



NAV 100

Part II

Piloting & Chartwork Scenario

Objectives

- Practice in measuring & calculating skills
- Integration of skills in a semi-realistic scenario
- Improved speed with maintained accuracy
- Introduction of Nav Log and Bearing Book

Scenario

- You are the navigation plotter on a Navy 44 STC underway on Chesapeake Bay
- You create and maintain the bearing book and nav log, and plot the STC's Fixed, DR, and if required EP positions (chartwork) in near real time.
- You interact with the helm (steering orders, course feedback) and lookout (bearing taker).
- In this scenario you do not maintain the normal communications or damage control watch.

1600

- The number above refers to the time stamp occurring on the chart, in the intra-watch communications, in the nav & deck log, and in the bearing book.
- A work page will appear here with solutions for the segment being worked.

1600 Intra-Watch Communications

- WC: Nav, begin formal piloting as we pass R4.
- NAV: Aye, formal piloting at R4. Recommend course 150 magnetic (C150M) at R4.
- WC: Helm, steer C150M at R4.
- NAV: Trimmer (TR), please tell me when R4 is abeam. Our speed is 5.0 knots.
- TR: Aye.

1600 Deck Log Narrative

OFFSHORE LOG

Date: 18 JAN 2006

Time	Narrative Comments - to include at a minimum: watch relief, sail changes, fix intervals, and weather (see SOP Art. 211)
1600	UNDERWAY SANTEE BASIN, UNDER POWER, SEA & ANCHOR DETAIL. R. KNEEL, OIC
	LOCAL OP AREA.

- This is a portion of a narrative page in the offshore deck/ nav log.
- Status changes are noted here, e.g., under way, under power.
- We will introduce changes in scenario status here.

1610 Intra-Watch Communications

- TR: R4 abeam.
- NAV: R4 abeam, aye. TR, we will take the first round of bearings at 1620. We will use 1AH (AE), a Fl G 4s at relative bearing (RB) 020; R90 (AB), a Fl R 2.5s at RB 294; and Bembe Beach Tank (BO), an aquamarine water tank at RB 140.

1610 Deck Log Narrative

OFFSHORE LOG

Date: 18 JAN 2006

Time	Narrative Comments - to include at a minimum: watch relief, sail changes, fix intervals, and weather (see SOP Art. 211)
1600	UNDERWAY SANTEE BASIN, UNDER POWER, SEA & ANCHOR DETAIL. R. KNEEL, OIC
	LOCAL OP AREA.
1610	SEVERN RIVER "4" ABEAM, BEGIN PILOTING. FIX INTERVAL 30 MINUTES.

- Begin piloting.
- We started piloting by noting the time we passed close to a daymark, using that position as a fix (range and bearing).
- Note the 30 minute fix interval.
- There may not be a narrative entry for each nav log entry

1610 Bearing Book

STANDARD BEARING BOOK
OPNAV FORM 3530/2 (7-74)

RECORD GYRO BEARINGS

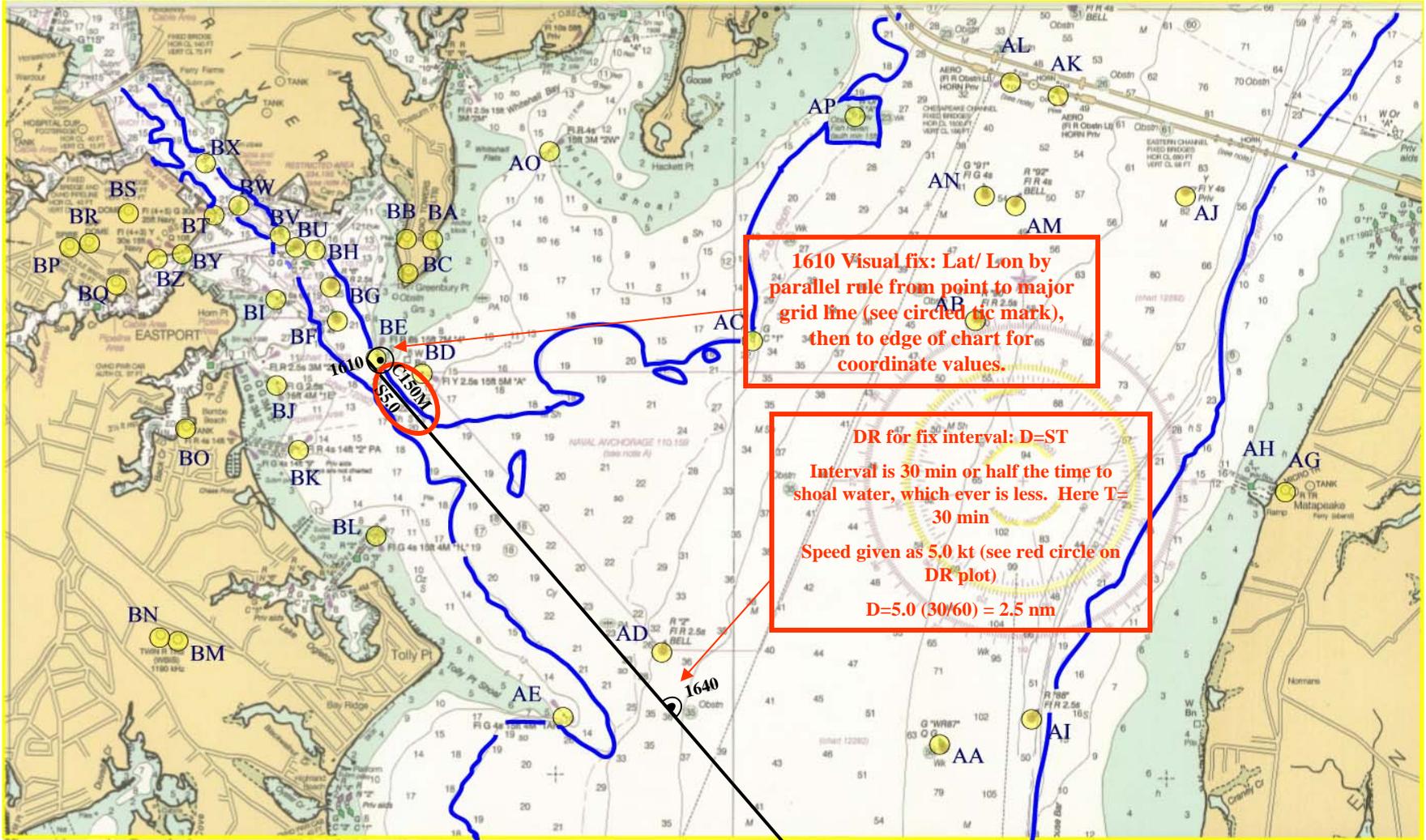
CHESAPEAKE BAY, VIC. ANNAPOLIS GYRO ERROR _____
PLACE

18 JAN 2006

DATE TIME						DEPTH
1610	SR 4°					22
	CLOSE ABeam					

- This is a page from the standard bearing book.
- We will give bearings to landmarks (& buoys).
- As an exception to normal practice, we will use buoy names, e.g., 1AH, rather than a two letter code.
- The bearing from the STC to the object is given under the column named with the item. Note that columns are reused.
- Note that depth as measured by the depthsounder is recorded at the time of the bearings in the righthand column.

1610 Chart



1610 Deck Log Data

NA - _____

OFFSHORE LOG

Date: _____

Time (local)	Fix type	Position		Depth (ft)		Course	Speed	True Wind		Seastate		Bar	Engine			Battery voltage			bilge strokes
		Latitude	Longitude	Fatho	Chart	(°M)	(kts)	(°M)	(kts)	(°M)	(ft)	(mb)	ON	Hrs	Fuel (gal)	1	2	ENG	
1610	V	38°58'05"N	076°27'34"W	22	21	150	5.0												

- This is a page from the data portion of the Deck/ Nav log.
- Data on this page and in the bearing book should allow you to recreate the nav plot on the chart.
- The nav log and the bearing book are filled in using **BLACK INK**.
- Note that each fix or rfix requires the nav plotter to determine and enter the lat & lon of the fix in the nav log.
- The right side columns (true Wind – bilge strokes) are filled in hourly on the hour.
- Entries for changes in course or speed require only the time and the new data.
- The “V” in column 2 signifies Visual Fix. A legend is at the bottom of each full page.
- We will use this page to display the target solution.

1620 Intra-Watch Communications

- TR: NAV, 1AH bears 170, Bembe Beach Tank bears 292, R90 bears 084.
- HELM: C150M; S5.0
- NAV: 1AH bears 170, Bembe Beach Tank bears 292, R90 bears 084, Depth 19. Our course and speed remain the same, C150M & S5.0.

1620 Bearing Book

STANDARD BEARING BOOK
OPNAV FORM 3530/2 (7-74)

RECORD GYRO BEARINGS

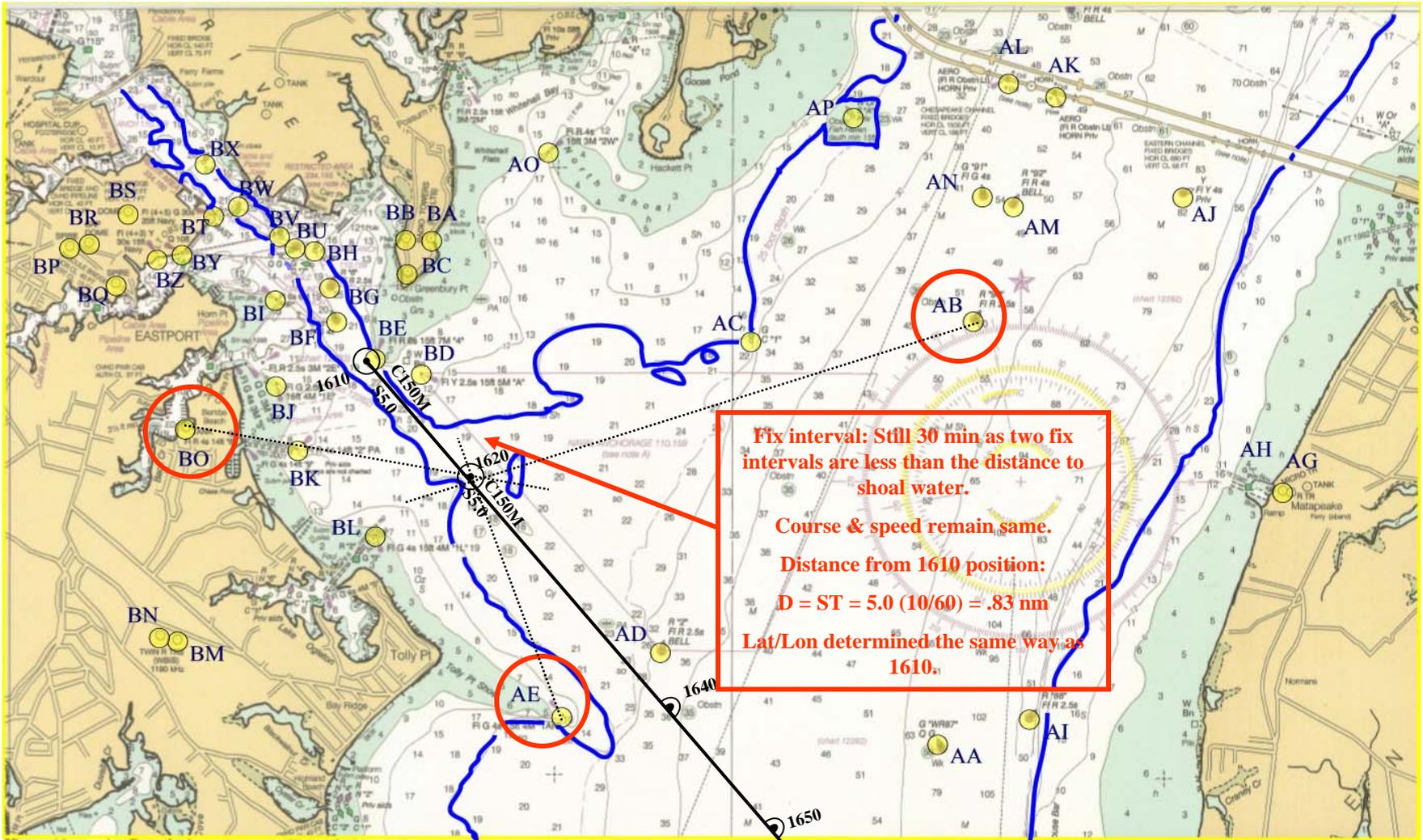
CHESAPEAKE BAY, VIC. ANNAPOLIS GYRO ERROR
PLACE

18 JAN 2006

DATE TIME						DEPTH
1610	SR 4° CLOSE ABGAM					22
1620	LAK 170	R80 084	BT 292	TPL		19

- The first round of bearings to establish a visual fix.
- Note the depth of 19 feet recorded from the depthsounder.

1620 Chart



1620 Deck Log Data

NA - _____

OFFSHORE LOG

Date: _____

Time (local)	Fix type	Position		Depth (ft)		Course	Speed	True Wind		Seastate		Bar	Engine			Battery voltage			bilge strokes
		Latitude	Longitude	Fatho	Chart	(°M)	(kts)	(°M)	(kts)	(°M)	(ft)	(mb)	ON	Hrs	Fuel (gal)	1	2	ENG	
1610	V	38° 58' 05" N	076° 27' 34" W	22	21	150	5.0												
1620	V	38° 57' 27" N	076° 26' 49" W	20	18														

- How close does your position determination come to this one?
- Note that the fathometer (depthsounder) reading and the interpolated depth from the chart at the position of your plotted fix are well within the allowed discrepancy.
- Note entry error for fathometer depth at 1620. Should be 19.

1630 Intra-Watch Communications

- Helm: Under full main and #1. Falling off to Heading 116.
- NAV: Maintain Course 116M. WC, 2.6 nm to shoal water. We must tack within 30 min. Speed remains 5.0 knots.
- WC: 2.6 nm to shoal water, within 30 min, aye.
- NAV: TR, we still need a fix by 1646. We will add TPL Fl 5s, with a RB of about 100.
- TR: NLT 1646 fix, add TPL, aye.

1630 Deck Log Narrative

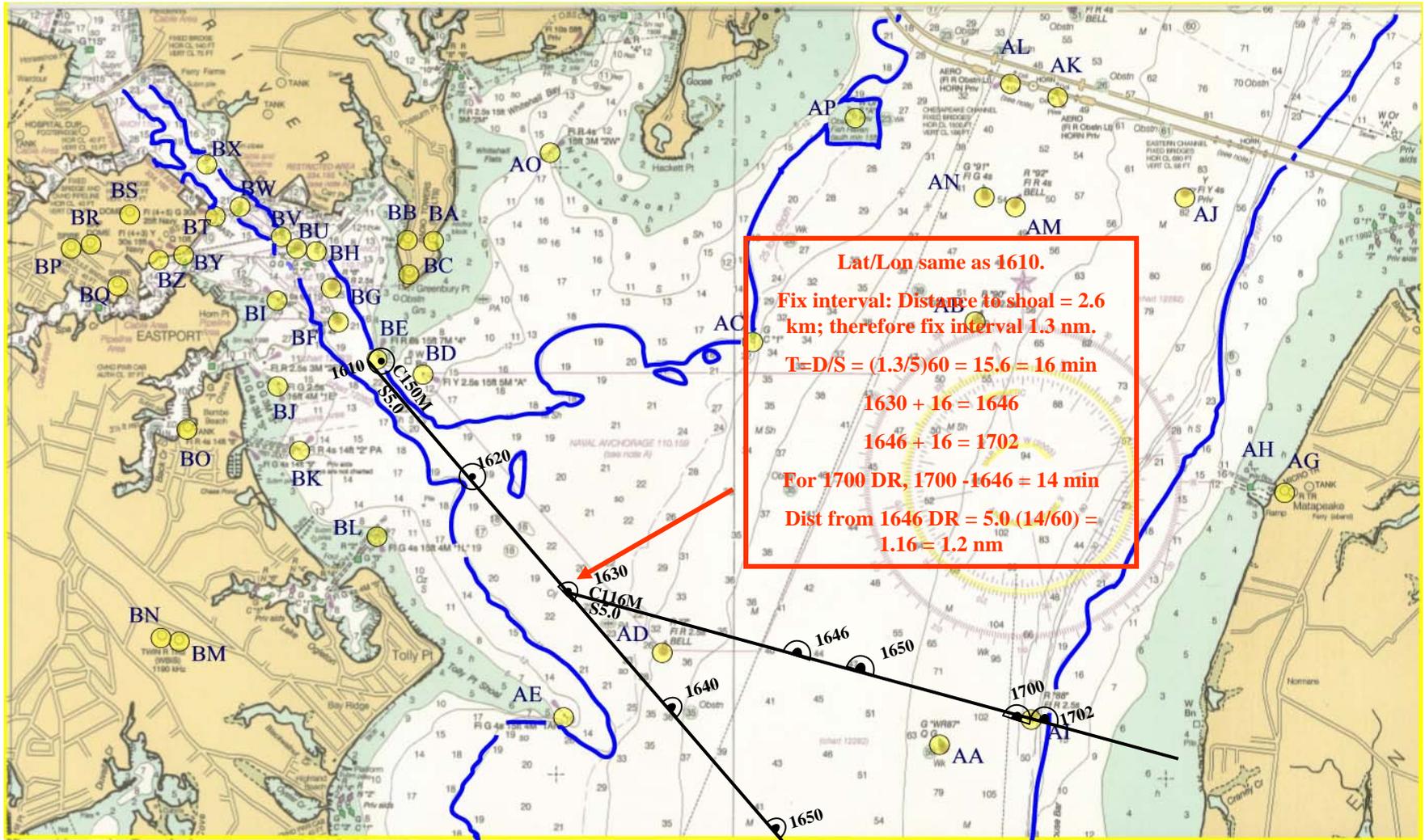
OFFSHORE LOG

Date: 18 JAN 2006

Time	Narrative Comments - to include at a minimum: watch relief, sail changes, fix intervals, and weather (see SOP Art. 211)
1600	UNDERWAY SANTSÉ BASIN, UNDER POWER, SEA & ANCHOR DETAIL. R. KNEEL, OIC LOCAL OP AREA.
1610	SEVERN RIVER "4" ABEAM, BEGIN PILOTING. FIX INTERVAL 30 MINUTES.
1630	ENGINE OFF; UNDER #1 & FULL MAIN, CLOSE HAULSD; 2.6 NM TO SHOAL WATER

- We began to sail on starboard tack and had to fall off to port.

1630 Chart



1630 Deck Log Data

NA - _____

OFFSHORE LOG

Date: _____

Time (local)	Fix type	Position		Depth (ft)		Course	Speed	True Wind		Seastate		Bar	Engine			Battery voltage			bilge strokes
		Latitude	Longitude	Fatho	Chart	(°M)	(kts)	(°M)	(kts)	(°M)	(ft)	(mb)	ON	Hrs	Fuel (gal)	1	2	ENG	
1610	V	38°58'05"N	076°27'34"W	22	21	150	5.0												
1620	V	38°57'27"N	076°26'49"W	20	18														
1630		N	W			116													

- Note that only the time and course changed; speed remained the same. Only two entries.

1644 Intra-Watch Communications

- TR: BBT bears 304, 1AH bears 270, R90 bears 040, TPL bears 216.
- NAV: Copy BBT bears 304, 1AH bears 270, R90 bears 040, TPL bears 216, depth 40.
- NAV: Fix checks with chart. TPL checks. We were pushed south slightly. Shoal water by 1702. Next fix by 1653. We will drop BBT, use TPL, check R86, Fl R 4s, with a RB approx 072.
- TR: Copy drop BBT, add TPL, check R86.
- WC: We will tack at 1653. Let's get this fix on time; LO take the bearings.

1644 Bearing Book

STANDARD BEARING BOOK
OPNAV FORM 3530/2 (7-74)

RECORD GYRO BEARINGS

CHESAPEAKE BAY, VIC. ANNAPOLIS
PLACE

GYRO ERROR —

18 JAN 2006

DATE TIME						DEPTH
	SR ⁴					
1610	CLOSE ABGAM					22
1620	1AH 170	R80 084	BT 292	TPL		19
1644	270	040	304	216	R86	40

- The second round of bearings to establish a visual fix.
- Note we added Thomas Point Light (TPL). This is a check bearing to be sure we are shooting what we think. If it plots closely in the mix, we will know it is TPL, and we can add it for future bearings.
- Note we are getting ready to check R86 next time.

1644 Chart

Distance down DR:
 $1644 - 1630 = 14 \text{ min}$

$$D = ST = 5.0 (14/60) = 1.16 = 1.2 \text{ nm}$$

Distance to shoal water =
 1.5 nm

Therefore fix interval is
 0.75 nm .

$$T = D/S = 0.75(60)/5 = 9 \text{ min}$$

$$1644 + 9 = 1653$$

$$1653 + 9 = 1702$$

Set & Drift:

Set: From Compass Rose:
 214M

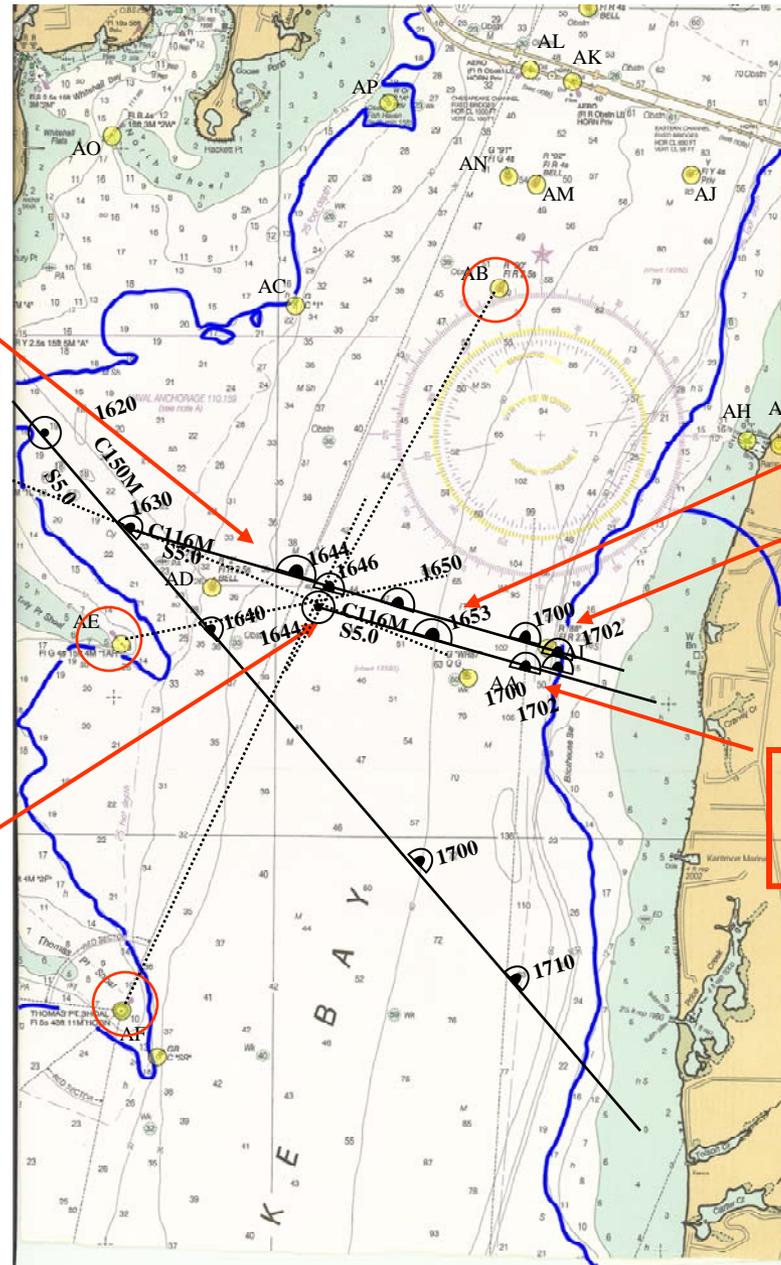
Drift: $D = .15 \text{ nm}$

$$T = 1620 - 1644 = 24 \text{ min}$$

$$S = D/T = .15 (24/60) = .375 = .4 \text{ kt}$$

For 1700 DR: $T = 7 \text{ min}$

$$D = ST = 5.0 (7/60) = .58 = .6 \text{ nm}$$



1644 Deck Log data

NA - _____

OFFSHORE LOG

Date: _____

Time (local)	Fix type	Position		Depth (ft)		Course (°M)	Speed (kts)	True Wind		Seastate		Bar (mb)	Engine			Battery voltage			bilge strokes
		Latitude	Longitude	Fatho	Chart			(°M)	(kts)	(°M)	(ft)		ON	Hrs	Fuel (gal)	1	2	ENG	
1610	V	38°58'05"N	076°27'34"W	22	21	150	5.0												
1620	V	38°57'27"N	076°26'49"W	20	18														
1630		N	W			116													
1644	V	38°56'23"N	076°24'42"W	42	41														

- How close does your position determination come to this one?
- Checks with chart!
- Note no change in course or speed
- Fix interval getting shorter and shorter...

1653 Intra-Watch Communications

Helm: Tacking

LO: R90 bears 022, R86 bears 188, TPL bears 232,
1AH bears 282.

NAV: Copy R90 bears 022, R86 bears 188, TPL
bears 232, 1AH bears 282; depth 60.

Helm: On Course 210M

NAV: Fix checks with chart. R86 checks. We have
a long run to shoal water. Next fix by 1723. Boat
speed is 4.5 knots.

1653 Bearing Book

STANDARD BEARING BOOK
OPNAV FORM 3530/2 (7-74)

RECORD GYRO BEARINGS

CHESAPEAKE BAY, VIC. ANNAPOLIS
PLACE

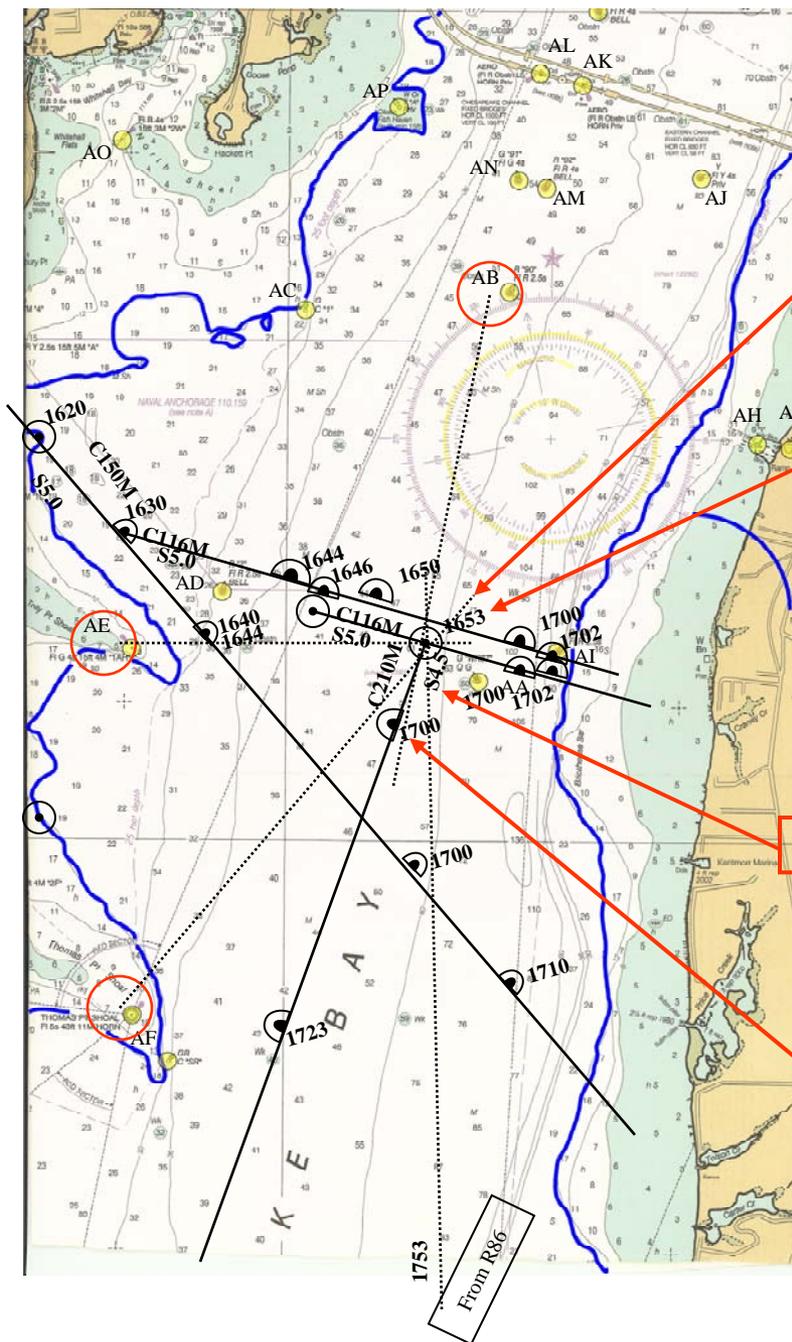
GYRO ERROR

18 JAN 2006

DATE TIME						DEPTH
	SR 4°					
1610	CLOSE ABeam					22
1620	LAH 170	R80 084	BT 292	TPL		19
1644	270	040	304	216	R86	40
1653	282	022	—	232	188	55

- The third round of bearings to establish a visual fix.
- Note we added Thomas Point Light (TPL) and dropped Bembe Beach Tank.
- We did a check bearing on R86. Was it good?

1653 Chart



Tacked to C210M, S 4.5
 Distance to shoal water
 greater than two fix
 intervals @ 30 min
 because we tacked.
 Therefore fix interval
 distance is .
 $D = ST = 4.5(30/60) = 2.25$
 nm

Distance down DR:
 1653 - 1644 = 9 min
 $D = ST = 5.0 (9/60) =$
 .75 nm

R86 checks OK

For 1700 DR: T = 7 min
 $D = ST = 4.5 (7/60) = .525$
 = .5 nm

1653 Deck Log Data

NA - _____

OFFSHORE LOG

Date: _____

Time (local)	Fix type	Position		Depth (ft)		Course (°M)	Speed (kts)	True Wind		Seastate		Bar (mb)	Engine			Battery voltage			bilge strokes
		Latitude	Longitude	Fatho	Chart			(°M)	(kts)	(°M)	(kts)		(°M)	(ft)	ON	Hrs	Fuel (gal)	1	
1610	V	38°58'05"N	076°27'34"W	22	21	150	5.0												
1620	V	38°57'27"N	076°26'49"W	20	18														
1630		N	W			116													
1644	V	38°56'23"N	076°24'42"W	42	41														
1653	V	38°56'09"N	076°23'51"W	60	65	210	4.5												

- How close does your position determination come to this one?
- Checks with chart!
- Note change in course and speed

1710 Intra-Watch Communications

- TR: I have TPL at 244.
- NAV: TPL at 244, aye. Helm, please maintain a constant heading (C210M) and boat speed (S4.5). We will try for a double-angle running fix. TR, Please tell me when TPL bears 278. We will also check Bloody Point Light (BPL), Fl 6s white about 320 RB (40 degrees of the bow to port), and G1, a Fl 4s G about 040 RB.
- Helm: Constant heading and speed, aye.
- TR: Roger.

1710 Bearing Book

STANDARD BEARING BOOK
OPNAV FORM 3530/2 (7-74)

RECORD GYRO BEARINGS

CHESAPEAKE BAY, VIC. ANNAPOLIS
PLACE

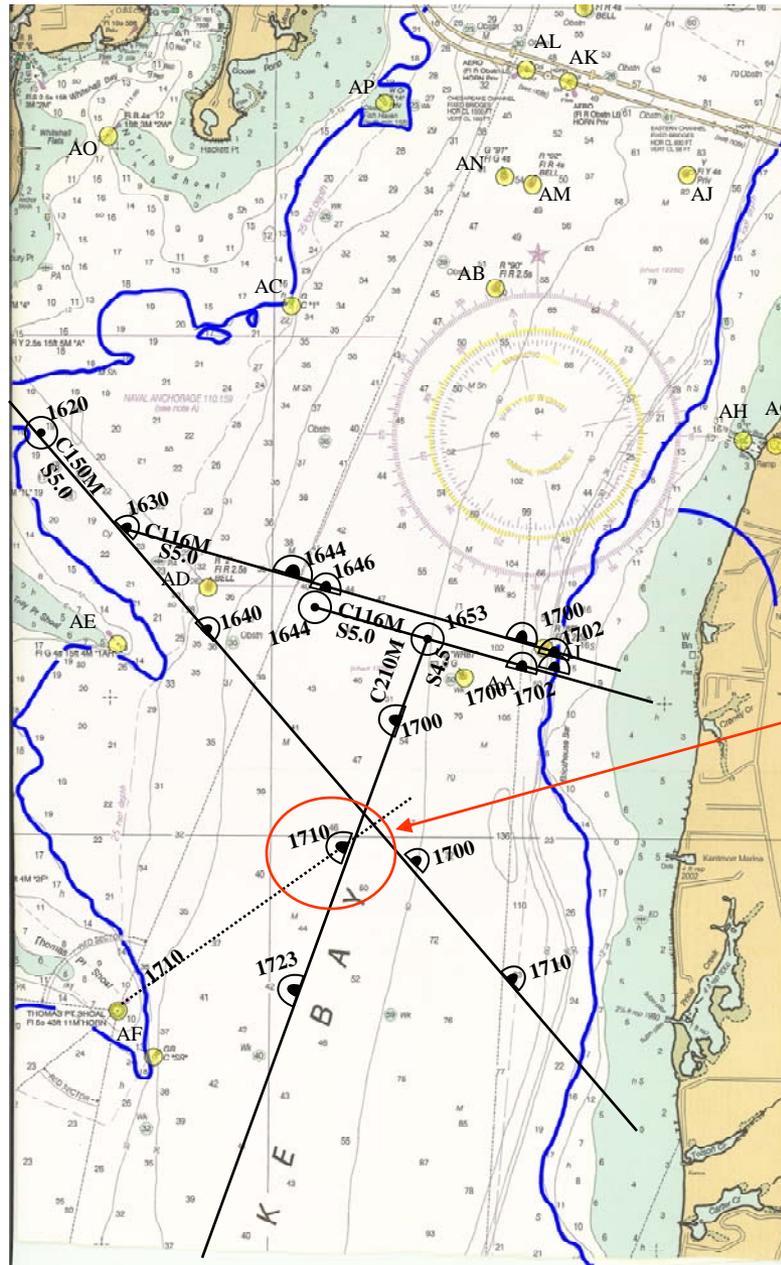
GYRO ERROR —

18 JAN 2006

DATE TIME						DEPTH
	SR 4'					
1610	CLOSE ABGAM					22
1620	LAH 170	R80 084	BT 292	TPL		19
1644	270	040	304	216	R86	40
1653	282	022	—	232	188	55
1710	—	—	BPL	244		

- This is a single bearing to establish a Line of Position.
- We can use the LOP to check our Set and Drift.
- What did this LOP tell us?
- Where is our 1710 EP?
- Note we are getting ready to check Bloody Point Light as a landmark.

1710 Chart



LOP went directly to DR,
indicating that set and drift are
likely not large.

1723 Intra-Watch Communications

- TR: NAV, TPL bears 278, G1 bears 229, BPL bears 177 at 1723.
- NAV: TPL at 278, G1 bears 229, BPL bears 177, aye. Depth 45.
- NAV: TPL bore 1.0 nm at 278M. A good running fix. Checks with chart. G1 and BPL check OK. C210M; S4.5 kt.
- Next fix NLT 1753. We will add G1 and BPL to TPL and R86. We will check R84A, a Fl R 2.5s at about 330 RB (30 degrees off the bow to port).

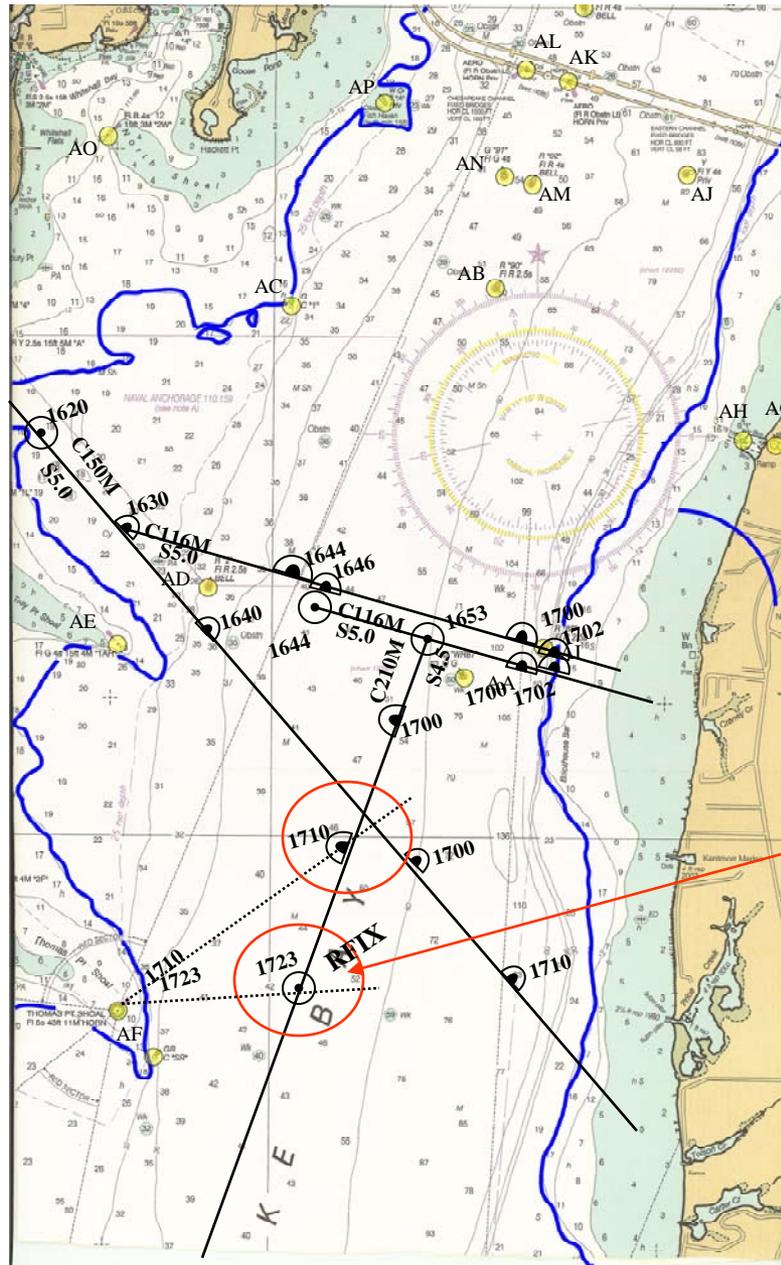
1723 Bearing Book

STANDARD BEARING BOOK
OPNAV FORM 3530/2 (7-74)

RECORD GYRO BEARINGS						
<u>CHESAPEAKE BAY, VIC. ANNAPOLIS</u>					GYRO ERROR <u>—</u>	
PLACE						
18 JAN 2006						
DATE TIME						DEPTH
1610	SR 4° CLOSE ABeam					22
1620	1 AH 170	R 90 084	BT 292	TPL		19
1644	270	040	304	216	R 86	40
1653	282	022	—	232	188	55
1710	—	—	BPL	244		
1723	R 84A	4 "I" 229	177	278		45

- This is a single bearing to establish a running fix by doubling the angle.
- We noted that our 1710 LOP had a relative angle of 22 degrees.
- We noted the time we got a relative angle twice the original (44 degrees).
- We needed to maintain a straight course during this time.
- Note that we also checked both Bloody Point Light and G1. Were they good?

1723 Chart



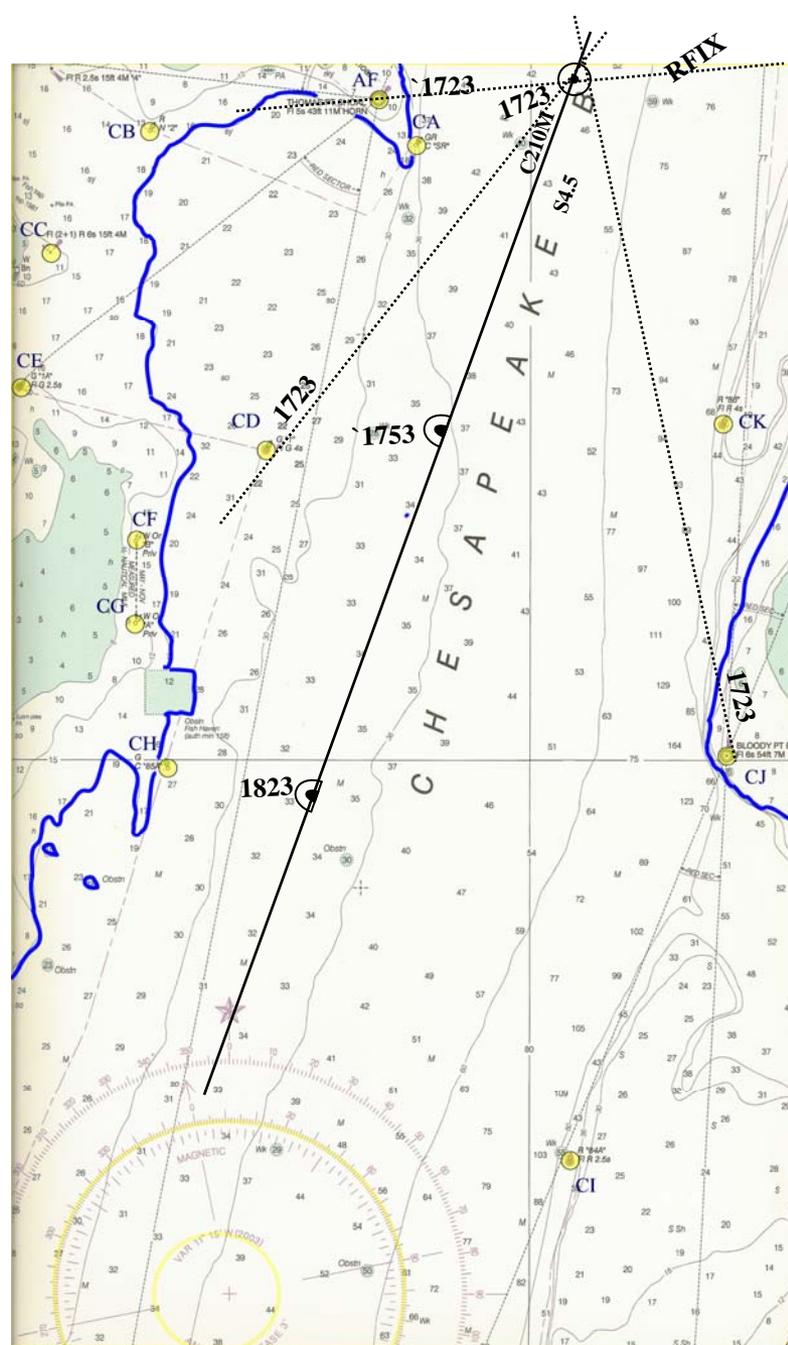
Double Angle: Second bearing at 1723. Time interval is 1723 - 1710 = 13 min

$$D = ST = 4.5 (13/60) = .975 = 1.0$$

We measure 1.0 on track graphically; good match.

TPL bears 1.0 nm at 068 R or 278M. It also measures 1.0 nm graphically.

1723 Chart



1723 Deck Log Data

NA - _____

OFFSHORE LOG

Date: _____

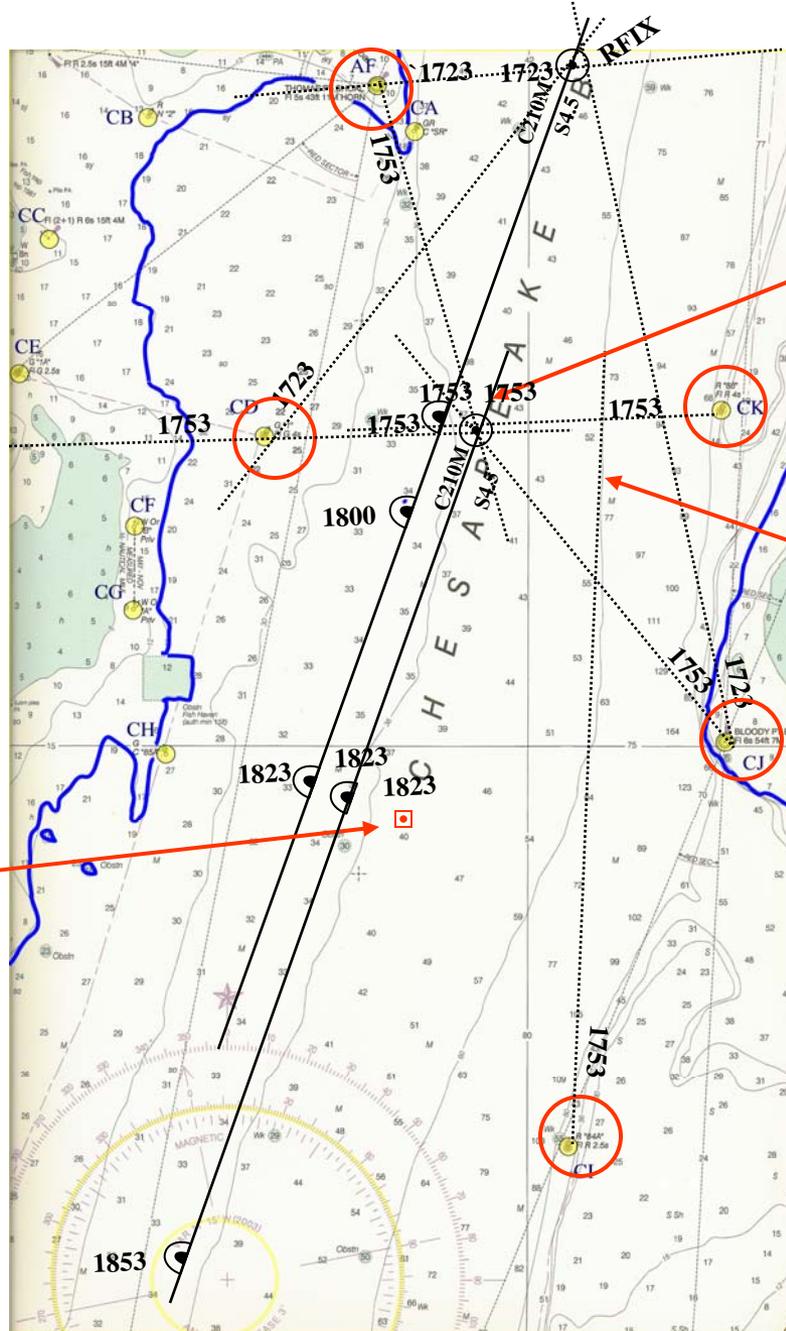
Time (local)	Fix type	Position		Depth (ft)		Course (°M)	Speed (kts)	True Wind		Seastate		Bar (mb)	Engine			Battery voltage			bilge strokes
		Latitude	Longitude	Fatho	Chart			(°M)	(kts)	(°M)	(ft)		ON	Hrs	Fuel (gal)	1	2	ENG	
1610	V	38°58'05"N	076°27'34"W	22	21	150	5.0												
1620	V	38°57'27"N	076°26'49"W	20	18														
1630		N	W			116													
1644	V	38°56'23"N	076°24'42"W	42	41														
1653	V	38°56'09"N	076°23'51"W	60	65	210	4.5												
1700		N	W					110	11	270	1	1009	23/5.7	44	12.6	12.6	12.9	Ø	
1723	V	38°54'02"N	076°24'48"W	45	44														

- How close does your position determination come to this one?
- Checks with chart!
- A Running Fix is not as good as a fix; we assume the DR is correct in a Running fix.
- A Running Fix can be done all graphically, the check is that the angles double, the sides measure the same length, and the DR is one side.

1753 Intra-Watch Communications

- TR: TPL bears 357, BPL bears 150, G1 bears 283, R86 bears 094, R84A bears 193.
- NAV: TPL bears 357, BPL bears 150, G1 bears 283, R86 bears 094, R84A bears 193, aye. Depth 39.
- NAV: Checks with chart. Some set to SE and drift; the set and drift are helpful. R84A not check; reshoot next fix. Next fix NLT 1823. Speed and course remain 4.5 knots on C210M. We will drop TPL; use G1, R86, & BPL; check G85; and recheck R84A.

1753 Chart



Set & Drift:
Set: From Compass Rose:
118M
Drift: D = .25 nm
T = 1753 - 1723 = 30 min
S = D/T = .25 (30/60) = 0.5 kt

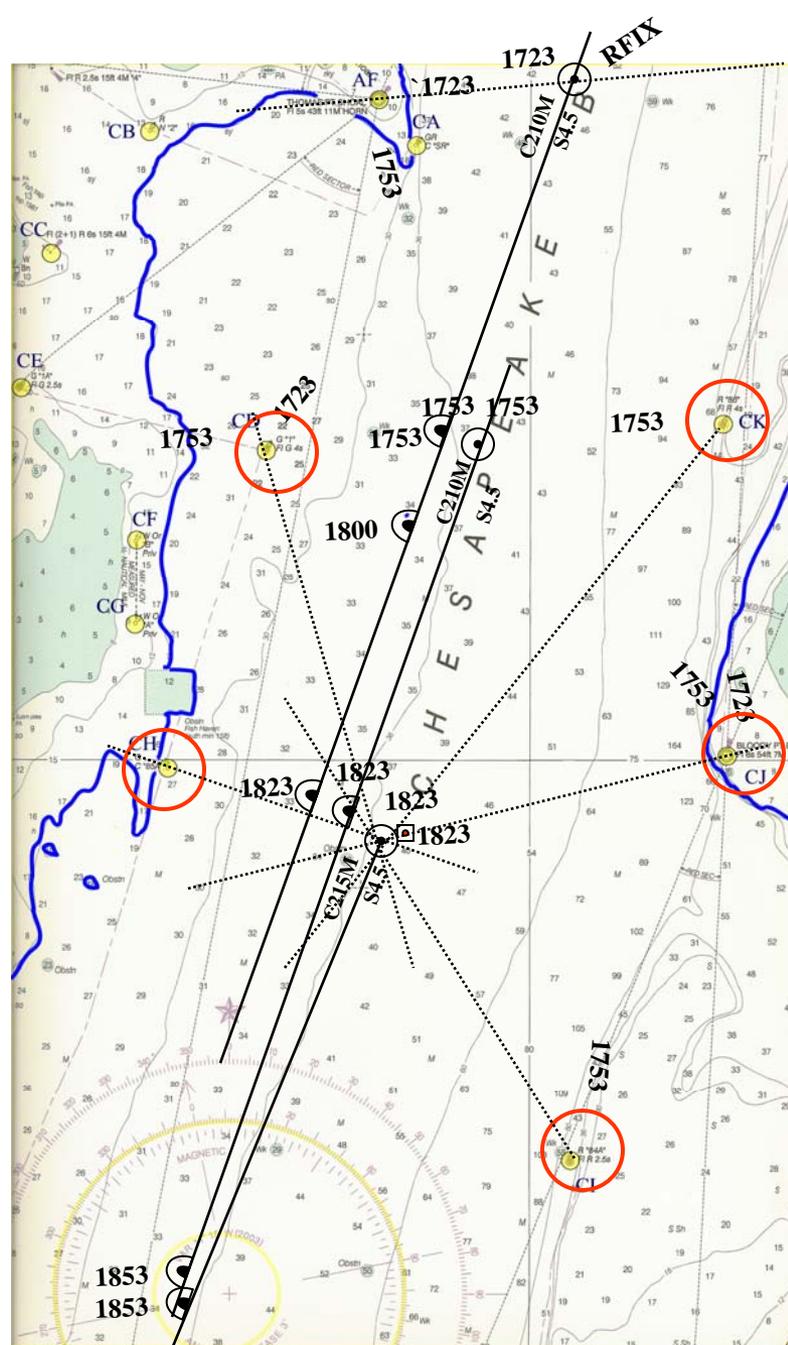
Your EP at 1823 is 0.25 nm from the 1823 DR at a bearing of 118M from the DR.

The R84A bearing did not meet the others; R84A did not check for an add-in. Reshoot.

1823 Intra-Watch Communications

- TR: BPL bears 087, G1 bears 355, R86 bears 050, R84A bears 162, G85 bears 302.
- NAV: BPL bears 087, G1 bears 355, R86 bears 050, R84A bears 162, G85 bears 302. aye. Depth 40.
- NAV: Checks with chart. Drift to SE continues; come right to C215M. R84A and G85 check ok. Next fix NLT 1853. Speed remains 4.5 knots.

1823 Chart



Questions?

Comments

- Please help me make this class more responsive to your needs and the volunteers who follow you.
- Comments today or by email to rknell@cox.net
- Thanks