NAVIGATIONAL DOs AND DON'Ts

1. **PLOT YOUR COURSE ON A MAP AND PLAN ANY DETOURS**
   A. DON'T MAKE UP THE ROUTE ON THE GROUND AS YOU GO
   B. WHEN THE FINAL ROUTE IS DECIDED, FILL OUT A NAVIGATIONAL DATA SHEET
2. **CHECK THE COMPASS AND MAP AT REGULAR INTERVALS**
   DON'T RELY ON YOUR SENSE OF DIRECTION
3. **LOCATE EACH BOUND BEFORE PROCEEDING TO THE NEXT CHECKPOINT**
   A. DON'T ESTIMATE POSITION AND PROCEED ON AN ASSUMPTION
   B. *BOUNDS SHOULD BE INMISTAKABLE OBJECTS*
4. **COUNT PACES AND ESTIMATE DISTANCE**
   A. DON'T RELY ON INSTINCT TO JUDGE DISTANCE TRAVELLED
   B. THE TENDENCY IN CLOSE COUNTRY IS TO OVER-ESTIMATE
5. **WHEN THE OBJECTIVE IS SMALL, ALLOW FOR ERROR**
   A. DON'T EXPECT ACCURACY WITHIN METRES WHEN BOUNDS ARE LONG DISTANCES APART
   B. AIM OFF, USING AN AUXILIARY OBJECT
6. **STAY STRICTLY ON THE BEARING**
   A. DON'T LET SCOUTS DRIFT OFF COURSE TO TAKE AN EASIER ROUTE
   B. WITH TRAINING, SCOUTS CAN MAINTAIN DIRECTION FOR LONG PERIODS WITHOUT NEED OF CORRECTION
7. **BYPASS BAD GOING BY DELIBERATE MEASURED BEARING**
8. DON'T ATTEMPT TO GUESS YOUR WAY AROUND AN OBSTACLE
9. **IF GROUND DOES NOT CONFORM TO MAP:**
   A. STOP;
   B. MENTALLY GO BACK OVER COURSE TO FIND WHERE THE ERROR OCCURRED; AND
   C. **RECONNOITRE TO FIND LANDMARK**
   D. DON'T BLAME AIDS AND CARRY ON
9. ***REMEMBER***:
   a. *A. THE COMPASS IS RIGHT*
   B. THE MAP IS RIGHT
   C. YOU ARE PROBABLY WRONG

DEGREES TO MILS CONVERSION

1	18	46	818	91	1618	136	2418	181	3218	226	4018	271	4818	316	5618
2	36	47	836	92	1636	137	2436	182	3236	227	4036	272	4836	317	5636
3	53	48	853	93	1653	138	2453	183	3253	228	4053	273	4853	318	5653
4	71	49	871	94	1671	139	2471	184	3271	229	4071	274	4871	319	5671
5	89	50	889	95	1689	140	2489	185	3289	230	4089	275	4889	320	5689
6	107	51	907	96	1707	141	2507	186	3307	231	4107	276	4907	321	5707
7	124	52	924	97	1724	142	2524	187	3324	232	4124	277	4924	322	5724
8	142	53	942	98	1742	143	2542	188	3342	233	4142	278	4942	323	5742
9	160	54	960	99	1760	144	2560	189	3360	234	4160	279	4960	324	5760
10	178	55	978	100	1778	145	2578	190	3378	235	4178	280	4978	325	5778
11	196	56	996	101	1796	146	2596	191	3396	236	4196	281	4996	326	5796
12	213	57	1013	102	1813	147	2613	192	3413	237	4213	282	5013	327	5813
13	231	58	1031	103	1831	148	2631	193	3431	238	4231	283	5031	328	5831
14	249	59	1049	104	1849	149	2649	194	3449	239	4249	284	5049	329	5849
15	267	60	1067	105	1867	150	2667	195	3467	240	4267	285	5067	330	5867
16	284	61	1084	106	1884	151	2684	196	3484	241	4284	286	5084	331	5884
17	302	62	1102	107	1902	152	2702	197	3502	242	4302	287	5102	332	5902
18	320	63	1120	108	1920	153	2720	198	3520	243	4320	288	5120	333	5920
19	338	64	1138	109	1938	154	2738	199	3538	244	4338	289	5138	334	5938
20	356	65	1156	110	1956	155	2756	200	3556	245	4356	290	5156	335	5956
21	373	66	1173	111	1973	156	2773	201	3573	246	4373	291	5173	336	5973
22	391	67	1191	112	1991	157	2791	202	3591	247	4391	292	5191	337	5991
23	409	68	1209	113	2009	158	2809	203	3609	248	4409	293	5209	338	6009
24	427	69	1227	114	2027	159	2827	204	3627	249	4427	294	5227	339	6027
25	444	70	1244	115	2044	160	2844	205	3644	250	4444	295	5244	340	6044
26	462	71	1262	116	2062	161	2862	206	3662	251	4462	296	5262	341	6062
27	480	72	1280	117	2080	162	2880	207	3680	252	4480	297	5280	342	6080
28	498	73	1298	118	2098	163	2898	208	3698	253	4498	298	5298	343	6098
29	516	74	1316	119	2116	164	2916	209	3716	254	4516	299	5316	344	6116
30	533	75	1333	120	2133	165	2933	210	3733	255	4533	300	5333	345	6133
31	551	76	1351	121	2151	166	2951	211	3751	256	4551	301	5351	346	6151
32	569	77	1369	122	2169	167	2969	212	3769	257	4569	302	5369	347	6169
33	587	78	1387	123	2187	168	2987	213	3787	258	4587	303	5387	348	6187
34	604	79	1404	124	2204	169	3004	214	3804	259	4604	304	5404	349	6204
35	622	80	1422	125	2222	170	3022	215	3822	260	4622	305	5422	350	6222
36	640	81	1440	126	2240	171	3040	216	3840	261	4640	306	5440	351	6240
37	658	82	1458	127	2258	172	3058	217	3858	262	4658	307	5458	352	6258
38	676	83	1476	128	2276	173	3076	218	3876	263	4676	308	5476	353	6276
39	693	84	1493	129	2293	174	3093	219	3893	264	4693	309	5493	354	6293
40	711	85	1511	130	2311	175	3111	220	3911	265	4711	310	5511	355	6311
41	729	86	1529	131	2329	176	3129	221	3929	266	4729	311	5529	356	6329
42	747	87	1547	132	2347	177	3147	222	3947	267	4747	312	5547	357	6347
43	764	88	1564	133	2364	178	3164	223	3964	268	4764	313	5564	358	6364
44	782	89	1582	134	2382	179	3182	224	3982	269	4782	314	5582	359	6382
45	800	90	1600	135	2400	180	3200	225	4000	270	4800	315	5600	360	6400

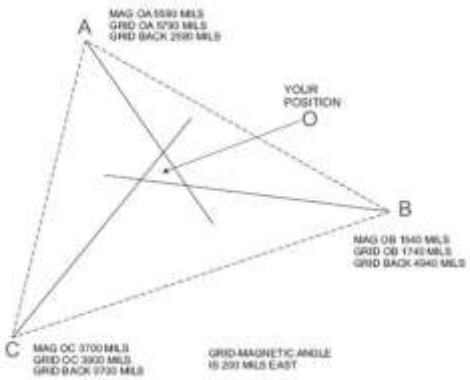
NAVIGATIONAL DATA SHEET

Bound	From GR And Descr (a)	To GR And Descr (b)	Magnetic Bearing (c)	Distance (m & paces) (d)	Estimated time (minutes) (e)	Going (f)	Remarks (g)

RESECTION SEQUENCE

1. SELECT THREE PROMINENT, WIDELY SPACED FEATURES THAT CAN BE RECOGNISED ON THE MAP AND ON THE GROUND. TWO FEATURES CAN BE USED TO OBTAIN AN APPROXIMATE POSITION.
2. ON THE GROUND, TAKE MAGNETIC BEARINGS TO THESE FEATURES WITH A COMPASS
3. CONVERT THESE MAGNETIC BEARINGS TO GRID BEARINGS (MGA).
4. CONVERT THE GRID BEARINGS TO BACK BEARINGS (ADD OR SUBTRACT 3200 MILS).
5. USING A PROTRACTOR, PLOT ON THE MAP THE BACK BEARINGS FROM THE IDENTIFIED FEATURES.
6. THESE LINES WILL EITHER INTERSECT TO LOCATE YOUR POSITION OR FORM A SMALL TRIANGLE OF ERROR WHICH WILL INDICATE THE AREA IN WHICH YOU ARE LOCATED.

EXAMPLE



TRIANGLE OF ERROR

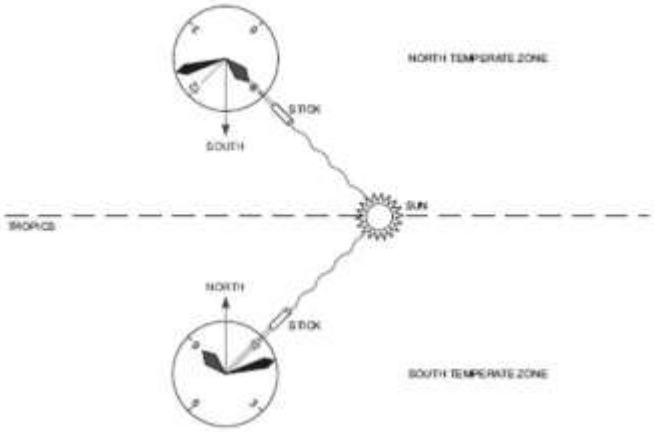
1. IF THE TRIANGLE OF ERROR IS INSIDE THE TRIANGLE FORMED BY THE THREE FEATURES (ABC), YOUR TRUE POSITION WILL BE INSIDE THE TRIANGLE OF ERROR. IF THE TRIANGLE OF ERROR IS OUTSIDE THE TRIANGLE ABC, THEN YOUR TRUE POSITION WILL BE OUTSIDE THE TRIANGLE OF ERROR;

2. IF THE TRIANGLE OF ERROR IS OUTSIDE THE TRIANGLE FORMED BY THE THREE FEATURES, ABC, THEN YOUR TRUE POSITION WILL BE EITHER TO THE LEFT OR RIGHT WHEN FACING THE FIXED POINTS OF ALL THE LINES DRAWN ON THE MAP FROM THE RESPECTIVE FEATURES THROUGH THE TRIANGLE OF ERROR; AND

3. REGARDLESS OF WHETHER YOUR TRUE POSITION IS INSIDE OR OUTSIDE THE TRIANGLE OF ERROR, THE DISTANCE FROM THAT POSITION TO THE LINES WILL BE DIRECTLY PROPORTIONAL TO THE LENGTH OF THE LINES (THAT IS, YOUR POSITION WILL BE NEAREST TO THE SHORTEST LINE AND FURTHEST FROM THE LONGEST LINE). DEPENDING ON THE SIZE OF THE TRIANGLE OF ERROR, YOUR POSITION WITHIN THE TRIANGLE CAN BE WORKED OUT EXACTLY BY THIS METHOD. BY APPROXIMATIONS, YOUR TRUE POSITION CAN BE CONFIRMED BY RELATING THE MAP TO THE GROUND.

FINDING DIRECTION

FINDING NORTH USING THE WATCH METHOD

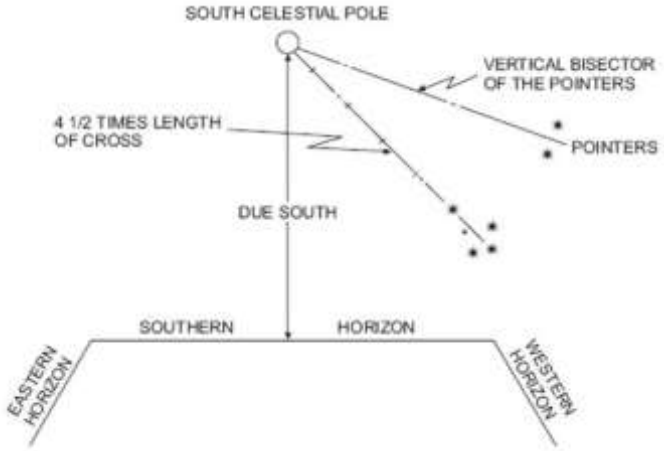


FINDING DIRECTION FROM THE SOUTHERN POLAR SKY

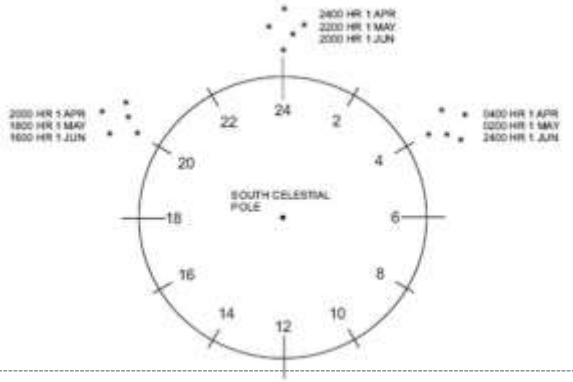
THE SOUTH CELESTIAL POLE CAN BE FOUND BY EXTENDING THE LONGEST AXIS OF THE SOUTHERN CROSS FOUR AND A HALF TIMES. THIS SHOULD BE CHECKED BY ENSURING THAT THE VERTICAL BISECTOR OF THE LINE JOINING THE POINTERS MEETS THE SOUTHERN CROSS PROLONGATION AT THIS SAME IMAGINARY POINT. THIS POINT IS THE GENERAL DIRECTION OF SOUTH.

THE POINTERS SHOULD ALWAYS BE USED AS A CHECK, TO ENSURE THAT ONE OF THE FALSE CROSSES HAS NOT BEEN USED BY MISTAKE.

FINDING SOUTH USING THE SOUTHERN CROSS



CALCULATING THE POSITION OF THE SOUTHERN CROSS



ESTIMATING DISTANCE (PACES)

KEY (SEE DIAGRAM)	GRADIENT	DISTANCE		PACES				
				UPHILL		DOWNHILL		AVERAGE
		MAP	GROUND	NUMBER PER 100 m	LENGTH cm	NUMBER PER 100 m	LENGTH cm	NUMBER PER 200 m
A	1 IN 1	100	180	600	30	400	45	1000
B	1 IN 1	100	141	313	45	225	60	548
C	1 IN 2	100	112	167	60	105	68	352
D	1 IN 3	100	103	154	65	140	75	294
E	1 IN 5	100	100	133	75	133	75	266

NOTES: 1 PACES DO NOT LENGTHEN APPRECIABLY ON STEEP DOWNGRADES
2 OBSTRUCTION AND TRAVERSING INCREASE NUMBER OF PACES
3 CAUTIOUS APPROACH SHORTENS PACES
4 EXPERIENCE AND PRACTICE ARE THE ONLY SURE MEANS OF ACHIEVING ACCURACY