
blue
B


blue B
POLARIS

automatic sextant

digital readouts of coordinates

screen interface

trigger

UT	ARIES	VENUS −3.9		MARS +1.7		JUPITER −2.0		SATURN +0.1		STARS		
	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Name	SHA	Dec
d h	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′		° ′	° ′
10 00	227 37.2	151 33.2	N23 58.3	151 02.2	N23 44.9	124 05.5	N23 04.8	154 31.5	N21 13.0	Acamar	315 25.3	S40 17.8
01	242 39.7	166 32.3	58.7	166 02.9	45.1	139 07.5	04.7	169 33.8	13.1	Achernar	335 33.7	S57 13.5
02	257 42.1	181 31.5	59.1	181 03.5	45.3	154 09.5	04.7	184 35.8	13.1	Acrux	173 16.8	S63 06.9
03	272 44.6	196 30.7	. . 59.5	196 04.2	. . 45.4	169 11.5	. . 04.7	199 37.9	. . 13.1	Adhara	255 19.7	S28 58.7
04	287 47.1	211 29.8	23 59.9	211 04.8	45.6	184 13.5	04.6	214 39.9	13.2	Aldebaran	290 59.0	N16 30.9
05	302 49.5	226 29.1	24 00.3	226 05.5	45.8	199 15.5	04.6	229 42.2	13.2			
06	317 52.0	241 28.3	N24 00.6	241 06.1	N23 45.9	214 17.6	N23 04.5	244 44.3	N21 13.3	Alioth	166 27.8	N55 57.1
07	332 54.4	256 27.5	01.0	256 06.8	46.1	229 19.4	04.5	259 46.5	13.3	Alkaid	153 05.2	N49 18.2
08	347 56.9	271 26.6	01.4	271 07.4	46.3	244 21.4	04.5	274 48.6	13.3	Al Na'ir	27 54.7	S46 56.9
09	2 59.4	286 25.8	. . 01.8	286 08.1	. . 46.4	259 23.4	. . 04.4	289 50.8	. . 13.4	Alnilam	275 55.6	S 1 12.1
10	18 01.8	301 25.0	02.2	301 08.7	46.6	274 25.4	04.4	304 52.9	13.4	Alphard	218 04.7	S 8 40.2
11	33 04.3	316 24.2	02.5	316 09.4	46.8	289 27.4	04.4	319 55.0	13.5			
12	48 06.8	331 23.4	N24 02.9	331 10.0	N23 46.9	304 29.4	N23 04.3	334 57.2	N21 13.5	Alphecca	126 18.0	N26 42.4
13	63 09.2	346 22.6	03.3	346 10.7	47.1	319 31.4	04.3	349 59.3	13.5	Alpheratz	357 52.9	N29 05.9
14	78 11.7	1 21.7	03.7	1 11.3	47.3	334 33.4	04.2	4 01.4	13.6	Altair	62 16.6	N 8 52.3
15	93 14.2	16 20.9	. . 04.0	16 12.0	. . 47.4	349 35.4	. . 04.2	19 03.6	. . 13.6	Ankaa	353 24.6	S42 17.6
16	108 16.6	31 20.1	04.4	31 12.6	47.6	4 37.4	04.2	34 05.7	13.7	Antares	112 36.7	S26 26.2
17	123 19.1	46 19.3	04.8	46 13.3	47.7	19 39.4	04.1	49 07.9	13.7			
18	138 21.5	61 18.5	N24 05.1	61 13.9	N23 47.9	34 41.3	N23 04.1	64 10.0	N21 13.7	Arcturus	146 03.4	N19 10.5
19	153 24.0	76 17.6	05.5	76 14.6	48.1	49 43.3	04.1	79 12.1	13.8	Atria	107 46.0	S69 01.8
20	168 26.5	91 16.8	05.9	91 15.2	48.2	64 45.3	04.0	94 14.3	13.8	Avior	234 21.9	S59 31.3
21	183 28.9	106 16.0	. . 06.2	106 15.9	. . 48.4	79 47.3	. . 04.0	109 16.4	. . 13.9	Bellatrix	278 41.7	N 6 21.0
22	198 31.4	121 15.2	06.6	121 16.6	48.6	94 49.3	03.9	124 18.6	13.9	Betelgeuse	271 11.1	N 7 24.4
23	213 33.9	136 14.4	07.0	136 17.1	48.7	109 51.3	03.9	139 20.7	13.9			
11 00	228 36.3	151 13.6	N24 07.3	151 17.8	N23 48.9	124 53.3	N23 03.9	154 22.8	N21 14.0	Canopus	264 00.4	S52 42.0
01	243 38.8	166 12.7	07.7	166 18.4	49.0	139 55.3	03.8	169 25.0	14.0	Capella	280 47.9	N46 00.1
02	258 41.3	181 11.9	08.0	181 19.1	49.2	154 57.3	03.8	184 27.1	14.1	Deneb	49 37.4	N45 16.9
03	273 43.7	196 11.1	. . 08.4	196 19.7	. . 49.4	169 59.3	. . 03.7	199 29.3	. . 14.1	Denebola	182 42.4	N14 33.6
04	288 46.2	211 10.3	08.8	211 20.4	49.5	185 01.2	03.7	214 31.4	14.1	Diphda	349 04.9	S17 58.6
05	303 48.7	226 09.4	09.1	226 21.0	49.7	200 03.2	03.7	229 33.6	14.2			
06	318 51.1	241 08.6	N24 09.5	241 21.7	N23 49.8	215 05.2	N23 03.6	244 35.7	N21 14.2	Dubhe	194 01.9	N61 48.6
07	333 53.6	256 07.8	09.9	256 22.3	50.0	230 07.2	03.6	259 37.8	14.3	Elnath	278 24.1	N28 36.6
08	348 56.0	271 07.0	10.2	271 23.0	50.1	245 09.2	03.6	274 39.9	14.3	Eltanin	90 49.8	N51 29.1
09	3 58.5	286 06.2	. . 10.6	286 23.6	. . 50.3	260 11.2	. . 03.5	289 42.1	. . 14.3	Enif	33 55.8	N 9 52.9
10	19 01.0	301 05.3	10.9	301 24.3	50.5	275 13.2	03.5	304 44.2	14.4	Fomalhaut	15 33.7	S29 36.6
11	34 03.4	316 04.5	11.2	316 24.9	50.6	290 15.2	03.4	319 46.4	14.4			
12	49 05.9	331 03.7	N24 11.6	331 25.6	N23 50.8	305 17.1	N23 03.4	334 48.5	N21 14.5	Gacrux	172 10.5	S57 07.7
13	64 08.4	346 02.8	11.9	346 26.2	50.9	320 19.1	03.4	349 50.6	14.5	Gienah	176 01.3	S17 33.9
14	79 10.8	1 02.0	12.3	1 26.9	51.1	335 21.1	03.3	4 52.8	14.5	Hadar	148 59.9	S60 23.1
15	94 13.3	16 01.2	. . 12.6	16 27.5	. . 51.2	350 23.1	. . 03.3	19 54.9	. . 14.6	Hamal	328 11.1	N23 28.2
16	109 15.8	31 00.4	12.9	31 28.2	51.4	5 25.1	03.2	34 57.1	14.6	Kaus Aust.	83 56.1	S34 23.0
17	124 18.2	45 59.6	13.3	46 28.9	51.5	20 27.1	03.2	50 59.2	14.7			
18	139 20.7	60 58.8	N24 13.6	61 29.5	N23 51.7	35 29.1	N23 03.2	66 01.3	N21 14.7	Kochab	137 18.2	N74 08.9
19	154 23.1	75 57.9	14.0	76 30.1	51.9	50 31.1	03.1	81 03.5	14.7	Markab	13 47.2	N15 12.8
20	169 25.6	90 57.1	14.3	91 30.8	52.0	65 33.0	03.1	96 05.6	14.8	Menkar	314 24.6	N 4 05.8
21	184 28.1	105 56.3	. . 14.6	106 31.4	. . 52.2	80 35.0	. . 03.0	111 07.7	. . 14.8	Menkent	148 17.6	S36 22.9
22	199 30.5	120 55.5	15.0	121 32.1	52.3	95 37.0	03.0	126 09.9	14.9	Miaplacidus	221 41.8	S69 43.0
23	214 33.0	135 54.6	15.3	136 32.7	52.5	110 39.0	03.0	141 12.0	14.9			
12 00	229 35.5	150 53.8	N24 15.6	151 33.4	N23 52.6	125 41.0	N23 02.9	156 14.2	N21 14.9	Mirfak	308 52.5	N49 52.1
01	244 37.9	165 53.0	16.0	166 34.0	52.8	140 43.0	02.9	171 16.3	15.0	Nunki	76 08.8	S26 17.4
02	259 40.4	180 52.2	16.3	181 34.7	52.9	155 45.0	02.9	186 18.4	15.0	Peacock	53 32.7	S56 43.5
03	274 42.8	195 51.3	. . 16.6	196 35.3	. . 53.1	170 46.9	. . 02.8	201 20.6	. . 15.0	Pollux	243 36.6	N28 01.8
04	289 45.3	210 50.5	17.0	211 35.9	53.2	185 48.9	02.8	216 22.7	15.1	Procyon	245 09.1	N 5 13.1
05	304 47.8	225 49.7	17.3	226 36.6	53.4	200 50.9	02.7	231 24.8	15.1			
06	319 50.3	240 48.8	N24 17.6	241 37.2	N23 53.5	215 52.9	N23 02.7	246 27.0	N21 15.2	Rasalhague	96 14.3	N12 33.4
07	334 52.7	255 48.0	17.9	256 37.9	53.7	230 54.9	02.7	261 29.1	15.2	Regulus	207 52.0	N11 57.4
08	349 55.2	270 47.2	18.3	271 38.5	53.8	245 56.9	02.6	276 31.2	15.2	Rigel	281 20.8	S 8 12.0
09	4 57.6	285 46.4	. . 18.6	286 39.2	. . 54.0	260 58.8	. . 02.6	291 33.4	. . 15.3	Rigil Kent.	140 03.3	S60 50.7
10	20 00.1	300 45.5	18.9	301 39.8	54.1	276 00.8	02.5	306 35.5	15.3	Sabik	102 22.3	S15 43.7
11	35 02.6	315 44.7	19.2	316 40.5	54.3	291 02.8	02.5	321 37.7	15.4			
12	50 05.0	330 43.8	N24 19.5	331 41.1	N23 54.4	306 04.8	N23 02.5	336 39.8	N21 15.4	Schedar	349 51.2	N56 32.7
13	65 07.5	345 43.1	19.9	346 41.8	54.6	321 06.8	02.4	351 41.9	15.4	Shaula	96 33.5	S37 06.3
14	80 10.0	0 42.2	20.2	1 42.4	54.7	336 08.8	02.4	6 44.1	15.5	Sirius	258 41.7	S16 43.9
15	95 12.4	15 41.4	. . 20.5	16 43.1	. . 54.9	351 10.7	. . 02.3	21 46.2	. . 15.5	Spica	158 40.2	S11 10.4
16	110 14.9	30 40.6	20.8	31 43.7	55.0	6 12.7	02.3	36 48.3	15.6	Suhail	222 59.0	S43 26.7
17	125 17.4	45 39.8	21.1	46 44.4	55.1	21 14.7	02.3	51 50.5	15.6			
18	140 19.8	60 38.9	N24 21.4	61 45.0	N23 55.3	36 16.7	N23 02.2	66 52.6	N21 15.6	Vega	80 48.6	N38 46.9

UT	SUN		MOON					Lat.	Twilight Naut.	Twilight Civil	Sunrise	Moonrise 10	Moonrise 11	Moonrise 12	Moonrise 13
	GHA	Dec	GHA	v	Dec	d	HP								
d h	° ′	° ′	° ′	′	° ′	′	′	°	h m	h m	h m	h m	h m	h m	h m
10 00	180 54.3	N17 31.0	205 56.8	16.1	N 4 25.8	12.5	54.4	N 72				03 19	02 53	02 37	
01	195 54.3	31.6	220 31.9	16.1	4 38.3	12.4	54.4	N 70	////	////	01 25	03 26	03 08	02 45	02 06
02	210 54.3	32.3	235 07.0	16.0	4 50.7	12.5	54.4	68	////	////	02 10	03 31	03 20	03 06	02 47
03	225 54.3	. . 32.9	249 42.0	16.0	5 03.2	12.5	54.4	66	////	////	02 39	03 36	03 30	03 23	03 15
04	240 54.4	33.6	264 17.0	16.0	5 15.7	12.4	54.4	64	////	01 35	03 01	03 40	03 38	03 37	03 37
05	255 54.4	34.3	278 52.0	16.0	5 28.1	12.5	54.4	62	////	02 09	03 18	03 44	03 46	03 48	03 55
06	270 54.4	N17 34.9	293 27.0	15.9	N 5 40.6	12.4	54.5	60	00 25	02 33	03 33	03 47	03 52	03 58	04 09
07	285 54.4	35.6	308 01.9	15.9	5 53.0	12.4	54.5	N 58	01 25	02 52	03 45	03 50	03 58	04 08	04 22
08	300 54.5	36.2	322 36.8	15.8	6 05.4	12.4	54.5	56	01 56	03 07	03 55	03 52	04 03	04 16	04 32
09	315 54.5	. . 36.9	337 11.6	15.8	6 17.8	12.3	54.5	54	02 19	03 20	04 05	03 54	04 07	04 23	04 42
10	330 54.5	37.5	351 46.4	15.8	6 30.1	12.4	54.5	52	02 36	03 32	04 13	03 56	04 11	04 29	04 51
11	345 54.5	38.2	6 21.2	15.7	6 42.5	12.3	54.5	50	02 51	03 42	04 20	03 58	04 15	04 35	04 58
12	0 54.5	N17 38.8	20 55.9	15.7	N 6 54.8	12.3	54.5	45	03 20	04 02	04 34	04 02	04 23	04 47	05 15
13	15 54.6	39.5	35 30.6	15.7	7 07.1	12.3	54.5	N 40	03 42	04 19	04 46	04 06	04 30	04 57	05 28
14	30 54.6	40.2	50 05.3	15.6	7 19.4	12.3	54.6	35	03 59	04 32	05 00	04 09	04 36	05 06	05 40
15	45 54.6	. . 40.8	64 39.9	15.5	7 31.7	12.2	54.6	30	04 12	04 44	05 09	04 11	04 41	05 14	05 50
16	60 54.6	41.5	79 14.4	15.6	7 43.9	12.3	54.6	20	04 35	05 02	05 24	04 14	04 50	05 27	06 07
17	75 54.7	42.1	93 49.0	15.4	7 56.2	12.2	54.6	N 10	04 52	05 18	05 40	04 20	04 58	05 38	06 23
18	90 54.7	N17 42.8	108 23.4	15.5	N 8 08.4	12.1	54.6	0	05 06	05 31	05 53	04 24	05 06	05 50	06 37
19	105 54.7	43.4	122 57.9	15.4	8 20.5	12.2	54.6	S 10	05 18	05 44	06 06	04 28	05 14	06 01	06 52
20	120 54.7	44.1	137 32.3	15.3	8 32.7	12.1	54.6	20	05 30	05 56	06 20	04 32	05 22	06 13	07 07
21	135 54.7	. . 44.7	152 06.6	15.3	8 44.8	12.1	54.7	30	05 41	06 10	06 35	04 37	05 31	06 27	07 25
22	150 54.8	45.4	166 40.9	15.3	8 56.9	12.1	54.7	35	05 47	06 17	06 44	04 40	05 37	06 35	07 36
23	165 54.8	46.0	181 15.2	15.2	9 09.0	12.0	54.7	40	05 53	06 25	06 54	04 43	05 43	06 45	07 49
11 00	180 54.8	N17 46.6	195 49.4	15.2	N 9 21.0	12.0	54.7	45	05 59	06 35	07 06	04 46	05 50	06 56	08 02
01	195 54.8	47.3	210 23.6	15.1	9 33.0	12.0	54.7	S 50	06 06	06 46	07 21	04 51	05 59	07 09	08 20
02	210 54.8	47.9	224 57.7	15.0	9 45.0	11.9	54.7	52	06 09	06 50	07 28	04 53	06 03	07 15	08 28
03	225 54.8	. . 48.6	239 31.7	15.0	9 56.9	11.9	54.7	54	06 13	06 54	07 35	04 55	06 08	07 22	08 38
04	240 54.8	49.2	254 05.7	15.0	10 08.8	11.9	54.8	56	06 16	06 59	07 43	04 58	06 13	07 30	08 48
05	255 54.8	49.8	268 39.7	14.9	10 20.7	11.8	54.8	S 60	06 20	07 05	07 53	05 01	06 19	07 38	09 00
06	270 54.8	N17 50.5	283 13.6	14.9	N10 32.5	11.8	54.8								
07	285 54.9	51.2	297 47.5	14.8	10 44.3	11.8	54.8								
08	300 54.9	51.8	312 21.3	14.7	10 56.1	11.7	54.8								
09	315 55.0	. . 52.5	326 55.0	14.7	11 07.8	11.7	54.8								
10	330 55.0	53.1	341 28.7	14.6	11 19.5	11.7	54.9								
11	345 55.0	53.7	356 02.3	14.6	11 31.2	11.6	54.9								
12	0 55.0	N17 54.4	10 35.9	14.5	N11 42.8	11.6	54.9								
13	15 55.0	55.0	25 09.4	14.4	11 54.4	11.5	54.9								
14	30 55.0	55.7	39 42.8	14.4	12 05.9	11.5	54.9								
15	45 55.0	. . 56.3	54 16.2	14.4	12 17.4	11.5	54.9								
16	60 55.1	56.9	68 49.6	14.2	12 28.9	11.4	54.9								
17	75 55.1	57.6	83 22.8	14.3	12 40.3	11.3	55.0								
18	90 55.1	N17 58.2	97 56.1	14.1	N12 51.6	11.3	55.0								
19	105 55.1	58.8	112 29.2	14.1	13 02.9	11.3	55.0								
20	120 55.1	17 59.5	127 02.3	14.0	13 14.2	11.2	55.0								
21	135 55.1	18 00.1	141 35.3	14.0	13 25.4	11.1	55.0								
22	150 55.1	00.8	156 08.3	13.9	13 36.5	11.2	55.0								
23	165 55.2	01.4	170 41.2	13.8	13 47.7	11.0	55.1								
12 00	180 55.2	N18 02.0	185 14.0	13.7	N13 58.7	11.0	55.1								
01	195 55.2	02.7	199 46.7	13.7	14 09.7	11.0	55.1								
02	210 55.2	03.3	214 19.4	13.7	14 20.7	10.9	55.1								
03	225 55.3	. . 03.9	228 52.1	13.6	14 31.6	10.8	55.1								
04	240 55.3	04.6	243 24.6	13.5	14 42.4	10.8	55.2								
05	255 55.3	05.2	257 57.1	13.4	14 53.2	10.7	55.2								
06	270 55.3	N18 05.8	272 29.5	13.4	N15 03.9	10.7	55.2								
07	285 55.3	06.5	287 01.9	13.3	15 14.6	10.6	55.2								
08	300 55.3	07.1	301 34.2	13.2	15 25.2	10.5	55.2								
09	315 55.3	. . 07.7	316 06.4	13.1	15 35.7	10.5	55.2								
10	330 55.3	08.3	330 38.5	13.1	15 46.2	10.5	55.3								
11	345 55.3	09.0	345 10.6	13.0	15 56.7	10.3	55.3								
12	0 55.3	N18 09.6	359 42.6	12.9	N16 07.0	10.3	55.3								
13	15 55.3	10.2	14 14.5	12.8	16 17.3	10.2	55.3								
14	30 55.3	10.8	28 46.3	12.8	16 27.5	10.2	55.3								
15	45 55.3	. . 11.5	43 18.1	12.7	16 37.7	10.1	55.3								
16	60 55.4	12.1	57 49.8	12.6	16 47.8	10.0	55.4								
17	75 55.4	12.7	72 21.4	12.6	16 57.8	9.9	55.4								
18	90 55.4	N18 13.4	86 53.0	12.4	N17 07.7	9.9	55.4								

Lat.	Sunset	Twilight Civil	Twilight Naut.	Moonset 10	Moonset 11	Moonset 12	Moonset 13
°	h m	h m	h m	h m	h m	h m	h m
N 72				18 32	20 39		
N 70	22 35	////	////	18 19	20 12	22 27	
68	21 47	////	////	18 09	19 52	21 47	24 15
66	21 17	////	////	18 00	19 37	21 29	23 14
64	20 54	22 23	////	17 53	19 24	20 58	22 40
62	20 37	21 47	////	17 47	19 13	20 43	22 15
60	20 22	21 22	////	17 42	19 04	20 29	21 55
N 58	20 09	21 03	22 32	17 37	18 56	20 17	21 39
56	19 59	20 47	22 00	17 33	18 49	20 07	21 25
54	19 49	20 34	21 36	17 30	18 43	19 58	21 14
52	19 41	20 22	21 18	17 26	18 37	19 50	21 03
50	19 33	20 12	21 03	17 23	18 32	19 43	20 54
45	19 17	19 51	20 34	17 17	18 21	19 27	20 35
N 40	19 04	19 35	20 12	17 12	18 12	19 15	20 19
35	18 53	19 21	19 55	17 07	18 05	19 04	20 05
30	18 44	19 10	19 41	17 03	17 58	18 56	19 54
20	18 27	18 51	19 19	16 56	17 46	18 38	19 34
N 10	18 13	18 35	19 01	16 50	17 36	18 25	19 17
0	18 00	18 22	18 47	16 44	17 27	18 12	19 01
S 10	17 47	18 09	18 34	16 38	17 17	18 00	18 45
20	17 33	17 56	18 23	16 32	17 07	17 46	18 28
30	17 17	17 42	18 11	16 25	16 56	17 30	18 09
35	17 08	17 35	18 05	16 21	16 50	17 21	17 57
40	16 58	17 27	17 58	16 17	16 42	17 11	17 45
45	16 46	17 17	17 53	16 11	16 33	16 59	17 29
S 50	16 31	17 07	17 46	16 05	16 23	16 44	17 11
52	16 25	17 02	17 43	16 02	16 18	16 38	17 02
54	16 17	16 56	17 39	15 59	16 13	16 30	16 52
56	16 09	16 50	17 36	15 56	16 07	16 22	16 41
58	15 59	16 44	17 32	15 52	16 01	16 12	16 29
S 60	15 48	16 36	17 28	15 48	15 54	16 02	16 14

SUN | MOON

Description	**Automated sextant** that makes celestial navigation easier
Customers	**Bluewater sailors** looking for a more convenient sextant
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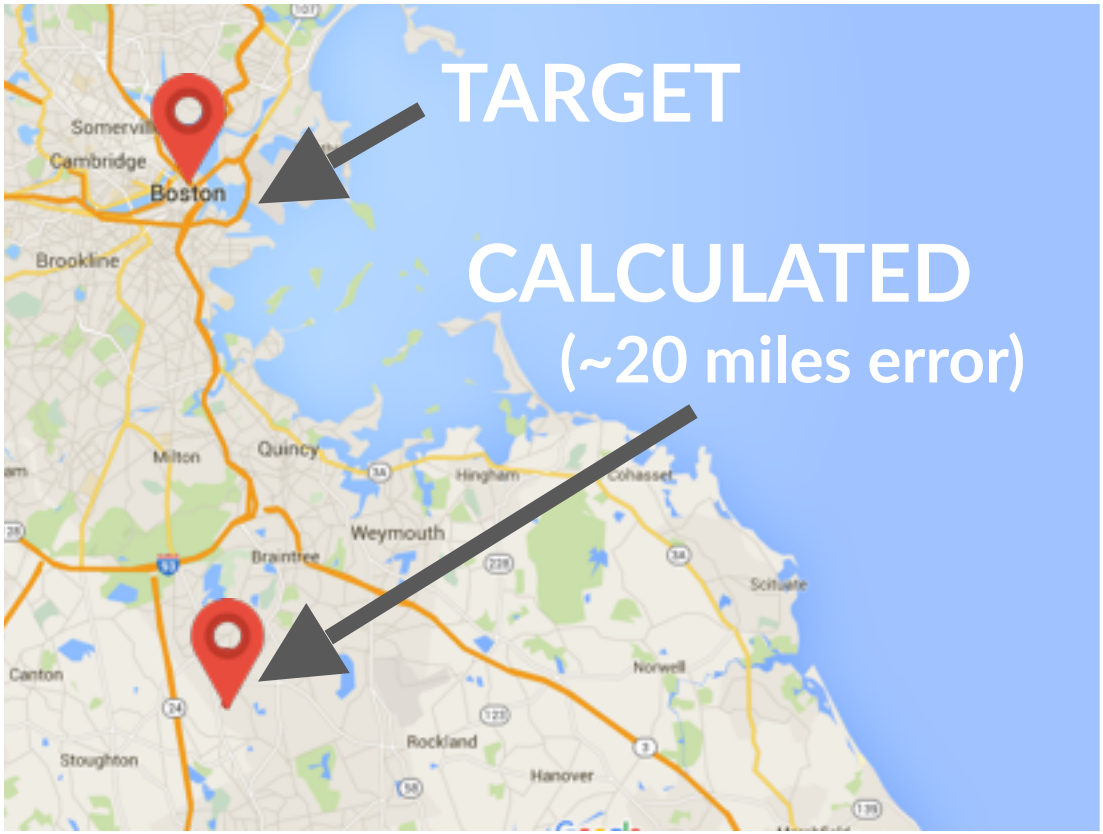
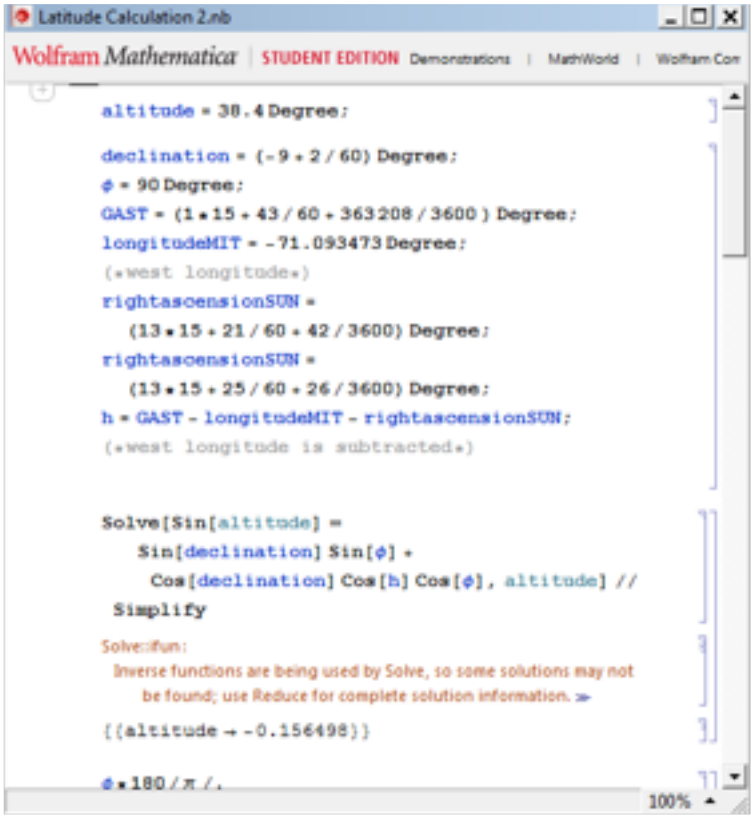
augmented sextant

low-mid range sextant: $250



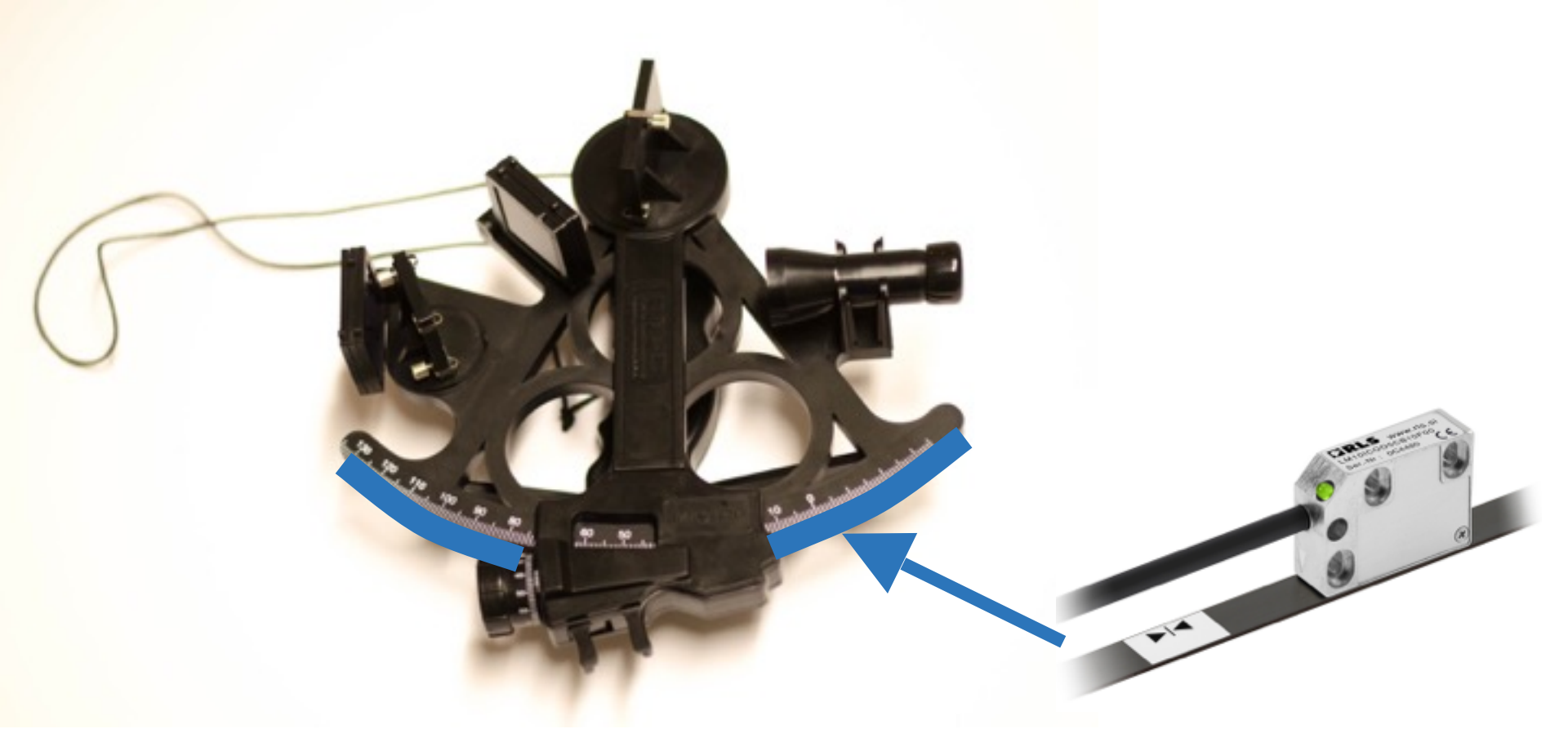


Need	Attribute	Specification
Calculates latitude and longitude	Accuracy	Returns a result within 5 miles of actual location

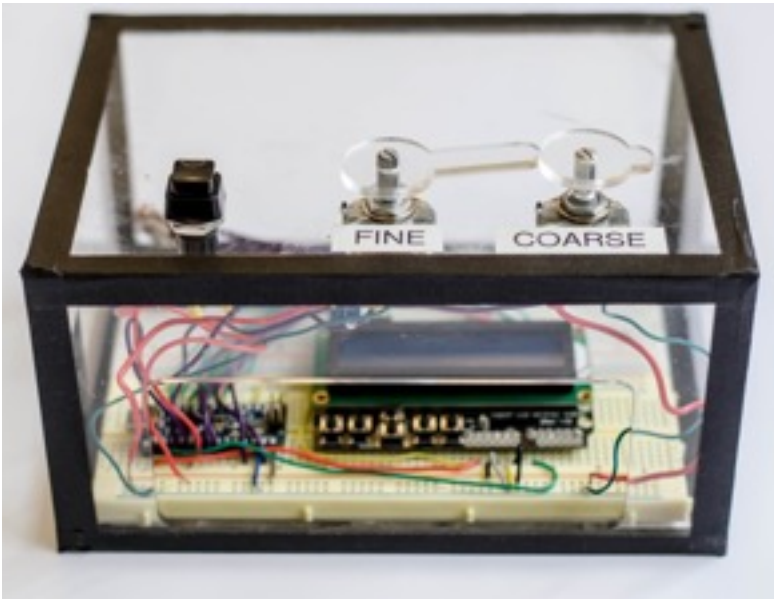
Coarse/Fine Measurement (2 readings)

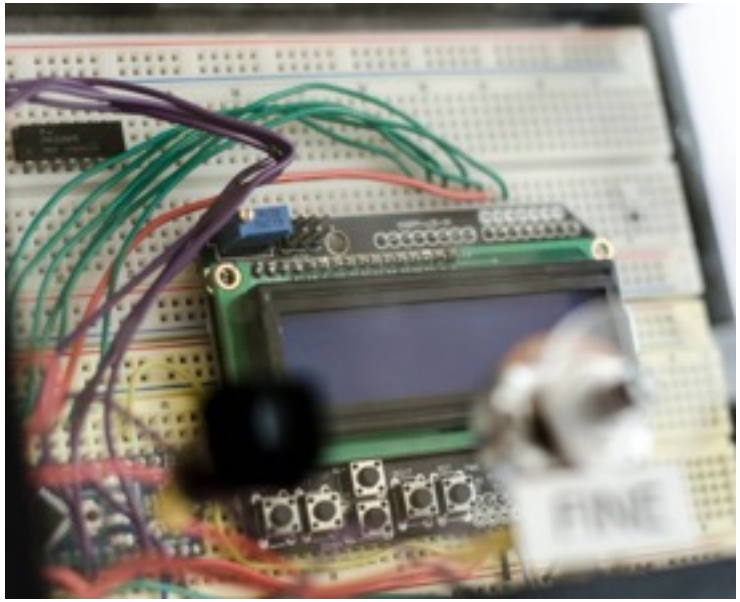
All-in-One Measurement (1 reading)

Need	Attribute	Specification
Calculates latitude and longitude	Precision	Can resolve angles to 1/600th of a degree



Need	Attribute	Specification
Calculates latitude and longitude	Precision	Can resolve angles to 1/600th of a degree





Sextant interface, capable of angle detection and computation

Need	Attribute	Specification
Functions at all times of day	Versatility	Relies on stars brighter than magnitude 2
Ease of use	Intuitive Interface	User can locate screen and buttons within 3 seconds

screen interface

trigger

Need	Attribute	Specification
Ease of handling	Weight & Form Factor	- Less than 4 pounds - Less than 13.5” x 11.5” x 4”

Water and Corrosion Resistance

Correction Factors

Implement Linear Encoder

Integration onto Sextant


POLARIS
simpler star guidance