Contents

Summary

The Japanese-registered wood-chip carrier Daishowa M&u arrived off Twofold Bay, New South Wales at 1818 local time on 10 February 1992. As the ship was not to berth until 0700, 11 February, the Master proceeded to the Quarantine Anchorage, where the ship anchored at 1930 on 10 February 1992.

Shortly after midnight, in strong winds, the ship dragged anchor and although attempts were made to weigh anchor and head out to sea, it was driven ashore on Whale Spit, off Tororago Point, at 0040, 11 February.

The ship was eventnally refloated at 1000 on 13 February 1992 and towed to anchorage in the outer bay. An underwater survey showed that the ship had suffered considerable damage to the bottom plating, but the hull had not been breached and no pollution occurred as a result of the grounding.

The propeller, rudder and steering gear had also all been damaged, therefore the owners decided that the ship should be towed to Japan for repairs. The towage operation commenced on 14 February 1992.

Information sources

Interviews were conducted on board Daishowa Maru in Twofold Bay on 12 February 1992 with the Master, Chief Officer, Second Officer and Third Officer.

Information was provided by:

Captain Max Saunders

Mr John Noble, of Merimbula

Bureau of Meteorology,
Sydney.

Eden Pilot

Weather observer

Sub-regulation 16(3) of the Navigation (Marine Casualty) Regulations provides "if a repon or part of a report, relates to a person's affairs to a material extent, the Inspecor must, if it is reasonable to do so, give the person a copy of the report or the relevant part of the report."

Sub-regulation 16(4) provides "A person referred to in sub-regulation (3) may, within 28 days of receiving the report, provide written comments or information relating to the report"

Copies of the report were provided to the Master and officers of the Daishowa Maru, the Inspector receiving advice that they had no comments to offer.

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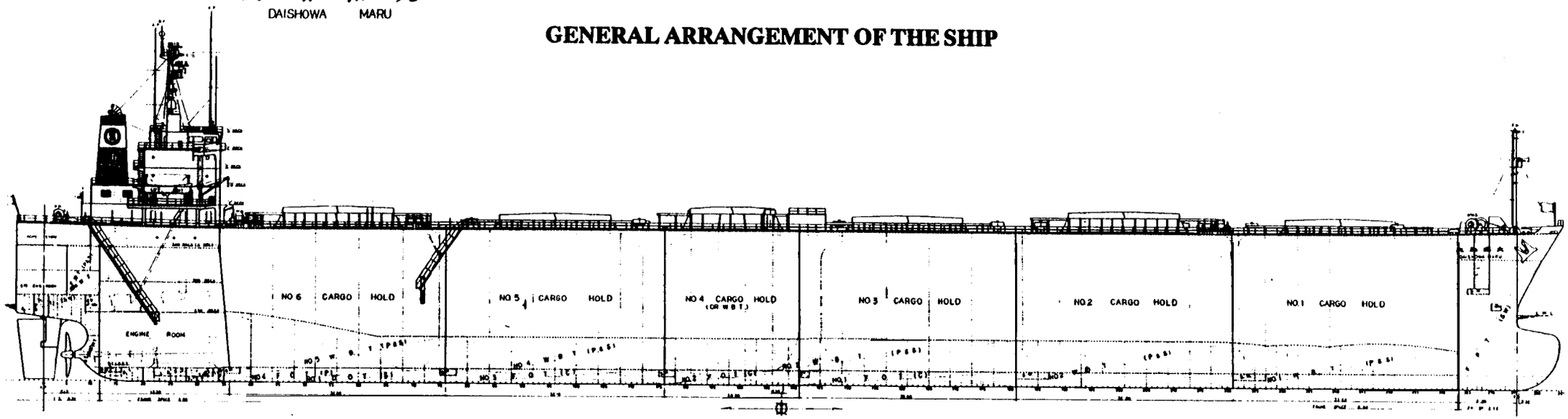
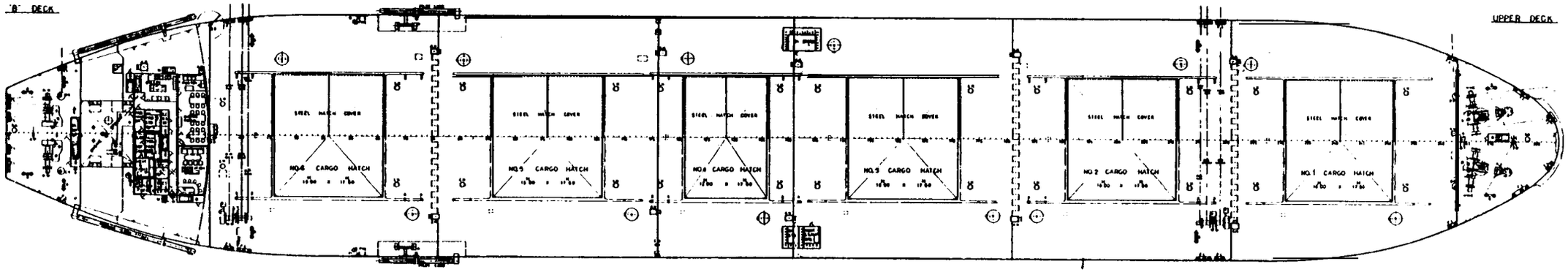
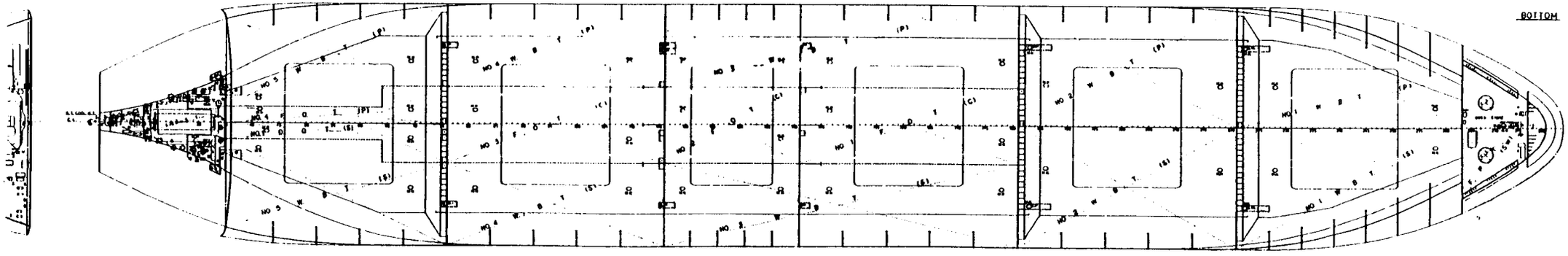
DAISHOWA MARU

GENERAL ARRANGEMENT OF THE SHIP

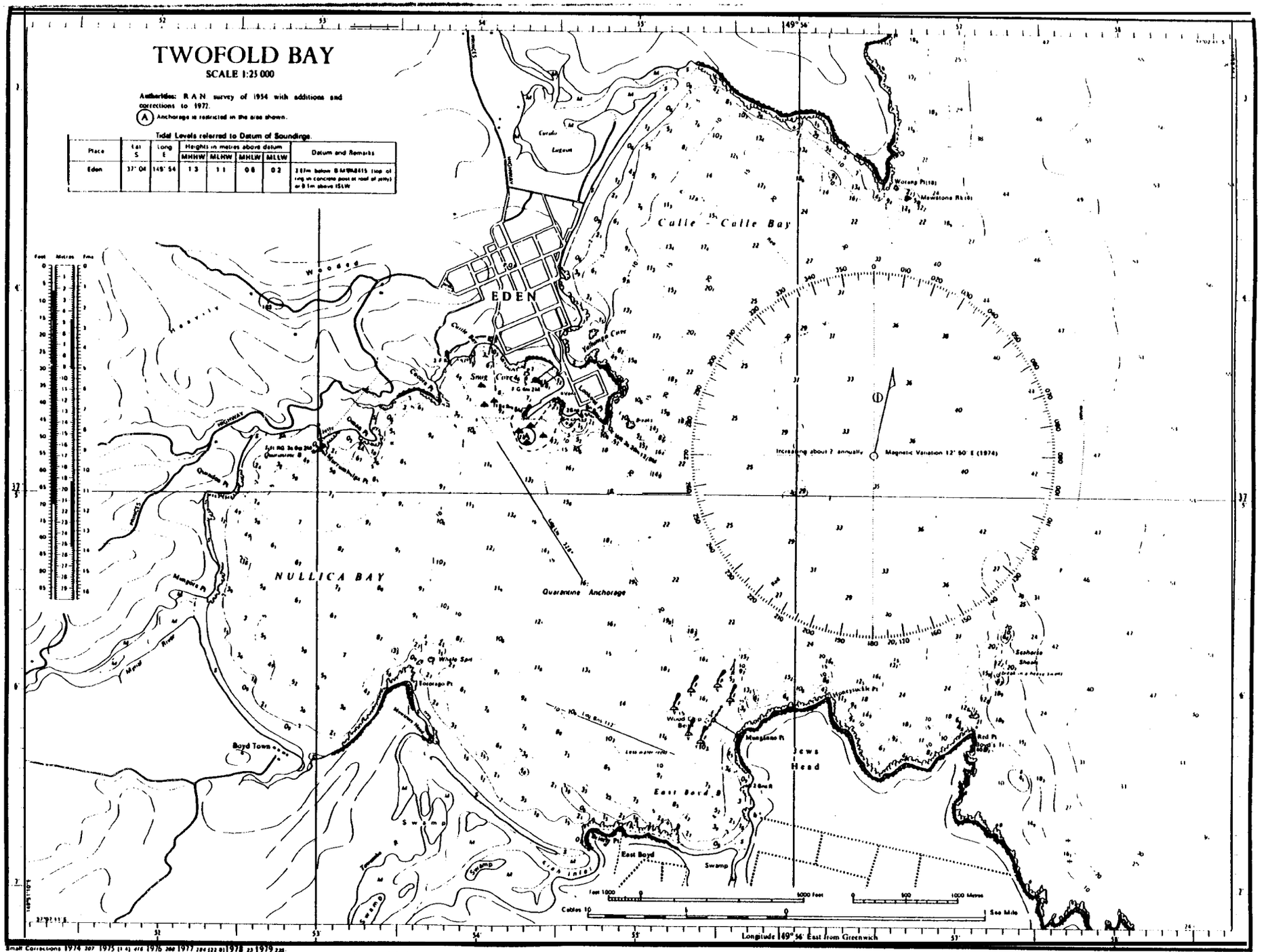






Details of ship

Name of ship:	Daishowa Maru
Lloyd's number:	8600557
Ship Type:	Bulk wood-chip carrier
Owner:	Koyo Shosen Co, Ltd, Japan
Charterer:	Showa Line Ltd, Japan
Crew:	18 (nine Japanese Officers and nine Korean ratings)
Year of build:	1986
Building yard:	Imabari Zosen, Marugame
Main engine:	Mitsubishi Sulzer 6RTA62 - 7723kW
Gross tonnage:	48,566
Nett tonnage:	16,175
Deadweight tonnage:	59,296
Length overall:	228.93m
Beam:	35.m
Depth moulded:	22.5m
Maximum draught:	11.018m
Number of holds:	Six
Classification Society:	Nippon Kaiji Kyokai



Small Corrections 1974 207 1975 (1 4) 416 1976 200 1977 284 (22 0) 1978 23 1979 220
1980 221 371 1981 426-559 1982 181 130 (21 3) 468 647 1983 100
1984 35 (4 5) 318 1985 39 69 185 455 580 1986 212 253 (26 0) 1987 285
1988 476 1989 157 217 (28 4) 433 1990 418 477 510 620 (20 10)

Australia. Published by the Hydrographic Service, R A N 13th December 1972 under the Superintendence of Captain J H S Osborn, Hydrographer, R A N
181 Walker Street, North Sydney, N S W 2060. Telephone (02) 925 4800. Fax (02) 925 4835. Telex AUSHYD AA 72669

DEPTHS IN METRES

Aus 191

CHART AUS 191: TWOFOLD BAY

Sequence of events

The Daishowa Maru, a dedicated wood-chip carrier of 59,296 tonnes deadweight on a summer draught of 11.018m, is engaged on a regular run between Shimizu, Suruga Wan, Honshu, Japan and Twofold Bay, on the South Coast of NSW

The ship departed Shimizu, at the commencement of voyage No."48 outward", on 26 January 1992, Berthing at the Twofold Bay loading terminal was scheduled for 0700, 11 February and as good time had been made on the passage south the ship was stopped for four hours on 8 February. However, the ship continued to make a good speed on 9 and 10 February, despite adverse weather conditions, and arrived off Twofold Bay at 1818 on 10 February.

The weather on 10 February, as recorded in the Deck Log Book, was south-easterly gales (force 7 and 8) and rain, although by 1600 the wind was recorded as having decreased to east-south-east force 5. It was also recorded in the Deck Log Book that the ship was labouring and straining heavily in a south-easterly to east-south-easterly swell.

On me previous voyage, berthing had been delayed because of bad weather (wind north-easterly force 6) and on that occasion the Daishowa Maru had lain safely at anchor in the Quarantine Anchorage from 31 December 1991, to 2 January 1992. The Master, who was well experienced, having sailed as Master for 19 years, decided, therefore, to proceed into the Quarantine Anchorage and anchor for the night, rather than remain under way off the coast

The Daishowa Maru passed between Lookout Point and Munganno Point, to enter the Quarantine Anchorage, at 1900. The Master then turned the ship round to starboard, to head into the wind and swell in preparation for anchoring. The Second and Third Officers assisted the Master on the bridge and the Chief Officer was stationed forward, supervising the letting go of the anchor.

The Chief Officer had had ten years experience in that position; the Second Officer had been a seafarer for 18 years, 5 of which had been as a watchkeeping officer; the Third Officer had been a seafarer for 10 years, but had only been a watchkeeping officer for two months.

The port anchor was let go at 1930, when the ship was 215 degrees 1.3 miles from Lookout Point, as fixed by the Second Officer using radar. The position was recorded in the Deck Log Book as being 37° 05.5'S 149° 54.6'E. The ship was brought up to a single (port) anchor with seven shackles of cable in the water, the ship lying headed in an easterly direction. The engine was rung off at 1942.

Once satisfied that the ship was safely brought up to the anchor the Chief Officer proceeded to the bridge and resumed his watch.

The weather at the time of anchoring, as recalled by the Master and as recorded in the Deck Log Book at 2000, was "wind SE'ly 5, fresh breeze & rain". According to the Chief Officer, there was a strong wind and a very heavy swell.

Due to the sea condition it was not possible to visually ascertain the ship's arrival draught. However, the Chief Officer calculated the draught as being 5.37m forward and 8.54m aft.

Standard procedure on board was for the three deck officers to maintain their normal sea watches when the ship was at anchor and for the ship's position to be checked at regular intervals, both by visual bearings and by radar. The frequency of checking the position was left to the discretion of the individual officer, and depended upon the weather conditions at the time.

Although the engineroom is classed for unmanned machinery space operation, the engineer officers also maintained full watchkeeping duties on this occasion. According to the Master, with the engineroom manned, the engine could be made ready for use in three minutes.

The Master did not leave written instructions for the officers, but left verbal instructions that the ship's position was to be checked frequently and that he was to be called if there was any change.

The Third Officer arrived on the bridge for his watch at 2000. However, the Chief Officer continued to keep an eye on things until about 2245, spending the time between the bridge and the ship's office. During this time he 'checked the ship's position about four times and he said that the ship maintained position very close to the 1930 anchoring position.

The Master visited the bridge at about 2130 and eventually went to bed at 2300, although he did not go to sleep straight away, prefering to read a magazine.

The Third Officer checked the position by visual bearings at 2200, at which time the fixed red lights of Snug Cove leading light and beacon were bearing 337 degrees and the north end of the berth 120 degrees. The weather at 2200 was recorded in the Deck Log Book as being "wind ESE 7, ram, barometer reading 1005.6".

At 2330 the Third Officer checked the bearings again and recalled them as being 338 degrees and 119 degrees, "only a little different" from those he obtained at 2200. At the end of his watch he recorded the weather in the Log Book as being "wind ESE 7, barometer 1002.8, high wind and rain".

The Second Officer arrived on the bridge at 2345, to take over the watch at midnight and noted the wind to be from the east-south-east at 34-35 knots (Force 8 gale). He plotted the position at 0014, 11 February, and noted a difference from the original position that he had plotted at 1930. At that time a very heavy squall was passing over and he had to wait until the wind and rain eased before being able to check the bearings again. The later checks confirmed his 0014 position and so he called the Master at 0020.

The Master arrived on the bridge at about 0022. As soon as he had looked at the chart and had been advised by the Second Officer that he thought the ship was dragging, he ordered the crew to stations and the engine to be placed on stand-by. The weather at this time was a "strong gale from the east-south-east, with heavy rain and thunder"; the ship was lying with the wind on the port bow, headed 130-140 degrees.

The main engine was ready at 0030 and the engine was put at slow ahead and the wheel to port 20. Engine speed was increased at 0031 to half ahead and then to full ahead at 0032, but the ship's head swung slowly to starboard.

While waiting for the anchor party to muster, the Master stationed himself at the compass repeater and monitored how the ship responded to the engine and helm movements. The Second Officer stationed himself at the radar and kept the Master informed, initially of the bearing and distance of Lookout Point and later of the distance off Tororago Point.

As soon as the Chief Officer and crew arrived on the forecastle the anchor was put in gear and they were told to heave away, at a time put at 0033. The cable was leading out on the port beam, with a great deal of weight - too much for the windlass to cope with. The Master ordered full sea speed and the wheel hard to port, but the ship, beam on to the swell, did not respond. The Master stopped the engine and then put the engine astern, but as the bow continued to swing to starboard he ordered stop and then full ahead again.

At about 0040 a moderate shock was felt as the ship grounded and the engine was stopped; at this time the ship was noted as yawing between a heading of 200 degrees and 205 degrees. The Master instructed the Chief Officer to continue heaving on the anchor, the cable by this time leading three points abaft the port beam. The cable was shortened to six shackles on deck, but after that the weight was too great for the windlass to pick up any more.

The Master ordered the crew to check the soundings of the tanks and the holds, the result ofwhich indicated that none had been breached by the grounding. He tried to contact the Harbour Office on VHF channel 16, but without success, the Harbour Office being unattended outside normal office hours.

The Pilot received a telephone call from a local resident at 0230, advising him that the Daishowa Maru was calling him on the radio. He immediately called the ship on VHF radio and learnt that it was aground and had commenced deballasting. As the tide was ebbing, the weather still bad and the ship apparently steady and not pounding on rocks, the Pilot advised the Master to stop deballasting and to wait until daylight, when the situation could be fully assessed. After discussing what facilities were available in Eden, the iMaster requested pilot, tug and diver assistance and that the ship's agent and the Daishowa Company be advised.

After his discussion with the Pilot, the Master telephoned the ship's owners in Tokyo, advising them of the grounding and of the fact that he had requested tug and diver assistance.

The Master then organised the crew to begin taking regular soundings of all the tanks. The Daishowa Maru is equipped with an automatic tank gauging system and therefore tank contents were readily available. Soundings of the depth of water around the ship indicated that the ship was only lightly aground, the depth being similar to the ship's calculated draught.

At 0325 a change in the sounding in No. 5 ballast tank indicated that that tank had been damaged and, at 0430, the adjacent No. 4 fuel oil tank with a capacity of 219 tonnes and containing approximately 30 tonnes, was found to be taking in water. This fuel tank eventually filled up with water.

Low Water was at 0817 and the Pilot realised the tugs would not be required before then, the most suitable time for attempting to refloat the ship being high water at 1400. At 0700 the Pilot went out to the ship in the pilot boat, but was unable to board because of the heavy swell. However, he noted that there appeared to be very little movement of the ship and there were no signs of oil pollution. Due to the heavy swell the two harbour tugs did not leave the shelter of the boat harbour.

At 0400 on 11 February the United Salvage Company was engaged to refloat the ship and the first members of the salvage crew arrived aboard at 1325. After fully assessing the situation - the location of the grounding with the close proximity to rocks, the weather and swell conditions, the equipment (polypropelene ropes) and power of the local tugs - the salvors decided to await further tug assistance. Arrangements were made for the tug Keera to proceed to Eden from Melbourne.

On Wednesday, 12 February, the United Salvage team conducted a sounding survey to seaward of the grounding position, in preparation for the refloating. The wind by this time was only light, but a 2m swell was still running into the bay, causing the Daishowa Maru to yaw easily, although jarringly at tirnes.

The Keera arrived in Twofold Bay at 2100, 12 February and commenced preparations for pulling the Daishowa Max-u off the spit The salvors decided to refloat the ship at noon on 13 February

Deballasring operations aboard the Daishowa Maru commenced at 0830 on 13 February and the Keera passed a tow line to the stem of the ship. At 1000 the Daishowa Maru floated free and began to swing around to the port anchor, whereupon the Keera moved ahead and took the weight on the tow line, holding then until the Daishowa Maru's port anchor had been weighed. The Daishowa Maru was then towed stern first to the outer bay and re-anchored in a position east of Lookout Point

Inspection of the ship revealed extensive damage to the bottom shell plating, set up 0.5m in places, although no plating had been breached. Internal bottom structure members also sustained extensive damage and it was found that the water in No. 4 fuel oil tank was from No. 5 ballast tank, not due to a breach in the hull. The inspection also revealed that all blades of the propeller had been bent, the bottom half of the rudder was missing, and the steering gear was damaged.

Due to the extensive damage, the owners decided the Daishowa Maru should be towed back to Japan, to undergo repairs in drydock The salvage tug Ansnal Salvor was engaged to tow the ship to Gladstone, where the tow would be handed over to a Japanese tug.

Shortly before the tow northwards was scheduled to commence, and while the tow line was being connected, the Daishowa Maru again started to drag anchor in strong winds. The Pilot, therefore, ordered that the Ausual Salver tow the ship out of port limits, this order being duly complied with.

Comment

Woodchip carriers arriving to load at the woodchip facility in Twofold Bay normally berth on arrival. Due to the fact that on the previous visit the Daishowa Maru had anchored when berthing was delayed and had ridden out a strong north-easterly wind, the Master had no reservations about anchoring to await berthing on this occasion.

Anchorage

British Admiralty publication NP 14, Australia Pilot Volume II, lists the anchorages in Twofold Bay in section 11.12 (Attachment 6). Although the information provides advice on the merits of the different anchorages in different weather conditions, it provides no advice on the nature of the seabed or the nature of the anchor holding.

The Navigation Chart, Aus 191, "Plans in New South Wales", provides no indication of the nature of the sea bed in Twofold Bay and depicts the Quarantine Anchorage as lying midway between Munganno Point, on the south side of the bay, and Snug Cove, the location of Eden harbour.

According to the Pilot, the seabed is hard sand and is considered to be good holding ground. The navigation chart in use aboard the Daishowa Maru bore the hand-written notation HARD SAND' off Worang Point. Of note was a second hand-written annotation in English, at the southern end and to seaward of the Port Limit line, which read "Don't pass this line before pilot boards".

Although the Quarantine Anchorage provides good shelter from all winds between south-east, through west, to north-east, it is exposed to easterly winds and to easterly swells. In an easterly wind a ship at anchor in the Quarantine Anchorage will be close to a lee shore.

In the position where the Daishowa Maru was anchored it received practically no protection at all from the east-south-east wind, especially as there would have been a wind sheer around the headland.

A seabed of hard sand does not allow the anchor to dig deep and the cable will not bury itself. With the Daishowa Maru moving in the heavy swell, resulting in the weight fluctuating on the cable, there was a real possibility of the anchor breaking out

It is considered that:

> With the wind from the east-south-east, the Daishowa Maru was provided very little protection from the wind by Jews Head.
>
> The Twofold Bay Quarantine Anchorage is not a safe anchorage for large vessels in a strong easterly wind or heavy easterly swell.

Weather

The weather forecast for the local area, Ulladulla to Gabo Island, issued by the Sydney office of the Bureau of Meteorology at 1305 local time on 10 February included a warning of gale winds, south-east 30 to 40 knots, seas rising to about 4m to 5m and a swell of 2m to 3m (Attachment 7). At 2137 local time the forecast was downgraded to a strong wind warning, south-east to east 20 to 30 knots, seas 4m to 5m and swell 4m to 5m.

As the storm passed through Merimbula, 11.5 miles to the north of Twofold Bay, winds were estimated by an accredited weather observer as being 50 to 55 knots.

It is considered that:

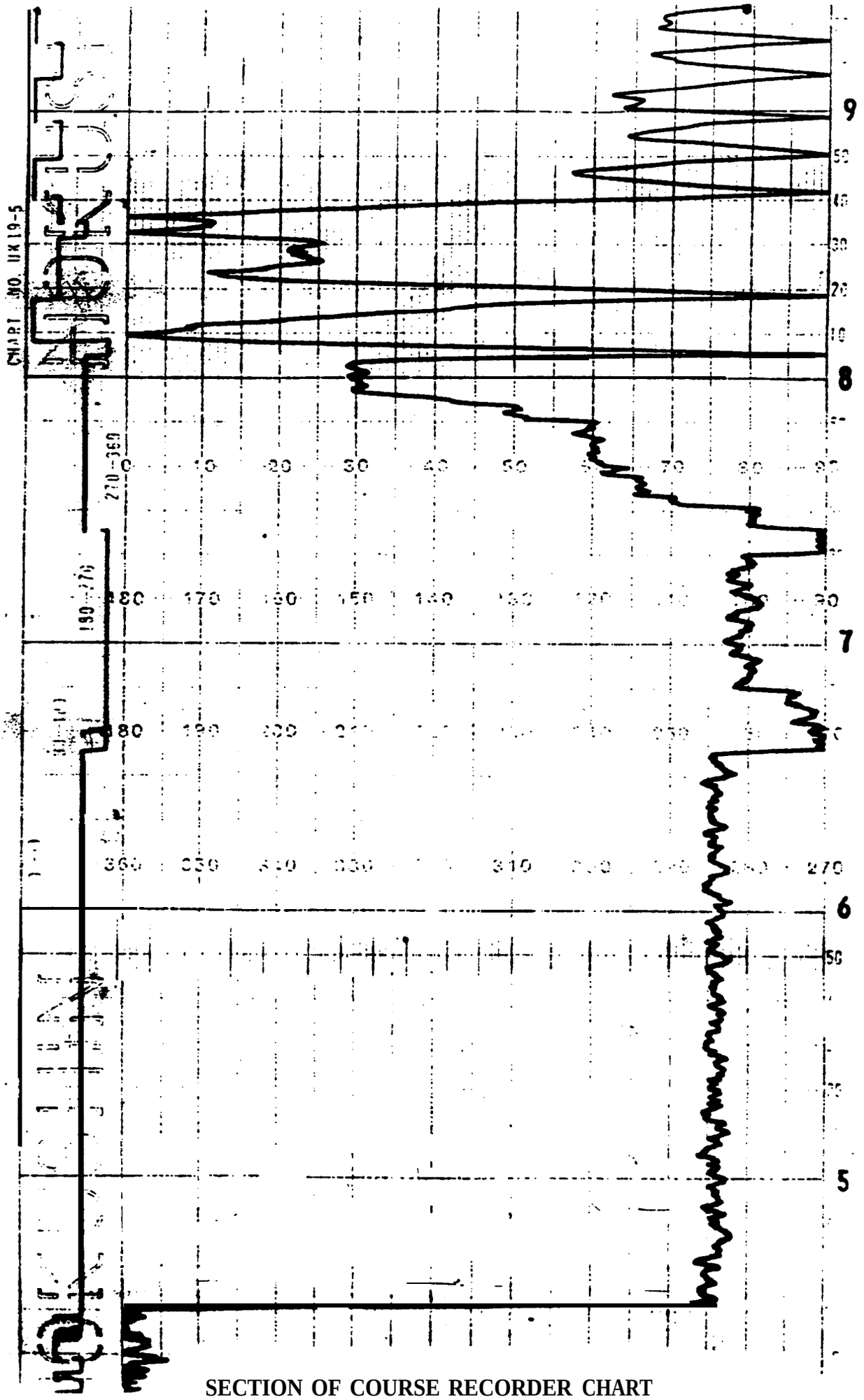
The strong wind and high swell warnings issued by the Bureau of Meteorology should have indicated to the Master that, under the forecast conditions, the Twofold Bay Quarantine Anchorage was not safe, placing the ship on a lee shore.

General

In line with normal practice on board, the course recorder was switched off after the ship was anchored, although in this instance not until 2025. From the course recorder chart (see page 15) it is apparent that the recorder had not been adjusted to the correct local time, being one hour behind.

Study of the course recorder chart indicated that at the time of anchoring, the Daishowa Maru was steadied on a heading of 155 degrees. The ship then swung to starboard, most probably due to the transverse thrust effect of the propeilor turning astern, to a heading of 191 degrees. Following this, the ship swung back to port, to a heading of 057 degrees and then proceeded to yaw either side of a mean heading of 090 degrees (East). At 2025, when the recorder was switched off, the ship appears to have settled into a pattern of yaw of 45 degrees (between headings of 068 degrees and 113 degrees) over a nine-minute period. This is at variance with the evidence of the officers, who stated that the ship was headed into the wind, towards the berth (south-easterly) and was not yawing very much.

The position fixed at 1930 by the Second Officer was the position of the navigating bridge at that time. The position where the anchor was dropped, from the evidence of the course recorder chart, was 155 degrees 195.5m from that position (Attachment 2). The amount of cable paid out was seven shackles, or 192m, in the water plus 14m, the height of the hawse pipe above the water. At maximum stretch, in the water depth of 15m, the bridge would be 399m from the anchor, the stem 427m from the anchor (Attachment 3). The Daishowa Maru would therefore yaw about the anchor on an arc having a maximum radius of 427m. At maximum radius the stem of the Daishowa Maru would have been only four cables, or 740m, from the shoal water off Whale Spit.



SECTION OF COURSE RECORDER CHART

The Second Officer fixed the ship's position at the time of anchoring, but the radar bearings and distances were not recorded, the position being logged as a latitude and a longitude. The Chief Officer and Third Officer both checked the bearings and distances, but again, these bearings and distances were not recorded, nor were positions plotted on the chart. Only the Third Officer was able to recall what the visual bearings were, these providing positions west (inshore), but within the maximum radius of the initial anchor position (Attachment 4).

The position plotted on the chart by the Second Officer at 0014 (Attachment 5) was 0.2 cables (37m) to the east of the position provided by the bearings obtained by the Third Officer at 2200 and 0.6 cables (111m) within the maximum radius of yaw. This would indicate that the Daishowa Maru had not dragged anchor at that tie, rather that the anchor most probably broke out at the time that the squall was at its height, at a time put by the Second Officer as being 0017.

It is considered that:

- The anchor broke out of its holding and the Daishowa Maru commenced dragging anchor during the height of the passing squall, at sometime between 0015 and 0020 on 11 February.

Bridge procedures

At the time that'the anchor was let go, at 1930, the Second Officer fixed the ship's position using radar bearings and distances. This position was then noted in the Deck Log Book as a latitude and longitude. The position was not fIxed again when the ship was brought up to the anchor, therefore there was no recorded data against which succeeding Watches could reference bearings and distances to astablish whether the ship was maintaining position. Whereas on a small-scale chart this is not so impormnt, on a large-scale chart, such as the plan of Twofold Bay, and with a ship close to dangers, it is extremely important

The points chosen for position checks were well out on either beam. While the ship was headed in an easterly direction the bearings of these points would provide a good indication of whether the ship was dragging the anchor. However, with the ship yawing through 40 to 45 degrees, the bearings of these points would have varied solely due to that fact and any change due to dragging would initially not be easy to detect.

Although the ship's radar sets were equipped with a variable range marker, none of the officers set this marker to touch the trace of Mungora and Quondoa Points, at the western end of the bay. Even with the ship yawing, such use of the radar would have provided very early indication of dragging.

It is considered that the bridge watchkeeping procedures aboard the Daishowa Maru were deficient in that

- The ship's officers failed to keep a proper record of the anchor position bearings and distances;

- The ship's officers failed to fully utilise the equipment available to them to monitor the ship's position while at anchor.

Response

When the Master arrived on the bridge his stated immediate concern was to head the Daishowa Maru to the east, pick up the anchor and proceed out to sea. This was a quite natural and understandable reaction to the situation.

While waiting for the anchor party to be ready the Master positioned himself by the compass repeater to see how the ship was responding to the engine and helm movements. The Second Officer checked the position on the radar, initially referencing off Lookout Point and only changing his attention to Tororago Point (Whale Spit) as that point became very close. No further positions were placed on the chart to monitor the direction of movement, nor was this apparently assessed on the radar.

In a free drift situation there is a tendency for large ships, such as tankers and bulk carriers, to not only drift down wind but also to "sail" across wind. This sailing effect is dependent upon such factors as draught and trim. Guidelines on rates and direction of drift of large oil tankers and gas carriers are contained in the International Chamber of Shipping publication Peril at Sea and Salvage - a Guide for Masters. Similar principles are also relevant to large dry-bulk carriers, such as the Daishowa Maru.

Although the wind was from an east-south-easterly direction, rather than dragging the anchor straight down wind (in a west-north-westerly direction), the Daishowa Maru, uimmed by the stem and having the wind on the port side, would have more probably dragged in a westerly direction. This would have mken the ship close to, but north of Whale Spit into Nullica Bay (see page 19). The line of dragging, from the original anchor position to the grounding position, was around 240 degrees. By using the engine ahead for most of the 10 minutes between the engines being ready and the grounding, the Master increased the across-wind movement, possibly by as much as two ship lengths, which resulted in the ship grounding on the eastern extremity of Whale Spit. The ship would have initially grounded aft and then would have continued to swing to starboard until grounded in more forward areas.

The manoeuvrability of a ship in strong winds and heavy seas, especially when there is a large windage area as with the Daishowa Maru, is greatly reduced. Significant forward movement is needed to overcome inertia and the force of the wind and swell. The Daishowa Maru had neither the time nor the sea room in which to build up the necessary speed to overcome the force exerted by the wind.

In the first instance, in the five or so minutes while waiting for the engine to be ready, the direction of drift should have been ascertained. Then, once the engine was ready and, while waiting for the anchor party to muster, had the ship been found to be dragging towards Whale Spit, the engine could have been run astern in an effort to keep the ship clear of that, at 740m the closest, hazard.

In his natural concern and perceived priority to weigh anchor and to proceed out to

sea, the Master did not consider letting go the starboard anchor. Letting go the starboard anchor, if effective or even if only partially effective, would have provided more time in which to assess the situation and, theoretically, would have had the effect of bringing the ship's head into the wind.

In the Inspector's view, as the Daishowa Maru was close to a lee shore, letting go the starboard anchor was the only course of action that was likely to prevent the ship from being driven ashore.

It is considered that:

- While waiting for the engine and anchor party to be ready, the Master failed to ascertain the direction in which the ship was dragging;

- In his concern to head the ship to the east and pick up the anchor, the Master failed to fully evaluate the situation and consider alternative actions.

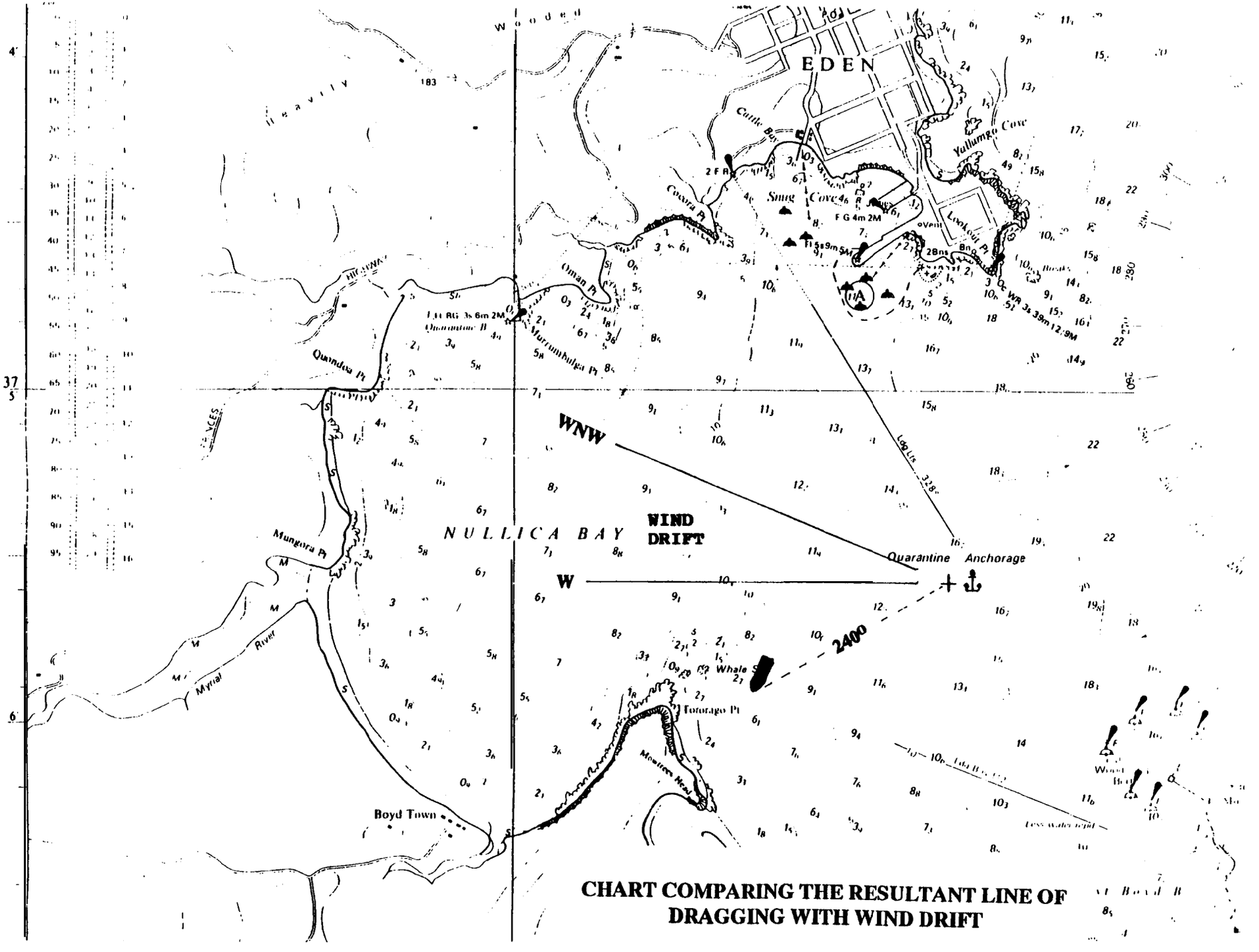


CHART COMPARING THE RESULTANT LINE OF DRAGGING WITH WIND DRIFT

Conclusions

It is considered that:

1. With the wind from the east-south-east the Daishowa Maru was provided very little protection from the wind by Jews Head.

2. The Twofold Bay Quarantine Ancorage is not a safe anchorage for large vessels in a strong easterly wind or heavy easterly swell.

3. The strong wind and high swell warnings issued by the Bureau of Meteorology should have indicated to the Master that, under the forecast conditions, the Twofold Bay Quarantine Anchorage was not safe, placing the ship on a lee shore.

4. The anchor broke out of its holding and the Daishowa Maru commenced dragging anchor during the height of the passing squall, at sometime between 0015 and 0020 on 11 February.

5. While waiting for the engine and anchor party to be ready the Master and Second Officer both failed to ascertain the direction in which the ship was dragging.

6. In his concern to head the ship to the east and pick up the anchor, the Master failed to fully evaluate the situation and consider alternative actions.

It is further considered that the bridge watchkeeping procedures aboard the Daishowa Maru were deficient in that:

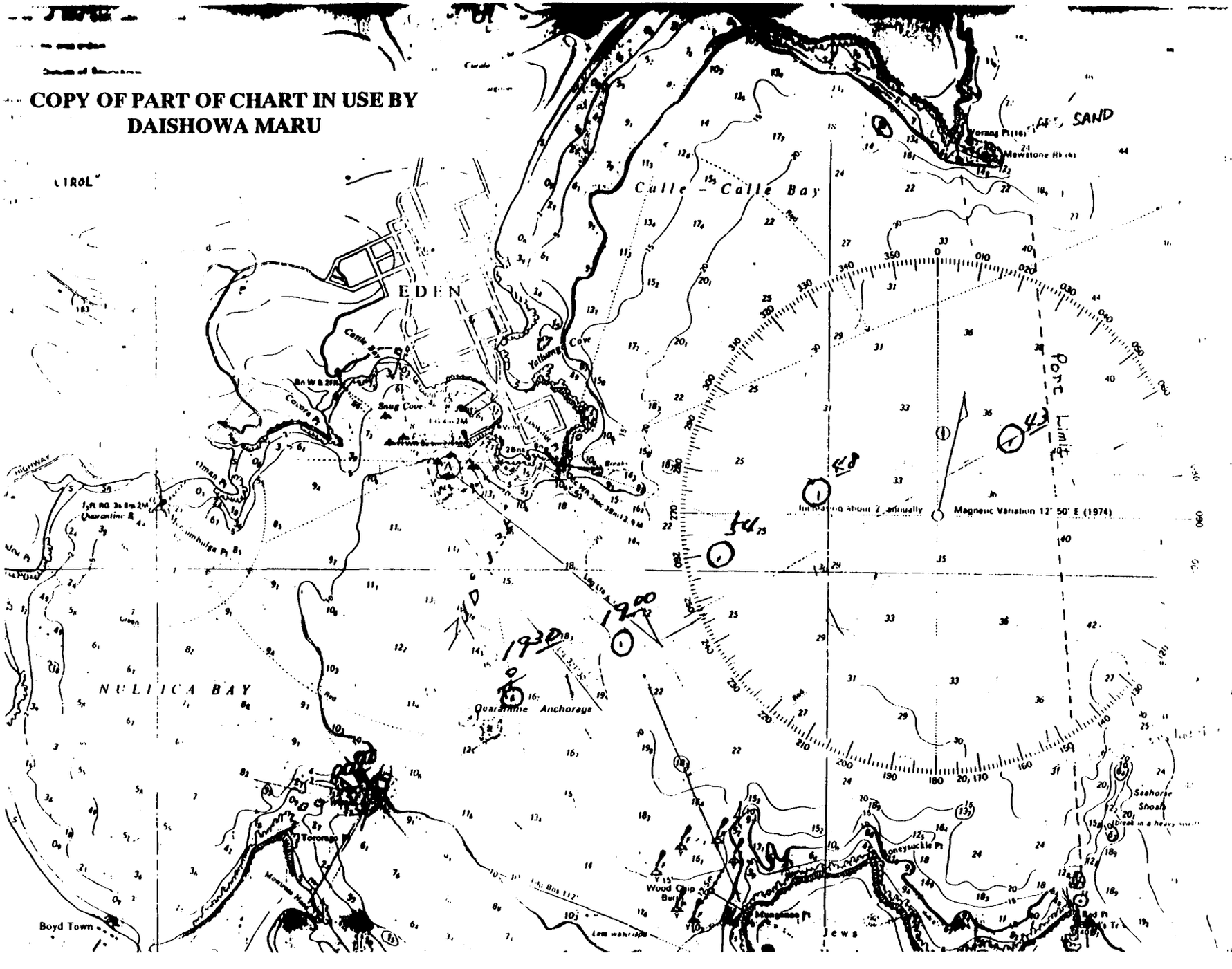
7. The ship's officers failed to keep a proper record of the anchor positon bearing and distances.

8. The ship's officers failed to fully utilise the equipment available to them to monitor the ship's position while at anchor.

Annex

As a result of the Daishowa Maru grounding, the Maritime Services Board of NSW, through the Eden Port Authority, has ruled that ships of more than 3000 GRT are not to anchor inside the port limits (inshore of a line joining Worang Point and Red Point), without the express permission of the Harbour Master.

COPY OF PART OF CHART IN USE BY DAISHOWA MARU



ATTACHMENT 1

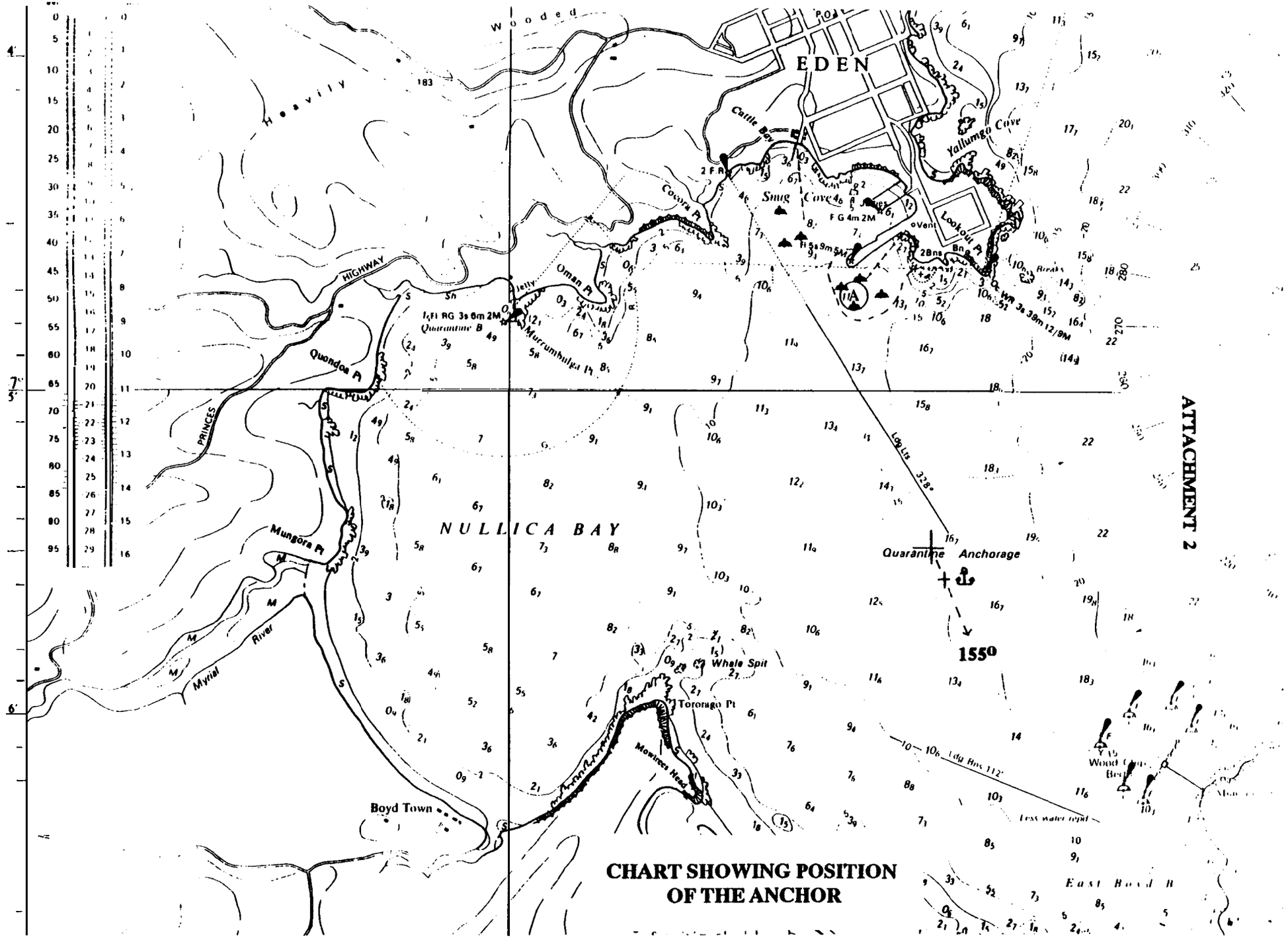


CHART SHOWING POSITION OF THE ANCHOR

ATTACHMENT 2

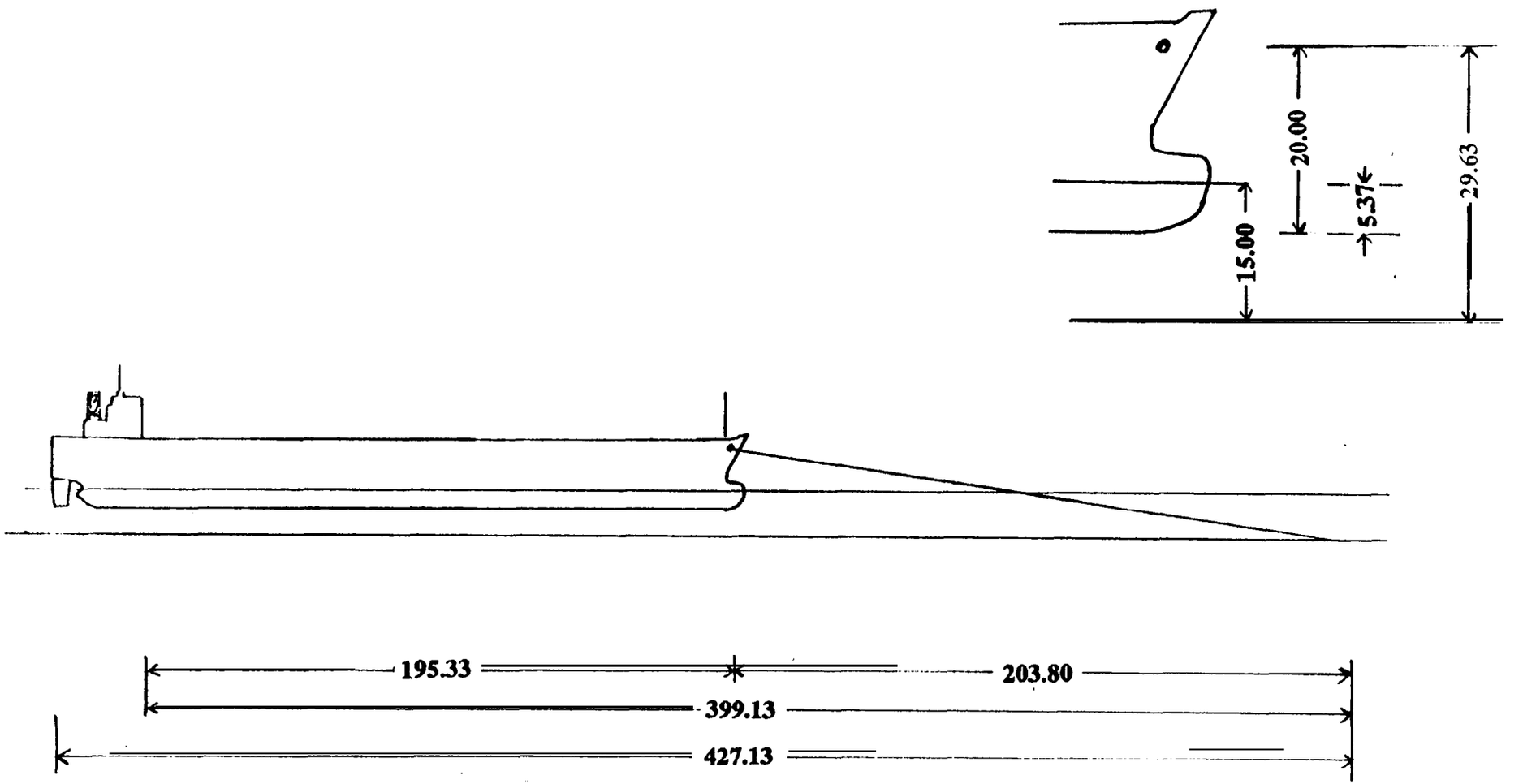


DIAGRAM DEPICTING DISTANCE OF BRIDGE FROM ANCHOR AT MAXIMUM STRETCH OF CABLE

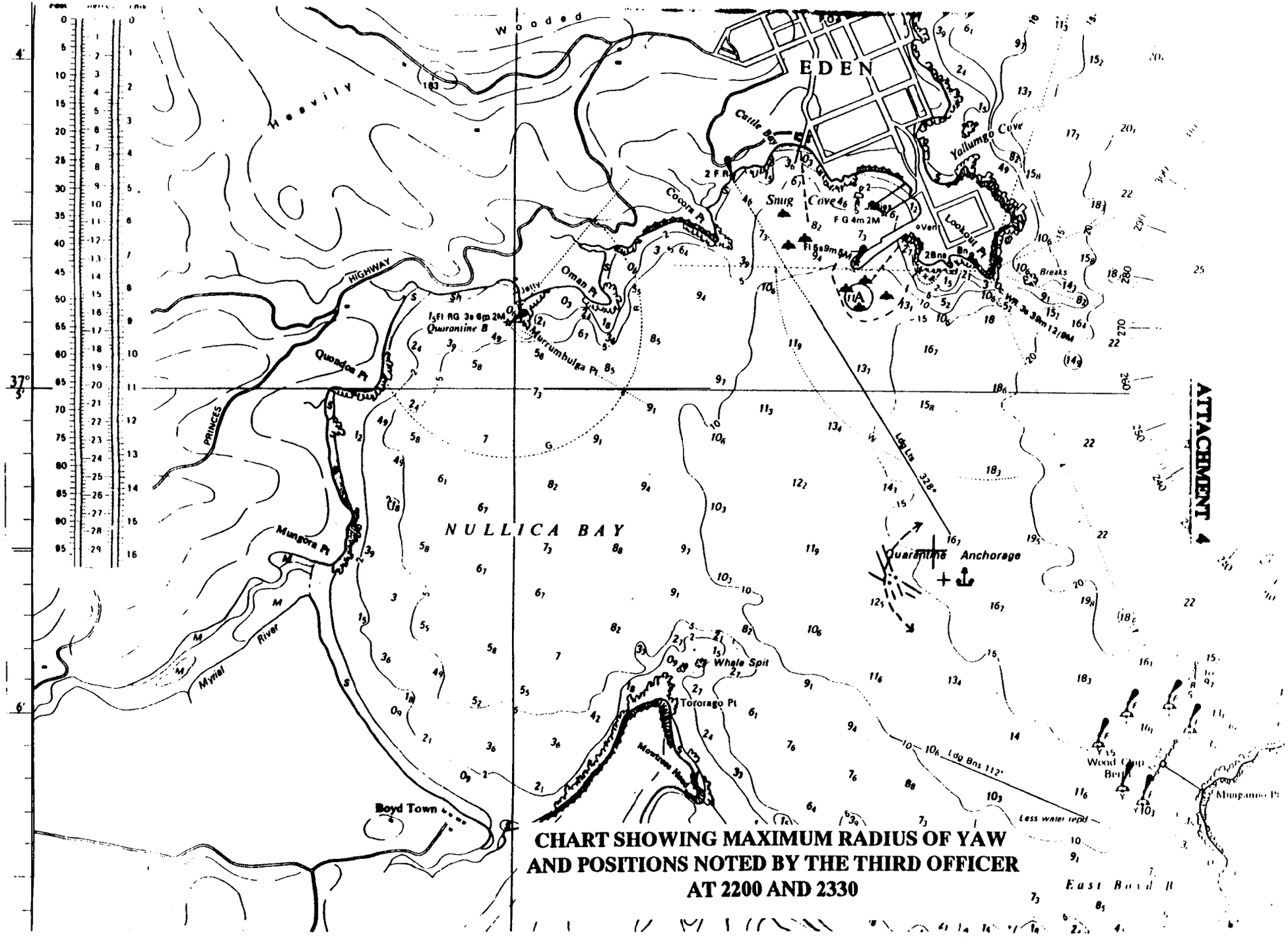


CHART SHOWING MAXIMUM RADIUS OF YAW AND POSITIONS NOTED BY THE THIRD OFFICER AT 2200 AND 2330

ATTACHMENT 4

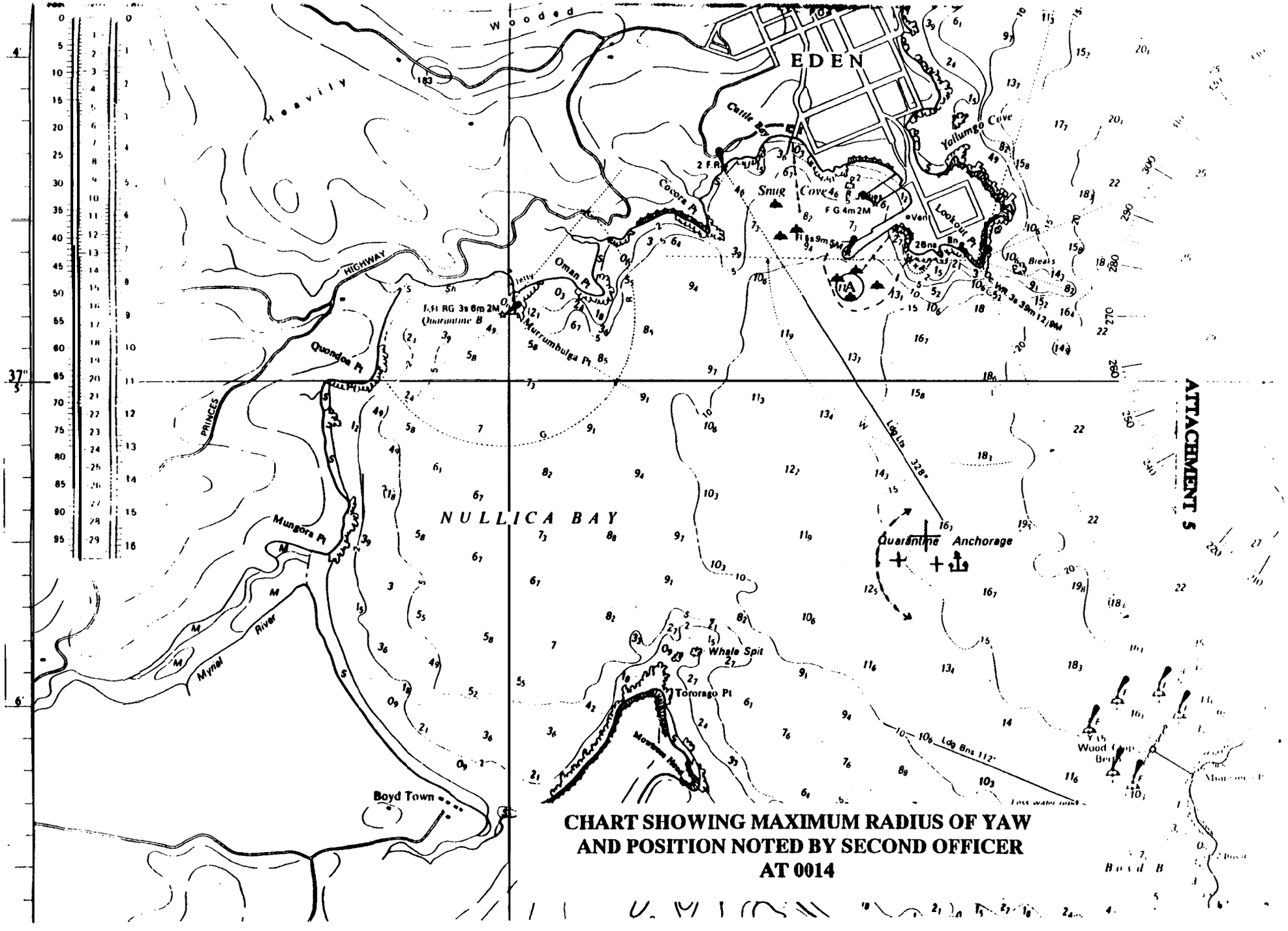


CHART SHOWING MAXIMUM RADIUS OF YAW AND POSITION NOTED BY SECOND OFFICER AT 0014

ATTACHMENT 5

A'ITACHMENT 6

Anchorages in Twofold Bay

11.12

Anchorages are as follows:

Off **Boyd Bay,** 3 cables WSW of Munganno Point. In SE gales this anchorage is better than that in Snug Cove.

Off **Snug Cove,** ¾ mile WSW of Lookout Point. This anchorage is good in NE gales but exposed to a heavy swell in E and SE gales.

In the S part of Nullica Bay off **Boyd Town.** This anchorage is much used by coasting vessels but is not recommended in E gales.

Quarantine anchorage. The quarantine line is from Honeysuckle Point to Tororago Point to Lookout Point. The quarantine anchorage lies within the triangular area defined by these points.

EXTRACT FROM AUSTRALIA PILOT VOLUME II, ANCHORAGES IN TWOFOLD BAY

ATTACHMENT 7

0205 GMT MONDAY 10/02/92 (1305 EST 10/02/92)

ULLAHDULLA TO GABO ISLAND AND 60NM SEAWARD
WARNING: GALE WINDS
WIND: SOUTHEAST 30/40 KNOTS TENDING EAST/NORTHEAST
SEA: RISING TO ABOUT 4 TO 5 METIES
SWELL: 2 TO 3 METRES
WEATHER: RAIN

1037 GMT MONDAY 10.02.92 (2137 EST 10/02/92)

ULLADULLA TO GAB0 ISLAND AND 60NM SEAWARD
WARNING: STRONG WIND WARNING
WIND: SOUTHEAST TO EAST 20/30 KNOTS
SEA: 4 TO 5 METRES
SWELL: 4 TO 5 METRES
WEATHER: RAIN

1618 GMT MONDAY 10/02/92 (0318 EST 11/02/92)

ULLADULLA TO GAB0 ISLAND AND 60NM SEAWARD
WARNING: GALE /STRONG WIND WARNING
WIND: SOUTHEAST 20/35 KNOTS EASING TO 25 KNOTS
SEA: 3 METRES
SWELL: 4 TO 5 METRES
WEATHER: RAIN. THUNDERSTORMS

BUREAU OF METEOROLOGY WEATHER FORECASTS FOR NSW SOUTH COAST