

## **M5/M24 NAVIGATION EXERCISES AUS 252**

### **NAME:**

Use chart [Aus 252](#) extract. Use the [deviation card](#) at end of this paper.

### **EXERCISE NO. 1            CHART INFORMATION**

Select Chart Aus252 and answer the following.

- 1** Find the extent of latitude and longitude
  
- 2** Give the Chart number and title
  
- 3** Find the last small correction
  
- 4** Give date of publication
  
- 5** Give measurement of soundings (metric or imperial)
  
- 6** See how many symbols you can identify using Chart Aus252.
  
- 7** What tidal information is given?
  
- 8** What warnings are given?
  
- 9** What is the latest magnetic variation?
  
- 10** What is the scale and projection?

**EXERCISE NO.2**

**CHART SYMBOLS**

**1 Draw Chart symbols for the following:-**

(a) Steep Coastline

(b) Disused submarine pipeline

(c) A rock which dries to 1.6 metres

(d) An easterly current of 2 knots

(e) Sand dunes

(f) Triangulation point

(g) South cardinal buoy

(h) Dangerous wreck

(i) Direction of buoyage

(j) A flood tide of 1.5 knots

(k) Eddies, tide rips and overfalls

(l) A submarine power cable

(m) A rock awash at chart datum

(n) A isolated danger beacon

**2 Draw chart symbols for the following**

(a) Shore breakers

(b) Designated anchorage B

(c) Prohibited anchorage

(d) Clifly coast

(e) An oil pipeline

(f) An airfield

(g) A quarantine anchorage

(h) Starboard special purpose buoy

(i) Hillocks transponder beacon

(j) X band radar (racon), morse R

(k) Underwater rock with less than 2 metres of water over it.

(l) Reef which covers and uncovers

**3 Give meanings of the following**

(a) ED

(b) MHWS

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(c) Wk

(d) Q(3)10s20m6M

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(e) (Oc)

(f) PA

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(g) WRG

(h) Dr

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(i) IQ

(j) Oc(2)6s10M

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(k) Iso.Bu.10s

(l) Rep

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(m) LAT

(n) Pk

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(o) fS

(p) soM

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(q) bkSh

(r) Wd

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**4** What does AUS 252 in the upper right margin of a chart signify?

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**5** How can you find out whether a chart has been corrected up to date?

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**6** How might soundings from an older survey be recognised on a chart?

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**7** What are the problems associated with using a gently sloping coastline when observing ranges and bearings?

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**8** Define Latitude and Longitude

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**9** Name 2 ways of giving your position on the earth's surface.

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**10** How are bearings and courses depicted on a Mercator Chart?

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**11** How do you measure distance on a Mercator Chart?

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**12** What are contained in the Admiralty Notices to Mariners?

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**13** Describe what is usually included under the Title or Legend of a Chart?

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**14** What should you check when using a coastal chart?

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**15** What should you take into account when laying off courses?

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**16** How should you keep a ship's log and what entries for navigation should be entered?

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**17** When navigating between Islands, what should you watch out for?

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**EXERCISE NO.3****COMPASS ERROR**

Use the deviation card provided at the end of this Section.

**1** From the Compass Rose you read:

Mag. Var.  $6^{\circ}50'E$  (1972), Increasing about 3.5' annually.

What is the variation for 1992?

<b>T</b>	<b>V</b>	<b>M</b>	<b>D</b>	<b>C</b>	<b>Error</b>

**2** True Course  $280^{\circ}$ , Variation  $11^{\circ}E$ .

What is the Compass Course?

<b>T</b>	<b>V</b>	<b>M</b>	<b>D</b>	<b>C</b>	<b>Error</b>

**3** Compass Course is  $150^{\circ}$ , Variation  $9^{\circ}E$ .

What is the True Course?

<b>T</b>	<b>V</b>	<b>M</b>	<b>D</b>	<b>C</b>	<b>Error</b>

**4** Steering  $030^{\circ}(C)$ , Coppersmith Rock bears  $357^{\circ}(C)$   
Variation  $9^{\circ}E$ .

What is the True Bearing of Coppersmith Rock?

<b>T</b>	<b>V</b>	<b>M</b>	<b>D</b>	<b>C</b>	<b>Error</b>

**5** Steering  $260^{\circ}(C)$ , Breaksea Light Vessel bears  $032^{\circ}$  Relative.  
What is the True Bearing of Breaksea Light Vessel? Variation  $10^{\circ}E$ .

<b>T</b>	<b>V</b>	<b>M</b>	<b>D</b>	<b>C</b>	<b>Error</b>

**6** On the chart you read: "Leading Lights  $317^{\circ}00''$ "  
You enter port with these leads in line and right ahead, steering  $311^{\circ}(C)$   
Variation is  $8^{\circ}E$ ., What is the Deviation?

<b>T</b>	<b>V</b>	<b>M</b>	<b>D</b>	<b>C</b>	<b>Error</b>

7 From the compass rose you read:

Mag.Var.  $7^{\circ}45'E$  (1972), Increasing about  $4'$  annually.

What variation would you use today?

<b>T</b>	<b>V</b>	<b>M</b>	<b>D</b>	<b>C</b>	<b>Error</b>

8 True course is  $172^{\circ}$ , variation  $12^{\circ}W$ .

What is the compass course?

<b>T</b>	<b>V</b>	<b>M</b>	<b>D</b>	<b>C</b>	<b>Error</b>

9 Compass course is  $265^{\circ}$ , variation  $9^{\circ}E$ .

What is the true course?

<b>T</b>	<b>V</b>	<b>M</b>	<b>D</b>	<b>C</b>	<b>Error</b>

**10** When steering  $070^{\circ}(C)$ , Round Hill Head is bearing  $270^{\circ}(C)$ .

Variation is  $11^{\circ}E$ .

What is the true bearing of Round Hill Head?

<b>T</b>	<b>V</b>	<b>M</b>	<b>D</b>	<b>C</b>	<b>Error</b>

**11** You are steering  $290^{\circ}(C)$  with Lady Elliot abeam to port.

Variation is  $11^{\circ}E$ .

What is the true bearing of Lady Elliot?

<b>T</b>	<b>V</b>	<b>M</b>	<b>D</b>	<b>C</b>	<b>Error</b>

**12** On the chart you read "Lights in Line  $074^{\circ}$ ".

By your compass the bearing of the lights when they are in transit is  $067^{\circ}$ . Variation is  $12^{\circ}E$ . What is the deviation?

<b>T</b>	<b>V</b>	<b>M</b>	<b>D</b>	<b>C</b>	<b>Error</b>

**EXERCISE NO.4**

**POSITION FINDING**

Unless otherwise stated all positions are to be given in Lat. and Long.

**1** Steering  $130^{\circ}(C)$  Hook Pk (1478) bears  $248^{\circ}(C)$  Right hand end of Border Is. bears  $199^{\circ}(C)$  Petrel Is. bears  $150^{\circ}(C)$

What is your position?

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**2** By radar range the nearest points of Mansell Is. and Jesuit Point are both 4.8 miles. Nicholson Is. is 7.0 miles.

What is your position?

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**3** By radar the relative bearing of Surprise rock is  $017^{\circ}$  and the range 3.2 miles. Your course is  $265^{\circ}(C)$ .

What is your position?

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**4** The bearing of Esk Is. is  $247^{\circ}(G)$ . Gyro error is  $2^{\circ}(H)$ . The corrected sounding is 20 fathoms.

What is your position?

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**5** You are heading  $335^{\circ}(C)$  at an estimated speed of 10.0 knots

At 1730 hrs Double Cone Is. Peak bears  $285^{\circ}(C)$ .

At 1748 hrs it bears  $243^{\circ}(C)$ .

What is your position at 1748 hours?

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**6** You are steering  $325^{\circ}(C)$  at 6.0 knots.

At 0206 Dent Is. Lt bears  $030^{\circ}(R)$

At 0218 it bears  $060^{\circ}(R)$ .

What is your position at 0218 (bearing and distance from Dent Is. Lt)?

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**7** Your compass is damaged. At 0600 Petrel Is. is in transit with Whitsunday Peak when the radar range of Petrel Is. is 3.1 miles.

What is your 0600 position?

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**8** The end of land at Jesuit Point is in transit with Pentecost Is. (949) bearing  $284^{\circ}(C)$ . At the same time Shaw Peak 1339 bears  $229^{\circ}(C)$  and Mansell Is. (630) bears  $189^{\circ}(C)$ .

What is your position?

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**9** What are the causes of a “cocked hat” and how may they be overcome?

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**10** Give your position in Lat. and Long, if the bearing of Whitsunday Peak is  $140^{\circ}C$  and the sextant angle  $2^{\circ} 19'$  no index error.

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**11** What should be looked for in selecting objects for observation in Bearings?

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**EXERCISE NO.5**

**SET, RATE & DRIFT**

Requires full chart AUS252 available from your chart agent.

**1** You depart the Elliott River entrance at 0900, steering 070°(T) at 6.0 knots. If the tide is flooding as charted, what is your estimated position at 1200?

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**2** From a position 2.0 mls South of Lady Elliott I. light at 0600, you set course direct to South Head. Your speed is 11.0 knots.

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At 0900 South Head lighthouse bears 172°(T), range 10.2 mls.

What set and drift have you experienced?

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**3** At 0300 you are 2.0 mls East of Bustard Head light. You wish to set course directly for Lady Musgrave I. Your speed is 9 knots.

What course should you steer to counteract a tide setting  $130^\circ$  at 2.5 knots?

When will you arrive 1.0 mile off Lady Musgrave I.?

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**4** You are steering  $150^\circ(\text{C})$  at 8.0 knots

At 1000	Shaw Peak $\Delta$ 1339	bears $265^\circ(\text{C})$
	Silversmith I. $\Delta$	bears $219^\circ(\text{C})$
	Linne I. $\Delta$ 932	bears $185^\circ(\text{C})$

At 1100	Linne I. $\Delta$ 932	bears $237^\circ(\text{C})$
	Skiddaw Pd. $\Delta$	129 bears $177^\circ(\text{C})$
	Cockermouth I. $\Delta$	670 bears $138^\circ(\text{C})$

What is the set and drift?

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**5** At 0600 Red Cliff I. (130) bears  $260^{\circ}(C)$  Radar range 1.3 mls.

Course  $043^{\circ}(C)$ , Speed 4.5 knots

At 0800 Allonby I. (198) bears  $076^{\circ}(C)$  Radar range 3.8 mls.

What is the set and drift?

What is the rate of the tidal stream?

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**6** At 0230 a fix is obtained 0.5 mls true south of Coppersmith Rock.

You steer  $285^{\circ}(C)$  at 5.0 knots until 0400.

The tide has set  $155^{\circ}(T)$  at 1.2 knots throughout.

What is your 0400 E.P.?

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**7** At 0418 the north end of N. Repulse I. is in transit with Cape Conway, whilst S. Repulse  $\Delta$  217 bears  $114^\circ(\text{G})$ .

The Gyro has an error of  $2^\circ(\text{L})$ .

You steer  $143^\circ(\text{T})$  at 1.0 knot throughout.

What is your 0600 E.P.?

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**8** Your 1300 position is 1.0 mile true east of Devereaux Rock.

You wish to pass Coppersmith Rock 1.5 mls off your port side.

Your speed is 7.0 knots. The tide is expected to set  $075^\circ(\text{T})$  at 1.8 knots throughout.

What is the compass course to steer to counteract the tide?

What is your E.T.A. at a position with Coppersmith Rock on your port beam?

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**9** You are at anchor at 0700 with Croaker Rock in transit with Stewart Peninsular  $\Delta$  417 bearing  $282^\circ(\text{C})$ . At the same time Rabbit I. (365) bears  $197^\circ(\text{C})$ .

If your ship's speed will be 6.0 knots, what is the compass course to steer to reach a position 3.0 mls true north of Gould I. when the tide is setting  $125^\circ(\text{T})$  at 2.0 knots?

How long will the trip take?

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**10** At 1230 Cockermouth I.  $\Delta$  670 bears  $343^\circ(\text{C})$

Devereaux Rock bears  $286^\circ(\text{C})$

You are steering  $240^\circ(\text{C})$  at 6.7 knots.

At 1348 Singapore Rock bears  $094^\circ(\text{C})$ , range 3.0 mls

What is the set and drift?

At 1348 you decide to increase speed to 8.0 knots and head for a position 1.0 mile true west of Allonby I.  $\Delta$

What is the compass course to steer to counteract the current you discovered above?

If a south-westerly wind is expected to cause 5 leeway, what course would you steer by compass?

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1. What are the times and heights of high and low waters at Fremantle on November 22nd 1996?

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2. What are the times and heights of afternoon high and low water at Darwin on June 3rd 1996?

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3. What are the times and heights of high waters at Gladstone on September 12th 1996?

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4. What is the earliest time and height of high water at Newcastle on April 3rd 1996?

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**Secondary Ports.** (requires a secondary ports form)

**5** You require to find the times and heights of high and low water at Heron Island for the 10th July 1966.

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**6** You require to find the times and heights of high and low water at Launceston for 21st January 1966.

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**7.** You require to find the times and heights of high and low water at Adele Island for the morning of the 10th March 1966

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**8** You require an under keel clearance of 0.5 metre and your draught is 2.25 metres. What height of tide is required to safely clear a charted sand bar which dries 1.2 metres.

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**9** You require an underwater clearance of 0.7 metres. The tidal height is 3.2 metres. What is the maximum draft you may have to clear a bar which dries to 1.1 metres.

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**10** The tidal height is 4.8 metres and your draught is 2.1 metres. If you require a minimum under water clearance of 0.8 metre, what is the maximum drying height you can safely steam across?

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**EXERCISE NO.7**

**WHEELHOUSE EQUIPMENT**

**1** Why are Radar ranges preferred to Radar bearings?

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**2** How would you recognise a Racon on a Radar Screen?

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**3** What effect can the tide have on different types of coast line in relation to taking ranges from the RADAR?

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**4** What should be taken into account when comparing chart soundings with those shown on the echo sounder?

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**5** Is a D.O.P. value 8, a good or bad satellite arrangement?

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**6** Describe the following errors associated with the G.P.S.

a. Dilution of Precision

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b. Environmental Errors

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c. Spheroidal Errors

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**7** Where can corrections to Satellite-Derived Positions be found?

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**8** Explain 5 capabilities plotters can be used for in navigation.

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**9** What errors should you be aware of when using a plotter?

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**10** What is Waypoint Navigation?

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**11** When working with electronic aids to navigation, it is suggested a written log book be kept.

Design a log book sheet to cover the aids in a present / or last vessel.

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**DEVIATION CARD 3 NAVIGATION**

<b>Ship's Head by Compass</b>	<b>Deviation</b>	<b>Ship's Head by Compass</b>	<b>Deviation</b>
000 <sup>0</sup>	3½ <sup>0</sup> E	180 <sup>0</sup>	2½ <sup>0</sup> W
010 <sup>0</sup>	4 <sup>0</sup> E	190 <sup>0</sup>	4 <sup>0</sup> W
020 <sup>0</sup>	4½ <sup>0</sup> E	200 <sup>0</sup>	5 <sup>0</sup> W
030 <sup>0</sup>	5 <sup>0</sup> E	210 <sup>0</sup>	5½ <sup>0</sup> W
040 <sup>0</sup>	5 <sup>0</sup> E	220 <sup>0</sup>	6½ <sup>0</sup> W
050 <sup>0</sup>	5 <sup>0</sup> E	230 <sup>0</sup>	6½ <sup>0</sup> W
060 <sup>0</sup>	5½ <sup>0</sup> E	240 <sup>0</sup>	7 <sup>0</sup> W
070 <sup>0</sup>	5½ <sup>0</sup> E	250 <sup>0</sup>	6½ <sup>0</sup> W
080 <sup>0</sup>	5 <sup>0</sup> E	260 <sup>0</sup>	6½ <sup>0</sup> W
090 <sup>0</sup>	5 <sup>0</sup> E	270 <sup>0</sup>	5½ <sup>0</sup> W
100 <sup>0</sup>	4½ <sup>0</sup> E	280 <sup>0</sup>	4½ <sup>0</sup> W
110 <sup>0</sup>	4 <sup>0</sup> E	290 <sup>0</sup>	3½ <sup>0</sup> W
120 <sup>0</sup>	3½ <sup>0</sup> E	300 <sup>0</sup>	2½ <sup>0</sup> W
130 <sup>0</sup>	3 <sup>0</sup> E	310 <sup>0</sup>	1½ <sup>0</sup> W
140 <sup>0</sup>	2 <sup>0</sup> E	320 <sup>0</sup>	½ <sup>0</sup> W
150 <sup>0</sup>	1 <sup>0</sup> E	330 <sup>0</sup>	½ <sup>0</sup> E
160 <sup>0</sup>	½ <sup>0</sup> W	340 <sup>0</sup>	1½ <sup>0</sup> E
170 <sup>0</sup>	1½ <sup>0</sup> W	350 <sup>0</sup>	2½ <sup>0</sup> E
180 <sup>0</sup>	2½ <sup>0</sup> W	000 <sup>0</sup>	3½ <sup>0</sup> E