

QUÉBEC (LAUZON)						2016						TIDE TABLES					
July-juillet						August-août						September-septembre					
Day	Time	Metres	jour	heure	mètres	Day	Time	Metres	jour	heure	mètres	Day	Time	Metres	jour	heure	mètres
1	0300	5.1	16	0339	4.4	1	0445	5.3	16	0439	4.8	1	0124	0.3	16	0054	0.2
	1103	0.2		1124	0.4		1251	0.2		1236	0.2		0609	5.2		0533	5.3
COURANT DES MARÉES MOYENNES / TIDAL STREAMS, MEAN TIDES																	
Basé sur PM (Québec)/Referred to HW (Québec)									Basé sur PM (Pte-au-Père)/Referred to HW (Pte-au-Père)								
Heures	A	47°14.6' N 070°32.7' W		B	47°24.4' N 070°27.3' W		C	47°26.1' N 070°24.1' W		D	47°28.4' N 070°13.5' W		E	47°27.2' N 070°10.8' W		Hours	
-6		212°	2.4 kn	202°	3.4 kn	240°	1.7 kn	052°	3.0 kn	035°	2.8 kn	-6					
-5		210°	2.6 kn	202°	3.7 kn	251°	2.9 kn	052°	3.1 kn	030°	2.4 kn	-5					
-4		218°	1.8 kn	202°	3.8 kn	246°	3.6 kn	052°	2.6 kn	034°	1.8 kn	-4					
-3		230°	1.3 kn	202°	2.5 kn	246°	2.8 kn	043°	1.7 kn	050°	1.6 kn	-3					
-2		240°	0.3 kn	180°	0.8 kn	230°	1.3 kn	variable	0.7 kn	variable	0.7 kn	-2					
-1		022°	1.0 kn	024°	1.7 kn	variable	1.0 kn	240°	1.4 kn	215°	1.2 kn	-1					
PM		020°	1.0 kn	040°	1.2 kn	075°	1.2 kn	230°	2.5 kn	212°	1.7 kn	HW					
+1		022°	1.8 kn	028°	3.7 kn	076°	3.0 kn	230°	2.5 kn	223°	1.7 kn	+1					
+2		030°	2.0 kn	020°	4.7 kn	070°	3.2 kn	233°	1.7 kn	225°	1.5 kn	+2					
+3		015°	1.7 kn	018°	4.0 kn	083°	4.3 kn	260°	0.8 kn	224°	0.6 kn	+3					
+4		340°	1.0 lkn	013°	3.2 lkn	082°	3.8 lkn	021°	1.0 lkn	030°	1.0 lkn	+4					
+5		320°	0.6 kn	013°	2.2 kn	084°	2.4 kn	040°	1.8 kn	025°	2.1 kn	+5					
+6		255°	-	340°	0.8 kn	085°	1.1 kn	-	-	-	-	+6					
7	0318	0.3	22	0300	0.2	7	0421	0.3	22	0418	0.1	7	0506	0.3	22	0539	0.2
	0757	5.5		0736	5.4		0857	5.0		0842	5.3		0942	4.3		1006	4.6
TH	1606	0.2	FR	1542	0.2	SU	1648	0.2	MO	1642	0.1	WE	1709	0.3	TH	1742	0.3
JE	2033	4.7	VE	2006	4.7	DI	2124	4.7	LU	2109	5.2	ME	2203	4.5	JE	2233	5.1
8	0400	0.3	23	0342	0.2	8	0500	0.3	23	0503	0.2	8	0539	0.5	23	0636	0.3
	0842	5.4		0815	5.4		0939	4.6		0930	5.0		1027	4.1		1115	4.3
FR	1645	0.2	SA	1621	0.2	MO	1721	0.2	TU	1724	0.1	TH	1739	0.5	FR	1836	0.4
VE	2118	4.7	SA	2048	4.9	LU	2203	4.5	MA	2200	5.1	JE	2248	4.3	VE	2339	4.8

Fig. 26 Tide and Current Table for 5.9.

### 6.1 Determining course to steer and SMG:

Plot your 10:00 GPS fix at  $xx^{\circ} 25.0' N, xxx^{\circ} xx.0' W$ . From this fix, you want to follow a course to make good of  $190^{\circ} T$ . Your boat speed is  $S = 7 \text{ kn}$ , in a current whose  $\text{Set} = 130^{\circ} T$  and  $\text{Drift} = 3.0 \text{ kn}$ . Determine the **course to steer** and **Speed Made Good** of your boat. (Fig. 25)

- Course to steer:      a)  $C = 212^{\circ} T$   
                               b)  $\text{SMG} = 8 \text{ kn}$

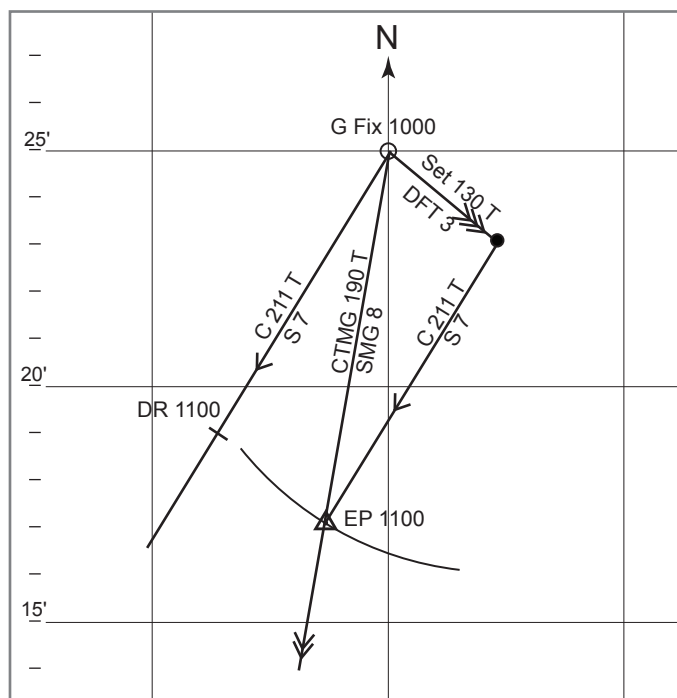


Fig. 27 Answer to 6.1

### 6.2 Determining Set, Drift, CMG, SMG:

At 18:00, from a fix at 48° 58.0' N, 123° 22.0' W, you proceed with a boat heading of 300° T. Your speed is reduced to S=4 kn. Using the nearest ebb current on the chart, calculate your SMG and your CMG. (Fig. 28)

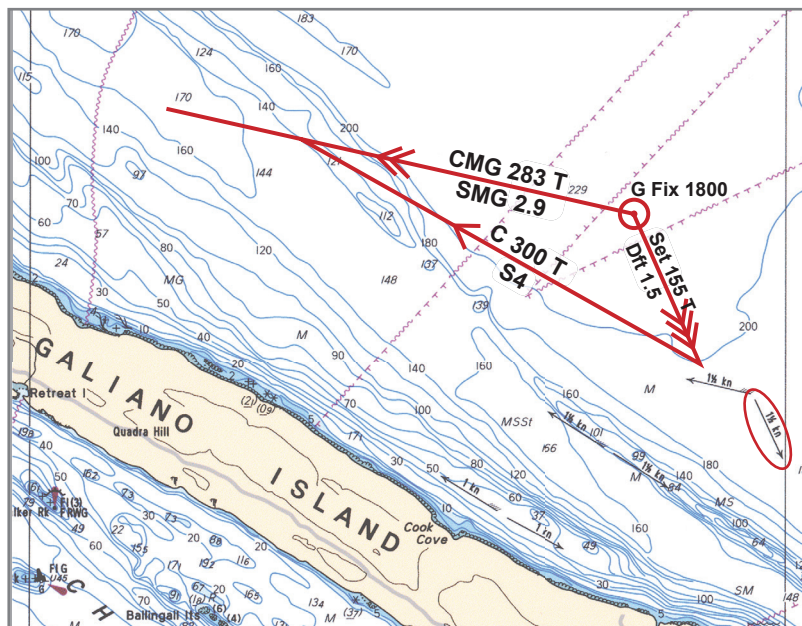


Fig. 28 Answer to 6.2

### 6.3 Compass rose indications: Magnetic variation in 2016?

- a) 009° W 1998 (11' W) (On a chart for the East coast)
- b) 012° E 1998 (09' W) (On a chart for the West coast)

Magnetic variation in 2016?

$$\begin{aligned} \text{a) } 009^\circ \text{ W} + (11' \text{ W} \times 18 \text{ years}) &= 009^\circ \text{ W} + 198' \text{ W} \\ &\approx 009^\circ \text{ W} + 3^\circ \text{ W} = \mathbf{012^\circ \text{ W}} \end{aligned}$$

$$\begin{aligned} \text{b) } 012^\circ \text{ E} + (09' \text{ W} \times 18 \text{ years}) &= 012^\circ \text{ E} - 162' \text{ W} \\ &\approx 012^\circ \text{ E} - 3^\circ \text{ W} = \mathbf{009^\circ \text{ E}} \end{aligned}$$

### 6.4 Maximum current in False Narrows, mid-day, June 10, 2016?

- a) Reference station: Dodd Narrows (Appendix 9, p. 109; Appendix 11, p. 111; and Appendix 14, p. 114)
- b) Time: at Dodd Narrows,  $10:39 + 1:00 = 11:39$  (Appendix 11, p. 111);  
at False Narrows,  $11:39 - 0:35 = \mathbf{11:04}$  (Appendix 14, p. 114)
- c) Speed: At Dodd Narrows, - 5.0 kn; at False Narrows,  $55\% \times 5.0 = - \mathbf{2.8 \text{ kn}}$   
(Appendix 11, p. 111 and Appendix 14, p. 114)
- d) Direction: Ebb, at False Narrows,  $295^\circ \text{ T} - 180^\circ = \mathbf{115^\circ}$   
(Appendix 14, p. 114, column 3)

### 6.5 Current in the St. Lawrence River

Current in the mouth of the St. Lawrence River at  $47^\circ 14.6' \text{ N} - 070^\circ 32.7' \text{ W}$  on July 30, 2016 at high tide in the afternoon? (Appendix 13, p. 113)

- a) Reference station? **Québec**
- b) Time of highest tide?  $15:30 + 01:00 = \mathbf{16:30}$
- c) Direction and speed of current at high tide (High Water)?  **$020^\circ \text{ T}$ ;  $1 \text{ kn}$**  (“Tidal Streams” inset table)

### 6.6 Leeway

While sailing towards  $030^\circ \text{ C}$ , and trying to remain right on the leading line which guides you into the harbour, you notice that the wind from the NW is resulting in a leeway of  $5^\circ$ . Towards which new compass heading would you turn your boat in order to offset this leeway?

The wind comes from the **port** side. Turn to port to  **$025^\circ \text{ C}$**

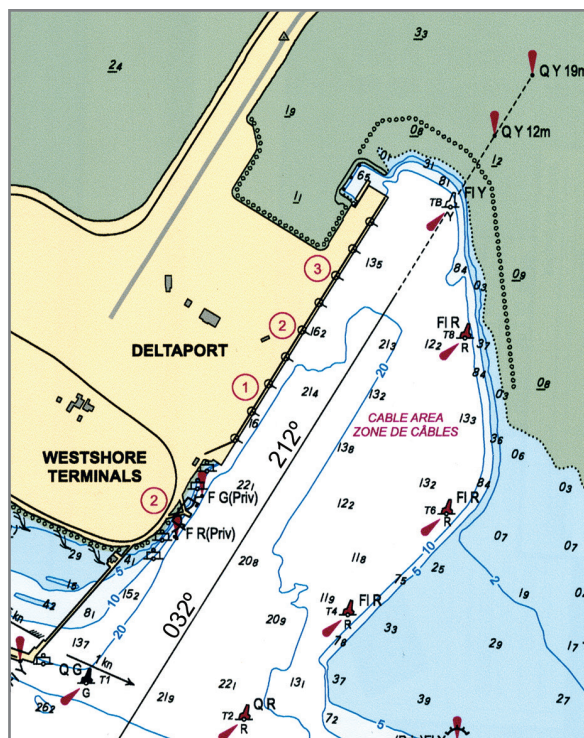


Fig. 29 Chart for 6.7

### 6.7 Checking the compass

Entering Deltaport on *Myboat*, and carefully following the leading line (Fig. 29) you decide to verify your compass deviation table (Fig. 30). There is no wind or current, and you are carefully following the leading line. FOR THIS EXERCISE ONLY, the local magnetic variation is  $10^\circ \text{ W}$ . Your boat compass reads  $045^\circ$ . FOR THIS EXERCISE ONLY, use the compass deviation table (Fig. 30).

- a) What is the compass deviation in this direction?

T	V	M	D	C
$032^\circ$	$10^\circ \text{ W}$	$042^\circ$	<b><math>03^\circ \text{ W}</math></b>	$045^\circ$

Magnetic Course	Compass Deviation	Compass Course
000	3 W	003
015	2 W	017
030	1W	031
045	0	045
060	1 E	059
075	2 E	073
090	3 E	087
105	4 E	101
120	3 E	117

Fig. 30 Table for 6.7

- b) Does your measured deviation match the one from the table?  
**No** (Table shows Deviation = 0 for  $M = 042^\circ$ )
- c) What are some sources of compass error? **Magnetic masses near the boat compass (winches, portable radios, binoculars, loud speakers); local electric currents (lighting of the compass).**

### 6.8 Crossing South Georgia Strait (cruise 1a) (Fig. 31)

Plot the course from the lighthouse at the end of the “North Arm” jetty (west of Point Grey / UBC) to the Thrasher Rock light (east of the south end of Gabriola Island).

- a) True course?  **$246^\circ$  T**  
 b) Magnetic course

T	V	M	D	C
$246^\circ$	$18^\circ$ E	<b><math>228^\circ</math></b>		

- c) Compass course (use the compass deviation table in Appendix 1, p. 101.)

T	V	M	D	C
		$228^\circ$	$02^\circ$ E	<b><math>226^\circ</math></b>

- d) What is the distance between the lighthouse and the beacon? **15.4 NM**

### 6.9 Crossing South Georgia Strait (cruise 1b) (Fig. 31)

You depart the end of the North Arm jetty at 10:00, at 6 kn.

- a) What is your DR at 10:50? 50 min:  $D = 5$  NM; DR: **Lat =  $49^\circ 13.4'$  N; Long =  $123^\circ 23.9'$  W**
- b) At 10:50, you change your compass heading to  $282^\circ$  C. What is your new True course?

T	V	M	D	C
<b><math>296^\circ</math></b>	$18^\circ$ E	$278^\circ$	$4^\circ$ W	$282^\circ$

- c) What is your new DR at 11:30? 40 min = 4 NM; DR: Lat =  $49^\circ 15.1'$  N; Long =  $123^\circ 29.2'$  W

### 6.10 Crossing South Georgia Strait (cruise 1c) (Fig. 31)

At 11:30, you establish a fix from three bearings with your hand bearing compass ( $V = 18^\circ$ E):

- Cape Roger Curtis (SW of Bowen Island):  $350^\circ$  M
- The Sand Heads light at the end of the Steveston jetty:  $128^\circ$  M
- The Thrasher Rock light:  $213^\circ$  M

Assuming that the reason why you are not exactly on your DR is the effect of the current (tide). What are the set and drift of the current in this area on that day, during the latter part of the morning?

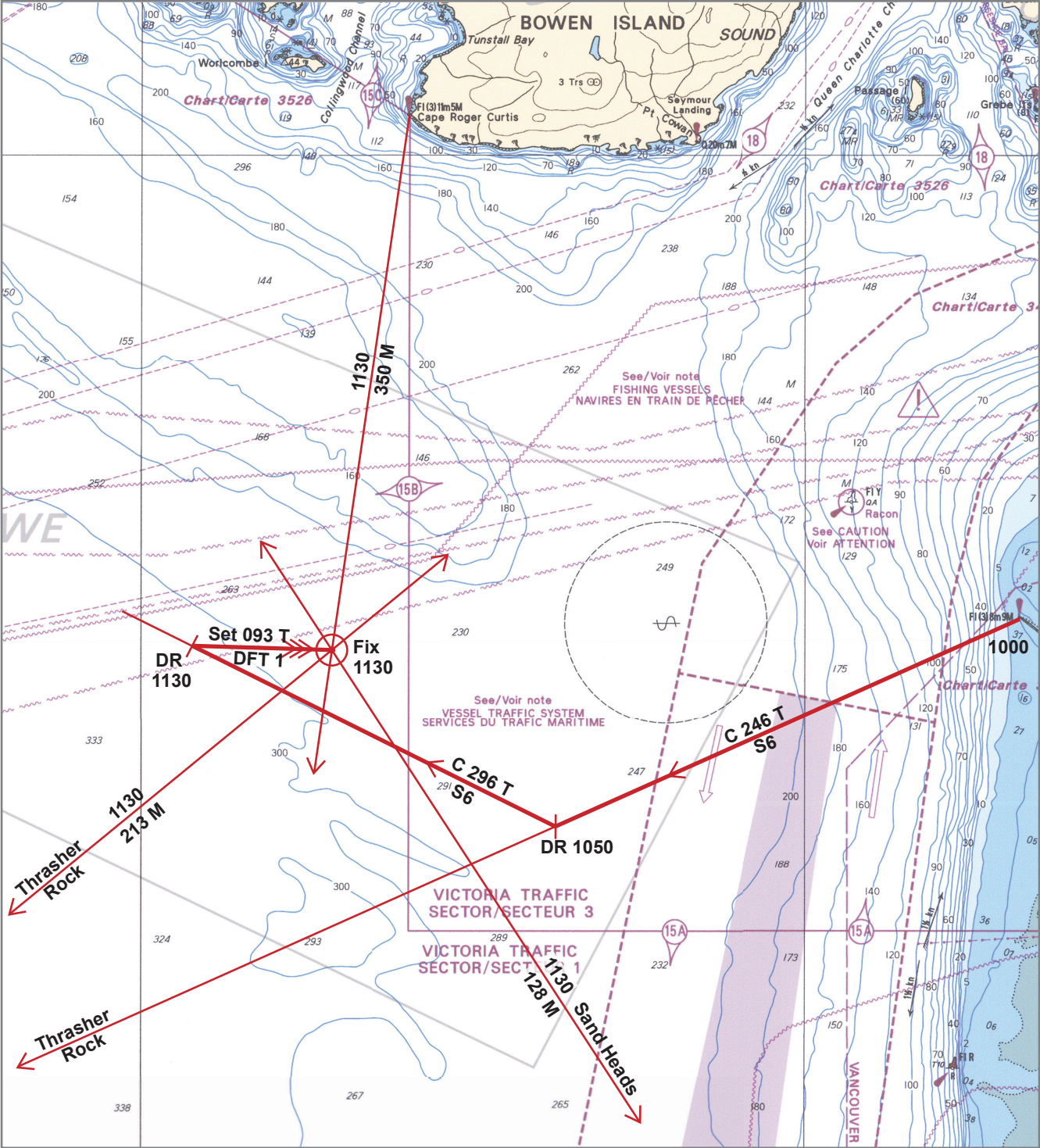


Fig. 31 Answer to 6.8, 6.9 and 6.10

Let us first convert the Magnetic bearings to True:

	T	V	M	D	C
Cape Roger Curtis	<b>008°</b>	18° E	350°		
Sand Heads light	<b>146°</b>	18° E	128°		
Thrasher Rock light	<b>231°</b>	18° E	213°		

**R Fix: Lat 49° 15.1' N; Long 123° 27.1' W**

Total duration: 1h 30 min; Displacement due to current: 1.5 NM in 90 min, measured on the chart. Current speed:

**Set: 093° T** (direction towards which the current is flowing, measured on the chart)

**Drift: (60 D) / T = (60 x 1.5 NM) / 90 = 1 kn**

### 6.11 Crossing South Georgia Strait (cruise 2a) (Fig. 32)

Another day, you plan a trip from Point Cowan light (SE Bowen Island) to Entrance Island (off the north shore of Gabriola Island). You plan for a departure at 09:00, with a speed of 5 kn, and assume no leeway. You anticipate making most of the crossing at the time of maximum flood. Using the nearest current vector (near McCall Bank, 6 NM west of Bowen Island), what are the:

- a) Distance to travel? **19.1 NM**  
 b) Course to Make Good? **247° T**  
 c) Compass course to steer?

Local current: set = 312° T; Drift = 1 kn

T	V	M	D	C
236°	18° E	218°	3 E°	<b>215°</b>

- d) Expected Speed Made Good? **5.3 kn** (measured on the chart)  
 e) Estimated Time of Arrival?  $T = (60 \times D) / S = (60 \times 19.1) / 5.3 = 216 \text{ min} = 3 \text{ h } 36 \text{ min}$   
 Arrival at 09:00 + 03: 36 = **12:36**

### 6.12 Crossing South Georgia Strait (cruise 2b) (Fig. 32)

You actually leave at 09:20, steering the planned compass course of 215° C, at the planned boat speed of 5 kn.

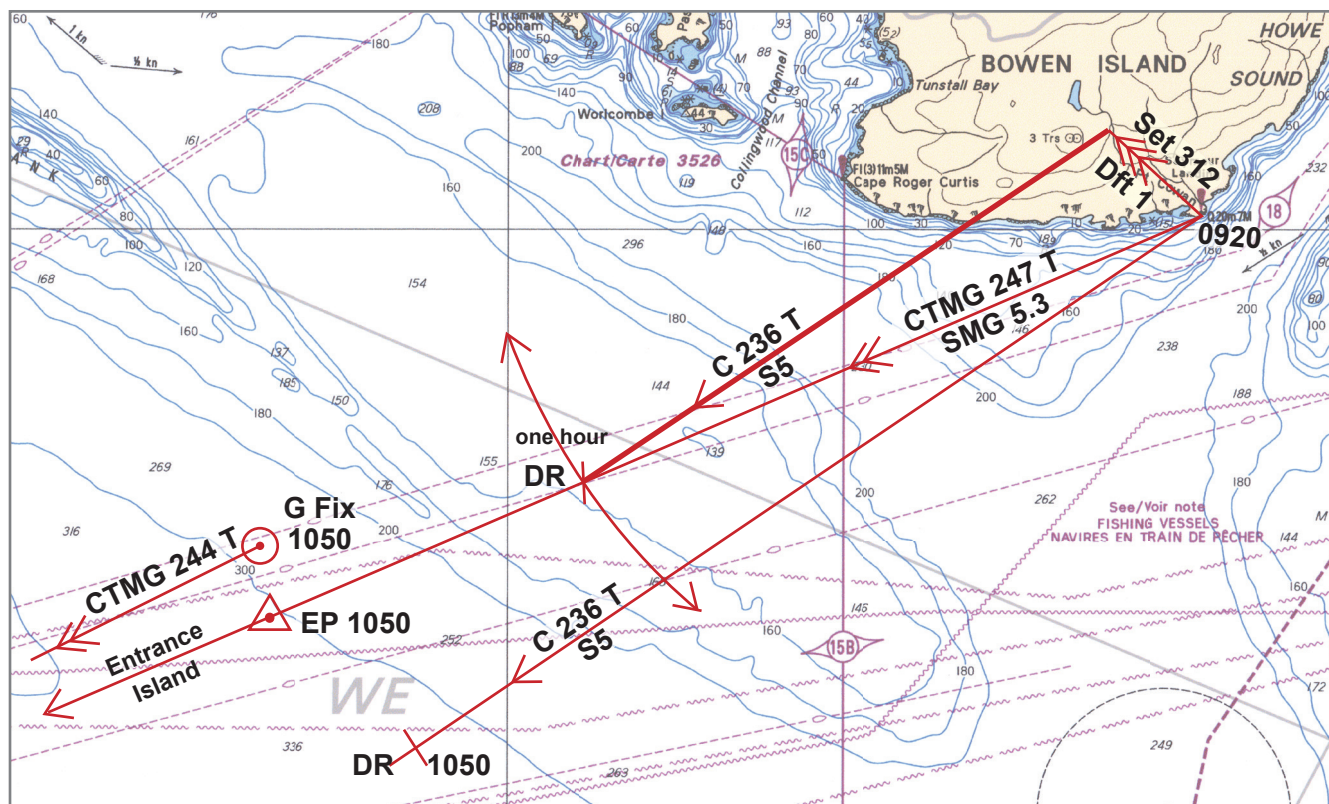


Fig. 32 Answer to 6.11, 6.12 and 6.13

a) What is your DR at 10:50?

The DR is on a line corresponding to the boat course without current:  $236^{\circ}$  T; Distanced travelled, without current: 1 h 30 min @ 5 kn = 7.5 NM.

DR: Lat =  $49^{\circ} 15.9' N$ ; Long =  $123^{\circ} 31.1' W$

b) What is your EP at 10:50?

The EP is on the Course to Make Good (route), at the ground speed. These are the GPS track and speed. Distance travelled, with current: 1 h 30 min @ 5.3 kn = 8.0 NM.

EP: Lat =  $49^{\circ} 16.9' N$ ; Long =  $123^{\circ} 32.8' W$

### 6.13 Crossing South Georgia Strait (cruise 2c) (Fig. 32)

At 10:50, your GPS gives you a fix of Lat  $49^{\circ} 17.5' N$ ; Long  $123^{\circ} 33.0' W$ . What is your Course to Make Good to Entrance Island lighthouse from your new fix?

C =  $244^{\circ}$  T

**6.14 Crossing South Georgia Strait (cruise 2d) (Fig. 33)**

From the 10:50 GPS fix, you follow the direct course to the Entrance Island lighthouse at 6 kn. We can assume that the tide is turning (i.e. no current), and that there is no leeway.

At 10:55, you take a bearing on Thrasher Rock light: 182° M

At 11:55, you take another bearing: 132° M

a) What is your position at 11:55?

	T	V	M	D	C
LOP at 10:55	200°	18° E	182°		

Advance this LOP by  $D = (S \times T) / 60 = (6 \times 60) / 60 = 6 \text{ NM}$ , in the direction travelled by the boat, 244° T.

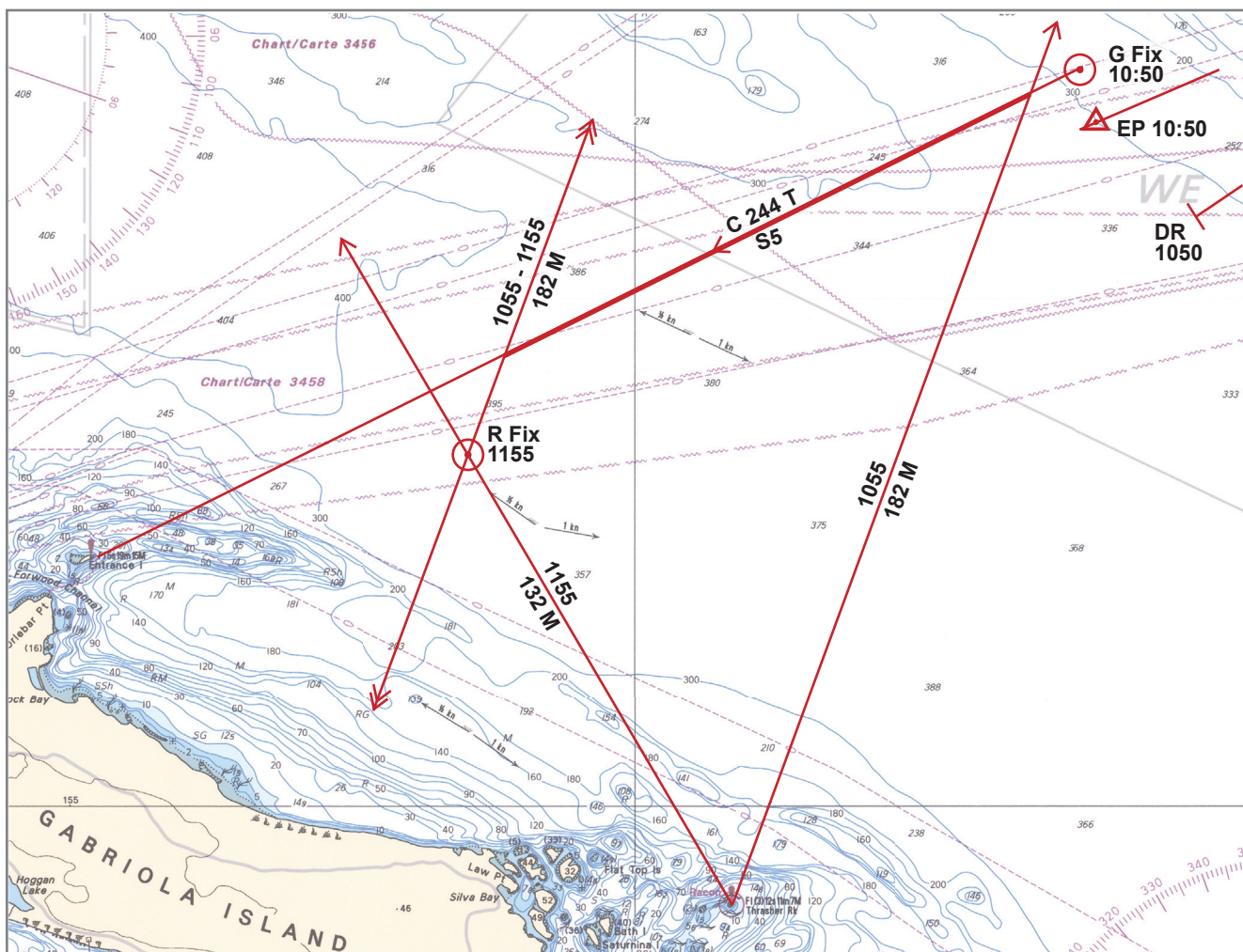


Fig. 33 Answer to 6.14



The R Fix is at the intersection of the Advanced Lop (10:55 – 11:55) and the second LOP (11:55):

	T	V	M	D	C
LOP at 11:55	<b>150°</b>	18° E	132°		

**R Fix at 11:55: Lat = 49° 13.6' N; Long = 123° 42.7' W**

b) What are some of the reasons why your fix is not always on your DR?

**Poor helming; speed not the one planned; leeway (wind); current; use of an old compass deviation table; use of wrong magnetic variation; error in the calculations.**

### 6.15 Danger bearings (Fig. 34)

A few days later, near the north end of Gabriola Island, you come in towards Nanaimo Harbour from a point NE of Snake Island and NW of Entrance Island. You aim towards the center of the narrow and deep passage south of Protection Island, just south of the small triangular landmark.

What are the two danger bearings (in degrees magnetic) which will keep you off the Snake Island rocks and its red buoy, on one side, and the 10 m depth contour line on the other side (near Gabriola Island)?

NLT 208° T (**190° M**);  
NMT 222° T (**204° M**)

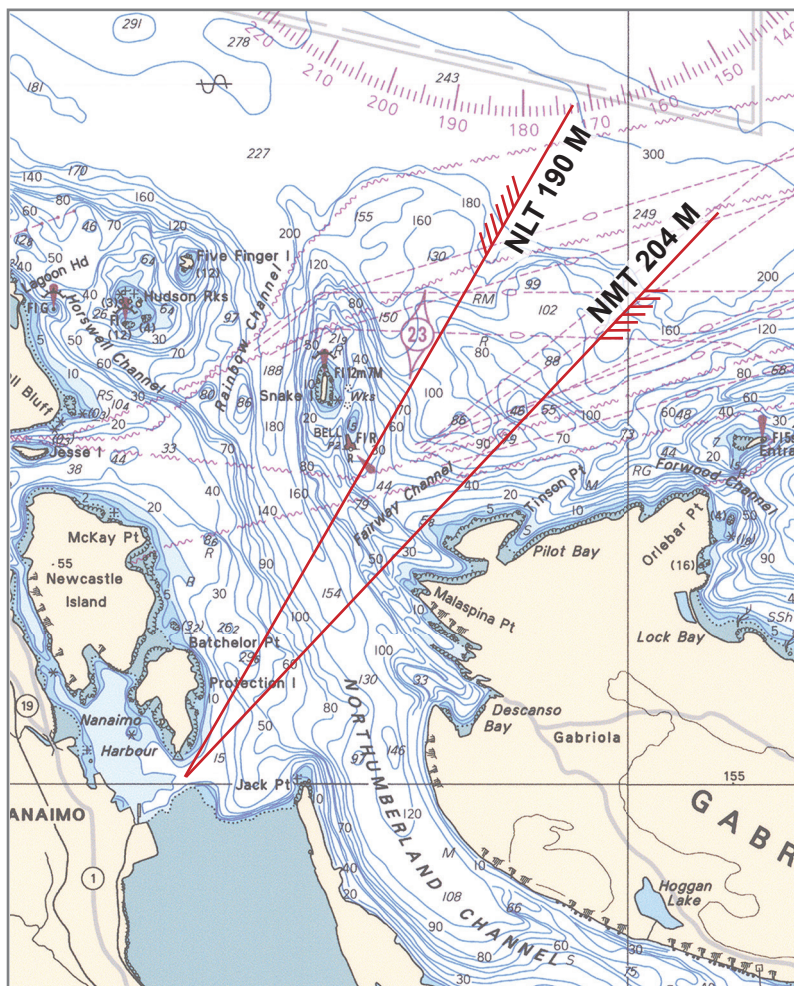


Fig. 34 Answer to 6.15

**6.16 Advanced LOP # 1** (Fig. 35)

At 10:00; sight of 202° M to the lighthouse; course 080 T at 4 kn. Advance the LOP to 11:30.

**6.17 Advanced LOP # 2** (Fig. 35)

At 12:00; sight of 242° M to the lighthouse; course 110 T at 6 kn. Advance the LOP to 13:10.

**6.18 Advanced LOP # 3** (Fig. 35)

At 16:00; sight of 302° M to the lighthouse; course 070 T at 6 kn. Advance the LOP to 16:40.

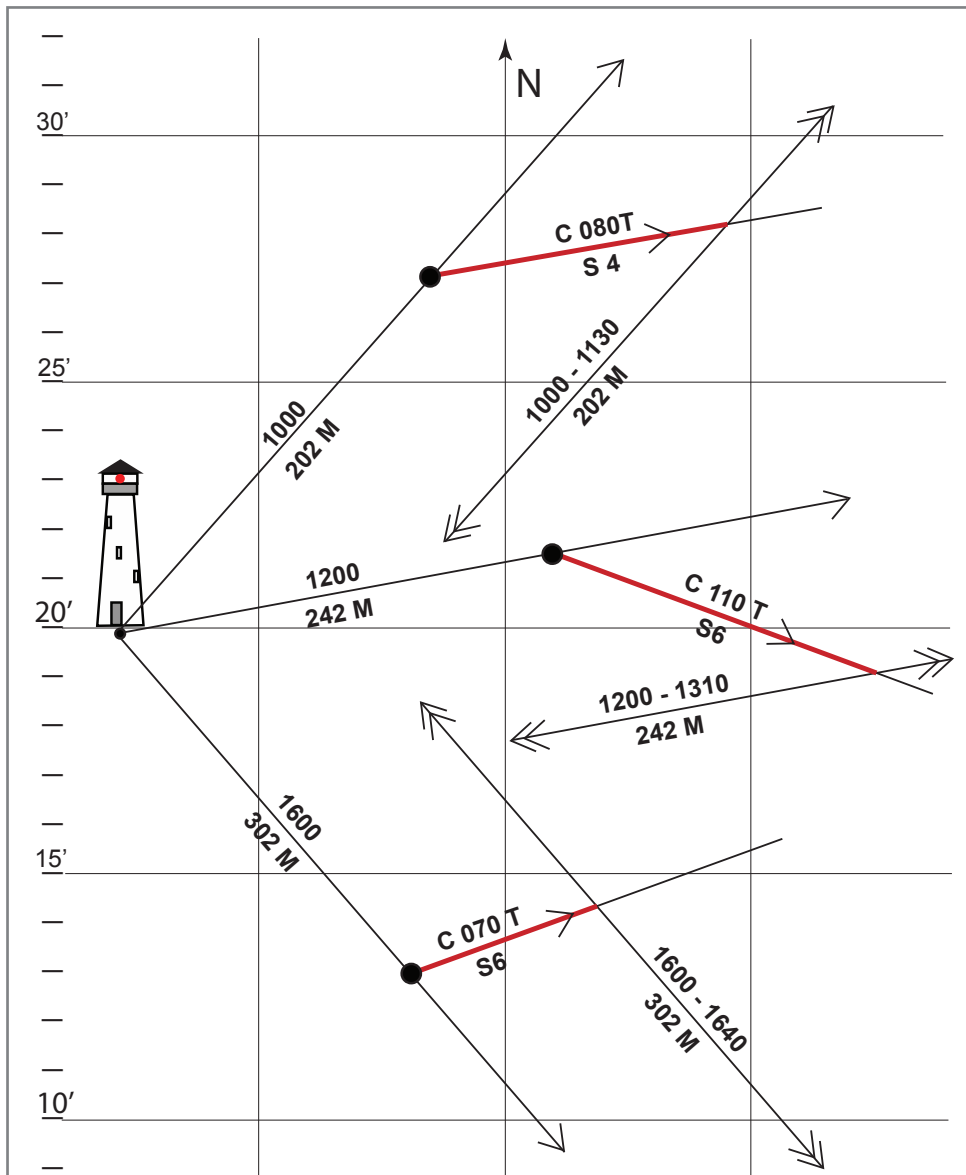


Fig. 35 Answer to 6.16, 6.17 and 6.18