the depth rapidly decreases near Mioko Harbour and the water strikes the near vertical wall of the fringing coral reefs. The combination would lead to strong, locally variable currents, swirling around to get

⁷⁹ White, Michael W D, *Australian Submarines – A History*, AGPS, 1992, Appendix I, Technical details of The E Class Submarine by Jim Ekin, p 219.

around the obstructions - navigation in this area required particular care. The water would then split and drive to the north and west around the obstruction represented by the Duke of York Island and its surrounding reefs and minor islands. (See figure 27 below). With a low height of eye (AE1's bridge deck was at 12 ft (3.6m) AE1's lookouts would be looking into the setting sun low on the western horizon, the off lying reefs would be invisible beneath dark reflecting waters. Besant and his officers were an inexperienced command team and unfamiliar with the area. Perhaps they failed to take the precautions necessary when operating in proximity to reefs and were not aware of or failed to appreciate the significance of this confluence of factors.

Gus Mellon has provided this first hand description of the 2007 BENALLA survey off Mioko Harbour, (the plot from this survey is at Figure 29 on page 94).

- x *'The last sighted position of AE1 at 1530 is marked at the top right corner of the page and the red, submarine-like blob near the western end of Mioko Island is the contact that was subsequently investigated by YARRA later that same year.*
- x *I recall from looking at the 3 D plots which were being generated on BENALLA's charting displays whilst they were plotting that contact, that the slope of the reef face was close to vertical along the detailed area which was surveyed, about 75-80 degrees, with a subsea ledge at about 90m, then nearly vertical again to the bottom in 130m+ water, from memory.*
- x *Inspection of the depth soundings on this same chart extract shows that this same sort of nearly vertical reef face profile most likely extends right along the bottom edges of Kerewara and Kabakon Islands, as well.*
- x *During BENALLA's plotted survey runs, the current coming up from the southeast at about 3 knots, was hitting this almost vertical wall of island fringing reefs and were "roiling" upwards all around the vessel in a totally confused mass of water which simply did not know which way to go next. Quite obviously, some of it then proceeded north along the eastern side of DoY Island and the rest passed westwards, across the bottom edge of Kerewara and Kabakon islands, before passing in between the Credners and Kabakon and looping around the western DoY's , to join up again to the northwest of the islands.*
- x *The best description that I can give for the state of those waters off Mioko island is to look at the state of the huge volume of water issuing into the turbine outlet ponds below some of the Snowy Mountains power stations, or the visual surface effect on the co-joining of two major irrigation canals, in the Shepparton District of Victoria.*
- x *Suffice to say that the confused currents were causing BENALLA, with her twin steerable propulsors, to offset 60 degrees from the survey line, in order to keep the required course.'*

This would indeed be a formidable and dangerous spot for AE1 to venture into – if indeed, that is what she did!



Figure 27 — Modern Chart of The Entrance To Mioko Harbour Showing Wirian Reef off The Eastern End of Mioko Island
Australian Hydrographic Office Chart

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10th February 2012

6.5.1.4 The Pilot notes tidal stream ebb and flow into/out of the entrance to Mioko Harbour of 2 to 3 kts at Springs, with a tidal range of 2.5 ft (0.8m) at Springs and 1.5 ft (0.45m) at neaps. The direction follows the line of the channel (NW / SE). From the US almanac, we know that the moon was a 37% waning crescent (i.e. just over 1/3rd of time from full to new moon (the new moon – 15 days). Neaps would have been on the 12th September 1914, Springs (New Moon) would have been on the 19th September 1914. Hence the tidal range would have been about 1.75 ft (0.53m) and the estimated maximum tidal ebb/flow on the 14th September 1914 about 1 kt. The net set and drift close offshore Mioko Harbour would have been a combination of tidal stream and current.

6.5.1.5 Probability of Steering Failure

Darren Brown has uncovered numerous accounts of steering failures in E class and earlier submarines. Stoker records an occasion of AE2's helm jamming in Lombok Strait during the delivery voyage and 'putting me nearly on a lee shore'. It is assessed that there is a possibility that a steering failure could have played a role in the loss.

6.5.2 The Likely Consequences of a Heavy Grounding

6.5.2.1 Stability Model

Mike Rikard-Bell has developed a computer based stability model from the General Arrangement drawings for AE1 that enables us to consider the likely consequences of a heavy grounding. He has considered a number of scenarios; the first involves a bow on grounding onto a gently shelving or a steeply shelving bottom topography. Whilst nothing untoward emerges in these situations, it is worth noting that:

- x The forward part of an E boat's pressure hull likely to be impacted in the event of a heavy grounding by the bows is particularly strongly constructed (in anticipation of this scenario), with a strong fore foot at the bow and an enormously strong keel section further aft; the keel does not start for some 21.5 ft (6.5m) aft of the bow and extends aft for 120 ft (36.5m). The arrangements of the fore foot and keel are illustrated in this scale model.

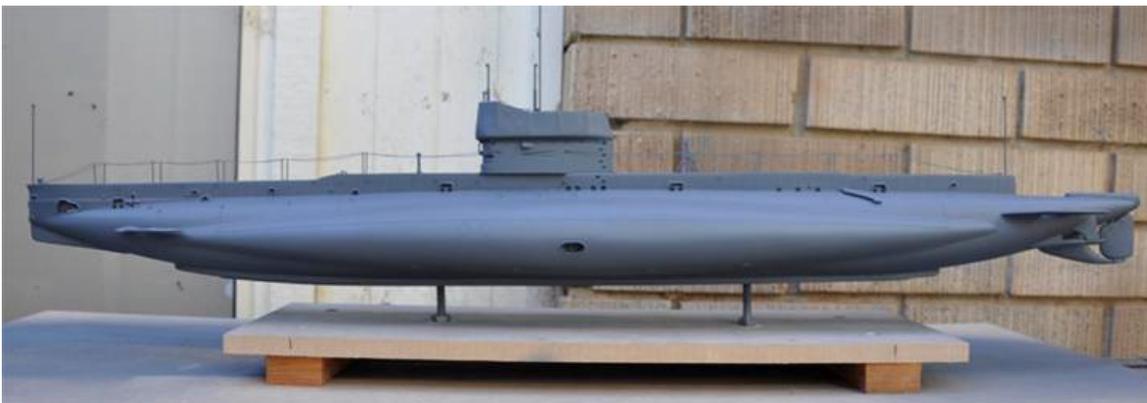


Figure 28 — Scale Model of AE1, Port Beam Aspect

- x The internal tanks that would be exposed should the pressure hull forward of the keel be breached in such a grounding are (from the bow moving aft):
 - o Forward Compensating Tank.
 - o Forward Trim Tank.
 - o Magazine.
- x No 1 Oil Fuel Tank (OFT) starts 26 ft (9.9m) back from the bow and is protected by the

start of the keel, although at this stage the keel is fairly small - 18" (458 mm) wide and 7" (178 mm) deep.

6.5.2.2 Heavy Grounding by the Bow

It is difficult to conclude that a heavy grounding by the bow on a steep to obstruction, such as a coral reef, could result in a breach of the pressure hull, because of the strength of the pressure hull and fore foot. In the unlikely event that this occurred, the Forward Compensating & Trim Tanks would offer an inner boundary, as each is a pressure tight tank, tested to 50 pounds per square inch. This boundary could possibly delay flooding whilst the submarine was on the surface. After considering the construction of AE1 it was concluded that:

- x Such a grounding would not necessarily lead to a major fuel leak from No 1 OFT.
- x It seems likely that in such a scenario the submarine would end up wedged onto the reef.
- x If the submarine subsequently pulled back from the reef (noting that it is believed that only AE1's port shaft was available going astern) and then sank then the damaged bow would be more vulnerable to damage on impact with the bottom, possibly causing a fuel leak from No 1 OFT but this is not a certainty.
- x The volatility of the light lighter diesel fuel would cause a slick to disperse more quickly than heavier oil.

6.5.2.3 A Beam on Grounding Amidships

The consequences of a beam on impact, damaging the amidships ballast tanks situated in the saddle tanks on one side of the pressure hull would cause the submarine to list heavily. Completely flooding two of the ballast tanks on one side would a feasible scenario; since any impact would be likely to slash an opening in the ballast tanks situated in the saddle tank attached to the pressure hull.

6.5.2.4 Implications

Given this 'worst case' scenario of flooding two ballast tanks on one side the submarine would be in a vulnerable position, listing heavily, with reduced stability and reserve of buoyancy and in close proximity to ongoing hazard from the reef. Three resultant scenarios will be considered; a loss of stability resulting in the submarine capsizing by rolling onto its damaged side, an inadvertent or deliberate dive to recover stability, or flooding through the open conning tower hatch.

6.5.2.5 Capsize

In this scenario it is postulated that the submarine under the influence of the rudder or an external force such as the current pinning it against a coral pinnacle was rolled onto its beam ends (i.e. close to a 90 degree list), causing injury and chaos for the crew, spilling battery acid and other liquids, followed by a loss of electric power, rendering normal means for propulsion, control and egress unavailable, inoperable or ineffective. A controlled dive from this situation or release of the drop keel seems improbable given the difficulty of operating equipment in this attitude.

6.5.2.6 Deliberate Dive

Provided the crew remained able to function, with the presence of mind to initiate a dive and there was sufficient water depth to dive and the submarine was ready to dive and was in a reasonable diving trim, then a controlled dive would overcome the list and bring the submarine upright. Considering the need to disengage the port engine clutch before being able to propel ahead or astern on the port main motor, these serial preconditions combine to make this scenario unlikely.

6.5.2.7 Flooding Following A Beam On Grounding

Shutting the upper conning tower hatch would be difficult following such a grounding. Whilst the upper hatch was fitted with a means of closing it from below, it is likely that both bridge and control room personnel would have difficulty maintaining their position and ability to operate the submarine systems due to the list and may not have been able to close the hatch. Under this scenario the submarine is vulnerable to any additional loss of buoyancy, reduction in stability, external force or some combination of these that could force the conning tower hatch under the water, causing the submarine to flood and sink quickly to the bottom.

6.5.2.8 Dived Approach To Simpsonhafen

Given a deliberate dive was successfully achieved this scenario could lead to AE1 making a dived approach to harbour, perhaps with the intention of beaching the submarine or surfacing in shallow water close to help by releasing the drop keel. Simpson Harbour is suggested as the most likely destination given its sheltered position and presence of support ships. This seems an improbable combination of circumstances.

6.5.2.9 The Most likely Scenario Following a Beam on Grounding

It is considered most likely that following this type of grounding, the list would develop quickly following efforts to manoeuvre clear of the reef and before the crew were able to secure the upper hatch. Any further incident leading to the loss of buoyancy and stability, would allow the submarine to flood via the conning tower. In these circumstances the submarine's descent to the bottom would be more rapid. An oil slick and some debris/bodies would be likely, if so, it is possible that these were borne away during the night on the strong currents and dispersed by daybreak.

6.5.2.10 Pressure Hull Vulnerability In A Beam On Grounding

It is possible for a portion of the pressure hull between the bottom of the saddle tanks and keel to be damaged in a beam on impact scenario. However this would require a reef of just the right height to hit the pressure hull whilst avoiding the saddle tanks above and with sufficient force to breach the pressure hull that is at its maximum thickness in this amidships section. This alignment of factors seems unlikely. Alternatively, and more likely, if the submarine grounded with headway on then the forward athwartships bulkhead of the broadside torpedo tube annulus could be the single point for arresting the force of the grounding on its leading edge. This would be a major impact and could cause a leak or in worst case, breach the pressure hull, flooding the submarine. The submarine is vulnerable to water entering in this area, particularly with a starboard list (the likely direction), as this could quickly reach the switchboard and main batteries, leading to a loss of power and generation of chlorine gas.

6.5.3 Observations on Analogy with AE2's Groundings

6.5.3.1 AE2 grounded heavily on Sagandra point on the isle of Mudros at 2145 on 10th March 1915. The submarine was reported as 'hard aground and bumping heavily in short, steep seas'. After three hours of bumping and scraping the weather moderated and the submarine was towed clear. AE2 was able to make her own way to Malta where 13 hull plates were replaced.⁸⁰

6.5.3.2 AE2 grounded twice during her famous penetration of the Dardanelles. On the first 'she hit the bottom and slid up on the bank to an actual depth of 10 ft'. On the second occasion, shortly after refloating using full astern power, AE2 'slid up the bank to a depth of 8 ft'. As the submarine was facing down the bank towards deep water Stoker came ahead at full power to come off the bank,

⁸⁰ White, Michael W D, *Australian Submarines A History*, AGPS 1992, p46.

'gave a slight bump, gathered way and then bumped heavily. The last bump was calculated to have considerably injured the vessel, and probably impaired her fighting efficiency'. History shows that AE2 survived both groundings and went on to penetrate the Dardanelles.

6.5.3.3 The 3 groundings tend to confirm the analysis that:

- x AE1 and AE2 were extremely tough and resiliently constructed vessels.
- x They tended to ride up on striking a bank, becoming firmly aground, but without breaching the pressure hull, even though some hull seams might commence leaking.

6.5.4 Internal Bulkheads

Once dived the two internal bulkheads could contain flooding whilst they held. However, the submarine lacked the reserve of buoyancy to remain afloat with a fully flooded compartment:

- x The bulkheads were tested to 35-50 Lbs/sq.in and would probably not have withstood the pressure below 200 ft depth of water.
- x The submarine would not have sufficient buoyancy to surface or remain on the surface should any internal compartment flood.
- x Shutting the bulkhead doors against the angle on the submarine or the inrush of air/water could be difficult or impractical (both doors shut away from the control room) as Kinder attests in his account of the loss of AE2 following three shell holes in the engine room:

'The watertight door leading into the engine room was closed after a hard struggle owing to the angle of the boat and the engine room was isolated. All the available air was turned on so sufficient pressure could be maintained to get the water out of the tanks as quickly as possible.

The great trouble was the difficulty we had in carrying out our orders. We began to wonder what the results were going to be as no-one knew how fast the water was pouring in through the shell holes.

As AE2 weighed 900 tons, once she began sinking she took a lot of checking and it was not long before we were down to 60 ft, then to 80 ft, then the indicator began to slow down and AE2 was suspended. But would she rise to the surface? Everything had been done and it was just a matter of watch and wait for results. Things were beginning to look serious and it meant a struggle for life or death.

If any of the water pouring into the engine room came in contact with the motors and short circuited them it would be all up. As it was, the motors were working far beyond their safety load and the electricians were standing by with spare fuses in case others blew out. I think it would have been useless as AE2 was just holding her own and a lot depended on whether the water was being blown out of the tanks faster than it was pouring into the engine room. The boat was vibrating so much it seemed as though she would shake to pieces.

At last the gauge indicated that we were rising to the surface but very slowly: would the air pressure last? All the air pipes were frosting so it was being used up fairly fast.'

6.6 Evaluation of the Possible Causes of the Loss of AE1

6.6.1 Probability – Not Certainty

We have not located definitive evidence of the cause of the loss and therefore must deal in probabilities. There are a number of clues however:

- x Whatever befell AE1 occurred in a fashion and at such a speed that no effective distress call was made, noting that this may have required the rigging of the WT mast, (if Patey's account is correct, the WT mast was rigged and set working at 1430).
- x There was no persistent oil slick. Whilst the diesel fuel may have dissipated quickly in the tropical temperatures the heavier lubricating oil could have reasonably been expected to provide a persistent oil slick for some time after the sinking. There was no enduring slick found.
- x There was no debris or bodies found.
- x The local people have a story of a submarine approaching the reef from the northeast, stopping off the entrance and moving off to the northeast before disappearing. The story is time and date stamped by a story relating to ENCOUNTER's bombardment on the morning of 14th September 1914 and the searchlights and flares used by the searching ships that night.
- x They have no account of a battle with a German steamer.
- x Apart from YARRA's grounding on a reef, none of the surface ships reported a collision or damage.

6.6.2 AE1's Most Likely Course of Action on 14th September 1914

6.6.2.1 Return on the surface by the Most Direct Route to Rabaul

AE1's most likely course of action after she and PARRAMATTA parted company shortly after 1430 on the afternoon of 14th September was to return on the surface by the most direct route from last sighted position. This is particularly so having been given a direct order by RADM Patey at the time of sailing that morning, (0703 14th September) to be back by dark (sunset was at 1750). The direct route lies to the south of Duke of York Island, passing close off the entrance to Mioko Harbour and thence heading westerly so as to pass to the north of the Credner Islands – this is not only the shortest but also the safest; leaving the hazardous reefs of the Credner Islands down sun and up tide - thence direct to the anchorage.

6.6.2.2 Distances/Times

The distance from AE1's last seen position on the tracing of the chart submitted with HMAS PARRAMATTA's ROP (see fig 7 above), is about 24 nm to the anchorage in Simpsonhaven – about 2 hours and 10 mins @ 11 kts. However, for the first 6 or 7 nm AE1 would have an opposing current (reportedly 2 – 3 kts) and thereafter a crossing current. So the speed made good would have been less; allowing for these currents AE1 would have needed about 2 hrs and 25 mins to make the passage. AE1 had insufficient time to spare and no obvious rationale for a check dive. The alternative route, north about Duke of York Island was approximately 30% longer and would cause AE1 to be even later; it also required an unattractive and difficult navigational passage around the north of the Duke of York Island in the dark.

6.6.3 Evaluation of The Clues V Scenarios

6.6.3.1 Clues v Scenario table

Table 1 sets out an evaluation of the clues observed with the various scenarios considered. Clues are assessed on a scale of 0-5; 0 indicates the clue is not applicable to the scenario, 1 that the scenario has a good fit with the clue, ranging to 5 where the clue is contrary to the scenario.

The score represents the degree of the likely consequences that the event fits the clues surrounding the loss of AE1, not the probability of the event occurring.

Serial	Clue observed	Scenario 1 Bow On Grounding on a reef whilst surfaced	Scenario 2 Internal explosion, damage sufficient to sink SM	Scenario 3 Grounding on a reef whilst dived, damage sufficient to flood and sink the SM	Scenario 4 Run down by surface ship whilst dived, damage sufficient to flood and sink SM	Scenario 5 Combined Scenario - Glancing Grounding, SM dived to correct list, run down enroute harbour	Scenario 6 Sunk in engagement with German Steamer	Scenario 7 Beam On grounding surfaced, damaging ballast tanks, vulnerable to an additional event leading to sinking
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(d)
1	Sudden event, no time to rig WT mast and send distress call	4	2	2	1	1	1	1
2	No persistent oil slick	5	5	5	3	3	2	2
3	No debris or bodies (Note currents would have dispersed any debris + shortfalls in search mitigate the significance of this clue)	4	5	3	1	1	1	1
4	No observation by local natives = no story handed down	4	3	2	1	1	5	1
5	No surface ships report any damage or collision	0	0	0	4	4	0	0
6	Totals (the lower the score the better the scenario fits the clues noted)	17	15	12	10	10	9	5

This scenario is consistent with the story that has been handed down.

Table 1 — Evaluation of Clues v Scenarios

Let us now consider each scenario against these clues.

6.6.3.2 Scenario 1 – Bow on Grounding. The absence of debris, wreckage or a distress call militates against, but does not totally discount the probability of loss following a bow on grounding (see the discussion of the likely impact of a grounding in section 6.5.3 above). A grounding sufficient to breach the pressure hull is assessed as unlikely, but if this scenario is to result in the loss of the submarine then it had to do so. In which case, an oil slick and some debris could be anticipated. If this grounding took place on the reefs near Mioko Harbour then a local story might have recorded it – there were none of these clues.

6.6.3.3 Scenario 2 - Internal Explosion

This event is not judged likely, nor does the absence of an oil slick, debris/bodies or possibly, a local story fit this scenario.

6.6.3.4 Scenario 3 - Dived Grounding

Given the imperative to be back in harbour by 1750 (sunset), we do not assess it is likely that AE1 would have chosen to dive on the return passage to harbour. Had she done so (against the odds), a dived grounding of sufficient force to breach the pressure hull is judged unlikely – the most usual result of a dived grounding is a rapid ascent, absorbing much of the impact. Had it occurred it would almost certainly result in an oil slick and probably, a debris field?

6.6.3.5 Scenario 4 - Run Down By A Surface Ship

As noted above, we do not assess it is likely that AE1 chose to dive on the return passage to harbour. Had she done so (against the odds), a dived collision with a surface ship with sufficient force to breach the pressure hull would almost certainly result in damage to the ship, possibly an oil slick and maybe a debris field. None of these clues were present.

6.6.3.6 Scenario 5 - Beam on Grounding Damaging Main Ballast Tanks Resulting in a Dive and then Run Down by a Surface Ship

This combined scenario requires an extraordinary combination of circumstances. Ultimately, the lack of any unaccounted for damage to the ships rules against this scenario.

6.6.3.7 Scenario 6 - Sunk In An Engagement With A German Steamer

This scenario could fit the clues well, except for the absence of a local story recording an engagement that would have probably happened close by Mioko Harbour. Setting aside Reuschel's boast of an engagement between KOLONIALGESELLSCHAFT and AE1 we have not been able to place any other suitably armed German steamer at the scene. We do not know the identity of the steamer sighted by YARRA on the evening of 13 September, nor whether it was suitably armed.

6.6.3.8 Scenario 7 - Beam On Grounding Damaging Main Ballast Tanks Leading to The Sinking. This scenario provides the best fit to the clues, including the local story. If the submarine damaged two of the ballast tanks located in the 'saddle tanks' on one side of the pressure hull in a beam on grounding, it would have effectively lost 18-20% of its buoyancy and a significant reduction to its stability as the submarine settled to a new equilibrium position on its damaged beam. This alone would not be sufficient to sink the submarine but the submarine would then be very vulnerable to anything that further reduced its buoyancy or stability. To cite a few examples:

- x Breaching the pressure hull at the seam where the athwartships bulkhead of the broadside tube annulus reaches the alignment of the saddle tanks, causing a heavy leak or uncontrolled flooding with consequent damage to the switchboard and/or batteries.
- x A leaking or open Kingston valve in one of the undamaged external ballast tanks, allowing water into this tank or, perhaps more likely, a failure to achieve full buoyancy by leaving residual water in the ballast tanks after a check trim dive earlier in the day. This water would have a double effect; a reduction in buoyancy and the free surface created would also cause a reduction in stability.
- x A jammed helm with full astern power on the port shaft.
- x Or some combination of any or all of these otherwise manageable events.

Whatever the source, it would take an additional loss of buoyancy or force to increase the list so as to place the conning tower upper hatch under water, allowing water to enter the submarine via this hatch. Unless this hatch or the lower conning tower hatch was quickly shut the submarine would flood and sink in an uncontrolled descent to the bottom. It would be difficult to get the hatch shut in these circumstances – given the steep angle of heel and rapidly unfolding situation. Even if this had been achieved against the odds, the failure of power supplies and impossibility of working equipment in the resultant chaos would greatly hamper efforts to generate sufficient buoyancy to remain on the surface. In this situation (with the hatch secured), the descent would be much slower and the submarine may have travelled some distance on the current and possibly, moving along the bottom before settling on the bottom. The direction of this movement is most likely to be to the north given the well-established current flows at this time of the year (this is consistent with the local people’s handed down story). However, Mioko Island appears to be at a juncture point for the current with water flowing along the reef edges to the north-north-east and west, so it is possible but less likely that AE1 moved to the west of the impact rather than to the north east..

The absence of an oil slick could indicate that if the hatch was shut then the submarine probably remained intact, i.e. settling at a shallower depth than its crush depth. If it was flooded (considered the most likely outcome) then this proviso is no longer relevant.

6.6.3.9 Grounding the Most Likely Cause of the Loss

6.6.3.9.1 Bow on Grounding

The argument against a bow on grounding option as a cause for the loss of AE1 is strength of the submarine hull in this situation, the lack of any survivors, bodies, debris or distress messages from the surfaced submarine during its time on the reef, or an significant and persistent oil slick from the wreck should it have sunk with little notice. The lack of these indicators is not conclusive but tends to militate against a bow on grounding as the cause of the loss.

6.6.3.9.2 Beam on Grounding

A beam on grounding, damaging Main Ballast Tanks and resulting in loss of stability, combining with another event leading to a loss of buoyancy could lead to an uncontrolled descent to the bottom with the pressure hull intact and crew secured or trapped inside the flooded submarine seems the more credible of these scenarios. Given the lack of debris field or oil slick it seems more likely that the submarine bottomed with the conning tower hatch secured and did not exceed its crush depth. It remained disabled and intact on the bottom, either fully flooded through the conning tower hatch or a breach in the pressure hull, or if the crew survived (judged unlikely), unable to achieve sufficient buoyancy to surface.

6.6.3.9.3 Beam on Grounding Reconstruction of the Sequence of Events

A possible sequence of events may have been:-

- x AE1 headed for Rabaul on the surface shortly after 1430, (say 1500) from the position reported by PARRAMATTA.
- x AE1 was under pressure to get back before dark and had about 30 minutes in hand to make an ETA of 1750.
- x The shortest route to the anchorage passed close by Mioko Harbour and the island of the same name on the southern side of the Duke of York Island.
- x AE1 had earlier deviated from the orders given for the day to patrol the southern approaches to Rabaul, in order to check out a report on 13th September 1914 of a steamer off the Duke of York Island - a final look through the entrance enroute Rabaul would have been very tempting.
- x Inexperienced in the local conditions, particularly the precautions necessary when operating in proximity to coral reefs AE1 misjudged the strength of the current surging NW towards the reefs and through the entrance to Mioko Harbour.
- x As a result, AE1 found herself in a rapidly changing, dangerous situation, close in to the reefs off the entrance, on a lee shore with the SE wind and strong NW current pushing onto this hazard.
- x Combined with the low height of eye and poor lighting to observe outlying reefs, defective starboard shaft when running astern and the ever present possibility of a helm or propulsion failure, AE1 was unwittingly standing into mortal danger.
- x Looking up sun combined with the disturbed water arising from current hitting the near vertical faces of the reefs (see Gus Mellon's description of this at para 6.5.1.3 above) the reefs were difficult/impossible to see.
- x Whilst still making headway AE1 was washed beam onto a reef outcrop, opening up numbers 1 and 3 main ballast tanks forward of the broadside tube on the starboard side.
- x The force of the grounding was arrested by the athwartships bulkhead on the leading edge of the broadside tubes annulus in the pressure hull (para 3.7.2 refers).
- x The current held the submarine there, grinding and pivoting against the bulkhead with the diesels still propelling ahead.
- x The crew was thrown from their feet by the impact and working with a developing list took several minutes to stop the diesels and to engage astern power on the port shaft.⁸¹ This exacerbated the damage already experienced.
- x With difficulty she extracted herself, using full power astern on the one (port) shaft available and moved astern off the reef.
- x The natural tendency of the port shaft running astern to pull the stern towards the reefs (to starboard) was probably offset by the wind – most submarines have a strong tendency to swing into wind when going astern.
- x As a result AE1 moved off and in what direction it went is not certain but may depend on where it grounded. A likely scenario is that it moved to the NE swinging to starboard, i.e. making sternway away from the reefs and to the east, swinging to the south east, at the same time, assisted by the NE running current also moving away from the harbour entrance.
- x In the process of moving clear it is possible that she struck a second time, adding to the damage already experienced to her ballast tanks and pressure hull.
- x A heavy list quickly developed as water flooded into the damaged ballast tanks, causing difficulty for the crew trying to maintain their stations and regain control the submarine.
- x A new factor or combination of factors then intervened, perhaps pressure hull was

breached at the broadside tube bulkhead leading to flooding and a loss of power as the control room began to flood, with the starboard list channelling water towards the switchboard and main batteries, perhaps the combined impact of astern power, rudder and delicate state of stability combined to force the submarine onto her beam ends drawing the conning tower hatch underwater, before the crew were able to close it, flooding the submarine. We don't know.

- x As it sank it AE1 probably drifted further on the current before settling on the bottom.

Section 7 - Conclusions and Judgements in Selecting the Search Area

7.1 The Balance of Probabilities

It is concluded that on the balance of probabilities AE1 was damaged in a beam on grounding on the reefs surrounding the southern and eastern end of Mioko Islands rendering it more vulnerable to a further incident, leading to flooding and a loss of stability. Where the submarine was carried after grounding is not certain, but it would likely be to the north and the submarine was probably carried off to the NE on the strong currents and settled on the bottom otherwise intact, some distance from the grounding position. The minor differences, discussed in para 5.5.3 on page 54, as to the last known position of AE1 and the time of last sighting are not significant in this judgement, on the balance of probabilities, as to AE1's fate or to the recommendation for the search area.

7.2 Selection of the Search Area

7.2.1 Effectiveness of the Search September 1914

7.2.1.1 Impact of Currents On Debris Fields

The effectiveness of the search by the fleet after AE1's loss has been discussed and criticised earlier at section 5.6 above. Nonetheless, the areas searched appear to have covered the most likely areas to contain AE1 and any wreckage or debris. Gus Mellon has reported on the currents in the St George's Channel area, based on the MARLIN database (CSIRO Hobart) and the SOPAC database. Of all the marine geophysical surveys conducted in the area of interest, only two held any useful information - the cruises made by the Research Vessel FRANKLIN in 1985 and 1986. During these cruises, FRANKLIN laid and then recovered six months later a set of three current meters in the St George's Channel just off Waiara Point on the north east coast of Duke of York Island. They also made a number of runs across the strait between DoY and New Ireland, plotting depths. The unrefined current data is available on the MARLIN website but despite approaches to CSIRO no knowledge of what happened to the depth profile info could be obtained. Basically, the FRANKLIN survey found that the sea floor in this area is like a deep vee formation. The current meter readings for September 1985 showed about 3 knots of surface current, diminishing to about 1 knot at 900 meters (based on a rough interpolation from the unresolved current vectors 'U' and 'V', as plotted). David Nicholls has used the data provided by Gus to estimate the likely drift of any pattern of debris that might have existed and plotted the same to estimate if any of the tracks of the search vessels might have coincided with the set and drift of any pattern of debris. Given that the set and drift would have occurred in darkness, overnight on the 14th-15th September and is likely to have dispersed over an increasingly widening area, thus reducing the probability that it would be seen (if any debris existed).

7.2.1.2 Oil and Bubbles Sighted

There are anecdotal reports in Hodgson and Hamilton's diaries and HMAS ENCOUNTER's ROP of a patch of oil and bubbles being found. Hodgson records that ENCOUNTER located these in deep water:

*“At 1 p.m. “Encounter” discovered oil and bubbles in large quantities in St George’s Channel. It was too deep, however, to locate the boat, and at dusk the search was abandoned, all ships returning to Rabaul.”*⁸²

This report cannot be correct; ENCOUNTER’s deck log records that she anchored in Simpsonhaven at 1045 on 15th September 1914 and remained there for the remainder of the day. The deck log contains no record of sighting oil or bubbles during the search conducted that morning.

At 1700 on 15th September ENCOUNTER reported to AUSTRALIA (now enroute Sydney) that:

*‘The patch of oil reported has dispersed. A careful search has been made this afternoon on the source area and traces of oil are apparent but no more than might be expected with big ships cruising in the vicinity. Jackson is now proceeding to carry out search with Motor Boat. Prize Steam Yacht is now searching as arranged York Island & New Ireland coast also Coast of North York Island.’*⁸³

We have been unable to locate the original report of an oil patch referred to in this signal or the source of the advice that it had now dispersed – presumably one of the motor boats or the so called ‘prize steam yacht’ (presumably the NUSA?), involved in the search. NUSA was fitted with a WT set (and armed) and this could explain how the advice was transmitted back to ENCOUNTER at anchor.

No record can be found of an accurate position for these oil and bubble sightings, this information could be a valuable clue to the location of AE1.

7.2.1.3 Board of Inquiry

RADM Patey and the Fleet were still in the process of taking over German New Guinea and had other priorities demanding their attention. The Flagship, HMAS AUSTRALIA weighed anchor and sailed at 1245 on 15th September. Sometime after 1700 on that day AUSTRALIA ordered HMAS ENCOUNTER to conduct a Board of Inquiry and nominated Stoker and Warren as witnesses to be called. The Flagship returned to Rabaul on 19th September and this could possibly be interpreted as effectively over ruling the instruction, i.e. if a Board of Inquiry were to be conducted then RADM Patey should have convened it himself. However, in his Letter #26 to the Secretary of the Navy Board RADM Patey indicates that he is still anticipating a Board of Inquiry to be conducted by Acting Captain Lewin in ENCOUNTER. In the event no formal Board of Inquiry appears to have been conducted. Despite the exigencies of the war this seems an extraordinary outcome, given the number of uncertainties and unknowns. If an Inquiry had been held then its records could provide invaluable information on the loss of AE1.

7.2.2 Contemporary Searches

7.2.2.1 Timeline of Searches for AE1 since 1914

⁸² Aubrey Hodgson, diary 22nd September 1914, Australian War Memorial - 3DRL/6032 -Hodgson, Aubrey Wilfred

⁸³ HMAS ENCOUNTER Captain’s signal log.

Gus Mellon has provided the basis for this summary of the post-loss day searches for AE1:

- x 1976 - John Foster first became aware of the AE1 story whilst serving as the Assistant Defence Attaché in Port Moresby. He commenced researching the history of AE1 in the Australian Archives and determined an initial search area.
- x 1976 - Foster obtained permission from Navy to conduct one side scan search, taking advantage of the presence of the RAN Hydrographic Survey Ship HMAS FLINDERS, which was heading to New Ireland to carry out survey work. One unresolved contact was made in the vicinity of the Credner (Pigeon) Islands, but overall the mission was unsuccessful, due mainly to inadequate scope of the side scan sonar available.
- x 1978 - FLINDERS conducted an ad-hoc search for the submarine during an opportunity visit to the Rabaul area.
- x 1980-1989 - Foster continued his research and included a preliminary visit to Rabaul to elicit intelligence and talk to local people, in conjunction with his Australian Rotary Club's aid projects to the Duke of York Islanders (helping to provide improved water storage capabilities for the islands). Foster made several trips to Rabaul during this time period, all under the auspices of the Murwillumbah Rotary Club.
- x 1990 - Jacques Cousteau (*Calypso*) agreed to conduct an ad hoc search in the vicinity of the Credner Island group on his way to New Ireland. Unfortunately his submersible went unserviceable as it was about to be deployed onto the FLINDERS' (1976) contact. Cousteau was able to conduct a magnetometer search in the area, however this was also unsuccessful.
- x 2002 - John Foster established liaison with West Australian Maritime Museum [WAMM]⁸⁴ seeking advice and support for his search for AE1. WAMM sought political support, leading to the former Leader of the Opposition, the Hon Kim Beazley urging the Minister Assisting the Minister for Defence, the Hon Danna Vale to provide assistance to Foster's search. WAMM formally provided support, advice, and archaeological expertise; remote sensing technology and equipment were offered. This support continues.
- x 2002 - Foster obtained financial assistance from Baypond Productions and conducted a private search off Wirian Reef (Mioko Island) using local divers. This was based on intelligence gained from the parish priest at Milmila Mission (Fr Bernie Miller – now deceased) on Duke of York Island. The local parish's financial assistant and his brother claimed to have sighted a submarine some years earlier whilst diving for trochus in the area. A tower of large sharks over a possible site prevented a full investigation by the divers.
- x 2003 - Foster conducted another search at his own expense recruiting two local divers and using the Rabaul Hotel's utility boat as the search platform. The search was again harassed by sharks, but there was no contact of any wreck.
- x 2003 - With financial assistance from the Australian Broadcasting Corporation, Foster chartered a local game fishing boat (*MV J Michelin*). In conjunction with Professor Jeremy Green from the WAMM, Richard Smith, the ABC's Film Director (brother of Tim Smith of the NSW Heritage Office) and Peter West of NUMA, they

⁸⁴ 1995 WAMM decided to create an Australian submarine museum to focus on AE1, AE2, the 'J' and the 'O' boats as well as the 'Z' force boats in its future exhibits and research activities.

- searched the very close littoral area of southern Mioko Island and two adjacent islands along the most probable return track for AE1.
- x 2007 - Project AE1 secured Ministerial support (Departments of Defence and Veteran's Affairs) that tasked the RAN to conduct a search. HMAS BENALLA (Hydrographic Survey Ship) with Foster as ship-rider/adviser and Mellon as shore support, located what seemed to be a man-made object close to Wirian Reef, off Mioko Island. This location fitted in with local intelligence about AE1's disappearance but a positive determination was not made at the time.
 - x 2007 - Later in the same year, the RAN dispatched HMAS YARRA (Minehunter), again with Foster onboard, to conduct a search using Variable Depth Sonar and a controlled Mine Disposal Vehicle with sonar and video to check the BENALLA contact. RAN Clearance Divers were also used but were unable to descend deep enough to reach the wreck site. Whilst the dimensions of the contact (as plotted by the BENALLA's sonars) closely resembled a submarine conning tower and mid pressure hull section, it was later classified as a rock formation following shore analysis of the gathered data by the RAN Seapower Centre and DSTO.
 - x 2009 - Whilst planning another expedition, Foster had several conversations with former Rabaul salvage diver George Tyers, who claimed he saw a submarine in Simpson Harbour in 1971 off the shore of Vulcan Island to the harbour's west and later realized that it might be AE1 from photos he saw in 1974. Foster believed the matter should now be followed up. This was despite the Navy's rejection of Tyers' 'find' earlier on.
 - x 2009. - With the assistance of private donations and the Seven Television Network, a search by Foster was conducted in May using the local dive charter vessel MV *Barbarian*. In the team were Major Tom Hall (AE1 Descendants Researcher and Project AE1 member), wreck diver Dr Mark Spencer (of the AE2 search team) and another well-known wreck diver Mr Samir Alhafith of Sydney. Mike Munro of Channel 7 filmed the event. Whilst the general location of Tyers' marker wreck (KEIFUKU MARU, a WW2 Japanese freighter) was found, there was no trace of the submarine nearby. The footage from the mission was aired on Seven's "Sunday Night" program involved some of the descendent relatives and gained favourable publicity.
 - x 2009 - Project AE1 decided to utilize the remaining donation funds left and conducted another search in the Tyers contact area, this time again recruiting the assistance of Dr Jeremy Green of the WAMM and his proton magnetometer, with diving support by diver John Riley (of the AE2 search team) and ground support by Major Tom Hall. A magnetometer search was conducted, clearly locating Tyers' marker wreck (KEIFUKU MARU). Unfortunately, there were many magnetic anomalies in the area due to the close proximity of the volcano Vulcan. Further, it was discovered that the Japanese marker wreck was now buried under 30 metres of pyroclastic matter, due to the 1994 volcanic eruptions. No submarine wreck was found to seaward of the KEIFUKU MARU location.
 - x 2011 – HMNZS RESOLUTION (survey ship) and HMAS GASCOYNE (mine hunter) during Operation RENDER SAFE 2011 found a hitherto unknown Japanese Midget Submarine in Simpson Harbour.
 - x 2011 – HMNZS RESOLUTION conducted a brief Multi Beam Echo Sounder Survey of the close in to land portion of the high probability search area for AE1. Nothing

found.

7.2.2.2 Entombed But Not Forgotten

John Foster provides a more detailed account of the searches conducted up to November 2003 in his book, *Entombed But Not Forgotten*.⁸⁵

7.2.3 Selecting a Future Search Area

7.2.3.1 Broad Definition

The search area should be broadly confined to an area centred on the last sighted position and a return track by the most direct route, south of Duke of York Islands, north of the Credner islands and thence to UPOLU at the anchorage off Rabaul. John Foster reached a similar conclusion following a number of unsuccessful inshore searches based on local sightings of wreck like objects.⁸⁶ However, he incorrectly assumed that AE1 was heading for Kokopo rather than to Simpson Harbour.

7.2.3.2 Impact of the Most Likely Scenario

The possibility of loss following a beam on grounding off Mioko Island and consequent either slow or rapid descent to the bottom should determine the primary search area. The secondary area should include the last seen position, the most likely area for a dived collision with PARRAMATTA. Finally the tertiary area should be extended to cover a dived collision in the approaches to Simpson Harbour.

7.2.3.3 Recommended Search Area

The primary search area can be set out, say 3 nm to the north east and west from the possible site of a beam on grounding to allow for drift in either direction depending on which arm of the current predominated, prior to settling on the bottom. Given the geometry and the handed down native account, the north east is the most likely direction of drift. The area should be bounded by the reef edge and extend to seaward to allow for the possibility that the submarine may have moved down any steep slopes on the bottom within this area. Note that this area includes the last known position of AE1. The primary area is about 5 Sq. NM of which 15-20% is deeper than 300 metres.

The secondary search area should comprise a five mile circle around the last seen position (it is bounded to the West by Duke of York Islands). The tertiary area can be set out as 3 nm up tide (i.e. to the SE of the track) and 5 miles down tide (i.e. NW of the track) either side of the route back to the anchorage, excluding areas encompassed in the primary and secondary search areas. Three miles is nominated to allow for navigational errors, drift, etc. The NW extremity of this demarcation line will be constrained by the reef fringe of Duke of York Island. The secondary area is approximately 62 Sq NM of which about 87% is deeper than 300m.

⁸⁵ Foster, John, *Entombed But Not Forgotten*, Sydney, 2006, p86-102.

⁸⁶, Ibid.

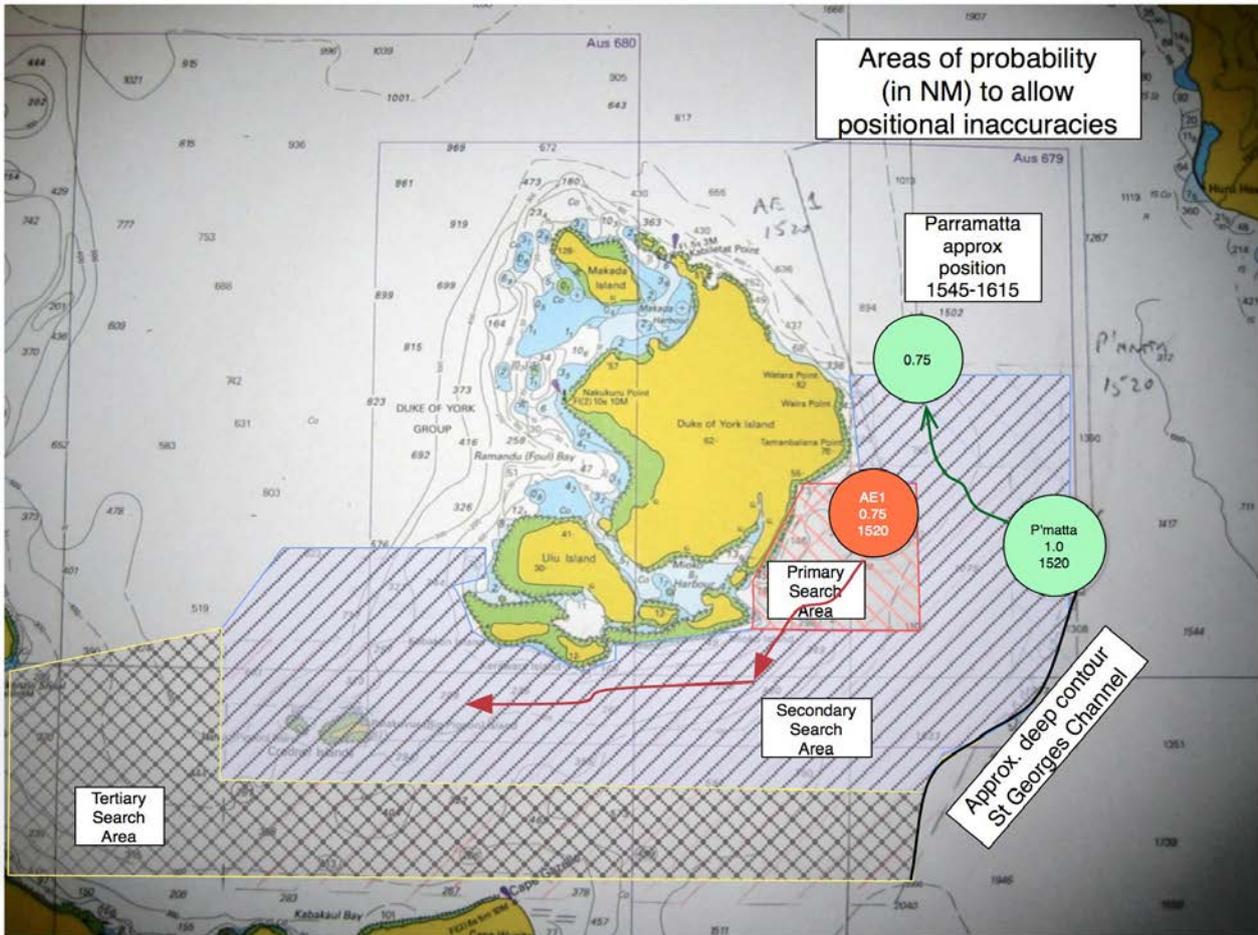


Figure 30 Recommended Search Areas

As defined above, the tertiary search area should encompass the approaches to Simpson Harbour along the track of the most direct route back to harbour. The tertiary area is approximately 40 Sq NM of which about 78% is deeper than 300m

As mentioned above, irrespective of whether the loss of AE1 was due to a navigational error as we conclude, or by enemy action – sunk by the KOLONIALGESELLSCHAFT, as we discount, there would be considerable overlap of the likely location of the loss, which adds weight to the recommended search areas.

7.2.3.4 Impact of Earlier Searches

It is considered that none of the earlier searches should be considered comprehensive; any areas already searched in the primary and secondary search areas set out above should be searched afresh.

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Editor and Chairman

AE1 Search Area Committee

10th February 2012

Annexes:

- A. Contributing Authors and Researchers
- B. Geographical Reconstruction
- C. General Arrangement drawings of AE1
- D. Annotated Transcript of Hodgson's Diary

⁸⁷ Green, J, *The Search for The AE1: Magnetometer and Side Scan Sonar Survey Duke of York islands, East New Britain, 22-28 November 2003*, WA Maritime Museum, Fremantle, p7.

Annex A – Contributing Authors and Researchers

Richard Arundel joined the Royal Australian Naval College in 1947. He specialized in signal-communications and served as the Deputy Director of Joint Service Communications and as the Director of Naval Signals. He retired in 1986 as the Defence Attaché Paris and Berne and lives in his home-state Queensland. His interests include military research.

Rear Admiral Peter D Briggs AO CSC RAN Rtd. Peter retired from the RAN in 2001 after a 40 year naval career. He specialized as a submarine operator, including two submarine command tours. He spent ten years as a senior Defence executive and is the Chairman of the AE 2 Commemorative Foundation Ltd.

Darren Brown of Melbourne, born in the 1960s has spent the last 30 years working for major airlines in Australia in the maintenance environment. He became interested in WW1 British Submarines via stories his grand mother would tell about her father. This interest has turned into a full time passion covering the years of 1901 to 1930 & including the Royal Australian Navy. In 2008 he embarked on solving the mysterious loss of his great grandfather's submarine HMS E18 in 1916 in the Baltic Sea. This intense research, using only primary sources from the British, German & Russian Archives led to E18 being found in October 2009. His work in this field continues, heavily focused on discovering who the early submariners actually were as there is no official list. From the years of 1901 to 1930 this research has now discovered 6,400 RN & RAN men & the total grows daily; the focus is to also search through every Submarine log book & patrol report to compile individual histories of all submarines over this period.

Gus Mellon served for 24 years in the RAN, as a marine engineering sailor, NCO and officer, spending 18 of those years in the submarine force. On leaving the navy he worked briefly for the Australian Maritime Safety Authority before entering the subsea engineering and construction side of the offshore oil industry. A chartered marine engineer and also a chartered mechanical engineer, he now works as a consulting engineer in owner's project teams building ultra deep water drilling rigs for the offshore oil and gas industry. Married to Christine, with four children and several grandchildren, his interests include travel, food, wine and beer, reading and naval history, particularly that of submarines.

David Nicholls (Commander. RAN Rtd) spent 34 years as a Naval Officer and the past 10 years as a consultant to Defence Industry. He began his naval career in 1967 at Britannia, Royal Naval College in the Royal Navy and transferred to the RAN in 1977: he is a 'Perisher' (Command Qualified) submarine graduate and a 'Dagger' navigator: he commanded two RAN submarines. He currently works part-time as the Executive Manager of the Submarine Institute of Australia

Ian Noble (Captain. RAN Rtd) retired from the RAN in 1996 after a lengthy career as a weapons and electrical engineer, during which he served in submarines and had major roles in two large submarine capability development projects. Since 2005, he has been a voluntary guide at the Australian War Memorial, where he is able to highlight the service of both of Australia's submarines in the First World War, and to research their records.

Peter Richardson Arrived in Rabaul in PNG via Sunderland Flying Boat in September 1953 as a babe in arms.

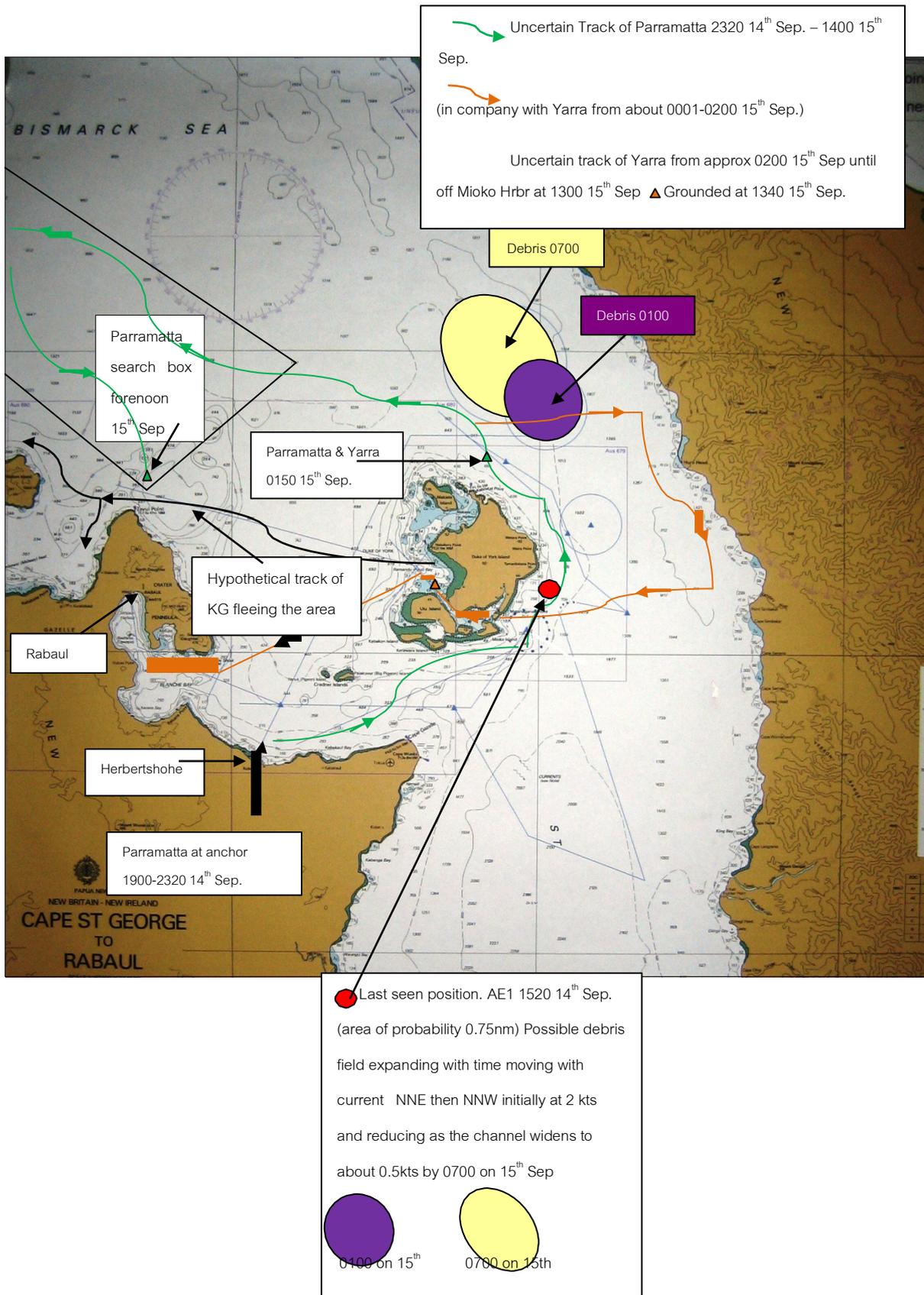
- x Lived at Kerevat LAES (Lowlands Agricultural Experimental Station) until 1960.
- x Peter's father John retired from the Australian Govt. and then set about developing a 400 acre cocoa plantation in the Upper Warangoi Valley under the Ex Servicemen's Scheme.
- x Began Scuba diving in Rabaul in 1974. By 1980 he was a qualified commercial diver & working in the offshore oil fields of South East Asia & Australia.
- x He now manages offshore diving projects for a number of clients in the Malaysian Oil & Gas Industry.
- x Peter's interest in the AE1 began in Rabaul in 1975. Since 1988, Peter has been actively researching & seeking as much information on AE1 as possible.
- x The web site - <http://www.ae1submarine.com/> - is Peter's attempt to share his research with the general public.

Terence Roach (Commodore. AM. RAN Rtd) with his wife presently runs beef cattle on a farm near Canberra. He commanded two Australian submarines; was a long-term planner in Defence before retiring as the Naval Attaché in Washington, USA after 41-year career. He is a Director of the AE2 Commemorative Foundation and a consultant to Defence Industry.

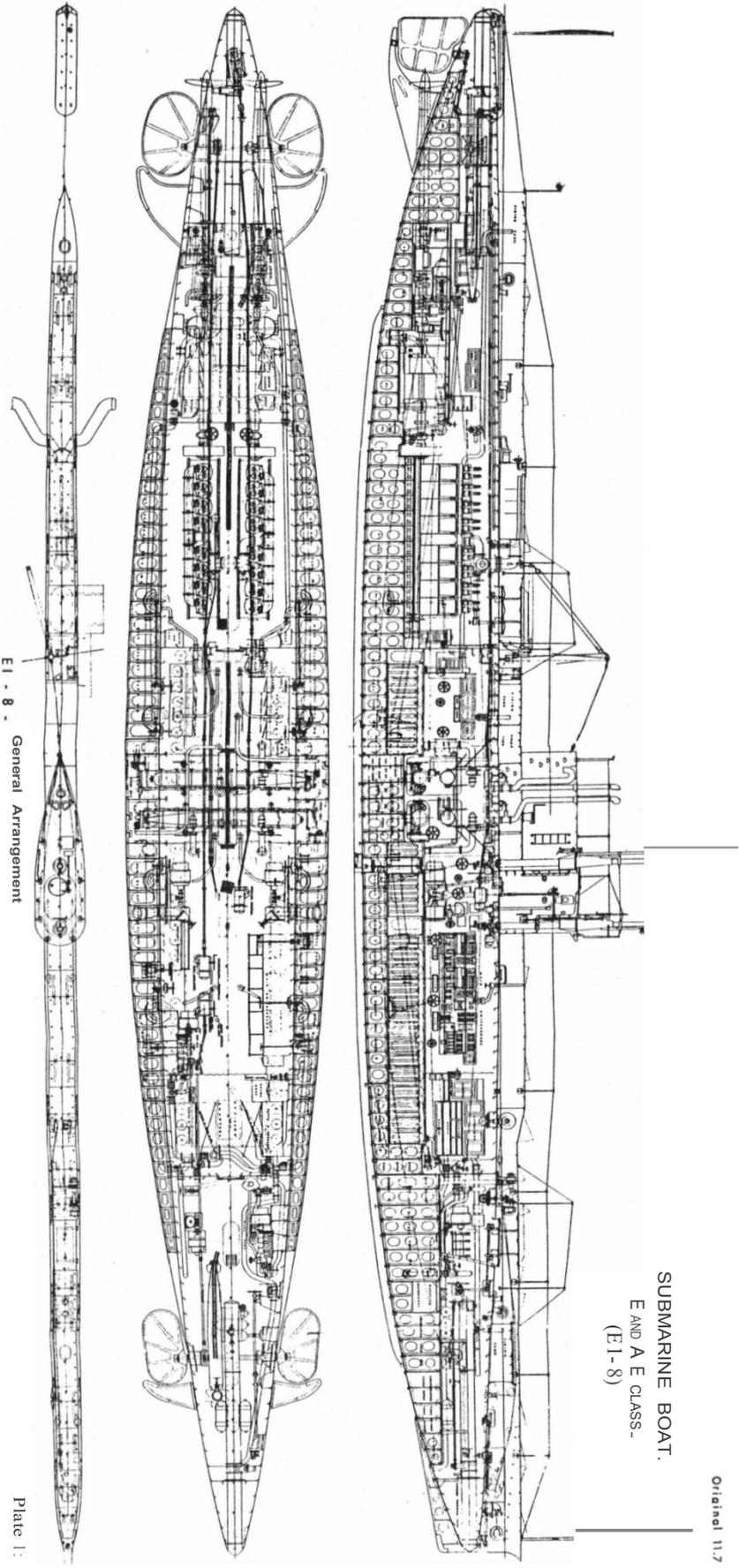
Tim Smith is the Deputy Director of the NSW State Government's Heritage Branch, Office of Environment and Heritage (Sydney, Australia). As NSW State Government Maritime Archaeologist, Tim has been working in the field both nationally and internationally for over 25 years, including participation in archaeological projects in the Middle East, Greece, Italy and Turkey. A member of the initial Project AE2 expedition that first documented the AE2 submarine wreck site, Tim is Director - Maritime Archaeology of the ongoing AE2 Commemorative Foundation's archaeological expedition. Tim is also the Director of the separate Project Beneath Gallipoli expedition that continues to map the 1915 underwater cultural battlefield landscape around the Dardanelles Peninsula. An expert in the heritage management of submarine sites, Tim manages the M24 Japanese midget submarine wreck site (1942) off Sydney. He won a prestigious 'Award of Distinction' from UNESCO for setting a global benchmark in the management of the fragile underwater heritage site. Tim is past Vice President and Secretary of the Australasian Institute for Maritime Archaeology (AIMA), and currently is State Council.

Annex B Geographic Reconstruction by David Nichols

Possible tracks of Parramatta and Yarra 2320 14th – 1400 15th Sep.



Annex C - General Arrangement Drawing AE Class



-- 304 --

Original 11.7

SUBMARINE BOAT.
E AND A E CLASS.
(E1-8)

E1 - 8 . General Arrangement

Plate 1:

Annex D - Annotated Transcript of Aubrey Hodgson's Diary

A Critique of Aubrey Hodgson's Journal Tue 21 Sep – Sun 27 Sep 1914

The Diary Transcription has been Compiled By Ian Noble, annotations are by Peter Briggs

Monday 21st (Sep)

Rec'd W./T. "Yarra aground in St George's channel. Sumatra sent out and towed her off the Reef, suffered no serious damage beyond a bent shaft, she was placed on the slip, and hauled up for repairs.

YARRA ran aground at 1340 on Tuesday 15Sep14 after exiting the northern entrance to Mioko Harbour whilst searching for AE1. Her port and centre propellers were damaged. The ship did not stick on the reef and was not towed back, she returned to Simpson Haven under own power. She was not slipped, divers removed the centre and port propellers and replaced the centre with a spare, the port shaft was too bent to use. YARRA deck log refers.

At 4p.m. French cruiser "Montcalm" came in, and Admiral sent for our Captain who returned with a guard of French bluejackets and at 5.30p.m. The German deposed Governor was brought onboard to await passage to Sydney. He has 3 servants and large amount of luggage.

HMAS ENCOUNTER's deck log records that FS MONTCALM arrived at 1530 on 15 Sep14, providing an accurate date for this diary event.

He is a dapper little man, with fat bloated face, large blossom nose, tremendous corporation, wearing a high collar, which I fear, must be a serious menace to his ears. He appears genial natured, and has a "satisfied and self confident" air with him. He dines in his cabin, and has every comfort that can be extended, and a stalwart Frenchman stands guard over his apartments. He terms the Australian soldiers as brigands, rumour says, they made very short work of his wine cellar when the Governor's residence was captured. At 10p.m. all Germans were transferred from steamer "Murex" to the "Aorangi" Hope our guests will behave themselves. Guard of 10 men sent with prisoners They were located in 2nd class accommodation quarters. Very motley throng some soldiers, some sailors shop assistants, farmers and well-to-do gents. Hope they don't stay here too long as they take up too much room.

“Sydney” entered at midnight, having captured small steamer with 200 tons of coal in her holds, which couldn’t be accounted for

No record of SYDNEY capturing a small steamer has been found. The Official History of Australia’s Involvement in the War 1914-1918 Vol IX – RAN, Appendix 9 list all ships captured in PNG, none by SYDNEY!

“Sydney sent a boat over to “Aorangi”, and sailed immediately.

Tuesday 22nd (Sep)

The visual signal station at “Potsdorf” captured last night. Three Naval signalmen brought in as prisoners.

At daybreak, Destroyers were sent to sea, to search for “Submarine A.E.I.”, which vessel, should have come in last night.

The destroyers sailed at 2320 on 14 Sep 14 to search for AE1, not daybreak on 15th (when ENCOUNTER sailed).

Wrong, PARRAMATTA was with AE1 and last saw her between 1430 and 1520 on the 14 Sep 14

It seems that she was on patrol duty at the entrance to the harbour, from noon until midnight, but when “Parramatta” went out yesterday at 3.30pm the submarine couldn’t be found. Generally a submarine has a parent ship on duty with her, but for some reason, “Yarra” was

Wrong. YARRA was not with AE1.

obliged to leave her,

and it appears on this occasion that the submarine was out of the sight of all ships. It is generally believed that the submarine has sighted an enemy, and gone in pursuit of him.

No other accounts giving this explanation were found.

She was, of course, unable to use her W./T. Apparatus on account of the mast being dismantled preparatory to diving, in case of emergency. No news having been received of the missing submarine by 11 a.m., fears were entertained for her safety.

Wrong. The alarm was raised at 2015 by AE2 and a search order at ~ 2230 on 14 Sep 14.

So all ships were ordered to sea to drag for her.

Wrong. Only HMAS PARRAMATTA and YARRA searched overnight on 14 Sep 14, HMAS ENCOUNTER from 0545 until 1045 on 15 Sep 14. HMAS WARREGO (0630-1000) and SYDNEY also searched on 15Sep14 as they undertook other missions. Several boats and schooners were used on 15 Sep 14, but no other HMA ships were involved.

At 1 p.m. "Encounter" discovered oil and bubbles in large quantities in St George's Channel.

HMAS ENCOUNTER anchored at 1045 on 15 Sep 14 and hence could not have sighted bubbles at 1300. HMAS ENCOUNTER was in charge from midday on 15th, HMAS AUSTRALIA having sailed for Sydney. HMAS ENCOUNTER signalled a report to AUSTRALIA at 1700 on 15 Sep14 regarding the finding of a patch of oil that had now dispersed and was dismissed as unrelated to AE1's disappearance.

It was too deep, however, to locate the boat, and at dusk the search was abandoned, all ships returning to Rabaul.

Two motor boats were despatched at about 8 p.m. under orders of "Yarra", they are to make a thorough search of the many lagoons in the Island group, for German sloops "Condor", "Planet", and "Komet", who are, it is believed, hidden under of Palm trees, along the coast.

Terrific thunderstorm passed over us tonight. The air is now lovely and clear.

Wednesday 23rd (Sep)

Presumably this is the morning of 15 Sep 14, not the 23rd?

No news of the submarine this morning, several theorys (sic) have been suggested as to the probable cause of her disappearance. It is probable that, during the destroyers (sic) absence, she may have been fired at from some small fort, or boat, or she may have been exercising "diving", and, being in deep water, failed to release her 10-ton keel-bar in time to prevent her submerging too deep, and thus the pressure of the water became too great, and so, the boat was forced to the bottom. It is to be hoped some light will be thrown on the mystery very soon. Some of her crew underwent naval training in England with me. "Warrego" arrived about lunch time with a German steamer "Makelong"(sic) in tow.

Wrong. According to her deck log HMAS PARRAMATTA captured the NDL Metlong at 1100 on 23Sep 14 in Mioko Harbour and weighed and proceeded in company with her at 1410 enroute Rabaul.

She is laden with arms, supplies, coal, etc. for German warships. She has palm tree branches on top of her funnel, and masts. This is quite an ingenious method playing "Hide and seek". The crew are Naval men.

3p.m. "Newcastle" arrived with a yacht in tow. This is the "Nusa" the late Governor's official yacht, and a splendid model.

There is no record of HMS NEWCASTLE arriving in Rabaul in any of the ship's deck logs. Nusa was captured by HMAS WARREGO at Kavieng on 14 Sep 14, sailed back by a prize crew with WARREGO and presumably brought into Rabaul on 15 Sep 11, (WARREGO arrived at 1005).

Crew sent to "Aorangi", and, Naval men, under a Lieut of "Newcastle" in charge took her over. She is being fitted with W./T. 3 x 12 pounder guns, and 2 maxims.

Wrong about the crew and inaccurate about the armament. HMAS ENCOUNTER's ROP rendered on 19 Sep 14 on the return of HMAS AUSTRALIA states that NUSA was fitted with WT, armed with 1x3pdr gun and a maxim gun both from ENCOUNTER and crewed from BERRIMA under the command of LCDR Jackson.

No doubt our "chief guest" will be pleased when he hears his yacht is now in the "Role" of a "British Man-o'-war". "The Nusa" would look quite at home conveying picnic parties about "Our harbour".

"Steamer Madang" came up from Herbertshohe, with native prisoners and many boxes of money and valuables, which had been taken from the late residents homes.

Improbable. The proclamation issued at Rabaul on 12 Sep 14 and the terms of capitulation signed on 17 Sep 14 made it clear that private property was to be protected, the law of the land and many officials administering it were also left in place subject to the latter signing an oath of neutrality. Further, the terms of capitulation negotiated between Haber and Holmes were documented in a series of letters. None of these record a protest about the theft of valuables from local residents. I suspect the valuables referred to were the remains of the German treasury that had been handed over as part of the surrender.

The first such signal was sent by HMAS AUSTRALIA WT AT 1610 on 15 Sep 14 (the ship was then at sea, enroute Sydney.)

The Vice Admiral informed the fleet that He very much regretted to report that the "Submarine A.E.I." had been lost with all hands. Details of the catastrophe would be signalled later.

At 9 p.m. "Newcastle" sailed for unknown destination taking collier "Seaham" with her. "Nusa" sent out to try her guns and torpedoes, also tune her. W./T. Gear.

Thursday 24th (Sep)

News was received during the night, that two large cruisers passed Apia. Samoa, steering Nor^West 15 knots p.h. A Nor^Westerly course would bring them here, or perhaps the Marshalls, but their course may alter dozens of times, soon as they get clear of the land. However, it's nice to know they are still in the Pacific "looking for our ships". This news has caused much excitement in the fleet.

This may refer to the reported return of the German cruisers that caused HMAS AUSTRALIA to reverse course on 18 Sep 14 and return to Rabaul, arriving 19 Sep 14?

Received news that "Newcastle" acting with a Japanese squadron, had occupied the Marshall Isds. "Australia", "Sydney" and "Montcalm" sailed 5p.m., Patrol coast during the

HMAS AUSTRALIA, FS MONTCALM, HMAS ENCOUNTER and HMAS BERRIMA sailed for Madang on 22 Sep 14, see German timeline. This may assist in correctly dating the conversation with Reuschel?

night.

"Fantome" arrived bringing mails from "Sydney" The first we have had. In a conversation with a prisoner who, I understand, is an Engr. Officer of "German Warship Planet" I gathered the following, He claimed to have been in charge of a small yacht named the "Colonial" (sic), and that, when our submne. (sic) Was "hove to" in St Georges channel on Monday afternoon last, he approached her, flying a White Ensign, fired at, and sunk her, and then ran over her. I assured him, our submarine wasn't lost, but he wouldn't accept my argument. He was most callous, and gloated over the fact, that he caught them napping so very simply.

I immediately informed our captain, who, in turn, told the Senior Naval Officer present, and I was required to write a statement, descriptive of our conversation. Would love to know if this fellow is telling the truth, or only bluffing. Everyone forbidden to converse with the prisoners onboard "Aorangi".

Friday 26th (Sep)

Friday was the 25th!

Squadron returned to harbour 6 am. "Warrego" sent to sea 8 am.

Saturday, 26 Sep 14 is probably the correct date for HMAS AUSTRALIA squadron's return to Rabaul, they sailed from Madang 24 Sep 14.

memorial service was conducted in "Australia" this forenoon, colours were half-masted as a token of respect to those who lost their lives in "AEI." Flagship made general signal this afternoon describing the position of the Allies in the Western Theatre and things appear very favourable. Think our old friend "Kaiser Bill", was a little out in his references to "Sir John French's" "miserable little Army." being contemptable (sic). Admiral made a signal warning both Officers and men, that correspondence would be confined to "post cards only" should any further case of communicating the doings of the military and naval Forces occur. It must be borne in mind by everyone, that the CinC will give all possible information to the public. Censorship is a most necessary evil. A large guard of soldiers came onboard after tea, and all German prisoners were transferred from "Aorangi" to collier "Whangape" for passage to Sydney. Everyone in "Aorangi" glad to get rid of prisoners.

Following received by W./T.

Heartiest congratulations to Vice Admiral Patey, and all under his command for Naval success in Pacific (signed) Munro Ferguson. Gov. Genl. Australia.

[Unrelated text continues]

Sunday 27th (Sep)

[Second para] Went onboard Submarine A.E.II. in the evening. Was shown over the boat by 2nd coxswain Bray. The "E class" submarines are "one series of wonderful inventions". The periscope can be worked from 3 different positions. She has 4 tubes 21 inch, each torpedo having speed of 45 knots for 6000 yards., she is propelled by "Diesel Engines" has a speed of 19 knots and action radius of 4,000 miles also fitted with Wireless Telegraphy. Complement 35 Officers and Men. We took a sight of the steamer "Oonah" which was approaching, and it is simply wonderful how simple it is, to keep the sights on, and get the exact range of the vessel aimed at.

Arthur Gwynne a member of the crew of A.E.I. came on board and had dinner with me. Gwynne was ill when his boat went out, and Caulbold [Corbould] of no II went out in his stead. Both Gwynne and Caulbold [Corbould] went to England with us in 1910.

[Unrelated text continues]

Thursday Oct. 1 at 1915

[Fourth para] This afternoon, "Warrego" came in and she has a tripod, with a 5 barrelled Nordenfeldt gun attached onboard. Her report stated that while cruising off Cape Gazelle a motor yacht was found ashore burnt out. Whaler was sent to examine her and the crew had abandoned her. petrol was found on the decks below, also a tripod. A diver was afterwards sent down, and he brought up the gun which contained 5 shells, one of which had been fired. The gun evidently had only been quite recently submerged. This is most interesting, and bears out the Officers statement, which I submitted to our captain. I feel confident that this is the vessel that sank the submarine.

HMAS WARREGO secured alongside SS AORANGI at 1735 on 18Sep14, having first sighted KG at 1245 that day and sent a boarding party across by boat. Hodgson's is the only account that mentions the removal of the gun and tripod. Other reports including HMAS ENCOUNTER's (the senior officer with WARREGO on the day), tell of finding a used cartridge case on the deck, not in the gun.

[Unrelated text continues]

[All ships sailed from Rabaul on Sunday 4 October; "Aorangi" sailed in company for Vila late in the afternoon.]