

ANNEXURE 1 – EXAMINATION NOTES AND DEVIATION CARD

1. **All** relevant working must be shown on the Answer Sheet.
2. **All** work done on the chart must be done lightly, using a 2B pencil.
3. Corrections applicable to courses and bearings must be calculated correct to the nearest $\frac{1}{2}^\circ$ and plotted to a similar accuracy.

DEVIATION CARD

Sip's Head (Compass)	Deviation	Sip's Head (Compass)	Deviation
000	2° W	180	0°
010	4° W	190	3° E
020	5° W	200	5° E
030	7° W	210	7° E
040	9° W	220	9° E
050	11° W	230	11° E
060	12° W	240	12° E
070	13° W	250	13° E
080	14° W	260	14° E
090	13° W	270	13° E
100	12° W	280	12° E
110	11° W	290	11° E
120	10° W	300	10° E
130	9° W	310	9° E
140	8° W	320	7° E
150	7° W	330	5° E
160	5° W	340	3° E
170	3° W	350	1° E

ANNEXURE 2 – SOUTH AFRICAN TIDE TABLES 2007, PAGE 45**DURBAN**
2007

TIME ZONE - 2

TIME ZONE - 2

JANUARY			FEBRUARY			MARCH					
DAY	TIME	M	DAY	TIME	M	DAY	TIME	M	DAY	TIME	M
1	02 07	1.60	16	02 04	1.51	1	03 36	1.84	16	03 08	1.87
M	08 07	0.54	T	08 00	0.65	T	09 36	0.42	F	09 11	0.39
	14 25	1.79		14 11	1.69		15 46	1.88		15 19	1.96
	20 42	0.43		20 33	0.53		21 54	0.29		21 32	0.26
2	02 57	1.72	17	02 44	1.66	2	04 08	1.93	17	03 44	2.04
T	08 56	0.45	W	08 42	0.53	F	10 08	0.35	S	09 48	0.25
	15 10	1.85		14 52	1.82	○	16 18	1.93	●	15 56	2.07
	21 25	0.34		21 11	0.40		22 24	0.23		22 07	0.14
3	03 40	1.82	18	03 22	1.80	3	04 38	1.98	18	04 20	2.16
W	09 39	0.39	T	09 21	0.41	S	10 38	0.32	\$	10 25	0.17
○	15 51	1.89		15 31	1.92		16 46	1.95		16 33	2.13
	22 03	0.27		21 47	0.29		22 52	0.20		22 41	0.06
4	04 18	1.88	19	03 59	1.93	4	05 05	2.00	19	04 56	2.22
T	10 17	0.36	F	09 59	0.32	\$	11 06	0.32	M	11 01	0.15
	16 29	1.90	●	16 09	2.00		17 13	1.94		17 09	2.13
	22 38	0.24		22 22	0.20		23 19	0.21		23 15	0.05
5	04 54	1.91	20	04 36	2.02	5	05 31	1.98	20	05 32	2.21
F	10 52	0.36	S	10 38	0.27	M	11 33	0.35	T	11 38	0.18
	17 02	1.88		16 47	2.04		17 38	1.90		17 44	2.06
	23 10	0.24		22 58	0.15		23 45	0.25		23 48	0.11
6	05 26	1.90	21	05 14	2.07	6	05 57	1.94	21	06 08	2.13
S	11 26	0.40	\$	11 17	0.26	T	12 01	0.41	W	12 14	0.28
	17 34	1.84		17 25	2.02		18 03	1.84		18 19	1.95
	23 42	0.27		23 34	0.15						
7	05 58	1.86	22	05 52	2.07	7	00 11	0.32	22	00 22	0.22
\$	11 57	0.45	M	11 56	0.30	W	06 23	1.87	T	06 44	1.99
	18 03	1.78		18 03	1.97		12 28	0.49		12 50	0.42
							18 29	1.75		18 55	1.79
8	00 12	0.33	23	00 09	0.19	8	00 37	0.42	23	00 57	0.40
M	06 28	1.80	T	06 31	2.02	T	06 51	1.77	F	07 22	1.80
	12 29	0.53		12 35	0.38		12 57	0.59		13 29	0.59
	18 32	1.70		18 40	1.86		18 57	1.64		19 33	1.61
9	00 42	0.41	24	00 46	0.28	9	01 05	0.54	24	01 36	0.60
T	06 59	1.73	W	07 11	1.92	F	07 22	1.66	S	08 07	1.58
	13 03	0.62		13 17	0.50		13 30	0.70	●	14 17	0.77
	19 03	1.61		19 20	1.73		19 29	1.51		20 24	1.41
10	01 14	0.51	25	01 24	0.42	10	01 37	0.69	25	02 30	0.82
W	07 35	1.64	T	07 55	1.78	S	08 01	1.53	\$	09 24	1.39
	13 41	0.72		14 03	0.64	●	14 13	0.83		15 45	0.93
	19 38	1.50		20 04	1.57		20 12	1.37		22 38	1.27
11	01 50	0.63	26	02 09	0.58	11	02 23	0.84	26	05 18	0.97
T	08 18	1.54	F	08 50	1.62	\$	09 05	1.40	M	12 11	1.34
●	14 30	0.82	●	15 03	0.78		15 30	0.94		18 47	0.89
	20 25	1.38		21 05	1.41		21 43	1.25			
12	02 38	0.76	27	03 11	0.76	12	04 12	0.96	27	01 16	1.38
F	09 19	1.45	S	10 15	1.49	M	11 14	1.36	T	07 30	0.84
	15 43	0.89		16 40	0.87		18 12	0.93		13 38	1.48
	21 39	1.29		23 00	1.31					19 57	0.72
13	03 57	0.86	28	05 14	0.86	13	00 40	1.30	28	02 12	1.57
S	10 51	1.41	\$	12 11	1.47	T	06 44	0.89	W	08 19	0.67
	17 31	0.89		18 44	0.82		13 01	1.47		14 25	1.63
	23 42	1.27					19 35	0.78		20 36	0.55
14	05 51	0.86	29	01 07	1.39	14	01 49	1.48			
\$	12 22	1.46	M	07 14	0.79	M	07 48	0.73	14	06 18	0.93
	18 58	0.80		13 34	1.56		13 58	1.63	W	12 35	1.41
				19 58	0.67		20 21	0.60		19 07	0.82
15	01 11	1.37	30	02 14	1.55	15	02 31	1.67			
M	07 09	0.78	T	08 17	0.65	T	08 32	0.55	15	01 23	1.49
	13 24	1.57		14 29	1.68		14 41	1.80	T	07 29	0.74
	19 52	0.67		20 45	0.52		20 58	0.42		13 38	1.60
			31	02 59	1.71					19 56	0.62
			W	09 00	0.52						
				15 11	1.79						
				21 22	0.39						
									31	02 51	1.85
									S	08 56	0.42
										15 04	1.82
										21 06	0.34

ANNEXURE 3 – ALTITUDE CORRECTION TABLES

ALTITUDE CORRECTION TABLES 10°-90°—SUN, STARS, PLANETS

OCT.—MAR. SUN			APR.—SEPT.			STARS AND PLANETS				DIP			
App. Alt.	Lower Limb	Upper Limb	App. Alt.	Lower Limb	Upper Limb	App. Alt.	Corr ⁿ	App. Alt.	Additional Corr ⁿ	Ht. of Eye	Corr ⁿ	Ht. of Eye	Corr ⁿ
°	'		°	'		°	'			m		ft.	m
9 34	+10.8	-21.5	9 39	+10.6	-21.2	9 56	-5.3		1987	2.4	-2.8	8.0	1.0 - 1.8
9 45	+10.9	-21.4	9 51	+10.7	-21.1	10 08	-5.2		VENUS	2.6	-2.9	8.6	1.5 - 2.2
9 56	+11.0	-21.3	10 03	+10.8	-21.0	10 20	-5.1		Jan. 1-Jan. 4	2.8	-3.0	9.2	2.0 - 2.5
10 08	+11.1	-21.2	10 15	+10.9	-20.9	10 33	-5.0	0	0 + 0.3	3.0	-3.1	9.8	2.5 - 2.8
10 21	+11.2	-21.1	10 27	+11.0	-20.8	10 46	-4.9	34	+ 0.2	3.2	-3.2	10.5	3.0 - 3.0
10 34	+11.3	-21.0	10 40	+11.1	-20.7	11 00	-4.8	60	+ 0.1	3.4	-3.3	11.2	See table
10 47	+11.4	-20.9	10 54	+11.2	-20.6	11 14	-4.7	80		3.6	-3.4	11.9	←
11 01	+11.5	-20.8	11 08	+11.3	-20.5	11 29	-4.6		Jan. 5-Feb. 25	3.8	-3.5	12.6	m
11 15	+11.6	-20.7	11 23	+11.4	-20.4	11 45	-4.5	0	0 + 0.2	4.0	-3.6	13.3	20 - 7.9
11 30	+11.7	-20.6	11 38	+11.5	-20.3	12 01	-4.4	41	+ 0.1	4.3	-3.7	14.1	22 - 8.3
11 46	+11.8	-20.5	11 54	+11.6	-20.2	12 18	-4.3	76		4.5	-3.8	14.9	24 - 8.6
12 02	+11.9	-20.4	12 10	+11.7	-20.1	12 35	-4.2		Feb. 26-Dec. 31	4.7	-3.9	15.7	26 - 9.0
12 19	+12.0	-20.3	12 28	+11.8	-20.0	12 54	-4.1	0	0 + 0.1	5.0	-4.0	16.5	28 - 9.3
12 37	+12.1	-20.2	12 46	+11.9	-19.9	13 13	-4.0	60		5.2	-4.1	17.4	
12 55	+12.2	-20.1	13 05	+12.0	-19.8	13 33	-3.9			5.5	-4.1	18.3	30 - 9.6
13 14	+12.3	-20.0	13 24	+12.1	-19.7	13 54	-3.8			5.8	-4.2	19.1	32 - 10.0
13 35	+12.4	-19.9	13 45	+12.2	-19.6	14 16	-3.7		MARS	6.1	-4.3	20.1	34 - 10.3
13 56	+12.5	-19.8	14 07	+12.3	-19.5	14 40	-3.6		Jan. 1-Dec. 31	6.3	-4.4	21.0	36 - 10.6
14 18	+12.6	-19.7	14 30	+12.4	-19.4	15 04	-3.5	0	0 + 0.1	6.6	-4.5	22.0	38 - 10.8
14 42	+12.7	-19.6	14 54	+12.5	-19.3	15 30	-3.4	60		6.9	-4.6	22.9	
15 06	+12.8	-19.5	15 19	+12.6	-19.2	15 57	-3.3			7.2	-4.7	23.9	40 - 11.1
15 32	+12.9	-19.4	15 46	+12.7	-19.1	16 26	-3.2			7.5	-4.8	24.9	42 - 11.4
15 59	+13.0	-19.3	16 14	+12.8	-19.0	16 56	-3.1			7.9	-4.9	26.0	44 - 11.7
16 28	+13.1	-19.2	16 44	+12.9	-18.9	17 28	-3.0			8.2	-5.0	27.1	46 - 11.9
16 59	+13.2	-19.1	17 15	+13.0	-18.8	18 02	-2.9			8.5	-5.1	28.1	48 - 12.2
17 32	+13.3	-19.0	17 48	+13.1	-18.7	18 38	-2.8			8.8	-5.2	29.2	ft.
18 06	+13.4	-18.9	18 24	+13.2	-18.6	19 17	-2.7			9.2	-5.3	30.4	2 - 1.4
18 42	+13.5	-18.8	19 01	+13.3	-18.5	19 58	-2.6			9.5	-5.4	31.5	4 - 1.9
19 21	+13.6	-18.7	19 42	+13.4	-18.4	20 42	-2.5			9.9	-5.5	32.7	6 - 2.4
20 03	+13.7	-18.6	20 25	+13.5	-18.3	21 28	-2.4			10.3	-5.6	33.9	8 - 2.7
20 48	+13.8	-18.5	21 11	+13.6	-18.2	22 19	-2.3			10.6	-5.7	35.1	10 - 3.1
21 35	+13.9	-18.4	22 00	+13.7	-18.1	23 13	-2.2			11.0	-5.8	36.3	See table
22 26	+14.0	-18.3	22 54	+13.8	-18.0	24 11	-2.1			11.4	-5.9	37.6	←
23 22	+14.1	-18.2	23 51	+13.9	-17.9	25 14	-2.0			11.8	-6.0	38.9	ft.
24 21	+14.2	-18.1	24 53	+14.0	-17.8	26 22	-1.9			12.2	-6.1	40.1	70 - 8.1
25 26	+14.3	-18.0	26 00	+14.1	-17.7	27 36	-1.8			12.6	-6.2	41.5	75 - 8.4
26 36	+14.4	-17.9	27 13	+14.2	-17.6	28 56	-1.7			13.0	-6.3	42.8	80 - 8.7
27 52	+14.5	-17.8	28 33	+14.3	-17.5	30 24	-1.6			13.4	-6.4	44.2	85 - 8.9
29 15	+14.6	-17.7	30 00	+14.4	-17.4	32 00	-1.5			13.8	-6.5	45.5	90 - 9.2
30 46	+14.7	-17.6	31 35	+14.5	-17.3	33 45	-1.4			14.2	-6.6	46.9	95 - 9.5
32 26	+14.8	-17.5	33 20	+14.6	-17.2	35 40	-1.3			14.7	-6.7	48.4	
34 17	+14.9	-17.4	35 17	+14.7	-17.1	37 48	-1.2			15.1	-6.8	49.8	
36 20	+15.0	-17.3	37 26	+14.8	-17.0	40 08	-1.1			15.5	-6.9	51.3	100 - 9.7
38 36	+15.1	-17.2	39 50	+14.9	-16.9	42 44	-1.0			16.0	-7.0	52.8	105 - 9.9
41 08	+15.2	-17.1	42 31	+15.0	-16.8	45 36	-0.9			16.5	-7.1	54.3	110 - 10.2
43 59	+15.3	-17.0	45 31	+15.1	-16.7	48 47	-0.8			16.9	-7.2	55.8	115 - 10.4
47 10	+15.4	-16.9	48 55	+15.2	-16.6	52 18	-0.7			17.4	-7.3	57.4	120 - 10.6
50 46	+15.5	-16.8	52 44	+15.3	-16.5	56 11	-0.6			17.9	-7.4	58.9	125 - 10.8
54 49	+15.6	-16.7	57 02	+15.4	-16.4	60 28	-0.5			18.4	-7.5	60.5	
59 23	+15.7	-16.6	61 51	+15.5	-16.3	65 08	-0.4			18.8	-7.6	62.1	130 - 11.1
64 30	+15.8	-16.5	67 17	+15.6	-16.2	70 11	-0.3			19.3	-7.7	63.8	135 - 11.3
70 12	+15.9	-16.4	73 16	+15.7	-16.1	75 34	-0.2			19.8	-7.8	65.4	140 - 11.5
76 26	+16.0	-16.3	79 43	+15.8	-16.0	81 13	-0.1			20.4	-7.9	67.1	145 - 11.7
83 05	+16.1	-16.2	86 32	+15.9	-15.9	87 03	0.0			20.9	-8.0	68.8	150 - 11.9
90 00			90 00			90 00				21.4	-8.1	70.5	155 - 12.1

App. Alt. = Apparent altitude = Sextant altitude corrected for index error and dip.

ANNEXURE 4 – CONVERSION OF ARC TO TIME

CONVERSION OF ARC TO TIME

0°–59°			60°–119°			120°–179°			180°–239°			240°–299°			300°–359°				0°.00	0°.25	0°.50	0°.75
°	'	"	°	'	"	°	'	"	°	'	"	°	'	"	°	'	"		m	s	m	s
0	0	00	60	4	00	120	8	00	180	12	00	240	16	00	300	20	00	0	0	00	0	02
1	0	04	61	4	04	121	8	04	181	12	04	241	16	04	301	20	04	1	0	04	0	06
2	0	08	62	4	08	122	8	08	182	12	08	242	16	08	302	20	08	2	0	08	0	10
3	0	12	63	4	12	123	8	12	183	12	12	243	16	12	303	20	12	3	0	12	0	14
4	0	16	64	4	16	124	8	16	184	12	16	244	16	16	304	20	16	4	0	16	0	18
5	0	20	65	4	20	125	8	20	185	12	20	245	16	20	305	20	20	5	0	20	0	22
6	0	24	66	4	24	126	8	24	186	12	24	246	16	24	306	20	24	6	0	24	0	26
7	0	28	67	4	28	127	8	28	187	12	28	247	16	28	307	20	28	7	0	28	0	30
8	0	32	68	4	32	128	8	32	188	12	32	248	16	32	308	20	32	8	0	32	0	34
9	0	36	69	4	36	129	8	36	189	12	36	249	16	36	309	20	36	9	0	36	0	38
10	0	40	70	4	40	130	8	40	190	12	40	250	16	40	310	20	40	10	0	40	0	42
11	0	44	71	4	44	131	8	44	191	12	44	251	16	44	311	20	44	11	0	44	0	46
12	0	48	72	4	48	132	8	48	192	12	48	252	16	48	312	20	48	12	0	48	0	50
13	0	52	73	4	52	133	8	52	193	12	52	253	16	52	313	20	52	13	0	52	0	54
14	0	56	74	4	56	134	8	56	194	12	56	254	16	56	314	20	56	14	0	56	0	58
15	1	00	75	5	00	135	9	00	195	13	00	255	17	00	315	21	00	15	1	00	1	02
16	1	04	76	5	04	136	9	04	196	13	04	256	17	04	316	21	04	16	1	04	1	06
17	1	08	77	5	08	137	9	08	197	13	08	257	17	08	317	21	08	17	1	08	1	10
18	1	12	78	5	12	138	9	12	198	13	12	258	17	12	318	21	12	18	1	12	1	14
19	1	16	79	5	16	139	9	16	199	13	16	259	17	16	319	21	16	19	1	16	1	18
20	1	20	80	5	20	140	9	20	200	13	20	260	17	20	320	21	20	20	1	20	1	22
21	1	24	81	5	24	141	9	24	201	13	24	261	17	24	321	21	24	21	1	24	1	26
22	1	28	82	5	28	142	9	28	202	13	28	262	17	28	322	21	28	22	1	28	1	30
23	1	32	83	5	32	143	9	32	203	13	32	263	17	32	323	21	32	23	1	32	1	34
24	1	36	84	5	36	144	9	36	204	13	36	264	17	36	324	21	36	24	1	36	1	38
25	1	40	85	5	40	145	9	40	205	13	40	265	17	40	325	21	40	25	1	40	1	42
26	1	44	86	5	44	146	9	44	206	13	44	266	17	44	326	21	44	26	1	44	1	46
27	1	48	87	5	48	147	9	48	207	13	48	267	17	48	327	21	48	27	1	48	1	50
28	1	52	88	5	52	148	9	52	208	13	52	268	17	52	328	21	52	28	1	52	1	54
29	1	56	89	5	56	149	9	56	209	13	56	269	17	56	329	21	56	29	1	56	1	58
30	2	00	90	6	00	150	10	00	210	14	00	270	18	00	330	22	00	30	2	00	2	02
31	2	04	91	6	04	151	10	04	211	14	04	271	18	04	331	22	04	31	2	04	2	06
32	2	08	92	6	08	152	10	08	212	14	08	272	18	08	332	22	08	32	2	08	2	10
33	2	12	93	6	12	153	10	12	213	14	12	273	18	12	333	22	12	33	2	12	2	14
34	2	16	94	6	16	154	10	16	214	14	16	274	18	16	334	22	16	34	2	16	2	18
35	2	20	95	6	20	155	10	20	215	14	20	275	18	20	335	22	20	35	2	20	2	22
36	2	24	96	6	24	156	10	24	216	14	24	276	18	24	336	22	24	36	2	24	2	26
37	2	28	97	6	28	157	10	28	217	14	28	277	18	28	337	22	28	37	2	28	2	30
38	2	32	98	6	32	158	10	32	218	14	32	278	18	32	338	22	32	38	2	32	2	34
39	2	36	99	6	36	159	10	36	219	14	36	279	18	36	339	22	36	39	2	36	2	38
40	2	40	100	6	40	160	10	40	220	14	40	280	18	40	340	22	40	40	2	40	2	42
41	2	44	101	6	44	161	10	44	221	14	44	281	18	44	341	22	44	41	2	44	2	46
42	2	48	102	6	48	162	10	48	222	14	48	282	18	48	342	22	48	42	2	48	2	50
43	2	52	103	6	52	163	10	52	223	14	52	283	18	52	343	22	52	43	2	52	2	54
44	2	56	104	6	56	164	10	56	224	14	56	284	18	56	344	22	56	44	2	56	2	58
45	3	00	105	7	00	165	11	00	225	15	00	285	19	00	345	23	00	45	3	00	3	02
46	3	04	106	7	04	166	11	04	226	15	04	286	19	04	346	23	04	46	3	04	3	06
47	3	08	107	7	08	167	11	08	227	15	08	287	19	08	347	23	08	47	3	08	3	10
48	3	12	108	7	12	168	11	12	228	15	12	288	19	12	348	23	12	48	3	12	3	14
49	3	16	109	7	16	169	11	16	229	15	16	289	19	16	349	23	16	49	3	16	3	18
50	3	20	110	7	20	170	11	20	230	15	20	290	19	20	350	23	20	50	3	20	3	22
51	3	24	111	7	24	171	11	24	231	15	24	291	19	24	351	23	24	51	3	24	3	26
52	3	28	112	7	28	172	11	28	232	15	28	292	19	28	352	23	28	52	3	28	3	30
53	3	32	113	7	32	173	11	32	233	15	32	293	19	32	353	23	32	53	3	32	3	34
54	3	36	114	7	36	174	11	36	234	15	36	294	19	36	354	23	36	54	3	36	3	38
55	3	40	115	7	40	175	11	40	235	15	40	295	19	40	355	23	40	55	3	40	3	42
56	3	44	116	7	44	176	11	44	236	15	44	296	19	44	356	23	44	56	3	44	3	46
57	3	48	117	7	48	177	11	48	237	15	48	297	19	48	357	23	48	57	3	48	3	50
58	3	52	118	7	52	178	11	52	238	15	52	298	19	52	358	23	52	58	3	52	3	54
59	3	56	119	7	56	179	11	56	239	15	56	299	19	56	359	23	56	59	3	56	3	58

The above table is for converting expressions in arc to their equivalent in time ; its main use in this Almanac is for the conversion of longitude for application to L.M.T. (added if west, subtracted if east) to give G.M.T. or vice

ANNEXURE 5 – NAUTICAL ALMANAC – 1987 MAY 4, 5, 6

1987 MAY 4, 5, 6 (MON., TUES., WED.)

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G.M.T. (UT)	SUN		MOON					Lat.	Twilight		Sunrise	Moonrise					
	G.H.A.		Dec.	G.H.A.		u	Dec.		d	H.P.		Naut.	Civil	4	5	6	7
	d	h		d	h												
MONDAY	00	180 47.0	N15 44.9	108 48.2	10.7	N27 01.3	5.0	54.2	N 72	///	///	01 20	□	□	□	09 54	
	01	195 47.0	45.6	123 17.9	10.8	26 56.3	5.2	54.2	N 70	///	///	02 10	□	□	07 27	10 25	
	02	210 47.1	46.4	137 47.7	10.9	26 51.1	5.2	54.2	68	///	///	02 41	□	□	08 34	10 47	
	03	225 47.2	47.1	152 17.6	10.9	26 45.9	5.4	54.2	66	///	01 33	03 04	□	06 36	09 09	11 05	
	04	240 47.2	47.8	166 47.5	11.0	26 40.5	5.5	54.2	64	///	02 09	03 22	□	07 38	09 34	11 19	
	05	255 47.3	48.6	181 17.5	11.0	26 35.0	5.6	54.2	62	///	02 34	03 37	06 23	08 12	09 54	11 30	
	06	270 47.4	N15 49.3	195 47.5	11.1	N26 29.4	5.8	54.2	60	01 22	02 54	03 49	07 04	08 37	10 10	11 40	
	07	285 47.4	50.0	210 17.6	11.1	26 23.6	5.8	54.2	N 58	01 55	03 10	03 59	07 31	08 57	10 23	11 49	
	08	300 47.5	50.7	224 47.7	11.2	26 17.8	6.0	54.2	56	02 19	03 23	04 09	07 53	09 13	10 35	11 57	
	09	315 47.5	51.5	239 17.9	11.3	26 11.8	6.1	54.2	54	02 37	03 34	04 17	08 11	09 27	10 45	12 03	
	10	330 47.6	52.2	253 48.2	11.3	26 05.7	6.3	54.2	52	02 52	03 44	04 24	08 26	09 39	10 54	12 09	
	11	345 47.7	52.9	268 18.5	11.3	25 59.4	6.3	54.2	50	03 05	03 53	04 31	08 39	09 49	11 02	12 15	
	12	0 47.7	N15 53.7	282 48.8	11.4	N25 53.1	6.5	54.2	45	03 31	04 12	04 45	09 06	10 12	11 19	12 26	
	13	15 47.8	54.4	297 19.2	11.5	25 46.6	6.6	54.2	N 40	03 50	04 26	04 56	09 27	10 29	11 33	12 36	
	14	30 47.8	55.1	311 49.7	11.5	25 40.0	6.7	54.2	35	04 06	04 39	05 06	09 44	10 44	11 44	12 44	
	15	45 47.9	55.8	326 20.2	11.6	25 33.3	6.8	54.2	30	04 18	04 49	05 14	10 00	10 57	11 54	12 51	
	16	60 48.0	56.6	340 50.8	11.7	25 26.5	6.9	54.2	20	04 38	05 06	05 29	10 25	11 19	12 12	13 04	
	17	75 48.0	57.3	355 21.5	11.7	25 19.6	7.1	54.2	N 10	04 54	05 20	05 42	10 47	11 38	12 27	13 14	
	18	90 48.1	N15 58.0	9 52.2	11.7	N25 12.5	7.1	54.2	0	05 07	05 32	05 53	11 07	11 55	12 41	13 24	
	19	105 48.1	58.7	24 22.9	11.8	25 05.4	7.3	54.2	S 10	05 18	05 43	06 05	11 28	12 13	12 55	13 34	
	20	120 48.2	59.5	38 53.7	11.9	24 58.1	7.4	54.2	20	05 28	05 54	06 17	11 50	12 31	13 10	13 45	
	21	135 48.3	60.2	53 24.6	11.9	24 50.7	7.5	54.2	30	05 38	06 06	06 31	12 15	12 53	13 27	13 57	
	22	150 48.3	60.9	67 55.5	12.0	24 43.2	7.6	54.2	35	05 43	06 13	06 39	12 29	13 05	13 36	14 04	
	23	165 48.4	61.6	82 26.5	12.0	24 35.6	7.7	54.2	40	05 48	06 20	06 48	12 47	13 20	13 48	14 12	
24	180 48.4	62.3	96 57.5	12.1	24 27.9	7.8	54.3	45	05 53	06 28	06 59	13 07	13 37	14 01	14 21		
TUESDAY	00	180 48.4	N16 02.4	96 57.5	12.1	N24 27.9	7.8	54.3	S 50	05 58	06 37	07 12	13 33	13 58	14 17	14 32	
	01	195 48.5	03.1	111 28.6	12.2	24 20.1	8.0	54.3	52	06 01	06 41	07 18	13 45	14 08	14 24	14 37	
	02	210 48.5	03.8	125 59.8	12.2	24 12.1	8.0	54.3	54	06 03	06 46	07 24	13 59	14 19	14 32	14 43	
	03	225 48.6	04.5	140 31.0	12.3	24 04.1	8.2	54.3	56	06 06	06 51	07 31	14 16	14 31	14 42	14 49	
	04	240 48.7	05.2	155 02.3	12.3	23 55.9	8.2	54.3	58	06 09	06 56	07 40	14 35	14 46	14 52	14 56	
	05	255 48.7	06.0	169 33.6	12.4	23 47.7	8.4	54.3	S 60	06 12	07 03	07 49	15 00	15 03	15 04	15 03	
	06	270 48.8	N16 06.7	184 05.0	12.5	N23 39.3	8.5	54.3		Lat.	Sunset	Twilight		Moonset			
	07	285 48.8	07.4	198 36.5	12.5	23 30.8	8.6	54.3				Civil	Naut.	4	5	6	7
	08	300 48.9	08.1	213 08.0	12.6	23 22.2	8.6	54.3									
	09	315 48.9	08.8	227 39.6	12.6	23 13.6	8.8	54.3									
	10	330 49.0	09.5	242 11.2	12.7	23 04.8	8.9	54.3									
	11	345 49.1	10.3	256 42.9	12.7	22 55.9	9.0	54.3									
	12	0 49.1	N16 11.0	271 14.6	12.8	N22 46.9	9.1	54.4	N 72	22 44	///	///	□	□	□	04 57	
	13	15 49.2	11.7	285 46.4	12.9	22 37.8	9.2	54.4	N 70	21 49	///	///	□	□	05 50	04 24	
	14	30 49.2	12.4	300 18.3	12.9	22 28.6	9.3	54.4	68	21 16	///	///	□	□	04 42	04 00	
	15	45 49.3	13.1	314 50.2	12.9	22 19.3	9.4	54.4	66	20 52	22 27	///	□	05 03	04 05	03 41	
	16	60 49.3	13.8	329 22.1	13.1	22 09.9	9.4	54.4	64	20 34	21 49	///	□	04 00	03 39	03 26	
	17	75 49.4	14.6	343 54.2	13.0	22 00.5	9.6	54.4	62	20 19	21 22	///	03 34	03 25	03 18	03 13	
	18	90 49.4	N16 15.3	358 26.2	13.2	N21 50.9	9.7	54.4	60	20 06	21 02	22 37	02 53	02 59	03 02	03 02	
	19	105 49.5	16.0	12 58.4	13.1	21 41.2	9.8	54.4	N 58	19 56	20 46	22 02	02 24	02 39	02 47	02 52	
	20	120 49.5	16.7	27 30.5	13.3	21 31.4	9.8	54.4	56	19 46	20 32	21 37	02 02	02 22	02 35	02 44	
	21	135 49.6	17.4	42 02.8	13.3	21 21.6	10.0	54.5	54	19 38	20 21	21 18	01 44	02 08	02 24	02 36	
	22	150 49.6	18.1	56 35.1	13.3	21 11.6	10.1	54.5	52	19 31	20 10	21 03	01 29	01 56	02 15	02 29	
	23	165 49.7	18.8	71 07.4	13.4	21 01.5	10.1	54.5	50	19 24	20 01	20 50	01 15	01 45	02 06	02 23	
24	180 49.7	19.5	85 39.8	13.5	N20 51.4	10.3	54.5	45	19 10	19 43	20 24	00 48	01 21	01 48	02 10		
WEDNESDAY	00	180 49.7	N16 19.5	85 39.8	13.5	N20 51.4	10.3	54.5	N 40	18 58	19 28	20 04	00 26	01 03	01 33	01 59	
	01	195 49.8	20.3	100 12.3	13.5	20 41.1	10.3	54.5	35	18 48	19 16	19 49	00 08	00 47	01 20	01 50	
	02	210 49.8	21.0	114 44.8	13.6	20 30.8	10.4	54.5	30	18 40	19 05	19 36	24 33	00 33	01 09	01 41	
	03	225 49.9	21.7	129 17.4	13.6	20 20.4	10.6	54.5	20	18 25	18 48	19 15	24 10	00 10	00 50	01 27	
	04	240 49.9	22.4	143 50.0	13.6	20 09.8	10.6	54.6	N 10	18 12	18 34	19 00	23 50	24 33	00 33	01 14	
	05	255 50.0	23.1	158 22.6	13.8	19 59.2	10.7	54.6	0	18 00	18 22	18 47	23 31	24 17	00 17	01 02	
	06	270 50.1	N16 23.8	172 55.4	13.7	N19 48.5	10.7	54.6	S 10	17 48	18 10	18 36	23 12	24 02	00 02	00 50	
	07	285 50.1	24.5	187 28.1	13.8	19 37.8	10.9	54.6	20	17 36	17 59	18 25	22 51	23 44	24 37	00 37	
	08	300 50.2	25.2	202 00.9	13.9	19 26.9	11.0	54.6	30	17 22	17 47	18 15	22 27	23 25	24 22	00 22	
	09	315 50.2	25.9	216 33.8	13.9	19 15.9	11.0	54.6	35	17 14	17 40	18 11	22 13	23 13	24 13	00 13	
	10	330 50.3	26.6	231 06.7	14.0	19 04.9	11.2	54.6	40	17 05	17 33	18 05	21 57	23 00	24 03	00 03	
	11	345 50.3	27.3	245 39.7	14.0	18 53.7	11.2	54.7	45	16 54	17 25	18 00	21 37	22 44	23 51	24 59	
	12	0 50.3	N16 28.0	260 12.7	14.0	N18 42.5	11.3	54.7	S 50	16 41	17 16	17 54	21 12	22 24	23 37	24 50	
	13	15 50.4	28.7	274 45.7	14.1	18 31.2	11.3	54.7	52	16 35	17 11	17 52	21 00	22 15	23 30	24 45	
	14	30 50.4	29.4	289 18.8	14.2	18 19.9	11.5	54.7	54	16 29	17 07	17 49	20 46	22 04	23 22	24 41	
	15	45 50.5	30.1	303 52.0	14.1	18 08.4	11.6	54.7	56	16 21	17 02	17 46	20 30	21 52	23 14	24 35	
	16	60 50.5	30.8	318 25.1	14.3	17 56.8	11.6	54.8	58	16 13	16 56	17 43	20 11	21 38	23 04	24 30	
	17	75 50.6	31.5	332 58.4	14.2	17 45.2	11.7	54.8	S 60	16 04	16 50	17 40	19 47	21 21	22 53	24 23	
	18	90 50.6	N16 32.3	347 31.6	14.4	N17 33.5	11.8	54.8									
	19	105 50.7	33.0	2 05.0	14.3	17 21.7	11.8	54.8									
	20	120 50.7	33.7														

ANNEXURE 6 – NAUTICAL ALMANAC – 1987 JUNE 18, 19, 20

1987 JUNE 18, 19, 20 (THURS., FRI., SAT.)

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G.M.T. (UT)	SUN		MOON				La .	Twilight		Sunrise	Moonrise				
	G.H.A.	Dec.	G.H.A.	ν	Dec.	d		Naut.	Civil		18	19	20	21	
d h	° /	° /	° /	'	° /	'	°	h m	h m	h m	h m	h m	h m	h m	h m
18 <															

ANNEXURE 7 – INCREMENTS AND CORRECTIONS

12^m

INCREMENTS AND CORRECTIONS

13^m

12 ^m	SUN PLANETS	ARIES	MOON	$\frac{v}{d}$ or Corr ⁿ	$\frac{v}{d}$ or Corr ⁿ	$\frac{v}{d}$ or Corr ⁿ	13 ^m	SUN PLANETS	ARIES	MOON	$\frac{v}{d}$ or Corr ⁿ	$\frac{v}{d}$ or Corr ⁿ	$\frac{v}{d}$ or Corr ⁿ
00	3 00.0	3 00.5	2 51.8	0.0 0.0	6.0 1.3	12.0 2.5	00	3 15.0	3 15.5	3 06.1	0.0 0.0	6.0 1.4	12.0 2.7
01	3 00.3	3 00.7	2 52.0	0.1 0.0	6.1 1.3	12.1 2.5	01	3 15.3	3 15.8	3 06.4	0.1 0.0	6.1 1.4	12.1 2.7
02	3 00.5	3 01.0	2 52.3	0.2 0.0	6.2 1.3	12.2 2.5	02	3 15.5	3 16.0	3 06.6	0.2 0.0	6.2 1.4	12.2 2.7
03	3 00.8	3 01.2	2 52.5	0.3 0.1	6.3 1.3	12.3 2.6	03	3 15.8	3 16.3	3 06.8	0.3 0.1	6.3 1.4	12.3 2.8
04	3 01.0	3 01.5	2 52.8	0.4 0.1	6.4 1.3	12.4 2.6	04	3 16.0	3 16.5	3 07.1	0.4 0.1	6.4 1.4	12.4 2.8
05	3 01.3	3 01.7	2 53.0	0.5 0.1	6.5 1.4	12.5 2.6	05	3 16.3	3 16.8	3 07.3	0.5 0.1	6.5 1.5	12.5 2.8
06	3 01.5	3 02.0	2 53.2	0.6 0.1	6.6 1.4	12.6 2.6	06	3 16.5	3 17.0	3 07.5	0.6 0.1	6.6 1.5	12.6 2.8
07	3 01.8	3 02.2	2 53.5	0.7 0.1	6.7 1.4	12.7 2.6	07	3 16.8	3 17.3	3 07.8	0.7 0.2	6.7 1.5	12.7 2.9
08	3 02.0	3 02.5	2 53.7	0.8 0.2	6.8 1.4	12.8 2.7	08	3 17.0	3 17.5	3 08.0	0.8 0.2	6.8 1.5	12.8 2.9
09	3 02.3	3 02.7	2 53.9	0.9 0.2	6.9 1.4	12.9 2.7	09	3 17.3	3 17.8	3 08.3	0.9 0.2	6.9 1.6	12.9 2.9
10	3 02.5	3 03.0	2 54.2	1.0 0.2	7.0 1.5	13.0 2.7	10	3 17.5	3 18.0	3 08.5	1.0 0.2	7.0 1.6	13.0 2.9
11	3 02.8	3 03.3	2 54.4	1.1 0.2	7.1 1.5	13.1 2.7	11	3 17.8	3 18.3	3 08.7	1.1 0.2	7.1 1.6	13.1 2.9
12	3 03.0	3 03.5	2 54.7	1.2 0.3	7.2 1.5	13.2 2.8	12	3 18.0	3 18.5	3 09.0	1.2 0.3	7.2 1.6	13.2 3.0
13	3 03.3	3 03.8	2 54.9	1.3 0.3	7.3 1.5	13.3 2.8	13	3 18.3	3 18.8	3 09.2	1.3 0.3	7.3 1.6	13.3 3.0
14	3 03.5	3 04.0	2 55.1	1.4 0.3	7.4 1.5	13.4 2.8	14	3 18.5	3 19.0	3 09.5	1.4 0.3	7.4 1.7	13.4 3.0
15	3 03.8	3 04.3	2 55.4	1.5 0.3	7.5 1.6	13.5 2.8	15	3 18.8	3 19.3	3 09.7	1.5 0.3	7.5 1.7	13.5 3.0
16	3 04.0	3 04.5	2 55.6	1.6 0.3	7.6 1.6	13.6 2.8	16	3 19.0	3 19.5	3 09.9	1.6 0.4	7.6 1.7	13.6 3.1
17	3 04.3	3 04.8	2 55.9	1.7 0.4	7.7 1.6	13.7 2.9	17	3 19.3	3 19.8	3 10.2	1.7 0.4	7.7 1.7	13.7 3.1
18	3 04.5	3 05.0	2 56.1	1.8 0.4	7.8 1.6	13.8 2.9	18	3 19.5	3 20.0	3 10.4	1.8 0.4	7.8 1.8	13.8 3.1
19	3 04.8	3 05.3	2 56.3	1.9 0.4	7.9 1.6	13.9 2.9	19	3 19.8	3 20.3	3 10.7	1.9 0.4	7.9 1.8	13.9 3.1
20	3 05.0	3 05.5	2 56.6	2.0 0.4	8.0 1.7	14.0 2.9	20	3 20.0	3 20.5	3 10.9	2.0 0.5	8.0 1.8	14.0 3.2
21	3 05.3	3 05.8	2 56.8	2.1 0.4	8.1 1.7	14.1 2.9	21	3 20.3	3 20.8	3 11.1	2.1 0.5	8.1 1.8	14.1 3.2
22	3 05.5	3 06.0	2 57.0	2.2 0.5	8.2 1.7	14.2 3.0	22	3 20.5	3 21.0	3 11.4	2.2 0.5	8.2 1.8	14.2 3.2
23	3 05.8	3 06.3	2 57.3	2.3 0.5	8.3 1.7	14.3 3.0	23	3 20.8	3 21.3	3 11.6	2.3 0.5	8.3 1.9	14.3 3.2
24	3 06.0	3 06.5	2 57.5	2.4 0.5	8.4 1.8	14.4 3.0	24	3 21.0	3 21.6	3 11.8	2.4 0.5	8.4 1.9	14.4 3.2
25	3 06.3	3 06.8	2 57.8	2.5 0.5	8.5 1.8	14.5 3.0	25	3 21.3	3 21.8	3 12.1	2.5 0.6	8.5 1.9	14.5 3.3
26	3 06.5	3 07.0	2 58.0	2.6 0.5	8.6 1.8	14.6 3.0	26	3 21.5	3 22.1	3 12.3	2.6 0.6	8.6 1.9	14.6 3.3
27	3 06.8	3 07.3	2 58.2	2.7 0.6	8.7 1.8	14.7 3.1	27	3 21.8	3 22.3	3 12.6	2.7 0.6	8.7 2.0	14.7 3.3
28	3 07.0	3 07.5	2 58.5	2.8 0.6	8.8 1.8	14.8 3.1	28	3 22.0	3 22.6	3 12.8	2.8 0.6	8.8 2.0	14.8 3.3
29	3 07.3	3 07.8	2 58.7	2.9 0.6	8.9 1.9	14.9 3.1	29	3 22.3	3 22.8	3 13.0	2.9 0.7	8.9 2.0	14.9 3.4
30	3 07.5	3 08.0	2 59.0	3.0 0.6	9.0 1.9	15.0 3.1	30	3 22.5	3 23.1	3 13.3	3.0 0.7	9.0 2.0	15.0 3.4
31	3 07.8	3 08.3	2 59.2	3.1 0.6	9.1 1.9	15.1 3.1	31	3 22.8	3 23.3	3 13.5	3.1 0.7	9.1 2.0	15.1 3.4
32	3 08.0	3 08.5	2 59.4	3.2 0.7	9.2 1.9	15.2 3.2	32	3 23.0	3 23.6	3 13.8	3.2 0.7	9.2 2.1	15.2 3.4
33	3 08.3	3 08.8	2 59.7	3.3 0.7	9.3 1.9	15.3 3.2	33	3 23.3	3 23.8	3 14.0	3.3 0.7	9.3 2.1	15.3 3.4
34	3 08.5	3 09.0	2 59.9	3.4 0.7	9.4 2.0	15.4 3.2	34	3 23.5	3 24.1	3 14.2	3.4 0.8	9.4 2.1	15.4 3.5
35	3 08.8	3 09.3	3 00.2	3.5 0.7	9.5 2.0	15.5 3.2	35	3 23.8	3 24.3	3 14.5	3.5 0.8	9.5 2.1	15.5 3.5
36	3 09.0	3 09.5	3 00.4	3.6 0.8	9.6 2.0	15.6 3.3	36	3 24.0	3 24.6	3 14.7	3.6 0.8	9.6 2.2	15.6 3.5
37	3 09.3	3 09.8	3 00.6	3.7 0.8	9.7 2.0	15.7 3.3	37	3 24.3	3 24.8	3 14.9	3.7 0.8	9.7 2.2	15.7 3.5
38	3 09.5	3 10.0	3 00.9	3.8 0.8	9.8 2.0	15.8 3.3	38	3 24.5	3 25.1	3 15.2	3.8 0.9	9.8 2.2	15.8 3.6
39	3 09.8	3 10.3	3 01.1	3.9 0.8	9.9 2.1	15.9 3.3	39	3 24.8	3 25.3	3 15.4	3.9 0.9	9.9 2.2	15.9 3.6
40	3 10.0	3 10.5	3 01.3	4.0 0.8	10.0 2.1	16.0 3.3	40	3 25.0	3 25.6	3 15.7	4.0 0.9	10.0 2.3	16.0 3.6
41	3 10.3	3 10.8	3 01.6	4.1 0.9	10.1 2.1	16.1 3.4	41	3 25.3	3 25.8	3 15.9	4.1 0.9	10.1 2.3	16.1 3.6
42	3 10.5	3 11.0	3 01.8	4.2 0.9	10.2 2.1	16.2 3.4	42	3 25.5	3 26.1	3 16.1	4.2 0.9	10.2 2.3	16.2 3.6
43	3 10.8	3 11.3	3 02.1	4.3 0.9	10.3 2.1	16.3 3.4	43	3 25.8	3 26.3	3 16.4	4.3 1.0	10.3 2.3	16.3 3.7
44	3 11.0	3 11.5	3 02.3	4.4 0.9	10.4 2.2	16.4 3.4	44	3 26.0	3 26.6	3 16.6	4.4 1.0	10.4 2.3	16.4 3.7
45	3 11.3	3 11.8	3 02.5	4.5 0.9	10.5 2.2	16.5 3.4	45	3 26.3	3 26.8	3 16.9	4.5 1.0	10.5 2.4	16.5 3.7
46	3 11.5	3 12.0	3 02.8	4.6 1.0	10.6 2.2	16.6 3.5	46	3 26.5	3 27.1	3 17.1	4.6 1.0	10.6 2.4	16.6 3.7
47	3 11.8	3 12.3	3 03.0	4.7 1.0	10.7 2.2	16.7 3.5	47	3 26.8	3 27.3	3 17.3	4.7 1.1	10.7 2.4	16.7 3.8
48	3 12.0	3 12.5	3 03.3	4.8 1.0	10.8 2.3	16.8 3.5	48	3 27.0	3 27.6	3 17.6	4.8 1.1	10.8 2.4	16.8 3.8
49	3 12.3	3 12.8	3 03.5	4.9 1.0	10.9 2.3	16.9 3.5	49	3 27.3	3 27.8	3 17.8	4.9 1.1	10.9 2.5	16.9 3.8
50	3 12.5	3 13.0	3 03.7	5.0 1.0	11.0 2.3	17.0 3.5	50	3 27.5	3 28.1	3 18.0	5.0 1.1	11.0 2.5	17.0 3.8
51	3 12.8	3 13.3	3 04.0	5.1 1.1	11.1 2.3	17.1 3.6	51	3 27.8	3 28.3	3 18.3	5.1 1.1	11.1 2.5	17.1 3.8
52	3 13.0	3 13.5	3 04.2	5.2 1.1	11.2 2.3	17.2 3.6	52	3 28.0	3 28.6	3 18.5	5.2 1.2	11.2 2.5	17.2 3.9
53	3 13.3	3 13.8	3 04.4	5.3 1.1	11.3 2.4	17.3 3.6	53	3 28.3	3 28.8	3 18.8	5.3 1.2	11.3 2.5	17.3 3.9
54	3 13.5	3 14.0	3 04.7	5.4 1.1	11.4 2.4	17.4 3.6	54	3 28.5	3 29.1	3 19.0	5.4 1.2	11.4 2.6	17.4 3.9
55	3 13.8	3 14.3	3 04.9	5.5 1.1	11.5 2.4	17.5 3.6	55	3 28.8	3 29.3	3 19.2	5.5 1.2	11.5 2.6	17.5 3.9
56	3 14.0	3 14.5	3 05.2	5.6 1.2	11.6 2.4	17.6 3.7	56	3 29.0	3 29.6	3 19.5	5.6 1.3	11.6 2.6	17.6 4.0
57	3 14.3	3 14.8	3 05.4	5.7 1.2	11.7 2.4	17.7 3.7	57	3 29.3	3 29.8	3 19.7	5.7 1.3	11.7 2.6	17.7 4.0
58	3 14.5	3 15.0	3 05.6	5.8 1.2	11.8 2.5	17.8 3.7	58	3 29.5	3 30.1	3 20.0	5.8 1.3	11.8 2.7	17.8 4.0
59	3 14.8	3 15.3	3 05.9	5.9 1.2	11.9 2.5	17.9 3.7	59	3 29.8	3 30.3	3 20.2	5.9 1.3	11.9 2.7	17.9 4.0
60	3 15.0	3 15.5	3 06.1	6.0 1.3	12.0 2.5	18.0 3.8	60	3 30.0	3 30.6	3 20.4	6.0 1.4	12.0 2.7	18.0 4.1