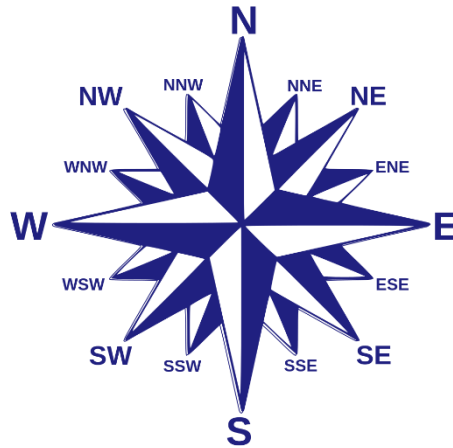


Stars and Compass



2021 Paper

Introduction

The Stars and Compass trophy has been donated for annual competition with a view to maintaining an interest in traditional methods of navigation.

No answers are to include the use of modern devices such as GPS, chart plotters or software such as Navionics charts, tidal charts etc.

General Instructions

Please:

- Use a title page with your name and contact information (email and/or phone number)
- Number all pages
- Show all calculations
- Provide copies of any plots and illustrations, with appropriate notations that you use in preparing your answers
- Make explicit any assumptions that you have used
- Begin each main question on a new sheet
- Sub-questions such as 1(a), 1(b) for example should start on a new line
- If your answers are prepared on a computer then use at least 1.5 line spacing and a 10 point font or larger
- Enjoy the challenge

All entries must be submitted in hard copy or electronically to the office of RBYC by 4pm on 14 June 2021. There are a number of ways to do this:

- Email a digital copy (prepared on computer or scanned hardcopy) to the RBYC Sailing Office - boatingmanager@rbyc.org.au , or
- Post a hardcopy to RBYC - Addressed:
Stars and Compass,
Royal Brighton Yacht Club,
253 Esplanade,
Middle Brighton, VIC 3186
- Drop it off, in an envelope addressed to Stars and Compass, at RBYC Reception

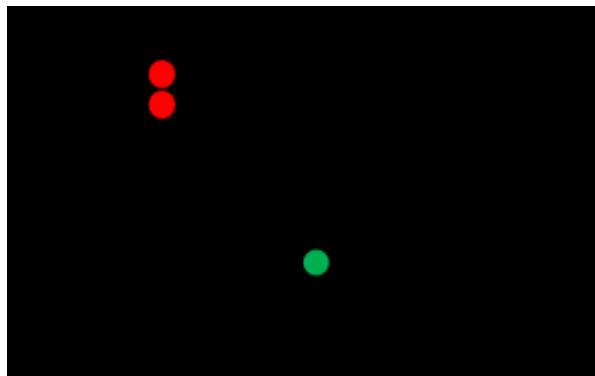
Notes:

1. Access to charts AUS 143 – Port Phillip and AUS 150 – Western Port is required.
2. Access to chart AUS 144 – The Rip or the book 'Creeks and Harbours of Port Phillip' by Mike Smith with Richard Hawkins is recommended.
3. Charts published within the previous 10 years (and possibly longer) will be suitable.
4. The BOM / AHO tables for tides are to be used. They are available from the BOM website, AHO publications and the State transport authorities. Any data used from the tables should be listed in your answers.
5. Tidal height interpolation chart, deviation table, speed polars, tidal heights for Changjiang, extracts from the chart for New Caledonia, and an extract from the Gnomonic chart for the South Pacific Ocean are provided as attachments at the end of the paper.

1. General

- a. You are planning a passage north from Sydney to Lady Musgrave Island and you are stepping off the distances for each of the legs with your dividers on a small scale chart (1:3 500 000). Where on the chart will you use your dividers to determine the distances to be sailed for each leg? Why? (3)

- b. While sailing in a murky night in Bass Strait you see this set of lights – what do they indicate? Having seen these – what is your status in the Colregs and what action should you take? Why would the vessel be displaying these lights.



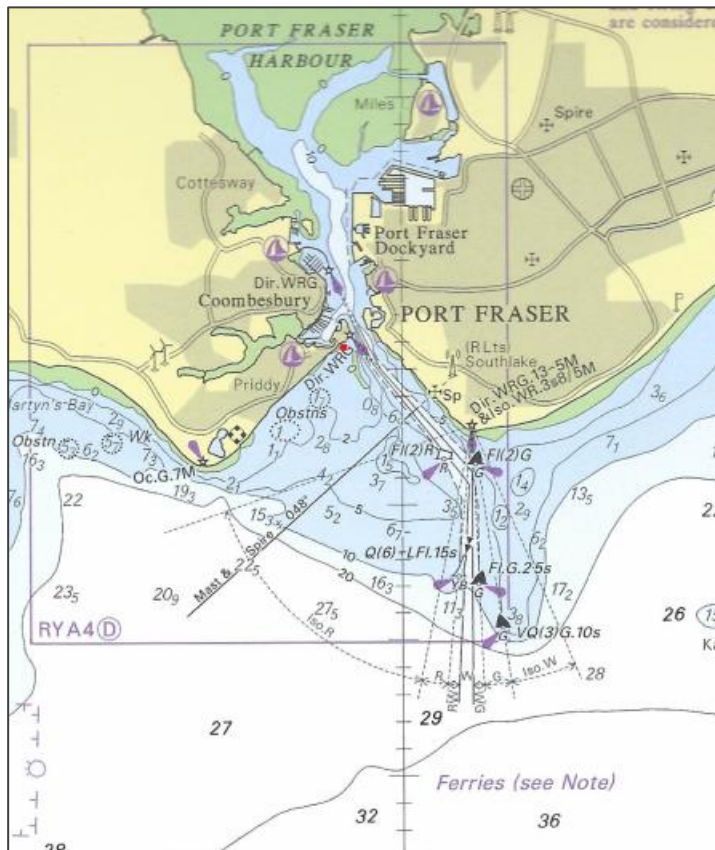
- c. A beacon with a charted height of 10m is situated on sand shown with a symbol of $\overline{2.3m}$. If MHWS is 5.7m what is the height of the beacon above the sand? (3)

Use a diagram to explain your answer.

- d. As shown on the extract from the RYA Training Chart overleaf the lead light at the entrance for Port Fraser is described as:

Dir.WRG 13-5M & Iso. WR.3s8/5M

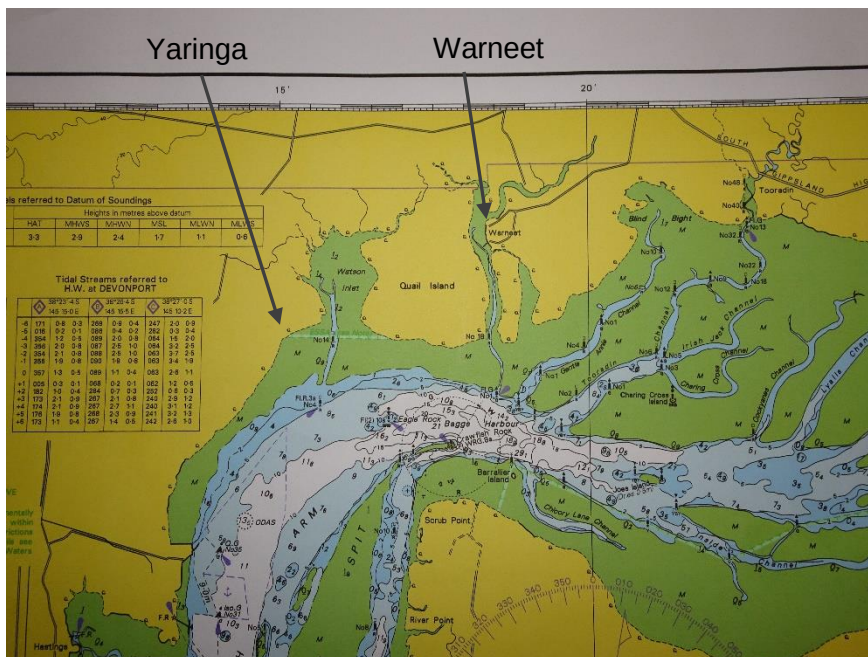
Describe what the mariner will see at night when approaching Port Fraser.



2. Tidal Height Calculations

Your friend has asked to take his boat from the boatyard at Yaringa back to Sorrento. The Yaringa Channel shows a minimum charted depth of 1.6m. The boat draws 2.6m. You are to take it from Yaringa on 2 April 2021. Yaringa is at the northern end of Western Port as shown overleaf on the extract from AUS 150.

- a. During which times would it be possible to safely take the boat out through the Yaringa Channel? HW at Warneet Pier is 25 minutes later than Stony Point. Allow a safety margin of 0.5m under the keel. You are to use one of the tidal height interpolation charts that are available or calculations to determine the tidal heights during the day. Your chosen method is to be submitted with your answers. Note: You may find AH130 in Attachment 1 to be useful. Note: Downloading the tidal height chart for the day from Navionics, willyweather or other electronic sources as evidence will not earn marks. (11)
- b. Suggest a way of calibrating the depth sounder. Why may this be necessary? (2)
- c. An intense high pressure system has been sitting over the Bay region of Victoria for several days. How does this affect your calculations? (2)



Extract from AUS 150 showing Yaringa and Warneet at the northern end of Western Port.

3. Passage Plan

Prepare a passage plan take the boat from Yaringa to Sorrento in Pt Phillip Bay that departs within the safe times calculated in Question 2. Northerly winds are forecast of 10-15 knots. See Attachment 3 for the speed polar diagram. The deviation table for the boat is shown in Attachment 2. (12)

4. Pilotage Plan

Prepare a pilotage plan for the transit of the Rip and into Sorrento that can be used in cockpit. Visibility is expected to be good although there is expected to be substantial cloud cover. The pilotage plan is to be a hand drawn sketch showing key navigation features that will allow you to pilot the boat on the approaches to the Rip, through the Rip and then onto Sorrento where you may wish to pick up a public mooring or lie at anchor. There should be sufficient information included in the pilotage plan so that you do not have to refer to a chart during the transit of the Rip. Avoid including superfluous information, which will make it difficult to follow. (10)

5. Lights and Shapes

On AUS 143 what charted items are located at the following locations?

- 38° 5.0'S 144° 38.6' E – Describe clearly the structure supporting the light, the colour and pattern of the day shape and the light characteristics. What is the significance for the pilot on vessels sailing towards Geelong. (5)
- 38° 7.6'S 144° 37.7' E – Describe clearly the structure supporting the light, the colour and pattern of the day shape and the light characteristics. What is the significance for the pilot on vessels sailing from Geelong. (5)
- 38° 7.7'S 144° 44.3' E – Describe clearly the structure supporting the light, the colour and pattern of the day shape and the light characteristics. (4)

6. Tidal Streams

You are entering the Canal de Havannah in New Caledonia very soon after 0000 (UTC+11) on 28 April 2021 in visibility that varies from less than a mile to good as rain squalls pass through in rapid succession from the north. This is the principal entrance for ships coming from the eastern Pacific Ocean in transit to Noumea. See Attachments 5 and 6 for an extract of the chart for the Canal de Havannah and the relevant tidal stream information. The tidal height chart is shown in Attachment 4. Use the deviation table provided in Attachment 2. Your boat speed through the water is 5.5knots.

(5)

- a. What compass course will you instruct the helm to steer when entering the Canal de Havannah from the east and heading towards Cap Ndoua? What is the SOG.
- b. Ten minutes later, the Cap de la Reine-Charlotte is almost abeam. What is the new compass course to be steered? What is the new speed over the ground.
- c. As you pass the headlands at the entrance to Port Boisé and approach Recif loro what compass course should be required to maintain a safe passage to Cap Ndoua? The distance between the entrance to Canal de Havannah and Recif loro is five nautical miles.
- d. As the rain squalls pass through and the visibility improves briefly, what check will you use to ensure that your boat's heading is correct.

(5)

(2)

(2)

7. On Passage Navigation

You are on a passage from Wyndham Harbour to Mornington in your steel motor boat *Sprite* for which the deviation table is provided overleaf. By changing the heading of your vessel you use the boat's steering compass to take a set of bearings to confirm your position. Variation is to be the nearest whole degree.

The bearings from the ship's compass are:

Water Tower at Werribee	302° (Taken as a bearing over the stern)
Entrance to Pt Richards Channel	232° (Taken by steering towards the beacon)
Prince George beacon	188° (Taken by steering towards the beacon)

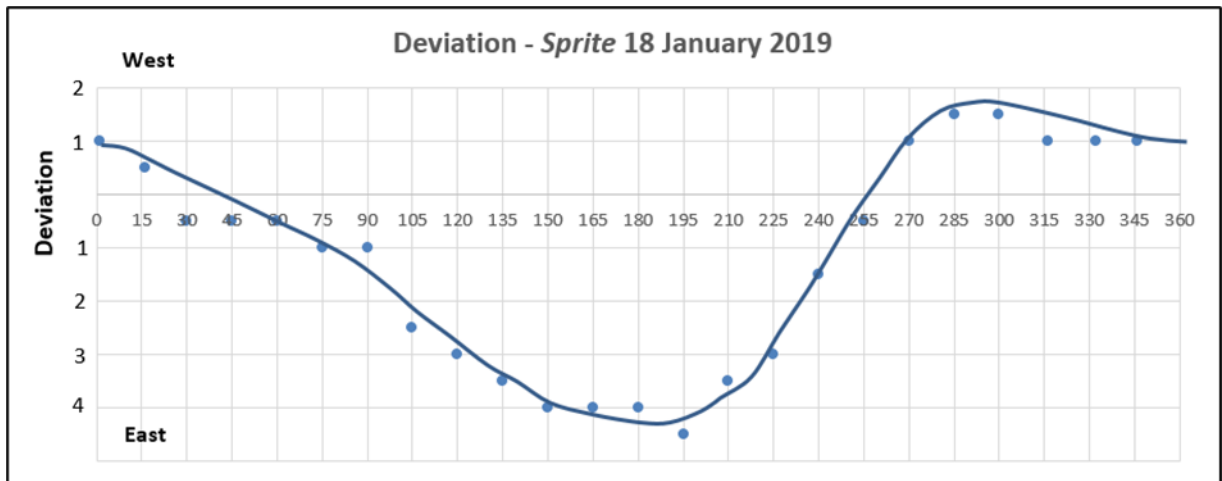
- a. What is your position?
- b. How far are you from the rhumb line between Wyndham Harbour and Mornington?
- c. What is a possible reason for this difference?
- d. Using this information what is the recommended course to steer for the remainder of the trip? (Bonus mark if you recommend a sensible course to steer)

(4)

(1)

(1)

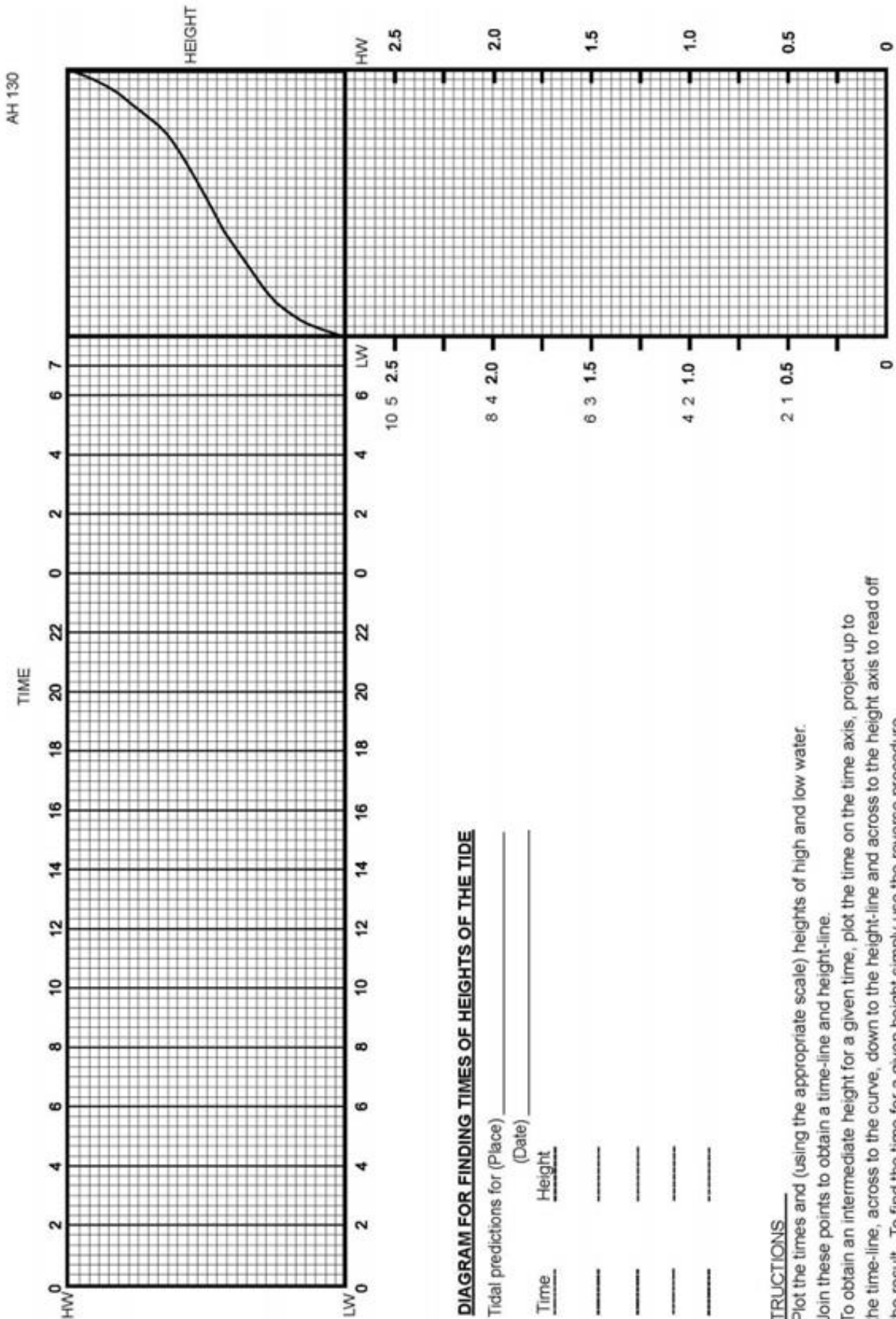
(3)



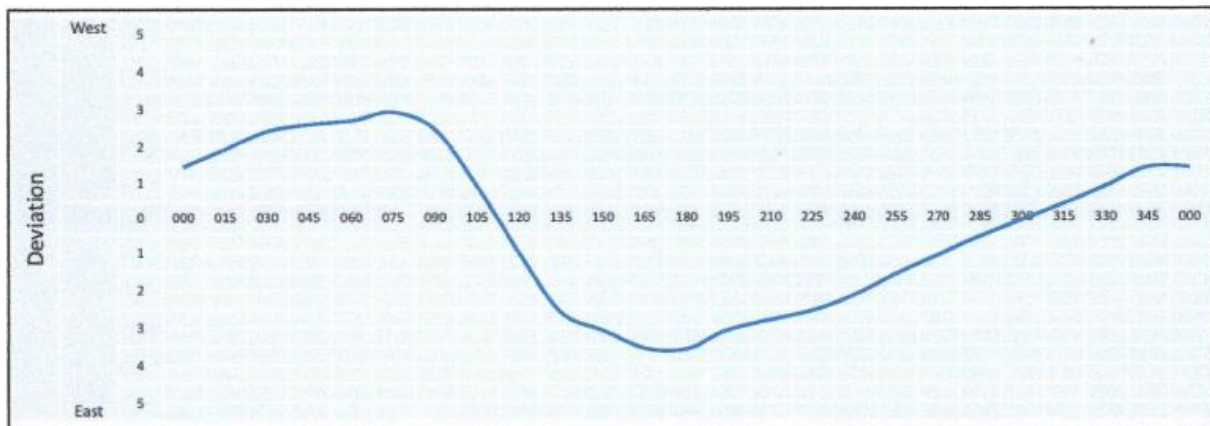
8. Trans-Tasman Passage

You are planning a passage from Hobart to Dunedin in New Zealand. Using the extract of the Gnomonic Chart for the South Pacific shown in Attachment 7 determine the shortest course between Hobart and southern end of Stewart Island.

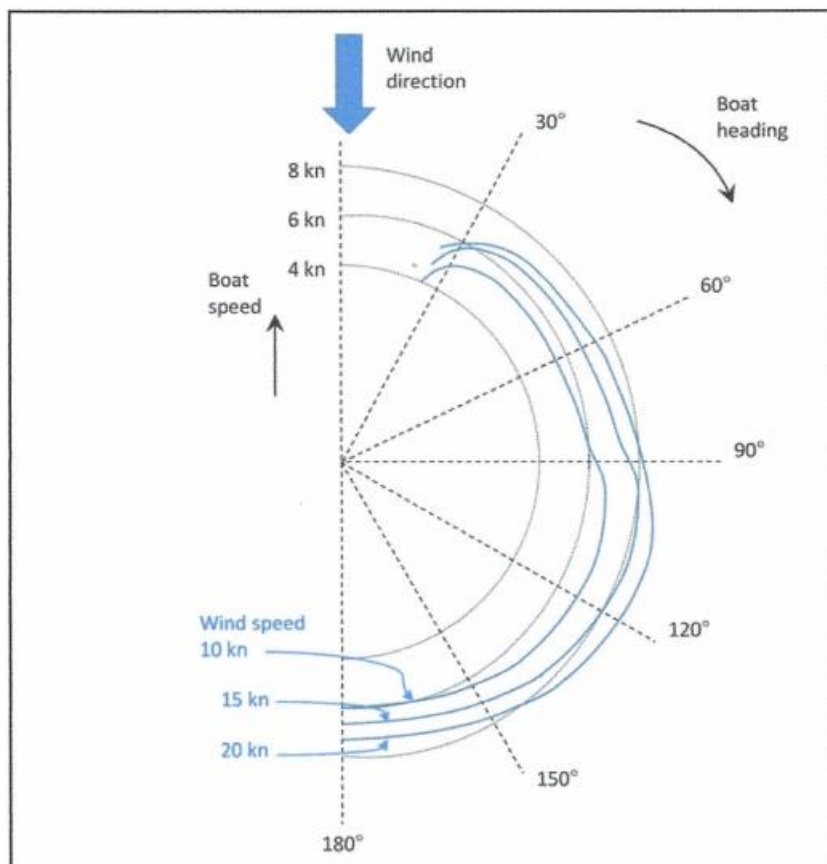
- Provide sufficient waypoints between Hobart and Stewart Island for you to estimate the distance to be sailed. (3)
- Describe how you will determine the distance to be sailed between Hobart and Stewart Island and the headings to be used on passage. (3)



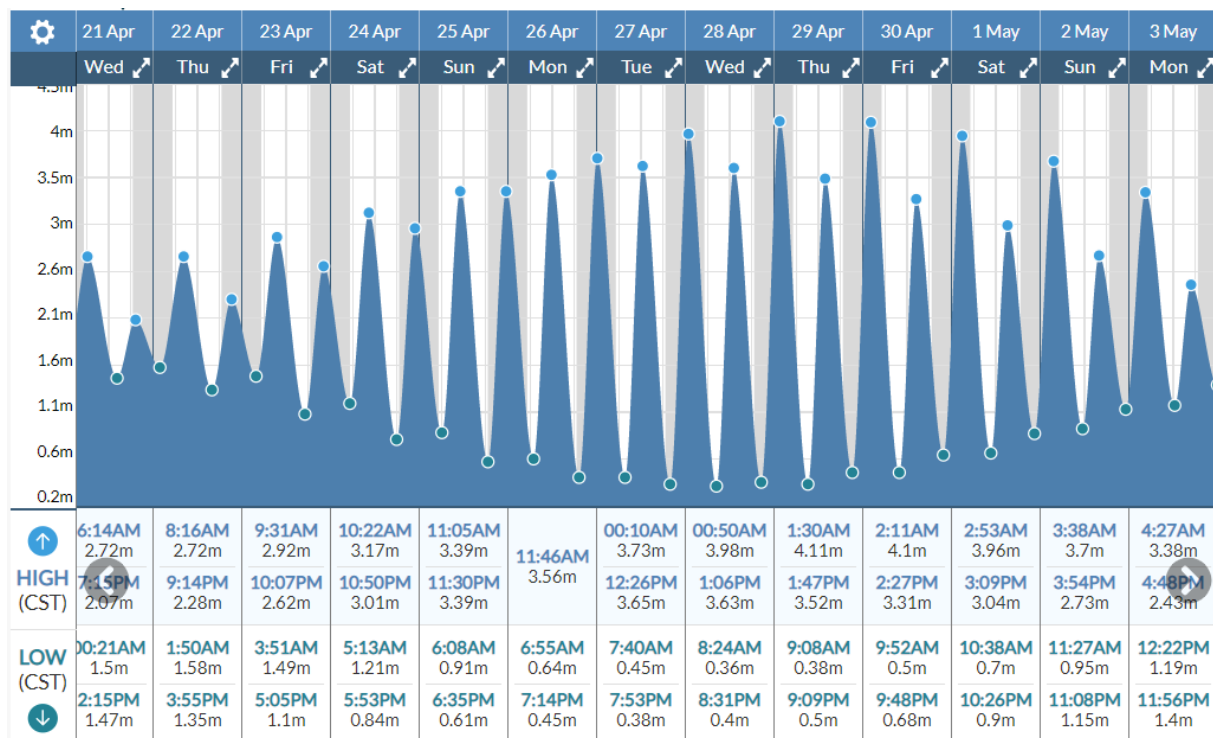
Attachment 2: Deviation Table



Attachment 3: Speed Polar Diagram



Attachment 4: Tide times for Changjiang Approaches (Luhuadao) UTC+8



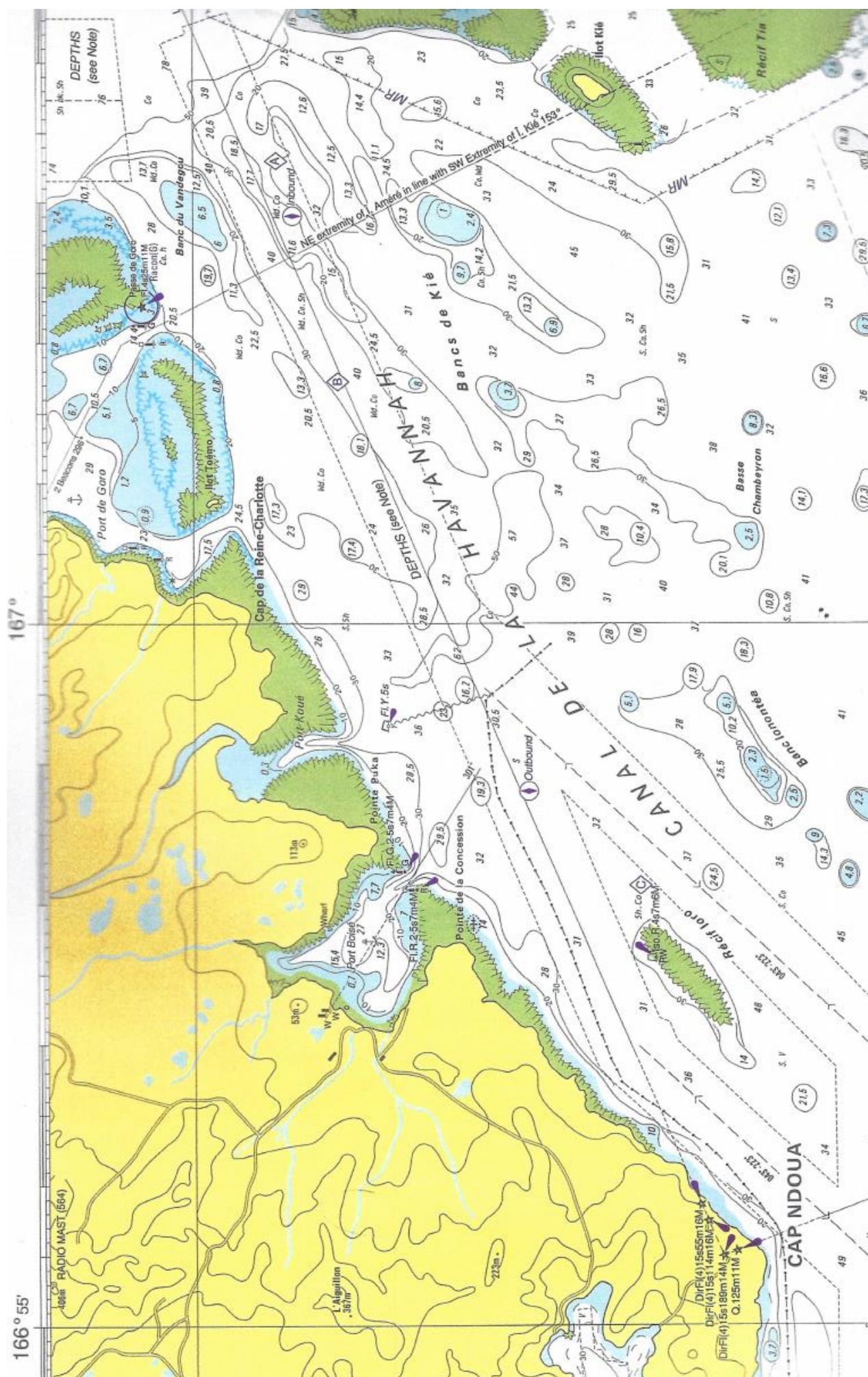
Attachment 5

Extract of the Chart for New Caledonia showing tidal diamond information

Tidal Streams referred to HW at CHANGJIANG APPROACHES (LUHUADAO)													
Geographical Position		22°20'17 S 167°03'1 E		22°21'11 S 167°01'5 E		22°23'0 S 166°58'1 E		22°24'4 S 166°51'2 E		22°28'1 S 167°05'1 E		22°29'1 S 166°58'9 E	
Hours	Geographical Position	22°20'17 S 167°03'1 E		22°21'11 S 167°01'5 E		22°23'0 S 166°58'1 E		22°24'4 S 166°51'2 E		22°28'1 S 167°05'1 E		22°29'1 S 166°58'9 E	
Before High Water	Directions of streams (degrees)	210	3-4 1-7	200	0-7 0-3	220	0-6 0-3	321	0-0 0-0	321	0-3 0-1	231	0-9 0-5
High Water	Rates at spring tides (knots)	210	4-4 2-3	200	1-4 0-7	230	0-9 0-5	321	0-1 0-1	297	0-3 0-1	250	0-6 0-3
After High Water	Rates at neap tides (knots)	210	4-4 2-3	206	1-7 0-9	235	0-8 0-4	312	0-3 0-1	278	0-4 0-2	250	0-5 0-3
Directions of streams (degrees)		215	3-6 1-8	204	1-8 0-9	230	0-3 0-1	300	0-3 0-1	262	0-6 0-3	241	0-4 0-2
Rates at spring tides (knots)		235	1-8 0-9	204	1-4 0-7	080	0-1 0-0	284	0-3 0-1	232	0-8 0-4	171	0-4 0-2
Rates at neap tides (knots)		260	0-8 0-4	210	0-4 0-2	045	0-4 0-2	259	0-1 0-1	222	0-8 0-4	205	1-0 0-5
Before High Water	Directions of streams (degrees)	030	1-3 0-6	007	0-8 0-4	040	0-6 0-3	000	0-0 0-0	214	0-4 0-2	072	0-5 0-3
High Water	Rates at spring tides (knots)	040	3-2 1-6	028	1-4 0-7	035	0-6 0-3	000	0-0 0-0	030	0-1 0-1	074	0-5 0-3
After High Water	Rates at neap tides (knots)	040	4-7 2-4	029	2-0 1-0	035	0-6 0-3	130	0-1 0-1	017	0-4 0-2	087	0-6 0-3
Directions of streams (degrees)		035	4-7 2-4	027	1-8 0-9	055	0-3 0-1	115	0-3 0-1	024	0-5 0-3	101	0-6 0-3
Rates at spring tides (knots)		030	3-5 1-8	029	1-3 0-6	090	0-1 0-0	108	0-3 0-1	022	0-4 0-2	126	0-4 0-2
Rates at neap tides (knots)		020	0-6 0-3	027	0-7 0-3	200	0-1 0-0	123	0-1 0-0	000	0-2 0-1	190	0-3 0-1
Before High Water	Directions of streams (degrees)	210	1-5 0-8	000	0-0 0-0	220	0-5 0-3	000	0-0 0-0	331	0-3 0-1	220	0-7 0-4
High Water	Rates at spring tides (knots)												
After High Water	Rates at neap tides (knots)												

Attachment 6

Extract of the Chart for New Caledonia showing the Canal de la Havannah
Shown overleaf



Attachment 7: Extract from the Gnomonic Chart for the South Pacific Ocean

