

**DECLINATION AND TIME EQUATION TABLE (JANUARY-AUGUST)**

DAY	<i>J</i>	$\delta^\circ$	<i>E<sub>t</sub></i> (min)	<i>J</i>	$\delta^\circ$	<i>E<sub>t</sub></i> (min)	<i>J</i>	$\delta^\circ$	<i>E<sub>t</sub></i> (min)	<i>J</i>	$\delta^\circ$	<i>E<sub>t</sub></i> (min)
1	1	-23.06	-2.90	60	-7.88	-12.91	121	14.83	3.02	182	23.18	-3.46
2	2	-22.98	-3.35	61	-7.50	-12.73	122	15.13	3.15	183	23.11	-3.66
3	3	-22.89	-3.79	62	-7.12	-12.54	123	15.43	3.27	184	23.04	-3.86
4	4	-22.80	-4.23	63	-6.73	-12.35	124	15.73	3.38	185	22.96	-4.05
5	5	-22.70	-4.67	64	-6.35	-12.14	125	16.02	3.48	186	22.88	-4.24
6	6	-22.59	-5.09	65	-5.96	-11.92	126	16.31	3.57	187	22.78	-4.42
7	7	-22.47	-5.52	66	-5.57	-11.70	127	16.59	3.65	188	22.69	-4.60
8	8	-22.35	-5.93	67	-5.19	-11.47	128	16.87	3.72	189	22.58	-4.77
9	9	-22.21	-6.34	68	-4.79	-11.23	129	17.14	3.78	190	22.47	-4.93
10	10	-22.07	-6.74	69	-4.40	-10.98	130	17.41	3.83	191	22.35	-5.09
11	11	-21.93	-7.14	70	-4.01	-10.72	131	17.67	3.87	192	22.23	-5.24
12	12	-21.77	-7.52	71	-3.62	-10.46	132	17.93	3.90	193	22.09	-5.39
13	13	-21.61	-7.90	72	-3.23	-10.19	133	18.18	3.92	194	21.96	-5.53
14	14	-21.45	-8.27	73	-2.83	-9.92	134	18.43	3.94	195	21.81	-5.66
15	15	-21.27	-8.63	74	-2.44	-9.64	135	18.67	3.94	196	21.66	-5.79
16	16	-21.09	-8.99	75	-2.04	-9.36	136	18.91	3.93	197	21.51	-5.90
17	17	-20.90	-9.33	76	-1.65	-9.07	137	19.14	3.91	198	21.35	-6.01
18	18	-20.71	-9.66	77	-1.25	-8.77	138	19.37	3.88	199	21.18	-6.11
19	19	-20.51	-9.99	78	-0.86	-8.47	139	19.59	3.85	200	21.00	-6.20
20	20	-20.30	-10.30	79	-0.46	-8.17	140	19.81	3.80	201	20.82	-6.28
21	21	-20.09	-10.60	80	-0.07	-7.86	141	20.02	3.74	202	20.64	-6.35
22	22	-19.87	-10.89	81	0.33	-7.55	142	20.23	3.68	203	20.44	-6.42
23	23	-19.64	-11.18	82	0.72	-7.24	143	20.43	3.61	204	20.25	-6.47
24	24	-19.41	-11.45	83	1.12	-6.93	144	20.62	3.52	205	20.04	-6.52
25	25	-19.17	-11.70	84	1.51	-6.61	145	20.81	3.43	206	19.84	-6.55
26	26	-18.92	-11.95	85	1.90	-6.29	146	20.99	3.33	207	19.62	-6.58
27	27	-18.67	-12.19	86	2.30	-5.97	147	21.16	3.23	208	19.40	-6.59
28	28	-18.42	-12.41	87	2.69	-5.66	148	21.33	3.11	209	19.18	-6.60
29	29	-18.15	-12.62	88	3.08	-5.34	149	21.50	2.99	210	18.95	-6.59
30	30	-17.89	-12.82	89	3.47	-5.02	150	21.65	2.86	211	18.71	-6.57
31	31	-17.61	-13.00	90	3.86	-4.70	151	21.80	2.72	212	18.47	-6.55
1	32	-17.34	-13.18	91	4.24	-4.38	152	21.95	2.58	213	18.22	-6.51
2	33	-17.05	-13.34	92	4.63	-4.06	153	22.09	2.42	214	17.97	-6.46
3	34	-16.76	-13.49	93	5.01	-3.75	154	22.22	2.27	215	17.72	-6.41
4	35	-16.47	-13.62	94	5.40	-3.44	155	22.34	2.10	216	17.46	-6.34
5	36	-16.17	-13.75	95	5.78	-3.13	156	22.46	1.93	217	17.19	-6.26
6	37	-15.87	-13.86	96	6.16	-2.82	157	22.58	1.76	218	16.92	-6.17
7	38	-15.56	-13.95	97	6.53	-2.51	158	22.68	1.58	219	16.65	-6.07
8	39	-15.25	-14.04	98	6.91	-2.21	159	22.78	1.39	220	16.37	-5.96
9	40	-14.93	-14.11	99	7.28	-1.92	160	22.87	1.20	221	16.09	-5.83
10	41	-14.61	-14.16	100	7.66	-1.62	161	22.96	1.01	222	15.80	-5.70
11	42	-14.29	-14.21	101	8.03	-1.34	162	23.04	0.81	223	15.51	-5.56
12	43	-13.96	-14.24	102	8.39	-1.05	163	23.11	0.60	224	15.21	-5.40
13	44	-13.63	-14.26	103	8.76	-0.78	164	23.18	0.40	225	14.91	-5.24
14	45	-13.29	-14.27	104	9.12	-0.50	165	23.23	0.19	226	14.61	-5.07
15	46	-12.95	-14.26	105	9.48	-0.24	166	23.29	-0.02	227	14.30	-4.88
16	47	-12.61	-14.24	106	9.84	0.02	167	23.33	-0.24	228	13.99	-4.69
17	48	-12.26	-14.21	107	10.19	0.28	168	23.37	-0.45	229	13.67	-4.48
18	49	-11.91	-14.17	108	10.55	0.52	169	23.40	-0.67	230	13.36	-4.27
19	50	-11.56	-14.11	109	10.89	0.76	170	23.42	-0.89	231	13.03	-4.05
20	51	-11.20	-14.04	110	11.24	1.00	171	23.44	-1.11	232	12.71	-3.82
21	52	-10.84	-13.96	111	11.58	1.22	172	23.45	-1.32	233	12.38	-3.57
22	53	-10.48	-13.87	112	11.92	1.44	173	23.46	-1.54	234	12.05	-3.32
23	54	-10.12	-13.76	113	12.26	1.65	174	23.45	-1.76	235	11.71	-3.06
24	55	-9.75	-13.65	114	12.60	1.85	175	23.44	-1.98	236	11.38	-2.80
25	56	-9.38	-13.52	115	12.93	2.04	176	23.42	-2.20	237	11.03	-2.52
26	57	-9.01	-13.39	116	13.25	2.23	177	23.40	-2.42	238	10.69	-2.24
27	58	-8.63	-13.24	117	13.57	2.40	178	23.37	-2.63	239	10.34	-1.95
28	59	-8.26	-13.08	118	13.89	2.57	179	23.33	-2.84	240	9.99	-1.65
29				119	14.21	2.73	180	23.29	-3.05	241	9.64	-1.34
30				120	14.52	2.88	181	23.24	-3.26	242	9.29	-1.03
31										243	8.93	-0.71

(Calculations from Spencer formula)

**DECLINATION AND TIME EQUATION TABLE (SEPTEMBER-DECEMBER)**

DAY	<i>J</i>	$\delta^\circ$	<i>E<sub>t</sub></i> (min)	<i>J</i>	$\delta^\circ$	<i>E<sub>t</sub></i> (min)
1	244	8.57	-0.38	305	-14.19	16.39
2	245	8.21	-0.05	306	-14.51	16.39
3	246	7.85	0.29	307	-14.83	16.37
4	247	7.48	0.63	308	-15.14	16.35
5	248	7.11	0.98	309	-15.46	16.31
6	249	6.74	1.33	310	-15.76	16.25
7	250	6.37	1.69	311	-16.06	16.18
8	251	6.00	2.05	312	-16.36	16.10
9	252	5.62	2.41	313	-16.65	16.01
10	253	5.25	2.78	314	-16.94	15.90
11	254	4.87	3.15	315	-17.22	15.77
12	255	4.49	3.52	316	-17.50	15.64
13	256	4.11	3.89	317	-17.77	15.49
14	257	3.73	4.27	318	-18.04	15.33
15	258	3.34	4.64	319	-18.30	15.15
16	259	2.96	5.02	320	-18.56	14.96
17	260	2.57	5.40	321	-18.81	14.76
18	261	2.19	5.77	322	-19.06	14.55
19	262	1.80	6.15	323	-19.30	14.32
20	263	1.41	6.52	324	-19.53	14.08
21	264	1.03	6.90	325	-19.76	13.83
22	265	0.64	7.27	326	-19.98	13.57
23	266	0.25	7.64	327	-20.20	13.30
24	267	-0.14	8.01	328	-20.41	13.01
25	268	-0.53	8.37	329	-20.61	12.71
26	269	-0.92	8.73	330	-20.81	12.41
27	270	-1.31	9.09	331	-21.00	12.09
28	271	-1.70	9.44	332	-21.18	11.76
29	272	-2.09	9.79	333	-21.36	11.42
30	273	-2.48	10.13	334	-21.53	11.07
1	274	-2.87	10.47	335	-21.69	10.72
2	275	-3.25	10.80	336	-21.85	10.35
3	276	-3.64	11.13	337	-22.00	9.98
4	277	-4.03	11.44	338	-22.14	9.59
5	278	-4.42	11.76	339	-22.27	9.20
6	279	-4.80	12.06	340	-22.40	8.80
7	280	-5.19	12.36	341	-22.52	8.40
8	281	-5.57	12.65	342	-22.64	7.98
9	282	-5.95	12.93	343	-22.74	7.56
10	283	-6.33	13.20	344	-22.84	7.14
11	284	-6.71	13.46	345	-22.93	6.71
12	285	-7.09	13.71	346	-23.01	6.27
13	286	-7.47	13.95	347	-23.09	5.83
14	287	-7.84	14.19	348	-23.16	5.38
15	288	-8.22	14.41	349	-23.22	4.93
16	289	-8.59	14.62	350	-23.27	4.48
17	290	-8.96	14.82	351	-23.32	4.02
18	291	-9.33	15.01	352	-23.35	3.56
19	292	-9.69	15.19	353	-23.38	3.10
20	293	-10.06	15.36	354	-23.41	2.64
21	294	-10.42	15.51	355	-23.42	2.17
22	295	-10.77	15.66	356	-23.43	1.71
23	296	-11.13	15.79	357	-23.42	1.24
24	297	-11.48	15.91	358	-23.41	0.78
25	298	-11.83	16.01	359	-23.40	0.31
26	299	-12.18	16.11	360	-23.37	-0.16
27	300	-12.52	16.19	361	-23.34	-0.62
28	301	-12.86	16.25	362	-23.30	-1.08
29	302	-13.20	16.31	363	-23.25	-1.54
30	303	-13.53	16.35	364	-23.19	-2.00
31	304	-13.86	16.37	365	-23.13	-2.45

(Calculations from Spencer formula)