

EPHEMERIS FOR PHYSICAL OBSERVATIONS
FOR 0^h TERRESTRIAL TIME

Date	The Earth's			Physical			The Sun's		Position	Angle	Frac-
0 ^h TT	Selenographic			Libration			Selenographic			Bright	tion
	Long.	Lat.	Lg.	Lt.	P.A.		Colong.	Lat.	Axis	Limb	Illum.
	°	°		(0°001)			°	°	°	°	
Jan.	0	+4.395	+4.969	+ 8	- 32	- 5	212.01	+ 0.21	18.301	104.39	0.205
	1	+4.820	+3.734	+ 8	- 32	- 6	224.19	+ 0.24	14.045	99.39	0.124
	2	+5.029	+2.309	+ 8	- 31	- 7	236.37	+ 0.27	8.920	94.13	0.061
	3	+5.014	+0.780	+ 8	- 31	- 6	248.56	+ 0.30	3.340	89.64	0.020
	4	+4.774	-0.765	+ 7	- 32	- 6	260.75	+ 0.33	357.744	93.31	0.002
	5	+4.310	-2.246	+ 7	- 32	- 5	272.94	+ 0.35	352.503	247.96	0.004
	6	+3.632	-3.593	+ 6	- 32	- 4	285.12	+ 0.38	347.862	248.54	0.027
	7	+2.757	-4.750	+ 5	- 32	- 2	297.31	+ 0.40	343.952	246.59	0.068
	8	+1.713	-5.676	+ 3	- 33	0	309.49	+ 0.42	340.828	245.01	0.125
	9	+0.538	-6.342	+ 2	- 33	+ 2	321.67	+ 0.44	338.513	244.17	0.195
	10	-0.722	-6.730	0	- 34	+ 4	333.85	+ 0.46	337.029	244.14	0.275
	11	-2.008	-6.830	- 1	- 34	+ 6	346.02	+ 0.48	336.409	244.95	0.363
	12	-3.252	-6.640	- 2	- 35	+ 8	358.18	+ 0.50	336.710	246.62	0.456
	13	-4.384	-6.159	- 4	- 35	+ 10	10.34	+ 0.52	338.006	249.16	0.551
	14	-5.327	-5.395	- 5	- 36	+ 11	22.49	+ 0.54	340.366	252.59	0.646
	15	-6.009	-4.363	- 5	- 36	+ 12	34.64	+ 0.56	343.827	256.84	0.738
	16	-6.363	-3.088	- 5	- 36	+ 12	46.78	+ 0.59	348.338	261.73	0.823
	17	-6.338	-1.616	- 5	- 36	+ 12	58.91	+ 0.61	353.709	266.82	0.897
	18	-5.907	-0.010	- 5	- 36	+ 11	71.04	+ 0.64	359.592	271.14	0.954
	19	-5.072	+1.638	- 5	- 36	+ 9	83.17	+ 0.67	5.535	271.02	0.989
	20	-3.877	+3.220	- 4	- 35	+ 7	95.29	+ 0.70	11.084	161.72	0.999
	21	-2.405	+4.616	- 4	- 35	+ 5	107.42	+ 0.73	15.868	119.95	0.982
	22	-0.771	+5.713	- 3	- 35	+ 3	119.55	+ 0.76	19.632	118.37	0.937
	23	+0.890	+6.427	- 3	- 34	+ 1	131.68	+ 0.80	22.211	118.01	0.867
	24	+2.444	+6.710	- 3	- 34	- 2	143.81	+ 0.83	23.493	116.97	0.777
	25	+3.782	+6.556	- 2	- 33	- 4	155.96	+ 0.85	23.409	114.92	0.673
	26	+4.831	+5.999	- 2	- 33	- 5	168.11	+ 0.88	21.933	111.79	0.562
	27	+5.554	+5.096	- 2	- 33	- 6	180.27	+ 0.91	19.118	107.69	0.450
	28	+5.952	+3.922	- 2	- 33	- 7	192.43	+ 0.94	15.122	102.83	0.343
	29	+6.046	+2.557	- 2	- 33	- 8	204.60	+ 0.97	10.223	97.59	0.246
	30	+5.872	+1.084	- 2	- 33	- 8	216.78	+ 0.99	4.798	92.45	0.161
31	+5.469	-0.420	- 3	- 33	- 7	228.96	+ 1.02	359.256	88.10	0.093	
Feb.	1	+4.873	-1.880	- 4	- 33	- 7	241.15	+ 1.04	353.958	85.63	0.043
	2	+4.114	-3.229	- 5	- 34	- 6	253.34	+ 1.06	349.167	88.70	0.012
	3	+3.213	-4.410	- 6	- 34	- 4	265.54	+ 1.08	345.045	144.45	0.001
	4	+2.191	-5.377	- 7	- 34	- 2	277.73	+ 1.10	341.676	228.66	0.009
	5	+1.062	-6.094	- 9	- 35	0	289.92	+ 1.12	339.103	236.55	0.035
	6	-0.153	-6.539	- 10	- 35	+ 2	302.11	+ 1.13	337.355	239.08	0.078
	7	-1.428	-6.700	- 12	- 36	+ 4	314.30	+ 1.15	336.468	240.96	0.135
	8	-2.725	-6.575	- 13	- 36	+ 5	326.48	+ 1.16	336.484	243.11	0.205
	9	-3.997	-6.168	- 15	- 37	+ 7	338.66	+ 1.17	337.459	245.83	0.286
	10	-5.181	-5.489	- 16	- 37	+ 9	350.84	+ 1.18	339.447	249.26	0.376
	11	-6.207	-4.557	- 17	- 37	+ 10	3.01	+ 1.19	342.477	253.41	0.471
	12	-6.993	-3.396	- 18	- 37	+ 10	15.17	+ 1.20	346.525	258.23	0.570
	13	-7.457	-2.039	- 18	- 37	+ 10	27.32	+ 1.22	351.467	263.50	0.669
	14	-7.521	-0.537	- 18	- 37	+ 10	39.47	+ 1.23	357.053	268.84	0.764
	15	-7.126	+1.043	- 18	- 37	+ 9	51.62	+ 1.25	2.918	273.64	0.850

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Date	The Earth's Selenographic		Physical Libration			The Sun's Selenographic		Position	Angle	Frac-
0 ^h TT	Long.	Lat.	Lg.	Lt.	P.A.	Colong.	Lat.	Axis	Bright Limb	tion Illum.
	°	°		(0°001)		°	°	°	°	
Feb. 15	-7.126	+1.043	- 18	- 37	+ 9	51.62	+ 1.25	2.918	273.64	0.850
16	-6.241	+2.611	- 17	- 36	+ 7	63.76	+ 1.26	8.642	276.89	0.922
17	-4.886	+4.057	- 17	- 36	+ 5	75.89	+ 1.28	13.822	276.02	0.972
18	-3.138	+5.262	- 16	- 35	+ 3	88.03	+ 1.30	18.129	250.47	0.997
19	-1.132	+6.114	- 15	- 34	0	100.16	+ 1.32	21.313	139.00	0.992
20	+0.951	+6.535	- 15	- 34	- 2	112.29	+ 1.33	23.188	124.85	0.958
21	+2.921	+6.494	- 14	- 33	- 4	124.43	+ 1.35	23.625	119.88	0.896
22	+4.612	+6.012	- 13	- 33	- 6	136.57	+ 1.37	22.563	115.64	0.813
23	+5.907	+5.152	- 13	- 33	- 8	148.72	+ 1.38	20.044	110.96	0.714
24	+6.755	+4.000	- 13	- 33	- 9	160.88	+ 1.40	16.236	105.68	0.608
25	+7.155	+2.650	- 12	- 33	- 10	173.04	+ 1.41	11.442	100.02	0.499
26	+7.148	+1.193	- 12	- 33	- 10	185.22	+ 1.43	6.059	94.34	0.393
27	+6.797	-0.289	- 12	- 33	- 9	197.39	+ 1.44	0.508	89.05	0.295
28	+6.171	-1.725	- 13	- 34	- 9	209.58	+ 1.46	355.153	84.60	0.208
Mar. 1	+5.336	-3.055	- 14	- 34	- 8	221.77	+ 1.47	350.262	81.39	0.134
2	+4.349	-4.226	- 15	- 35	- 6	233.97	+ 1.48	345.997	80.01	0.075
3	+3.255	-5.194	- 16	- 35	- 5	246.17	+ 1.50	342.450	81.94	0.033
4	+2.084	-5.923	- 17	- 36	- 3	258.37	+ 1.51	339.673	94.19	0.008
5	+0.860	-6.390	- 19	- 36	- 1	270.58	+ 1.51	337.703	174.13	0.002
6	-0.402	-6.577	- 20	- 37	+ 1	282.78	+ 1.52	336.582	224.83	0.013
7	-1.686	-6.481	- 22	- 37	+ 3	294.98	+ 1.52	336.356	235.31	0.042
8	-2.971	-6.105	- 23	- 38	+ 5	307.19	+ 1.53	337.077	240.84	0.088
9	-4.225	-5.463	- 25	- 38	+ 6	319.39	+ 1.53	338.792	245.51	0.148
10	-5.404	-4.577	- 26	- 38	+ 7	331.58	+ 1.53	341.520	250.29	0.222
11	-6.451	-3.475	- 27	- 39	+ 8	343.77	+ 1.53	345.233	255.43	0.307
12	-7.294	-2.193	- 27	- 39	+ 8	355.96	+ 1.52	349.823	260.94	0.401
13	-7.852	-0.775	- 27	- 38	+ 8	8.14	+ 1.52	355.083	266.61	0.502
14	-8.041	+0.722	- 27	- 38	+ 7	20.31	+ 1.52	0.715	272.12	0.606
15	-7.786	+2.227	- 27	- 37	+ 6	32.48	+ 1.52	6.363	277.01	0.709
16	-7.032	+3.650	- 27	- 37	+ 4	44.64	+ 1.52	11.668	280.78	0.805
17	-5.769	+4.889	- 26	- 36	+ 2	56.79	+ 1.52	16.307	282.69	0.888
18	-4.045	+5.835	- 26	- 35	- 1	68.94	+ 1.52	20.003	281.21	0.952
19	-1.978	+6.390	- 25	- 34	- 3	81.09	+ 1.52	22.517	268.83	0.989
20	+0.253	+6.489	- 24	- 33	- 5	93.23	+ 1.52	23.644	168.50	0.997
21	+2.439	+6.120	- 23	- 33	- 8	105.38	+ 1.52	23.232	127.02	0.975
22	+4.377	+5.324	- 22	- 32	- 9	117.53	+ 1.52	21.233	116.89	0.924
23	+5.917	+4.187	- 21	- 32	- 11	129.69	+ 1.52	17.757	109.74	0.850
24	+6.970	+2.817	- 20	- 32	- 12	141.85	+ 1.52	13.094	103.03	0.759
25	+7.518	+1.323	- 20	- 32	- 12	154.02	+ 1.51	7.679	96.52	0.659
26	+7.593	-0.197	- 19	- 32	- 12	166.19	+ 1.51	1.995	90.45	0.554
27	+7.257	-1.664	- 19	- 33	- 11	178.38	+ 1.52	356.464	85.11	0.451
28	+6.592	-3.012	- 19	- 33	- 10	190.57	+ 1.52	351.388	80.73	0.352
29	+5.678	-4.193	- 20	- 34	- 9	202.77	+ 1.52	346.940	77.49	0.262
30	+4.590	-5.167	- 21	- 35	- 7	214.97	+ 1.52	343.212	75.51	0.182
31	+3.391	-5.903	- 22	- 35	- 5	227.18	+ 1.52	340.247	75.02	0.115
Apr. 1	+2.131	-6.379	- 23	- 36	- 3	239.39	+ 1.52	338.077	76.59	0.062
2	+0.847	-6.578	- 25	- 37	- 1	251.61	+ 1.51	336.740	82.13	0.025

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	Long.	Lat.	Lg.	Lt.	P.A.	Colong.	Lat.	Axis	Limb	Illum.	
	°	°		(0°001)		°	°	°	°		
Apr.	1	+2.131	-6.379	- 23	- 36	- 3	239.39	+ 1.52	338.077	76.59	0.062
	2	+0.847	-6.578	- 25	- 37	- 1	251.61	+ 1.51	336.740	82.13	0.025
	3	-0.436	-6.495	- 26	- 37	+ 1	263.83	+ 1.51	336.287	103.11	0.005
	4	-1.699	-6.130	- 27	- 38	+ 2	276.05	+ 1.50	336.774	200.12	0.003
	5	-2.925	-5.496	- 29	- 38	+ 4	288.27	+ 1.50	338.255	234.18	0.019
	6	-4.093	-4.617	- 30	- 39	+ 5	300.49	+ 1.49	340.754	244.82	0.053
	7	-5.173	-3.522	- 31	- 39	+ 6	312.71	+ 1.47	344.245	252.08	0.104
	8	-6.126	-2.252	- 31	- 39	+ 6	324.92	+ 1.46	348.622	258.59	0.170
	9	-6.899	-0.856	- 32	- 39	+ 6	337.13	+ 1.45	353.684	264.86	0.252
	10	-7.428	+0.610	- 32	- 39	+ 5	349.34	+ 1.43	359.148	270.85	0.345
	11	-7.643	+2.079	- 32	- 38	+ 4	1.53	+ 1.42	4.685	276.33	0.447
	12	-7.475	+3.476	- 31	- 38	+ 3	13.73	+ 1.40	9.972	281.00	0.555
	13	-6.870	+4.715	- 31	- 37	+ 1	25.91	+ 1.39	14.719	284.56	0.664
	14	-5.807	+5.703	- 30	- 36	- 2	38.09	+ 1.37	18.679	286.70	0.767
	15	-4.310	+6.349	- 30	- 35	- 4	50.26	+ 1.35	21.631	287.03	0.858
	16	-2.463	+6.578	- 29	- 34	- 6	62.43	+ 1.34	23.358	284.72	0.931
	17	-0.408	+6.349	- 28	- 33	- 9	74.60	+ 1.32	23.657	276.62	0.979
	18	+1.671	+5.668	- 27	- 32	- 11	86.76	+ 1.30	22.379	222.14	0.998
	19	+3.587	+4.595	- 25	- 32	- 12	98.93	+ 1.28	19.503	123.97	0.987
	20	+5.179	+3.228	- 24	- 31	- 13	111.09	+ 1.26	15.210	108.89	0.948
	21	+6.340	+1.686	- 23	- 31	- 14	123.26	+ 1.25	9.891	99.97	0.885
	22	+7.022	+0.088	- 22	- 31	- 14	135.44	+ 1.23	4.074	92.59	0.805
	23	+7.229	-1.466	- 21	- 31	- 14	147.62	+ 1.22	358.274	86.24	0.712
	24	+7.005	-2.896	- 21	- 32	- 13	159.81	+ 1.20	352.883	80.97	0.613
	25	+6.419	-4.145	- 21	- 32	- 12	172.01	+ 1.19	348.135	76.83	0.513
	26	+5.547	-5.172	- 21	- 33	- 10	184.21	+ 1.18	344.137	73.83	0.415
	27	+4.469	-5.950	- 22	- 33	- 8	196.42	+ 1.17	340.929	71.95	0.322
	28	+3.258	-6.460	- 22	- 34	- 6	208.64	+ 1.16	338.530	71.19	0.236
	29	+1.979	-6.689	- 23	- 35	- 4	220.86	+ 1.15	336.965	71.59	0.161
	30	+0.684	-6.632	- 25	- 36	- 2	233.09	+ 1.13	336.272	73.36	0.098
May	1	-0.583	-6.291	- 26	- 36	0	245.32	+ 1.12	336.510	77.08	0.050
	2	-1.792	-5.674	- 27	- 37	+ 2	257.55	+ 1.11	337.736	85.03	0.017
	3	-2.916	-4.802	- 27	- 37	+ 3	269.79	+ 1.09	339.995	119.80	0.002
	4	-3.935	-3.704	- 28	- 38	+ 4	282.02	+ 1.07	343.278	235.45	0.005
	5	-4.825	-2.422	- 29	- 38	+ 4	294.26	+ 1.05	347.497	253.81	0.029
	6	-5.563	-1.007	- 29	- 38	+ 4	306.49	+ 1.03	352.459	262.79	0.071
	7	-6.116	+0.479	- 29	- 38	+ 3	318.73	+ 1.01	357.878	269.89	0.132
	8	-6.446	+1.967	- 29	- 38	+ 2	330.95	+ 0.99	3.414	276.03	0.210
	9	-6.511	+3.380	- 29	- 37	+ 1	343.17	+ 0.96	8.734	281.24	0.303
	10	-6.272	+4.639	- 29	- 37	- 1	355.39	+ 0.94	13.557	285.40	0.407
	11	-5.697	+5.661	- 28	- 36	- 3	7.60	+ 0.91	17.656	288.37	0.517
	12	-4.777	+6.369	- 27	- 35	- 5	19.80	+ 0.88	20.845	290.05	0.630
	13	-3.532	+6.695	- 27	- 34	- 7	32.00	+ 0.85	22.942	290.29	0.738
	14	-2.023	+6.593	- 26	- 33	- 9	44.19	+ 0.83	23.764	288.92	0.834
	15	-0.347	+6.050	- 25	- 32	- 11	56.38	+ 0.80	23.140	285.63	0.913
	16	+1.365	+5.097	- 23	- 32	- 13	68.56	+ 0.76	20.962	279.41	0.968
	17	+2.976	+3.805	- 22	- 31	- 14	80.74	+ 0.73	17.271	261.37	0.996

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	°	°		(0°001)		°	°	°	°	
May 17	+2.976	+3.805	− 22	− 31	− 14	80.74	+ 0.73	17.271	261.37	0.996
18	+4.357	+2.277	− 20	− 30	− 15	92.92	+ 0.70	12.323	114.43	0.996
19	+5.408	+0.635	− 19	− 30	− 16	105.10	+ 0.67	6.580	96.35	0.968
20	+6.070	− 1.006	− 18	− 30	− 16	117.28	+ 0.65	0.600	87.90	0.917
21	+6.322	− 2.545	− 17	− 30	− 15	129.47	+ 0.62	354.876	81.54	0.848
22	+6.180	− 3.907	− 16	− 31	− 14	141.66	+ 0.59	349.742	76.59	0.765
23	+5.683	− 5.038	− 16	− 31	− 12	153.86	+ 0.57	345.373	72.89	0.674
24	+4.892	− 5.906	− 16	− 31	− 11	166.07	+ 0.55	341.833	70.34	0.578
25	+3.873	− 6.492	− 16	− 32	− 9	178.28	+ 0.53	339.139	68.85	0.481
26	+2.699	− 6.788	− 17	− 33	− 6	190.50	+ 0.52	337.300	68.36	0.386
27	+1.441	− 6.791	− 18	− 33	− 4	202.73	+ 0.50	336.337	68.83	0.296
28	+0.164	− 6.504	− 18	− 34	− 2	214.96	+ 0.48	336.294	70.27	0.214
29	− 1.071	− 5.937	− 19	− 35	0	227.20	+ 0.47	337.227	72.71	0.141
30	− 2.215	− 5.107	− 20	− 35	+ 1	239.44	+ 0.45	339.188	76.25	0.081
31	− 3.225	− 4.037	− 20	− 36	+ 2	251.68	+ 0.43	342.196	81.18	0.036
June 1	− 4.067	− 2.765	− 21	− 36	+ 3	263.93	+ 0.41	346.200	89.13	0.008
2	− 4.717	− 1.341	− 21	− 37	+ 3	276.18	+ 0.38	351.043	227.83	0.000
3	− 5.154	+ 0.174	− 21	− 37	+ 2	288.43	+ 0.36	356.452	268.76	0.013
4	− 5.366	+ 1.705	− 20	− 37	+ 1	300.67	+ 0.33	2.074	276.45	0.048
5	− 5.344	+ 3.171	− 20	− 36	0	312.92	+ 0.31	7.543	282.16	0.104
6	− 5.083	+ 4.485	− 20	− 36	− 2	325.16	+ 0.28	12.542	286.65	0.180
7	− 4.586	+ 5.566	− 19	− 35	− 4	337.39	+ 0.25	16.828	289.96	0.273
8	− 3.863	+ 6.337	− 19	− 35	− 6	349.62	+ 0.22	20.220	292.05	0.378
9	− 2.935	+ 6.740	− 18	− 34	− 8	1.84	+ 0.19	22.564	292.88	0.491
10	− 1.838	+ 6.734	− 17	− 33	− 10	14.06	+ 0.15	23.716	292.42	0.605
11	− 0.621	+ 6.309	− 16	− 32	− 12	26.27	+ 0.12	23.531	290.64	0.715
12	+ 0.649	+ 5.482	− 14	− 31	− 14	38.47	+ 0.08	21.898	287.56	0.814
13	+ 1.899	+ 4.307	− 13	− 31	− 15	50.67	+ 0.05	18.796	283.27	0.896
14	+ 3.049	+ 2.865	− 12	− 30	− 16	62.86	+ 0.01	14.363	278.02	0.956
15	+ 4.025	+ 1.259	− 10	− 30	− 17	75.05	− 0.02	8.937	272.32	0.991
16	+ 4.763	− 0.400	− 9	− 30	− 17	87.24	− 0.06	3.012	83.36	1.000
17	+ 5.215	− 2.003	− 8	− 30	− 16	99.43	− 0.09	357.111	79.85	0.983
18	+ 5.354	− 3.460	− 7	− 30	− 16	111.62	− 0.12	351.654	75.16	0.945
19	+ 5.174	− 4.701	− 6	− 30	− 14	123.82	− 0.15	346.904	71.36	0.887
20	+ 4.690	− 5.680	− 6	− 30	− 13	136.02	− 0.18	342.985	68.58	0.815
21	+ 3.934	− 6.369	− 6	− 31	− 11	148.22	− 0.20	339.940	66.81	0.732
22	+ 2.954	− 6.758	− 6	− 31	− 9	160.43	− 0.22	337.778	66.00	0.642
23	+ 1.810	− 6.846	− 7	− 32	− 7	172.65	− 0.24	336.511	66.09	0.548
24	+ 0.569	− 6.640	− 7	− 33	− 5	184.87	− 0.26	336.164	67.06	0.453
25	− 0.697	− 6.150	− 8	− 33	− 3	197.10	− 0.28	336.776	68.87	0.360
26	− 1.918	− 5.394	− 8	− 34	− 1	209.34	− 0.30	338.396	71.52	0.271
27	− 3.022	− 4.394	− 9	− 34	0	221.58	− 0.31	341.057	74.95	0.190
28	− 3.949	− 3.180	− 9	− 35	+ 1	233.82	− 0.33	344.742	79.02	0.118
29	− 4.643	− 1.793	− 9	− 35	+ 1	246.07	− 0.35	349.347	83.36	0.061
30	− 5.066	− 0.289	− 9	− 35	+ 1	258.32	− 0.37	354.651	86.89	0.021
July 1	− 5.192	+ 1.262	− 8	− 35	0	270.57	− 0.39	0.323	79.69	0.002
2	− 5.017	+ 2.775	− 8	− 35	− 1	282.83	− 0.41	5.979	292.67	0.005

EPHEMERIS FOR PHYSICAL OBSERVATIONS
FOR 0^h TERRESTRIAL TIME

Date	The Earth's		Physical			The Sun's		Position	Angle	Frac-	
0 ^h TT	Selenographic		Libration			Selenographic			Bright	tion	
	Long.	Lat.	Lg.	Lt.	P.A.	Colong.	Lat.	Axis	Limb	Illum.	
	°	°		(0°001)		°	°	°	°		
July	1	− 5.192	+ 1.262	− 8	− 35	0	270.57	− 0.39	0.323	79.69	0.002
	2	− 5.017	+ 2.775	− 8	− 35	− 1	282.83	− 0.41	5.979	292.67	0.005
	3	− 4.557	+ 4.159	− 7	− 34	− 2	295.08	− 0.44	11.251	291.01	0.033
	4	− 3.848	+ 5.319	− 7	− 34	− 4	307.33	− 0.46	15.843	293.00	0.084
	5	− 2.941	+ 6.174	− 6	− 33	− 6	319.57	− 0.49	19.537	294.67	0.158
	6	− 1.901	+ 6.657	− 5	− 33	− 8	331.81	− 0.52	22.169	295.42	0.251
	7	− 0.793	+ 6.732	− 4	− 32	− 11	344.05	− 0.55	23.606	295.06	0.356
	8	+ 0.319	+ 6.391	− 3	− 31	− 12	356.28	− 0.58	23.732	293.54	0.470
	9	+ 1.381	+ 5.657	− 2	− 31	− 14	8.50	− 0.61	22.461	290.86	0.585
	10	+ 2.350	+ 4.581	0	− 30	− 15	20.71	− 0.64	19.774	287.13	0.695
	11	+ 3.194	+ 3.236	+ 1	− 30	− 16	32.92	− 0.68	15.772	282.58	0.794
	12	+ 3.887	+ 1.710	+ 3	− 30	− 17	45.12	− 0.71	10.714	277.67	0.877
	13	+ 4.408	+ 0.102	+ 4	− 30	− 17	57.32	− 0.75	5.007	273.24	0.940
	14	+ 4.736	− 1.489	+ 5	− 30	− 17	69.51	− 0.78	359.132	271.54	0.981
	15	+ 4.853	− 2.974	+ 6	− 30	− 17	81.70	− 0.81	353.527	295.61	0.999
	16	+ 4.744	− 4.275	+ 6	− 30	− 16	93.90	− 0.84	348.509	57.05	0.993
	17	+ 4.398	− 5.333	+ 7	− 30	− 14	106.09	− 0.87	344.264	62.64	0.967
	18	+ 3.817	− 6.111	+ 7	− 31	− 13	118.28	− 0.89	340.878	62.88	0.922
	19	+ 3.011	− 6.589	+ 7	− 31	− 11	130.48	− 0.91	338.384	62.79	0.861
	20	+ 2.009	− 6.762	+ 6	− 32	− 9	142.69	− 0.93	336.799	63.16	0.788
	21	+ 0.852	− 6.636	+ 6	− 32	− 7	154.89	− 0.95	336.139	64.19	0.705
	22	− 0.404	− 6.226	+ 5	− 33	− 5	167.11	− 0.96	336.433	65.95	0.615
	23	− 1.691	− 5.550	+ 5	− 33	− 3	179.33	− 0.97	337.713	68.46	0.521
	24	− 2.932	− 4.633	+ 4	− 34	− 2	191.55	− 0.99	340.009	71.70	0.426
	25	− 4.047	− 3.502	+ 4	− 34	− 1	203.78	− 1.00	343.317	75.63	0.332
	26	− 4.955	− 2.193	+ 4	− 34	0	216.01	− 1.01	347.574	80.07	0.243
	27	− 5.580	− 0.750	+ 4	− 34	0	228.25	− 1.02	352.620	84.70	0.161
	28	− 5.860	+ 0.766	+ 4	− 34	− 1	240.50	− 1.03	358.186	88.89	0.092
	29	− 5.754	+ 2.281	+ 5	− 34	− 2	252.75	− 1.04	3.919	91.22	0.040
	30	− 5.251	+ 3.705	+ 5	− 34	− 3	265.00	− 1.06	9.437	85.21	0.009
Aug.	31	− 4.378	+ 4.939	+ 6	− 33	− 5	277.25	− 1.07	14.392	337.76	0.002
	1	− 3.201	+ 5.887	+ 7	− 32	− 7	289.50	− 1.09	18.503	304.33	0.022
	2	− 1.822	+ 6.468	+ 8	− 32	− 9	301.75	− 1.11	21.555	300.49	0.068
	3	− 0.359	+ 6.631	+ 9	− 31	− 11	313.99	− 1.13	23.382	298.68	0.139
	4	+ 1.067	+ 6.363	+ 10	− 30	− 13	326.23	− 1.15	23.856	296.58	0.230
	5	+ 2.356	+ 5.690	+ 11	− 30	− 15	338.46	− 1.17	22.899	293.64	0.336
	6	+ 3.439	+ 4.670	+ 13	− 29	− 16	350.69	− 1.19	20.507	289.79	0.448
	7	+ 4.279	+ 3.381	+ 14	− 29	− 17	2.90	− 1.22	16.787	285.14	0.562
	8	+ 4.871	+ 1.913	+ 15	− 29	− 18	15.11	− 1.24	11.985	279.97	0.670
	9	+ 5.227	+ 0.359	+ 17	− 29	− 18	27.32	− 1.27	6.474	274.74	0.769
	10	+ 5.368	− 1.190	+ 18	− 29	− 18	39.52	− 1.29	0.696	270.06	0.853
	11	+ 5.312	− 2.652	+ 18	− 30	− 18	51.71	− 1.32	355.071	266.73	0.919
	12	+ 5.075	− 3.954	+ 19	− 30	− 17	63.90	− 1.34	349.925	266.44	0.966
	13	+ 4.663	− 5.037	+ 19	− 30	− 16	76.09	− 1.37	345.470	276.85	0.993
	14	+ 4.078	− 5.858	+ 19	− 31	− 14	88.28	− 1.39	341.823	9.65	0.998
	15	+ 3.320	− 6.389	+ 18	− 31	− 13	100.47	− 1.40	339.044	49.68	0.984
16	+ 2.393	− 6.619	+ 18	− 32	− 11	112.65	− 1.42	337.165	56.48	0.951	

EPHEMERIS FOR PHYSICAL OBSERVATIONS
FOR 0^h TERRESTRIAL TIME

Date	The Earth's Selenographic		Physical Libration			The Sun's Selenographic		Position	Angle	Frac-
0 ^h TT	Long.	Lat.	Lg.	Lt.	P.A.	Colong.	Lat.	Axis	Bright Limb	tion Illum.
	°	°				°	°	°	°	
Aug. 16	+2.393	-6.619	+ 18	- 32	- 11	112.65	- 1.42	337.165	56.48	0.951
17	+1.310	-6.551	+ 17	- 32	- 9	124.84	- 1.43	336.211	59.70	0.902
18	+0.097	-6.197	+ 16	- 33	- 7	137.04	- 1.43	336.209	62.42	0.839
19	-1.202	-5.578	+ 16	- 33	- 6	149.24	- 1.44	337.183	65.40	0.765
20	-2.531	-4.722	+ 15	- 34	- 4	161.44	- 1.44	339.151	68.87	0.680
21	-3.819	-3.658	+ 14	- 34	- 3	173.64	- 1.44	342.109	72.92	0.589
22	-4.983	-2.422	+ 14	- 34	- 2	185.86	- 1.44	346.005	77.49	0.493
23	-5.932	-1.054	+ 14	- 34	- 2	198.08	- 1.44	350.715	82.42	0.395
24	-6.576	+0.396	+ 14	- 34	- 2	210.30	- 1.44	356.029	87.43	0.299
25	-6.833	+1.866	+ 14	- 34	- 3	222.53	- 1.44	1.654	92.09	0.208
26	-6.638	+3.281	+ 14	- 33	- 4	234.76	- 1.45	7.246	95.75	0.128
27	-5.964	+4.550	+ 15	- 33	- 6	247.00	- 1.45	12.459	97.24	0.063
28	-4.828	+5.573	+ 16	- 32	- 8	259.24	- 1.45	16.977	92.71	0.020
29	-3.305	+6.257	+ 16	- 31	- 10	271.48	- 1.45	20.532	41.36	0.002
30	-1.524	+6.528	+ 17	- 30	- 13	283.72	- 1.46	22.895	315.01	0.013
31	+0.351	+6.351	+ 19	- 29	- 15	295.96	- 1.46	23.883	303.33	0.053
Sept. 1	+2.149	+5.738	+ 20	- 29	- 16	308.20	- 1.47	23.368	297.84	0.120
2	+3.726	+4.748	+ 21	- 28	- 18	320.43	- 1.48	21.320	292.93	0.207
3	+4.985	+3.468	+ 23	- 28	- 19	332.65	- 1.49	17.841	287.66	0.309
4	+5.881	+2.002	+ 24	- 27	- 20	344.87	- 1.50	13.190	282.00	0.419
5	+6.414	+0.452	+ 25	- 27	- 20	357.08	- 1.51	7.756	276.21	0.530
6	+6.616	-1.089	+ 26	- 28	- 20	9.28	- 1.52	1.995	270.72	0.637
7	+6.531	-2.539	+ 27	- 28	- 19	21.47	- 1.54	356.332	265.94	0.735
8	+6.209	-3.831	+ 28	- 29	- 18	33.66	- 1.55	351.096	262.28	0.821
9	+5.691	-4.912	+ 28	- 29	- 17	45.85	- 1.56	346.503	260.17	0.891
10	+5.009	-5.741	+ 27	- 30	- 16	58.03	- 1.57	342.674	260.44	0.945
11	+4.184	-6.291	+ 27	- 30	- 14	70.21	- 1.58	339.679	265.87	0.980
12	+3.228	-6.547	+ 26	- 31	- 12	82.38	- 1.59	337.558	295.96	0.997
13	+2.151	-6.506	+ 25	- 32	- 11	94.56	- 1.59	336.348	30.32	0.995
14	+0.964	-6.180	+ 24	- 32	- 9	106.73	- 1.59	336.080	52.22	0.975
15	-0.315	-5.587	+ 23	- 33	- 8	118.91	- 1.58	336.785	59.88	0.938
16	-1.655	-4.756	+ 21	- 33	- 6	131.09	- 1.58	338.481	65.18	0.886
17	-3.013	-3.721	+ 20	- 34	- 5	143.27	- 1.57	341.158	70.10	0.820
18	-4.328	-2.519	+ 20	- 34	- 4	155.46	- 1.56	344.763	75.15	0.742
19	-5.526	-1.193	+ 19	- 34	- 4	167.65	- 1.55	349.182	80.42	0.654
20	-6.523	+0.210	+ 18	- 34	- 4	179.84	- 1.53	354.229	85.80	0.558
21	-7.225	+1.635	+ 18	- 34	- 5	192.04	- 1.52	359.651	91.04	0.458
22	-7.543	+3.018	+ 18	- 34	- 6	204.25	- 1.51	5.151	95.82	0.356
23	-7.398	+4.285	+ 18	- 33	- 7	216.46	- 1.49	10.423	99.75	0.257
24	-6.742	+5.348	+ 18	- 32	- 9	228.68	- 1.48	15.173	102.36	0.166
25	-5.572	+6.117	+ 19	- 31	- 11	240.90	- 1.47	19.131	102.90	0.090
26	-3.944	+6.504	+ 19	- 30	- 14	253.13	- 1.46	22.042	99.27	0.034
27	-1.984	+6.452	+ 20	- 29	- 16	265.35	- 1.45	23.666	76.83	0.005
28	+0.134	+5.940	+ 22	- 28	- 18	277.58	- 1.44	23.799	323.82	0.006
29	+2.214	+5.004	+ 23	- 27	- 19	289.81	- 1.43	22.317	300.81	0.037
30	+4.075	+3.729	+ 25	- 26	- 21	302.03	- 1.42	19.244	291.94	0.096
Oct. 1	+5.585	+2.226	+ 26	- 26	- 22	314.25	- 1.42	14.798	284.82	0.177

EPHEMERIS FOR PHYSICAL OBSERVATIONS
FOR 0^h TERRESTRIAL TIME

Date	The Earth's Selenographic		Physical Libration			The Sun's Selenographic		Position	Angle	Frac-
0 ^h TT	Long.	Lat.	Lg.	Lt.	P.A.	Colong.	Lat.	Axis	Bright Limb	tion Illum.
	°	°		(0°001)		°	°	°	°	
Oct. 1	+5.585	+2.226	+ 26	− 26	− 22	314.25	− 1.42	14.798	284.82	0.177
2	+6.673	+0.618	+ 28	− 25	− 22	326.46	− 1.41	9.388	278.12	0.274
3	+7.321	−0.982	+ 29	− 25	− 22	338.66	− 1.41	3.523	271.83	0.379
4	+7.556	−2.482	+ 30	− 26	− 22	350.86	− 1.41	357.693	266.22	0.487
5	+7.428	−3.810	+ 30	− 26	− 21	3.05	− 1.41	352.271	261.55	0.592
6	+6.999	−4.917	+ 30	− 26	− 20	15.24	− 1.40	347.491	257.99	0.689
7	+6.327	−5.765	+ 30	− 27	− 18	27.41	− 1.40	343.477	255.64	0.777
8	+5.468	−6.331	+ 29	− 28	− 16	39.59	− 1.40	340.288	254.64	0.853
9	+4.462	−6.605	+ 28	− 29	− 15	51.75	− 1.39	337.960	255.28	0.914
10	+3.344	−6.582	+ 27	− 29	− 13	63.92	− 1.39	336.525	258.46	0.959
11	+2.137	−6.272	+ 25	− 30	− 11	76.08	− 1.38	336.019	268.16	0.988
12	+0.864	−5.692	+ 24	− 31	− 9	88.24	− 1.36	336.478	324.77	0.999
13	−0.457	−4.867	+ 23	− 32	− 8	100.40	− 1.35	337.929	48.73	0.992
14	−1.798	−3.832	+ 21	− 32	− 7	112.56	− 1.33	340.372	64.04	0.967
15	−3.127	−2.628	+ 20	− 33	− 6	124.72	− 1.31	343.760	71.99	0.926
16	−4.396	−1.301	+ 19	− 33	− 6	136.88	− 1.29	347.980	78.47	0.869
17	−5.550	+0.099	+ 18	− 33	− 6	149.05	− 1.27	352.849	84.50	0.797
18	−6.518	+1.517	+ 17	− 33	− 6	161.22	− 1.24	358.120	90.21	0.713
19	−7.224	+2.891	+ 16	− 33	− 7	173.40	− 1.22	3.513	95.47	0.619
20	−7.588	+4.157	+ 15	− 32	− 9	185.58	− 1.19	8.746	100.08	0.517
21	−7.536	+5.242	+ 15	− 32	− 10	197.77	− 1.17	13.559	103.79	0.411
22	−7.013	+6.067	+ 15	− 31	− 12	209.96	− 1.14	17.715	106.38	0.305
23	−6.001	+6.555	+ 15	− 30	− 14	222.16	− 1.12	20.989	107.59	0.206
24	−4.530	+6.638	+ 16	− 29	− 17	234.36	− 1.09	23.153	107.01	0.119
25	−2.689	+6.274	+ 17	− 27	− 19	246.57	− 1.07	23.972	103.73	0.053
26	−0.624	+5.462	+ 18	− 26	− 20	258.78	− 1.05	23.240	93.17	0.012
27	+1.487	+4.256	+ 19	− 25	− 22	270.99	− 1.02	20.852	343.33	0.001
28	+3.461	+2.754	+ 21	− 24	− 23	283.20	− 1.00	16.887	292.58	0.021
29	+5.146	+1.086	+ 22	− 24	− 24	295.41	− 0.98	11.670	281.58	0.069
30	+6.435	−0.616	+ 24	− 23	− 24	307.62	− 0.96	5.724	273.70	0.141
31	+7.279	−2.231	+ 25	− 23	− 24	319.82	− 0.95	359.629	267.06	0.229
Nov. 1	+7.674	−3.669	+ 26	− 23	− 23	332.01	− 0.93	353.869	261.52	0.327
2	+7.651	−4.868	+ 26	− 23	− 22	344.19	− 0.91	348.754	257.14	0.430
3	+7.265	−5.787	+ 26	− 24	− 21	356.37	− 0.90	344.441	253.91	0.532
4	+6.578	−6.409	+ 25	− 24	− 19	8.55	− 0.89	340.991	251.81	0.630
5	+5.655	−6.726	+ 24	− 25	− 17	20.71	− 0.87	338.425	250.79	0.721
6	+4.558	−6.741	+ 23	− 26	− 15	32.87	− 0.85	336.759	250.83	0.803
7	+3.341	−6.462	+ 21	− 27	− 13	45.03	− 0.84	336.014	252.00	0.872
8	+2.052	−5.908	+ 20	− 28	− 11	57.18	− 0.82	336.226	254.48	0.928
9	+0.730	−5.102	+ 18	− 28	− 10	69.33	− 0.80	337.426	258.98	0.969
10	−0.591	−4.075	+ 17	− 29	− 9	81.47	− 0.77	339.630	269.32	0.993
11	−1.878	−2.866	+ 15	− 30	− 8	93.62	− 0.75	342.809	22.19	0.999
12	−3.099	−1.523	+ 13	− 30	− 7	105.76	− 0.72	346.870	73.37	0.988
13	−4.220	−0.100	+ 12	− 31	− 7	117.90	− 0.69	351.636	83.12	0.958
14	−5.202	+1.345	+ 11	− 31	− 8	130.05	− 0.66	356.857	89.94	0.910
15	−6.000	+2.747	+ 10	− 31	− 8	142.20	− 0.63	2.241	95.74	0.845
16	−6.564	+4.041	+ 9	− 31	− 10	154.35	− 0.59	7.495	100.74	0.765

EPHEMERIS FOR PHYSICAL OBSERVATIONS
FOR 0^h TERRESTRIAL TIME

Date	The Earth's		Physical			The Sun's		Position	Angle	Frac-			
0 ^h TT	Selenographic		Libration			Selenographic			Bright	tion			
	Long.	Lat.	Lg.	Lt.	P.A.	Colong.	Lat.	Axis	Limb	Illum.			
	°	°		(0°001)		°	°	°	°				
Nov.	16	− 6.564	+ 4.041	+	9	− 31	− 10	154.35	− 0.59	7.495	100.74	0.765	
	17	− 6.844	+ 5.159	+	8	− 30	− 11	166.51	− 0.56	12.360	104.86	0.673	
	18	− 6.791	+ 6.031	+	7	− 29	− 13	178.67	− 0.53	16.618	108.01	0.570	
	19	− 6.369	+ 6.593	+	7	− 29	− 15	190.84	− 0.50	20.081	110.06	0.461	
	20	− 5.559	+ 6.785	+	7	− 28	− 17	203.02	− 0.47	22.562	110.92	0.351	
	21	− 4.378	+ 6.564	+	7	− 27	− 19	215.20	− 0.43	23.866	110.46	0.245	
	22	− 2.878	+ 5.916	+	8	− 26	− 21	227.39	− 0.40	23.789	108.56	0.151	
	23	− 1.150	+ 4.859	+	9	− 25	− 22	239.58	− 0.37	22.162	105.01	0.075	
	24	+ 0.681	+ 3.459	+	10	− 24	− 23	251.78	− 0.34	18.930	99.22	0.024	
	25	+ 2.475	+ 1.820	+	12	− 23	− 24	263.97	− 0.31	14.241	81.27	0.001	
	26	+ 4.094	+ 0.072	+	13	− 22	− 25	276.17	− 0.28	8.496	277.31	0.008	
	27	+ 5.424	− 1.650	+	15	− 22	− 25	288.37	− 0.25	2.271	267.91	0.043	
	28	+ 6.382	− 3.227	+	16	− 21	− 24	300.56	− 0.23	356.153	261.50	0.101	
	29	+ 6.929	− 4.570	+	16	− 21	− 24	312.75	− 0.20	350.587	256.45	0.178	
	30	+ 7.057	− 5.622	+	16	− 21	− 22	324.93	− 0.18	345.827	252.64	0.266	
	Dec.	1	+ 6.792	− 6.356	+	16	− 22	− 21	337.11	− 0.16	341.980	249.99	0.362
		2	+ 6.183	− 6.763	+	15	− 22	− 19	349.28	− 0.13	339.074	248.40	0.461
		3	+ 5.290	− 6.851	+	14	− 23	− 17	1.45	− 0.11	337.109	247.80	0.558
		4	+ 4.182	− 6.635	+	13	− 23	− 15	13.61	− 0.09	336.088	248.12	0.652
		5	+ 2.930	− 6.136	+	11	− 24	− 14	25.76	− 0.07	336.026	249.30	0.739
6		+ 1.603	− 5.379	+	10	− 25	− 12	37.91	− 0.04	336.947	251.31	0.817	
7		+ 0.264	− 4.393	+	8	− 26	− 10	50.05	− 0.02	338.871	254.11	0.884	
8		− 1.029	− 3.213	+	7	− 26	− 9	62.19	+ 0.01	341.789	257.62	0.937	
9		− 2.228	− 1.883	+	5	− 27	− 9	74.32	+ 0.04	345.639	261.56	0.976	
10		− 3.291	− 0.454	+	4	− 27	− 8	86.45	+ 0.06	350.276	264.59	0.996	
	11	− 4.183	+ 1.015	+	2	− 27	− 9	98.59	+ 0.10	355.466	97.24	0.998	
	12	− 4.879	+ 2.457	+	1	− 28	− 9	110.72	+ 0.13	0.912	99.05	0.981	
	13	− 5.356	+ 3.799		0	− 27	− 10	122.85	+ 0.16	6.292	103.21	0.943	
	14	− 5.600	+ 4.970	−	1	− 27	− 12	134.99	+ 0.19	11.316	107.04	0.885	
	15	− 5.601	+ 5.899	−	2	− 27	− 13	147.13	+ 0.22	15.745	110.13	0.810	
	16	− 5.354	+ 6.523	−	2	− 26	− 15	159.27	+ 0.25	19.387	112.29	0.719	
	17	− 4.859	+ 6.792	−	3	− 26	− 17	171.42	+ 0.29	22.082	113.41	0.616	
	18	− 4.126	+ 6.672	−	3	− 25	− 19	183.58	+ 0.32	23.675	113.42	0.505	
	19	− 3.173	+ 6.151	−	2	− 24	− 21	195.74	+ 0.35	24.006	112.28	0.392	
	20	− 2.032	+ 5.242	−	2	− 23	− 22	207.91	+ 0.38	22.929	109.97	0.283	
	21	− 0.749	+ 3.991	−	1	− 23	− 23	220.09	+ 0.41	20.355	106.56	0.184	
	22	+ 0.613	+ 2.474		0	− 22	− 24	232.27	+ 0.44	16.322	102.33	0.102	
	23	+ 1.976	+ 0.793	+	1	− 21	− 25	244.45	+ 0.47	11.070	98.07	0.042	
	24	+ 3.254	− 0.930	+	3	− 21	− 25	256.64	+ 0.50	5.047	97.40	0.008	
	25	+ 4.360	− 2.573	+	4	− 20	− 25	268.83	+ 0.53	358.818	236.26	0.001	
	26	+ 5.211	− 4.029	+	4	− 20	− 24	281.02	+ 0.56	352.906	251.24	0.021	
	27	+ 5.746	− 5.216	+	5	− 20	− 23	293.21	+ 0.59	347.687	249.53	0.064	
	28	+ 5.926	− 6.085	+	5	− 20	− 22	305.40	+ 0.61	343.362	247.39	0.126	
	29	+ 5.740	− 6.615	+	4	− 20	− 21	317.58	+ 0.63	340.012	245.89	0.203	
	30	+ 5.208	− 6.807	+	3	− 21	− 19	329.75	+ 0.66	337.655	245.20	0.289	
	31	+ 4.370	− 6.679	+	2	− 21	− 17	341.92	+ 0.68	336.287	245.36	0.382	
	32	+ 3.288	− 6.255	+	1	− 22	− 15	354.09	+ 0.70	335.906	246.32	0.477	