

1 CMDR RUSH: Sir, CAPT McLaughlin will take the first two  
2 witnesses this morning, who are Navy serving officers, and  
3 they will be followed, I anticipate, sir, by Mr Samuel s and  
4 Mr Karlov, who will be the witnesses for today.  
5

6 CAPT McLAUGHLIN: Commissioner, today we will hear  
7 evidence from two experts. This evidence will relate to  
8 the weather pertaining at the time of the initial  
9 Sydney/Kormoran signalling interaction, and it will also  
10 address the effects of such weather conditions and the  
11 effects they would have likely had on the tactical  
12 appreciation by both ships of the situation they  
13 encountered.  
14

15 We will first hear from LEUT Scott Rivett, who is a  
16 Royal Australian Navy seaman officer and meteorologist.  
17 LEUT Rivett has examined a range of weather-related  
18 materials submitted to the Commission of Inquiry. In  
19 particular, LEUT Rivett will provide evidence as to sea  
20 state and direction, wind speed and direction, the bearing  
21 of the sun and the time of sunset, and the impending phase  
22 of the moon for 19 November 1941.  
23

24 Following this, we will hear from CAPT Warren  
25 Bairstow, who is currently Commander, Surface Task Group at  
26 Fleet Command. CAPT Bairstow is a very experienced seaman  
27 officer and gunnery specialist. He has commanded both  
28 patrol boat and a WA-based major fleet unit. He has  
29 experience, including command experience, of the effects of  
30 weather on tactical decision making off the coast of  
31 Western Australia.  
32

33 In particular, CAPT Bairstow will provide comment as  
34 to the effects of the weather on initial positioning,  
35 reading signal flags, launching sea boats and the tactical  
36 appreciation of remaining daylight. CAPT Bairstow will not  
37 comment on the actual engagement, as that is not the  
38 purpose of today's examination.  
39

40 Sir, with your permission, I call LEUT Rivett.  
41

42 <SCOTT JAMES RIVETT, sworn: [10.03am]  
43

44 <EXAMINATION BY CAPT McLAUGHLIN:  
45

46 CAPT McLAUGHLIN: Q. LEUT Rivett, when did you join the  
47 Royal Australian Navy?

1 A. In January 1996, sir.

2

3 Q. Through what training establishment did you join?

4 A. I joined at the Australian Defence Force Academy.

5

6 Q. How long did you spend at ADFA?

7 A. Three years, completing a Bachelor of Science degree.

8

9 Q. What were your areas of specialisation in your science  
10 degree?

11 A. I majored in chemistry and politics and sub-majored in  
12 mathematics.

13

14 Q. After the Defence Academy, when you graduated, what  
15 was the next step in your training continuum?

16 A. I proceeded through the junior warfare application  
17 course to HMAS Watson and various establishments around  
18 Australia to train up through all four phases of the seaman  
19 officer basic training, culminating in a Bridge  
20 Watch-Keeping Certificate.

21

22 Q. How long is this training continuum, culminating in  
23 the award of a Bridge Watch-Keeping Certificate?

24 A. It's one year to complete all the different phases -  
25 learning about relative velocity, ship identification,  
26 basic seamanship - and then anywhere between 6 months and  
27 18 months to be awarded a Bridge Watch-Keeping Certificate,  
28 depending on which ship you were sent to and how much sea  
29 time you got.

30

31 Q. What are the major components? You have mentioned a  
32 couple already. What are the major components of this  
33 training?

34 A. All manner of identifying vessels, so you have to  
35 learn to read flags, learn rudimentary reading of signal  
36 lamps, ship handling, learn how to conduct boarding  
37 operations. In ship handling, the key things are keeping  
38 the ship safe and running activities within the ship, so  
39 you are organising your people and your time.

40

41 Q. On completion of your training, when you achieve the  
42 Bridge Watch-Keeping Certificate, what are you qualified to  
43 do?

44 A. You are qualified to represent the Captain on the  
45 bridge and keep the ship safe by day or by night, in  
46 company or not in company, also known as single ship  
47 steaming, so you are responsible for the ship's safety.

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Q. After qualifying, where did you then serve?

A. I served in HMAS Townsville, a Cairns-based patrol boat, completed some work there and got my ticket. I then joined HMAS Canberra, which was a Western Australian based frigate, and served there for approximately nine months, doing various exercises and training. I was awarded my major fleet unit ticket on 11 September 2001.

Q. By "ticket", you mean?

A. A bridge watch-keeping certificate, sir, which is your entitlement to stand watch and represent the Captain. I then joined HMAS Newcastle, which was a Sydney-based frigate, and went to the Middle East for seven months doing work in the Gulf. When I completed that, I came back to do my navigation course for minor war vessel navigation and again posted to Cairns, this time joining HMAS Townsville, and spent close to a year doing patrol boat operations out of there before going to Iraq for another seven months, training up the new Iraqi Navy and the Coalition Military Assistance Training Team.

Q. When you did your minor war vessel navigation training, is this a step further than the basic navigation training that a seaman officer does?

A. It is, sir. As Navigator, you have a higher level of responsibility for maintenance of the chart outfit and to the Captain, and you are a more responsible member of the command team, and you also have a responsibility for training the junior warfare officers.

Q. Once you became qualified as a minor war vessel Navigator, you went on to serve in HMAS Townsville?

A. That's correct, sir.

Q. What operations did you conduct whilst you were a Navigator of patrol boats?

A. We conducted several patrols, ranging from Cairns to Broome, of the Australian Economic Exclusion Zone, for boarding operations, conducting boarding, doing basic patrol work, being involved in suspected illegal entry vessel apprehension, as well as the normal training, in company training as well, to improve the skill level of the junior warfare officers.

Q. As the Navigator on board a patrol boat, what is your role? What is your primary purpose?

1 A. The primary purpose is as a senior watch-keeper. The  
2 Executive Officer in a patrol boat is the senior  
3 watch-keeper, but the navigation officer spends a lot more  
4 time on the bridge, generally. Their primary purpose is to  
5 be on the bridge, to run the bridge team, to keep the chart  
6 outfit correct and to assist in the training of the junior  
7 warfare officers.

8  
9 Q. What sorts of things do you, as a Navigator, do to  
10 assist in the training of the junior warfare officers?

11 A. I think the key is to develop the appreciation of the  
12 manoeuvring of ships at sea, and that includes visual  
13 signalling but also recognition of when a ship is  
14 altering - learning what is going to happen if you change  
15 course in comparison to the relative movement of another  
16 ship. It is called developing a seaman's eye and it is all  
17 about appreciating the distances between ships at sea.  
18 When there are no other indications of how far something  
19 is, you just learn - if the horizon sits at this point  
20 relative to the guns on a patrol boat, it means it is at  
21 this range, so you are really learning your environment  
22 around you.

23  
24 Q. Once you completed your time as Navigator of a  
25 Fremantle class patrol boat, you said that you went to Iraq  
26 a second time?

27 A. That's correct.

28  
29 Q. What was your function or your role during that  
30 deployment?

31 A. I was one of five lieutenants, Coalition. There were  
32 two Australians, and our role was to train up the new  
33 Iraqi Navy both in theory, so in the classroom, and Relvel  
34 and rules of the road.

35  
36 Q. What is "Relvel"?

37 A. Relative velocity. As I mentioned before, one of the  
38 fundamentals of being a seaman officer is to have a good  
39 appreciation of the relative movement of ships at sea.  
40 Additionally, we taught the Iraqis boarding operations,  
41 towing operations and how to manoeuvre with small ships.

42  
43 Q. Did you complete any sea time in Iraqi vessels during  
44 this period?

45 A. We did, sir. We outfitted the boats. We sea trialled  
46 them before we transited them from Jebal Ali Port to Iraq.  
47 Then we spent another five months training the Iraqis both

1 in the classroom and at sea. Probably every second day, we  
2 would be at sea for the entire day. Unfortunately, our  
3 rules of engagement meant that we couldn't go on live  
4 operations, but all the training and theory was exactly as  
5 we would have taught anyone.

6  
7 Q. Where did you post on your return from Iraq?

8 A. I posted to the Bridge Training Faculty at HMAS Watson  
9 and I was the Junior Warfare Application Course Phase 4  
10 Training Officer, which meant that I organised the courses  
11 for the trainees to go on before they went out to ships at  
12 sea. We would do daytime watches and night-time watches in  
13 a bridge simulator and we would change the weather  
14 conditions and change the number of contacts to try to  
15 develop these trainees' appreciation of how the ship was  
16 going to handle and things that they had to think about in  
17 relation to rules of the road and keeping the ship safe.

18  
19 Q. This is all part of developing what you referred to as  
20 a seaman's eye?

21 A. Developing the seaman's eye, being aware of the ship's  
22 routines and how to keep the ship safe.

23  
24 Q. After your time at the Bridge Training Faculty, did  
25 you go on to any further training or specialisations?

26 A. Yes, sir. After two years at the training faculty,  
27 I then specialised as a meteorologist through the Bureau of  
28 Meteorology, which is the only course you can do in  
29 Australia to make you legally entitled to give a forecast.  
30 That is conducted, as I said, through the Bureau of  
31 Meteorology in Melbourne and it's a postgraduate course.

32  
33 Q. How long is that course?

34 A. It is 11 months long. The Navy conducts nine and a  
35 half months, which is the full requirement, and then whilst  
36 our civilian counterparts are learning about bushfire  
37 forecasts and things like that, we do a sea phase to align  
38 ourselves with the military requirements of finding your  
39 environment.

40  
41 Q. What is the qualification you achieved at the end of  
42 that period of training?

43 A. A Postgraduate Diploma in Meteorology.

44  
45 Q. Is the Navy meteorology qualification the same as or  
46 different from that gained from the Bureau of Meteorology?

47 A. It is an identical qualification, sir, and a lot of

1 Navy meteorologists move on, after a career in the Navy, to  
2 serve with the Bureau of Meteorology.

3  
4 Q. On completion of this, where did you post and what  
5 sorts of duties did you undertake?

6 A. I then posted to Headquarters Joint Operations, where  
7 we continued to provide what used to be known as fleet  
8 weather oceanography forecasts but are now Joint  
9 Operations, because we also provide weather impact  
10 information to troops in Timor and personnel in Afghanistan  
11 as well.

12  
13 Q. What is your current posting?

14 A. I'm still with the Joint Headquarters Operations, and  
15 that's now located in Bungendore in the new Joint  
16 Headquarters.

17  
18 Q. Your role there remains doing forecasting?

19 A. Correct, sir. I continue doing forecasts.

20  
21 Q. I want now to move to the issue of weather conditions  
22 off the WA coast in November 1941. First, were you asked  
23 to prepare a statement for the Commission of Inquiry?

24 A. Yes, I was, sir. I have typed up a written  
25 submission.

26  
27 Q. Is this a copy of that statement? (Shown) Would you  
28 confirm that it is a true and correct copy of your  
29 statement?

30 A. Yes, sir. That's my signature. That's my statement.

31  
32 CAPT McLAUGHLIN: Sir, I tender that statement.

33  
34 EXHIBIT #109 STATEMENT OF LEUT SCOTT JAMES RIVETT

35  
36 CAPT McLAUGHLIN: Q. First, I want to look at the  
37 sources you used in preparing the statement. What  
38 documents did you examine in relation to preparing the  
39 statement?

40 A. Sir, I was able to access whatever I wanted from the  
41 archives. The key things I wanted to look at were the  
42 routing charts and anything pertaining to charts or  
43 recordings of weather on the day, but the most useful was  
44 a 2008 report by --

45  
46 Q. By Len van Burgel?

47 A. Yes. It is a good one, because he also refers to two

1 1991 studies done on the weather of the day. So that was  
2 the key document.

3  
4 CAPT McLAUGHLIN: Sir, we would like to tender the paper  
5 by Len van Burgel and the preliminary studies done by  
6 Courtney, Southern, Steedman and McCormack, which  
7 van Burgel used.

8  
9 EXHIBIT #110 STUDY ENTITLED "AN ANALYSIS OF WEATHER  
10 CONDITIONS OFF THE COAST OF SHARK BAY IN NOVEMBER 1941" BY  
11 JL VAN BURGEL

12  
13 EXHIBIT #111 DOCUMENT ENTITLED "REPORT ON THE  
14 METEOROLOGICAL CONDITIONS NEAR 26S 111E FOR 17-28 NOVEMBER  
15 1941" BY MR JOE COURTNEY OF THE BUREAU OF METEOROLOGY

16  
17 EXHIBIT #112 DOCUMENT ENTITLED "CLIMATOLOGY OF WEATHER  
18 CONDITIONS W.A. WEST COAST NOVEMBER 1941" BY  
19 MR BOB SOUTHERN

20  
21 CAPT McLAUGHLIN: We would also like to tender the final  
22 of those papers, which is a paper by Steedman and  
23 McCormack.

24  
25 EXHIBIT #113 PAPER ENTITLED "BACKTRACKING THE LIFEBOATS AND  
26 FLOATS - A METOCEAN VIEW" BY MESSRS STEEDMAN AND McCORMACK

27  
28 CAPT McLAUGHLIN: Q. What does the van Burgel paper go  
29 to?

30 A. Sir, the key elements are that it reviews the 1991  
31 studies and compares them for suitability and accuracy and  
32 it highlights the methods used, the key method being in one  
33 of the studies attempting to extend a mean sea level  
34 pressure field and extrapolate that from observations along  
35 the Western Australian coast, and the other being a pattern  
36 matching method. The pattern matching method has become a  
37 lot more accurate, because we can now correlate that with  
38 satellite data of known wind fields that match  
39 corresponding conditions that were recorded on the day.

40  
41 Q. You have mentioned two methods that van Burgel has  
42 used here - a mean sea level pressure analysis and the  
43 pattern matching. Could you please briefly describe or  
44 explain each of those methods and what they aim to achieve  
45 or what the outcome of applying those methods is?

46 A. Yes, sir. In the past, and certainly continuing  
47 today, depending on the size of the town, post offices or

1 pubs every day would record the temperature, the pressure  
2 and the wind. If you know certain characteristics of a  
3 body of air, being its temperature, humidity and the  
4 pressure, and you also know at what height that observation  
5 was taken, called a station level height, you can use a  
6 hydrostatic approximation and convert that to a mean sea  
7 level pressure. You could convert it to what the pressure  
8 would be at a kilometre. It wouldn't matter. It is  
9 following the equation.

10  
11 Once you have all these points converted to a mean sea  
12 level pressure, you can then try to match these points,  
13 kind of like joining dot to dot, to a corresponding chart.  
14 So if we know 10 different points that all have different  
15 values, we try to find a chart of a mean sea level pressure  
16 analysis that has been done in the last 40 years and say do  
17 we have another chart that corresponds to these same  
18 pressures? If we can find one, we can be very certain, on  
19 a synoptic scale, which is a large scale, that this is what  
20 we would have expected to have seen on the day.

21  
22 The scale of this also comes into point, because the  
23 smaller scale and more localised you become, the more  
24 variance there is and less certainty. You can have the lee  
25 effect of a mountain or friction or additional heating that  
26 you may not have been able to take into account, but as  
27 soon as you take it to a large scale, these little flaws  
28 and errors smooth themselves out and you are going to get a  
29 very accurate picture, certainly to within a few degrees  
30 and a few knots, as to what the wind conditions would have  
31 been at a given time.

32  
33 Q. What were van Burgel's next steps in using this MSLP  
34 analysis? What did he then do with that?

35 A. He then basically did a computer search of the entire  
36 Bureau of Meteorology archives and their archive called  
37 ADAM. That records conditions across Australia for all the  
38 records that we have. He compared those, using computers  
39 to do the fast calculations, with the conditions known on  
40 the day and identified what he believed to be the mean wind  
41 conditions.

42  
43 He backed this up using what are called the  
44 Navier-Stokes equations, which are equations governing the  
45 motion of compressible fluids. It is a couple of hundred  
46 years old basic theory, but he then said, okay, how do we  
47 apply this to our current problem, and they worked out that



1 it was effectively a south-south-easterly wind. The fact  
2 that it is a southerly wind generally takes out some of the  
3 room for error, because you are looking only at a  
4 north-south component; you are not looking at an east-west  
5 component. So even if you have a pool of errors, they are  
6 elongated in north-south. There is less variance. So that  
7 actually made his work a lot easier.

8  
9 Q. So is this use of the MSLP and the following analysis  
10 of the MSLP an accepted and relevant methodological  
11 approach to the problem at hand?

12 A. Definitely. All the way through our seaman officer  
13 training, we get taught to look at a mean sea level  
14 pressure chart and, from that, infer the wind. It's called  
15 the geostrophic wind. That just means the wind in balance  
16 between the pressure and the movement of the earth. Most  
17 seaman officers, and certainly once they are qualified,  
18 would be able to look at a mean sea level pressure chart  
19 and identify what wind to expect. This is useful, because  
20 you can then plan ahead. So, yes, it is a valid method and  
21 the additional work that he did in correlating that with  
22 satellite derived winds, I guess, tied it in to what they  
23 expect the conditions were on that day.

24  
25 Q. So, in your view, was this methodology applied  
26 appropriately in van Burgel's study?

27 A. It was appropriate, sir.

28  
29 Q. What results did this analysis yield?

30 A. It was a south to south-easterly wind, 15 to 25 knots.  
31 My assessment, from mean sea level pressures and also from  
32 synoptic conditions, by which I mean the expected  
33 conditions on the day, would have been a south to  
34 south-easterly wind at 17 to 22 knots. That is how I would  
35 have forecast it.

36  
37 Q. I would like to move now to a general overview of  
38 weather conditions, and then we will come down into  
39 specific elements of the weather conditions. What was the  
40 general weather picture which applied in November off the  
41 coast of WA?

42 A. Sir, we have what is known as the East Indian Ocean  
43 anti-cyclone, which is just a high pressure system, and we  
44 have a semi-permanent coastal or inland trough, which starts  
45 at the Kimberleys, moves down to the Pilbara and then  
46 extends all the way down sometimes to Albany. That's a  
47 persistent feature of the Australian climatology. These

1 two weather patterns interact to have a generally southerly  
2 flow. That's the first component. That's the picture. We  
3 have the Western Australian coast --

4  
5 THE PRESIDENT: Q. Is that throughout the year?

6 A. The East Indian Ocean anti-cyclone is a round-the-year  
7 event; the trough not so much. That is generated by  
8 extreme heating. It is a heat-induced trough. But the  
9 East Indian Ocean anti-cyclone is a permanent feature, sir.

10  
11 CAPT McLAUGHLIN: Q. I want to move now to the more  
12 specific weather conditions for 19 November 1941 and  
13 specifically in the afternoon of that day. You have  
14 mentioned wind, so let's begin with wind. Where was the  
15 wind from? Actually, could we put the template on the  
16 screen? I may get you to illustrate on the template and  
17 draw in the weather conditions as we go.

18 A. The wind was from the south to south east, which is  
19 anywhere between 150 and 170 true bearing.

20  
21 Q. That is where the wind is travelling from?

22 A. Yes. The arrow is pointing in the direction towards  
23 which the wind is going. I have done this because if you  
24 were holding up your shirt - or your hair - it would be  
25 blowing in that direction.

26  
27 Q. At what speed was the wind travelling?

28 A. As I stated, 17 to 22 knots is what I would have  
29 forecast, but the study found between 15 and 25 knots.  
30 I would say that 20 knots is a fair assessment.

31  
32 Q. There is some evidence before the Commission of  
33 Inquiry from Kormoran sources that the wind in the early  
34 afternoon was south south-east 3 to 4. What does this  
35 mean?

36 A. The "3 to 4" would have referred to the force. You  
37 have a Beaufort's force system, which describes the wind in  
38 terms of its effect on the sea.

39  
40 CAPT McLAUGHLIN: We will call up a Beaufort's table,  
41 RAN.002.0139.

42  
43 THE PRESIDENT: Could we capture that image? If we can,  
44 I shall mark it as exhibit 114.

45  
46 CAPT McLAUGHLIN: Q. Could we go to the third page of  
47 that document. It is at page 0141. If we scroll down just

1 a little, this is the Beaufort wind scale that is used by  
2 the RAN and most Navies and most mariners to describe the  
3 wind. We were talking of a south-south-east 3 to 4. So  
4 could you explain what the "3 to 4" means?

5 A. The "3 to 4" there refers to a gentle, firstly, or  
6 then a moderate breeze, and that's at the lowest scale of  
7 what I would have assessed the wind to have been for the  
8 day.

9  
10 Q. What is the upper limit of the wind at scale 4?

11 A. At scale 4, the upper limit, and just of note  
12 generally, is about 15 knots, where you start to see any  
13 white horses. The sea criterion is fairly frequent white  
14 horses. So at the upper limit, you start getting white  
15 horses or capping of your sea waves.

16  
17 Q. Could we now return to the template. So far, we have  
18 a wind from 160 at speed --

19 A. The upper limit of force 4 was 16 knots in that  
20 previous document, and the findings of van Burgel were 15  
21 to 25. I believe it was 17 to 22.

22  
23 THE PRESIDENT: Q. In CAPT Detmers' book, he wrote that  
24 as the sunset and evening descended, the wind scale  
25 increased from 5 to 6. I take it that he would have been  
26 speaking, again, of the wind scale of Beaufort?

27 A. In the force, sir, yes. That would have been based on  
28 the appearance of the sea.

29  
30 Q. And 6 has a velocity of 22 to 27?

31 A. Yes, sir.

32  
33 CAPT McLAUGHLIN: Q. We will now move on to the sea and  
34 swell. First of all, could you explain the difference  
35 between sea and swell in weather terms?

36 A. The sea is the effect of the wind on the water where  
37 you are, whereas the swell is the effect of the wind on the  
38 water surface somewhere else and the energy wave then  
39 travelling to your position. So it is possible to have a  
40 swell from one direction and a sea from a completely  
41 different direction.

42  
43 Q. On this day, where was the sea coming from?

44 A. The sea was from the direction of the wind, as I just  
45 said, so that's a south to south-easterly sea. A sea state  
46 of between 17 and 22 knots, which is what I have stated it  
47 to be, would have been sea state 4, which is 1.25 to

1 2.5 metres.

2

3 Q. That 1.25 to 2.5 metres is a height in the sea state.  
4 Where is that measured from?

5 A. You measure it from the base of the trough of the wave  
6 to the peak.

7

8 Q. Could you mark the sea and the swell for us on your  
9 diagram?

10 A. The sea is from the same direction as the wind, and  
11 the swell is as a result of the East Indian Ocean  
12 anti-cyclone, which is a generally southerly swell up the  
13 coast, so I will put that.

14

15 Q. So the swell also is coming from a southerly  
16 direction; is that right?

17 A. Affirmative.

18

19 Q. What was the height of the swell?

20 A. A moderate swell is the climatology. I have read no  
21 reports of any cyclones or anything that would have changed  
22 any of this, but it is about a 2 metre swell. There is a  
23 moderate swell expected for that time of year.

24

25 Q. There is some evidence before the COI from Kormoran  
26 sources that in the early afternoon, conditions included  
27 sea state 3, medium swell from south-west. Does this  
28 accord with your view?

29 A. Yes, I would be happy to accept a south-westerly  
30 report. I would have said southerly as my first guess. If  
31 someone said, "Where do you expect the swell to come  
32 from?", in that part of the world I would say the south.

33

34 THE PRESIDENT: Q. One relevance of this material is  
35 that if Sydney, after the engagement, was in a sea state  
36 described as 4, then, according to the DSTO information,  
37 her prospect of surviving was nil, because of the damage  
38 suffered?

39 A. Yes, sir. If you have a 2 metre swell and then on top  
40 of that you have up to a 2.5 metre wave, from peak to  
41 trough you can sometimes have 4.5 metres. I don't know  
42 what the draught of the Sydney was, but any damage near the  
43 waterline could sometimes have up to 4 metres of water  
44 pressure.

45

46 CAPT McLAUGHLIN: Q. I want to move on to visibility -  
47 firstly, visibility range. What was the visibility range

1 in these weather conditions?

2 A. I would say 10 to 15 nautical miles, which is out to  
3 about 30 kilometres. At that range, that's when you can  
4 start identifying finer features and details. It is not to  
5 say you couldn't see a mountain at 50 kilometres, but  
6 that's a large object. To identify a mast against the  
7 horizon or anything similar - 10 to 15 nautical miles.

8

9 Q. There is some evidence before the COI from Kormoran  
10 sources that Kormoran sighted Sydney's mastheads at  
11 33 kilometres, which is approximately 18 to 19 nautical  
12 miles. Would this accord with your view of the visibility  
13 on the day?

14 A. Yes, that's extremely likely. As I said, 10 to 15  
15 would be my standard expectation, and adding to that  
16 because it is on the eastern side of a high pressure system  
17 where the conditions are favourable for good visibility.

18

19 Q. Does the fact that the Kormoran lookout was located  
20 above sea level in a higher part of the ship add to or  
21 detract from his ability to detect something at a further  
22 distance?

23 A. The higher you are, the further you are away from any  
24 effects of the wind-blown spray, so you get better  
25 visibility if you are above that.

26

27 Q. How much cloud cover was there on the day?

28 A. Again, based on the fact that it was on the leading  
29 edge or the eastern edge of a high pressure system, I would  
30 say one to two octres, or eighths, of the sky would have  
31 been covered with cloud, but because it is a high pressure  
32 system, you have a strong inversion, which prevents  
33 development of cumulus-type clouds, so there wouldn't have  
34 been any rain or anything about.

35

36 THE PRESIDENT: Q. LEUT Bunjes described the weather as  
37 "very clear".

38 A. I would agree with that, sir.

39

40 Q. According to him, the vessel, when sighted, was about  
41 20 to 25 miles distant?

42 A. That's completely plausible, sir. Most of our  
43 recommendations and our forecasts are for someone standing  
44 on the bridge of the ship, so if someone is higher up by  
45 another 5 or 10 metres, they will have an extended range.

46

47 Q. He was in the crows nest, I think.

1 A. He would have had an even better range.

2

3 CAPT McLAUGHLIN: Q. I now want to move on to the impact  
4 of the sun and the moon on 19 November 1941. What time was  
5 sunset on 19 November 1941?

6 A. It was at 19:05, based on the latitude and longitude  
7 where the Sydney was found. That time could change by 1 or  
8 2 minutes, depending if they were further north, south,  
9 east or west.

10

11 Q. How quickly would it have become dark after sunset?

12 A. You have what we call civil twilight, which is when  
13 the sun is 6 degrees beneath the horizon. At that stage,  
14 you could still probably read a novel or something, but you  
15 would certainly know it is getting dark. That occurs for  
16 about 20 to 25 minutes, again depending on the latitude or  
17 longitude, but at these latitudes it is not a significant  
18 difference. I only make reference to that because if you  
19 are close to the South Pole, you are going to have  
20 permanent twilight. But for these latitudes, it is about  
21 25 to 30 minutes.

22

23 The next phase is when the sun is 12 degrees beneath  
24 the horizon. That's known as nautical twilight. We in the  
25 Navy use that as a good time to take our star observations,  
26 because you can still see the horizon, but it is getting  
27 difficult to read anything. You would certainly struggle  
28 to write down your observations. That's about another  
29 20 minutes later. We're now looking at 19:40, 19:50. Then  
30 by 20:00, it would have been total darkness, and it was  
31 also a new moon, so only 1 per cent illumination.

32

33 Q. We will come to the moon in a moment. There is some  
34 evidence from a Kormoran source that they calculated that  
35 darkness would be at 19:00 hours. Does that approximately  
36 accord with your view?

37 A. Yes. You have 15 minutes per degree of longitude, so  
38 your sunset is going to change depending on what longitude  
39 you are. The time that you are experiencing relative to  
40 the sun versus the time you have set for your time zone is  
41 what that difference is.

42

43 Q. What was the bearing of the sun for sunset on this  
44 afternoon?

45 A. 248 was the azimuth.

46

47 Q. There is some evidence before the COI from Kormoran

1 sources that Kormoran, at around 16:30, turned into the sun  
2 full speed towards the sun 250 degrees. How does this  
3 accord with your view?

4 A. Yes, the sun - over a few hours leading up to sunset,  
5 the bearing of it is going to change only to within 10 or  
6 15 degrees maximum. So anywhere between 260 and 245 would  
7 have been generally in the direction of the sun.

8  
9 Q. That would have been including at about 16:00, 16:30  
10 on that day, 19 November 1941?

11 A. Yes, so a little bit further north, obviously, for a  
12 few hours before.

13  
14 Q. But within a 10 to 15 degree spread?

15 A. A 10 to 15 degree arc.

16  
17 Q. What was the phase of the moon for 19 November 1941?

18 A. A new moon, sir.

19  
20 Q. What does this mean - a new moon?

21 A. It means that, at night, there is no illumination.  
22 Obviously, the moon just reflects the light of the sun. In  
23 a full moon, obviously you can sometimes read by that, but  
24 for a new moon, it is only the stars that are going to  
25 provide any illumination. Total darkness is what that  
26 means.

27  
28 Q. So no moonlight to aid visibility at night?

29 A. No, sir.

30  
31 Q. There is some evidence from a Kormoran source that,  
32 "Nights in this region were light, so light that once  
33 visual contact with an alien vessel had been established,  
34 it would not be lost." With respect to the night of  
35 19 November 1941, does this general statement accord with  
36 your views?

37 A. The nights are clear, but they are going to be  
38 illuminated only if you have a moon, if you have a light  
39 source.

40  
41 Q. I now want to move on to some more specific effects of  
42 the conditions which we have discussed. The first is the  
43 weather relative to Kormoran. In particular, we will start  
44 with the wind. If I could ask you to assume for the  
45 purpose of this evidence, and draw on your template, that  
46 the Kormoran was steering a course of 260 and she was at a  
47 speed of 14 knots.

1 A. This is just a relative vector (indicating),  
2 obviously, because Kormoran, for the purposes of this,  
3 remains at the centre of the manoeuvring form.

4  
5 Q. Where was the wind relative to Kormoran if she was  
6 steering a course of 260 at 14 knots?

7 A. At 14 knots? If there was zero wind, the wind that  
8 she would experience would be from right ahead, because she  
9 is driving into it. But the wind is at, I will say,  
10 20 knots from 160. The way the Relvel works, we have to  
11 take that into account. So the combined vector is the  
12 relative velocity, which is circled, sir. I will bring  
13 that back to the centre of the ship. Someone standing on  
14 the Kormoran at that course and speed, with a 20 knot 160  
15 wind, would experience a wind where I'm drawing this arrow,  
16 from this direction, the implication being that any flag  
17 hoist she is flying will be flying downwind. So that is  
18 the relative position of the wind relative to Kormoran.

19  
20 THE PRESIDENT: Q. Could you do the same exercise with  
21 some dotted lines for 240 degrees?

22 A. For the course, yes, sir. And at 14 knots, sir?

23  
24 Q. Yes. That makes a slight difference?

25 A. It makes a little bit of difference.

26  
27 Q. Not a great difference?

28 A. Not a great difference. In fact, at 20 knots, so you  
29 can see that between zero and 20 knots, that's the relative  
30 position that the flags would have been flying for a course  
31 of 260.

32  
33 THE PRESIDENT: Thank you.

34  
35 CAPT McLAUGHLIN: Q. You have conducted a relative wind  
36 calculation. Is this a commonplace calculation or is this  
37 something that just Mets do?

38 A. No, all seaman officers do it. When you are on the  
39 bridge, you use the same relative velocity principles for  
40 working out how to close another ship or how to approach  
41 another ship within 500 yards on a particular bearing. It  
42 is called station-keeping. This is certainly commonplace  
43 and I would expect that every officer of the watch would be  
44 doing wind calculations at least every hour.

45  
46 Q. Taking this relative wind, I want you to assume that  
47 Sydney is 10 degrees off being right astern of Kormoran, so



1 at a relative of green 170 on Kormoran's ship's head.  
2 Let's use 260 as her course.

3 A. Okay, so right ahead is there, right astern is there,  
4 and 10 degrees from right astern is where I have indicated  
5 the Sydney.

6  
7 Q. Would you highlight again the vector that would be  
8 where the flags were pointing or flying if Kormoran was at  
9 260 at 14 knots for Sydney?

10 A. That vector (indicating).

11  
12 Q. So how much of the flags would Sydney have been able  
13 to see in that position?

14 A. On the assumption that the flags were in a fully  
15 visible area, anyway, Sydney is looking towards the ship,  
16 so they would see maybe 60 per cent of the flags, but  
17 keeping in note the sun at this point.

18  
19 THE PRESIDENT: Q. 248?

20 A. That would be azimuth of sunset. It wouldn't have  
21 reached that yet; it would still be in this area. So the  
22 flags, which are not transparent, would have been backlit  
23 by the sun, so they would be casting a shadow on  
24 themselves, making them also more difficult to read.

25  
26 CAPT McLAUGHLIN: Q. Would the presence of  
27 superstructure or funnel or masts and the like aft of where  
28 the flag hoists were have any further effect on this?

29 A. Definitely to obscure, but also the funnels themselves  
30 would be emitting a lot of heat. You would have all seen -  
31 well, I have - the heat haze effect of the bonnet of your  
32 car. You can see the heat haze. For a ship that is  
33 manoeuvring at high speeds or certainly at maximum speed,  
34 the heat haze is significant and would also make it more  
35 difficult to read flags that were on a distant side.

36  
37 Q. Another assumption, another assumed or postulated  
38 position, is that Sydney may have been on a starboard  
39 quarter, so green 135, on Kormoran. Where would that have  
40 been in relation to the vector in which the flags would  
41 have been flying?

42 A. Firstly, "green" means the starboard and "red" is the  
43 port. "135" is 135 degrees to starboard from Kormoran's  
44 ship's head, which would be in that area (indicating) which  
45 would almost be looking down the line of the flags.

46  
47 THE PRESIDENT: Q. That area is where you have marked a

1 circle at about 135 degrees?

2 A. Affirmative, sir. That's position green 135.

3

4 CAPT McLAUGHLIN: Q. From that position, looking at the  
5 flags, you would have been looking at them --

6 A. Almost end-on. You would probably have seen  
7 10 per cent of a poorly illuminated flag.

8

9 Q. You spoke a moment ago about the bearing of the sun  
10 relative to both Kormoran and Sydney in either the astern  
11 or 10 degrees off the astern position and around on  
12 Kormoran's starboard quarter. You mentioned the effect  
13 that the fact that they were looking into the sun would  
14 have on the flags. Would you explain that a little more?

15 A. The sun would be forcing the flags to cast somewhat of  
16 a shadow on themselves. They are not cellophane, they are  
17 made of cloth which is not transparent to the sun, or not  
18 significantly transparent. So the colours of the flags  
19 would have been looking less bright, basically.

20

21 Q. At what inclination or height above the horizon at  
22 16:30 or 17:00 would the sun have been? Would it have been  
23 well above so that it wasn't casting back on the flags?

24 A. It would have been about 20 degrees above the horizon,  
25 sir. I haven't done the exact calculation for it, but it  
26 is easy to do.

27

28 Q. So reasonably low to the horizon?

29 A. Yes. 15 degrees is, generally, taking your arm out,  
30 so 20 degrees is one-and-a-half hand spans above the  
31 horizon, starting to really fall down.

32

33 CAPT McLAUGHLIN: Sir, that concludes my questioning of  
34 LEUT Rivett.

35

36 THE PRESIDENT: Thank you.

37

38 CAPT McLAUGHLIN: At this point, I will tender the  
39 completed diagram.

40

41 EXHIBIT #114 COMPLETED TEMPLATE WITH DIAGRAM AS DRAWN BY  
42 LEUT RIVETT

43

44 THE PRESIDENT: Q. What was the angle of approach at  
45 which you said 60 per cent of the flag would be visible?

46 A. That would be from green 170, sir.

47

1 CMDR RENWICK: Sir, I just have one question, if I may.

2

3 THE PRESIDENT: Yes, CMDR Renwick.

4

5 <EXAMINATION BY CMDR RENWICK:

6

7 CMDR RENWICK: Q. You have given evidence about where  
8 the sun would be in relation to the horizon about 16:30 or  
9 17:00. What effect would the position of the sun at that  
10 time have on viewing a daylight flashing lamp coming from  
11 the Kormoran?

12 A. It would reduce your ability to easily see it, sir,  
13 because you are already looking generally towards the sun.  
14 If you are driving, you have sun glare issues with the sun  
15 a reasonable distance above the horizon so to then try to  
16 discern a flashing light, whether it is a 5-inch or 10-inch  
17 flashing lamp - you would see it, but it would impact on  
18 your ability to easily see it, sir.

19

20 Q. Finally, in relation to both of the positions you have  
21 postulated for the Sydney on that chart, what would be the  
22 effect on viewing the silhouette of the Kormoran from the  
23 Sydney?

24 A. The same issue with the shadowing, casting shadows  
25 upon itself, would apply. With the sun in that position,  
26 it would be harder to see the length of the ship  
27 accurately, for example, because you couldn't make out as  
28 many finer features on the ship to get a gauge for, "Oh,  
29 this ship is this long; there is its funnel". You would  
30 see the front, you would see the funnel, you would see the  
31 end - the stern - but all the finer details in between  
32 would become a lot more difficult to see until you were at  
33 closer range, by which I mean probably 2 nautical miles.

34

35 Q. There is just one other matter. Do you have your  
36 statement there?

37 A. No, I don't have it, I am sorry.

38

39 Q. I will read out paragraph 11. You there say:

40

41 Additionally I assess that the maximum  
42 range at which an experienced officer or  
43 signalman could read flags in these  
44 conditions would be 10,000 yards (5nM) for  
45 a flag hoist that you were expecting to  
46 see, however it is more likely that with an  
47 unfamiliar flag hoist this would reduce

1                   significantly.

2

3                   Are you assuming, in making that statement in paragraph 11,  
4                   that the signal flags of merchant ships in World War II  
5                   were the same size as those of warships at that time?

6                   A.     Yes, I am, sir.

7

8                   CMDR RENWICK:    Thank you.  I have no further questions,  
9                   sir.

10

11                  THE PRESIDENT:    Q.    If my recollection serves me right,  
12                  there is some evidence from at least one of the German  
13                  survivors that following a signal from Sydney they in fact  
14                  drew the flag hoist halyard to starboard, or drew the flag  
15                  to starboard, I'm not sure which.

16                  A.     Sir, to move the flags further to starboard?

17

18                  Q.     Yes?

19                  A.     Yes, that would be to let the flags fly better in the  
20                  wind, I believe.

21

22                  Q.     Would it affect the angle at which the flag flew?

23                  A.     No, sir.  The relative position of the wind wouldn't  
24                  change unless the wind or the ship changed.

25

26                  Q.     But it may have improved visibility because of absence  
27                  of other structures or whatever?

28                  A.     Yes, sir, it would have potentially freed those flags  
29                  away from the superstructure to let them fly further,  
30                  higher.

31

32                  THE PRESIDENT:    Is there anything arising out of that?

33

34                  CMDR RENWICK:    Just to note, sir, that the reference,  
35                  I think, to which you were drawing attention is at page 453  
36                  of the Official War History, where it is stated:

37

38                                 Ahlbach, Kormoran's yeoman of signals, drew  
39                                 the halliards to the starboard side to make  
40                                 the flags more visible ...

41

42                  THE PRESIDENT:    Thank you.

43

44                  CAPT McLAUGHLIN:    May LEUT Rivett be excused?

45

46                  THE PRESIDENT:    Yes, thank you, LEUT Rivett.

47