

EPHEMERIDES FOR THE YEAR 2028

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SUN - ICRS GEOCENTRIC RECTANGULAR COORDINATES

Date 0h TT	Julian Date	X au	Y au	Z au	R au
12/31/2027	2461770.5	0.1481934	-0.8919547	-0.3866421	0.9833802
01/01/2028	2461771.5	0.1654617	-0.8893736	-0.3855228	0.9833569
01/02/2028	2461772.5	0.1826774	-0.8865150	-0.3842831	0.9833379
01/03/2028	2461773.5	0.1998348	-0.8833799	-0.3829237	0.9833232
01/04/2028	2461774.5	0.2169286	-0.8799696	-0.3814452	0.9833132
01/05/2028	2461775.5	0.2339534	-0.8762854	-0.3798480	0.9833081
01/06/2028	2461776.5	0.2509038	-0.8723287	-0.3781329	0.9833080
01/07/2028	2461777.5	0.2677748	-0.8681011	-0.3763004	0.9833132
01/08/2028	2461778.5	0.2845611	-0.8636042	-0.3743514	0.9833240
01/09/2028	2461779.5	0.3012578	-0.8588396	-0.3722866	0.9833408
01/10/2028	2461780.5	0.3178601	-0.8538092	-0.3701066	0.9833637
01/11/2028	2461781.5	0.3343631	-0.8485146	-0.3678123	0.9833929
01/12/2028	2461782.5	0.3507622	-0.8429577	-0.3654043	0.9834288
01/13/2028	2461783.5	0.3670528	-0.8371402	-0.3628834	0.9834713
01/14/2028	2461784.5	0.3832302	-0.8310636	-0.3602502	0.9835204
01/15/2028	2461785.5	0.3992899	-0.8247297	-0.3575055	0.9835760
01/16/2028	2461786.5	0.4152270	-0.8181402	-0.3546498	0.9836378
01/17/2028	2461787.5	0.4310369	-0.8112966	-0.3516838	0.9837055
01/18/2028	2461788.5	0.4467145	-0.8042009	-0.3486084	0.9837788
01/19/2028	2461789.5	0.4622550	-0.7968548	-0.3454243	0.9838573
01/20/2028	2461790.5	0.4776533	-0.7892604	-0.3421324	0.9839407
01/21/2028	2461791.5	0.4929044	-0.7814199	-0.3387336	0.9840286
01/22/2028	2461792.5	0.5080033	-0.7733355	-0.3352290	0.9841207
01/23/2028	2461793.5	0.5229451	-0.7650097	-0.3316196	0.9842169
01/24/2028	2461794.5	0.5377248	-0.7564451	-0.3279065	0.9843169
01/25/2028	2461795.5	0.5523375	-0.7476444	-0.3240911	0.9844206
01/26/2028	2461796.5	0.5667785	-0.7386105	-0.3201745	0.9845279
01/27/2028	2461797.5	0.5810430	-0.7293464	-0.3161582	0.9846386
01/28/2028	2461798.5	0.5951265	-0.7198552	-0.3120433	0.9847528
01/29/2028	2461799.5	0.6090244	-0.7101400	-0.3078315	0.9848705
01/30/2028	2461800.5	0.6227324	-0.7002042	-0.3035242	0.9849916
01/31/2028	2461801.5	0.6362461	-0.6900513	-0.2991227	0.9851164
02/01/2028	2461802.5	0.6495614	-0.6796846	-0.2946288	0.9852448
02/02/2028	2461803.5	0.6626742	-0.6691079	-0.2900440	0.9853771
02/03/2028	2461804.5	0.6755807	-0.6583246	-0.2853697	0.9855133
02/04/2028	2461805.5	0.6882770	-0.6473386	-0.2806078	0.9856537
02/05/2028	2461806.5	0.7007595	-0.6361535	-0.2757597	0.9857985
02/06/2028	2461807.5	0.7130248	-0.6247733	-0.2708272	0.9859479
02/07/2028	2461808.5	0.7250694	-0.6132016	-0.2658117	0.9861023
02/08/2028	2461809.5	0.7368902	-0.6014422	-0.2607151	0.9862618
02/09/2028	2461810.5	0.7484841	-0.5894990	-0.2555388	0.9864266
02/10/2028	2461811.5	0.7598480	-0.5773755	-0.2502844	0.9865971
02/11/2028	2461812.5	0.7709791	-0.5650755	-0.2449535	0.9867732
02/12/2028	2461813.5	0.7818744	-0.5526024	-0.2395474	0.9869549
02/13/2028	2461814.5	0.7925308	-0.5399599	-0.2340677	0.9871420
02/14/2028	2461815.5	0.8029452	-0.5271513	-0.2285160	0.9873344
02/15/2028	2461816.5	0.8131146	-0.5141805	-0.2228937	0.9875315
02/16/2028	2461817.5	0.8230357	-0.5010510	-0.2172025	0.9877332
02/17/2028	2461818.5	0.8327054	-0.4877667	-0.2114440	0.9879389
02/18/2028	2461819.5	0.8421206	-0.4743316	-0.2056199	0.9881483
02/19/2028	2461820.5	0.8512782	-0.4607496	-0.1997321	0.9883611
02/20/2028	2461821.5	0.8601751	-0.4470252	-0.1937824	0.9885769
02/21/2028	2461822.5	0.8688086	-0.4331624	-0.1877726	0.9887955
02/22/2028	2461823.5	0.8771758	-0.4191657	-0.1817048	0.9890166
02/23/2028	2461824.5	0.8852741	-0.4050395	-0.1755808	0.9892400

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Date 0h TT	Julian Date	X au	Y au	Z au	R au
02/24/2028	2461825.5	0.8931009	-0.3907885	-0.1694027	0.9894656
02/25/2028	2461826.5	0.9006538	-0.3764171	-0.1631725	0.9896930
02/26/2028	2461827.5	0.9079304	-0.3619302	-0.1568923	0.9899224
02/27/2028	2461828.5	0.9149287	-0.3473325	-0.1505641	0.9901535
02/28/2028	2461829.5	0.9216467	-0.3326287	-0.1441900	0.9903864
02/29/2028	2461830.5	0.9280824	-0.3178236	-0.1377722	0.9906210
03/01/2028	2461831.5	0.9342342	-0.3029223	-0.1313128	0.9908575
03/02/2028	2461832.5	0.9401005	-0.2879294	-0.1248139	0.9910958
03/03/2028	2461833.5	0.9456799	-0.2728500	-0.1182776	0.9913361
03/04/2028	2461834.5	0.9509712	-0.2576888	-0.1117060	0.9915786
03/05/2028	2461835.5	0.9559733	-0.2424508	-0.1051013	0.9918234
03/06/2028	2461836.5	0.9606853	-0.2271408	-0.0984654	0.9920708
03/07/2028	2461837.5	0.9651062	-0.2117635	-0.0918005	0.9923211
03/08/2028	2461838.5	0.9692356	-0.1963237	-0.0851084	0.9925744
03/09/2028	2461839.5	0.9730727	-0.1808258	-0.0783912	0.9928311
03/10/2028	2461840.5	0.9766170	-0.1652744	-0.0716507	0.9930913
03/11/2028	2461841.5	0.9798680	-0.1496738	-0.0648888	0.9933550
03/12/2028	2461842.5	0.9828250	-0.1340284	-0.0581074	0.9936222
03/13/2028	2461843.5	0.9854875	-0.1183425	-0.0513082	0.9938929
03/14/2028	2461844.5	0.9878546	-0.1026205	-0.0444931	0.9941667
03/15/2028	2461845.5	0.9899258	-0.0868666	-0.0376641	0.9944433
03/16/2028	2461846.5	0.9917002	-0.0710855	-0.0308231	0.9947223
03/17/2028	2461847.5	0.9931773	-0.0552818	-0.0239722	0.9950034
03/18/2028	2461848.5	0.9943564	-0.0394600	-0.0171133	0.9952862
03/19/2028	2461849.5	0.9952372	-0.0236250	-0.0102486	0.9955703
03/20/2028	2461850.5	0.9958193	-0.0077815	-0.0033802	0.9958554
03/21/2028	2461851.5	0.9961024	0.0080656	0.0034898	0.9961412
03/22/2028	2461852.5	0.9960865	0.0239114	0.0103592	0.9964273
03/23/2028	2461853.5	0.9957716	0.0397510	0.0172259	0.9967136
03/24/2028	2461854.5	0.9951579	0.0555795	0.0240877	0.9969998
03/25/2028	2461855.5	0.9942457	0.0713919	0.0309425	0.9972857
03/26/2028	2461856.5	0.9930354	0.0871833	0.0377880	0.9975711
03/27/2028	2461857.5	0.9915276	0.1029486	0.0446221	0.9978560
03/28/2028	2461858.5	0.9897231	0.1186830	0.0514427	0.9981401
03/29/2028	2461859.5	0.9876227	0.1343814	0.0582475	0.9984236
03/30/2028	2461860.5	0.9852274	0.1500390	0.0650345	0.9987063
03/31/2028	2461861.5	0.9825386	0.1656509	0.0718016	0.9989884
04/01/2028	2461862.5	0.9795575	0.1812123	0.0785466	0.9992699
04/02/2028	2461863.5	0.9762855	0.1967186	0.0852676	0.9995510
04/03/2028	2461864.5	0.9727244	0.2121650	0.0919626	0.9998319
04/04/2028	2461865.5	0.9688758	0.2275471	0.0986297	1.0001129
04/05/2028	2461866.5	0.9647414	0.2428604	0.1052670	1.0003941
04/06/2028	2461867.5	0.9603232	0.2581008	0.1118727	1.0006758
04/07/2028	2461868.5	0.9556230	0.2732640	0.1184451	1.0009584
04/08/2028	2461869.5	0.9506425	0.2883461	0.1249824	1.0012419
04/09/2028	2461870.5	0.9453837	0.3033431	0.1314830	1.0015264
04/10/2028	2461871.5	0.9398482	0.3182510	0.1379451	1.0018120
04/11/2028	2461872.5	0.9340377	0.3330660	0.1443672	1.0020984
04/12/2028	2461873.5	0.9279539	0.3477841	0.1507473	1.0023856
04/13/2028	2461874.5	0.9215984	0.3624012	0.1570839	1.0026732
04/14/2028	2461875.5	0.9149729	0.3769134	0.1633752	1.0029609
04/15/2028	2461876.5	0.9080793	0.3913165	0.1696192	1.0032483
04/16/2028	2461877.5	0.9009194	0.4056063	0.1758141	1.0035352
04/17/2028	2461878.5	0.8934952	0.4197787	0.1819582	1.0038210
04/18/2028	2461879.5	0.8858089	0.4338295	0.1880496	1.0041056

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04/19/2028	2461880.5	0.8778627	0.4477545	0.1940865	1.0043886
04/20/2028	2461881.5	0.8696589	0.4615496	0.2000669	1.0046698
04/21/2028	2461882.5	0.8611999	0.4752106	0.2059891	1.0049487
04/22/2028	2461883.5	0.8524884	0.4887333	0.2118513	1.0052252
04/23/2028	2461884.5	0.8435271	0.5021138	0.2176517	1.0054991
04/24/2028	2461885.5	0.8343188	0.5153478	0.2233884	1.0057701
04/25/2028	2461886.5	0.8248664	0.5284314	0.2290598	1.0060381
04/26/2028	2461887.5	0.8151730	0.5413606	0.2346642	1.0063029
04/27/2028	2461888.5	0.8052419	0.5541316	0.2401998	1.0065646
04/28/2028	2461889.5	0.7950764	0.5667404	0.2456650	1.0068230
04/29/2028	2461890.5	0.7846800	0.5791836	0.2510583	1.0070782
04/30/2028	2461891.5	0.7740562	0.5914574	0.2563781	1.0073304
05/01/2028	2461892.5	0.7632087	0.6035584	0.2616230	1.0075797
05/02/2028	2461893.5	0.7521413	0.6154834	0.2667915	1.0078264
05/03/2028	2461894.5	0.7408575	0.6272293	0.2718825	1.0080707
05/04/2028	2461895.5	0.7293612	0.6387930	0.2768946	1.0083129
05/05/2028	2461896.5	0.7176561	0.6501716	0.2818266	1.0085532
05/06/2028	2461897.5	0.7057457	0.6613625	0.2866773	1.0087920
05/07/2028	2461898.5	0.6936337	0.6723629	0.2914457	1.0090293
05/08/2028	2461899.5	0.6813236	0.6831702	0.2961305	1.0092653
05/09/2028	2461900.5	0.6688188	0.6937817	0.3007306	1.0095001
05/10/2028	2461901.5	0.6561227	0.7041949	0.3052449	1.0097335
05/11/2028	2461902.5	0.6432387	0.7144070	0.3096721	1.0099654
05/12/2028	2461903.5	0.6301704	0.7244153	0.3140112	1.0101957
05/13/2028	2461904.5	0.6169211	0.7342172	0.3182608	1.0104239
05/14/2028	2461905.5	0.6034945	0.7438099	0.3224197	1.0106499
05/15/2028	2461906.5	0.5898942	0.7531906	0.3264867	1.0108733
05/16/2028	2461907.5	0.5761240	0.7623566	0.3304607	1.0110938
05/17/2028	2461908.5	0.5621877	0.7713053	0.3343404	1.0113112
05/18/2028	2461909.5	0.5480892	0.7800340	0.3381246	1.0115252
05/19/2028	2461910.5	0.5338326	0.7885401	0.3418123	1.0117354
05/20/2028	2461911.5	0.5194220	0.7968210	0.3454022	1.0119415
05/21/2028	2461912.5	0.5048615	0.8048743	0.3488932	1.0121434
05/22/2028	2461913.5	0.4901556	0.8126974	0.3522844	1.0123407
05/23/2028	2461914.5	0.4753085	0.8202879	0.3555746	1.0125333
05/24/2028	2461915.5	0.4603248	0.8276436	0.3587628	1.0127209
05/25/2028	2461916.5	0.4452091	0.8347623	0.3618482	1.0129034
05/26/2028	2461917.5	0.4299661	0.8416418	0.3648298	1.0130808
05/27/2028	2461918.5	0.4146006	0.8482803	0.3677069	1.0132529
05/28/2028	2461919.5	0.3991175	0.8546760	0.3704786	1.0134200
05/29/2028	2461920.5	0.3835216	0.8608271	0.3731443	1.0135822
05/30/2028	2461921.5	0.3678177	0.8667323	0.3757035	1.0137396
05/31/2028	2461922.5	0.3520108	0.8723903	0.3781556	1.0138926
06/01/2028	2461923.5	0.3361055	0.8777999	0.3805001	1.0140414
06/02/2028	2461924.5	0.3201066	0.8829600	0.3827367	1.0141864
06/03/2028	2461925.5	0.3040187	0.8878697	0.3848648	1.0143278
06/04/2028	2461926.5	0.2878462	0.8925280	0.3868842	1.0144659
06/05/2028	2461927.5	0.2715937	0.8969342	0.3887944	1.0146010
06/06/2028	2461928.5	0.2552653	0.9010873	0.3905951	1.0147331
06/07/2028	2461929.5	0.2388655	0.9049865	0.3922859	1.0148623
06/08/2028	2461930.5	0.2223986	0.9086309	0.3938663	1.0149887
06/09/2028	2461931.5	0.2058688	0.9120197	0.3953360	1.0151120
06/10/2028	2461932.5	0.1892806	0.9151518	0.3966945	1.0152323
06/11/2028	2461933.5	0.1726382	0.9180265	0.3979414	1.0153492
06/12/2028	2461934.5	0.1559462	0.9206429	0.3990763	1.0154626

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06/13/2028	2461935.5	0.1392090	0.9230000	0.4000987	1.0155723
06/14/2028	2461936.5	0.1224312	0.9250971	0.4010084	1.0156780
06/15/2028	2461937.5	0.1056174	0.9269335	0.4018049	1.0157795
06/16/2028	2461938.5	0.0887723	0.9285084	0.4024880	1.0158765
06/17/2028	2461939.5	0.0719007	0.9298212	0.4030573	1.0159687
06/18/2028	2461940.5	0.0550073	0.9308713	0.4035125	1.0160558
06/19/2028	2461941.5	0.0380970	0.9316581	0.4038535	1.0161377
06/20/2028	2461942.5	0.0211747	0.9321813	0.4040801	1.0162141
06/21/2028	2461943.5	0.0042456	0.9324404	0.4041921	1.0162846
06/22/2028	2461944.5	-0.0126854	0.9324354	0.4041894	1.0163492
06/23/2028	2461945.5	-0.0296132	0.9321659	0.4040720	1.0164076
06/24/2028	2461946.5	-0.0465324	0.9316322	0.4038400	1.0164598
06/25/2028	2461947.5	-0.0634379	0.9308345	0.4034936	1.0165059
06/26/2028	2461948.5	-0.0803246	0.9297730	0.4030329	1.0165458
06/27/2028	2461949.5	-0.0971873	0.9284486	0.4024582	1.0165799
06/28/2028	2461950.5	-0.1140211	0.9268618	0.4017699	1.0166084
06/29/2028	2461951.5	-0.1308210	0.9250135	0.4009685	1.0166316
06/30/2028	2461952.5	-0.1475823	0.9229046	0.4000542	1.0166498
07/01/2028	2461953.5	-0.1643004	0.9205362	0.3990277	1.0166635
07/02/2028	2461954.5	-0.1809706	0.9179093	0.3978892	1.0166728
07/03/2028	2461955.5	-0.1975887	0.9150249	0.3966393	1.0166782
07/04/2028	2461956.5	-0.2141502	0.9118840	0.3952783	1.0166798
07/05/2028	2461957.5	-0.2306508	0.9084878	0.3938068	1.0166777
07/06/2028	2461958.5	-0.2470862	0.9048371	0.3922251	1.0166722
07/07/2028	2461959.5	-0.2634523	0.9009331	0.3905336	1.0166632
07/08/2028	2461960.5	-0.2797446	0.8967768	0.3887327	1.0166508
07/09/2028	2461961.5	-0.2959589	0.8923691	0.3868229	1.0166348
07/10/2028	2461962.5	-0.3120909	0.8877112	0.3848045	1.0166152
07/11/2028	2461963.5	-0.3281362	0.8828041	0.3826780	1.0165918
07/12/2028	2461964.5	-0.3440904	0.8776490	0.3804440	1.0165646
07/13/2028	2461965.5	-0.3599492	0.8722469	0.3781027	1.0165332
07/14/2028	2461966.5	-0.3757081	0.8665992	0.3756548	1.0164975
07/15/2028	2461967.5	-0.3913625	0.8607071	0.3731009	1.0164574
07/16/2028	2461968.5	-0.4069081	0.8545719	0.3704414	1.0164124
07/17/2028	2461969.5	-0.4223403	0.8481951	0.3676771	1.0163625
07/18/2028	2461970.5	-0.4376545	0.8415783	0.3648085	1.0163074
07/19/2028	2461971.5	-0.4528461	0.8347229	0.3618364	1.0162468
07/20/2028	2461972.5	-0.4679105	0.8276307	0.3587616	1.0161804
07/21/2028	2461973.5	-0.4828429	0.8203035	0.3555848	1.0161081
07/22/2028	2461974.5	-0.4976388	0.8127433	0.3523070	1.0160297
07/23/2028	2461975.5	-0.5122934	0.8049524	0.3489292	1.0159451
07/24/2028	2461976.5	-0.5268022	0.7969330	0.3454524	1.0158544
07/25/2028	2461977.5	-0.5411607	0.7886877	0.3418778	1.0157577
07/26/2028	2461978.5	-0.5553647	0.7802192	0.3382065	1.0156552
07/27/2028	2461979.5	-0.5694100	0.7715301	0.3344399	1.0155474
07/28/2028	2461980.5	-0.5832927	0.7626233	0.3305790	1.0154345
07/29/2028	2461981.5	-0.5970089	0.7535016	0.3266251	1.0153169
07/30/2028	2461982.5	-0.6105551	0.7441678	0.3225795	1.0151950
07/31/2028	2461983.5	-0.6239275	0.7346248	0.3184433	1.0150691
08/01/2028	2461984.5	-0.6371228	0.7248752	0.3142177	1.0149395
08/02/2028	2461985.5	-0.6501374	0.7149218	0.3099039	1.0148066
08/03/2028	2461986.5	-0.6629680	0.7047675	0.3055030	1.0146704
08/04/2028	2461987.5	-0.6756113	0.6944149	0.3010162	1.0145311
08/05/2028	2461988.5	-0.6880637	0.6838668	0.2964446	1.0143889
08/06/2028	2461989.5	-0.7003220	0.6731259	0.2917894	1.0142438

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08/07/2028	2461990.5	-0.7123829	0.6621950	0.2870518	1.0140958
08/08/2028	2461991.5	-0.7242430	0.6510768	0.2822329	1.0139450
08/09/2028	2461992.5	-0.7358989	0.6397743	0.2773339	1.0137911
08/10/2028	2461993.5	-0.7473473	0.6282901	0.2723562	1.0136342
08/11/2028	2461994.5	-0.7585848	0.6166273	0.2673008	1.0134742
08/12/2028	2461995.5	-0.7696081	0.6047888	0.2621691	1.0133108
08/13/2028	2461996.5	-0.7804138	0.5927776	0.2569624	1.0131440
08/14/2028	2461997.5	-0.7909986	0.5805968	0.2516820	1.0129734
08/15/2028	2461998.5	-0.8013590	0.5682495	0.2463293	1.0127990
08/16/2028	2461999.5	-0.8114917	0.5557390	0.2409058	1.0126205
08/17/2028	2462000.5	-0.8213933	0.5430686	0.2354129	1.0124375
08/18/2028	2462001.5	-0.8310606	0.5302417	0.2298521	1.0122499
08/19/2028	2462002.5	-0.8404900	0.5172620	0.2242250	1.0120575
08/20/2028	2462003.5	-0.8496785	0.5041333	0.2185334	1.0118601
08/21/2028	2462004.5	-0.8586228	0.4908595	0.2127790	1.0116576
08/22/2028	2462005.5	-0.8673200	0.4774446	0.2069636	1.0114501
08/23/2028	2462006.5	-0.8757674	0.4638929	0.2010890	1.0112378
08/24/2028	2462007.5	-0.8839622	0.4502085	0.1951571	1.0110209
08/25/2028	2462008.5	-0.8919023	0.4363958	0.1891697	1.0107998
08/26/2028	2462009.5	-0.8995854	0.4224589	0.1831286	1.0105748
08/27/2028	2462010.5	-0.9070094	0.4084020	0.1770357	1.0103464
08/28/2028	2462011.5	-0.9141724	0.3942293	0.1708927	1.0101150
08/29/2028	2462012.5	-0.9210726	0.3799448	0.1647014	1.0098808
08/30/2028	2462013.5	-0.9277081	0.3655526	0.1584634	1.0096443
08/31/2028	2462014.5	-0.9340772	0.3510566	0.1521805	1.0094057
09/01/2028	2462015.5	-0.9401782	0.3364610	0.1458544	1.0091652
09/02/2028	2462016.5	-0.9460093	0.3217696	0.1394867	1.0089231
09/03/2028	2462017.5	-0.9515690	0.3069865	0.1330792	1.0086795
09/04/2028	2462018.5	-0.9568557	0.2921155	0.1266335	1.0084346
09/05/2028	2462019.5	-0.9618676	0.2771608	0.1201514	1.0081883
09/06/2028	2462020.5	-0.9666032	0.2621262	0.1136346	1.0079409
09/07/2028	2462021.5	-0.9710610	0.2470158	0.1070847	1.0076922
09/08/2028	2462022.5	-0.9752394	0.2318336	0.1005036	1.0074422
09/09/2028	2462023.5	-0.9791369	0.2165836	0.0938930	1.0071909
09/10/2028	2462024.5	-0.9827520	0.2012701	0.0872547	1.0069382
09/11/2028	2462025.5	-0.9860831	0.1858972	0.0805905	1.0066839
09/12/2028	2462026.5	-0.9891289	0.1704690	0.0739022	1.0064279
09/13/2028	2462027.5	-0.9918878	0.1549899	0.0671918	1.0061700
09/14/2028	2462028.5	-0.9943586	0.1394643	0.0604611	1.0059100
09/15/2028	2462029.5	-0.9965398	0.1238966	0.0537122	1.0056475
09/16/2028	2462030.5	-0.9984302	0.1082914	0.0469471	1.0053824
09/17/2028	2462031.5	-1.0000285	0.0926534	0.0401678	1.0051145
09/18/2028	2462032.5	-1.0013338	0.0769875	0.0333765	1.0048435
09/19/2028	2462033.5	-1.0023453	0.0612986	0.0265755	1.0045695
09/20/2028	2462034.5	-1.0030623	0.0455918	0.0197668	1.0042925
09/21/2028	2462035.5	-1.0034845	0.0298720	0.0129526	1.0040126
09/22/2028	2462036.5	-1.0036117	0.0141443	0.0061352	1.0037301
09/23/2028	2462037.5	-1.0034439	-0.0015865	-0.0006833	1.0034454
09/24/2028	2462038.5	-1.0029813	-0.0173155	-0.0075010	1.0031588
09/25/2028	2462039.5	-1.0022242	-0.0330380	-0.0143158	1.0028708
09/26/2028	2462040.5	-1.0011730	-0.0487493	-0.0211256	1.0025817
09/27/2028	2462041.5	-0.9998280	-0.0644449	-0.0279286	1.0022920
09/28/2028	2462042.5	-0.9981897	-0.0801202	-0.0347228	1.0020018
09/29/2028	2462043.5	-0.9962587	-0.0957707	-0.0415063	1.0017117
09/30/2028	2462044.5	-0.9940355	-0.1113921	-0.0482772	1.0014217

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10/01/2028	2462045.5	-0.9915206	-0.1269798	-0.0550336	1.0011322
10/02/2028	2462046.5	-0.9887146	-0.1425296	-0.0617737	1.0008433
10/03/2028	2462047.5	-0.9856183	-0.1580370	-0.0684956	1.0005553
10/04/2028	2462048.5	-0.9822323	-0.1734978	-0.0751973	1.0002682
10/05/2028	2462049.5	-0.9785574	-0.1889075	-0.0818771	0.9999822
10/06/2028	2462050.5	-0.9745942	-0.2042619	-0.0885330	0.9996974
10/07/2028	2462051.5	-0.9703435	-0.2195566	-0.0951632	0.9994137
10/08/2028	2462052.5	-0.9658062	-0.2347873	-0.1017658	0.9991311
10/09/2028	2462053.5	-0.9609830	-0.2499496	-0.1083388	0.9988496
10/10/2028	2462054.5	-0.9558749	-0.2650390	-0.1148804	0.9985690
10/11/2028	2462055.5	-0.9504828	-0.2800511	-0.1213885	0.9982892
10/12/2028	2462056.5	-0.9448076	-0.2949814	-0.1278611	0.9980100
10/13/2028	2462057.5	-0.9388505	-0.3098254	-0.1342963	0.9977312
10/14/2028	2462058.5	-0.9326125	-0.3245783	-0.1406920	0.9974525
10/15/2028	2462059.5	-0.9260950	-0.3392355	-0.1470461	0.9971736
10/16/2028	2462060.5	-0.9192994	-0.3537922	-0.1533564	0.9968944
10/17/2028	2462061.5	-0.9122274	-0.3682434	-0.1596209	0.9966147
10/18/2028	2462062.5	-0.9048808	-0.3825844	-0.1658375	0.9963344
10/19/2028	2462063.5	-0.8972618	-0.3968103	-0.1720039	0.9960535
10/20/2028	2462064.5	-0.8893727	-0.4109164	-0.1781183	0.9957722
10/21/2028	2462065.5	-0.8812160	-0.4248981	-0.1841786	0.9954907
10/22/2028	2462066.5	-0.8727942	-0.4387509	-0.1901830	0.9952093
10/23/2028	2462067.5	-0.8641101	-0.4524705	-0.1961295	0.9949285
10/24/2028	2462068.5	-0.8551666	-0.4660527	-0.2020164	0.9946485
10/25/2028	2462069.5	-0.8459663	-0.4794932	-0.2078419	0.9943697
10/26/2028	2462070.5	-0.8365123	-0.4927882	-0.2136044	0.9940925
10/27/2028	2462071.5	-0.8268072	-0.5059338	-0.2193021	0.9938172
10/28/2028	2462072.5	-0.8168541	-0.5189259	-0.2249335	0.9935441
10/29/2028	2462073.5	-0.8066560	-0.5317609	-0.2304968	0.9932735
10/30/2028	2462074.5	-0.7962157	-0.5444349	-0.2359905	0.9930057
10/31/2028	2462075.5	-0.7855362	-0.5569444	-0.2414130	0.9927409
11/01/2028	2462076.5	-0.7746207	-0.5692856	-0.2467627	0.9924793
11/02/2028	2462077.5	-0.7634720	-0.5814550	-0.2520380	0.9922210
11/03/2028	2462078.5	-0.7520934	-0.5934490	-0.2572375	0.9919664
11/04/2028	2462079.5	-0.7404878	-0.6052641	-0.2623596	0.9917153
11/05/2028	2462080.5	-0.7286583	-0.6168967	-0.2674026	0.9914679
11/06/2028	2462081.5	-0.7166080	-0.6283435	-0.2723652	0.9912242
11/07/2028	2462082.5	-0.7043402	-0.6396008	-0.2772457	0.9909841
11/08/2028	2462083.5	-0.6918579	-0.6506651	-0.2820426	0.9907474
11/09/2028	2462084.5	-0.6791645	-0.6615329	-0.2867542	0.9905141
11/10/2028	2462085.5	-0.6662633	-0.6722005	-0.2913791	0.9902839
11/11/2028	2462086.5	-0.6531578	-0.6826644	-0.2959155	0.9900565
11/12/2028	2462087.5	-0.6398516	-0.6929209	-0.3003620	0.9898317
11/13/2028	2462088.5	-0.6263483	-0.7029665	-0.3047168	0.9896092
11/14/2028	2462089.5	-0.6126521	-0.7127974	-0.3089784	0.9893888
11/15/2028	2462090.5	-0.5987668	-0.7224100	-0.3131452	0.9891703
11/16/2028	2462091.5	-0.5846970	-0.7318011	-0.3172158	0.9889536
11/17/2028	2462092.5	-0.5704470	-0.7409670	-0.3211886	0.9887387
11/18/2028	2462093.5	-0.5560216	-0.7499048	-0.3250625	0.9885256
11/19/2028	2462094.5	-0.5414253	-0.7586114	-0.3288360	0.9883146
11/20/2028	2462095.5	-0.5266631	-0.7670838	-0.3325080	0.9881058
11/21/2028	2462096.5	-0.5117396	-0.7753195	-0.3360773	0.9878997
11/22/2028	2462097.5	-0.4966598	-0.7833159	-0.3395430	0.9876964
11/23/2028	2462098.5	-0.4814284	-0.7910706	-0.3429039	0.9874964
11/24/2028	2462099.5	-0.4660502	-0.7985812	-0.3461592	0.9872999

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11/25/2028	2462100.5	-0.4505301	-0.8058456	-0.3493078	0.9871072
11/26/2028	2462101.5	-0.4348728	-0.8128617	-0.3523489	0.9869186
11/27/2028	2462102.5	-0.4190831	-0.8196274	-0.3552816	0.9867344
11/28/2028	2462103.5	-0.4031658	-0.8261407	-0.3581051	0.9865548
11/29/2028	2462104.5	-0.3871257	-0.8323999	-0.3608185	0.9863802
11/30/2028	2462105.5	-0.3709675	-0.8384031	-0.3634212	0.9862107
12/01/2028	2462106.5	-0.3546960	-0.8441486	-0.3659122	0.9860465
12/02/2028	2462107.5	-0.3383159	-0.8496347	-0.3682909	0.9858879
12/03/2028	2462108.5	-0.3218319	-0.8548597	-0.3705566	0.9857348
12/04/2028	2462109.5	-0.3052487	-0.8598222	-0.3727085	0.9855874
12/05/2028	2462110.5	-0.2885710	-0.8645204	-0.3747459	0.9854457
12/06/2028	2462111.5	-0.2718035	-0.8689527	-0.3766680	0.9853095
12/07/2028	2462112.5	-0.2549511	-0.8731176	-0.3784741	0.9851787
12/08/2028	2462113.5	-0.2380185	-0.8770135	-0.3801635	0.9850532
12/09/2028	2462114.5	-0.2210107	-0.8806387	-0.3817355	0.9849326
12/10/2028	2462115.5	-0.2039328	-0.8839916	-0.3831893	0.9848166
12/11/2028	2462116.5	-0.1867899	-0.8870708	-0.3845242	0.9847050
12/12/2028	2462117.5	-0.1695874	-0.8898749	-0.3857398	0.9845975
12/13/2028	2462118.5	-0.1523307	-0.8924023	-0.3868352	0.9844938
12/14/2028	2462119.5	-0.1350255	-0.8946521	-0.3878101	0.9843937
12/15/2028	2462120.5	-0.1176774	-0.8966230	-0.3886640	0.9842969
12/16/2028	2462121.5	-0.1002921	-0.8983142	-0.3893966	0.9842036
12/17/2028	2462122.5	-0.0828755	-0.8997251	-0.3900076	0.9841136
12/18/2028	2462123.5	-0.0654334	-0.9008552	-0.3904968	0.9840271
12/19/2028	2462124.5	-0.0479715	-0.9017041	-0.3908642	0.9839443
12/20/2028	2462125.5	-0.0304956	-0.9022716	-0.3911097	0.9838652
12/21/2028	2462126.5	-0.0130113	-0.9025577	-0.3912333	0.9837902
12/22/2028	2462127.5	0.0044758	-0.9025626	-0.3912350	0.9837195
12/23/2028	2462128.5	0.0219601	-0.9022864	-0.3911151	0.9836533
12/24/2028	2462129.5	0.0394360	-0.9017294	-0.3908735	0.9835920
12/25/2028	2462130.5	0.0568982	-0.9008920	-0.3905106	0.9835356
12/26/2028	2462131.5	0.0743413	-0.8997747	-0.3900265	0.9834845
12/27/2028	2462132.5	0.0917599	-0.8983781	-0.3894215	0.9834390
12/28/2028	2462133.5	0.1091488	-0.8967029	-0.3886958	0.9833992
12/29/2028	2462134.5	0.1265027	-0.8947497	-0.3878498	0.9833654
12/30/2028	2462135.5	0.1438166	-0.8925194	-0.3868837	0.9833378
12/31/2028	2462136.5	0.1610854	-0.8900128	-0.3857980	0.9833166
01/01/2029	2462137.5	0.1783040	-0.8872308	-0.3845929	0.9833018

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12/31/2027	2461770.5	120959.129	-457346.164	-190590.904	510021.095
01/01/2028	2461771.5	121373.598	-456657.174	-190304.291	509394.786
01/02/2028	2461772.5	121787.024	-455967.706	-190017.463	508768.380
01/03/2028	2461773.5	122199.404	-455277.755	-189730.419	508141.870
01/04/2028	2461774.5	122610.738	-454587.316	-189443.157	507515.251
01/05/2028	2461775.5	123021.025	-453896.384	-189155.673	506888.517
01/06/2028	2461776.5	123430.265	-453204.955	-188867.967	506261.662
01/07/2028	2461777.5	123838.455	-452513.022	-188580.036	505634.678
01/08/2028	2461778.5	124245.595	-451820.581	-188291.876	505007.560
01/09/2028	2461779.5	124651.683	-451127.625	-188003.485	504380.299
01/10/2028	2461780.5	125056.717	-450434.148	-187714.860	503752.889
01/11/2028	2461781.5	125460.695	-449740.144	-187425.999	503125.320
01/12/2028	2461782.5	125863.614	-449045.606	-187136.897	502497.586
01/13/2028	2461783.5	126265.470	-448350.527	-186847.550	501869.675
01/14/2028	2461784.5	126666.262	-447654.899	-186557.956	501241.580
01/15/2028	2461785.5	127065.982	-446958.714	-186268.110	500613.289
01/16/2028	2461786.5	127464.628	-446261.966	-185978.008	499984.793
01/17/2028	2461787.5	127862.191	-445564.646	-185687.645	499356.081
01/18/2028	2461788.5	128258.665	-444866.747	-185397.017	498727.141
01/19/2028	2461789.5	128654.042	-444168.259	-185106.120	498097.963
01/20/2028	2461790.5	129048.312	-443469.178	-184814.948	497468.535
01/21/2028	2461791.5	129441.464	-442769.494	-184523.499	496838.846
01/22/2028	2461792.5	129833.487	-442069.202	-184231.766	496208.885
01/23/2028	2461793.5	130224.369	-441368.298	-183939.748	495578.643
01/24/2028	2461794.5	130614.094	-440666.775	-183647.441	494948.109
01/25/2028	2461795.5	131002.650	-439964.632	-183354.841	494317.276
01/26/2028	2461796.5	131390.022	-439261.867	-183061.947	493686.137
01/27/2028	2461797.5	131776.195	-438558.478	-182768.757	493054.686
01/28/2028	2461798.5	132161.154	-437854.467	-182475.271	492422.917
01/29/2028	2461799.5	132544.884	-437149.834	-182181.488	491790.828
01/30/2028	2461800.5	132927.373	-436444.584	-181887.409	491158.417
01/31/2028	2461801.5	133308.606	-435738.718	-181593.034	490525.683
02/01/2028	2461802.5	133688.571	-435032.243	-181298.365	489892.624
02/02/2028	2461803.5	134067.256	-434325.162	-181003.404	489259.243
02/03/2028	2461804.5	134444.650	-433617.480	-180708.152	488625.541
02/04/2028	2461805.5	134820.743	-432909.204	-180412.612	487991.519
02/05/2028	2461806.5	135195.526	-432200.339	-180116.786	487357.179
02/06/2028	2461807.5	135568.989	-431490.890	-179820.677	486722.524
02/07/2028	2461808.5	135941.126	-430780.864	-179524.287	486087.556
02/08/2028	2461809.5	136311.927	-430070.265	-179227.618	485452.277
02/09/2028	2461810.5	136681.386	-429359.101	-178930.673	484816.691
02/10/2028	2461811.5	137049.495	-428647.375	-178633.455	484180.800
02/11/2028	2461812.5	137416.250	-427935.093	-178335.965	483544.606
02/12/2028	2461813.5	137781.642	-427222.260	-178038.206	482908.111
02/13/2028	2461814.5	138145.667	-426508.882	-177740.180	482271.317
02/14/2028	2461815.5	138508.318	-425794.963	-177441.890	481634.227
02/15/2028	2461816.5	138869.590	-425080.508	-177143.337	480996.843
02/16/2028	2461817.5	139229.477	-424365.521	-176844.524	480359.166
02/17/2028	2461818.5	139587.973	-423650.008	-176545.452	479721.198
02/18/2028	2461819.5	139945.072	-422933.973	-176246.124	479082.942
02/19/2028	2461820.5	140300.770	-422217.421	-175946.542	478444.398
02/20/2028	2461821.5	140655.060	-421500.356	-175646.707	477805.569
02/21/2028	2461822.5	141007.938	-420782.782	-175346.622	477166.456
02/22/2028	2461823.5	141359.398	-420064.706	-175046.288	476527.060
02/23/2028	2461824.5	141709.433	-419346.131	-174745.707	475887.385

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02/24/2028	2461825.5	142058.040	-418627.061	-174444.882	475247.431
02/25/2028	2461826.5	142405.212	-417907.503	-174143.814	474607.199
02/26/2028	2461827.5	142750.945	-417187.461	-173842.506	473966.693
02/27/2028	2461828.5	143095.232	-416466.939	-173540.959	473325.914
02/28/2028	2461829.5	143438.068	-415745.943	-173239.175	472684.864
02/29/2028	2461830.5	143779.449	-415024.478	-172937.157	472043.544
03/01/2028	2461831.5	144119.369	-414302.549	-172634.907	471401.958
03/02/2028	2461832.5	144457.822	-413580.162	-172332.427	470760.107
03/03/2028	2461833.5	144794.804	-412857.322	-172029.719	470117.994
03/04/2028	2461834.5	145130.309	-412134.035	-171726.785	469475.621
03/05/2028	2461835.5	145464.333	-411410.307	-171423.628	468832.991
03/06/2028	2461836.5	145796.870	-410686.143	-171120.251	468190.106
03/07/2028	2461837.5	146127.917	-409961.549	-170816.655	467546.970
03/08/2028	2461838.5	146457.467	-409236.531	-170512.843	466903.585
03/09/2028	2461839.5	146785.517	-408511.096	-170208.817	466259.954
03/10/2028	2461840.5	147112.062	-407785.249	-169904.581	465616.081
03/11/2028	2461841.5	147437.097	-407058.998	-169600.137	464971.969
03/12/2028	2461842.5	147760.618	-406332.349	-169295.488	464327.622
03/13/2028	2461843.5	148082.622	-405605.308	-168990.636	463683.042
03/14/2028	2461844.5	148403.105	-404877.882	-168685.584	463038.235
03/15/2028	2461845.5	148722.061	-404150.078	-168380.335	462393.203
03/16/2028	2461846.5	149039.489	-403421.903	-168074.891	461747.951
03/17/2028	2461847.5	149355.384	-402693.364	-167769.257	461102.483
03/18/2028	2461848.5	149669.743	-401964.467	-167463.435	460456.803
03/19/2028	2461849.5	149982.563	-401235.221	-167157.427	459810.915
03/20/2028	2461850.5	150293.842	-400505.632	-166851.238	459164.824
03/21/2028	2461851.5	150603.576	-399775.708	-166544.869	458518.535
03/22/2028	2461852.5	150911.763	-399045.455	-166238.325	457872.052
03/23/2028	2461853.5	151218.402	-398314.882	-165931.608	457225.380
03/24/2028	2461854.5	151523.489	-397583.995	-165624.722	456578.524
03/25/2028	2461855.5	151827.023	-396852.802	-165317.669	455931.489
03/26/2028	2461856.5	152129.004	-396121.310	-165010.453	455284.280
03/27/2028	2461857.5	152429.428	-395389.526	-164703.077	454636.901
03/28/2028	2461858.5	152728.297	-394657.459	-164395.543	453989.358
03/29/2028	2461859.5	153025.608	-393925.114	-164087.857	453341.656
03/30/2028	2461860.5	153321.361	-393192.499	-163780.019	452693.799
03/31/2028	2461861.5	153615.556	-392459.621	-163472.033	452045.793
04/01/2028	2461862.5	153908.194	-391726.487	-163163.903	451397.643
04/02/2028	2461863.5	154199.273	-390993.103	-162855.631	450749.353
04/03/2028	2461864.5	154488.796	-390259.476	-162547.219	450100.928
04/04/2028	2461865.5	154776.761	-389525.612	-162238.671	449452.372
04/05/2028	2461866.5	155063.171	-388791.516	-161929.989	448803.689
04/06/2028	2461867.5	155348.025	-388057.194	-161621.174	448154.883
04/07/2028	2461868.5	155631.325	-387322.652	-161312.230	447505.957
04/08/2028	2461869.5	155913.072	-386587.894	-161003.158	446856.915
04/09/2028	2461870.5	156193.266	-385852.925	-160693.960	446207.760
04/10/2028	2461871.5	156471.908	-385117.749	-160384.637	445558.493
04/11/2028	2461872.5	156748.998	-384382.370	-160075.190	444909.116
04/12/2028	2461873.5	157024.537	-383646.791	-159765.621	444259.630
04/13/2028	2461874.5	157298.523	-382911.015	-159455.929	443610.036
04/14/2028	2461875.5	157570.956	-382175.046	-159146.117	442960.335
04/15/2028	2461876.5	157841.833	-381438.885	-158836.184	442310.526
04/16/2028	2461877.5	158111.153	-380702.537	-158526.131	441660.608
04/17/2028	2461878.5	158378.911	-379966.005	-158215.958	441010.582
04/18/2028	2461879.5	158645.104	-379229.291	-157905.666	440360.447

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04/19/2028	2461880.5	158909.726	-378492.400	-157595.255	439710.203
04/20/2028	2461881.5	159172.772	-377755.338	-157284.727	439059.850
04/21/2028	2461882.5	159434.235	-377018.108	-156974.082	438409.388
04/22/2028	2461883.5	159694.109	-376280.719	-156663.324	437758.820
04/23/2028	2461884.5	159952.387	-375543.177	-156352.454	437108.149
04/24/2028	2461885.5	160209.063	-374805.493	-156041.476	436457.378
04/25/2028	2461886.5	160464.130	-374067.674	-155730.393	435806.513
04/26/2028	2461887.5	160717.582	-373329.733	-155419.209	435155.560
04/27/2028	2461888.5	160969.415	-372591.681	-155107.929	434504.526
04/28/2028	2461889.5	161219.625	-371853.530	-154796.559	433853.420
04/29/2028	2461890.5	161468.209	-371115.293	-154485.104	433202.251
04/30/2028	2461891.5	161715.164	-370376.982	-154173.569	432551.029
05/01/2028	2461892.5	161960.491	-369638.612	-153861.961	431899.765
05/02/2028	2461893.5	162204.188	-368900.195	-153550.286	431248.470
05/03/2028	2461894.5	162446.258	-368161.745	-153238.549	430597.155
05/04/2028	2461895.5	162686.702	-367423.274	-152926.758	429945.833
05/05/2028	2461896.5	162925.523	-366684.796	-152614.918	429294.513
05/06/2028	2461897.5	163162.725	-365946.322	-152303.035	428643.208
05/07/2028	2461898.5	163398.312	-365207.864	-151991.116	427991.930
05/08/2028	2461899.5	163632.290	-364469.435	-151679.165	427340.689
05/09/2028	2461900.5	163864.662	-363731.045	-151367.189	426689.496
05/10/2028	2461901.5	164095.435	-362992.704	-151055.192	426038.362
05/11/2028	2461902.5	164324.616	-362254.425	-150743.180	425387.299
05/12/2028	2461903.5	164552.210	-361516.215	-150431.159	424736.315
05/13/2028	2461904.5	164778.225	-360778.086	-150119.132	424085.421
05/14/2028	2461905.5	165002.667	-360040.046	-149807.105	423434.627
05/15/2028	2461906.5	165225.544	-359302.103	-149495.082	422783.942
05/16/2028	2461907.5	165446.863	-358564.268	-149183.067	422133.375
05/17/2028	2461908.5	165666.631	-357826.547	-148871.066	421482.935
05/18/2028	2461909.5	165884.857	-357088.949	-148559.081	420832.632
05/19/2028	2461910.5	166101.548	-356351.481	-148247.117	420182.472
05/20/2028	2461911.5	166316.713	-355614.151	-147935.177	419532.466
05/21/2028	2461912.5	166530.358	-354876.965	-147623.266	418882.620
05/22/2028	2461913.5	166742.493	-354139.930	-147311.386	418232.942
05/23/2028	2461914.5	166953.125	-353403.054	-146999.542	417583.441
05/24/2028	2461915.5	167162.264	-352666.341	-146687.736	416934.123
05/25/2028	2461916.5	167369.916	-351929.799	-146375.972	416284.996
05/26/2028	2461917.5	167576.092	-351193.433	-146064.253	415636.067
05/27/2028	2461918.5	167780.799	-350457.248	-145752.582	414987.343
05/28/2028	2461919.5	167984.045	-349721.250	-145440.962	414338.830
05/29/2028	2461920.5	168185.841	-348985.445	-145129.395	413690.535
05/30/2028	2461921.5	168386.193	-348249.836	-144817.884	413042.465
05/31/2028	2461922.5	168585.112	-347514.429	-144506.433	412394.626
06/01/2028	2461923.5	168782.606	-346779.227	-144195.042	411747.023
06/02/2028	2461924.5	168978.684	-346044.237	-143883.716	411099.663
06/03/2028	2461925.5	169173.355	-345309.460	-143572.455	410452.552
06/04/2028	2461926.5	169366.628	-344574.902	-143261.263	409805.695
06/05/2028	2461927.5	169558.511	-343840.566	-142950.141	409159.097
06/06/2028	2461928.5	169749.015	-343106.456	-142639.092	408512.765
06/07/2028	2461929.5	169938.148	-342372.574	-142328.118	407866.702
06/08/2028	2461930.5	170125.920	-341638.924	-142017.219	407220.915
06/09/2028	2461931.5	170312.340	-340905.509	-141706.399	406575.408
06/10/2028	2461932.5	170497.417	-340172.331	-141395.658	405930.186
06/11/2028	2461933.5	170681.160	-339439.392	-141084.999	405285.253
06/12/2028	2461934.5	170863.580	-338706.696	-140774.423	404640.615

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06/13/2028	2461935.5	171044.685	-337974.243	-140463.931	403996.274
06/14/2028	2461936.5	171224.485	-337242.036	-140153.525	403352.235
06/15/2028	2461937.5	171402.990	-336510.076	-139843.205	402708.503
06/16/2028	2461938.5	171580.209	-335778.365	-139532.973	402065.081
06/17/2028	2461939.5	171756.152	-335046.904	-139222.830	401421.973
06/18/2028	2461940.5	171930.829	-334315.693	-138912.777	400779.181
06/19/2028	2461941.5	172104.250	-333584.733	-138602.814	400136.710
06/20/2028	2461942.5	172276.424	-332854.024	-138292.942	399494.563
06/21/2028	2461943.5	172447.361	-332123.568	-137983.163	398852.742
06/22/2028	2461944.5	172617.071	-331393.362	-137673.475	398211.249
06/23/2028	2461945.5	172785.564	-330663.407	-137363.879	397570.089
06/24/2028	2461946.5	172952.850	-329933.703	-137054.376	396929.262
06/25/2028	2461947.5	173118.940	-329204.247	-136744.966	396288.770
06/26/2028	2461948.5	173283.843	-328475.039	-136435.648	395648.616
06/27/2028	2461949.5	173447.569	-327746.077	-136126.422	395008.801
06/28/2028	2461950.5	173610.128	-327017.358	-135817.287	394369.325
06/29/2028	2461951.5	173771.531	-326288.880	-135508.242	393730.189
06/30/2028	2461952.5	173931.786	-325560.640	-135199.288	393091.394
07/01/2028	2461953.5	174090.906	-324832.635	-134890.422	392452.940
07/02/2028	2461954.5	174248.898	-324104.860	-134581.643	391814.825
07/03/2028	2461955.5	174405.772	-323377.311	-134272.949	391177.048
07/04/2028	2461956.5	174561.539	-322649.982	-133964.338	390539.608
07/05/2028	2461957.5	174716.206	-321922.870	-133655.808	389902.503
07/06/2028	2461958.5	174869.783	-321195.967	-133347.357	389265.729
07/07/2028	2461959.5	175022.278	-320469.266	-133038.981	388629.282
07/08/2028	2461960.5	175173.698	-319742.761	-132730.677	387993.158
07/09/2028	2461961.5	175324.051	-319016.445	-132422.441	387357.352
07/10/2028	2461962.5	175473.342	-318290.308	-132114.270	386721.857
07/11/2028	2461963.5	175621.577	-317564.344	-131806.160	386086.667
07/12/2028	2461964.5	175768.760	-316838.542	-131498.106	385451.775
07/13/2028	2461965.5	175914.894	-316112.895	-131190.104	384817.172
07/14/2028	2461966.5	176059.980	-315387.395	-130882.149	384182.850
07/15/2028	2461967.5	176204.021	-314662.032	-130574.237	383548.801
07/16/2028	2461968.5	176347.015	-313936.800	-130266.364	382915.016
07/17/2028	2461969.5	176488.962	-313211.690	-129958.525	382281.486
07/18/2028	2461970.5	176629.859	-312486.698	-129650.717	381648.204
07/19/2028	2461971.5	176769.703	-311761.816	-129342.937	381015.161
07/20/2028	2461972.5	176908.491	-311037.042	-129035.181	380382.351
07/21/2028	2461973.5	177046.220	-310312.370	-128727.448	379749.769
07/22/2028	2461974.5	177182.886	-309587.800	-128419.736	379117.409
07/23/2028	2461975.5	177318.486	-308863.329	-128112.043	378485.267
07/24/2028	2461976.5	177453.017	-308138.957	-127804.370	377853.341
07/25/2028	2461977.5	177586.477	-307414.684	-127496.715	377221.628
07/26/2028	2461978.5	177718.865	-306690.509	-127189.079	376590.129
07/27/2028	2461979.5	177850.179	-305966.434	-126881.463	375958.841
07/28/2028	2461980.5	177980.420	-305242.459	-126573.866	375327.766
07/29/2028	2461981.5	178109.588	-304518.585	-126266.289	374696.904
07/30/2028	2461982.5	178237.685	-303794.813	-125958.733	374066.255
07/31/2028	2461983.5	178364.712	-303071.144	-125651.198	373435.821
08/01/2028	2461984.5	178490.671	-302347.578	-125343.686	372805.602
08/02/2028	2461985.5	178615.566	-301624.114	-125036.195	372175.599
08/03/2028	2461986.5	178739.398	-300900.752	-124728.728	371545.813
08/04/2028	2461987.5	178862.172	-300177.493	-124421.283	370916.243
08/05/2028	2461988.5	178983.891	-299454.334	-124113.861	370286.892
08/06/2028	2461989.5	179104.558	-298731.275	-123806.462	369657.757

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08/07/2028	2461990.5	179224.177	-298008.314	-123499.084	369028.840
08/08/2028	2461991.5	179342.751	-297285.448	-123191.729	368400.139
08/09/2028	2461992.5	179460.285	-296562.676	-122884.395	367771.654
08/10/2028	2461993.5	179576.780	-295839.995	-122577.082	367143.383
08/11/2028	2461994.5	179692.241	-295117.403	-122269.787	366515.325
08/12/2028	2461995.5	179806.671	-294394.895	-121962.512	365887.479
08/13/2028	2461996.5	179920.072	-293672.470	-121655.254	365259.843
08/14/2028	2461997.5	180032.449	-292950.123	-121348.012	364632.413
08/15/2028	2461998.5	180143.802	-292227.851	-121040.784	364005.189
08/16/2028	2461999.5	180254.135	-291505.650	-120733.570	363378.167
08/17/2028	2462000.5	180363.451	-290783.517	-120426.368	362751.345
08/18/2028	2462001.5	180471.750	-290061.447	-120119.176	362124.719
08/19/2028	2462002.5	180579.036	-289339.437	-119811.993	361498.287
08/20/2028	2462003.5	180685.309	-288617.482	-119504.817	360872.046
08/21/2028	2462004.5	180790.572	-287895.579	-119197.645	360245.991
08/22/2028	2462005.5	180894.825	-287173.722	-118890.478	359620.119
08/23/2028	2462006.5	180998.070	-286451.908	-118583.311	358994.427
08/24/2028	2462007.5	181100.307	-285730.132	-118276.145	358368.910
08/25/2028	2462008.5	181201.538	-285008.390	-117968.976	357743.566
08/26/2028	2462009.5	181301.762	-284286.677	-117661.803	357118.389
08/27/2028	2462010.5	181400.980	-283564.990	-117354.625	356493.376
08/28/2028	2462011.5	181499.193	-282843.324	-117047.438	355868.523
08/29/2028	2462012.5	181596.399	-282121.674	-116740.241	355243.825
08/30/2028	2462013.5	181692.600	-281400.036	-116433.033	354619.278
08/31/2028	2462014.5	181787.794	-280678.406	-116125.811	353994.878
09/01/2028	2462015.5	181881.981	-279956.780	-115818.573	353370.620
09/02/2028	2462016.5	181975.160	-279235.153	-115511.318	352746.501
09/03/2028	2462017.5	182067.330	-278513.521	-115204.043	352122.515
09/04/2028	2462018.5	182158.491	-277791.881	-114896.746	351498.659
09/05/2028	2462019.5	182248.641	-277070.227	-114589.426	350874.927
09/06/2028	2462020.5	182337.779	-276348.556	-114282.081	350251.316
09/07/2028	2462021.5	182425.904	-275626.863	-113974.709	349627.820
09/08/2028	2462022.5	182513.013	-274905.146	-113667.308	349004.435
09/09/2028	2462023.5	182599.106	-274183.399	-113359.876	348381.158
09/10/2028	2462024.5	182684.180	-273461.619	-113052.411	347757.983
09/11/2028	2462025.5	182768.234	-272739.803	-112744.912	347134.905
09/12/2028	2462026.5	182851.266	-272017.945	-112437.376	346511.922
09/13/2028	2462027.5	182933.274	-271296.044	-112129.803	345889.027
09/14/2028	2462028.5	183014.255	-270574.094	-111822.189	345266.216
09/15/2028	2462029.5	183094.208	-269852.093	-111514.534	344643.486
09/16/2028	2462030.5	183173.130	-269130.037	-111206.835	344020.832
09/17/2028	2462031.5	183251.019	-268407.922	-110899.092	343398.248
09/18/2028	2462032.5	183327.873	-267685.744	-110591.301	342775.732
09/19/2028	2462033.5	183403.689	-266963.500	-110283.462	342153.278
09/20/2028	2462034.5	183478.464	-266241.187	-109975.573	341530.882
09/21/2028	2462035.5	183552.198	-265518.800	-109667.631	340908.539
09/22/2028	2462036.5	183624.886	-264796.337	-109359.636	340286.245
09/23/2028	2462037.5	183696.526	-264073.792	-109051.584	339663.995
09/24/2028	2462038.5	183767.117	-263351.164	-108743.475	339041.785
09/25/2028	2462039.5	183836.654	-262628.447	-108435.306	338419.610
09/26/2028	2462040.5	183905.136	-261905.638	-108127.075	337797.464
09/27/2028	2462041.5	183972.560	-261182.732	-107818.780	337175.342
09/28/2028	2462042.5	184038.922	-260459.725	-107510.419	336553.240
09/29/2028	2462043.5	184104.220	-259736.612	-107201.989	335931.151
09/30/2028	2462044.5	184168.449	-259013.390	-106893.488	335309.069

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10/01/2028	2462045.5	184231.608	-258290.052	-106584.912	334686.987
10/02/2028	2462046.5	184293.691	-257566.593	-106276.260	334064.900
10/03/2028	2462047.5	184354.694	-256843.008	-105967.527	333442.800
10/04/2028	2462048.5	184414.612	-256119.291	-105658.712	332820.678
10/05/2028	2462049.5	184473.439	-255395.436	-105349.809	332198.526
10/06/2028	2462050.5	184531.170	-254671.438	-105040.817	331576.336
10/07/2028	2462051.5	184587.796	-253947.289	-104731.730	330954.099
10/08/2028	2462052.5	184643.310	-253222.985	-104422.545	330331.803
10/09/2028	2462053.5	184697.703	-252498.519	-104113.259	329709.439
10/10/2028	2462054.5	184750.964	-251773.886	-103803.868	329086.996
10/11/2028	2462055.5	184803.082	-251049.081	-103494.367	328464.464
10/12/2028	2462056.5	184854.045	-250324.101	-103184.755	327841.832
10/13/2028	2462057.5	184903.840	-249598.941	-102875.028	327219.090
10/14/2028	2462058.5	184952.452	-248873.600	-102565.184	326596.227
10/15/2028	2462059.5	184999.868	-248148.078	-102255.222	325973.235
10/16/2028	2462060.5	185046.073	-247422.374	-101945.139	325350.106
10/17/2028	2462061.5	185091.052	-246696.490	-101634.936	324726.832
10/18/2028	2462062.5	185134.790	-245970.429	-101324.612	324103.409
10/19/2028	2462063.5	185177.274	-245244.195	-101014.170	323479.830
10/20/2028	2462064.5	185218.490	-244517.793	-100703.609	322856.093
10/21/2028	2462065.5	185258.425	-243791.229	-100392.932	322232.196
10/22/2028	2462066.5	185297.067	-243064.510	-100082.142	321608.138
10/23/2028	2462067.5	185334.405	-242337.643	-99771.241	320983.918
10/24/2028	2462068.5	185370.429	-241610.636	-99460.233	320359.537
10/25/2028	2462069.5	185405.131	-240883.495	-99149.120	319734.998
10/26/2028	2462070.5	185438.501	-240156.230	-98837.906	319110.301
10/27/2028	2462071.5	185470.532	-239428.848	-98526.595	318485.449
10/28/2028	2462072.5	185501.217	-238701.357	-98215.190	317860.446
10/29/2028	2462073.5	185530.551	-237973.765	-97903.695	317235.294
10/30/2028	2462074.5	185558.526	-237246.080	-97592.113	316609.996
10/31/2028	2462075.5	185585.139	-236518.309	-97280.448	315984.556
11/01/2028	2462076.5	185610.385	-235790.459	-96968.703	315358.978
11/02/2028	2462077.5	185634.258	-235062.538	-96656.882	314733.264
11/03/2028	2462078.5	185656.756	-234334.554	-96344.988	314107.419
11/04/2028	2462079.5	185677.873	-233606.512	-96033.024	313481.445
11/05/2028	2462080.5	185697.607	-232878.420	-95720.994	312855.347
11/06/2028	2462081.5	185715.954	-232150.284	-95408.900	312229.127
11/07/2028	2462082.5	185732.911	-231422.110	-95096.746	311602.789
11/08/2028	2462083.5	185748.475	-230693.906	-94784.534	310976.337
11/09/2028	2462084.5	185762.642	-229965.678	-94472.268	310349.773
11/10/2028	2462085.5	185775.410	-229237.432	-94159.951	309723.102
11/11/2028	2462086.5	185786.777	-228509.174	-93847.585	309096.325
11/12/2028	2462087.5	185796.739	-227780.911	-93535.174	308469.448
11/13/2028	2462088.5	185805.294	-227052.649	-93222.720	307842.473
11/14/2028	2462089.5	185812.440	-226324.393	-92910.227	307215.403
11/15/2028	2462090.5	185818.174	-225596.151	-92597.697	306588.242
11/16/2028	2462091.5	185822.495	-224867.927	-92285.132	305960.994
11/17/2028	2462092.5	185825.399	-224139.730	-91972.537	305333.662
11/18/2028	2462093.5	185826.886	-223411.564	-91659.914	304706.249
11/19/2028	2462094.5	185826.954	-222683.436	-91347.265	304078.760
11/20/2028	2462095.5	185825.600	-221955.351	-91034.594	303451.197
11/21/2028	2462096.5	185822.823	-221227.317	-90721.903	302823.564
11/22/2028	2462097.5	185818.621	-220499.340	-90409.196	302195.866
11/23/2028	2462098.5	185812.994	-219771.425	-90096.475	301568.106
11/24/2028	2462099.5	185805.940	-219043.579	-89783.743	300940.289

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Date 0h TT	Julian Date	X km	Y km	Z km	R km
11/25/2028	2462100.5	185797.457	-218315.808	-89471.004	300312.417
11/26/2028	2462101.5	185787.546	-217588.119	-89158.260	299684.496
11/27/2028	2462102.5	185776.205	-216860.517	-88845.514	299056.529
11/28/2028	2462103.5	185763.433	-216133.010	-88532.769	298428.521
11/29/2028	2462104.5	185749.231	-215405.602	-88220.028	297800.476
11/30/2028	2462105.5	185733.597	-214678.301	-87907.295	297172.399
12/01/2028	2462106.5	185716.532	-213951.113	-87594.571	296544.293
12/02/2028	2462107.5	185698.035	-213224.044	-87281.861	295916.165
12/03/2028	2462108.5	185678.108	-212497.100	-86969.166	295288.017
12/04/2028	2462109.5	185656.750	-211770.288	-86656.491	294659.856
12/05/2028	2462110.5	185633.961	-211043.613	-86343.838	294031.686
12/06/2028	2462111.5	185609.743	-210317.083	-86031.210	293403.513
12/07/2028	2462112.5	185584.096	-209590.702	-85718.611	292775.340
12/08/2028	2462113.5	185557.023	-208864.478	-85406.042	292147.173
12/09/2028	2462114.5	185528.523	-208138.415	-85093.508	291519.018
12/10/2028	2462115.5	185498.598	-207412.521	-84781.010	290890.879
12/11/2028	2462116.5	185467.251	-206686.800	-84468.553	290262.762
12/12/2028	2462117.5	185434.483	-205961.260	-84156.138	289634.673
12/13/2028	2462118.5	185400.297	-205235.904	-83843.769	289006.616
12/14/2028	2462119.5	185364.694	-204510.739	-83531.449	288378.597
12/15/2028	2462120.5	185327.678	-203785.771	-83219.180	287750.622
12/16/2028	2462121.5	185289.250	-203061.004	-82906.964	287122.696
12/17/2028	2462122.5	185249.416	-202336.444	-82594.805	286494.824
12/18/2028	2462123.5	185208.176	-201612.095	-82282.706	285867.013
12/19/2028	2462124.5	185165.536	-200887.962	-81970.667	285239.267
12/20/2028	2462125.5	185121.498	-200164.050	-81658.693	284611.592
12/21/2028	2462126.5	185076.067	-199440.363	-81346.784	283983.993
12/22/2028	2462127.5	185029.246	-198716.904	-81034.944	283356.475
12/23/2028	2462128.5	184981.040	-197993.677	-80723.173	282729.043
12/24/2028	2462129.5	184931.452	-197270.686	-80411.474	282101.702
12/25/2028	2462130.5	184880.488	-196547.932	-80099.848	281474.457
12/26/2028	2462131.5	184828.151	-195825.419	-79788.297	280847.311
12/27/2028	2462132.5	184774.445	-195103.148	-79476.820	280220.269
12/28/2028	2462133.5	184719.376	-194381.121	-79165.421	279593.333
12/29/2028	2462134.5	184662.947	-193659.339	-78854.097	278966.507
12/30/2028	2462135.5	184605.161	-192937.803	-78542.851	278339.794
12/31/2028	2462136.5	184546.022	-192216.512	-78231.682	277713.193
01/01/2029	2462137.5	184485.534	-191495.466	-77920.589	277086.708

EARTH - BARYCENTRIC POSITION AND VELOCITY

Date	X	Y	Z	dx/dt	dy/dt	dz/dt
0h TDB	au	au	au	au/day	au/day	au/day
12/31/2027	-0.147384800	0.888897521	0.385368107	-0.017290081	-0.002437351	-0.001057176
01/01/2028	-0.164650385	0.886321053	0.384250647	-0.017240160	-0.002715421	-0.001177668
01/02/2028	-0.181863273	0.883467029	0.383012932	-0.017184698	-0.002992441	-0.001297677
01/03/2028	-0.199017956	0.880336559	0.381655470	-0.017123760	-0.003268296	-0.001417156
01/04/2028	-0.216108992	0.876930863	0.380178813	-0.017057417	-0.003542874	-0.001536058
01/05/2028	-0.233131013	0.873251271	0.378583560	-0.016985743	-0.003816070	-0.001654342
01/06/2028	-0.250078730	0.869299218	0.376870348	-0.016908825	-0.004087781	-0.001771969
01/07/2028	-0.266946945	0.865076235	0.375039853	-0.016826755	-0.004357915	-0.001888904
01/08/2028	-0.283730557	0.860583942	0.373092780	-0.016739638	-0.004626390	-0.002005119
01/09/2028	-0.300424577	0.855824028	0.371029860	-0.016647589	-0.004893146	-0.002120597
01/10/2028	-0.317024129	0.850798235	0.368851834	-0.016550721	-0.005158147	-0.002235332
01/11/2028	-0.333524448	0.845508322	0.366559440	-0.016449139	-0.005421386	-0.002349334
01/12/2028	-0.349920862	0.839956042	0.364153404	-0.016342920	-0.005682887	-0.002462622
01/13/2028	-0.366208754	0.834143114	0.361634426	-0.016232096	-0.005942689	-0.002575221
01/14/2028	-0.382383515	0.828071216	0.359003184	-0.016116653	-0.006200833	-0.002687152
01/15/2028	-0.398440501	0.821741995	0.356260344	-0.015996532	-0.006457334	-0.002798417
01/16/2028	-0.414374990	0.815157101	0.353406576	-0.015871645	-0.006712172	-0.002909002
01/17/2028	-0.430182172	0.808318225	0.350442579	-0.015741903	-0.006965285	-0.003018869
01/18/2028	-0.445857153	0.801227140	0.347369097	-0.015607230	-0.007216573	-0.003127962
01/19/2028	-0.461394971	0.793885729	0.344186934	-0.015467572	-0.007465912	-0.003236218
01/20/2028	-0.476790627	0.786296011	0.340896964	-0.015322904	-0.007713164	-0.003343565
01/21/2028	-0.492039109	0.778460144	0.337500130	-0.015173225	-0.007958185	-0.003449934
01/22/2028	-0.507135414	0.770380434	0.333997446	-0.015018555	-0.008200827	-0.003555253
01/23/2028	-0.522074569	0.762059331	0.330389996	-0.014858934	-0.008440949	-0.003659456
01/24/2028	-0.536851649	0.753499424	0.326678929	-0.014694414	-0.008678409	-0.003762478
01/25/2028	-0.551461787	0.744703444	0.322865455	-0.014525064	-0.008913075	-0.003864258
01/26/2028	-0.565900194	0.735674249	0.318950846	-0.014350964	-0.009144816	-0.003964739
01/27/2028	-0.580162161	0.726414827	0.314936428	-0.014172203	-0.009373511	-0.004063868
01/28/2028	-0.594243078	0.716928281	0.310823577	-0.013988880	-0.009599046	-0.004161596
01/29/2028	-0.608138436	0.707217825	0.306613717	-0.013801103	-0.009821314	-0.004257880
01/30/2028	-0.621843836	0.697286774	0.302308312	-0.013608983	-0.010040218	-0.004352679
01/31/2028	-0.635354993	0.687138539	0.297908866	-0.013412638	-0.010255669	-0.004445958
02/01/2028	-0.648667744	0.676776614	0.293416913	-0.013212190	-0.010467585	-0.004537686
02/02/2028	-0.661778047	0.666204572	0.288834020	-0.013007763	-0.010675892	-0.004627835
02/03/2028	-0.674681988	0.655426054	0.284161776	-0.012799490	-0.010880525	-0.004716383
02/04/2028	-0.687375790	0.644444766	0.279401794	-0.012587506	-0.011081426	-0.004803310
02/05/2028	-0.699855812	0.633264461	0.274555700	-0.012371956	-0.011278553	-0.004888606
02/06/2028	-0.712118561	0.621888928	0.269625126	-0.012152985	-0.011471880	-0.004972269
02/07/2028	-0.724160691	0.610321968	0.264611703	-0.011930742	-0.011661407	-0.005054308
02/08/2028	-0.735978998	0.598567371	0.259517045	-0.011705359	-0.011847160	-0.005134744
02/09/2028	-0.747570398	0.586628888	0.254342739	-0.011476943	-0.012029192	-0.005213609
02/10/2028	-0.758931896	0.574510204	0.249090338	-0.011245560	-0.012207573	-0.005290941
02/11/2028	-0.770060535	0.562214935	0.243761358	-0.011011223	-0.012382373	-0.005366771
02/12/2028	-0.780953346	0.549746635	0.238357291	-0.010773897	-0.012553639	-0.005441115
02/13/2028	-0.791607313	0.537108834	0.232879626	-0.010533521	-0.012721373	-0.005513965
02/14/2028	-0.802019349	0.524305080	0.227329870	-0.010290029	-0.012885533	-0.005585290
02/15/2028	-0.812186316	0.511338988	0.221709571	-0.010043375	-0.013046033	-0.005655040
02/16/2028	-0.822105041	0.498214271	0.216020335	-0.009793547	-0.013202762	-0.005723155
02/17/2028	-0.831772359	0.484934761	0.210263828	-0.009540567	-0.013355599	-0.005789570
02/18/2028	-0.841185142	0.471504412	0.204441780	-0.009284486	-0.013504421	-0.005854227
02/19/2028	-0.850340322	0.457927297	0.198555978	-0.009025377	-0.013649112	-0.005917070
02/20/2028	-0.859234917	0.444207601	0.192608262	-0.008763330	-0.013789566	-0.005978048
02/21/2028	-0.867866036	0.430349611	0.186600518	-0.008498445	-0.013925684	-0.006037117
02/22/2028	-0.876230898	0.416357708	0.180534677	-0.008230832	-0.014057376	-0.006094237
02/23/2028	-0.884326830	0.402236362	0.174412707	-0.007960607	-0.014184558	-0.006149370

EARTH - BARYCENTRIC POSITION AND VELOCITY

Date 0h TDB	X au	Y au	Z au	dx/dt au/day	dy/dt au/day	dz/dt au/day
02/24/2028	-0.892151283	0.387990121	0.168236610	-0.007687894	-0.014307154	-0.006202485
02/25/2028	-0.899701832	0.373623607	0.162008419	-0.007412823	-0.014425094	-0.006253553
02/26/2028	-0.906976188	0.359141506	0.155730194	-0.007135529	-0.014538316	-0.006302549
02/27/2028	-0.913972197	0.344548564	0.149404017	-0.006856155	-0.014646768	-0.006349454
02/28/2028	-0.920687853	0.329849576	0.143031988	-0.006574847	-0.014750404	-0.006394253
02/29/2028	-0.927121297	0.315049373	0.136616217	-0.006291756	-0.014849191	-0.006436935
03/01/2028	-0.933270821	0.300152819	0.130158826	-0.006007032	-0.014943104	-0.006477495
03/02/2028	-0.939134869	0.285164793	0.123661935	-0.005720832	-0.015032132	-0.006515934
03/03/2028	-0.944712044	0.270090184	0.117127662	-0.005433310	-0.015116272	-0.006552259
03/04/2028	-0.950001101	0.254933874	0.110558117	-0.005144623	-0.015195539	-0.006586483
03/05/2028	-0.955000952	0.239700722	0.103955390	-0.004854923	-0.015269962	-0.006618626
03/06/2028	-0.959710658	0.224395549	0.097321548	-0.004564358	-0.015339591	-0.006648720
03/07/2028	-0.964129422	0.209023115	0.090658621	-0.004273057	-0.015404498	-0.006676802
03/08/2028	-0.968256561	0.193588096	0.083968598	-0.003981124	-0.015464775	-0.006702921
03/09/2028	-0.972091481	0.178095072	0.077253417	-0.003688624	-0.015520527	-0.006727125
03/10/2028	-0.975633628	0.162548516	0.070514971	-0.003395576	-0.015571855	-0.006749458
03/11/2028	-0.978882442	0.146952811	0.063755115	-0.003101954	-0.015618836	-0.006769949
03/12/2028	-0.981837326	0.131312280	0.056975686	-0.002807705	-0.015661508	-0.006788602
03/13/2028	-0.984497624	0.115631235	0.050178529	-0.002512774	-0.015699859	-0.006805401
03/14/2028	-0.986862635	0.099914019	0.043365515	-0.002217127	-0.015733837	-0.006820308
03/15/2028	-0.988931639	0.084165045	0.036538560	-0.001920764	-0.015763361	-0.006833276
03/16/2028	-0.990703937	0.068388813	0.029699627	-0.001623725	-0.015788338	-0.006844256
03/17/2028	-0.992178887	0.052589913	0.022850726	-0.001326082	-0.015808684	-0.006853203
03/18/2028	-0.993355931	0.036773016	0.015993911	-0.001027931	-0.015824319	-0.006860080
03/19/2028	-0.994234615	0.020942866	0.009131266	-0.000729381	-0.015835181	-0.006864858
03/20/2028	-0.994814599	0.005104263	0.002264903	-0.000430551	-0.015841217	-0.006867513
03/21/2028	-0.995095664	-0.010737945	-0.004603046	-0.000131563	-0.015842386	-0.006868027
03/22/2028	-0.995077716	-0.026578875	-0.011470432	0.000167454	-0.015838655	-0.006866386
03/23/2028	-0.994760788	-0.042413612	-0.018335097	0.000466373	-0.015829996	-0.006862581
03/24/2028	-0.994145047	-0.058237217	-0.025194871	0.000765059	-0.015816388	-0.006856605
03/25/2028	-0.993230795	-0.074044734	-0.032047581	0.001063373	-0.015797817	-0.006848454
03/26/2028	-0.992018473	-0.089831195	-0.038891054	0.001361172	-0.015774277	-0.006838129
03/27/2028	-0.990508672	-0.105591633	-0.045723117	0.001658307	-0.015745771	-0.006825637
03/28/2028	-0.988702130	-0.121321087	-0.052541609	0.001954628	-0.015712313	-0.006810989
03/29/2028	-0.986599738	-0.137014617	-0.059344382	0.002249981	-0.015673930	-0.006794203
03/30/2028	-0.984202541	-0.152667318	-0.066129310	0.002544214	-0.015630662	-0.006775304
03/31/2028	-0.981511733	-0.168274332	-0.072894295	0.002837179	-0.015582566	-0.006754323
04/01/2028	-0.978528653	-0.183830865	-0.079637275	0.003128735	-0.015529712	-0.006731298
04/02/2028	-0.975254776	-0.199332199	-0.086356226	0.003418751	-0.015472186	-0.006706274
04/03/2028	-0.971691703	-0.214773714	-0.093049174	0.003707110	-0.015410089	-0.006679302
04/04/2028	-0.967841140	-0.230150893	-0.099714199	0.003993717	-0.015343537	-0.006650437
04/05/2028	-0.963704877	-0.245459345	-0.106349437	0.004278503	-0.015272656	-0.006619738
04/06/2028	-0.959284752	-0.260694804	-0.112953083	0.004561437	-0.015197573	-0.006587261
04/07/2028	-0.954582620	-0.275853131	-0.119523383	0.0048442520	-0.015118409	-0.006553055
04/08/2028	-0.949600316	-0.290930295	-0.126058629	0.005121791	-0.015035260	-0.006517155
04/09/2028	-0.944339623	-0.305922342	-0.132557134	0.005399307	-0.014948184	-0.006479576
04/10/2028	-0.938802267	-0.320825359	-0.139017219	0.005675126	-0.014857196	-0.006440311
04/11/2028	-0.932989924	-0.335635425	-0.145437187	0.005949286	-0.014762276	-0.006399338
04/12/2028	-0.926904247	-0.350348584	-0.151815314	0.006221791	-0.014663374	-0.006356624
04/13/2028	-0.920546904	-0.364960826	-0.158149843	0.006492609	-0.014560433	-0.006312136
04/14/2028	-0.913919613	-0.379468084	-0.164438984	0.006761673	-0.014453397	-0.006265844
04/15/2028	-0.907024172	-0.393866241	-0.170680922	0.007028895	-0.014342225	-0.006217727
04/16/2028	-0.899862473	-0.408151146	-0.176873826	0.007294169	-0.014226889	-0.006167773
04/17/2028	-0.892436520	-0.422318627	-0.183015853	0.007557385	-0.014107376	-0.006115976
04/18/2028	-0.884748428	-0.436364505	-0.189105163	0.007818430	-0.013983683	-0.006062336

EARTH - BARYCENTRIC POSITION AND VELOCITY

Date 0h TDB	X au	Y au	Z au	dx/dt au/day	dy/dt au/day	dz/dt au/day
04/19/2028	-0.876800423	-0.450284603	-0.195139913	0.008077189	-0.013855817	-0.006006859
04/20/2028	-0.868594850	-0.464074753	-0.201118271	0.008333548	-0.013723792	-0.005949552
04/21/2028	-0.860134166	-0.477730806	-0.207038412	0.008587390	-0.013587625	-0.005890428
04/22/2028	-0.851420949	-0.491248630	-0.212898524	0.008838595	-0.013447340	-0.005829498
04/23/2028	-0.842457897	-0.504624123	-0.218696812	0.009087037	-0.013302968	-0.005766781
04/24/2028	-0.833247839	-0.517853216	-0.224431499	0.009332587	-0.013154549	-0.005702301
04/25/2028	-0.823793732	-0.530931888	-0.230100835	0.009575112	-0.013002134	-0.005636085
04/26/2028	-0.814098669	-0.543856174	-0.235703101	0.009814477	-0.012845791	-0.005568169
04/27/2028	-0.804165876	-0.556622187	-0.241236620	0.010050551	-0.012685602	-0.005498597
04/28/2028	-0.793998705	-0.569226129	-0.246699761	0.010283212	-0.012521668	-0.005427422
04/29/2028	-0.783600626	-0.581664314	-0.252090949	0.010512352	-0.012354107	-0.005354700
04/30/2028	-0.772975206	-0.593933177	-0.257408667	0.010737879	-0.012183049	-0.005280495
05/01/2028	-0.762126094	-0.606029293	-0.262651467	0.010959728	-0.012008635	-0.005204874
05/02/2028	-0.751056990	-0.617949377	-0.267817965	0.011177857	-0.011831010	-0.005127901
05/03/2028	-0.739771623	-0.629690292	-0.272906841	0.011392255	-0.011650321	-0.005049641
05/04/2028	-0.728273719	-0.641249043	-0.277916837	0.011602938	-0.011466703	-0.004970150
05/05/2028	-0.716566973	-0.652622762	-0.282846746	0.011809947	-0.011280276	-0.004889473
05/06/2028	-0.704655027	-0.663808690	-0.287695399	0.012013348	-0.011091133	-0.004807643
05/07/2028	-0.692541456	-0.674804144	-0.292461653	0.012213210	-0.010899336	-0.004724676
05/08/2028	-0.680229764	-0.685606487	-0.297144371	0.012409601	-0.010704912	-0.004640570
05/09/2028	-0.667723397	-0.696213092	-0.301742410	0.012602566	-0.010507857	-0.004555313
05/10/2028	-0.655025767	-0.706621316	-0.306254607	0.012792124	-0.010308147	-0.004468884
05/11/2028	-0.642140289	-0.716828490	-0.310679781	0.012978259	-0.010105750	-0.004381263
05/12/2028	-0.629076046	-0.726831910	-0.315016729	0.013160925	-0.009900637	-0.004292432
05/13/2028	-0.615819618	-0.736628852	-0.319264238	0.013340054	-0.009692791	-0.004202382
05/14/2028	-0.602391503	-0.746216579	-0.323421087	0.013515566	-0.009482208	-0.004111112
05/15/2028	-0.588789722	-0.755592360	-0.327486058	0.013687372	-0.009268901	-0.004018629
05/16/2028	-0.575018025	-0.764753479	-0.331457944	0.013855382	-0.009052891	-0.003924944
05/17/2028	-0.561080253	-0.773697251	-0.335335551	0.014019507	-0.008834211	-0.003830075
05/18/2028	-0.546980336	-0.782421023	-0.339117705	0.014179658	-0.008612899	-0.003734041
05/19/2028	-0.532722292	-0.790922186	-0.342803253	0.014335745	-0.008388999	-0.003636866
05/20/2028	-0.518310230	-0.799198174	-0.346391064	0.014487678	-0.008162559	-0.003538573
05/21/2028	-0.503748353	-0.807246475	-0.349880036	0.014635359	-0.007933633	-0.003439192
05/22/2028	-0.489040962	-0.815064631	-0.353269097	0.014778689	-0.007702283	-0.003338756
05/23/2028	-0.474192461	-0.822650257	-0.356557210	0.014917562	-0.007468585	-0.003237304
05/24/2028	-0.459207359	-0.830001048	-0.359743382	0.015051873	-0.007232629	-0.003134883
05/25/2028	-0.444090270	-0.837114800	-0.362826671	0.015181518	-0.006994527	-0.003031550
05/26/2028	-0.428845906	-0.843989429	-0.365806198	0.015306411	-0.006754408	-0.002927369
05/27/2028	-0.413479056	-0.850622993	-0.368681151	0.015426482	-0.006512423	-0.002822413
05/28/2028	-0.397994563	-0.857013706	-0.371450791	0.015541691	-0.006268731	-0.002716757
05/29/2028	-0.382397298	-0.863159942	-0.374114456	0.015652028	-0.006023499	-0.002610475
05/30/2028	-0.366692125	-0.869060244	-0.376671556	0.015757515	-0.005776887	-0.002503637
05/31/2028	-0.350883869	-0.874713306	-0.379121565	0.015858201	-0.005529042	-0.002396303
06/01/2028	-0.334977298	-0.880117961	-0.381464013	0.015954160	-0.005280092	-0.002288522
06/02/2028	-0.318977097	-0.885273156	-0.383698472	0.016045476	-0.005030138	-0.002180330
06/03/2028	-0.302887862	-0.890177929	-0.385824544	0.016132242	-0.004779257	-0.002071750
06/04/2028	-0.286714100	-0.894831377	-0.387841845	0.016214546	-0.004527495	-0.001962790
06/05/2028	-0.270460232	-0.899232633	-0.389749998	0.016292463	-0.004274875	-0.001853451
06/06/2028	-0.254130618	-0.903380841	-0.391548617	0.016366048	-0.004021398	-0.001743722
06/07/2028	-0.237729571	-0.907275139	-0.393237308	0.016435331	-0.003767052	-0.001633591
06/08/2028	-0.221261389	-0.910914650	-0.394815662	0.016500315	-0.003511822	-0.001523046
06/09/2028	-0.204730381	-0.914298485	-0.396283259	0.016560979	-0.003255696	-0.001412078
06/10/2028	-0.188140885	-0.917425744	-0.397639676	0.016617282	-0.002998672	-0.001300685
06/11/2028	-0.171497287	-0.920295533	-0.398884489	0.016669173	-0.002740760	-0.001188873
06/12/2028	-0.154804030	-0.922906975	-0.400017287	0.016716591	-0.002481983	-0.001076655

EARTH - BARYCENTRIC POSITION AND VELOCITY

Date 0h TDB	X au	Y au	Z au	dx/dt au/day	dy/dt au/day	dz/dt au/day
06/13/2028	-0.138065615	-0.925259223	-0.401037670	0.016759477	-0.002222377	-0.000964049
06/14/2028	-0.121286606	-0.927351468	-0.401945263	0.016797770	-0.001961985	-0.000851078
06/15/2028	-0.104471625	-0.929182949	-0.402739712	0.016831411	-0.001700858	-0.000737766
06/16/2028	-0.087625354	-0.930752958	-0.403420692	0.016860341	-0.001439052	-0.000624144
06/17/2028	-0.070752533	-0.932060846	-0.403987907	0.016884500	-0.001176627	-0.000510242
06/18/2028	-0.053857966	-0.933106026	-0.404441094	0.016903823	-0.000913647	-0.000396093
06/19/2028	-0.036946521	-0.933887980	-0.404780023	0.016918243	-0.000650187	-0.000281735
06/20/2028	-0.020023138	-0.934406269	-0.405004508	0.016927687	-0.000386332	-0.000167213
06/21/2028	-0.003092830	-0.934660547	-0.405114412	0.016932082	-0.000122184	-0.000052580
06/22/2028	0.013839319	-0.934650581	-0.405109652	0.016931357	0.000142132	0.000062102
06/23/2028	0.030768160	-0.934376274	-0.404990215	0.016925460	0.000406472	0.000176761
06/24/2028	0.047688505	-0.933837685	-0.404756164	0.016914364	0.000670668	0.000291318
06/25/2028	0.064595157	-0.933035045	-0.404407641	0.016898077	0.000934543	0.000405691
06/26/2028	0.081482945	-0.931968764	-0.403944869	0.016876647	0.001197922	0.000519804
06/27/2028	0.098346765	-0.930639421	-0.403368142	0.016850158	0.001460643	0.000633590
06/28/2028	0.115181612	-0.929047743	-0.402677815	0.016818721	0.001722570	0.000746998
06/29/2028	0.131982599	-0.927194580	-0.401874286	0.016782461	0.001983601	0.000859991
06/30/2028	0.148744968	-0.925080866	-0.400957979	0.016741504	0.002243660	0.000972548
07/01/2028	0.165464080	-0.922707598	-0.399929337	0.016695966	0.002502704	0.001084662
07/02/2028	0.182135409	-0.920075804	-0.398788804	0.016645952	0.002760709	0.001196332
07/03/2028	0.198754520	-0.917186528	-0.397536820	0.016591544	0.003017670	0.001307565
07/04/2028	0.215317053	-0.914040812	-0.396173816	0.016532804	0.003273590	0.001418371
07/05/2028	0.231818697	-0.910639692	-0.394700216	0.016469772	0.003528479	0.001528760
07/06/2028	0.248255173	-0.906984195	-0.393116432	0.016402467	0.003782346	0.001638740
07/07/2028	0.264622209	-0.903075339	-0.391422872	0.016330892	0.004035196	0.001748313
07/08/2028	0.280915529	-0.898914143	-0.389619943	0.016255033	0.004287025	0.001857478
07/09/2028	0.297130840	-0.894501635	-0.387708055	0.016174867	0.004537816	0.001966226
07/10/2028	0.313263818	-0.889838864	-0.385687633	0.016090365	0.004787546	0.002074545
07/11/2028	0.329310115	-0.884926910	-0.383559116	0.016001497	0.005036176	0.002182412
07/12/2028	0.345265347	-0.879766893	-0.381322966	0.015908232	0.005283662	0.002289807
07/13/2028	0.361125103	-0.874359984	-0.378979670	0.015810540	0.005529952	0.002396700
07/14/2028	0.376884941	-0.868707407	-0.376529743	0.015708392	0.005774989	0.002503063
07/15/2028	0.392540391	-0.862810446	-0.373973731	0.015601758	0.006018709	0.002608863
07/16/2028	0.408086952	-0.856670449	-0.371312215	0.015490608	0.006261047	0.002714066
07/17/2028	0.423520090	-0.850288837	-0.368545811	0.015374906	0.006501926	0.002818633
07/18/2028	0.438835234	-0.843667111	-0.365675177	0.015254613	0.006741261	0.002922518
07/19/2028	0.454027774	-0.836806864	-0.362701020	0.015129690	0.006978948	0.003025668
07/20/2028	0.469093060	-0.829709806	-0.359624107	0.015000104	0.007214862	0.003128021
07/21/2028	0.484026420	-0.822377779	-0.356445268	0.014865836	0.007448857	0.003229505
07/22/2028	0.498823175	-0.814812788	-0.353165414	0.014726900	0.007680763	0.003330039
07/23/2028	0.513478682	-0.807017009	-0.349785533	0.014583350	0.007910402	0.003429543
07/24/2028	0.527988370	-0.798992799	-0.346306695	0.014435285	0.008137599	0.003527943
07/25/2028	0.542347794	-0.790742675	-0.342730034	0.014282847	0.008362206	0.003625181
07/26/2028	0.556552661	-0.782269289	-0.339056735	0.014126200	0.008584108	0.003721216
07/27/2028	0.570598849	-0.773575384	-0.335288010	0.013965517	0.008803235	0.003816029
07/28/2028	0.584482402	-0.764663756	-0.331425084	0.013800957	0.009019552	0.003909619
07/29/2028	0.598199517	-0.755537220	-0.327469177	0.013632660	0.009233050	0.004001993
07/30/2028	0.611746515	-0.746198591	-0.323421499	0.013460740	0.009443740	0.004093165
07/31/2028	0.625119820	-0.736650671	-0.319283243	0.013285285	0.009651637	0.004183150
08/01/2028	0.638315930	-0.726896242	-0.315055590	0.013106363	0.009856761	0.004271961
08/02/2028	0.651331406	-0.716938067	-0.310739708	0.012924022	0.010059130	0.004359610
08/03/2028	0.664162846	-0.706778895	-0.306336755	0.012738296	0.010258756	0.004446104
08/04/2028	0.676806876	-0.696421466	-0.301847884	0.012549206	0.010455645	0.004531446
08/05/2028	0.689260140	-0.685868518	-0.297274248	0.012356763	0.010649795	0.004615633
08/06/2028	0.701519286	-0.675122793	-0.292617006	0.012160972	0.010841195	0.004698658

EARTH - BARYCENTRIC POSITION AND VELOCITY

Date 0h TDB	X au	Y au	Z au	dx/dt au/day	dy/dt au/day	dz/dt au/day
08/07/2028	0.713580968	-0.664187050	-0.287877322	0.011961833	0.011029827	0.004780511
08/08/2028	0.725441834	-0.653064072	-0.283056380	0.011759342	0.011215661	0.004861174
08/09/2028	0.737098533	-0.641756673	-0.278155377	0.011553496	0.011398661	0.004940627
08/10/2028	0.748547708	-0.630267709	-0.273175536	0.011344294	0.011578784	0.005018847
08/11/2028	0.759786002	-0.618600081	-0.268118103	0.011131734	0.011755979	0.005095806
08/12/2028	0.770810056	-0.606756744	-0.262984354	0.010915814	0.011930193	0.005171476
08/13/2028	0.781616509	-0.594740710	-0.2577775593	0.010696533	0.012101363	0.005245823
08/14/2028	0.792201999	-0.582555056	-0.252493160	0.010473887	0.012269421	0.005318812
08/15/2028	0.802563159	-0.570202932	-0.247138435	0.010247871	0.012434288	0.005390401
08/16/2028	0.812696617	-0.557687575	-0.241712841	0.010018483	0.012595869	0.005460542
08/17/2028	0.822599002	-0.545012327	-0.236217853	0.009785726	0.012754051	0.005529177
08/18/2028	0.832266953	-0.532180650	-0.230655010	0.009549620	0.012908700	0.005596241
08/19/2028	0.841697143	-0.519196157	-0.225025919	0.009310217	0.013059659	0.005661660
08/20/2028	0.850886319	-0.506062616	-0.219332262	0.009067611	0.013206766	0.005725363
08/21/2028	0.859831344	-0.492783961	-0.213575788	0.008821943	0.013349865	0.005787284
08/22/2028	0.868529246	-0.479364264	-0.207758303	0.008573400	0.013488830	0.005847377
08/23/2028	0.876977254	-0.465807706	-0.201881651	0.008322190	0.013623580	0.005905619
08/24/2028	0.885172808	-0.452118520	-0.195947683	0.008068524	0.013754083	0.005962009
08/25/2028	0.893113546	-0.438300953	-0.189958243	0.007812589	0.013880347	0.006016566
08/26/2028	0.900797282	-0.424359227	-0.183915153	0.007554540	0.014002409	0.006069315
08/27/2028	0.908221963	-0.410297521	-0.177820206	0.007294499	0.014120316	0.006120287
08/28/2028	0.915385647	-0.396119965	-0.171675164	0.007032557	0.014234116	0.006169507
08/29/2028	0.922286468	-0.381830643	-0.165481767	0.006768785	0.014343854	0.006216999
08/30/2028	0.928922624	-0.367433600	-0.159241737	0.006503235	0.014449563	0.006262777
08/31/2028	0.935292361	-0.352932852	-0.152956780	0.006235954	0.014551269	0.006306854
09/01/2028	0.941393966	-0.338332390	-0.146628593	0.005966976	0.014648992	0.006349237
09/02/2028	0.947225757	-0.323636191	-0.140258870	0.005696332	0.014742743	0.006389928
09/03/2028	0.952786083	-0.308848225	-0.133849301	0.005424048	0.014832526	0.006428926
09/04/2028	0.958073315	-0.293972462	-0.127401584	0.005150148	0.014918339	0.006466226
09/05/2028	0.963085847	-0.279012875	-0.120917419	0.004874651	0.015000170	0.006501819
09/06/2028	0.967822092	-0.263973455	-0.114398519	0.004597577	0.015078002	0.006535693
09/07/2028	0.972280482	-0.248858211	-0.107846611	0.004318945	0.015151812	0.006567832
09/08/2028	0.976459470	-0.233671182	-0.101263439	0.004038775	0.015221568	0.006598217
09/09/2028	0.980357526	-0.218416440	-0.094650769	0.003757087	0.015287231	0.006626825
09/10/2028	0.983973146	-0.203098099	-0.088010389	0.003473904	0.015348757	0.006653632
09/11/2028	0.987304844	-0.187720322	-0.081344115	0.003189249	0.015406092	0.006678607
09/12/2028	0.990351161	-0.172287331	-0.074653797	0.002903147	0.015459174	0.006701716
09/13/2028	0.993110667	-0.156803417	-0.067941318	0.002615629	0.015507926	0.006722920
09/14/2028	0.995581961	-0.141272952	-0.061208607	0.002326735	0.015552257	0.006742174
09/15/2028	0.997763696	-0.125700412	-0.054457639	0.002036521	0.015592058	0.006759423
09/16/2028	0.999654591	-0.110090387	-0.047690447	0.001745074	0.015627206	0.006774612
09/17/2028	1.001253474	-0.094447594	-0.040909120	0.001452520	0.015657573	0.006787685
09/18/2028	1.002559319	-0.078776874	-0.034115799	0.001159032	0.015683041	0.006798594
09/19/2028	1.003571296	-0.063083175	-0.027312662	0.000864821	0.015703522	0.006807313
09/20/2028	1.004288798	-0.047371506	-0.020501906	0.000570122	0.015718978	0.006818386
09/21/2028	1.004711455	-0.031646891	-0.013685716	0.000275167	0.015729421	0.006818184
09/22/2028	1.004839114	-0.015914317	-0.006866249	-0.000019843	0.015734908	0.006820396
09/23/2028	1.004671806	-0.000178699	-0.000045620	-0.000314743	0.015735524	0.006820519
09/24/2028	1.004209705	0.015555138	0.006774107	-0.000609413	0.015731361	0.006818599
09/25/2028	1.003453088	0.031282459	0.013590912	-0.000903762	0.015722506	0.006814679
09/26/2028	1.002402310	0.046998612	0.020402811	-0.001197725	0.015709037	0.006808794
09/27/2028	1.001057784	0.062699015	0.027207854	-0.001491250	0.015691015	0.006800970
09/28/2028	0.999419972	0.078379142	0.034004112	-0.001784290	0.015668493	0.006791227
09/29/2028	0.997489379	0.094034516	0.040789674	-0.002076804	0.015641514	0.006779583
09/30/2028	0.995266551	0.109660697	0.047562647	-0.002368754	0.015610113	0.006766048

EARTH - BARYCENTRIC POSITION AND VELOCITY

Date 0h TDB	X au	Y au	Z au	dx/dt au/day	dy/dt au/day	dz/dt au/day
10/01/2028	0.992752072	0.125253278	0.054321143	-0.002660102	0.015574320	0.006750632
10/02/2028	0.989946560	0.140807881	0.061063285	-0.002950813	0.015534160	0.006733342
10/03/2028	0.986850668	0.156320148	0.067787202	-0.003240856	0.015489650	0.006714180
10/04/2028	0.983465080	0.171785736	0.074491023	-0.003530201	0.015440804	0.006693148
10/05/2028	0.979790509	0.187200312	0.081172874	-0.003818818	0.015387627	0.006670242
10/06/2028	0.975827696	0.202559545	0.087830880	-0.004106681	0.015330115	0.006645454
10/07/2028	0.971577409	0.217859094	0.094463152	-0.004393758	0.015268258	0.006618775
10/08/2028	0.967040452	0.233094607	0.101067793	-0.004680017	0.015202037	0.006590187
10/09/2028	0.962217660	0.248261703	0.107642885	-0.004965420	0.015131420	0.006559674
10/10/2028	0.957109911	0.263355970	0.114186492	-0.005249924	0.015056371	0.006527213
10/11/2028	0.951718130	0.278372951	0.120696652	-0.005533475	0.014976840	0.006492776
10/12/2028	0.946043301	0.293308135	0.127171376	-0.005816006	0.014892766	0.006456333
10/13/2028	0.940086485	0.308156946	0.133608639	-0.006097433	0.014804080	0.006417852
10/14/2028	0.933848841	0.322914732	0.140066388	-0.006377642	0.014710705	0.006377297
10/15/2028	0.927331655	0.337576766	0.146362531	-0.006656487	0.014612564	0.006334638
10/16/2028	0.920536381	0.352138251	0.152674955	-0.006933786	0.014509596	0.006289855
10/17/2028	0.913464670	0.366594340	0.158941533	-0.007209323	0.014401771	0.006242945
10/18/2028	0.906118399	0.380940178	0.165160143	-0.007482867	0.014289101	0.006193927
10/19/2028	0.898499677	0.395170948	0.171328698	-0.007754192	0.014171650	0.006142843
10/20/2028	0.890610821	0.409281918	0.177445159	-0.008023103	0.014049521	0.006089750
10/21/2028	0.882454327	0.423268475	0.183507551	-0.008289446	0.013922848	0.006034716
10/22/2028	0.874032821	0.437126145	0.189513966	-0.008553111	0.013791768	0.005977807
10/23/2028	0.865349021	0.450850587	0.195462559	-0.008814025	0.013656413	0.005919081
10/24/2028	0.856405705	0.464437584	0.201351540	-0.009072138	0.013516897	0.005858589
10/25/2028	0.847205691	0.477883028	0.207179163	-0.009327414	0.013373323	0.005796372
10/26/2028	0.837751833	0.491182904	0.212943720	-0.009579821	0.013225773	0.005732462
10/27/2028	0.828047014	0.504333275	0.218643533	-0.009829331	0.013074324	0.005666890
10/28/2028	0.818094146	0.517330274	0.224276953	-0.010075914	0.012919041	0.005599679
10/29/2028	0.807896171	0.530170100	0.229842352	-0.010319542	0.012759989	0.005530852
10/30/2028	0.797456057	0.542849013	0.235338126	-0.010560187	0.012597223	0.005460430
10/31/2028	0.786776798	0.555363327	0.240762688	-0.010797827	0.012430798	0.005388432
11/01/2028	0.775861413	0.567709406	0.246114469	-0.011032439	0.012260762	0.005314871
11/02/2028	0.764712936	0.579883660	0.251391913	-0.011264006	0.012087154	0.005239760
11/03/2028	0.753334421	0.591882534	0.256593475	-0.011492512	0.011910007	0.005163106
11/04/2028	0.741728937	0.603702501	0.261717612	-0.011717940	0.011729340	0.005084912
11/05/2028	0.729899575	0.615340045	0.266762784	-0.011940266	0.011545163	0.005005174
11/06/2028	0.717849449	0.626791657	0.271727443	-0.012159461	0.011357474	0.004923886
11/07/2028	0.705581711	0.638053819	0.276610035	-0.012375483	0.011166260	0.004841037
11/08/2028	0.693099560	0.649122996	0.281408993	-0.012588275	0.010971502	0.004756616
11/09/2028	0.680406262	0.659995632	0.286122739	-0.012797763	0.010773173	0.004670609
11/10/2028	0.667505168	0.670668142	0.290749678	-0.013003850	0.010571245	0.004583003
11/11/2028	0.654399735	0.681136915	0.295288209	-0.013206417	0.010365694	0.004493790
11/12/2028	0.641093556	0.691398317	0.299736722	-0.013405317	0.010156503	0.004402969
11/13/2028	0.627590380	0.701448709	0.304093613	-0.013600380	0.009943677	0.004310549
11/14/2028	0.613894138	0.711284470	0.308357295	-0.013791416	0.009727250	0.004216556
11/15/2028	0.600008955	0.720902031	0.312526215	-0.013978231	0.009507291	0.004121034
11/16/2028	0.585939146	0.730297912	0.316598873	-0.014160639	0.009283913	0.004024043
11/17/2028	0.571689199	0.739468765	0.320573838	-0.014338483	0.009057263	0.003925660
11/18/2028	0.557263742	0.748411402	0.324449756	-0.014511645	0.008827509	0.003825965
11/19/2028	0.542667494	0.757122807	0.328225357	-0.014680052	0.008594826	0.003725039
11/20/2028	0.527905237	0.765600135	0.331899447	-0.014843662	0.008359382	0.003622954
11/21/2028	0.512981775	0.773840702	0.335470901	-0.015002460	0.008121328	0.003519776
11/22/2028	0.497901921	0.781841966	0.338938653	-0.015156446	0.007880797	0.003415558
11/23/2028	0.482670485	0.789601508	0.342301686	-0.015305625	0.007637904	0.003310346
11/24/2028	0.467292271	0.797117022	0.345559028	-0.015450003	0.007392755	0.003204181

EARTH - BARYCENTRIC POSITION AND VELOCITY

Date 0h TDB	X au	Y au	Z au	dX/dt au/day	dY/dt au/day	dZ/dt au/day
11/25/2028	0.451772078	0.804386298	0.348709742	-0.015589583	0.007145445	0.003097098
11/26/2028	0.436114702	0.811407221	0.351752929	-0.015724370	0.006896063	0.002989132
11/27/2028	0.420324933	0.818177763	0.354687723	-0.015854370	0.006644697	0.002880316
11/28/2028	0.404407556	0.824695980	0.357513287	-0.015979589	0.006391426	0.002770679
11/29/2028	0.388367344	0.830960007	0.360228816	-0.016100041	0.006136329	0.002660249
11/30/2028	0.372209058	0.836968053	0.362833528	-0.016215741	0.005879475	0.002549049
12/01/2028	0.355937439	0.842718390	0.365326664	-0.016326709	0.005620921	0.002437099
12/02/2028	0.339557210	0.848209344	0.367707479	-0.016432964	0.005360714	0.002324411
12/03/2028	0.323073077	0.853439276	0.369975241	-0.016534521	0.005098882	0.002210991
12/04/2028	0.306489735	0.858406573	0.372129217	-0.016631380	0.004835443	0.002096840
12/05/2028	0.289811887	0.863109629	0.374168677	-0.016723528	0.004570401	0.001981957
12/06/2028	0.273044261	0.867546839	0.376092887	-0.016810928	0.004303753	0.001866338
12/07/2028	0.256191634	0.871716598	0.377901108	-0.016893518	0.004035496	0.001749982
12/08/2028	0.239258856	0.875617297	0.379592607	-0.016971215	0.003765635	0.001632895
12/09/2028	0.222250871	0.879247339	0.381166658	-0.017043912	0.003494187	0.001515088
12/10/2028	0.205172740	0.882605154	0.382622552	-0.017111486	0.003221188	0.001396587
12/11/2028	0.188029651	0.885689218	0.383959612	-0.017173803	0.002946700	0.001277427
12/12/2028	0.170826932	0.888498086	0.385177202	-0.017230725	0.002670810	0.001157658
12/13/2028	0.153570043	0.891030411	0.386274746	-0.017282121	0.002393639	0.001037344
12/14/2028	0.136264571	0.893284985	0.387251734	-0.017327876	0.002115334	0.000916560
12/15/2028	0.118916201	0.895260757	0.388107736	-0.017367902	0.001836066	0.000795388
12/16/2028	0.101530694	0.896956858	0.388842410	-0.017402147	0.001556021	0.000673916
12/17/2028	0.084113841	0.898372602	0.389455496	-0.017430591	0.001275386	0.000552228
12/18/2028	0.066671440	0.899507493	0.389946819	-0.017453249	0.000994342	0.000430401
12/19/2028	0.049209261	0.900361204	0.390316276	-0.017470155	0.000713053	0.000308506
12/20/2028	0.031733030	0.900933567	0.390563827	-0.017481361	0.000431667	0.000186601
12/21/2028	0.014248421	0.901224550	0.390689491	-0.017486923	0.000150314	0.000064737
12/22/2028	-0.003238953	0.901234245	0.390693330	-0.017486899	-0.000130890	-0.000057040
12/23/2028	-0.020723534	0.900962855	0.390575452	-0.017481347	-0.000411840	-0.000178691
12/24/2028	-0.038199822	0.900410683	0.390336003	-0.017470321	-0.000692436	-0.000300177
12/25/2028	-0.055662371	0.899578131	0.389975164	-0.017453878	-0.000972586	-0.000421465
12/26/2028	-0.073105791	0.898465689	0.389493151	-0.017432075	-0.001252200	-0.000542519
12/27/2028	-0.090524754	0.897073937	0.388890213	-0.017404973	-0.001531195	-0.000663311
12/28/2028	-0.107913993	0.895403531	0.388166625	-0.017372639	-0.001809495	-0.000783814
12/29/2028	-0.125268311	0.893455201	0.387322688	-0.017335142	-0.002087035	-0.000904006
12/30/2028	-0.142582581	0.891229732	0.386358722	-0.017292555	-0.002363766	-0.001023873
12/31/2028	-0.159851744	0.888727949	0.385275053	-0.017244940	-0.002639658	-0.001143408
01/01/2029	-0.177070803	0.885950700	0.384072015	-0.017192351	-0.002914698	-0.001262613

EARTH-MOON SYSTEM BARYCENTER - BARYCENTRIC POSITION AND VELOCITY

Date 0h TDB	X au	Y au	Z au	dx/dt au/day	dy/dt au/day	dz/dt au/day
12/31/2027	-0.147362189	0.888875370	0.385359160	-0.017285096	-0.002433361	-0.001054777
01/01/2028	-0.164623338	0.886303353	0.384244279	-0.017236306	-0.002710542	-0.001174929
01/02/2028	-0.181833012	0.883454564	0.383009423	-0.017182149	-0.002986891	-0.001294720
01/03/2028	-0.198985853	0.880329878	0.381654972	-0.017122642	-0.003262320	-0.001414112
01/04/2028	-0.216076518	0.876930261	0.380181345	-0.017057803	-0.003536737	-0.001533066
01/05/2028	-0.233099689	0.873256771	0.378589000	-0.016987655	-0.003810053	-0.001651542
01/06/2028	-0.250050065	0.869310553	0.376878433	-0.016912219	-0.004082179	-0.001769503
01/07/2028	-0.266922372	0.865092840	0.375050180	-0.016831521	-0.004353025	-0.001886909
01/08/2028	-0.283711362	0.860604958	0.373104813	-0.016745588	-0.004622504	-0.002003722
01/09/2028	-0.300411812	0.855848317	0.371042946	-0.016654447	-0.004890528	-0.002119904
01/10/2028	-0.317018531	0.850824417	0.368865227	-0.016558131	-0.005157009	-0.002235418
01/11/2028	-0.333526359	0.845534843	0.366572345	-0.016456670	-0.005421860	-0.002350225
01/12/2028	-0.349930168	0.839981269	0.364165025	-0.016350100	-0.005684995	-0.002464289
01/13/2028	-0.366224867	0.834165454	0.361644028	-0.016238455	-0.005946329	-0.002577572
01/14/2028	-0.382405399	0.828089241	0.359010154	-0.016121774	-0.006205776	-0.002690037
01/15/2028	-0.398466749	0.821754558	0.356264239	-0.016000096	-0.006463253	-0.002801648
01/16/2028	-0.414403940	0.815163419	0.353407156	-0.015873463	-0.006718677	-0.002912368
01/17/2028	-0.430212038	0.808317917	0.350439811	-0.015741918	-0.006971964	-0.003022163
01/18/2028	-0.445886153	0.801220231	0.347363150	-0.015605504	-0.007223033	-0.003130996
01/19/2028	-0.461421440	0.793872618	0.344178151	-0.015464270	-0.007471802	-0.003238833
01/20/2028	-0.476813101	0.786277419	0.340885828	-0.015318262	-0.007718193	-0.003345638
01/21/2028	-0.492056389	0.778437052	0.337487230	-0.015167531	-0.007962125	-0.003451378
01/22/2028	-0.507146606	0.770354013	0.333983438	-0.015012128	-0.008203521	-0.003556018
01/23/2028	-0.522079106	0.762030880	0.330375571	-0.014852106	-0.008442304	-0.003659526
01/24/2028	-0.536849297	0.753470302	0.326664775	-0.014687520	-0.008678397	-0.003761867
01/25/2028	-0.551452643	0.744675008	0.322852235	-0.014518426	-0.008911725	-0.003863011
01/26/2028	-0.565884665	0.735647799	0.318939165	-0.014344881	-0.009142213	-0.003962923
01/27/2028	-0.580140941	0.726391552	0.314926810	-0.014166944	-0.009369790	-0.004061573
01/28/2028	-0.594217110	0.716909214	0.310816449	-0.013984678	-0.009594383	-0.004158930
01/29/2028	-0.608108873	0.707203803	0.306609391	-0.013798142	-0.009815922	-0.004254963
01/30/2028	-0.621811994	0.697278411	0.302306975	-0.013607402	-0.010034336	-0.004349641
01/31/2028	-0.635322298	0.687136195	0.297910570	-0.013412522	-0.010249558	-0.004442936
02/01/2028	-0.648635680	0.676780381	0.293421574	-0.013213568	-0.010461521	-0.004534818
02/02/2028	-0.661748099	0.666214262	0.288841414	-0.013010608	-0.010670158	-0.004625258
02/03/2028	-0.674655584	0.655441195	0.284171547	-0.012803711	-0.010875405	-0.004714229
02/04/2028	-0.687354233	0.644464603	0.279413455	-0.012592947	-0.011077199	-0.004801703
02/05/2028	-0.699840213	0.633287969	0.274568648	-0.012378387	-0.011275478	-0.004887654
02/06/2028	-0.712109766	0.621914839	0.269638664	-0.012160104	-0.011470180	-0.004972054
02/07/2028	-0.724159205	0.610348820	0.264625065	-0.011938172	-0.011661248	-0.005054879
02/08/2028	-0.735984919	0.598593574	0.259529440	-0.011712666	-0.011848623	-0.005136102
02/09/2028	-0.747583370	0.586652824	0.254353402	-0.011483661	-0.012032248	-0.005215701
02/10/2028	-0.758951100	0.574530346	0.249098588	-0.011251234	-0.012212069	-0.005293650
02/11/2028	-0.770084725	0.562229973	0.243766660	-0.011015465	-0.012388031	-0.005369927
02/12/2028	-0.780980942	0.549755588	0.238359300	-0.010776432	-0.012560083	-0.005444509
02/13/2028	-0.791636527	0.537111128	0.232878215	-0.010534214	-0.012728173	-0.005517373
02/14/2028	-0.802048335	0.524300579	0.227325133	-0.010288893	-0.012892253	-0.005588499
02/15/2028	-0.812213306	0.511327975	0.221701803	-0.010040551	-0.013052275	-0.005657866
02/16/2028	-0.822128459	0.498197398	0.216009993	-0.009789271	-0.013208191	-0.005725454
02/17/2028	-0.831790897	0.484912975	0.210251494	-0.009535136	-0.013359959	-0.005791243
02/18/2028	-0.841197806	0.471478878	0.204428113	-0.009278229	-0.013507534	-0.005855215
02/19/2028	-0.850346460	0.457899319	0.198541677	-0.009018637	-0.013650874	-0.005917351
02/20/2028	-0.859234215	0.444178555	0.192594030	-0.008756446	-0.013789940	-0.005977634
02/21/2028	-0.867858514	0.430320878	0.186587033	-0.008491740	-0.013924692	-0.006036047
02/22/2028	-0.876216886	0.416330621	0.180522564	-0.008224608	-0.014055094	-0.006092575
02/23/2028	-0.884306951	0.402212152	0.174402517	-0.007955138	-0.014181110	-0.006147201

EARTH-MOON SYSTEM BARYCENTER - BARYCENTRIC POSITION AND VELOCITY

Date 0h TDB	X au	Y au	Z au	dx/dt au/day	dy/dt au/day	dz/dt au/day
02/24/2028	-0.892126411	0.387969873	0.168228800	-0.007683416	-0.014302707	-0.006199912
02/25/2028	-0.899673062	0.373608222	0.162003336	-0.007409533	-0.014419851	-0.006250693
02/26/2028	-0.906944786	0.359131665	0.155728062	-0.007133577	-0.014532513	-0.006299530
02/27/2028	-0.913939555	0.344544701	0.149404927	-0.006855638	-0.014640662	-0.006346412
02/28/2028	-0.920655431	0.329851855	0.143035893	-0.006575806	-0.014744271	-0.006391326
02/29/2028	-0.927090566	0.315057680	0.136622935	-0.006294172	-0.014843315	-0.006434261
03/01/2028	-0.933243203	0.300166754	0.130168035	-0.006010826	-0.014937769	-0.006475206
03/02/2028	-0.939111677	0.285183680	0.123673190	-0.005725859	-0.015027609	-0.006514151
03/03/2028	-0.944694412	0.270113081	0.117140403	-0.005439364	-0.015112815	-0.006551087
03/04/2028	-0.949989925	0.254959601	0.110571688	-0.005151431	-0.015193367	-0.006586006
03/05/2028	-0.954996825	0.239727904	0.103969066	-0.004862152	-0.015269247	-0.006618900
03/06/2028	-0.959713811	0.224422669	0.097334566	-0.004571619	-0.015340439	-0.006649761
03/07/2028	-0.964139676	0.209048594	0.090670223	-0.004279925	-0.015406927	-0.006678584
03/08/2028	-0.968273305	0.193610388	0.083978080	-0.003987162	-0.015468698	-0.006705362
03/09/2028	-0.972113674	0.178112775	0.077260183	-0.003693421	-0.015525740	-0.006730090
03/10/2028	-0.975659853	0.162560488	0.070518585	-0.003398796	-0.015578044	-0.006752764
03/11/2028	-0.978911002	0.146958269	0.063755341	-0.003103378	-0.015625600	-0.006773380
03/12/2028	-0.981866376	0.131310871	0.056972512	-0.002807260	-0.015668402	-0.006791935
03/13/2028	-0.984525321	0.115623051	0.050172159	-0.002510535	-0.015706445	-0.006808427
03/14/2028	-0.986887274	0.099899570	0.043356346	-0.002213293	-0.015739723	-0.006822854
03/15/2028	-0.988951765	0.084145195	0.036527139	-0.001915628	-0.015768234	-0.006835215
03/16/2028	-0.990718418	0.068364691	0.029686605	-0.001617630	-0.015791979	-0.006845509
03/17/2028	-0.992186946	0.052562826	0.022836810	-0.001319393	-0.015810956	-0.006853737
03/18/2028	-0.993357154	0.036744366	0.015979820	-0.001021006	-0.015825169	-0.006859900
03/19/2028	-0.994228938	0.020914074	0.009117699	-0.000722561	-0.015834621	-0.006863998
03/20/2028	-0.994802287	0.005076709	0.002252510	-0.000424150	-0.015839318	-0.006866036
03/21/2028	-0.995077279	-0.010762978	-0.004613686	-0.000125862	-0.015839264	-0.006866014
03/22/2028	-0.995054082	-0.026600240	-0.011478833	0.000172212	-0.015834470	-0.006863937
03/23/2028	-0.994732955	-0.042430340	-0.018340877	0.000469983	-0.015824943	-0.006859809
03/24/2028	-0.994114247	-0.058248553	-0.025197769	0.000767361	-0.015810696	-0.006853635
03/25/2028	-0.993198395	-0.074050163	-0.032047466	0.001064256	-0.015791740	-0.006845420
03/26/2028	-0.991985925	-0.089830468	-0.038887930	0.001360581	-0.015768089	-0.006835169
03/27/2028	-0.990477452	-0.105584781	-0.045717128	0.001656247	-0.015739759	-0.006822890
03/28/2028	-0.988673680	-0.121308431	-0.052533036	0.001951167	-0.015706765	-0.006808589
03/29/2028	-0.986575397	-0.136996763	-0.059333636	0.002245253	-0.015669126	-0.006792275
03/30/2028	-0.984183480	-0.152645141	-0.066116918	0.002538419	-0.015626861	-0.006773956
03/31/2028	-0.981498893	-0.168248950	-0.072880882	0.002830580	-0.015579991	-0.006753640
04/01/2028	-0.978522684	-0.183803594	-0.079623536	0.003121649	-0.015528536	-0.006731338
04/02/2028	-0.975255986	-0.199304502	-0.086342898	0.003411543	-0.015472522	-0.006707058
04/03/2028	-0.971700019	-0.214747126	-0.093036997	0.003700176	-0.015411972	-0.006680812
04/04/2028	-0.967856082	-0.230126942	-0.099703871	0.003987466	-0.015346911	-0.006652612
04/05/2028	-0.963725562	-0.245439454	-0.106341572	0.004273330	-0.015277368	-0.006622468
04/06/2028	-0.959309925	-0.260680193	-0.112948163	0.004557686	-0.015203370	-0.006590393
04/07/2028	-0.954610720	-0.275844718	-0.119521718	0.004840453	-0.015124946	-0.006556399
04/08/2028	-0.949629576	-0.290928620	-0.126060326	0.005121549	-0.015042128	-0.006520501
04/09/2028	-0.944368204	-0.305927520	-0.132562089	0.005400896	-0.014954947	-0.006482711
04/10/2028	-0.938828393	-0.320837071	-0.139025123	0.005678415	-0.014863437	-0.006443045
04/11/2028	-0.933012010	-0.335652961	-0.145447559	0.005954027	-0.014767631	-0.006401517
04/12/2028	-0.926921001	-0.350370913	-0.151827541	0.006227654	-0.014667565	-0.006358142
04/13/2028	-0.920557388	-0.364986683	-0.158163232	0.006499221	-0.014563275	-0.006312936
04/14/2028	-0.913923271	-0.379496067	-0.164452809	0.006768652	-0.014454799	-0.006265916
04/15/2028	-0.907020822	-0.393894899	-0.170694464	0.007035872	-0.014342176	-0.006217097
04/16/2028	-0.899852289	-0.408179050	-0.176886410	0.007300806	-0.014225445	-0.006166498
04/17/2028	-0.892419995	-0.422344433	-0.183026873	0.007563383	-0.014104647	-0.006114136
04/18/2028	-0.884726333	-0.436387001	-0.189114101	0.007823530	-0.013979823	-0.006060030

EARTH-MOON SYSTEM BARYCENTER - BARYCENTRIC POSITION AND VELOCITY

Date 0h TDB	X au	Y au	Z au	dx/dt au/day	dy/dt au/day	dz/dt au/day
04/19/2028	-0.876773769	-0.450302752	-0.195146357	0.008081176	-0.013851017	-0.006004196
04/20/2028	-0.868564839	-0.464087723	-0.201121925	0.008336250	-0.013718272	-0.005946656
04/21/2028	-0.860102149	-0.477737998	-0.207039106	0.008588684	-0.013581634	-0.005887427
04/22/2028	-0.851388374	-0.491249707	-0.212896223	0.008838409	-0.013441146	-0.005826530
04/23/2028	-0.842426256	-0.504619023	-0.218691618	0.009085358	-0.013296857	-0.005763985
04/24/2028	-0.833218605	-0.517842169	-0.224423652	0.009329465	-0.013148813	-0.005699813
04/25/2028	-0.823768295	-0.530915414	-0.230090708	0.009570664	-0.012997064	-0.005634034
04/26/2028	-0.814078267	-0.543835078	-0.235691192	0.009808892	-0.012841657	-0.005566670
04/27/2028	-0.804151523	-0.556597527	-0.241223528	0.010044084	-0.012682644	-0.005497743
04/28/2028	-0.793991130	-0.569199181	-0.246686164	0.010276180	-0.012520076	-0.005427274
04/29/2028	-0.783600217	-0.581636510	-0.252077570	0.010505116	-0.012354003	-0.005355287
04/30/2028	-0.772981971	-0.593906037	-0.257396238	0.010730835	-0.012184479	-0.005281803
05/01/2028	-0.762139640	-0.606004336	-0.262640684	0.010953275	-0.012011557	-0.005206846
05/02/2028	-0.751076532	-0.617928037	-0.267809447	0.011172381	-0.011835291	-0.005130440
05/03/2028	-0.739796010	-0.629673823	-0.272901089	0.011388094	-0.011655736	-0.005052608
05/04/2028	-0.728301494	-0.641238432	-0.277914195	0.011600359	-0.011472948	-0.004973374
05/05/2028	-0.716596460	-0.652618659	-0.282847378	0.011809121	-0.011286982	-0.004892763
05/06/2028	-0.704684438	-0.663811356	-0.287699270	0.012014327	-0.011097895	-0.004810799
05/07/2028	-0.692569010	-0.674813429	-0.292468533	0.012215924	-0.010905746	-0.004727508
05/08/2028	-0.680253810	-0.685621847	-0.297153851	0.012413861	-0.010710593	-0.004642914
05/09/2028	-0.667742525	-0.696233633	-0.301753935	0.012608088	-0.010512493	-0.004557043
05/10/2028	-0.655038888	-0.706645871	-0.306267520	0.012798555	-0.010311508	-0.004469921
05/11/2028	-0.642146684	-0.716855706	-0.310693369	0.012985215	-0.010107696	-0.004381574
05/12/2028	-0.629069744	-0.726860342	-0.315030269	0.013168020	-0.009901119	-0.004292028
05/13/2028	-0.615811944	-0.736657043	-0.319277035	0.013346926	-0.009691838	-0.004201311
05/14/2028	-0.602377207	-0.746243137	-0.323432508	0.013521887	-0.009479914	-0.004109447
05/15/2028	-0.588769499	-0.755616012	-0.327495557	0.013692860	-0.009265411	-0.004016465
05/16/2028	-0.574992830	-0.764773119	-0.331465076	0.013859803	-0.009048390	-0.003922392
05/17/2028	-0.561051250	-0.773711973	-0.335339987	0.014022675	-0.008828915	-0.003827256
05/18/2028	-0.546948850	-0.782430152	-0.339119241	0.014181436	-0.008607049	-0.003731083
05/19/2028	-0.532689762	-0.790925297	-0.342801816	0.014336046	-0.008382858	-0.003633901
05/20/2028	-0.518278153	-0.799195114	-0.346386717	0.014486470	-0.008156405	-0.003535740
05/21/2028	-0.503718230	-0.807237375	-0.349872978	0.014632669	-0.007927756	-0.003436626
05/22/2028	-0.489014235	-0.815049915	-0.353259662	0.014774609	-0.007696976	-0.003336589
05/23/2028	-0.474170444	-0.822630638	-0.356545857	0.014912255	-0.007464131	-0.003235656
05/24/2028	-0.459191167	-0.829977510	-0.359730685	0.015045576	-0.007229287	-0.003133857
05/25/2028	-0.444080746	-0.837088567	-0.362813293	0.015174538	-0.006992511	-0.003031221
05/26/2028	-0.428843554	-0.843961910	-0.365792858	0.015299112	-0.006753869	-0.002927776
05/27/2028	-0.413483995	-0.850595707	-0.368668585	0.015419267	-0.006513430	-0.002823552
05/28/2028	-0.398006502	-0.856988194	-0.371439711	0.015534976	-0.006271261	-0.002718577
05/29/2028	-0.382415534	-0.863137675	-0.374105500	0.015646212	-0.006027429	-0.002612882
05/30/2028	-0.366715578	-0.869042521	-0.376665246	0.015752949	-0.005782003	-0.002506496
05/31/2028	-0.350911145	-0.874701172	-0.379118272	0.015855161	-0.005535051	-0.002399449
06/01/2028	-0.335006771	-0.880112136	-0.381463933	0.015952826	-0.005286641	-0.002291770
06/02/2028	-0.319007016	-0.885273991	-0.383701611	0.016045921	-0.005036844	-0.002183489
06/03/2028	-0.302916460	-0.890185384	-0.385830720	0.016134425	-0.004785727	-0.002074636
06/04/2028	-0.286739703	-0.894845028	-0.387850703	0.016218318	-0.004533360	-0.001965241
06/05/2028	-0.270481368	-0.899251709	-0.389761032	0.016297580	-0.004279812	-0.001855335
06/06/2028	-0.254146092	-0.903404282	-0.391561213	0.016372195	-0.004025154	-0.001744947
06/07/2028	-0.237738532	-0.907301670	-0.393250777	0.016442146	-0.003769455	-0.001634108
06/08/2028	-0.221263359	-0.910942868	-0.394829289	0.016507418	-0.003512784	-0.001522848
06/09/2028	-0.204725261	-0.914326939	-0.396296343	0.016567996	-0.003255213	-0.001411198
06/10/2028	-0.188128937	-0.917453017	-0.397651565	0.016623867	-0.002996812	-0.001299188
06/11/2028	-0.171479100	-0.920320309	-0.398894609	0.016675019	-0.002737650	-0.001186848
06/12/2028	-0.154780474	-0.922928087	-0.400025160	0.016721443	-0.002477798	-0.001074208

EARTH-MOON SYSTEM BARYCENTER - BARYCENTRIC POSITION AND VELOCITY

Date	X	Y	Z	dx/dt	dy/dt	dz/dt
0h TDB	au	au	au	au/day	au/day	au/day
06/13/2028	-0.138037794	-0.925275697	-0.401042936	0.016763128	-0.002217326	-0.000961301
06/14/2028	-0.121255801	-0.927362556	-0.401947682	0.016800066	-0.001956306	-0.000848155
06/15/2028	-0.104439246	-0.929188149	-0.402739177	0.016832250	-0.001694807	-0.000734802
06/16/2028	-0.087592887	-0.930752033	-0.403417228	0.016859674	-0.001432900	-0.000621272
06/17/2028	-0.070721487	-0.932053836	-0.403981673	0.016882333	-0.001170656	-0.000507596
06/18/2028	-0.053829811	-0.933093256	-0.404432382	0.016900223	-0.000908146	-0.000393805
06/19/2028	-0.036922630	-0.933870062	-0.404769254	0.016913343	-0.000645439	-0.000279928
06/20/2028	-0.020004717	-0.934384093	-0.404992220	0.016921689	-0.000382607	-0.000165998
06/21/2028	-0.003080842	-0.934635259	-0.405101241	0.016925264	-0.000119721	-0.000052043
06/22/2028	0.013844220	-0.934623540	-0.405096309	0.016924066	0.000143150	0.000061905
06/23/2028	0.030765700	-0.934348988	-0.404977444	0.016918099	0.000405935	0.000175815
06/24/2028	0.047678829	-0.933811723	-0.404744700	0.016907366	0.000668563	0.000289658
06/25/2028	0.064578844	-0.933011938	-0.404398161	0.016891870	0.000930964	0.000403402
06/26/2028	0.081460984	-0.931949895	-0.403937939	0.016871618	0.001193068	0.000517018
06/27/2028	0.098320497	-0.930625925	-0.403364178	0.016846616	0.001454804	0.000630474
06/28/2028	0.115152636	-0.929040432	-0.402677054	0.016816872	0.001716104	0.000743741
06/29/2028	0.131952664	-0.927193886	-0.401876769	0.016782395	0.001976897	0.000856788
06/30/2028	0.148715852	-0.925086831	-0.400963561	0.016743195	0.002237113	0.000969585
07/01/2028	0.165437484	-0.922719876	-0.399937692	0.016699283	0.002496682	0.001082103
07/02/2028	0.182112852	-0.920093704	-0.398799459	0.016650672	0.002755537	0.001194310
07/03/2028	0.198737265	-0.917209065	-0.397549186	0.016597374	0.003013606	0.001306177
07/04/2028	0.215306044	-0.914066777	-0.396187229	0.016539405	0.003270822	0.001417673
07/05/2028	0.231814523	-0.910667728	-0.394713972	0.016476780	0.003527116	0.001528771
07/06/2028	0.248258057	-0.907012876	-0.393129831	0.016409516	0.003782418	0.001639438
07/07/2028	0.264632014	-0.903103245	-0.391435249	0.016337630	0.004036662	0.001749647
07/08/2028	0.280931783	-0.898939928	-0.389630700	0.016261142	0.004289778	0.001859367
07/09/2028	0.297152772	-0.894524088	-0.387716689	0.016180073	0.004541699	0.001968568
07/10/2028	0.313290408	-0.889856952	-0.385693746	0.016094442	0.004792357	0.002077223
07/11/2028	0.329340142	-0.884939817	-0.383562435	0.016004272	0.005041686	0.002185301
07/12/2028	0.345297447	-0.879774046	-0.381323345	0.015909588	0.005289617	0.002292774
07/13/2028	0.361157821	-0.874361070	-0.378977098	0.015810412	0.005536086	0.002399612
07/14/2028	0.376916784	-0.868702384	-0.376524341	0.015706772	0.005781025	0.002505788
07/15/2028	0.392569884	-0.862799553	-0.373965753	0.015598692	0.006024368	0.002611272
07/16/2028	0.408112698	-0.856654203	-0.371302038	0.015486202	0.006266050	0.002716035
07/17/2028	0.423540828	-0.850268029	-0.368533932	0.015369330	0.006506005	0.002820051
07/18/2028	0.438849908	-0.843642790	-0.365662196	0.015248106	0.006744169	0.002923290
07/19/2028	0.454035600	-0.836780310	-0.362687621	0.015122561	0.006980477	0.003025724
07/20/2028	0.469093600	-0.829682476	-0.359611025	0.014992726	0.007214865	0.003127326
07/21/2028	0.484019634	-0.822351240	-0.356433255	0.014858636	0.007447270	0.003228069
07/22/2028	0.498809464	-0.814788618	-0.353155183	0.014720323	0.007677627	0.003327924
07/23/2028	0.513458885	-0.806996689	-0.349777712	0.014577824	0.007905875	0.003426864
07/24/2028	0.527963728	-0.798977592	-0.346301769	0.014431174	0.008131951	0.003524863
07/25/2028	0.542319861	-0.790733531	-0.342728308	0.014280410	0.008355793	0.003621894
07/26/2028	0.556523190	-0.782266772	-0.339058312	0.014125572	0.008577339	0.003717930
07/27/2028	0.570569660	-0.773579639	-0.335292789	0.013966698	0.008796528	0.003812944
07/28/2028	0.584455255	-0.764674521	-0.331432773	0.013803829	0.009013301	0.003906911
07/29/2028	0.598176000	-0.755553863	-0.327479325	0.013637006	0.009227597	0.003999804
07/30/2028	0.611727963	-0.746220173	-0.323433532	0.013466271	0.009439356	0.004091597
07/31/2028	0.625107253	-0.736676016	-0.319296506	0.013291669	0.009648520	0.004182266
08/01/2028	0.638310026	-0.726924017	-0.315069385	0.013111324	0.009855031	0.004271784
08/02/2028	0.651332479	-0.716966859	-0.310753330	0.012931038	0.010058830	0.004360127
08/03/2028	0.664170858	-0.706807280	-0.306349531	0.012745102	0.010259861	0.004447270
08/04/2028	0.676821454	-0.696448079	-0.301859198	0.012555481	0.010458066	0.004533188
08/05/2028	0.689280608	-0.685892109	-0.297283570	0.012362224	0.010653391	0.004617858
08/06/2028	0.701544707	-0.675142277	-0.292623907	0.012165381	0.010845778	0.004701255

EARTH-MOON SYSTEM BARYCENTER - BARYCENTRIC POSITION AND VELOCITY

Date 0h TDB	X au	Y au	Z au	dx/dt au/day	dy/dt au/day	dz/dt au/day
08/07/2028	0.713610192	-0.664201549	-0.287881493	0.011965002	0.011035175	0.004783355
08/08/2028	0.725473350	-0.653072942	-0.283057638	0.011761138	0.011221526	0.004864135
08/09/2028	0.737131324	-0.641759529	-0.278153672	0.011553841	0.011404779	0.004943571
08/10/2028	0.748580107	-0.630264435	-0.273170951	0.011343166	0.011584879	0.005021642
08/11/2028	0.759816546	-0.618590838	-0.268110851	0.011129164	0.011761776	0.005098324
08/12/2028	0.770837346	-0.606741967	-0.262974774	0.010911893	0.011935418	0.005173594
08/13/2028	0.781639262	-0.594721104	-0.257764140	0.010691408	0.012105754	0.005247432
08/14/2028	0.792219110	-0.582531578	-0.252480394	0.010467767	0.012272734	0.005319816
08/15/2028	0.802573762	-0.570176770	-0.247125001	0.010241026	0.012436310	0.005390723
08/16/2028	0.812700148	-0.557660110	-0.241699447	0.010011244	0.012596431	0.005460133
08/17/2028	0.822595257	-0.544985074	-0.236205240	0.009778482	0.012753052	0.005528026
08/18/2028	0.832256139	-0.532155189	-0.230643908	0.009542801	0.012906124	0.005594381
08/19/2028	0.841679905	-0.519174024	-0.225016999	0.009304260	0.013055603	0.005659177
08/20/2028	0.850863728	-0.506045196	-0.219326079	0.009062924	0.013201441	0.005722396
08/21/2028	0.859804843	-0.492772369	-0.213572738	0.008818855	0.013343596	0.005784019
08/22/2028	0.868500548	-0.479359247	-0.207758581	0.008572117	0.013482023	0.005844025
08/23/2028	0.876948208	-0.465809579	-0.201885233	0.008322775	0.013616680	0.005902397
08/24/2028	0.885145252	-0.452127157	-0.195954338	0.008070895	0.013747524	0.005959116
08/25/2028	0.893089174	-0.438315815	-0.189967557	0.007816543	0.013874515	0.006014165
08/26/2028	0.900777537	-0.424379425	-0.183926570	0.007559788	0.013997612	0.006067527
08/27/2028	0.908207970	-0.410321901	-0.177833072	0.007300696	0.014116777	0.006119183
08/28/2028	0.915378173	-0.396147195	-0.171688777	0.007039337	0.014231970	0.006169118
08/29/2028	0.922285913	-0.381859298	-0.165495415	0.006775781	0.014343154	0.006217316
08/30/2028	0.928929027	-0.367462235	-0.159254730	0.006510099	0.014450294	0.006263760
08/31/2028	0.935305425	-0.352960070	-0.152968484	0.006242361	0.014553353	0.006308435
09/01/2028	0.941413088	-0.338356901	-0.146638454	0.005972640	0.014652297	0.006351327
09/02/2028	0.947250068	-0.323656860	-0.140266430	0.005701008	0.014747092	0.006392420
09/03/2028	0.952814492	-0.308864110	-0.133854218	0.005427539	0.014837707	0.006431701
09/04/2028	0.958104558	-0.293982850	-0.127403636	0.005152307	0.014924109	0.006469156
09/05/2028	0.963118543	-0.279017306	-0.120916518	0.004875387	0.015006268	0.006504772
09/06/2028	0.967854796	-0.263971737	-0.114394709	0.004596855	0.015084155	0.006538536
09/07/2028	0.972311741	-0.248850430	-0.107840068	0.004316786	0.015157742	0.006570436
09/08/2028	0.976487882	-0.233657697	-0.101254463	0.004035258	0.015227000	0.006600460
09/09/2028	0.980381797	-0.218397881	-0.094639777	0.003752349	0.015291904	0.006628596
09/10/2028	0.983992145	-0.203075348	-0.087997904	0.003468135	0.015352430	0.006654834
09/11/2028	0.987317659	-0.187694489	-0.081330745	0.003182696	0.015408552	0.006679164
09/12/2028	0.990357155	-0.172259719	-0.074640216	0.002896112	0.015460249	0.006701575
09/13/2028	0.993109528	-0.156775474	-0.067928238	0.002608461	0.015507498	0.006722058
09/14/2028	0.995573750	-0.141246212	-0.061196745	0.002319825	0.015550279	0.006740605
09/15/2028	0.997748877	-0.125676411	-0.054447677	0.002030285	0.015588573	0.006757206
09/16/2028	0.999634045	-0.110070568	-0.047682984	0.001739921	0.015622361	0.006771854
09/17/2028	1.001228471	-0.094433197	-0.040904622	0.001448816	0.015651627	0.006784543
09/18/2028	1.002531456	-0.078768827	-0.034114554	0.001157052	0.015676355	0.006795263
09/19/2028	1.003542382	-0.063082004	-0.027314753	0.000864711	0.015696530	0.006804011
09/20/2028	1.004260715	-0.047377288	-0.020507192	0.000571879	0.015712140	0.006810779
09/21/2028	1.004686003	-0.031659250	-0.013693855	0.000278637	0.015723171	0.006815563
09/22/2028	1.004817881	-0.015932475	-0.006876729	-0.000014930	0.015729614	0.006818358
09/23/2028	1.004656064	-0.000201555	-0.000057804	-0.000308737	0.015731458	0.006819159
09/24/2028	1.004200355	0.015528906	0.006760924	-0.000602699	0.015728696	0.006817964
09/25/2028	1.003450642	0.031254300	0.013577458	-0.000896732	0.015721321	0.006814769
09/26/2028	1.002406896	0.046970009	0.020389795	-0.001190750	0.015709327	0.006809572
09/27/2028	1.001069176	0.062671412	0.027195934	-0.001484667	0.015692709	0.006802371
09/28/2028	0.999437625	0.078353884	0.033993868	-0.001778397	0.015671465	0.006793164
09/29/2028	0.997512474	0.094012798	0.040781593	-0.002071854	0.015645593	0.006781951
09/30/2028	0.995294037	0.109643526	0.047557101	-0.002364951	0.015615092	0.006768732

EARTH-MOON SYSTEM BARYCENTER - BARYCENTRIC POSITION AND VELOCITY

Date 0h TDB	X au	Y au	Z au	dx/dt au/day	dy/dt au/day	dz/dt au/day
10/01/2028	0.992782720	0.125241440	0.054318388	-0.002657602	0.015579964	0.006753507
10/02/2028	0.989979010	0.140801913	0.061063446	-0.002949720	0.015540212	0.006736277
10/03/2028	0.986883486	0.156320323	0.067790274	-0.003241218	0.015495838	0.006717044
10/04/2028	0.983496809	0.171792051	0.074496868	-0.003532009	0.015446848	0.006695810
10/05/2028	0.979819732	0.187212483	0.081181229	-0.003822006	0.015393249	0.006672579
10/06/2028	0.975853092	0.202577015	0.087841360	-0.004111121	0.015335049	0.006647352
10/07/2028	0.971597814	0.217881050	0.094475269	-0.004399266	0.015272256	0.006620135
10/08/2028	0.967054911	0.233120000	0.101080968	-0.004686356	0.015204882	0.006590932
10/09/2028	0.962225483	0.248289290	0.107656473	-0.004972302	0.015132938	0.006559748
10/10/2028	0.957110717	0.263384358	0.114199806	-0.005257018	0.015056439	0.006526590
10/11/2028	0.951711887	0.278400655	0.120708996	-0.005540415	0.014975399	0.006491463
10/12/2028	0.946030355	0.293333648	0.127182079	-0.005822408	0.014889835	0.006454375
10/13/2028	0.940067568	0.308178823	0.133617095	-0.006102909	0.014799764	0.006415334
10/14/2028	0.933825064	0.322931681	0.140012098	-0.006381831	0.014705207	0.006374347
10/15/2028	0.927304462	0.337587747	0.146365145	-0.006659087	0.014606183	0.006331425
10/16/2028	0.920507473	0.352142565	0.152674305	-0.006934593	0.014502714	0.006286576
10/17/2028	0.913435890	0.366591702	0.158937657	-0.007208260	0.014394826	0.006239811
10/18/2028	0.906091594	0.380930751	0.165153291	-0.007480004	0.014282541	0.006191140
10/19/2028	0.898476551	0.395155329	0.171319306	-0.007749739	0.014165888	0.006140576
10/20/2028	0.890592814	0.409261081	0.177433815	-0.008017379	0.014044894	0.006088130
10/21/2028	0.882442518	0.423243681	0.183494943	-0.008282841	0.013919589	0.006033815
10/22/2028	0.874027887	0.437098832	0.189500827	-0.008546039	0.013790003	0.005977645
10/23/2028	0.865351224	0.450822270	0.195449619	-0.008806889	0.013656169	0.005919633
10/24/2028	0.856414920	0.464409765	0.201339483	-0.009065308	0.013518120	0.005859794
10/25/2028	0.847221447	0.477857118	0.207168603	-0.009321212	0.013375893	0.005798144
10/26/2028	0.837773360	0.491160169	0.212935172	-0.009574521	0.013229522	0.005734698
10/27/2028	0.828073299	0.504314795	0.218637405	-0.009825150	0.013079048	0.005669472
10/28/2028	0.818123980	0.517316910	0.224273530	-0.010073019	0.012924509	0.005602485
10/29/2028	0.807928207	0.530162471	0.229841794	-0.010318048	0.012765945	0.005533754
10/30/2028	0.797488858	0.542847474	0.235340462	-0.010560156	0.012603401	0.005463297
10/31/2028	0.786808895	0.555367960	0.240767819	-0.010799264	0.012436919	0.005391133
11/01/2028	0.775891357	0.567720014	0.246122165	-0.011035293	0.012266544	0.005317281
11/02/2028	0.764739362	0.579899767	0.251401825	-0.011268165	0.012092324	0.005241763
11/03/2028	0.753356105	0.591903397	0.256605142	-0.011497803	0.011914307	0.005164598
11/04/2028	0.741744860	0.603727131	0.261730481	-0.011724130	0.011732541	0.005085809
11/05/2028	0.729908973	0.615367246	0.266776227	-0.011947073	0.011547078	0.005005417
11/06/2028	0.717851868	0.626820072	0.271740789	-0.012166554	0.011357970	0.004923445
11/07/2028	0.705577042	0.638081989	0.276622598	-0.012382502	0.011165270	0.004839916
11/08/2028	0.693088066	0.649149433	0.281420110	-0.012594843	0.010969033	0.004754854
11/09/2028	0.680388582	0.660018895	0.286131804	-0.012803506	0.010769316	0.004668283
11/10/2028	0.667482305	0.670686924	0.290756182	-0.013008419	0.010566176	0.004580229
11/11/2028	0.654373017	0.681150126	0.295291775	-0.013209514	0.010359672	0.004490716
11/12/2028	0.641064573	0.691405166	0.299737136	-0.013406721	0.010149863	0.004399770
11/13/2028	0.627560894	0.701448771	0.304090847	-0.013599973	0.009936812	0.004307419
11/14/2028	0.613865968	0.711277729	0.308351515	-0.013789204	0.009720580	0.004213690
11/15/2028	0.599983849	0.720888892	0.312517777	-0.013974348	0.009501233	0.004118610
11/16/2028	0.585918655	0.730279177	0.316588294	-0.014155342	0.009278834	0.004022207
11/17/2028	0.571674569	0.739445565	0.320561759	-0.014332123	0.009053450	0.003924510
11/18/2028	0.557255834	0.748385105	0.324436892	-0.014504629	0.008825149	0.003825549
11/19/2028	0.542666755	0.757094913	0.328212444	-0.014672801	0.008593999	0.003725352
11/20/2028	0.527911697	0.765572177	0.331887195	-0.014836578	0.008360071	0.003623951
11/21/2028	0.512995083	0.773814152	0.335459956	-0.014995904	0.008123434	0.003521376
11/22/2028	0.497921391	0.781818166	0.338929567	-0.015150723	0.007884161	0.003417659
11/23/2028	0.482695157	0.789581620	0.342294903	-0.015300980	0.007642325	0.003312830
11/24/2028	0.467320970	0.797101988	0.345554868	-0.015446621	0.007398001	0.003206923

EARTH-MOON SYSTEM BARYCENTER - BARYCENTRIC POSITION AND VELOCITY

Date 0h TDB	X au	Y au	Z au	dx/dt au/day	dy/dt au/day	dz/dt au/day
11/25/2028	0.451803471	0.804376817	0.348708400	-0.015587595	0.007151262	0.003099969
11/26/2028	0.436147353	0.811403733	0.351754469	-0.015723851	0.006902186	0.002992002
11/27/2028	0.420357358	0.818180435	0.354692077	-0.015855341	0.006650849	0.002883055
11/28/2028	0.404438277	0.824704704	0.357520263	-0.015982016	0.006397330	0.002773162
11/29/2028	0.388394945	0.830974394	0.360238096	-0.016103833	0.006141707	0.002662357
11/30/2028	0.372232246	0.836987443	0.362844684	-0.016220746	0.005884061	0.002550674
12/01/2028	0.355955103	0.842741868	0.365339164	-0.016332712	0.005624471	0.002438150
12/02/2028	0.339568484	0.848235765	0.367720714	-0.016439691	0.005363021	0.002324818
12/03/2028	0.323077395	0.853467316	0.369988544	-0.016541645	0.005099791	0.002210716
12/04/2028	0.306486883	0.858434782	0.372141901	-0.016638534	0.004834865	0.002095878
12/05/2028	0.289802028	0.863136509	0.374180068	-0.016730323	0.004568328	0.001980342
12/06/2028	0.273027947	0.867570928	0.376102363	-0.016816979	0.004300263	0.001864143
12/07/2028	0.256169791	0.871736553	0.377908145	-0.016898469	0.004030756	0.001747319
12/08/2028	0.239232742	0.875631987	0.379596806	-0.016974761	0.003759892	0.001629908
12/09/2028	0.222222011	0.879255915	0.381167777	-0.017045828	0.003487759	0.001511946
12/10/2028	0.205142837	0.882607111	0.382620526	-0.017111642	0.003214444	0.001393471
12/11/2028	0.188000487	0.885684437	0.383954560	-0.017172178	0.002940034	0.001274521
12/12/2028	0.170800249	0.888486843	0.385169424	-0.017227412	0.002664616	0.001155136
12/13/2028	0.153547436	0.891013364	0.386264699	-0.017277324	0.002388281	0.001035352
12/14/2028	0.136247382	0.893263129	0.387240008	-0.017321893	0.002111117	0.000915209
12/15/2028	0.118905438	0.895235352	0.388095010	-0.017361101	0.001833213	0.000794745
12/16/2028	0.101526973	0.896929339	0.388829404	-0.017394932	0.001554660	0.000674000
12/17/2028	0.084117371	0.898344485	0.389442928	-0.017423373	0.001275547	0.000553012
12/18/2028	0.066682029	0.899480276	0.389935360	-0.017446411	0.000995965	0.000431821
12/19/2028	0.049226354	0.900336290	0.390306515	-0.017464035	0.000716006	0.000310465
12/20/2028	0.031755765	0.900912192	0.390556249	-0.017476238	0.000435759	0.000188986
12/21/2028	0.014275687	0.901207742	0.390684458	-0.017483013	0.000155316	0.000067421
12/22/2028	-0.003208451	0.901222789	0.390691076	-0.017484356	-0.000125232	-0.000054189
12/23/2028	-0.020691213	0.900957274	0.390576079	-0.017480263	-0.000405793	-0.000175805
12/24/2028	-0.038167165	0.900411229	0.390339478	-0.017470735	-0.000686275	-0.000297387
12/25/2028	-0.055630871	0.899584780	0.389981330	-0.017455772	-0.000966588	-0.000418895
12/26/2028	-0.073076898	0.898478140	0.389501726	-0.017435377	-0.001246640	-0.000540290
12/27/2028	-0.090499817	0.897091618	0.388900801	-0.017409557	-0.001526338	-0.000661532
12/28/2028	-0.107894205	0.895425611	0.388178726	-0.017378317	-0.001805593	-0.000782582
12/29/2028	-0.125254648	0.893480611	0.387335715	-0.017341667	-0.002084312	-0.000903399
12/30/2028	-0.142575740	0.891257196	0.386372018	-0.017299619	-0.002362404	-0.001023945
12/31/2028	-0.159852090	0.888756041	0.385287927	-0.017252184	-0.002639779	-0.001144180
01/01/2029	-0.177078318	0.885977908	0.384083774	-0.017199378	-0.002916346	-0.001264065

Sun - Apparent data

Date	Right Ascension	Declination	Distance	Diameter	Eclip. Long.	Lat.
0h TT	h m s	d m s	au	arc sec	d m s	s
12/31/2027	18 39 25.402	-23 07 39.22	0.9833802	1951.71	279 03 24.44	0.19
01/01/2028	18 43 50.693	-23 03 15.41	0.9833569	1951.75	280 04 34.48	0.31
01/02/2028	18 48 15.674	-22 58 23.99	0.9833379	1951.79	281 05 44.43	0.42
01/03/2028	18 52 40.311	-22 53 05.10	0.9833233	1951.82	282 06 54.22	0.52
01/04/2028	18 57 04.574	-22 47 18.89	0.9833133	1951.84	283 08 03.80	0.59
01/05/2028	19 01 28.431	-22 41 05.56	0.9833081	1951.85	284 09 13.14	0.64
01/06/2028	19 05 51.856	-22 34 25.29	0.9833080	1951.85	285 10 22.19	0.66
01/07/2028	19 10 14.820	-22 27 18.29	0.9833132	1951.84	286 11 30.95	0.65
01/08/2028	19 14 37.299	-22 19 44.78	0.9833241	1951.82	287 12 39.38	0.61
01/09/2028	19 18 59.266	-22 11 44.99	0.9833408	1951.78	288 13 47.49	0.54
01/10/2028	19 23 20.699	-22 03 19.16	0.9833637	1951.74	289 14 55.25	0.44
01/11/2028	19 27 41.575	-21 54 27.54	0.9833930	1951.68	290 16 02.65	0.31
01/12/2028	19 32 01.874	-21 45 10.38	0.9834288	1951.61	291 17 09.70	0.17
01/13/2028	19 36 21.574	-21 35 27.91	0.9834713	1951.52	292 18 16.39	0.02
01/14/2028	19 40 40.658	-21 25 20.39	0.9835204	1951.43	293 19 22.75	-0.13
01/15/2028	19 44 59.111	-21 14 48.07	0.9835760	1951.32	294 20 28.81	-0.27
01/16/2028	19 49 16.920	-21 03 51.20	0.9836378	1951.19	295 21 34.63	-0.39
01/17/2028	19 53 34.071	-20 52 30.06	0.9837055	1951.06	296 22 40.26	-0.48
01/18/2028	19 57 50.551	-20 40 44.95	0.9837788	1950.91	297 23 45.72	-0.54
01/19/2028	20 02 06.346	-20 28 36.18	0.9838573	1950.76	298 24 51.01	-0.57
01/20/2028	20 06 21.442	-20 16 04.09	0.9839407	1950.59	299 25 56.10	-0.57
01/21/2028	20 10 35.824	-20 03 09.03	0.9840286	1950.42	300 27 00.93	-0.54
01/22/2028	20 14 49.475	-19 49 51.35	0.9841207	1950.24	301 28 05.43	-0.48
01/23/2028	20 19 02.381	-19 36 11.42	0.9842169	1950.05	302 29 09.50	-0.39
01/24/2028	20 23 14.526	-19 22 09.62	0.9843169	1949.85	303 30 13.06	-0.29
01/25/2028	20 27 25.897	-19 07 46.34	0.9844206	1949.64	304 31 15.99	-0.17
01/26/2028	20 31 36.481	-18 53 01.96	0.9845279	1949.43	305 32 18.21	-0.04
01/27/2028	20 35 46.268	-18 37 56.87	0.9846386	1949.21	306 33 19.62	0.09
01/28/2028	20 39 55.247	-18 22 31.47	0.9847528	1948.98	307 34 20.13	0.22
01/29/2028	20 44 03.411	-18 06 46.15	0.9848705	1948.75	308 35 19.66	0.33
01/30/2028	20 48 10.754	-17 50 41.33	0.9849916	1948.51	309 36 18.14	0.43
01/31/2028	20 52 17.270	-17 34 17.42	0.9851164	1948.27	310 37 15.50	0.51
02/01/2028	20 56 22.958	-17 17 34.81	0.9852448	1948.01	311 38 11.71	0.57
02/02/2028	21 00 27.815	-17 00 33.93	0.9853771	1947.75	312 39 06.69	0.60
02/03/2028	21 04 31.842	-16 43 15.19	0.9855133	1947.48	313 40 00.41	0.60
02/04/2028	21 08 35.039	-16 25 39.01	0.9856537	1947.20	314 40 52.84	0.57
02/05/2028	21 12 37.409	-16 07 45.82	0.9857985	1946.92	315 41 43.92	0.51
02/06/2028	21 16 38.955	-15 49 36.02	0.9859479	1946.62	316 42 33.62	0.42
02/07/2028	21 20 39.680	-15 31 10.05	0.9861023	1946.32	317 43 21.92	0.31
02/08/2028	21 24 39.592	-15 12 28.31	0.9862618	1946.00	318 44 08.78	0.17
02/09/2028	21 28 38.695	-14 53 31.20	0.9864266	1945.68	319 44 54.19	0.03
02/10/2028	21 32 36.999	-14 34 19.13	0.9865971	1945.34	320 45 38.15	-0.12
02/11/2028	21 36 34.515	-14 14 52.46	0.9867732	1944.99	321 46 20.68	-0.27
02/12/2028	21 40 31.257	-13 55 11.58	0.9869549	1944.64	322 47 01.87	-0.39
02/13/2028	21 44 27.242	-13 35 16.83	0.9871420	1944.27	323 47 41.79	-0.50
02/14/2028	21 48 22.485	-13 15 08.60	0.9873344	1943.89	324 48 20.53	-0.57
02/15/2028	21 52 17.003	-12 54 47.28	0.9875315	1943.50	325 48 58.15	-0.61
02/16/2028	21 56 10.811	-12 34 13.26	0.9877332	1943.10	326 49 34.66	-0.62
02/17/2028	22 00 03.920	-12 13 26.96	0.9879389	1942.70	327 50 10.07	-0.60
02/18/2028	22 03 56.344	-11 52 28.81	0.9881483	1942.29	328 50 44.34	-0.55
02/19/2028	22 07 48.093	-11 31 19.23	0.9883611	1941.87	329 51 17.41	-0.47
02/20/2028	22 11 39.178	-11 09 58.65	0.9885769	1941.45	330 51 49.21	-0.37
02/21/2028	22 15 29.610	-10 48 27.49	0.9887955	1941.02	331 52 19.68	-0.25
02/22/2028	22 19 19.400	-10 26 46.20	0.9890166	1940.58	332 52 48.75	-0.13
02/23/2028	22 23 08.562	-10 04 55.20	0.9892400	1940.14	333 53 16.33	0.00

Sun - Apparent data

Date	Right Ascension	Declination	Distance	Diameter	Eclip. Long.	Lat.
0h TT	h m s	d m s	au	arc sec	d m s	s
02/24/2028	22 26 57.106	-09 42 54.92	0.9894656	1939.70	334 53 42.37	0.13
02/25/2028	22 30 45.047	-09 20 45.77	0.9896930	1939.26	335 54 06.78	0.24
02/26/2028	22 34 32.398	-08 58 28.20	0.9899224	1938.81	336 54 29.52	0.35
02/27/2028	22 38 19.174	-08 36 02.61	0.9901535	1938.35	337 54 50.53	0.43
02/28/2028	22 42 05.391	-08 13 29.42	0.9903864	1937.90	338 55 09.74	0.49
02/29/2028	22 45 51.063	-07 50 49.07	0.9906210	1937.44	339 55 27.12	0.53
03/01/2028	22 49 36.208	-07 28 01.94	0.9908575	1936.98	340 55 42.61	0.54
03/02/2028	22 53 20.841	-07 05 08.47	0.9910958	1936.51	341 55 56.16	0.52
03/03/2028	22 57 04.980	-06 42 09.06	0.9913361	1936.04	342 56 07.73	0.47
03/04/2028	23 00 48.640	-06 19 04.12	0.9915786	1935.57	343 56 17.27	0.39
03/05/2028	23 04 31.841	-05 55 54.05	0.9918234	1935.09	344 56 24.73	0.29
03/06/2028	23 08 14.598	-05 32 39.24	0.9920708	1934.61	345 56 30.07	0.17
03/07/2028	23 11 56.929	-05 09 20.10	0.9923211	1934.12	346 56 33.25	0.03
03/08/2028	23 15 38.854	-04 45 56.99	0.9925744	1933.63	347 56 34.25	-0.11
03/09/2028	23 19 20.393	-04 22 30.30	0.9928311	1933.13	348 56 33.07	-0.25
03/10/2028	23 23 01.569	-03 59 00.36	0.9930912	1932.62	349 56 29.77	-0.38
03/11/2028	23 26 42.408	-03 35 27.50	0.9933550	1932.11	350 56 24.41	-0.49
03/12/2028	23 30 22.937	-03 11 52.06	0.9936222	1931.59	351 56 17.10	-0.57
03/13/2028	23 34 03.183	-02 48 14.36	0.9938929	1931.06	352 56 07.97	-0.62
03/14/2028	23 37 43.173	-02 24 34.74	0.9941667	1930.53	353 55 57.09	-0.64
03/15/2028	23 41 22.932	-02 00 53.54	0.9944433	1929.99	354 55 44.53	-0.62
03/16/2028	23 45 02.481	-01 37 11.13	0.9947223	1929.45	355 55 30.30	-0.58
03/17/2028	23 48 41.842	-01 13 27.87	0.9950034	1928.91	356 55 14.39	-0.50
03/18/2028	23 52 21.034	-00 49 44.15	0.9952862	1928.36	357 54 56.80	-0.41
03/19/2028	23 56 00.076	-00 26 00.34	0.9955703	1927.81	358 54 37.48	-0.30
03/20/2028	23 59 38.988	-00 02 16.83	0.9958554	1927.26	359 54 16.39	-0.18
03/21/2028	00 03 17.787	00 21 26.01	0.9961411	1926.70	0 53 53.51	-0.05
03/22/2028	00 06 56.493	00 45 07.79	0.9964273	1926.15	1 53 28.80	0.07
03/23/2028	00 10 35.123	01 08 48.13	0.9967136	1925.60	2 53 02.21	0.18
03/24/2028	00 14 13.698	01 32 26.66	0.9969998	1925.04	3 52 33.70	0.28
03/25/2028	00 17 52.234	01 56 03.00	0.9972857	1924.49	4 52 03.26	0.37
03/26/2028	00 21 30.751	02 19 36.78	0.9975711	1923.94	5 51 30.83	0.43
03/27/2028	00 25 09.267	02 43 07.62	0.9978560	1923.39	6 50 56.38	0.47
03/28/2028	00 28 47.800	03 06 35.16	0.9981401	1922.85	7 50 19.88	0.48
03/29/2028	00 32 26.366	03 29 59.01	0.9984236	1922.30	8 49 41.29	0.47
03/30/2028	00 36 04.984	03 53 18.82	0.9987063	1921.76	9 49 00.55	0.43
03/31/2028	00 39 43.669	04 16 34.22	0.9989884	1921.21	10 48 17.63	0.35
04/01/2028	00 43 22.438	04 39 44.84	0.9992699	1920.67	11 47 32.46	0.26
04/02/2028	00 47 01.306	05 02 50.31	0.9995510	1920.13	12 46 44.99	0.15
04/03/2028	00 50 40.288	05 25 50.28	0.9998319	1919.59	13 45 55.18	0.02
04/04/2028	00 54 19.402	05 48 44.39	1.0001128	1919.05	14 45 02.99	-0.11
04/05/2028	00 57 58.664	06 11 32.30	1.0003941	1918.51	15 44 08.39	-0.25
04/06/2028	01 01 38.093	06 34 13.68	1.0006758	1917.97	16 43 11.41	-0.37
04/07/2028	01 05 17.710	06 56 48.19	1.0009584	1917.43	17 42 12.10	-0.48
04/08/2028	01 08 57.538	07 19 15.54	1.0012419	1916.89	18 41 10.55	-0.56
04/09/2028	01 12 37.601	07 41 35.42	1.0015264	1916.34	19 40 06.86	-0.62
04/10/2028	01 16 17.923	08 03 47.55	1.0018120	1915.80	20 39 01.16	-0.64
04/11/2028	01 19 58.528	08 25 51.63	1.0020984	1915.25	21 37 53.54	-0.63
04/12/2028	01 23 39.436	08 47 47.33	1.0023856	1914.70	22 36 44.10	-0.59
04/13/2028	01 27 20.667	09 09 34.35	1.0026732	1914.15	23 35 32.88	-0.52
04/14/2028	01 31 02.238	09 31 12.35	1.0029609	1913.60	24 34 19.90	-0.43
04/15/2028	01 34 44.165	09 52 40.98	1.0032483	1913.05	25 33 05.18	-0.32
04/16/2028	01 38 26.463	10 13 59.90	1.0035351	1912.51	26 31 48.72	-0.20
04/17/2028	01 42 09.149	10 35 08.76	1.0038210	1911.96	27 30 30.54	-0.08
04/18/2028	01 45 52.235	10 56 07.22	1.0041056	1911.42	28 29 10.62	0.04

Sun - Apparent data

Date	Right Ascension	Declination	Distance	Diameter	Eclip. Long.	Lat.
0h TT	h m s	d m s	au	arc sec	d m s	s
04/19/2028	01 49 35.735	11 16 54.92	1.0043886	1910.88	29 27 48.98	0.16
04/20/2028	01 53 19.663	11 37 31.52	1.0046697	1910.35	30 26 25.59	0.26
04/21/2028	01 57 04.031	11 57 56.67	1.0049487	1909.82	31 25 00.47	0.34
04/22/2028	02 00 48.851	12 18 10.03	1.0052252	1909.29	32 23 33.61	0.41
04/23/2028	02 04 34.134	12 38 11.26	1.0054991	1908.77	33 22 04.99	0.45
04/24/2028	02 08 19.891	12 58 00.00	1.0057701	1908.26	34 20 34.60	0.46
04/25/2028	02 12 06.129	13 17 35.93	1.0060381	1907.75	35 19 02.43	0.45
04/26/2028	02 15 52.857	13 36 58.69	1.0063029	1907.25	36 17 28.43	0.41
04/27/2028	02 19 40.082	13 56 07.97	1.0065645	1906.75	37 15 52.58	0.34
04/28/2028	02 23 27.808	14 15 03.41	1.0068229	1906.26	38 14 14.81	0.25
04/29/2028	02 27 16.039	14 33 44.68	1.0070782	1905.78	39 12 35.07	0.13
04/30/2028	02 31 04.778	14 52 11.44	1.0073304	1905.30	40 10 53.30	0.01
05/01/2028	02 34 54.030	15 10 23.37	1.0075797	1904.83	41 09 09.45	-0.12
05/02/2028	02 38 43.797	15 28 20.14	1.0078264	1904.36	42 07 23.48	-0.25
05/03/2028	02 42 34.084	15 46 01.43	1.0080707	1903.90	43 05 35.40	-0.38
05/04/2028	02 46 24.897	16 03 26.94	1.0083128	1903.45	44 03 45.22	-0.48
05/05/2028	02 50 16.244	16 20 36.35	1.0085532	1902.99	45 01 53.00	-0.57
05/06/2028	02 54 08.134	16 37 29.40	1.0087919	1902.54	45 59 58.83	-0.63
05/07/2028	02 58 00.576	16 54 05.82	1.0090293	1902.09	46 58 02.81	-0.65
05/08/2028	03 01 53.579	17 10 25.32	1.0092653	1901.65	47 56 05.06	-0.65
05/09/2028	03 05 47.151	17 26 27.65	1.0095001	1901.21	48 54 05.68	-0.61
05/10/2028	03 09 41.298	17 42 12.53	1.0097335	1900.77	49 52 04.75	-0.55
05/11/2028	03 13 36.023	17 57 39.68	1.0099654	1900.33	50 50 02.33	-0.46
05/12/2028	03 17 31.329	18 12 48.81	1.0101956	1899.90	51 47 58.49	-0.35
05/13/2028	03 21 27.218	18 27 39.64	1.0104239	1899.47	52 45 53.27	-0.23
05/14/2028	03 25 23.688	18 42 11.86	1.0106498	1899.04	53 43 46.70	-0.11
05/15/2028	03 29 20.740	18 56 25.20	1.0108732	1898.62	54 41 38.83	0.02
05/16/2028	03 33 18.372	19 10 19.35	1.0110938	1898.21	55 39 29.68	0.14
05/17/2028	03 37 16.580	19 23 54.04	1.0113112	1897.80	56 37 19.30	0.24
05/18/2028	03 41 15.361	19 37 08.99	1.0115251	1897.40	57 35 07.72	0.33
05/19/2028	03 45 14.710	19 50 03.92	1.0117353	1897.01	58 32 54.95	0.40
05/20/2028	03 49 14.621	20 02 38.57	1.0119415	1896.62	59 30 41.03	0.44
05/21/2028	03 53 15.086	20 14 52.66	1.0121434	1896.24	60 28 25.97	0.46
05/22/2028	03 57 16.095	20 26 45.96	1.0123407	1895.87	61 26 09.78	0.44
05/23/2028	04 01 17.640	20 38 18.20	1.0125333	1895.51	62 23 52.45	0.40
05/24/2028	04 05 19.705	20 49 29.16	1.0127209	1895.16	63 21 33.97	0.34
05/25/2028	04 09 22.278	21 00 18.59	1.0129034	1894.82	64 19 14.29	0.24
05/26/2028	04 13 25.340	21 10 46.26	1.0130807	1894.49	65 16 53.37	0.13
05/27/2028	04 17 28.874	21 20 51.96	1.0132529	1894.17	66 14 31.14	0.01
05/28/2028	04 21 32.860	21 30 35.46	1.0134200	1893.85	67 12 07.54	-0.13
05/29/2028	04 25 37.278	21 39 56.54	1.0135821	1893.55	68 09 42.50	-0.26
05/30/2028	04 29 42.112	21 48 55.01	1.0137396	1893.26	69 07 16.02	-0.39
05/31/2028	04 33 47.343	21 57 30.66	1.0138925	1892.97	70 04 48.07	-0.50
06/01/2028	04 37 52.956	22 05 43.33	1.0140413	1892.69	71 02 18.69	-0.59
06/02/2028	04 41 58.938	22 13 32.83	1.0141863	1892.42	71 59 47.95	-0.66
06/03/2028	04 46 05.273	22 20 59.02	1.0143278	1892.16	72 57 15.91	-0.69
06/04/2028	04 50 11.950	22 28 01.77	1.0144659	1891.90	73 54 42.68	-0.69
06/05/2028	04 54 18.954	22 34 40.94	1.0146010	1891.65	74 52 08.35	-0.66
06/06/2028	04 58 26.271	22 40 56.41	1.0147331	1891.40	75 49 32.99	-0.60
06/07/2028	05 02 33.884	22 46 48.05	1.0148623	1891.16	76 46 56.69	-0.51
06/08/2028	05 06 41.777	22 52 15.74	1.0149886	1890.93	77 44 19.53	-0.41
06/09/2028	05 10 49.933	22 57 19.36	1.0151120	1890.70	78 41 41.56	-0.29
06/10/2028	05 14 58.332	23 01 58.80	1.0152322	1890.47	79 39 02.85	-0.16
06/11/2028	05 19 06.956	23 06 13.94	1.0153492	1890.26	80 36 23.47	-0.03
06/12/2028	05 23 15.786	23 10 04.68	1.0154626	1890.04	81 33 43.48	0.09

Sun - Apparent data

Date	Right Ascension	Declination	Distance	Diameter	Eclip. Long.	Lat.
0h TT	h m s	d m s	au	arc sec	d m s	s
06/13/2028	05 27 24.802	23 13 30.93	1.0155723	1889.84	82 31 02.94	0.20
06/14/2028	05 31 33.985	23 16 32.59	1.0156780	1889.64	83 28 21.92	0.30
06/15/2028	05 35 43.312	23 19 09.59	1.0157795	1889.45	84 25 40.48	0.37
06/16/2028	05 39 52.764	23 21 21.87	1.0158764	1889.27	85 22 58.66	0.42
06/17/2028	05 44 02.317	23 23 09.39	1.0159686	1889.10	86 20 16.51	0.45
06/18/2028	05 48 11.949	23 24 32.10	1.0160558	1888.94	87 17 34.08	0.44
06/19/2028	05 52 21.636	23 25 29.98	1.0161377	1888.79	88 14 51.39	0.41
06/20/2028	05 56 31.352	23 26 03.01	1.0162140	1888.65	89 12 08.44	0.35
06/21/2028	06 00 41.072	23 26 11.21	1.0162846	1888.52	90 09 25.25	0.26
06/22/2028	06 04 50.766	23 25 54.58	1.0163491	1888.40	91 06 41.77	0.15
06/23/2028	06 09 00.405	23 25 13.15	1.0164076	1888.29	92 03 57.95	0.03
06/24/2028	06 13 09.959	23 24 06.96	1.0164598	1888.19	93 01 13.73	-0.11
06/25/2028	06 17 19.396	23 22 36.05	1.0165058	1888.10	93 58 29.03	-0.25
06/26/2028	06 21 28.687	23 20 40.46	1.0165458	1888.03	94 55 43.80	-0.38
06/27/2028	06 25 37.803	23 18 20.25	1.0165799	1887.97	95 52 58.00	-0.50
06/28/2028	06 29 46.719	23 15 35.50	1.0166084	1887.91	96 50 11.65	-0.59
06/29/2028	06 33 55.414	23 12 26.27	1.0166316	1887.87	97 47 24.75	-0.66
06/30/2028	06 38 03.865	23 08 52.66	1.0166498	1887.84	98 44 37.37	-0.70
07/01/2028	06 42 12.053	23 04 54.79	1.0166634	1887.81	99 41 49.57	-0.71
07/02/2028	06 46 19.960	23 00 32.75	1.0166728	1887.79	100 39 01.41	-0.68
07/03/2028	06 50 27.566	22 55 46.69	1.0166782	1887.78	101 36 12.97	-0.62
07/04/2028	06 54 34.854	22 50 36.72	1.0166797	1887.78	102 33 24.30	-0.54
07/05/2028	06 58 41.806	22 45 02.97	1.0166777	1887.79	103 30 35.47	-0.44
07/06/2028	07 02 48.405	22 39 05.58	1.0166722	1887.80	104 27 46.56	-0.32
07/07/2028	07 06 54.635	22 32 44.68	1.0166632	1887.81	105 24 57.62	-0.19
07/08/2028	07 11 00.480	22 26 00.40	1.0166507	1887.84	106 22 08.73	-0.05
07/09/2028	07 15 05.924	22 18 52.90	1.0166347	1887.87	107 19 19.97	0.07
07/10/2028	07 19 10.955	22 11 22.31	1.0166152	1887.90	108 16 31.42	0.19
07/11/2028	07 23 15.560	22 03 28.79	1.0165918	1887.94	109 13 43.15	0.30
07/12/2028	07 27 19.724	21 55 12.52	1.0165645	1888.00	110 10 55.26	0.38
07/13/2028	07 31 23.437	21 46 33.66	1.0165332	1888.05	111 08 07.80	0.44
07/14/2028	07 35 26.685	21 37 32.40	1.0164975	1888.12	112 05 20.86	0.48
07/15/2028	07 39 29.458	21 28 08.94	1.0164573	1888.19	113 02 34.50	0.49
07/16/2028	07 43 31.744	21 18 23.49	1.0164124	1888.28	113 59 48.78	0.47
07/17/2028	07 47 33.532	21 08 16.25	1.0163625	1888.37	114 57 03.72	0.42
07/18/2028	07 51 34.808	20 57 47.46	1.0163074	1888.47	115 54 19.37	0.34
07/19/2028	07 55 35.562	20 46 57.36	1.0162467	1888.59	116 51 35.72	0.24
07/20/2028	07 59 35.779	20 35 46.20	1.0161804	1888.71	117 48 52.76	0.12
07/21/2028	08 03 35.445	20 24 14.25	1.0161081	1888.84	118 46 10.44	-0.01
07/22/2028	08 07 34.545	20 12 21.76	1.0160296	1888.99	119 43 28.69	-0.15
07/23/2028	08 11 33.065	20 00 09.02	1.0159451	1889.15	120 40 47.45	-0.28
07/24/2028	08 15 30.991	19 47 36.29	1.0158543	1889.32	121 38 06.66	-0.41
07/25/2028	08 19 28.313	19 34 43.85	1.0157577	1889.50	122 35 26.28	-0.51
07/26/2028	08 23 25.023	19 21 31.97	1.0156552	1889.69	123 32 46.30	-0.59
07/27/2028	08 27 21.117	19 08 00.94	1.0155474	1889.89	124 30 06.73	-0.64
07/28/2028	08 31 16.592	18 54 11.03	1.0154345	1890.10	125 27 27.62	-0.65
07/29/2028	08 35 11.444	18 40 02.55	1.0153169	1890.32	126 24 48.98	-0.63
07/30/2028	08 39 05.673	18 25 35.77	1.0151949	1890.54	127 22 10.86	-0.58
07/31/2028	08 42 59.278	18 10 50.99	1.0150691	1890.78	128 19 33.29	-0.50
08/01/2028	08 46 52.261	17 55 48.49	1.0149395	1891.02	129 16 56.32	-0.40
08/02/2028	08 50 44.623	17 40 28.56	1.0148065	1891.27	130 14 20.00	-0.29
08/03/2028	08 54 36.367	17 24 51.47	1.0146703	1891.52	131 11 44.38	-0.16
08/04/2028	08 58 27.497	17 08 57.50	1.0145311	1891.78	132 09 09.51	-0.03
08/05/2028	09 02 18.018	16 52 46.92	1.0143889	1892.04	133 06 35.48	0.10
08/06/2028	09 06 07.936	16 36 20.02	1.0142438	1892.32	134 04 02.36	0.22

Sun - Apparent data

Date	Right Ascension	Declination	Distance	Diameter	Eclip. Long.	Lat.
0h TT	h m s	d m s	au	arc sec	d m s	s
08/07/2028	09 09 57.260	16 19 37.05	1.0140958	1892.59	135 01 30.24	0.33
08/08/2028	09 13 45.998	16 02 38.31	1.0139449	1892.87	135 58 59.19	0.43
08/09/2028	09 17 34.158	15 45 24.07	1.0137911	1893.16	136 56 29.31	0.49
08/10/2028	09 21 21.751	15 27 54.61	1.0136342	1893.45	137 54 00.69	0.54
08/11/2028	09 25 08.786	15 10 10.22	1.0134742	1893.75	138 51 33.39	0.56
08/12/2028	09 28 55.273	14 52 11.20	1.0133108	1894.06	139 49 07.50	0.55
08/13/2028	09 32 41.223	14 33 57.84	1.0131440	1894.37	140 46 43.06	0.51
08/14/2028	09 36 26.646	14 15 30.46	1.0129734	1894.69	141 44 20.14	0.44
08/15/2028	09 40 11.550	13 56 49.35	1.0127990	1895.01	142 41 58.77	0.35
08/16/2028	09 43 55.946	13 37 54.86	1.0126204	1895.35	143 39 38.95	0.24
08/17/2028	09 47 39.840	13 18 47.30	1.0124375	1895.69	144 37 20.68	0.12
08/18/2028	09 51 23.241	12 59 27.01	1.0122499	1896.04	145 35 03.93	-0.02
08/19/2028	09 55 06.153	12 39 54.34	1.0120575	1896.40	146 32 48.64	-0.15
08/20/2028	09 58 48.584	12 20 09.63	1.0118601	1896.77	147 30 34.75	-0.28
08/21/2028	10 02 30.540	12 00 13.23	1.0116576	1897.15	148 28 22.21	-0.39
08/22/2028	10 06 12.030	11 40 05.47	1.0114501	1897.54	149 26 10.97	-0.48
08/23/2028	10 09 53.066	11 19 46.71	1.0112378	1897.94	150 24 01.02	-0.53
08/24/2028	10 13 33.657	10 59 17.26	1.0110209	1898.35	151 21 52.34	-0.56
08/25/2028	10 17 13.818	10 38 37.48	1.0107997	1898.76	152 19 44.93	-0.55
08/26/2028	10 20 53.561	10 17 47.69	1.0105748	1899.19	153 17 38.79	-0.51
08/27/2028	10 24 32.899	09 56 48.23	1.0103464	1899.62	154 15 33.91	-0.44
08/28/2028	10 28 11.847	09 35 39.43	1.0101149	1900.05	155 13 30.30	-0.34
08/29/2028	10 31 50.420	09 14 21.61	1.0098808	1900.49	156 11 27.97	-0.23
08/30/2028	10 35 28.634	08 52 55.08	1.0096443	1900.94	157 09 26.95	-0.11
08/31/2028	10 39 06.505	08 31 20.14	1.0094057	1901.39	158 07 27.28	0.02
09/01/2028	10 42 44.054	08 09 37.11	1.0091652	1901.84	159 05 29.00	0.15
09/02/2028	10 46 21.297	07 47 46.29	1.0089231	1902.29	160 03 32.17	0.27
09/03/2028	10 49 58.257	07 25 47.96	1.0086795	1902.75	161 01 36.87	0.38
09/04/2028	10 53 34.953	07 03 42.43	1.0084346	1903.22	161 59 43.16	0.48
09/05/2028	10 57 11.406	06 41 30.00	1.0081883	1903.68	162 57 51.14	0.55
09/06/2028	11 00 47.640	06 19 10.96	1.0079409	1904.15	163 56 00.87	0.60
09/07/2028	11 04 23.675	05 56 45.60	1.0076921	1904.62	164 54 12.45	0.62
09/08/2028	11 07 59.535	05 34 14.24	1.0074422	1905.09	165 52 25.95	0.61
09/09/2028	11 11 35.240	05 11 37.17	1.0071909	1905.57	166 50 41.44	0.58
09/10/2028	11 15 10.812	04 48 54.71	1.0069382	1906.04	167 48 58.98	0.52
09/11/2028	11 18 46.273	04 26 07.17	1.0066839	1906.53	168 47 18.61	0.44
09/12/2028	11 22 21.642	04 03 14.89	1.0064279	1907.01	169 45 40.37	0.34
09/13/2028	11 25 56.939	03 40 18.18	1.0061700	1907.50	170 44 04.28	0.22
09/14/2028	11 29 32.183	03 17 17.40	1.0059099	1907.99	171 42 30.32	0.09
09/15/2028	11 33 07.392	02 54 12.88	1.0056475	1908.49	172 40 58.49	-0.04
09/16/2028	11 36 42.581	02 31 05.00	1.0053824	1908.99	173 39 28.73	-0.17
09/17/2028	11 40 17.767	02 07 54.10	1.0051145	1909.50	174 38 01.01	-0.28
09/18/2028	11 43 52.969	01 44 40.55	1.0048435	1910.02	175 36 35.29	-0.38
09/19/2028	11 47 28.201	01 21 24.71	1.0045695	1910.54	176 35 11.51	-0.44
09/20/2028	11 51 03.483	00 58 06.94	1.0042925	1911.07	177 33 49.65	-0.48
09/21/2028	11 54 38.831	00 34 47.61	1.0040126	1911.60	178 32 29.67	-0.47
09/22/2028	11 58 14.263	00 11 27.06	1.0037301	1912.14	179 31 11.53	-0.44
09/23/2028	12 01 49.796	-00 11 54.34	1.0034454	1912.68	180 29 55.18	-0.38
09/24/2028	12 05 25.445	-00 35 16.23	1.0031588	1913.23	181 28 40.56	-0.29
09/25/2028	12 09 01.230	-00 58 38.26	1.0028708	1913.77	182 27 27.65	-0.18
09/26/2028	12 12 37.168	-01 22 00.08	1.0025817	1914.33	183 26 16.43	-0.06
09/27/2028	12 16 13.279	-01 45 21.35	1.0022920	1914.88	184 25 06.88	0.07
09/28/2028	12 19 49.584	-02 08 41.74	1.0020018	1915.43	185 23 59.04	0.19
09/29/2028	12 23 26.105	-02 32 00.90	1.0017117	1915.99	186 22 52.92	0.31
09/30/2028	12 27 02.863	-02 55 18.52	1.0014217	1916.54	187 21 48.57	0.42

Sun - Apparent data

Date	Right Ascension	Declination	Distance	Diameter	Eclip. Long.	Lat.
0h TT	h m s	d m s	au	arc sec	d m s	s
10/01/2028	12 30 39.882	-03 18 34.25	1.0011322	1917.10	188 20 46.03	0.51
10/02/2028	12 34 17.186	-03 41 47.77	1.0008433	1917.65	189 19 45.36	0.58
10/03/2028	12 37 54.798	-04 04 58.75	1.0005553	1918.20	190 18 46.63	0.63
10/04/2028	12 41 32.742	-04 28 06.87	1.0002682	1918.75	191 17 49.91	0.66
10/05/2028	12 45 11.042	-04 51 11.79	0.9999822	1919.30	192 16 55.26	0.65
10/06/2028	12 48 49.722	-05 14 13.17	0.9996974	1919.85	193 16 02.75	0.62
10/07/2028	12 52 28.805	-05 37 10.68	0.9994137	1920.39	194 15 12.44	0.56
10/08/2028	12 56 08.315	-06 00 03.97	0.9991311	1920.94	195 14 24.37	0.48
10/09/2028	12 59 48.271	-06 22 52.68	0.9988496	1921.48	196 13 38.59	0.38
10/10/2028	13 03 28.697	-06 45 36.45	0.9985690	1922.02	197 12 55.11	0.27
10/11/2028	13 07 09.611	-07 08 14.92	0.9982892	1922.56	198 12 13.96	0.14
10/12/2028	13 10 51.033	-07 30 47.70	0.9980100	1923.10	199 11 35.12	0.01
10/13/2028	13 14 32.982	-07 53 14.41	0.9977312	1923.63	200 10 58.59	-0.12
10/14/2028	13 18 15.473	-08 15 34.64	0.9974525	1924.17	201 10 24.34	-0.23
10/15/2028	13 21 58.525	-08 37 48.00	0.9971736	1924.71	202 09 52.34	-0.33
10/16/2028	13 25 42.155	-08 59 54.09	0.9968945	1925.25	203 09 22.57	-0.40
10/17/2028	13 29 26.377	-09 21 52.50	0.9966147	1925.79	204 08 54.98	-0.44
10/18/2028	13 33 11.207	-09 43 42.82	0.9963344	1926.33	205 08 29.55	-0.45
10/19/2028	13 36 56.658	-10 05 24.66	0.9960535	1926.87	206 08 06.20	-0.42
10/20/2028	13 40 42.743	-10 26 57.60	0.9957722	1927.42	207 07 44.85	-0.36
10/21/2028	13 44 29.470	-10 48 21.24	0.9954907	1927.96	208 07 25.42	-0.27
10/22/2028	13 48 16.850	-11 09 35.16	0.9952094	1928.51	209 07 07.81	-0.17
10/23/2028	13 52 04.894	-11 30 38.96	0.9949285	1929.05	210 06 51.94	-0.05
10/24/2028	13 55 53.614	-11 51 32.23	0.9946485	1929.59	211 06 37.77	0.08
10/25/2028	13 59 43.020	-12 12 14.56	0.9943697	1930.14	212 06 25.25	0.21
10/26/2028	14 03 33.127	-12 32 45.58	0.9940925	1930.67	213 06 14.36	0.33
10/27/2028	14 07 23.949	-12 53 04.88	0.9938172	1931.21	214 06 05.12	0.44
10/28/2028	14 11 15.498	-13 13 12.07	0.9935441	1931.74	215 05 57.53	0.53
10/29/2028	14 15 07.790	-13 33 06.77	0.9932735	1932.27	216 05 51.61	0.61
10/30/2028	14 19 00.838	-13 52 48.60	0.9930057	1932.79	217 05 47.40	0.66
10/31/2028	14 22 54.657	-14 12 17.18	0.9927409	1933.30	218 05 44.95	0.68
11/01/2028	14 26 49.260	-14 31 32.11	0.9924793	1933.81	219 05 44.28	0.68
11/02/2028	14 30 44.660	-14 50 33.02	0.9922211	1934.32	220 05 45.45	0.64
11/03/2028	14 34 40.869	-15 09 19.52	0.9919664	1934.81	221 05 48.50	0.59
11/04/2028	14 38 37.900	-15 27 51.23	0.9917153	1935.30	222 05 53.47	0.50
11/05/2028	14 42 35.762	-15 46 07.76	0.9914679	1935.78	223 06 00.40	0.40
11/06/2028	14 46 34.464	-16 04 08.72	0.9912242	1936.26	224 06 09.31	0.28
11/07/2028	14 50 34.015	-16 21 53.70	0.9909841	1936.73	225 06 20.21	0.15
11/08/2028	14 54 34.420	-16 39 22.30	0.9907474	1937.19	226 06 33.11	0.02
11/09/2028	14 58 35.685	-16 56 34.10	0.9905141	1937.65	227 06 48.01	-0.11
11/10/2028	15 02 37.814	-17 13 28.71	0.9902839	1938.10	228 07 04.90	-0.23
11/11/2028	15 06 40.809	-17 30 05.68	0.9900565	1938.54	229 07 23.77	-0.33
11/12/2028	15 10 44.673	-17 46 24.62	0.9898317	1938.98	230 07 44.61	-0.40
11/13/2028	15 14 49.406	-18 02 25.11	0.9896092	1939.42	231 08 07.41	-0.45
11/14/2028	15 18 55.006	-18 18 06.74	0.9893888	1939.85	232 08 32.13	-0.46
11/15/2028	15 23 01.470	-18 33 29.12	0.9891703	1940.28	233 08 58.72	-0.44
11/16/2028	15 27 08.790	-18 48 31.86	0.9889536	1940.71	234 09 27.12	-0.38
11/17/2028	15 31 16.958	-19 03 14.55	0.9887387	1941.13	235 09 57.21	-0.30
11/18/2028	15 35 25.959	-19 17 36.81	0.9885256	1941.55	236 10 28.87	-0.19
11/19/2028	15 39 35.781	-19 31 38.26	0.9883146	1941.96	237 11 01.99	-0.07
11/20/2028	15 43 46.411	-19 45 18.51	0.9881059	1942.37	238 11 36.45	0.06
11/21/2028	15 47 57.834	-19 58 37.18	0.9878997	1942.78	239 12 12.17	0.19
11/22/2028	15 52 10.038	-20 11 33.92	0.9876965	1943.18	240 12 49.06	0.32
11/23/2028	15 56 23.010	-20 24 08.36	0.9874964	1943.57	241 13 27.09	0.44
11/24/2028	16 00 36.738	-20 36 20.15	0.9872999	1943.96	242 14 06.23	0.54

Sun - Apparent data

Date 0h TT	Right Ascension h m s	Declination d m s	Distance au	Diameter arc sec	Eclip. Long. d m s	Lat. s
11/25/2028	16 04 51.210	-20 48 08.98	0.9871072	1944.34	243 14 46.46	0.62
11/26/2028	16 09 06.411	-20 59 34.50	0.9869186	1944.71	244 15 27.78	0.67
11/27/2028	16 13 22.330	-21 10 36.40	0.9867344	1945.07	245 16 10.19	0.70
11/28/2028	16 17 38.951	-21 21 14.39	0.9865549	1945.43	246 16 53.69	0.70
11/29/2028	16 21 56.260	-21 31 28.15	0.9863802	1945.77	247 17 38.30	0.67
11/30/2028	16 26 14.242	-21 41 17.41	0.9862107	1946.10	248 18 24.05	0.61
12/01/2028	16 30 32.879	-21 50 41.88	0.9860466	1946.43	249 19 10.94	0.53
12/02/2028	16 34 52.153	-21 59 41.29	0.9858879	1946.74	250 19 58.99	0.43
12/03/2028	16 39 12.047	-22 08 15.39	0.9857348	1947.04	251 20 48.23	0.31
12/04/2028	16 43 32.540	-22 16 23.90	0.9855874	1947.33	252 21 38.66	0.17
12/05/2028	16 47 53.611	-22 24 06.57	0.9854457	1947.61	253 22 30.28	0.04
12/06/2028	16 52 15.238	-22 31 23.15	0.9853095	1947.88	254 23 23.11	-0.10
12/07/2028	16 56 37.396	-22 38 13.39	0.9851787	1948.14	255 24 17.14	-0.22
12/08/2028	17 01 00.063	-22 44 37.06	0.9850532	1948.39	256 25 12.39	-0.33
12/09/2028	17 05 23.214	-22 50 33.93	0.9849326	1948.63	257 26 08.85	-0.41
12/10/2028	17 09 46.823	-22 56 03.80	0.9848167	1948.86	258 27 06.54	-0.47
12/11/2028	17 14 10.862	-23 01 06.46	0.9847051	1949.08	259 28 05.45	-0.49
12/12/2028	17 18 35.303	-23 05 41.75	0.9845976	1949.29	260 29 05.55	-0.48
12/13/2028	17 23 00.111	-23 09 49.52	0.9844938	1949.50	261 30 06.79	-0.43
12/14/2028	17 27 25.254	-23 13 29.62	0.9843937	1949.70	262 31 09.09	-0.35
12/15/2028	17 31 50.693	-23 16 41.95	0.9842970	1949.89	263 32 12.34	-0.25
12/16/2028	17 36 16.390	-23 19 26.40	0.9842036	1950.07	264 33 16.41	-0.13
12/17/2028	17 40 42.303	-23 21 42.87	0.9841136	1950.25	265 34 21.16	0.01
12/18/2028	17 45 08.394	-23 23 31.27	0.9840272	1950.42	266 35 26.48	0.15
12/19/2028	17 49 34.622	-23 24 51.55	0.9839443	1950.59	267 36 32.25	0.28
12/20/2028	17 54 00.951	-23 25 43.64	0.9838652	1950.74	268 37 38.38	0.40
12/21/2028	17 58 27.343	-23 26 07.51	0.9837903	1950.89	269 38 44.80	0.51
12/22/2028	18 02 53.763	-23 26 03.14	0.9837195	1951.03	270 39 51.45	0.60
12/23/2028	18 07 20.177	-23 25 30.53	0.9836534	1951.16	271 40 58.30	0.66
12/24/2028	18 11 46.550	-23 24 29.69	0.9835920	1951.29	272 42 05.32	0.70
12/25/2028	18 16 12.850	-23 23 00.64	0.9835356	1951.40	273 43 12.47	0.71
12/26/2028	18 20 39.043	-23 21 03.44	0.9834846	1951.50	274 44 19.73	0.69
12/27/2028	18 25 05.097	-23 18 38.15	0.9834390	1951.59	275 45 27.11	0.64
12/28/2028	18 29 30.982	-23 15 44.83	0.9833992	1951.67	276 46 34.58	0.56
12/29/2028	18 33 56.666	-23 12 23.59	0.9833654	1951.73	277 47 42.14	0.46
12/30/2028	18 38 22.118	-23 08 34.51	0.9833378	1951.79	278 48 49.78	0.34
12/31/2028	18 42 47.309	-23 04 17.70	0.9833166	1951.83	279 49 57.50	0.21
01/01/2029	18 47 12.210	-22 59 33.30	0.9833018	1951.86	280 51 05.30	0.07

SEASONS FOR 2028

Traditionally, the seasons have been marked by the Sun's Ecliptic Longitude being 0, 90, 180, or 270 degrees. However, the terminology of "solstices" and "equinoxes" implies a Solar declination of zero, maximum-North, zero, or maximum-South, where the maximum declination is approximately 23.44 degrees. Dates and times are TT.

Criterion	March Equinox	June Solstice	Sept. Equinox	Dec. Solstice
Ecliptic Longitude	03/20 02:18:17	06/20 20:03:09	09/22 11:46:28	12/21 08:20:49
Apparent Declination	03/20 02:18:27	06/20 19:55:08	09/22 11:46:04	12/21 08:17:17
(Appnt. Decl. in degrees)	0.000000	23.436546	0.000000	-23.435887

Perihelion 01/05/2028 12:30:56 TT 0.9833074 a.u.
 Aphelion 07/03/2028 22:18:45 TT 1.0166797 a.u.

Moon - Apparent data

Date	Right Ascension	Declination	Distance	Parallax	Diameter	Illum.	Phase
0h TT	h m s	d m s	km	arc min	arc sec	%	deg.
12/31/2027	21 03 56.015	-15 40 18.27	405006.604	54.14066	1770.37	9.0	145.1
01/01/2028	21 48 42.972	-11 00 50.49	405647.799	54.05507	1767.58	15.1	134.3
01/02/2028	22 31 55.255	-05 58 28.43	405293.016	54.10240	1769.12	22.4	123.5
01/03/2028	23 14 25.542	-00 42 53.77	403811.985	54.30084	1775.61	30.7	112.7
01/04/2028	23 57 12.304	04 36 56.12	401137.961	54.66285	1787.45	39.8	101.7
01/05/2028	00 41 18.207	09 51 44.90	397289.960	55.19233	1804.76	49.4	90.6
01/06/2028	01 27 48.446	14 50 39.45	392390.505	55.88154	1827.29	59.3	79.3
01/07/2028	02 17 46.124	19 19 48.41	386676.258	56.70742	1854.30	69.1	67.6
01/08/2028	03 12 00.984	23 01 25.16	380497.731	57.62832	1884.41	78.4	55.4
01/09/2028	04 10 49.116	25 34 13.54	374303.169	58.58214	1915.59	86.7	42.8
01/10/2028	05 13 29.110	26 36 35.47	368601.869	59.48834	1945.22	93.4	29.8
01/11/2028	06 18 14.264	25 52 40.96	363905.415	60.25616	1970.33	98.0	16.3
01/12/2028	07 22 42.018	23 19 08.02	360652.634	60.79967	1988.10	99.9	2.7
01/13/2028	08 24 50.236	19 07 37.30	359134.195	61.05676	1996.50	99.0	11.6
01/14/2028	09 23 38.509	13 41 26.28	359439.644	61.00487	1994.81	95.1	25.6
01/15/2028	10 19 10.680	07 28 56.72	361446.493	60.66612	1983.73	88.6	39.6
01/16/2028	11 12 12.798	00 57 58.07	364856.095	60.09913	1965.19	79.9	53.2
01/17/2028	12 03 49.072	-05 27 08.12	369262.814	59.38185	1941.74	69.8	66.6
01/18/2028	12 55 05.019	-11 26 05.21	374232.603	58.59318	1915.95	59.0	79.6
01/19/2028	13 46 56.419	-16 42 05.94	379369.285	57.79975	1890.01	48.1	92.2
01/20/2028	14 40 00.358	-21 01 06.32	384356.730	57.04967	1865.49	37.5	104.5
01/21/2028	15 34 26.948	-24 11 32.58	388975.318	56.37222	1843.34	27.8	116.4
01/22/2028	16 29 54.216	-26 04 59.65	393097.390	55.78104	1824.01	19.1	128.1
01/23/2028	17 25 31.384	-26 37 24.55	396668.603	55.27880	1807.59	11.9	139.6
01/24/2028	18 20 13.359	-25 50 05.18	399681.992	54.86199	1793.96	6.3	150.9
01/25/2028	19 13 01.436	-23 49 33.67	402150.482	54.52521	1782.95	2.4	162.0
01/26/2028	20 03 19.831	-20 46 15.13	404082.445	54.26449	1774.42	0.4	173.1
01/27/2028	20 51 01.249	-16 52 30.96	405463.727	54.07962	1768.38	0.1	176.0
01/28/2028	21 36 23.021	-12 20 56.50	406248.343	53.97516	1764.96	1.7	165.1
01/29/2028	22 19 59.578	-07 23 20.06	406358.705	53.96050	1764.48	5.0	154.2
01/30/2028	23 02 35.787	-02 10 24.26	405694.984	54.04879	1767.37	9.9	143.4
01/31/2028	23 45 02.784	03 08 00.11	404152.149	54.25513	1774.12	16.2	132.5
02/01/2028	00 28 15.875	08 22 17.68	401642.560	54.59416	1785.20	23.8	121.6
02/02/2028	01 13 13.133	13 22 16.17	398121.683	55.07702	1800.99	32.5	110.5
02/03/2028	02 00 52.707	17 56 04.71	393614.300	55.70778	1821.61	42.1	99.1
02/04/2028	02 52 06.234	21 49 16.76	388238.277	56.47925	1846.84	52.2	87.5
02/05/2028	03 47 25.856	24 44 29.04	382222.110	57.36831	1875.91	62.5	75.5
02/06/2028	04 46 45.519	26 22 30.50	375911.176	58.33152	1907.40	72.7	63.0
02/07/2028	05 49 05.857	26 25 51.75	369756.233	59.30260	1939.15	82.1	50.1
02/08/2028	06 52 40.172	24 44 09.38	364277.735	60.19456	1968.31	90.1	36.8
02/09/2028	07 55 29.588	21 18 51.01	360003.078	60.90938	1991.68	96.0	23.0
02/10/2028	08 56 07.537	16 24 17.99	357382.810	61.35601	2006.29	99.4	9.0
02/11/2028	09 54 02.933	10 24 36.85	356704.357	61.47272	2010.10	99.8	5.7
02/12/2028	10 49 34.297	03 48 34.66	358030.769	61.24496	2002.65	97.1	19.7
02/13/2028	11 43 29.661	-02 54 54.69	361188.098	60.70953	1985.15	91.6	33.7
02/14/2028	12 36 46.832	-09 19 46.92	365806.734	59.94294	1960.09	83.8	47.4
02/15/2028	13 30 18.518	-15 04 07.00	371400.042	59.04010	1930.57	74.5	60.6
02/16/2028	14 24 41.026	-19 50 26.05	377452.394	58.09332	1899.61	64.3	73.4
02/17/2028	15 20 05.322	-23 25 39.64	383492.563	57.17824	1869.69	53.7	85.7
02/18/2028	16 16 12.285	-25 41 19.85	389140.642	56.34827	1842.55	43.3	97.7
02/19/2028	17 12 16.192	-26 34 02.56	394128.010	55.63516	1819.24	33.5	109.3
02/20/2028	18 07 18.249	-26 05 40.72	398295.985	55.05292	1800.20	24.5	120.6
02/21/2028	19 00 25.361	-24 22 50.50	401580.295	54.60263	1785.48	16.7	131.7
02/22/2028	19 51 05.022	-21 35 28.26	403987.598	54.27723	1774.84	10.2	142.7
02/23/2028	20 39 10.500	-17 55 10.23	405568.881	54.06559	1767.92	5.2	153.6

Moon - Apparent data

Date	Right Ascension	Declination	Distance	Parallax	Diameter	Illum.	Phase
0h TT	h m s	d m s	km	arc min	arc sec	%	deg.
02/24/2028	21 24 57.569	-13 33 51.31	406393.413	53.95589	1764.33	1.9	164.3
02/25/2028	22 08 57.760	-08 42 59.88	406526.243	53.93826	1763.76	0.2	174.6
02/26/2028	22 51 52.151	-03 33 25.42	406011.705	54.00662	1765.99	0.4	173.1
02/27/2028	23 34 27.245	01 44 31.46	404864.816	54.15962	1770.99	2.3	162.6
02/28/2028	00 17 32.674	07 00 35.48	403071.649	54.40059	1778.87	6.0	151.7
02/29/2028	01 01 59.647	12 04 04.70	400598.766	54.73643	1789.85	11.3	140.6
03/01/2028	01 48 38.628	16 43 14.06	397410.696	55.17557	1804.21	18.2	129.4
03/02/2028	02 38 14.445	20 44 42.51	393493.460	55.72489	1822.17	26.5	118.0
03/03/2028	03 31 17.227	23 53 21.90	388881.277	56.38585	1843.78	35.9	106.4
03/04/2028	04 27 49.459	25 52 58.21	383682.703	57.14990	1868.77	46.1	94.5
03/05/2028	05 27 14.473	26 28 16.44	378101.461	57.99358	1896.35	56.8	82.2
03/06/2028	06 28 17.076	25 28 25.21	372445.952	58.87429	1925.15	67.6	69.4
03/07/2028	07 29 24.033	22 50 28.68	367120.484	59.72841	1953.07	77.7	56.3
03/08/2028	08 29 16.513	18 41 18.27	362591.861	60.47447	1977.46	86.7	42.8
03/09/2028	09 27 14.489	13 16 54.76	359329.216	61.02362	1995.42	93.7	29.0
03/10/2028	10 23 20.995	07 00 05.14	357724.058	61.29747	2004.37	98.3	15.1
03/11/2028	11 18 10.802	00 17 27.83	358009.342	61.24862	2002.77	99.9	3.9
03/12/2028	12 12 34.023	-06 23 12.46	360203.681	60.87546	1990.57	98.5	14.2
03/13/2028	13 07 20.645	-12 35 28.01	364101.831	60.22365	1969.26	94.3	27.7
03/14/2028	14 03 06.864	-17 56 06.04	369314.980	59.37346	1941.47	87.7	41.1
03/15/2028	15 00 03.316	-22 06 43.51	375344.804	58.41955	1910.28	79.4	54.0
03/16/2028	15 57 47.957	-24 55 03.69	381665.899	57.45192	1878.64	70.0	66.5
03/17/2028	16 55 28.922	-26 15 47.99	387795.292	56.54377	1848.95	60.0	78.5
03/18/2028	17 51 59.877	-26 10 36.11	393338.604	55.74683	1822.89	49.9	90.1
03/19/2028	18 46 21.857	-24 46 52.26	398012.355	55.09215	1801.48	40.1	101.4
03/20/2028	19 38 00.115	-22 15 34.70	401647.132	54.59354	1785.18	30.9	112.5
03/21/2028	20 26 49.042	-18 49 00.91	404177.541	54.25172	1774.01	22.5	123.4
03/22/2028	21 13 07.330	-14 39 14.16	405623.962	54.05825	1767.68	15.1	134.2
03/23/2028	21 57 29.659	-09 57 24.62	406069.786	53.99890	1765.74	9.1	145.0
03/24/2028	22 40 39.541	-04 53 52.45	405636.860	54.05653	1767.62	4.4	155.7
03/25/2028	23 23 24.779	00 21 25.94	404461.446	54.21364	1772.76	1.4	166.3
03/26/2028	00 06 35.010	05 38 22.85	402672.971	54.45445	1780.63	0.2	175.0
03/27/2028	00 51 00.038	10 46 04.02	400377.981	54.76661	1790.84	0.8	169.7
03/28/2028	01 37 27.450	15 32 18.70	397651.501	55.14215	1803.12	3.3	159.0
03/29/2028	02 26 37.896	19 43 22.86	394537.425	55.57742	1817.35	7.7	147.7
03/30/2028	03 18 56.866	23 04 09.47	391058.405	56.07191	1833.52	13.9	136.1
03/31/2028	04 14 23.744	25 19 06.31	387234.197	56.62571	1851.63	21.8	124.3
04/01/2028	05 12 23.055	26 14 16.66	383105.744	57.23598	1871.58	31.0	112.3
04/02/2028	06 11 46.615	25 40 06.09	378760.764	57.89263	1893.05	41.3	100.0
04/03/2028	07 11 11.894	23 33 52.09	374355.229	58.57399	1915.33	52.3	87.4
04/04/2028	08 09 29.552	20 00 42.30	370124.242	59.24363	1937.22	63.4	74.4
04/05/2028	09 06 04.266	15 12 45.11	366375.757	59.84983	1957.04	74.1	61.2
04/06/2028	10 00 59.333	09 27 25.98	363462.332	60.32962	1972.73	83.7	47.7
04/07/2028	10 54 48.276	03 05 51.27	361730.835	60.61843	1982.17	91.4	34.0
04/08/2028	11 48 21.575	-03 28 22.53	361457.788	60.66422	1983.67	96.9	20.4
04/09/2028	12 42 33.224	-09 50 14.16	362786.388	60.44204	1976.40	99.5	7.7
04/10/2028	13 38 07.417	-15 34 45.09	365684.999	59.96289	1960.74	99.4	9.2
04/11/2028	14 35 24.620	-20 19 03.62	369941.668	59.27287	1938.18	96.5	21.7
04/12/2028	15 34 09.442	-23 45 00.73	375196.201	58.44269	1911.03	91.2	34.5
04/13/2028	16 33 27.595	-25 41 45.04	380997.999	57.55265	1881.93	84.1	47.0
04/14/2028	17 31 59.261	-26 07 12.84	386871.596	56.67878	1853.36	75.7	59.0
04/15/2028	18 28 25.885	-25 07 31.92	392374.408	55.88383	1827.37	66.5	70.7
04/16/2028	19 21 55.288	-22 54 23.24	397138.315	55.21341	1805.45	56.9	82.1
04/17/2028	20 12 11.841	-19 41 40.66	400893.616	54.69617	1788.54	47.2	93.2
04/18/2028	20 59 31.705	-15 42 57.24	403477.862	54.34581	1777.08	37.8	104.2

Moon - Apparent data

Date	Right Ascension	Declination	Distance	Parallax	Diameter	Illum.	Phase
0h TT	h m s	d m s	km	arc min	arc sec	%	deg.
04/19/2028	21 44 31.842	-11 10 13.61	404833.284	54.16384	1771.13	28.9	115.0
04/20/2028	22 28 00.137	-06 13 54.97	404996.098	54.14206	1770.42	20.8	125.8
04/21/2028	23 10 49.181	-01 03 27.46	404080.054	54.26481	1774.43	13.7	136.6
04/22/2028	23 53 53.134	04 11 49.18	402255.827	54.51093	1782.48	7.8	147.5
04/23/2028	00 38 05.973	09 21 46.69	399727.658	54.85572	1793.75	3.5	158.5
04/24/2028	01 24 19.227	14 14 40.34	396708.961	55.27317	1807.40	0.9	169.2
04/25/2028	02 13 17.299	18 36 39.45	393399.287	55.73823	1822.61	0.2	174.7
04/26/2028	03 05 28.836	22 11 54.56	389965.734	56.22903	1838.66	1.6	165.4
04/27/2028	04 00 54.681	24 43 45.81	386532.040	56.72858	1854.99	5.1	153.8
04/28/2028	04 58 57.622	25 57 08.43	383177.881	57.22520	1871.23	10.7	141.7
04/29/2028	05 58 23.905	25 41 49.82	379949.104	57.71154	1887.13	18.2	129.4
04/30/2028	06 57 43.131	23 55 14.65	376877.144	58.18200	1902.51	27.4	116.9
05/01/2028	07 55 38.877	20 43 05.21	374003.269	58.62912	1917.13	37.8	104.1
05/02/2028	08 51 31.763	16 17 44.67	371401.414	59.03988	1930.56	49.0	91.2
05/03/2028	09 45 24.216	10 55 43.93	369192.649	59.39314	1942.11	60.3	78.1
05/04/2028	10 37 51.229	04 55 42.49	367545.223	59.65938	1950.81	71.3	64.8
05/05/2028	11 29 46.789	-01 22 24.71	366656.823	59.80395	1955.54	81.2	51.5
05/06/2028	12 22 11.364	-07 37 35.85	366720.223	59.79360	1955.20	89.4	38.1
05/07/2028	13 16 00.351	-13 27 48.93	367879.069	59.60523	1949.04	95.4	24.8
05/08/2028	14 11 51.204	-18 30 48.37	370185.279	59.23386	1936.90	98.9	12.0
05/09/2028	15 09 48.942	-22 26 00.00	373570.743	58.69701	1919.35	99.8	5.1
05/10/2028	16 09 15.368	-24 57 32.80	377842.178	58.03338	1897.65	98.2	15.6
05/11/2028	17 08 52.584	-25 57 29.46	382700.397	57.29661	1873.56	94.2	27.8
05/12/2028	18 07 06.425	-25 27 19.91	387777.677	56.54634	1849.03	88.4	39.7
05/13/2028	19 02 39.157	-23 36 43.20	392682.975	55.83991	1825.93	81.2	51.4
05/14/2028	19 54 51.415	-20 39 57.42	397045.273	55.22635	1805.87	72.8	62.8
05/15/2028	20 43 44.276	-16 52 17.87	400548.799	54.74326	1790.08	63.8	74.0
05/16/2028	21 29 48.420	-12 27 35.22	402957.687	54.41597	1779.38	54.4	85.0
05/17/2028	22 13 51.295	-07 37 29.29	404130.332	54.25806	1774.21	44.9	95.8
05/18/2028	22 56 48.057	-02 31 49.42	404024.848	54.27223	1774.68	35.6	106.7
05/19/2028	23 39 36.800	02 40 31.31	402697.055	54.45119	1780.53	26.8	117.6
05/20/2028	00 23 16.390	07 50 28.99	400291.857	54.77840	1791.23	18.8	128.6
05/21/2028	01 08 44.690	12 47 40.90	397028.333	55.22871	1805.95	11.8	139.9
05/22/2028	01 56 54.825	17 19 27.73	393178.654	55.76951	1823.63	6.1	151.3
05/23/2028	02 48 27.211	21 10 26.12	389041.409	56.36264	1843.02	2.2	162.9
05/24/2028	03 43 36.354	24 03 04.42	384911.179	56.96749	1862.80	0.3	174.0
05/25/2028	04 41 56.057	25 39 57.82	381047.968	57.54510	1881.69	0.6	171.2
05/26/2028	05 42 14.006	25 47 41.48	377651.714	58.06265	1898.61	3.3	159.1
05/27/2028	06 42 47.936	24 20 55.56	374847.498	58.49706	1912.81	8.4	146.4
05/28/2028	07 42 00.750	21 24 19.23	372685.489	58.83644	1923.91	15.6	133.5
05/29/2028	08 38 53.039	17 11 02.95	371155.970	59.07893	1931.84	24.7	120.4
05/30/2028	09 33 14.209	11 59 17.14	370215.409	59.22904	1936.74	35.2	107.2
05/31/2028	10 25 33.716	06 08 54.96	369816.043	59.29301	1938.84	46.5	94.1
06/01/2028	11 16 45.157	-00 00 14.79	369930.395	59.27468	1938.24	57.9	80.9
06/02/2028	12 07 52.075	-06 08 49.80	370563.712	59.17336	1934.92	69.0	67.7
06/03/2028	12 59 56.726	-11 57 33.84	371750.887	58.98438	1928.74	79.0	54.6
06/04/2028	13 53 49.192	-17 07 01.98	373538.799	58.70203	1919.51	87.4	41.6
06/05/2028	14 49 54.471	-21 18 14.46	375959.207	58.32407	1907.16	93.8	28.8
06/06/2028	15 47 59.290	-24 14 28.09	379000.014	57.85608	1891.85	98.0	16.2
06/07/2028	16 47 06.673	-25 44 13.94	382583.195	57.31416	1874.14	99.8	4.6
06/08/2028	17 45 48.257	-25 44 04.67	386555.566	56.72513	1854.88	99.3	9.3
06/09/2028	18 42 33.617	-24 19 20.72	390694.612	56.12412	1835.23	96.7	21.0
06/10/2028	19 36 20.096	-21 42 09.38	394727.448	55.55067	1816.48	92.2	32.5
06/11/2028	20 26 46.107	-18 07 48.57	398358.207	55.04432	1799.92	86.0	43.9
06/12/2028	21 14 06.508	-13 51 32.56	401298.381	54.64099	1786.73	78.6	55.0

Moon - Apparent data

Date	Right Ascension	Declination	Distance	Parallax	Diameter	Illum.	Phase
0h TT	h m s	d m s	km	arc min	arc sec	%	deg.
06/13/2028	21 59 00.110	-09 06 44.49	403295.608	54.37037	1777.89	70.3	66.0
06/14/2028	22 42 18.381	-04 04 33.46	404158.104	54.25433	1774.09	61.3	76.9
06/15/2028	23 24 58.510	01 05 33.98	403773.444	54.30602	1775.78	51.9	87.8
06/16/2028	00 08 00.139	06 14 54.84	402121.325	54.52916	1783.08	42.4	98.8
06/17/2028	00 52 23.732	11 14 19.26	399280.099	54.91722	1795.76	33.0	109.8
06/18/2028	01 39 08.249	15 52 58.53	395426.476	55.45246	1813.27	24.1	121.2
06/19/2028	02 29 05.547	19 57 25.60	390827.205	56.10508	1834.60	16.0	132.8
06/20/2028	03 22 49.163	23 11 16.32	385821.157	56.83311	1858.41	9.2	144.7
06/21/2028	04 20 17.803	25 16 17.07	380790.628	57.58399	1882.96	4.0	157.0
06/22/2028	05 20 41.079	25 55 38.09	376122.488	58.29875	1906.33	0.8	169.6
06/23/2028	06 22 22.565	24 58 43.74	372163.046	58.91905	1926.61	0.1	176.6
06/24/2028	07 23 29.158	22 25 19.71	369174.514	59.39605	1942.20	2.0	163.7
06/25/2028	08 22 32.331	18 26 15.36	367303.530	59.69864	1952.10	6.6	150.3
06/26/2028	09 18 53.778	13 20 22.65	366571.035	59.81794	1956.00	13.5	136.8
06/27/2028	10 12 44.715	07 30 10.17	366887.072	59.76641	1954.31	22.6	123.3
06/28/2028	11 04 49.861	01 18 16.43	368085.889	59.57174	1947.95	33.0	109.9
06/29/2028	11 56 10.000	-04 54 07.99	369970.351	59.26828	1938.03	44.3	96.6
06/30/2028	12 47 48.502	-10 47 33.45	372352.854	58.88901	1925.63	55.7	83.4
07/01/2028	13 40 40.478	-16 03 48.40	375083.030	58.46032	1911.61	66.7	70.5
07/02/2028	14 35 21.679	-20 25 49.22	378057.907	58.00026	1896.57	76.7	57.8
07/03/2028	15 31 56.672	-23 38 22.00	381215.554	57.51980	1880.86	85.2	45.3
07/04/2028	16 29 50.866	-25 29 51.26	384516.948	57.02590	1864.71	92.0	32.9
07/05/2028	17 27 54.803	-25 54 41.60	387922.642	56.52520	1848.34	96.7	20.9
07/06/2028	18 24 44.679	-24 54 49.46	391370.856	56.02714	1832.06	99.4	9.0
07/07/2028	19 19 10.257	-22 39 11.12	394762.319	55.54576	1816.32	99.9	2.8
07/08/2028	20 10 34.180	-19 21 15.27	397954.937	55.10010	1801.74	98.5	14.2
07/09/2028	20 58 54.955	-15 16 02.08	400768.888	54.71319	1789.09	95.2	25.4
07/10/2028	21 44 38.605	-10 37 47.37	403000.583	54.41018	1779.19	90.2	36.5
07/11/2028	22 28 27.852	-05 38 59.09	404442.737	54.21615	1772.84	83.8	47.5
07/12/2028	23 11 14.013	-00 30 13.84	404907.465	54.15392	1770.81	76.2	58.4
07/13/2028	23 53 52.541	04 39 09.15	404249.747	54.24203	1773.69	67.7	69.2
07/14/2028	00 37 20.938	09 40 13.68	402389.248	54.49285	1781.89	58.5	80.2
07/15/2028	01 22 37.151	14 23 22.46	399328.996	54.91049	1795.55	48.9	91.3
07/16/2028	02 10 36.259	18 37 12.52	395169.448	55.48853	1814.44	39.1	102.6
07/17/2028	03 02 03.020	22 07 47.27	390116.012	56.20737	1837.95	29.5	114.2
07/18/2028	03 57 18.765	24 38 38.52	384477.261	57.03178	1864.90	20.5	126.2
07/19/2028	04 56 05.200	25 52 25.77	378650.267	57.90952	1893.60	12.5	138.6
07/20/2028	05 57 15.580	25 34 38.76	373089.699	58.77269	1921.82	6.1	151.4
07/21/2028	06 59 07.335	23 38 25.86	368259.630	59.54363	1947.03	1.8	164.7
07/22/2028	07 59 57.086	20 07 55.64	364572.281	60.14593	1966.72	0.0	178.2
07/23/2028	08 58 36.929	15 18 03.65	362325.193	60.51898	1978.92	1.1	167.8
07/24/2028	09 54 49.347	09 31 08.31	361653.848	60.63133	1982.59	5.1	153.9
07/25/2028	10 48 59.297	03 12 31.40	362515.666	60.48718	1977.88	11.7	139.9
07/26/2028	11 41 56.760	-03 12 43.35	364711.582	60.12295	1965.97	20.5	126.2
07/27/2028	12 34 40.271	-09 21 38.42	367937.567	59.59575	1948.73	30.8	112.6
07/28/2028	13 28 03.856	-14 53 56.90	371848.601	58.96888	1928.24	41.8	99.4
07/29/2028	14 22 45.641	-19 32 05.37	376116.558	58.29967	1906.36	53.0	86.5
07/30/2028	15 18 57.116	-23 01 28.93	380469.785	57.63255	1884.55	63.8	73.9
07/31/2028	16 16 15.739	-25 11 26.16	384710.548	56.99720	1863.77	73.7	61.6
08/01/2028	17 13 46.938	-25 56 34.44	388712.941	56.41027	1844.58	82.4	49.6
08/02/2028	18 10 19.335	-25 17 54.56	392407.086	55.87917	1827.22	89.5	37.9
08/03/2028	19 04 47.887	-23 22 36.84	395756.239	55.40625	1811.75	94.8	26.3
08/04/2028	19 56 32.620	-20 22 19.63	398732.778	54.99260	1798.23	98.3	15.0
08/05/2028	20 45 24.709	-16 30 48.42	401297.867	54.64106	1786.74	99.9	4.1
08/06/2028	21 31 41.639	-12 01 55.60	403388.105	54.35790	1777.48	99.6	7.7

Moon - Apparent data

Date	Right Ascension	Declination	Distance	Parallax	Diameter	Illum.	Phase
0h TT	h m s	d m s	km	arc min	arc sec	%	deg.
08/07/2028	22 15 58.310	-07 08 30.34	404910.844	54.15347	1770.79	97.4	18.5
08/08/2028	22 58 59.301	-02 01 56.79	405748.384	54.04167	1767.14	93.6	29.4
08/09/2028	23 41 34.001	03 07 34.19	405769.987	54.03880	1767.04	88.2	40.2
08/10/2028	00 24 34.097	08 10 32.82	404849.865	54.16162	1771.06	81.4	51.0
08/11/2028	01 08 52.028	12 57 26.32	402888.980	54.42525	1779.68	73.5	61.9
08/12/2028	01 55 18.747	17 17 49.70	399838.475	54.84052	1793.26	64.6	73.0
08/13/2028	02 44 38.970	20 59 41.49	395722.560	55.41096	1811.91	55.0	84.2
08/14/2028	03 37 22.381	23 49 03.88	390658.479	56.12931	1835.40	45.0	95.8
08/15/2028	04 33 31.234	25 30 39.38	384870.442	56.97352	1863.00	34.8	107.7
08/16/2028	05 32 29.594	25 49 55.73	378693.250	57.90295	1893.39	25.0	120.0
08/17/2028	06 33 04.458	24 36 35.35	372560.170	58.85624	1924.55	16.0	132.8
08/18/2028	07 33 45.777	21 48 15.88	366969.650	59.75296	1953.87	8.5	146.0
08/19/2028	08 33 17.618	17 32 29.39	362428.506	60.50173	1978.35	3.1	159.6
08/20/2028	09 31 01.501	12 06 02.20	359376.682	61.01556	1995.15	0.4	173.2
08/21/2028	10 27 00.535	05 52 14.75	358109.274	61.23153	2002.22	0.6	171.4
08/22/2028	11 21 48.661	-00 42 17.02	358719.428	61.12737	1998.81	3.8	157.5
08/23/2028	12 16 14.924	-07 10 39.70	361083.256	60.72716	1985.73	9.8	143.4
08/24/2028	13 11 08.491	-13 07 55.26	364893.052	60.09305	1964.99	18.1	129.7
08/25/2028	14 07 05.279	-18 12 29.46	369725.915	59.30746	1939.31	27.9	116.3
08/26/2028	15 04 16.187	-22 07 14.77	375123.548	58.45401	1911.40	38.5	103.3
08/27/2028	16 02 19.627	-24 40 29.81	380660.780	57.60363	1883.60	49.4	90.7
08/28/2028	17 00 23.735	-25 46 55.61	385990.407	56.80819	1857.59	60.0	78.5
08/29/2028	17 57 21.176	-25 27 57.32	390862.557	56.10001	1834.44	69.8	66.7
08/30/2028	18 52 11.030	-23 50 55.67	395123.214	55.49502	1814.66	78.6	55.1
08/31/2028	19 44 16.198	-21 07 12.52	398698.708	54.99730	1798.38	86.1	43.8
09/01/2028	20 33 28.918	-17 29 57.41	401572.642	54.60367	1785.51	92.1	32.7
09/02/2028	21 20 06.144	-13 12 24.01	403760.516	54.30776	1775.84	96.4	21.8
09/03/2028	22 04 41.107	-08 26 55.53	405286.113	54.10332	1769.15	99.0	11.2
09/04/2028	22 47 55.893	-03 24 51.29	406162.703	53.98654	1765.34	99.9	3.9
09/05/2028	23 30 36.637	01 43 21.72	406381.231	53.95751	1764.39	98.9	11.8
09/06/2028	00 13 30.906	06 47 44.76	405906.712	54.02059	1766.45	96.3	22.3
09/07/2028	00 57 26.091	11 38 17.88	404683.105	54.18394	1771.79	91.9	33.1
09/08/2028	01 43 07.437	16 04 29.31	402645.996	54.45810	1780.75	86.0	43.9
09/09/2028	02 31 14.369	19 54 49.59	399741.655	54.85380	1793.69	78.7	55.0
09/10/2028	03 22 14.108	22 56 41.88	395950.414	55.37907	1810.87	70.2	66.2
09/11/2028	04 16 12.884	24 56 47.05	391311.839	56.03559	1832.33	60.7	77.7
09/12/2028	05 12 48.033	25 42 22.49	385948.507	56.81436	1857.79	50.5	89.5
09/13/2028	06 11 07.471	25 03 35.35	380084.236	57.69102	1886.46	39.9	101.6
09/14/2028	07 10 01.942	22 55 54.43	374051.265	58.62159	1916.88	29.5	114.2
09/15/2028	08 08 27.149	19 21 59.36	368279.670	59.54039	1946.92	19.7	127.3
09/16/2028	09 05 44.198	14 32 06.39	363262.613	60.36279	1973.81	11.3	140.8
09/17/2028	10 01 48.060	08 43 20.40	359494.999	60.99548	1994.50	4.8	154.6
09/18/2028	10 57 03.287	02 18 07.16	357392.197	61.35440	2006.23	1.0	168.3
09/19/2028	11 52 12.526	-04 17 34.44	357207.630	61.38610	2007.27	0.3	174.2
09/20/2028	12 48 02.684	-10 36 19.59	358975.907	61.08369	1997.38	2.5	161.7
09/21/2028	13 45 10.346	-16 11 44.26	362503.445	60.48922	1977.95	7.6	147.9
09/22/2028	14 43 47.271	-20 41 02.67	367410.369	59.68128	1951.53	15.0	134.4
09/23/2028	15 43 29.670	-23 47 40.30	373207.004	58.75422	1921.22	24.1	121.3
09/24/2028	16 43 18.627	-25 23 12.96	379378.343	57.79837	1889.97	34.1	108.6
09/25/2028	17 41 56.491	-25 28 04.49	385454.189	56.88723	1860.18	44.4	96.4
09/26/2028	18 38 12.991	-24 10 08.09	391054.251	56.07250	1833.54	54.7	84.6
09/27/2028	19 31 26.105	-21 41 56.83	395907.971	55.38501	1811.06	64.5	73.1
09/28/2028	20 21 27.978	-18 17 41.52	399854.433	54.83833	1793.19	73.5	61.9
09/29/2028	21 08 38.463	-14 11 03.86	402828.919	54.43337	1779.94	81.5	51.0
09/30/2028	21 53 34.576	-09 34 22.66	404841.795	54.16270	1771.10	88.2	40.1

Moon - Apparent data

Date	Right Ascension	Declination	Distance	Parallax	Diameter	Illum.	Phase
0h TT	h m s	d m s	km	arc min	arc sec	%	deg.
10/01/2028	22 37 01.711	-04 38 34.34	405953.971	54.01430	1766.24	93.6	29.4
10/02/2028	23 19 48.234	00 26 18.80	406252.156	53.97465	1764.95	97.3	18.8
10/03/2028	00 02 42.677	05 30 31.82	405826.494	54.03127	1766.80	99.4	8.9
10/04/2028	00 46 32.064	10 24 02.02	404752.902	54.17460	1771.48	99.7	6.0
10/05/2028	01 31 59.927	14 56 01.25	403082.077	54.39918	1778.83	98.2	15.3
10/06/2028	02 19 42.740	18 54 40.97	400836.654	54.70394	1788.79	95.0	26.0
10/07/2028	03 10 04.037	22 07 18.90	398017.156	55.09149	1801.46	89.9	37.0
10/08/2028	04 03 06.847	24 20 59.29	394616.321	55.56631	1816.99	83.3	48.3
10/09/2028	04 58 27.676	25 23 55.09	390640.250	56.13193	1835.48	75.2	59.8
10/10/2028	05 55 17.522	25 07 22.19	386133.626	56.78712	1856.90	65.8	71.6
10/11/2028	06 52 33.762	23 27 29.27	381205.140	57.52137	1880.91	55.5	83.7
10/12/2028	07 49 19.674	20 26 17.32	376048.031	58.31029	1906.70	44.7	96.1
10/13/2028	08 45 01.913	16 11 32.25	370949.419	59.11183	1932.91	33.7	109.0
10/14/2028	09 39 37.983	10 55 57.89	366281.479	59.86523	1957.54	23.3	122.2
10/15/2028	10 33 33.265	04 56 30.89	362468.644	60.49503	1978.14	14.2	135.8
10/16/2028	11 27 32.080	-01 26 06.33	359929.740	60.92180	1992.09	6.9	149.6
10/17/2028	12 22 26.343	-07 47 53.53	359002.995	61.07908	1997.23	2.1	163.3
10/18/2028	13 19 02.362	-13 42 37.68	359872.451	60.93150	1992.41	0.2	174.7
10/19/2028	14 17 45.013	-18 44 06.42	362519.803	60.48649	1977.86	1.3	166.8
10/20/2028	15 18 21.544	-22 29 34.82	366719.674	59.79369	1955.21	5.2	153.7
10/21/2028	16 19 53.728	-24 43 45.00	372079.838	58.93222	1927.04	11.4	140.6
10/22/2028	17 20 49.604	-25 21 42.29	378110.934	57.99213	1896.30	19.3	127.8
10/23/2028	18 19 34.534	-24 29 01.09	384302.819	57.05767	1865.75	28.5	115.5
10/24/2028	19 15 03.279	-22 18 43.63	390188.866	56.19688	1837.60	38.2	103.7
10/25/2028	20 06 53.928	-19 06 58.28	395389.205	55.45768	1813.44	48.1	92.2
10/26/2028	20 55 22.200	-15 09 29.79	399632.461	54.86879	1794.18	57.8	81.0
10/27/2028	21 41 07.444	-10 39 58.28	402760.102	54.44267	1780.25	67.1	70.0
10/28/2028	22 25 00.206	-05 49 48.53	404718.510	54.17920	1771.63	75.6	59.2
10/29/2028	23 07 54.589	-00 48 48.29	405543.071	54.06904	1768.03	83.2	48.4
10/30/2028	23 50 44.511	04 13 56.25	405337.371	54.09648	1768.93	89.6	37.7
10/31/2028	00 34 21.857	09 09 05.31	404249.737	54.24203	1773.69	94.6	27.0
11/01/2028	01 19 34.583	13 46 19.93	402449.028	54.48475	1781.63	98.0	16.3
11/02/2028	02 07 03.152	17 53 54.20	400101.791	54.80442	1792.08	99.7	6.4
11/03/2028	02 57 14.265	21 18 37.60	397353.232	55.18355	1804.47	99.5	8.1
11/04/2028	03 50 12.345	23 46 42.57	394314.640	55.60883	1818.38	97.4	18.7
11/05/2028	04 45 32.269	25 05 26.52	391059.570	56.07174	1833.51	93.3	30.1
11/06/2028	05 42 19.819	25 05 32.77	387630.037	56.56788	1849.74	87.3	41.8
11/07/2028	06 39 24.722	23 43 18.27	384052.315	57.09489	1866.97	79.5	53.8
11/08/2028	07 35 42.759	21 01 25.27	380359.907	57.64920	1885.09	70.3	66.0
11/09/2028	08 30 35.499	17 08 16.88	376619.311	58.22183	1903.81	60.0	78.5
11/10/2028	09 23 58.365	12 16 19.54	372952.656	58.79429	1922.53	48.9	91.2
11/11/2028	10 16 17.136	06 40 38.09	369550.399	59.33563	1940.23	37.7	104.2
11/12/2028	11 08 18.738	00 38 19.84	366667.557	59.80219	1955.48	26.9	117.5
11/13/2028	12 01 00.932	-05 31 18.20	364599.099	60.14150	1966.58	17.2	131.0
11/14/2028	12 55 21.492	-11 26 33.36	363634.851	60.30099	1971.79	9.2	144.6
11/15/2028	13 52 04.796	-16 43 40.90	364001.443	60.24026	1969.81	3.6	158.2
11/16/2028	14 51 24.590	-20 58 44.64	365805.967	59.94306	1960.09	0.6	171.3
11/17/2028	15 52 47.544	-23 51 15.98	368998.812	59.42434	1943.13	0.4	173.0
11/18/2028	16 54 50.561	-25 08 49.91	373368.275	58.72884	1920.39	2.8	160.7
11/19/2028	17 55 43.422	-24 50 16.30	378568.407	57.92204	1894.01	7.6	148.0
11/20/2028	18 53 48.553	-23 05 07.61	384170.186	57.07738	1866.39	14.2	135.7
11/21/2028	19 48 11.699	-20 09 35.28	389720.687	56.26439	1839.81	22.2	123.8
11/22/2028	20 38 47.336	-16 21 34.29	394796.648	55.54093	1816.16	31.1	112.2
11/23/2028	21 26 05.738	-11 57 21.12	399044.687	54.94962	1796.82	40.5	101.0
11/24/2028	22 10 56.544	-07 10 19.50	402206.244	54.51765	1782.70	50.0	90.0

Moon - Apparent data

Date	Right Ascension	Declination	Distance	Parallax	Diameter	Illum.	Phase
Oh TT	h m s	d m s	km	arc min	arc sec	%	deg.
11/25/2028	22 54 17.033	-02 11 15.57	404128.912	54.25825	1774.22	59.4	79.1
11/26/2028	23 37 05.985	02 50 44.89	404767.056	54.17270	1771.42	68.5	68.3
11/27/2028	00 20 21.012	07 47 07.36	404174.291	54.25216	1774.02	76.8	57.5
11/28/2028	01 04 56.881	12 28 42.15	402489.605	54.47926	1781.45	84.3	46.7
11/29/2028	01 51 42.666	16 44 50.68	399918.130	54.82959	1792.90	90.6	35.6
11/30/2028	02 41 15.968	20 22 57.36	396707.418	55.27339	1807.41	95.5	24.4
12/01/2028	03 33 53.551	23 08 48.70	393120.460	55.77776	1823.90	98.7	13.1
12/02/2028	04 29 20.728	24 48 02.74	389407.781	56.30961	1841.29	99.9	3.1
12/03/2028	05 26 46.488	25 08 51.31	385782.156	56.83886	1858.60	99.0	11.3
12/04/2028	06 24 52.780	24 05 06.01	382400.395	57.34156	1875.03	95.9	23.3
12/05/2028	07 22 18.576	21 38 15.23	379356.290	57.80173	1890.08	90.7	35.6
12/06/2028	08 18 06.411	17 57 05.37	376687.019	58.21137	1903.47	83.4	48.2
12/07/2028	09 11 56.705	13 15 31.60	374392.079	58.56822	1915.14	74.3	60.9
12/08/2028	10 04 06.346	07 50 06.82	372460.357	58.87201	1925.07	64.0	73.8
12/09/2028	10 55 18.459	01 58 21.57	370898.294	59.11998	1933.18	52.8	86.8
12/10/2028	11 46 30.796	-04 01 46.43	369751.184	59.30341	1939.18	41.4	99.9
12/11/2028	12 38 45.345	-09 51 35.44	369110.783	59.40631	1942.54	30.4	113.1
12/12/2028	13 32 57.585	-15 11 14.98	369105.373	59.40718	1942.57	20.4	126.3
12/13/2028	14 29 42.721	-19 40 01.37	369872.865	59.28390	1938.54	11.9	139.6
12/14/2028	15 28 59.089	-22 57 59.97	371522.614	59.02062	1929.93	5.6	152.7
12/15/2028	16 29 56.108	-24 49 29.66	374095.881	58.61460	1916.65	1.5	165.8
12/16/2028	17 31 00.210	-25 07 04.66	377536.290	58.08041	1899.19	0.0	177.8
12/17/2028	18 30 24.457	-23 53 49.17	381679.060	57.44994	1878.58	1.0	168.6
12/18/2028	19 26 46.283	-21 21 56.33	386261.842	56.76827	1856.29	4.2	156.4
12/19/2028	20 19 29.094	-17 48 39.87	390953.462	56.08696	1834.01	9.3	144.5
12/20/2028	21 08 40.309	-13 31 53.09	395392.635	55.45720	1813.42	16.0	132.9
12/21/2028	21 54 56.816	-08 47 26.02	399228.168	54.92436	1796.00	23.8	121.6
12/22/2028	22 39 10.461	-03 48 14.59	402154.302	54.52469	1782.93	32.4	110.6
12/23/2028	23 22 18.723	01 15 16.07	403937.980	54.28390	1775.06	41.6	99.7
12/24/2028	00 05 20.137	06 14 13.35	404437.297	54.21688	1772.87	51.0	88.8
12/25/2028	00 49 12.196	11 00 07.90	403611.736	54.32778	1776.49	60.4	78.0
12/26/2028	01 34 49.369	15 23 46.15	401524.969	54.61015	1785.73	69.4	67.1
12/27/2028	02 22 59.119	19 14 15.61	398340.523	55.04676	1800.00	77.9	56.0
12/28/2028	03 14 14.232	22 18 40.52	394309.919	55.60949	1818.40	85.5	44.7
12/29/2028	04 08 41.564	24 22 35.69	389752.494	56.25980	1839.66	91.9	33.1
12/30/2028	05 05 51.490	25 12 05.40	385026.451	56.95043	1862.24	96.6	21.1
12/31/2028	06 04 37.226	24 37 00.12	380492.230	57.62915	1884.43	99.4	8.8
01/01/2029	07 03 31.561	22 34 17.77	376471.936	58.24463	1904.56	99.9	3.8

Lunations for 2028

Lunation	New Moon		First Quarter		Full Moon		Last Quarter	
	TT	TT	TT	TT	TT	TT	TT	TT
1299	12/27/2027	20:13:29	01/05/2028	01:41:38	01/12/2028	04:04:14	01/18/2028	19:27:08
1300	01/26/2028	15:13:40	02/03/2028	19:11:40	02/10/2028	15:04:56	02/17/2028	08:09:09
1301	02/25/2028	10:38:35	03/04/2028	09:03:34	03/11/2028	01:07:14	03/17/2028	23:24:01
1302	03/26/2028	04:32:29	04/02/2028	19:16:39	04/09/2028	10:27:47	04/16/2028	16:38:05
1303	04/24/2028	19:48:06	05/02/2028	02:26:55	05/08/2028	19:50:06	05/16/2028	10:44:16
1304	05/24/2028	08:17:28	05/31/2028	07:37:47	06/07/2028	06:09:58	06/15/2028	04:28:34
1305	06/22/2028	18:28:43	06/29/2028	12:11:47	07/06/2028	18:11:59	07/14/2028	20:57:44
1306	07/22/2028	03:02:52	07/28/2028	17:41:19	08/05/2028	08:10:59	08/13/2028	11:46:29
1307	08/20/2028	10:45:01	08/27/2028	01:37:03	09/03/2028	23:48:45	09/12/2028	00:46:56
1308	09/18/2028	18:24:55	09/25/2028	13:11:12	10/03/2028	16:26:09	10/11/2028	11:58:02
1309	10/18/2028	02:57:58	10/25/2028	04:54:21	11/02/2028	09:18:31	11/09/2028	21:27:02
1310	11/16/2028	13:19:11	11/24/2028	00:15:49	12/02/2028	01:41:24	12/09/2028	05:40:06
1311	12/16/2028	02:07:29	12/23/2028	21:46:07	12/31/2028	16:49:41	01/07/2029	13:27:33

The times listed above are based on the traditional definitions using the difference in ecliptic longitude of the Sun and the Moon.

The times listed below are non-traditional - they are based on the apparent angles from the Moon to the Sun and to the Earth, i.e. the apparent phase angle of the Moon.

Lunation	New Moon		First Quarter		Full Moon		Last Quarter	
	TT	TT	TT	TT	TT	TT	TT	TT
1299	12/27/2027	20:40:04	01/05/2028	01:22:34	01/12/2028	04:15:24	01/18/2028	19:44:46
1300	01/26/2028	15:08:59	02/03/2028	18:53:49	02/10/2028	14:49:58	02/17/2028	08:27:47
1301	02/25/2028	10:06:43	03/04/2028	08:46:56	03/11/2028	00:43:50	03/17/2028	23:43:43
1302	03/26/2028	04:09:06	04/02/2028	19:01:02	04/09/2028	10:21:46	04/16/2028	16:58:40
1303	04/24/2028	19:56:28	05/02/2028	02:11:59	05/08/2028	20:10:26	05/16/2028	11:05:15
1304	05/24/2028	08:45:40	05/31/2028	07:23:09	06/07/2028	06:39:31	06/15/2028	04:49:23
1305	06/22/2028	18:48:00	06/29/2028	11:57:03	07/06/2028	18:22:20	07/14/2028	21:17:55
1306	07/22/2028	02:56:38	07/28/2028	17:26:03	08/05/2028	07:50:31	08/13/2028	12:05:46
1307	08/20/2028	10:21:03	08/27/2028	01:20:51	09/03/2028	23:17:51	09/12/2028	01:05:15
1308	09/18/2028	18:06:45	09/25/2028	12:53:44	10/03/2028	16:18:29	10/11/2028	12:15:29
1309	10/18/2028	03:04:07	10/25/2028	04:35:33	11/02/2028	09:43:04	11/09/2028	21:43:52
1310	11/16/2028	13:44:59	11/23/2028	23:55:59	12/02/2028	02:11:22	12/09/2028	05:56:35
1311	12/16/2028	02:25:58	12/23/2028	21:25:54	12/31/2028	16:54:34	01/07/2029	13:44:03

The times below are based on the visual Sun-Moon separation angle as seen from the Earth.

Lunation	New Moon		First Quarter		Full Moon		Last Quarter	
	TT	TT	TT	TT	TT	TT	TT	TT
1299	12/27/2027	20:40:04	01/05/2028	01:41:38	01/12/2028	04:14:14	01/18/2028	19:27:08
1300	01/26/2028	15:08:59	02/03/2028	19:11:40	02/10/2028	14:48:48	02/17/2028	08:09:09
1301	02/25/2028	10:06:43	03/04/2028	09:03:34	03/11/2028	00:42:41	03/17/2028	23:24:01
1302	03/26/2028	04:09:06	04/02/2028	19:16:39	04/09/2028	10:20:45	04/16/2028	16:38:05
1303	04/24/2028	19:56:27	05/02/2028	02:26:55	05/08/2028	20:09:11	05/16/2028	10:44:16
1304	05/24/2028	08:45:40	05/31/2028	07:37:47	06/07/2028	06:38:13	06/15/2028	04:28:34
1305	06/22/2028	18:48:00	06/29/2028	12:11:47	07/06/2028	18:20:57	07/14/2028	20:57:44
1306	07/22/2028	02:56:38	07/28/2028	17:41:19	08/05/2028	07:49:05	08/13/2028	11:46:29
1307	08/20/2028	10:21:03	08/27/2028	01:37:03	09/03/2028	23:16:21	09/12/2028	00:46:56
1308	09/18/2028	18:06:45	09/25/2028	13:11:12	10/03/2028	16:16:59	10/11/2028	11:58:02
1309	10/18/2028	03:04:07	10/25/2028	04:54:21	11/02/2028	09:41:37	11/09/2028	21:27:02
1310	11/16/2028	13:44:59	11/24/2028	00:15:49	12/02/2028	02:09:58	12/09/2028	05:40:06
1311	12/16/2028	02:25:58	12/23/2028	21:46:08	12/31/2028	16:53:15	01/07/2029	13:27:32

LUNAR PERIGEE AND APOGEE						
Date	Time	Apparent Distance	Phase	Date	Time	True Distance
	TT	km	deg		TT	km
01/01/2028	04:00:26	405661.968	47.4	01/01/2028	03:53:07	405631.887
01/13/2028	07:53:27	359035.181	196.2	01/13/2028	07:46:42	359045.390
01/28/2028	15:46:20	406402.731	21.9	01/28/2028	15:32:23	406387.259
02/10/2028	20:03:08	356676.894	183.0	02/10/2028	19:56:48	356679.085
02/24/2028	16:45:52	406555.860	352.0	02/24/2028	16:29:06	406561.086
03/10/2028	08:29:27	357603.051	170.1	03/10/2028	08:22:56	357597.449
03/22/2028	23:34:08	406069.928	324.9	03/22/2028	23:23:48	406092.635
04/07/2028	16:15:09	361374.494	155.5	04/07/2028	16:07:52	361360.190
04/19/2028	15:19:15	405069.153	302.1	04/19/2028	15:13:59	405102.727
05/05/2028	10:40:22	366557.300	134.6	05/05/2028	10:31:52	366532.010
05/17/2028	09:57:56	404240.661	280.5	05/17/2028	09:56:13	404279.538
05/31/2028	06:37:02	369796.689	89.4	05/31/2028	06:36:54	369760.535
06/14/2028	04:45:49	404182.982	259.2	06/14/2028	04:47:17	404221.762
06/26/2028	04:16:18	366554.595	45.5	06/26/2028	04:24:29	366529.020
07/11/2028	22:21:18	404910.102	237.7	07/11/2028	22:26:24	404943.398
07/23/2028	22:11:41	361649.455	24.9	07/23/2028	22:18:52	361634.757
08/08/2028	12:43:54	405869.809	215.0	08/08/2028	12:53:56	405892.242
08/21/2028	04:07:43	358081.273	10.3	08/21/2028	04:14:14	358075.404
09/04/2028	19:48:18	406391.708	189.1	09/04/2028	20:04:05	406397.462
09/18/2028	14:14:54	357043.750	357.5	09/18/2028	14:21:16	357045.825
10/01/2028	21:25:26	406256.355	160.4	10/01/2028	21:39:30	406242.292
10/17/2028	00:34:27	359002.476	344.4	10/17/2028	00:41:09	359012.585
10/29/2028	06:48:11	405583.574	134.7	10/29/2028	06:55:52	405554.396
11/14/2028	05:47:15	363595.072	328.3	11/14/2028	05:54:57	363614.530
11/26/2028	00:07:07	404767.071	111.7	11/26/2028	00:10:18	404729.192
12/11/2028	12:23:06	369019.806	300.2	12/11/2028	12:31:48	369051.967
12/23/2028	21:01:49	404447.511	89.7	12/23/2028	21:01:44	404406.831

Note: the phase is calculated as Lunar Ecliptic Longitude minus Solar Ecliptic Longitude.

Mercury - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
12/31/2027	19	27	56.711	-24	05	45.13	1.3330721	0.4144914	5.05	-0.8	27.1	11.2
01/01/2028	19	34	54.105	-23	50	29.05	1.3200784	0.4094172	5.10	-0.8	28.9	11.7
01/02/2028	19	41	49.102	-23	33	40.83	1.3062838	0.4041764	5.15	-0.8	30.9	12.3
01/03/2028	19	48	41.190	-23	15	21.21	1.2916674	0.3987858	5.21	-0.8	32.9	12.9
01/04/2028	19	55	29.791	-22	55	31.31	1.2762083	0.3932644	5.27	-0.8	35.0	13.5
01/05/2028	20	02	14.255	-22	34	12.72	1.2598868	0.3876336	5.34	-0.8	37.3	14.0
01/06/2028	20	08	53.849	-22	11	27.56	1.2426845	0.3819170	5.42	-0.8	39.7	14.6
01/07/2028	20	15	27.743	-21	47	18.61	1.2245853	0.3761413	5.50	-0.8	42.2	15.1
01/08/2028	20	21	54.997	-21	21	49.37	1.2055765	0.3703356	5.58	-0.8	44.9	15.6
01/09/2028	20	28	14.547	-20	55	04.22	1.1856499	0.3645326	5.68	-0.8	47.7	16.1
01/10/2028	20	34	25.184	-20	27	08.54	1.1648032	0.3587676	5.78	-0.8	50.8	16.6
01/11/2028	20	40	25.541	-19	58	08.88	1.1430420	0.3530796	5.89	-0.8	54.0	17.1
01/12/2028	20	46	14.074	-19	28	13.10	1.1203813	0.3475104	6.01	-0.8	57.4	17.5
01/13/2028	20	51	49.046	-18	57	30.56	1.0968480	0.3421053	6.14	-0.8	61.0	17.9
01/14/2028	20	57	08.513	-18	26	12.29	1.0724835	0.3369120	6.28	-0.8	64.9	18.2
01/15/2028	21	02	10.314	-17	54	31.14	1.0473462	0.3319805	6.43	-0.8	69.0	18.5
01/16/2028	21	06	52.066	-17	22	41.95	1.0215141	0.3273626	6.59	-0.8	73.3	18.7
01/17/2028	21	11	11.170	-16	51	01.64	0.9950879	0.3231106	6.76	-0.7	77.8	18.8
01/18/2028	21	15	04.828	-16	19	49.27	0.9681932	0.3192762	6.95	-0.7	82.6	18.8
01/19/2028	21	18	30.081	-15	49	25.93	0.9409825	0.3159096	7.15	-0.6	87.7	18.7
01/20/2028	21	21	23.870	-15	20	14.59	0.9136362	0.3130572	7.37	-0.5	93.0	18.5
01/21/2028	21	23	43.124	-14	52	39.73	0.8863627	0.3107607	7.59	-0.3	98.5	18.2
01/22/2028	21	25	24.881	-14	27	06.76	0.8593970	0.3090551	7.83	-0.2	104.3	17.7
01/23/2028	21	26	26.442	-14	04	01.31	0.8329974	0.3079671	8.08	0.1	110.3	17.0
01/24/2028	21	26	45.560	-13	43	48.25	0.8074408	0.3075143	8.33	0.3	116.5	16.2
01/25/2028	21	26	20.654	-13	26	50.45	0.7830157	0.3077042	8.59	0.7	122.8	15.2
01/26/2028	21	25	11.035	-13	13	27.56	0.7600135	0.3085334	8.86	1.1	129.3	14.1
01/27/2028	21	23	17.138	-13	03	54.51	0.7387190	0.3099887	9.11	1.5	135.9	12.7
01/28/2028	21	20	40.709	-12	58	20.29	0.7193988	0.3120468	9.36	2.1	142.5	11.2
01/29/2028	21	17	24.940	-12	56	46.80	0.7022906	0.3146759	9.58	2.7	149.1	9.5
01/30/2028	21	13	34.501	-12	59	08.27	0.6875923	0.3178369	9.79	3.4	155.5	7.8
01/31/2028	21	09	15.448	-13	05	11.11	0.6754529	0.3214850	9.96	4.1	161.6	6.1
02/01/2028	21	04	34.999	-13	14	34.60	0.6659659	0.3255716	10.11	4.8	166.6	4.5
02/02/2028	20	59	41.180	-13	26	52.12	0.6591656	0.3300453	10.21	5.2	169.4	3.6
02/03/2028	20	54	42.386	-13	41	32.93	0.6550282	0.3348538	10.27	5.0	168.3	3.8
02/04/2028	20	49	46.905	-13	58	04.28	0.6534748	0.3399451	10.30	4.5	164.3	5.2
02/05/2028	20	45	02.469	-14	15	53.39	0.6543796	0.3452684	10.28	3.9	159.2	6.9
02/06/2028	20	40	35.889	-14	34	29.21	0.6575786	0.3507749	10.23	3.3	153.8	8.8
02/07/2028	20	36	32.808	-14	53	23.68	0.6628810	0.3564184	10.15	2.8	148.5	10.7
02/08/2028	20	32	57.583	-15	12	12.51	0.6700790	0.3621557	10.04	2.3	143.2	12.5
02/09/2028	20	29	53.287	-15	30	35.41	0.6789583	0.3679466	9.91	1.9	138.2	14.2
02/10/2028	20	27	21.799	-15	48	15.96	0.6893057	0.3737542	9.76	1.6	133.4	15.8
02/11/2028	20	25	23.966	-16	05	01.28	0.7009159	0.3795449	9.60	1.3	128.9	17.3
02/12/2028	20	23	59.778	-16	20	41.50	0.7135955	0.3852882	9.43	1.0	124.6	18.6
02/13/2028	20	23	08.562	-16	35	09.27	0.7271666	0.3909563	9.26	0.9	120.5	19.8
02/14/2028	20	22	49.152	-16	48	19.25	0.7414675	0.3965246	9.08	0.7	116.7	20.9
02/15/2028	20	23	00.041	-17	00	07.67	0.7563539	0.4019705	8.90	0.6	113.0	21.9
02/16/2028	20	23	39.512	-17	10	31.96	0.7716980	0.4072744	8.72	0.4	109.6	22.8
02/17/2028	20	24	45.731	-17	19	30.43	0.7873881	0.4124183	8.55	0.4	106.4	23.6
02/18/2028	20	26	16.830	-17	27	02.08	0.8033270	0.4173866	8.38	0.3	103.3	24.2
02/19/2028	20	28	10.961	-17	33	06.34	0.8194312	0.4221652	8.21	0.2	100.5	24.8
02/20/2028	20	30	26.334	-17	37	43.02	0.8356289	0.4267417	8.05	0.2	97.7	25.3
02/21/2028	20	33	01.244	-17	40	52.16	0.8518590	0.4311050	7.90	0.1	95.1	25.7
02/22/2028	20	35	54.086	-17	42	33.98	0.8680699	0.4352454	7.75	0.1	92.6	26.1
02/23/2028	20	39	03.363	-17	42	48.80	0.8842178	0.4391545	7.61	0.1	90.3	26.4

Mercury - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
02/24/2028	20	42	27.688	-17	41	37.06	0.9002662	0.4428246	7.48	0.1	88.0	26.6
02/25/2028	20	46	05.784	-17	38	59.23	0.9161845	0.4462492	7.35	0.1	85.8	26.7
02/26/2028	20	49	56.481	-17	34	55.84	0.9319476	0.4494224	7.22	0.0	83.7	26.8
02/27/2028	20	53	58.707	-17	29	27.44	0.9475345	0.4523392	7.10	0.0	81.8	26.9
02/28/2028	20	58	11.489	-17	22	34.59	0.9629282	0.4549952	6.99	0.0	79.8	26.9
02/29/2028	21	02	33.938	-17	14	17.89	0.9781150	0.4573865	6.88	0.0	78.0	26.9
03/01/2028	21	07	05.250	-17	04	37.91	0.9930836	0.4595100	6.78	0.0	76.2	26.8
03/02/2028	21	11	44.696	-16	53	35.26	1.0078253	0.4613628	6.68	0.0	74.5	26.7
03/03/2028	21	16	31.616	-16	41	10.52	1.0223331	0.4629425	6.58	0.0	72.8	26.5
03/04/2028	21	21	25.415	-16	27	24.30	1.0366017	0.4642473	6.49	-0.0	71.1	26.3
03/05/2028	21	26	25.555	-16	12	17.19	1.0506268	0.4652757	6.41	-0.0	69.5	26.1
03/06/2028	21	31	31.554	-15	55	49.76	1.0644053	0.4660263	6.32	-0.0	68.0	25.9
03/07/2028	21	36	42.979	-15	38	02.60	1.0779349	0.4664984	6.24	-0.0	66.5	25.6
03/08/2028	21	41	59.443	-15	18	56.28	1.0912135	0.4666914	6.17	-0.0	65.0	25.3
03/09/2028	21	47	20.603	-14	58	31.35	1.1042397	0.4666051	6.09	-0.1	63.6	25.0
03/10/2028	21	52	46.157	-14	36	48.34	1.1170120	0.4662397	6.02	-0.1	62.2	24.6
03/11/2028	21	58	15.840	-14	13	47.80	1.1295288	0.4655954	5.96	-0.1	60.8	24.3
03/12/2028	22	03	49.424	-13	49	30.25	1.1417885	0.4646731	5.89	-0.1	59.5	23.9
03/13/2028	22	09	26.711	-13	23	56.23	1.1537889	0.4634738	5.83	-0.1	58.1	23.4
03/14/2028	22	15	07.530	-12	57	06.30	1.1655276	0.4619988	5.77	-0.1	56.8	23.0
03/15/2028	22	20	51.737	-12	29	01.02	1.1770017	0.4602501	5.72	-0.1	55.5	22.5
03/16/2028	22	26	39.214	-11	59	40.97	1.1882074	0.4582298	5.66	-0.2	54.2	22.0
03/17/2028	22	32	29.863	-11	29	06.75	1.1991404	0.4559404	5.61	-0.2	53.0	21.5
03/18/2028	22	38	23.611	-10	57	18.95	1.2097956	0.4533850	5.56	-0.2	51.7	21.0
03/19/2028	22	44	20.409	-10	24	18.19	1.2201668	0.4505673	5.52	-0.2	50.4	20.4
03/20/2028	22	50	20.226	-09	50	05.08	1.2302466	0.4474914	5.47	-0.3	49.0	19.8
03/21/2028	22	56	23.054	-09	14	40.28	1.2400265	0.4441621	5.43	-0.3	47.7	19.2
03/22/2028	23	02	28.905	-08	38	04.44	1.2494964	0.4405849	5.39	-0.3	46.3	18.6
03/23/2028	23	08	37.810	-08	00	18.26	1.2586448	0.4367661	5.35	-0.4	44.9	18.0
03/24/2028	23	14	49.819	-07	21	22.48	1.2674581	0.4327129	5.31	-0.4	43.5	17.3
03/25/2028	23	21	04.998	-06	41	17.89	1.2759211	0.4284334	5.27	-0.5	42.0	16.6
03/26/2028	23	27	23.430	-06	00	05.33	1.2840161	0.4239369	5.24	-0.5	40.5	15.9
03/27/2028	23	33	45.214	-05	17	45.73	1.2917232	0.4192339	5.21	-0.5	38.9	15.1
03/28/2028	23	40	10.465	-04	34	20.11	1.2990200	0.4143363	5.18	-0.6	37.3	14.4
03/29/2028	23	46	39.306	-03	49	49.63	1.3058810	0.4092574	5.15	-0.7	35.5	13.6
03/30/2028	23	53	11.877	-03	04	15.56	1.3122780	0.4040123	5.13	-0.7	33.7	12.8
03/31/2028	23	59	48.322	-02	17	39.37	1.3181793	0.3986181	5.11	-0.8	31.9	11.9
04/01/2028	00	06	28.794	-01	30	02.73	1.3235499	0.3930938	5.08	-0.9	29.9	11.1
04/02/2028	00	13	13.452	-00	41	27.56	1.3283510	0.3874607	5.07	-1.0	27.8	10.2
04/03/2028	00	20	02.452	00	08	03.96	1.3325401	0.3817427	5.05	-1.0	25.7	9.3
04/04/2028	00	26	55.951	00	58	29.26	1.3360709	0.3759664	5.04	-1.1	23.4	8.4
04/05/2028	00	33	54.096	01	49	45.40	1.3388930	0.3701612	5.03	-1.2	21.0	7.4
04/06/2028	00	40	57.023	02	41	49.00	1.3409522	0.3643596	5.02	-1.4	18.5	6.4
04/07/2028	00	48	04.848	03	34	36.13	1.3421908	0.3585971	5.01	-1.5	15.9	5.5
04/08/2028	00	55	17.659	04	28	02.28	1.3425478	0.3529128	5.01	-1.6	13.1	4.4
04/09/2028	01	02	35.507	05	22	02.25	1.3419596	0.3473487	5.02	-1.8	10.3	3.4
04/10/2028	01	09	58.396	06	16	30.11	1.3403608	0.3419499	5.02	-1.9	7.3	2.4
04/11/2028	01	17	26.264	07	11	19.07	1.3376855	0.3367643	5.03	-2.1	4.4	1.4
04/12/2028	01	24	58.986	08	06	21.51	1.3338688	0.3318419	5.05	-2.2	2.3	0.8
04/13/2028	01	32	36.329	09	01	29.07	1.3288488	0.3272346	5.06	-2.2	3.8	1.3
04/14/2028	01	40	17.975	09	56	31.99	1.3225686	0.3229945	5.09	-2.1	7.1	2.3
04/15/2028	01	48	03.503	10	51	20.01	1.3149787	0.3191734	5.12	-2.0	10.7	3.4
04/16/2028	01	55	52.367	11	45	41.97	1.3060399	0.3158213	5.15	-1.9	14.5	4.5
04/17/2028	02	03	43.903	12	39	26.01	1.2957256	0.3129847	5.19	-1.8	18.5	5.7
04/18/2028	02	11	37.324	13	32	19.78	1.2840244	0.3107049	5.24	-1.7	22.6	6.8

Mercury - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
04/19/2028	02	19	31.726	14	24	10.62	1.2709421	0.3090166	5.30	-1.6	26.8	7.9
04/20/2028	02	27	26.097	15	14	45.87	1.2565029	0.3079466	5.36	-1.5	31.0	9.0
04/21/2028	02	35	19.332	16	03	53.12	1.2407503	0.3075120	5.42	-1.4	35.3	10.1
04/22/2028	02	43	10.254	16	51	20.54	1.2237465	0.3077199	5.50	-1.3	39.7	11.2
04/23/2028	02	50	57.639	17	36	57.16	1.2055714	0.3085671	5.58	-1.3	44.0	12.2
04/24/2028	02	58	40.234	18	20	33.11	1.1863203	0.3100397	5.67	-1.2	48.3	13.3
04/25/2028	03	06	16.786	19	01	59.80	1.1661012	0.3121143	5.77	-1.1	52.6	14.2
04/26/2028	03	13	46.064	19	41	10.09	1.1450316	0.3147590	5.88	-1.0	56.9	15.1
04/27/2028	03	21	06.874	20	17	58.34	1.1232348	0.3179344	5.99	-1.0	61.1	16.0
04/28/2028	03	28	18.076	20	52	20.36	1.1008369	0.3215958	6.11	-0.9	65.2	16.8
04/29/2028	03	35	18.594	21	24	13.42	1.0779633	0.3256943	6.24	-0.8	69.2	17.5
04/30/2028	03	42	07.417	21	53	36.08	1.0547366	0.3301786	6.38	-0.7	73.1	18.2
05/01/2028	03	48	43.607	22	20	28.09	1.0312742	0.3349963	6.53	-0.6	76.9	18.9
05/02/2028	03	55	06.290	22	44	50.21	1.0076869	0.3400956	6.68	-0.5	80.6	19.4
05/03/2028	04	01	14.657	23	06	44.05	0.9840778	0.3454255	6.84	-0.4	84.2	19.9
05/04/2028	04	07	07.960	23	26	11.91	0.9605423	0.3509374	7.01	-0.3	87.8	20.3
05/05/2028	04	12	45.501	23	43	16.64	0.9371673	0.3565850	7.18	-0.2	91.2	20.7
05/06/2028	04	18	06.627	23	58	01.51	0.9140319	0.3623253	7.36	-0.1	94.6	21.0
05/07/2028	04	23	10.729	24	10	30.05	0.8912077	0.3681182	7.55	-0.0	97.9	21.2
05/08/2028	04	27	57.230	24	20	46.00	0.8687596	0.3739268	7.75	0.1	101.1	21.3
05/09/2028	04	32	25.586	24	28	53.16	0.8467461	0.3797176	7.95	0.2	104.3	21.4
05/10/2028	04	36	35.283	24	34	55.39	0.8252203	0.3854600	8.16	0.4	107.4	21.4
05/11/2028	04	40	25.838	24	38	56.50	0.8042305	0.3911266	8.37	0.5	110.5	21.3
05/12/2028	04	43	56.801	24	41	00.22	0.7838211	0.3966924	8.59	0.6	113.6	21.1
05/13/2028	04	47	07.759	24	41	10.21	0.7640334	0.4021353	8.81	0.8	116.7	20.8
05/14/2028	04	49	58.346	24	39	30.06	0.7449057	0.4074355	9.03	1.0	119.7	20.5
05/15/2028	04	52	28.247	24	36	03.24	0.7264745	0.4125752	9.26	1.1	122.7	20.1
05/16/2028	04	54	37.216	24	30	53.20	0.7087745	0.4175387	9.50	1.3	125.8	19.6
05/17/2028	04	56	25.080	24	24	03.38	0.6918396	0.4223120	9.73	1.5	128.8	19.0
05/18/2028	04	57	51.764	24	15	37.23	0.6757022	0.4268827	9.96	1.7	131.9	18.3
05/19/2028	04	58	57.298	24	05	38.36	0.6603947	0.4312399	10.19	1.9	135.0	17.6
05/20/2028	04	59	41.842	23	54	10.53	0.6459486	0.4353738	10.42	2.2	138.1	16.8
05/21/2028	05	00	05.699	23	41	17.82	0.6323948	0.4392760	10.64	2.4	141.2	15.9
05/22/2028	05	00	09.338	23	27	04.72	0.6197641	0.4429390	10.86	2.7	144.4	14.9
05/23/2028	04	59	53.405	23	11	36.22	0.6080861	0.4463561	11.07	3.0	147.5	13.8
05/24/2028	04	59	18.742	22	54	57.98	0.5973899	0.4495215	11.27	3.3	150.7	12.7
05/25/2028	04	58	26.394	22	37	16.38	0.5877032	0.4524303	11.45	3.7	153.9	11.5
05/26/2028	04	57	17.618	22	18	38.69	0.5790521	0.4550781	11.62	4.0	157.2	10.2
05/27/2028	04	55	53.882	21	59	13.07	0.5714607	0.4574611	11.78	4.4	160.4	8.9
05/28/2028	04	54	16.859	21	39	08.68	0.5649507	0.4595760	11.91	4.8	163.6	7.6
05/29/2028	04	52	28.415	21	18	35.63	0.5595407	0.4614201	12.03	5.2	166.7	6.3
05/30/2028	04	50	30.586	20	57	44.96	0.5552460	0.4629911	12.12	5.6	169.7	4.9
05/31/2028	04	48	25.548	20	36	48.52	0.5520779	0.4642870	12.19	6.0	172.5	3.7
06/01/2028	04	46	15.581	20	15	58.80	0.5500436	0.4653063	12.24	6.3	174.5	2.7
06/02/2028	04	44	03.027	19	55	28.70	0.5491456	0.4660478	12.26	6.4	174.9	2.4
06/03/2028	04	41	50.246	19	35	31.32	0.5493819	0.4665108	12.25	6.2	173.4	2.9
06/04/2028	04	39	39.568	19	16	19.60	0.5507458	0.4666947	12.22	5.8	170.9	4.0
06/05/2028	04	37	33.246	18	58	06.05	0.5532259	0.4665992	12.16	5.4	168.1	5.3
06/06/2028	04	35	33.422	18	41	02.43	0.5568065	0.4662245	12.09	5.0	165.1	6.7
06/07/2028	04	33	42.087	18	25	19.54	0.5614683	0.4655711	11.99	4.6	162.1	8.0
06/08/2028	04	32	01.061	18	11	06.90	0.5671880	0.4646396	11.87	4.2	159.0	9.4
06/09/2028	04	30	31.967	17	58	32.66	0.5739399	0.4634312	11.73	3.9	156.0	10.7
06/10/2028	04	29	16.231	17	47	43.49	0.5816954	0.4619472	11.57	3.6	153.0	11.9
06/11/2028	04	28	15.071	17	38	44.46	0.5904246	0.4601895	11.40	3.3	150.0	13.1
06/12/2028	04	27	29.508	17	31	39.11	0.6000962	0.4581603	11.21	3.0	147.1	14.2

Mercury - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Phase Solar				
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
06/13/2028	04	27	00.375	17	26	29.50	0.6106780	0.4558622	11.02	2.7	144.2	15.3
06/14/2028	04	26	48.330	17	23	16.24	0.6221378	0.4532982	10.82	2.5	141.3	16.3
06/15/2028	04	26	53.876	17	21	58.66	0.6344434	0.4504720	10.61	2.2	138.5	17.2
06/16/2028	04	27	17.378	17	22	34.91	0.6475627	0.4473878	10.39	2.0	135.7	18.0
06/17/2028	04	27	59.085	17	25	02.10	0.6614644	0.4440505	10.17	1.8	132.9	18.8
06/18/2028	04	28	59.150	17	29	16.43	0.6761178	0.4404654	9.95	1.7	130.1	19.5
06/19/2028	04	30	17.644	17	35	13.33	0.6914929	0.4366390	9.73	1.5	127.4	20.1
06/20/2028	04	31	54.581	17	42	47.56	0.7075603	0.4325785	9.51	1.3	124.7	20.6
06/21/2028	04	33	49.926	17	51	53.32	0.7242910	0.4282921	9.29	1.2	121.9	21.0
06/22/2028	04	36	03.614	18	02	24.34	0.7416567	0.4237890	9.07	1.0	119.2	21.4
06/23/2028	04	38	35.560	18	14	13.95	0.7596290	0.4190798	8.86	0.9	116.5	21.7
06/24/2028	04	41	25.671	18	27	15.12	0.7781792	0.4141764	8.65	0.8	113.7	22.0
06/25/2028	04	44	33.852	18	41	20.51	0.7972783	0.4090923	8.44	0.6	110.9	22.1
06/26/2028	04	48	00.015	18	56	22.50	0.8168963	0.4038425	8.24	0.5	108.1	22.2
06/27/2028	04	51	44.086	19	12	13.21	0.8370015	0.3984443	8.04	0.4	105.3	22.2
06/28/2028	04	55	46.003	19	28	44.48	0.8575603	0.3929166	7.85	0.3	102.5	22.2
06/29/2028	05	00	05.717	19	45	47.89	0.8785364	0.3872810	7.66	0.2	99.6	22.1
06/30/2028	05	04	43.191	20	03	14.72	0.8998901	0.3815613	7.48	0.1	96.6	21.9
07/01/2028	05	09	38.395	20	20	55.96	0.9215778	0.3757842	7.30	-0.0	93.6	21.6
07/02/2028	05	14	51.297	20	38	42.23	0.9435510	0.3699791	7.13	-0.1	90.5	21.3
07/03/2028	05	20	21.858	20	56	23.83	0.9657557	0.3641788	6.97	-0.2	87.4	21.0
07/04/2028	05	26	10.018	21	13	50.65	0.9881320	0.3584188	6.81	-0.3	84.2	20.5
07/05/2028	05	32	15.689	21	30	52.20	1.0106129	0.3527383	6.66	-0.4	80.9	20.0
07/06/2028	05	38	38.733	21	47	17.59	1.0331242	0.3471792	6.51	-0.5	77.6	19.5
07/07/2028	05	45	18.951	22	02	55.57	1.0555839	0.3417869	6.38	-0.6	74.1	18.9
07/08/2028	05	52	16.066	22	17	34.58	1.0779021	0.3366093	6.24	-0.7	70.5	18.2
07/09/2028	05	59	29.697	22	31	02.80	1.0999812	0.3316964	6.12	-0.7	66.9	17.5
07/10/2028	06	06	59.344	22	43	08.28	1.1217163	0.3271000	6.00	-0.8	63.2	16.7
07/11/2028	06	14	44.370	22	53	39.11	1.1429961	0.3228724	5.89	-0.9	59.3	15.8
07/12/2028	06	22	43.981	23	02	23.54	1.1637046	0.3190652	5.78	-1.0	55.4	15.0
07/13/2028	06	30	57.216	23	09	10.30	1.1837232	0.3157283	5.69	-1.1	51.4	14.0
07/14/2028	06	39	22.942	23	13	48.79	1.2029328	0.3129081	5.59	-1.2	47.3	13.0
07/15/2028	06	47	59.854	23	16	09.36	1.2212171	0.3106455	5.51	-1.2	43.2	12.0
07/16/2028	06	56	46.488	23	16	03.62	1.2384661	0.3089753	5.43	-1.3	39.0	11.0
07/17/2028	07	05	41.243	23	13	24.69	1.2545788	0.3079237	5.36	-1.4	34.8	9.9
07/18/2028	07	14	42.407	23	08	07.38	1.2694671	0.3075078	5.30	-1.5	30.6	8.8
07/19/2028	07	23	48.203	23	00	08.42	1.2830581	0.3077342	5.25	-1.6	26.5	7.7
07/20/2028	07	32	56.822	22	49	26.47	1.2952965	0.3085993	5.20	-1.7	22.4	6.6
07/21/2028	07	42	06.478	22	36	02.18	1.3061454	0.3100891	5.15	-1.8	18.4	5.5
07/22/2028	07	51	15.446	22	19	58.04	1.3155873	0.3121800	5.12	-1.9	14.6	4.4
07/23/2028	08	00	22.108	22	01	18.28	1.3236230	0.3148397	5.08	-2.0	11.0	3.3
07/24/2028	08	09	24.978	21	40	08.59	1.3302700	0.3180289	5.06	-2.1	7.8	2.4
07/25/2028	08	18	22.737	21	16	35.91	1.3355614	0.3217026	5.04	-2.2	5.7	1.7
07/26/2028	08	27	14.236	20	50	48.07	1.3395423	0.3258119	5.02	-2.2	5.5	1.7
07/27/2028	08	35	58.504	20	22	53.66	1.3422678	0.3303055	5.01	-2.1	7.2	2.4
07/28/2028	08	44	34.751	19	53	01.72	1.3438003	0.3351310	5.01	-1.9	9.8	3.3
07/29/2028	08	53	02.357	19	21	21.45	1.3442069	0.3402366	5.01	-1.8	12.7	4.3
07/30/2028	09	01	20.851	18	48	02.05	1.3435570	0.3455714	5.01	-1.6	15.5	5.3
07/31/2028	09	09	29.905	18	13	12.57	1.3419207	0.3510870	5.02	-1.5	18.3	6.3
08/01/2028	09	17	29.310	17	37	01.82	1.3393673	0.3567371	5.02	-1.4	21.0	7.3
08/02/2028	09	25	18.964	16	59	38.21	1.3359636	0.3624788	5.04	-1.2	23.7	8.3
08/03/2028	09	32	58.852	16	21	09.76	1.3317737	0.3682720	5.05	-1.1	26.2	9.2
08/04/2028	09	40	29.029	15	41	44.05	1.3268578	0.3740801	5.07	-1.0	28.6	10.2
08/05/2028	09	47	49.612	15	01	28.18	1.3212723	0.3798696	5.09	-0.9	30.9	11.1
08/06/2028	09	55	00.761	14	20	28.79	1.3150691	0.3856100	5.12	-0.8	33.2	12.0

Mercury - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
08/07/2028	10	02	02.670	13	38	52.08	1.3082963	0.3912738	5.14	-0.8	35.3	12.9
08/08/2028	10	08	55.560	12	56	43.81	1.3009972	0.3968364	5.17	-0.7	37.4	13.7
08/09/2028	10	15	39.665	12	14	09.34	1.2932115	0.4022756	5.20	-0.6	39.4	14.5
08/10/2028	10	22	15.230	11	31	13.66	1.2849747	0.4075716	5.24	-0.6	41.4	15.3
08/11/2028	10	28	42.504	10	48	01.40	1.2763188	0.4127067	5.27	-0.5	43.2	16.1
08/12/2028	10	35	01.734	10	04	36.88	1.2672723	0.4176653	5.31	-0.4	45.0	16.8
08/13/2028	10	41	13.161	09	21	04.14	1.2578605	0.4224333	5.35	-0.4	46.8	17.5
08/14/2028	10	47	17.019	08	37	26.96	1.2481058	0.4269986	5.39	-0.3	48.4	18.2
08/15/2028	10	53	13.530	07	53	48.89	1.2380280	0.4313500	5.44	-0.3	50.1	18.9
08/16/2028	10	59	02.900	07	10	13.29	1.2276443	0.4354781	5.48	-0.3	51.7	19.6
08/17/2028	11	04	45.321	06	26	43.33	1.2169698	0.4393742	5.53	-0.2	53.2	20.2
08/18/2028	11	10	20.966	05	43	22.07	1.2060176	0.4430309	5.58	-0.2	54.7	20.8
08/19/2028	11	15	49.992	05	00	12.41	1.1947989	0.4464415	5.63	-0.2	56.2	21.3
08/20/2028	11	21	12.531	04	17	17.16	1.1833236	0.4496005	5.69	-0.1	57.7	21.9
08/21/2028	11	26	28.700	03	34	39.06	1.1716002	0.4525027	5.74	-0.1	59.1	22.4
08/22/2028	11	31	38.590	02	52	20.77	1.1596360	0.4551437	5.80	-0.1	60.5	22.9
08/23/2028	11	36	42.273	02	10	24.90	1.1474374	0.4575198	5.87	-0.1	61.9	23.4
08/24/2028	11	41	39.794	01	28	54.05	1.1350102	0.4596278	5.93	-0.1	63.2	23.8
08/25/2028	11	46	31.175	00	47	50.82	1.1223593	0.4614648	6.00	-0.0	64.6	24.3
08/26/2028	11	51	16.407	00	07	17.82	1.1094893	0.4630286	6.07	-0.0	65.9	24.7
08/27/2028	11	55	55.452	-00	32	42.29	1.0964045	0.4643173	6.14	-0.0	67.3	25.0
08/28/2028	12	00	28.243	-01	12	06.79	1.0831089	0.4653293	6.21	0.0	68.7	25.4
08/29/2028	12	04	54.680	-01	50	52.87	1.0696063	0.4660635	6.29	0.0	70.1	25.7
08/30/2028	12	09	14.628	-02	28	57.63	1.0559007	0.4665190	6.37	0.0	71.5	26.0
08/31/2028	12	13	27.917	-03	06	18.03	1.0419963	0.4666953	6.46	0.0	73.0	26.2
09/01/2028	12	17	34.337	-03	42	50.86	1.0278978	0.4665922	6.55	0.1	74.5	26.5
09/02/2028	12	21	33.635	-04	18	32.74	1.0136102	0.4662099	6.64	0.1	76.0	26.7
09/03/2028	12	25	25.514	-04	53	20.06	0.9991396	0.4655487	6.74	0.1	77.6	26.8
09/04/2028	12	29	09.627	-05	27	08.92	0.9844931	0.4646094	6.84	0.1	79.2	26.9
09/05/2028	12	32	45.577	-05	59	55.17	0.9696789	0.4633931	6.94	0.1	80.9	27.0
09/06/2028	12	36	12.907	-06	31	34.27	0.9547069	0.4619012	7.05	0.1	82.7	27.0
09/07/2028	12	39	31.100	-07	02	01.31	0.9395889	0.4601356	7.16	0.1	84.5	27.0
09/08/2028	12	42	39.577	-07	31	10.94	0.9243391	0.4580984	7.28	0.2	86.5	27.0
09/09/2028	12	45	37.686	-07	58	57.28	0.9089741	0.4557922	7.40	0.2	88.5	26.9
09/10/2028	12	48	24.705	-08	25	13.92	0.8935138	0.4532202	7.53	0.2	90.5	26.7
09/11/2028	12	50	59.835	-08	49	53.80	0.8779818	0.4503860	7.67	0.2	92.7	26.5
09/12/2028	12	53	22.200	-09	12	49.18	0.8624059	0.4472937	7.80	0.3	95.0	26.3
09/13/2028	12	55	30.845	-09	33	51.56	0.8468189	0.4439484	7.95	0.3	97.4	25.9
09/14/2028	12	57	24.740	-09	52	51.61	0.8312590	0.4403554	8.10	0.4	100.0	25.5
09/15/2028	12	59	02.784	-10	09	39.16	0.8157713	0.4365212	8.25	0.4	102.6	25.1
09/16/2028	13	00	23.811	-10	24	03.12	0.8004080	0.4324530	8.41	0.5	105.4	24.5
09/17/2028	13	01	26.612	-10	35	51.50	0.7852300	0.4281590	8.57	0.6	108.3	23.9
09/18/2028	13	02	09.952	-10	44	51.45	0.7703074	0.4236485	8.74	0.7	111.4	23.1
09/19/2028	13	02	32.601	-10	50	49.39	0.7557212	0.4189322	8.91	0.8	114.7	22.3
09/20/2028	13	02	33.380	-10	53	31.16	0.7415640	0.4140220	9.08	0.9	118.1	21.4
09/21/2028	13	02	11.214	-10	52	42.38	0.7279412	0.4089315	9.25	1.1	121.7	20.3
09/22/2028	13	01	25.199	-10	48	08.87	0.7149714	0.4036757	9.41	1.2	125.5	19.2
09/23/2028	13	00	14.694	-10	39	37.34	0.7027875	0.3982720	9.58	1.5	129.5	17.9
09/24/2028	12	58	39.415	-10	26	56.23	0.6915363	0.3927394	9.73	1.7	133.7	16.5
09/25/2028	12	56	39.552	-10	09	56.85	0.6813776	0.3870996	9.88	2.0	138.1	15.0
09/26/2028	12	54	15.882	-09	48	34.64	0.6724832	0.3813765	10.01	2.4	142.7	13.4
09/27/2028	12	51	29.886	-09	22	50.69	0.6650339	0.3755969	10.12	2.8	147.6	11.6
09/28/2028	12	48	23.838	-08	52	53.22	0.6592155	0.3697905	10.21	3.3	152.6	9.8
09/29/2028	12	45	00.872	-08	18	58.98	0.6552139	0.3639898	10.27	3.9	157.8	7.9
09/30/2028	12	41	24.990	-07	41	34.28	0.6532087	0.3582309	10.30	4.5	163.0	6.0

Mercury - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Phase	Solar			
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
10/01/2028	12	37	41.010	-07	01	15.42	0.6533651	0.3525528	10.30	5.1	168.1	4.1
10/02/2028	12	33	54.436	-06	18	48.28	0.6558263	0.3469977	10.26	5.7	172.3	2.6
10/03/2028	12	30	11.264	-05	35	06.96	0.6607053	0.3416111	10.19	5.8	172.9	2.4
10/04/2028	12	26	37.716	-04	51	11.50	0.6680771	0.3364408	10.07	5.2	169.1	3.7
10/05/2028	12	23	19.952	-04	08	04.89	0.6779733	0.3315371	9.93	4.5	163.6	5.5
10/06/2028	12	20	23.764	-03	26	49.63	0.6903781	0.3269518	9.75	3.7	157.6	7.3
10/07/2028	12	17	54.304	-02	48	24.44	0.7052268	0.3227371	9.54	3.0	151.3	9.1
10/08/2028	12	15	55.868	-02	13	41.31	0.7224071	0.3189447	9.32	2.4	145.0	10.7
10/09/2028	12	14	31.747	-01	43	23.37	0.7417626	0.3156242	9.07	1.8	138.6	12.2
10/10/2028	12	13	44.162	-01	18	03.62	0.7630981	0.3128219	8.82	1.3	132.3	13.5
10/11/2028	12	13	34.268	-00	58	04.54	0.7861866	0.3105786	8.56	0.9	126.0	14.7
10/12/2028	12	14	02.228	-00	43	38.43	0.8107775	0.3089286	8.30	0.5	119.8	15.7
10/13/2028	12	15	07.329	-00	34	48.29	0.8366046	0.3078980	8.04	0.2	113.7	16.5
10/14/2028	12	16	48.128	-00	31	29.11	0.8633948	0.3075033	7.79	-0.0	107.7	17.2
10/15/2028	12	19	02.614	-00	33	29.25	0.8908763	0.3077510	7.55	-0.2	101.9	17.6
10/16/2028	12	21	48.366	-00	40	31.93	0.9187858	0.3086370	7.32	-0.4	96.2	17.9
10/17/2028	12	25	02.706	-00	52	16.60	0.9468748	0.3101470	7.11	-0.5	90.7	18.1
10/18/2028	12	28	42.830	-01	08	20.23	0.9749148	0.3122570	6.90	-0.6	85.4	18.2
10/19/2028	12	32	45.920	-01	28	18.38	1.0027012	0.3149345	6.71	-0.7	80.3	18.1
10/20/2028	12	37	09.236	-01	51	46.15	1.0300549	0.3181399	6.53	-0.8	75.4	18.0
10/21/2028	12	41	50.180	-02	18	18.89	1.0568236	0.3218282	6.37	-0.8	70.7	17.7
10/22/2028	12	46	46.344	-02	47	32.78	1.0828815	0.3259504	6.21	-0.8	66.2	17.4
10/23/2028	12	51	55.537	-03	19	05.23	1.1081275	0.3304550	6.07	-0.9	61.9	17.0
10/24/2028	12	57	15.802	-03	52	35.17	1.1324839	0.3352898	5.94	-0.9	57.9	16.6
10/25/2028	13	02	45.411	-04	27	43.18	1.1558935	0.3404029	5.82	-0.9	54.0	16.1
10/26/2028	13	08	22.863	-05	04	11.56	1.1783172	0.3457437	5.71	-0.9	50.4	15.5
10/27/2028	13	14	06.865	-05	41	44.34	1.1997309	0.3512636	5.61	-0.9	46.9	15.0
10/28/2028	13	19	56.319	-06	20	07.16	1.2201238	0.3569167	5.52	-0.9	43.6	14.4
10/29/2028	13	25	50.299	-06	59	07.24	1.2394951	0.3626600	5.43	-0.9	40.5	13.8
10/30/2028	13	31	48.034	-07	38	33.24	1.2578523	0.3684536	5.35	-0.9	37.5	13.2
10/31/2028	13	37	48.889	-08	18	15.11	1.2752093	0.3742609	5.28	-0.9	34.8	12.5
11/01/2028	13	43	52.346	-08	58	03.99	1.2915847	0.3800487	5.21	-0.9	32.1	11.9
11/02/2028	13	49	57.987	-09	37	52.06	1.3070004	0.3857865	5.15	-1.0	29.6	11.2
11/03/2028	13	56	05.480	-10	17	32.45	1.3214808	0.3914470	5.09	-1.0	27.2	10.6
11/04/2028	14	02	14.567	-10	56	59.08	1.3350515	0.3970055	5.04	-1.0	25.0	9.9
11/05/2028	14	08	25.049	-11	36	06.58	1.3477387	0.4024400	4.99	-1.0	22.8	9.3
11/06/2028	14	14	36.779	-12	14	50.23	1.3595687	0.4077308	4.95	-1.0	20.8	8.6
11/07/2028	14	20	49.652	-12	53	05.80	1.3705673	0.4128603	4.91	-1.1	18.9	8.0
11/08/2028	14	27	03.598	-13	30	49.54	1.3807599	0.4178128	4.87	-1.1	17.0	7.3
11/09/2028	14	33	18.575	-14	07	58.10	1.3901706	0.4225745	4.84	-1.1	15.3	6.7
11/10/2028	14	39	34.566	-14	44	28.44	1.3988224	0.4271330	4.81	-1.1	13.6	6.1
11/11/2028	14	45	51.573	-15	20	17.83	1.4067371	0.4314774	4.78	-1.2	12.0	5.4
11/12/2028	14	52	09.612	-15	55	23.80	1.4139352	0.4355983	4.76	-1.2	10.5	4.8
11/13/2028	14	58	28.712	-16	29	44.06	1.4204358	0.4394870	4.74	-1.2	9.0	4.2
11/14/2028	15	04	48.909	-17	03	16.52	1.4262565	0.4431361	4.72	-1.3	7.6	3.6
11/15/2028	15	11	10.245	-17	35	59.24	1.4314137	0.4465392	4.70	-1.3	6.3	3.0
11/16/2028	15	17	32.766	-18	07	50.42	1.4359224	0.4496903	4.69	-1.3	5.0	2.4
11/17/2028	15	23	56.514	-18	38	48.32	1.4397964	0.4525846	4.67	-1.4	3.7	1.8
11/18/2028	15	30	21.535	-19	08	51.33	1.4430480	0.4552177	4.66	-1.4	2.5	1.2
11/19/2028	15	36	47.867	-19	37	57.92	1.4456885	0.4575858	4.66	-1.4	1.4	0.7
11/20/2028	15	43	15.571	-20	06	06.82	1.4477277	0.4596857	4.65	-1.5	0.8	0.4
11/21/2028	15	49	44.682	-20	33	15.71	1.4491745	0.4615147	4.64	-1.4	1.5	0.7
11/22/2028	15	56	15.206	-20	59	23.83	1.4500363	0.4630704	4.64	-1.3	2.6	1.2
11/23/2028	16	02	47.193	-21	24	29.71	1.4503193	0.4643510	4.64	-1.3	3.8	1.8
11/24/2028	16	09	20.669	-21	48	31.93	1.4500287	0.4653549	4.64	-1.2	4.9	2.4

Mercury - Apparent data

Date Oh TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
11/25/2028	16	15	55.653	-22	11	29.10	1.4491685	0.4660810	4.64	-1.2	6.1	2.9
11/26/2028	16	22	32.156	-22	33	19.86	1.4477414	0.4665285	4.65	-1.1	7.3	3.5
11/27/2028	16	29	10.180	-22	54	02.86	1.4457492	0.4666968	4.66	-1.1	8.5	4.0
11/28/2028	16	35	49.718	-23	13	36.75	1.4431923	0.4665857	4.66	-1.0	9.7	4.6
11/29/2028	16	42	30.751	-23	32	00.19	1.4400704	0.4661954	4.67	-1.0	10.9	5.2
11/30/2028	16	49	13.250	-23	49	11.83	1.4363817	0.4655263	4.69	-0.9	12.1	5.7
12/01/2028	16	55	57.172	-24	05	10.34	1.4321238	0.4645791	4.70	-0.9	13.4	6.3
12/02/2028	17	02	42.462	-24	19	54.37	1.4272927	0.4633550	4.72	-0.8	14.6	6.8
12/03/2028	17	09	29.046	-24	33	22.59	1.4218838	0.4618554	4.73	-0.8	15.9	7.4
12/04/2028	17	16	16.839	-24	45	33.67	1.4158910	0.4600821	4.75	-0.8	17.2	7.9
12/05/2028	17	23	05.734	-24	56	26.30	1.4093075	0.4580373	4.78	-0.8	18.6	8.4
12/06/2028	17	29	55.608	-25	05	59.15	1.4021252	0.4557237	4.80	-0.7	20.0	9.0
12/07/2028	17	36	46.318	-25	14	10.94	1.3943349	0.4531443	4.83	-0.7	21.3	9.5
12/08/2028	17	43	37.699	-25	21	00.41	1.3859264	0.4503029	4.86	-0.7	22.8	10.1
12/09/2028	17	50	29.562	-25	26	26.34	1.3768886	0.4472036	4.89	-0.7	24.2	10.6
12/10/2028	17	57	21.692	-25	30	27.58	1.3672093	0.4438513	4.92	-0.7	25.7	11.1
12/11/2028	18	04	13.847	-25	33	03.03	1.3568752	0.4402515	4.96	-0.7	27.3	11.7
12/12/2028	18	11	05.748	-25	34	11.70	1.3458725	0.4364107	5.00	-0.6	28.8	12.2
12/13/2028	18	17	57.082	-25	33	52.70	1.3341865	0.4323361	5.04	-0.6	30.5	12.7
12/14/2028	18	24	47.493	-25	32	05.26	1.3218017	0.4280360	5.09	-0.6	32.2	13.3
12/15/2028	18	31	36.581	-25	28	48.77	1.3087024	0.4235196	5.14	-0.6	33.9	13.8
12/16/2028	18	38	23.890	-25	24	02.79	1.2948725	0.4187977	5.20	-0.6	35.7	14.3
12/17/2028	18	45	08.913	-25	17	47.10	1.2802958	0.4138822	5.26	-0.6	37.6	14.8
12/18/2028	18	51	51.074	-25	10	01.72	1.2649565	0.4087867	5.32	-0.6	39.6	15.3
12/19/2028	18	58	29.730	-25	00	46.97	1.2488393	0.4035265	5.39	-0.6	41.6	15.8
12/20/2028	19	05	04.153	-24	50	03.52	1.2319302	0.3981186	5.46	-0.7	43.8	16.3
12/21/2028	19	11	33.527	-24	37	52.49	1.2142165	0.3925825	5.54	-0.7	46.1	16.7
12/22/2028	19	17	56.928	-24	24	15.47	1.1956882	0.3869397	5.63	-0.7	48.5	17.2
12/23/2028	19	24	13.314	-24	09	14.66	1.1763385	0.3812142	5.72	-0.7	51.0	17.6
12/24/2028	19	30	21.505	-23	52	52.92	1.1561650	0.3754330	5.82	-0.7	53.7	18.0
12/25/2028	19	36	20.169	-23	35	13.93	1.1351708	0.3696256	5.93	-0.7	56.6	18.4
12/26/2028	19	42	07.802	-23	16	22.30	1.1133664	0.3638250	6.04	-0.7	59.6	18.7
12/27/2028	19	47	42.707	-22	56	23.69	1.0907714	0.3580671	6.17	-0.7	62.8	19.0
12/28/2028	19	53	02.976	-22	35	24.97	1.0674164	0.3523910	6.30	-0.7	66.2	19.2
12/29/2028	19	58	06.470	-22	13	34.37	1.0433456	0.3468392	6.45	-0.7	69.9	19.4
12/30/2028	20	02	50.807	-21	51	01.62	1.0186195	0.3414572	6.61	-0.7	73.7	19.5
12/31/2028	20	07	13.354	-21	27	58.08	0.9933179	0.3362929	6.78	-0.6	77.8	19.6
01/01/2029	20	11	11.225	-21	04	36.83	0.9675421	0.3313968	6.96	-0.6	82.2	19.5

01/17/2028 17:17:41 Mercury East of the Sun 18.8 degrees.
 02/27/2028 16:36:43 Mercury West of the Sun 26.9 degrees.
 05/09/2028 06:14:36 Mercury East of the Sun 21.4 degrees.
 06/26/2028 19:35:24 Mercury West of the Sun 22.2 degrees.
 09/06/2028 10:21:34 Mercury East of the Sun 27.1 degrees.
 10/17/2028 23:04:37 Mercury West of the Sun 18.2 degrees.
 12/31/2028 00:44:28 Mercury East of the Sun 19.6 degrees.

Venus - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
12/31/2027	21	07	13.977	-18	27	43.62	1.2693718	0.7262714	13.15	-4.0	50.4	34.8
01/01/2028	21	12	09.039	-18	05	42.29	1.2636788	0.7261625	13.21	-4.0	50.8	35.0
01/02/2028	21	17	02.626	-17	43	11.70	1.2579558	0.7260514	13.27	-4.0	51.1	35.2
01/03/2028	21	21	54.737	-17	20	12.65	1.2522028	0.7259381	13.33	-4.0	51.5	35.4
01/04/2028	21	26	45.375	-16	56	45.92	1.2464199	0.7258228	13.39	-4.0	51.8	35.6
01/05/2028	21	31	34.543	-16	32	52.32	1.2406073	0.7257056	13.45	-4.0	52.1	35.8
01/06/2028	21	36	22.248	-16	08	32.63	1.2347652	0.7255865	13.52	-4.0	52.5	36.0
01/07/2028	21	41	08.499	-15	43	47.65	1.2288937	0.7254656	13.58	-4.0	52.8	36.2
01/08/2028	21	45	53.307	-15	18	38.19	1.2229931	0.7253430	13.65	-4.0	53.1	36.4
01/09/2028	21	50	36.683	-14	53	05.06	1.2170637	0.7252188	13.71	-4.0	53.5	36.6
01/10/2028	21	55	18.641	-14	27	09.05	1.2111058	0.7250932	13.78	-4.0	53.8	36.8
01/11/2028	21	59	59.197	-14	00	50.97	1.2051197	0.7249661	13.85	-4.0	54.2	37.0
01/12/2028	22	04	38.367	-13	34	11.62	1.1991059	0.7248378	13.92	-4.0	54.6	37.2
01/13/2028	22	09	16.170	-13	07	11.77	1.1930645	0.7247082	13.99	-4.0	55.0	37.4
01/14/2028	22	13	52.628	-12	39	52.20	1.1869959	0.7245776	14.06	-4.0	55.4	37.5
01/15/2028	22	18	27.765	-12	12	13.67	1.1809001	0.7244460	14.13	-4.0	55.8	37.7
01/16/2028	22	23	01.611	-11	44	16.91	1.1747773	0.7243134	14.21	-4.0	56.2	37.9
01/17/2028	22	27	34.195	-11	16	02.69	1.1686273	0.7241801	14.28	-4.0	56.6	38.1
01/18/2028	22	32	05.547	-10	47	31.73	1.1624500	0.7240461	14.36	-4.0	57.1	38.3
01/19/2028	22	36	35.697	-10	18	44.82	1.1562453	0.7239114	14.43	-4.0	57.5	38.5
01/20/2028	22	41	04.676	-09	49	42.70	1.1500128	0.7237763	14.51	-4.1	57.9	38.7
01/21/2028	22	45	32.511	-09	20	26.16	1.1437524	0.7236409	14.59	-4.1	58.4	38.9
01/22/2028	22	49	59.232	-08	50	55.97	1.1374638	0.7235051	14.67	-4.1	58.8	39.0
01/23/2028	22	54	24.865	-08	21	12.90	1.1311468	0.7233692	14.75	-4.1	59.3	39.2
01/24/2028	22	58	49.439	-07	51	17.74	1.1248012	0.7232332	14.84	-4.1	59.7	39.4
01/25/2028	23	03	12.982	-07	21	11.26	1.1184268	0.7230973	14.92	-4.1	60.1	39.6
01/26/2028	23	07	35.521	-06	50	54.23	1.1120235	0.7229615	15.01	-4.1	60.6	39.8
01/27/2028	23	11	57.085	-06	20	27.43	1.1055910	0.7228260	15.09	-4.1	61.0	39.9
01/28/2028	23	16	17.703	-05	49	51.62	1.0991295	0.7226909	15.18	-4.1	61.4	40.1
01/29/2028	23	20	37.403	-05	19	07.56	1.0926387	0.7225562	15.27	-4.1	61.8	40.3
01/30/2028	23	24	56.216	-04	48	16.02	1.0861187	0.7224221	15.37	-4.1	62.2	40.5
01/31/2028	23	29	14.171	-04	17	17.75	1.0795695	0.7222887	15.46	-4.1	62.6	40.6
02/01/2028	23	33	31.296	-03	46	13.50	1.0729911	0.7221560	15.55	-4.1	63.0	40.8
02/02/2028	23	37	47.623	-03	15	04.02	1.0663837	0.7220243	15.65	-4.1	63.4	41.0
02/03/2028	23	42	03.179	-02	43	50.05	1.0597475	0.7218935	15.75	-4.1	63.8	41.1
02/04/2028	23	46	17.994	-02	12	32.34	1.0530825	0.7217639	15.85	-4.1	64.2	41.3
02/05/2028	23	50	32.097	-01	41	11.61	1.0463891	0.7216354	15.95	-4.2	64.6	41.5
02/06/2028	23	54	45.513	-01	09	48.61	1.0396676	0.7215083	16.05	-4.2	65.0	41.6
02/07/2028	23	58	58.270	-00	38	24.07	1.0329182	0.7213825	16.16	-4.2	65.4	41.8
02/08/2028	00	03	10.395	-00	06	58.72	1.0261416	0.7212583	16.26	-4.2	65.8	41.9
02/09/2028	00	07	21.912	00	24	26.74	1.0193380	0.7211356	16.37	-4.2	66.2	42.1
02/10/2028	00	11	32.849	00	55	51.59	1.0125081	0.7210147	16.48	-4.2	66.6	42.3
02/11/2028	00	15	43.233	01	27	15.14	1.0056523	0.7208955	16.59	-4.2	67.1	42.4
02/12/2028	00	19	53.097	01	58	36.73	0.9987710	0.7207782	16.71	-4.2	67.5	42.6
02/13/2028	00	24	02.472	02	29	55.71	0.9918646	0.7206630	16.83	-4.2	68.0	42.7
02/14/2028	00	28	11.390	03	01	11.44	0.9849332	0.7205497	16.94	-4.2	68.4	42.9
02/15/2028	00	32	19.884	03	32	23.27	0.9779772	0.7204387	17.06	-4.2	68.9	43.0
02/16/2028	00	36	27.983	04	03	30.55	0.9709964	0.7203299	17.19	-4.2	69.4	43.1
02/17/2028	00	40	35.713	04	34	32.62	0.9639910	0.7202235	17.31	-4.2	69.9	43.3
02/18/2028	00	44	43.099	05	05	28.82	0.9569609	0.7201195	17.44	-4.2	70.4	43.4
02/19/2028	00	48	50.164	05	36	18.47	0.9499061	0.7200179	17.57	-4.2	70.9	43.6
02/20/2028	00	52	56.928	06	07	00.91	0.9428266	0.7199190	17.70	-4.2	71.5	43.7
02/21/2028	00	57	03.409	06	37	35.44	0.9357223	0.7198228	17.83	-4.2	72.0	43.8
02/22/2028	01	01	09.627	07	08	01.41	0.9285933	0.7197293	17.97	-4.3	72.5	43.9
02/23/2028	01	05	15.595	07	38	18.12	0.9214396	0.7196386	18.11	-4.3	73.0	44.1

Venus - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
02/24/2028	01	09	21.329	08	08	24.91	0.9142612	0.7195508	18.25	-4.3	73.5	44.2
02/25/2028	01	13	26.841	08	38	21.11	0.9070582	0.7194660	18.40	-4.3	74.1	44.3
02/26/2028	01	17	32.142	09	08	06.05	0.8998307	0.7193843	18.55	-4.3	74.6	44.4
02/27/2028	01	21	37.243	09	37	39.06	0.8925789	0.7193056	18.70	-4.3	75.1	44.5
02/28/2028	01	25	42.149	10	06	59.49	0.8853029	0.7192301	18.85	-4.3	75.6	44.7
02/29/2028	01	29	46.867	10	36	06.67	0.8780031	0.7191578	19.01	-4.3	76.1	44.8
03/01/2028	01	33	51.398	11	04	59.96	0.8706795	0.7190888	19.17	-4.3	76.6	44.9
03/02/2028	01	37	55.744	11	33	38.70	0.8633327	0.7190232	19.33	-4.3	77.1	45.0
03/03/2028	01	41	59.901	12	02	02.26	0.8559630	0.7189609	19.50	-4.3	77.6	45.1
03/04/2028	01	46	03.864	12	30	09.98	0.8485708	0.7189021	19.67	-4.3	78.1	45.2
03/05/2028	01	50	07.624	12	58	01.24	0.8411568	0.7188468	19.84	-4.4	78.6	45.3
03/06/2028	01	54	11.170	13	25	35.40	0.8337214	0.7187950	20.02	-4.4	79.1	45.3
03/07/2028	01	58	14.488	13	52	51.84	0.8262655	0.7187468	20.20	-4.4	79.6	45.4
03/08/2028	02	02	17.561	14	19	49.94	0.8187897	0.7187022	20.38	-4.4	80.1	45.5
03/09/2028	02	06	20.373	14	46	29.09	0.8112950	0.7186613	20.57	-4.4	80.6	45.6
03/10/2028	02	10	22.907	15	12	48.72	0.8037823	0.7186241	20.76	-4.4	81.1	45.7
03/11/2028	02	14	25.145	15	38	48.25	0.7962524	0.7185906	20.96	-4.4	81.7	45.7
03/12/2028	02	18	27.073	16	04	27.16	0.7887063	0.7185608	21.16	-4.4	82.2	45.8
03/13/2028	02	22	28.673	16	29	44.94	0.7811448	0.7185348	21.36	-4.4	82.8	45.8
03/14/2028	02	26	29.923	16	54	41.06	0.7735686	0.7185126	21.57	-4.4	83.3	45.9
03/15/2028	02	30	30.799	17	19	15.05	0.7659784	0.7184943	21.79	-4.4	83.9	45.9
03/16/2028	02	34	31.272	17	43	26.39	0.7583747	0.7184797	22.01	-4.4	84.5	46.0
03/17/2028	02	38	31.307	18	07	14.58	0.7507583	0.7184690	22.23	-4.4	85.1	46.0
03/18/2028	02	42	30.866	18	30	39.12	0.7431295	0.7184621	22.46	-4.5	85.8	46.1
03/19/2028	02	46	29.906	18	53	39.53	0.7354889	0.7184591	22.69	-4.5	86.4	46.1
03/20/2028	02	50	28.380	19	16	15.31	0.7278372	0.7184600	22.93	-4.5	87.1	46.1
03/21/2028	02	54	26.237	19	38	25.98	0.7201749	0.7184647	23.17	-4.5	87.7	46.1
03/22/2028	02	58	23.420	20	00	11.09	0.7125025	0.7184732	23.42	-4.5	88.4	46.1
03/23/2028	03	02	19.870	20	21	30.17	0.7048208	0.7184856	23.68	-4.5	89.0	46.1
03/24/2028	03	06	15.521	20	42	22.79	0.6971304	0.7185019	23.94	-4.5	89.7	46.1
03/25/2028	03	10	10.303	21	02	48.53	0.6894320	0.7185219	24.21	-4.5	90.4	46.1
03/26/2028	03	14	04.140	21	22	46.96	0.6817265	0.7185458	24.48	-4.5	91.1	46.1
03/27/2028	03	17	56.953	21	42	17.71	0.6740146	0.7185735	24.76	-4.5	91.8	46.0
03/28/2028	03	21	48.653	22	01	20.40	0.6662973	0.7186049	25.05	-4.5	92.5	46.0
03/29/2028	03	25	39.148	22	19	54.67	0.6585755	0.7186401	25.34	-4.5	93.2	46.0
03/30/2028	03	29	28.338	22	38	00.18	0.6508502	0.7186789	25.64	-4.5	93.9	45.9
03/31/2028	03	33	16.115	22	55	36.61	0.6431226	0.7187215	25.95	-4.6	94.6	45.9
04/01/2028	03	37	02.366	23	12	43.66	0.6353941	0.7187677	26.26	-4.6	95.3	45.8
04/02/2028	03	40	46.971	23	29	21.04	0.6276659	0.7188175	26.59	-4.6	96.0	45.7
04/03/2028	03	44	29.803	23	45	28.47	0.6199395	0.7188709	26.92	-4.6	96.7	45.6
04/04/2028	03	48	10.729	24	01	05.71	0.6122167	0.7189279	27.26	-4.6	97.4	45.5
04/05/2028	03	51	49.610	24	16	12.52	0.6044991	0.7189883	27.61	-4.6	98.1	45.4
04/06/2028	03	55	26.304	24	30	48.70	0.5967888	0.7190521	27.96	-4.6	98.8	45.3
04/07/2028	03	59	00.666	24	44	54.05	0.5890876	0.7191193	28.33	-4.6	99.5	45.1
04/08/2028	04	02	32.548	24	58	28.44	0.5813979	0.7191899	28.70	-4.6	100.3	45.0
04/09/2028	04	06	01.799	25	11	31.73	0.5737217	0.7192637	29.09	-4.6	101.0	44.8
04/10/2028	04	09	28.264	25	24	03.83	0.5660613	0.7193407	29.48	-4.7	101.8	44.7
04/11/2028	04	12	51.782	25	36	04.69	0.5584190	0.7194209	29.89	-4.7	102.6	44.5
04/12/2028	04	16	12.187	25	47	34.23	0.5507970	0.7195042	30.30	-4.7	103.4	44.3
04/13/2028	04	19	29.304	25	58	32.41	0.5431976	0.7195905	30.72	-4.7	104.3	44.1
04/14/2028	04	22	42.951	26	08	59.20	0.5356231	0.7196797	31.16	-4.7	105.1	43.8
04/15/2028	04	25	52.939	26	18	54.54	0.5280757	0.7197718	31.60	-4.7	106.0	43.6
04/16/2028	04	28	59.072	26	28	18.41	0.5205578	0.7198667	32.06	-4.7	106.9	43.3
04/17/2028	04	32	01.145	26	37	10.78	0.5130719	0.7199643	32.53	-4.7	107.9	43.1
04/18/2028	04	34	58.945	26	45	31.63	0.5056207	0.7200646	33.01	-4.7	108.8	42.8

Venus - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
04/19/2028	04	37	52.255	26	53	20.92	0.4982067	0.7201675	33.50	-4.7	109.8	42.5
04/20/2028	04	40	40.844	27	00	38.65	0.4908328	0.7202728	34.00	-4.7	110.8	42.1
04/21/2028	04	43	24.479	27	07	24.79	0.4835019	0.7203806	34.52	-4.7	111.8	41.8
04/22/2028	04	46	02.916	27	13	39.31	0.4762173	0.7204906	35.04	-4.7	112.9	41.4
04/23/2028	04	48	35.902	27	19	22.18	0.4689821	0.7206029	35.58	-4.7	114.0	41.0
04/24/2028	04	51	03.178	27	24	33.36	0.4617998	0.7207173	36.14	-4.7	115.0	40.6
04/25/2028	04	53	24.476	27	29	12.79	0.4546742	0.7208338	36.70	-4.7	116.2	40.2
04/26/2028	04	55	39.518	27	33	20.38	0.4476091	0.7209522	37.28	-4.7	117.3	39.7
04/27/2028	04	57	48.019	27	36	56.03	0.4406086	0.7210725	37.88	-4.7	118.5	39.2
04/28/2028	04	59	49.686	27	39	59.60	0.4336771	0.7211945	38.48	-4.7	119.6	38.7
04/29/2028	05	01	44.219	27	42	30.92	0.4268195	0.7213183	39.10	-4.7	120.8	38.1
04/30/2028	05	03	31.315	27	44	29.74	0.4200406	0.7214435	39.73	-4.7	122.0	37.6
05/01/2028	05	05	10.665	27	45	55.79	0.4133459	0.7215703	40.37	-4.7	123.3	37.0
05/02/2028	05	06	41.963	27	46	48.74	0.4067411	0.7216984	41.03	-4.7	124.5	36.4
05/03/2028	05	08	04.904	27	47	08.16	0.4002322	0.7218278	41.70	-4.7	125.8	35.7
05/04/2028	05	09	19.189	27	46	53.61	0.3938257	0.7219583	42.38	-4.7	127.1	35.0
05/05/2028	05	10	24.531	27	46	04.53	0.3875283	0.7220899	43.06	-4.7	128.5	34.3
05/06/2028	05	11	20.653	27	44	40.33	0.3813471	0.7222225	43.76	-4.7	129.8	33.5
05/07/2028	05	12	07.296	27	42	40.33	0.3752895	0.7223559	44.47	-4.7	131.2	32.7
05/08/2028	05	12	44.219	27	40	03.80	0.3693632	0.7224901	45.18	-4.7	132.6	31.9
05/09/2028	05	13	11.201	27	36	49.94	0.3635760	0.7226249	45.90	-4.7	134.1	31.0
05/10/2028	05	13	28.047	27	32	57.85	0.3579359	0.7227603	46.62	-4.6	135.6	30.1
05/11/2028	05	13	34.592	27	28	26.60	0.3524513	0.7228960	47.35	-4.6	137.2	29.2
05/12/2028	05	13	30.700	27	23	15.19	0.3471305	0.7230321	48.08	-4.6	138.8	28.2
05/13/2028	05	13	16.274	27	17	22.58	0.3419821	0.7231685	48.80	-4.6	140.4	27.2
05/14/2028	05	12	51.259	27	10	47.71	0.3370149	0.7233049	49.52	-4.5	142.1	26.1
05/15/2028	05	12	15.647	27	03	29.53	0.3322377	0.7234413	50.23	-4.5	143.8	25.0
05/16/2028	05	11	29.481	26	55	27.02	0.3276594	0.7235777	50.93	-4.5	145.6	23.8
05/17/2028	05	10	32.864	26	46	39.24	0.3232893	0.7237138	51.62	-4.4	147.5	22.6
05/18/2028	05	09	25.959	26	37	05.37	0.3191363	0.7238496	52.29	-4.4	149.3	21.4
05/19/2028	05	08	08.999	26	26	44.71	0.3152096	0.7239850	52.94	-4.4	151.3	20.1
05/20/2028	05	06	42.286	26	15	36.80	0.3115182	0.7241199	53.57	-4.3	153.2	18.8
05/21/2028	05	05	06.196	26	03	41.40	0.3080710	0.7242542	54.17	-4.3	155.2	17.5
05/22/2028	05	03	21.183	25	50	58.59	0.3048767	0.7243877	54.74	-4.2	157.3	16.1
05/23/2028	05	01	27.773	25	37	28.80	0.3019436	0.7245204	55.27	-4.1	159.4	14.7
05/24/2028	04	59	26.572	25	23	12.85	0.2992799	0.7246521	55.76	-4.1	161.5	13.2
05/25/2028	04	57	18.254	25	08	12.01	0.2968932	0.7247828	56.21	-4.0	163.7	11.8
05/26/2028	04	55	03.565	24	52	28.03	0.2947906	0.7249124	56.61	-4.1	165.8	10.3
05/27/2028	04	52	43.318	24	36	03.17	0.2929786	0.7250407	56.96	-4.1	168.0	8.7
05/28/2028	04	50	18.381	24	19	00.20	0.2914633	0.7251677	57.26	-4.1	170.2	7.2
05/29/2028	04	47	49.679	24	01	22.42	0.2902498	0.7252933	57.50	-4.2	172.4	5.6
05/30/2028	04	45	18.180	23	43	13.68	0.2893425	0.7254173	57.68	-4.2	174.6	4.1
05/31/2028	04	42	44.887	23	24	38.29	0.2887449	0.7255397	57.80	-4.2	176.8	2.5
06/01/2028	04	40	10.823	23	05	41.07	0.2884596	0.7256603	57.85	-4.2	178.6	1.1
06/02/2028	04	37	37.023	22	46	27.21	0.2884880	0.7257792	57.85	-4.2	178.1	1.1
06/03/2028	04	35	04.516	22	27	02.26	0.2888306	0.7258961	57.78	-4.2	176.1	2.5
06/04/2028	04	32	34.311	22	07	32.01	0.2894865	0.7260111	57.65	-4.2	174.0	4.1
06/05/2028	04	30	07.385	21	48	02.40	0.2904539	0.7261240	57.46	-4.2	171.9	5.7
06/06/2028	04	27	44.667	21	28	39.41	0.2917297	0.7262347	57.20	-4.1	169.7	7.2
06/07/2028	04	25	27.028	21	09	28.98	0.2933098	0.7263431	56.90	-4.1	167.6	8.8
06/08/2028	04	23	15.271	20	50	36.86	0.2951891	0.7264492	56.53	-4.1	165.5	10.3
06/09/2028	04	21	10.128	20	32	08.57	0.2973615	0.7265529	56.12	-4.0	163.4	11.8
06/10/2028	04	19	12.248	20	14	09.29	0.2998201	0.7266541	55.66	-4.1	161.3	13.3
06/11/2028	04	17	22.199	19	56	43.81	0.3025573	0.7267527	55.16	-4.1	159.3	14.7
06/12/2028	04	15	40.469	19	39	56.47	0.3055648	0.7268487	54.61	-4.2	157.3	16.1

Venus - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Mag.	Phase	Solar		
	h	m	s	d	m	s	Distance		Distance	Diameter	Angle	Sep.
						au	au	arc sec	deg.	deg.		
06/13/2028	04	14	07.464	19	23	51.13	0.3088339	0.7269419	54.04	-4.3	155.3	17.5
06/14/2028	04	12	43.509	19	08	31.15	0.3123557	0.7270323	53.43	-4.3	153.3	18.8
06/15/2028	04	11	28.859	18	53	59.36	0.3161206	0.7271199	52.79	-4.3	151.4	20.1
06/16/2028	04	10	23.697	18	40	18.08	0.3201193	0.7272045	52.13	-4.4	149.5	21.4
06/17/2028	04	09	28.142	18	27	29.14	0.3243420	0.7272862	51.45	-4.4	147.7	22.6
06/18/2028	04	08	42.254	18	15	33.86	0.3287792	0.7273648	50.76	-4.4	145.8	23.8
06/19/2028	04	08	06.040	18	04	33.12	0.3334212	0.7274402	50.05	-4.5	144.1	24.9
06/20/2028	04	07	39.460	17	54	27.38	0.3382587	0.7275125	49.34	-4.5	142.3	26.0
06/21/2028	04	07	22.433	17	45	16.69	0.3432823	0.7275816	48.61	-4.5	140.6	27.1
06/22/2028	04	07	14.840	17	37	00.76	0.3484830	0.7276474	47.89	-4.6	138.9	28.1
06/23/2028	04	07	16.534	17	29	38.99	0.3538523	0.7277098	47.16	-4.6	137.3	29.1
06/24/2028	04	07	27.346	17	23	10.48	0.3593816	0.7277689	46.44	-4.6	135.7	30.0
06/25/2028	04	07	47.085	17	17	34.13	0.3650630	0.7278245	45.71	-4.6	134.1	30.9
06/26/2028	04	08	15.553	17	12	48.60	0.3708888	0.7278766	45.00	-4.6	132.6	31.8
06/27/2028	04	08	52.542	17	08	52.41	0.3768518	0.7279253	44.28	-4.6	131.1	32.6
06/28/2028	04	09	37.841	17	05	43.94	0.3829450	0.7279704	43.58	-4.7	129.6	33.4
06/29/2028	04	10	31.240	17	03	21.45	0.3891616	0.7280119	42.88	-4.7	128.2	34.1
06/30/2028	04	11	32.524	17	01	43.13	0.3954953	0.7280499	42.20	-4.7	126.9	34.8
07/01/2028	04	12	41.482	17	00	47.08	0.4019398	0.7280841	41.52	-4.7	125.6	35.5
07/02/2028	04	13	57.901	17	00	31.34	0.4084891	0.7281148	40.85	-4.7	124.3	36.2
07/03/2028	04	15	21.570	17	00	53.91	0.4151373	0.7281417	40.20	-4.7	123.0	36.8
07/04/2028	04	16	52.279	17	01	52.73	0.4218790	0.7281649	39.56	-4.7	121.8	37.4
07/05/2028	04	18	29.819	17	03	25.75	0.4287086	0.7281844	38.93	-4.7	120.7	38.0
07/06/2028	04	20	13.984	17	05	30.85	0.4356210	0.7282001	38.31	-4.7	119.6	38.5
07/07/2028	04	22	04.573	17	08	05.96	0.4426109	0.7282121	37.70	-4.7	118.4	39.0
07/08/2028	04	24	01.385	17	11	08.98	0.4496736	0.7282204	37.11	-4.7	117.4	39.5
07/09/2028	04	26	04.226	17	14	37.83	0.4568044	0.7282248	36.53	-4.7	116.3	40.0
07/10/2028	04	28	12.906	17	18	30.47	0.4639988	0.7282255	35.97	-4.7	115.3	40.4
07/11/2028	04	30	27.239	17	22	44.88	0.4712525	0.7282224	35.41	-4.7	114.3	40.8
07/12/2028	04	32	47.045	17	27	19.08	0.4785615	0.7282156	34.87	-4.7	113.3	41.2
07/13/2028	04	35	12.148	17	32	11.12	0.4859219	0.7282049	34.34	-4.7	112.4	41.6
07/14/2028	04	37	42.380	17	37	19.11	0.4933299	0.7281905	33.83	-4.7	111.4	41.9
07/15/2028	04	40	17.573	17	42	41.20	0.5007821	0.7281724	33.32	-4.6	110.5	42.2
07/16/2028	04	42	57.568	17	48	15.57	0.5082752	0.7281505	32.83	-4.6	109.6	42.5
07/17/2028	04	45	42.210	17	54	00.47	0.5158059	0.7281250	32.35	-4.6	108.7	42.8
07/18/2028	04	48	31.346	17	59	54.18	0.5233713	0.7280957	31.89	-4.6	107.8	43.1
07/19/2028	04	51	24.829	18	05	55.05	0.5309685	0.7280627	31.43	-4.6	106.9	43.4
07/20/2028	04	54	22.515	18	12	01.45	0.5385950	0.7280261	30.99	-4.6	106.0	43.6
07/21/2028	04	57	24.263	18	18	11.82	0.5462483	0.7279859	30.55	-4.6	105.1	43.8
07/22/2028	05	00	29.939	18	24	24.61	0.5539263	0.7279420	30.13	-4.6	104.3	44.0
07/23/2028	05	03	39.412	18	30	38.37	0.5616268	0.7278946	29.71	-4.6	103.4	44.2
07/24/2028	05	06	52.559	18	36	51.63	0.5693481	0.7278437	29.31	-4.6	102.5	44.4
07/25/2028	05	10	09.266	18	43	03.01	0.5770885	0.7277893	28.92	-4.6	101.7	44.6
07/26/2028	05	13	29.427	18	49	11.16	0.5848465	0.7277315	28.53	-4.6	100.9	44.7
07/27/2028	05	16	52.940	18	55	14.79	0.5926207	0.7276702	28.16	-4.6	100.1	44.9
07/28/2028	05	20	19.711	19	01	12.64	0.6004096	0.7276056	27.79	-4.5	99.3	45.0
07/29/2028	05	23	49.650	19	07	03.49	0.6082119	0.7275377	27.44	-4.5	98.5	45.1
07/30/2028	05	27	22.666	19	12	46.13	0.6160262	0.7274665	27.09	-4.5	97.8	45.2
07/31/2028	05	30	58.675	19	18	19.41	0.6238511	0.7273921	26.75	-4.5	97.0	45.3
08/01/2028	05	34	37.592	19	23	42.20	0.6316853	0.7273146	26.42	-4.5	96.3	45.4
08/02/2028	05	38	19.334	19	28	53.36	0.6395274	0.7272340	26.09	-4.5	95.6	45.5
08/03/2028	05	42	03.819	19	33	51.83	0.6473759	0.7271503	25.78	-4.5	94.9	45.6
08/04/2028	05	45	50.967	19	38	36.53	0.6552294	0.7270637	25.47	-4.5	94.3	45.6
08/05/2028	05	49	40.700	19	43	06.45	0.6630867	0.7269742	25.17	-4.5	93.6	45.7
08/06/2028	05	53	32.939	19	47	20.58	0.6709463	0.7268819	24.87	-4.5	93.0	45.7

Venus - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
08/07/2028	05	57	27.608	19	51	17.97	0.6788070	0.7267868	24.58	-4.5	92.4	45.7
08/08/2028	06	01	24.631	19	54	57.68	0.6866672	0.7266890	24.30	-4.5	91.8	45.8
08/09/2028	06	05	23.932	19	58	18.82	0.6945259	0.7265886	24.03	-4.4	91.1	45.8
08/10/2028	06	09	25.436	20	01	20.53	0.7023817	0.7264856	23.76	-4.4	90.6	45.8
08/11/2028	06	13	29.068	20	04	02.00	0.7102334	0.7263802	23.50	-4.4	90.0	45.8
08/12/2028	06	17	34.753	20	06	22.43	0.7180798	0.7262724	23.24	-4.4	89.4	45.8
08/13/2028	06	21	42.416	20	08	21.09	0.7259198	0.7261624	22.99	-4.4	88.8	45.8
08/14/2028	06	25	51.983	20	09	57.25	0.7337523	0.7260501	22.74	-4.4	88.2	45.7
08/15/2028	06	30	03.378	20	11	10.25	0.7415761	0.7259356	22.50	-4.4	87.6	45.7
08/16/2028	06	34	16.524	20	11	59.44	0.7493903	0.7258192	22.27	-4.4	87.1	45.7
08/17/2028	06	38	31.345	20	12	24.23	0.7571940	0.7257008	22.04	-4.4	86.5	45.7
08/18/2028	06	42	47.763	20	12	24.04	0.7649862	0.7255805	21.82	-4.4	85.9	45.6
08/19/2028	06	47	05.701	20	11	58.33	0.7727663	0.7254585	21.60	-4.3	85.3	45.6
08/20/2028	06	51	25.083	20	11	06.60	0.7805335	0.7253347	21.38	-4.3	84.7	45.5
08/21/2028	06	55	45.835	20	09	48.35	0.7882874	0.7252094	21.17	-4.3	84.1	45.4
08/22/2028	07	00	07.888	20	08	03.15	0.7960275	0.7250827	20.96	-4.3	83.5	45.4
08/23/2028	07	04	31.177	20	05	50.57	0.8037536	0.7249545	20.76	-4.3	82.9	45.3
08/24/2028	07	08	55.637	20	03	10.23	0.8114654	0.7248250	20.57	-4.3	82.3	45.2
08/25/2028	07	13	21.209	20	00	01.78	0.8191627	0.7246944	20.37	-4.3	81.7	45.2
08/26/2028	07	17	47.833	19	56	24.89	0.8268452	0.7245627	20.18	-4.3	81.1	45.1
08/27/2028	07	22	15.449	19	52	19.27	0.8345126	0.7244299	20.00	-4.3	80.5	45.0
08/28/2028	07	26	44.000	19	47	44.62	0.8421646	0.7242963	19.82	-4.3	80.0	44.9
08/29/2028	07	31	13.428	19	42	40.70	0.8498008	0.7241620	19.64	-4.3	79.4	44.8
08/30/2028	07	35	43.678	19	37	07.27	0.8574207	0.7240269	19.46	-4.3	78.8	44.7
08/31/2028	07	40	14.693	19	31	04.11	0.8650239	0.7238913	19.29	-4.3	78.3	44.6
09/01/2028	07	44	46.420	19	24	31.06	0.8726099	0.7237552	19.12	-4.3	77.8	44.5
09/02/2028	07	49	18.806	19	17	27.94	0.8801780	0.7236188	18.96	-4.3	77.3	44.4
09/03/2028	07	53	51.800	19	09	54.64	0.8877277	0.7234820	18.80	-4.3	76.7	44.3
09/04/2028	07	58	25.350	19	01	51.06	0.8952585	0.7233452	18.64	-4.2	76.3	44.2
09/05/2028	08	02	59.409	18	53	17.12	0.9027697	0.7232083	18.49	-4.2	75.8	44.0
09/06/2028	08	07	33.926	18	44	12.79	0.9102607	0.7230715	18.33	-4.2	75.3	43.9
09/07/2028	08	12	08.856	18	34	38.07	0.9177308	0.7229348	18.18	-4.2	74.8	43.8
09/08/2028	08	16	44.151	18	24	32.97	0.9251794	0.7227985	18.04	-4.2	74.3	43.7
09/09/2028	08	21	19.767	18	13	57.56	0.9326059	0.7226625	17.89	-4.2	73.9	43.5
09/10/2028	08	25	55.656	18	02	51.93	0.9400096	0.7225270	17.75	-4.2	73.4	43.4
09/11/2028	08	30	31.777	17	51	16.20	0.9473899	0.7223921	17.62	-4.2	73.0	43.3
09/12/2028	08	35	08.083	17	39	10.50	0.9547461	0.7222579	17.48	-4.2	72.5	43.1
09/13/2028	08	39	44.533	17	26	35.03	0.9620775	0.7221246	17.35	-4.2	72.1	43.0
09/14/2028	08	44	21.083	17	13	29.99	0.9693837	0.7219921	17.22	-4.2	71.6	42.8
09/15/2028	08	48	57.692	16	59	55.62	0.9766640	0.7218607	17.09	-4.2	71.1	42.7
09/16/2028	08	53	34.318	16	45	52.16	0.9839179	0.7217304	16.96	-4.2	70.7	42.5
09/17/2028	08	58	10.923	16	31	19.90	0.9911450	0.7216013	16.84	-4.2	70.2	42.4
09/18/2028	09	02	47.471	16	16	19.14	0.9983451	0.7214736	16.72	-4.1	69.7	42.2
09/19/2028	09	07	23.930	16	00	50.18	1.0055178	0.7213473	16.60	-4.1	69.2	42.1
09/20/2028	09	12	00.271	15	44	53.35	1.01226631	0.7212225	16.48	-4.1	68.7	41.9
09/21/2028	09	16	36.469	15	28	29.01	1.0197811	0.7210993	16.36	-4.1	68.2	41.7
09/22/2028	09	21	12.502	15	11	37.53	1.0268718	0.7209779	16.25	-4.1	67.7	41.6
09/23/2028	09	25	48.346	14	54	19.29	1.0339351	0.7208583	16.14	-4.1	67.2	41.4
09/24/2028	09	30	23.983	14	36	34.67	1.0409713	0.7207406	16.03	-4.1	66.7	41.2
09/25/2028	09	34	59.397	14	18	24.09	1.0479801	0.7206250	15.92	-4.1	66.2	41.1
09/26/2028	09	39	34.571	13	59	47.96	1.0549616	0.7205114	15.82	-4.1	65.7	40.9
09/27/2028	09	44	09.493	13	40	46.70	1.0619156	0.7204001	15.72	-4.1	65.2	40.7
09/28/2028	09	48	44.154	13	21	20.74	1.0688420	0.7202910	15.61	-4.1	64.7	40.5
09/29/2028	09	53	18.546	13	01	30.52	1.0757406	0.7201843	15.51	-4.1	64.2	40.4
09/30/2028	09	57	52.663	12	41	16.51	1.0826111	0.7200801	15.41	-4.1	63.7	40.2

Venus - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Mag.	Phase	Solar		
	h	m	s	d	m	s	Distance		Distance	Diameter	Angle	Sep.
							au	au	arc sec	deg.	deg.	
10/01/2028	10	02	26.502	12	20	39.17	1.0894532	0.7199784	15.32	-4.1	63.3	40.0
10/02/2028	10	07	00.060	11	59	38.98	1.0962667	0.7198793	15.22	-4.1	62.8	39.8
10/03/2028	10	11	33.339	11	38	16.45	1.1030512	0.7197829	15.13	-4.1	62.4	39.6
10/04/2028	10	16	06.341	11	16	32.07	1.1098063	0.7196894	15.04	-4.1	61.9	39.5
10/05/2028	10	20	39.067	10	54	26.38	1.1165317	0.7195986	14.95	-4.1	61.5	39.3
10/06/2028	10	25	11.523	10	31	59.92	1.1232269	0.7195108	14.86	-4.1	61.1	39.1
10/07/2028	10	29	43.715	10	09	13.23	1.1298916	0.7194260	14.77	-4.1	60.6	38.9
10/08/2028	10	34	15.648	09	46	06.88	1.1365251	0.7193443	14.68	-4.1	60.2	38.7
10/09/2028	10	38	47.329	09	22	41.47	1.1431271	0.7192657	14.60	-4.1	59.8	38.5
10/10/2028	10	43	18.766	08	58	57.58	1.1496971	0.7191903	14.52	-4.1	59.4	38.3
10/11/2028	10	47	49.966	08	34	55.83	1.1562345	0.7191182	14.43	-4.1	59.0	38.1
10/12/2028	10	52	20.940	08	10	36.84	1.1627389	0.7190493	14.35	-4.0	58.6	37.9
10/13/2028	10	56	51.695	07	46	01.25	1.1692098	0.7189839	14.27	-4.0	58.2	37.7
10/14/2028	11	01	22.242	07	21	09.71	1.1756467	0.7189219	14.20	-4.0	57.8	37.5
10/15/2028	11	05	52.594	06	56	02.85	1.1820492	0.7188633	14.12	-4.0	57.4	37.3
10/16/2028	11	10	22.764	06	30	41.35	1.1884170	0.7188083	14.04	-4.0	57.0	37.1
10/17/2028	11	14	52.768	06	05	05.85	1.1947499	0.7187568	13.97	-4.0	56.6	36.9
10/18/2028	11	19	22.623	05	39	17.01	1.2010478	0.7187090	13.89	-4.0	56.2	36.7
10/19/2028	11	23	52.348	05	13	15.51	1.2073106	0.7186648	13.82	-4.0	55.8	36.5
10/20/2028	11	28	21.962	04	47	02.01	1.2135385	0.7186243	13.75	-4.0	55.3	36.3
10/21/2028	11	32	51.483	04	20	37.20	1.2197315	0.7185875	13.68	-4.0	54.9	36.1
10/22/2028	11	37	20.934	03	54	01.74	1.2258898	0.7185545	13.61	-4.0	54.4	35.9
10/23/2028	11	41	50.335	03	27	16.31	1.2320136	0.7185252	13.55	-4.0	54.0	35.7
10/24/2028	11	46	19.711	03	00	21.59	1.2381029	0.7184997	13.48	-4.0	53.5	35.5
10/25/2028	11	50	49.088	02	33	18.24	1.2441578	0.7184781	13.41	-4.0	53.0	35.3
10/26/2028	11	55	18.493	02	06	06.95	1.2501784	0.7184603	13.35	-4.0	52.6	35.0
10/27/2028	11	59	47.956	01	38	48.38	1.2561647	0.7184463	13.29	-4.0	52.1	34.8
10/28/2028	12	04	17.506	01	11	23.21	1.2621165	0.7184362	13.22	-4.0	51.7	34.6
10/29/2028	12	08	47.175	00	43	52.11	1.2680339	0.7184300	13.16	-4.0	51.2	34.4
10/30/2028	12	13	16.994	00	16	15.78	1.2739167	0.7184276	13.10	-4.0	50.8	34.2
10/31/2028	12	17	46.996	-00	11	25.11	1.2797648	0.7184292	13.04	-4.0	50.3	34.0
11/01/2028	12	22	17.215	-00	39	09.87	1.2855782	0.7184346	12.98	-4.0	49.9	33.8
11/02/2028	12	26	47.684	-01	06	57.79	1.2913565	0.7184439	12.92	-4.0	49.5	33.5
11/03/2028	12	31	18.437	-01	34	48.17	1.2970995	0.7184571	12.87	-4.0	49.1	33.3
11/04/2028	12	35	49.507	-02	02	40.30	1.3028071	0.7184741	12.81	-4.0	48.7	33.1
11/05/2028	12	40	20.927	-02	30	33.46	1.3084789	0.7184949	12.75	-4.0	48.3	32.9
11/06/2028	12	44	52.731	-02	58	26.92	1.3141146	0.7185196	12.70	-4.0	47.9	32.7
11/07/2028	12	49	24.949	-03	26	19.93	1.3197138	0.7185481	12.65	-4.0	47.5	32.4
11/08/2028	12	53	57.614	-03	54	11.76	1.3252762	0.7185804	12.59	-4.0	47.2	32.2
11/09/2028	12	58	30.757	-04	22	01.63	1.3308013	0.7186164	12.54	-4.0	46.8	32.0
11/10/2028	13	03	04.409	-04	49	48.79	1.3362887	0.7186562	12.49	-4.0	46.4	31.8
11/11/2028	13	07	38.602	-05	17	32.46	1.3417381	0.7186997	12.44	-4.0	46.1	31.6
11/12/2028	13	12	13.367	-05	45	11.87	1.3471491	0.7187468	12.39	-4.0	45.7	31.3
11/13/2028	13	16	48.736	-06	12	46.25	1.3525213	0.7187975	12.34	-3.9	45.4	31.1
11/14/2028	13	21	24.739	-06	40	14.83	1.3578545	0.7188519	12.29	-3.9	45.0	30.9
11/15/2028	13	26	01.408	-07	07	36.83	1.3631486	0.7189098	12.24	-3.9	44.6	30.7
11/16/2028	13	30	38.771	-07	34	51.47	1.3684034	0.7189711	12.20	-3.9	44.3	30.4
11/17/2028	13	35	16.856	-08	01	57.97	1.3736190	0.7190359	12.15	-3.9	43.9	30.2
11/18/2028	13	39	55.689	-08	28	55.55	1.3787956	0.7191041	12.10	-3.9	43.5	30.0
11/19/2028	13	44	35.298	-08	55	43.41	1.3839332	0.7191757	12.06	-3.9	43.1	29.8
11/20/2028	13	49	15.707	-09	22	20.77	1.3890322	0.7192505	12.01	-3.9	42.7	29.5
11/21/2028	13	53	56.945	-09	48	46.83	1.3940927	0.7193285	11.97	-3.9	42.3	29.3
11/22/2028	13	58	39.039	-10	15	00.82	1.3991149	0.7194097	11.93	-3.9	41.9	29.1
11/23/2028	14	03	22.017	-10	41	01.94	1.4040990	0.7194940	11.89	-3.9	41.5	28.8
11/24/2028	14	08	05.908	-11	06	49.42	1.4090453	0.7195813	11.84	-3.9	41.0	28.6

Venus - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
11/25/2028	14	12	50.738	-11	32	22.48	1.4139537	0.7196716	11.80	-3.9	40.6	28.4
11/26/2028	14	17	36.535	-11	57	40.34	1.4188245	0.7197647	11.76	-3.9	40.2	28.2
11/27/2028	14	22	23.326	-12	22	42.21	1.4236578	0.7198607	11.72	-3.9	39.8	27.9
11/28/2028	14	27	11.136	-12	47	27.31	1.4284537	0.7199593	11.68	-3.9	39.4	27.7
11/29/2028	14	31	59.989	-13	11	54.87	1.4332121	0.7200607	11.64	-3.9	39.0	27.5
11/30/2028	14	36	49.910	-13	36	04.10	1.4379332	0.7201646	11.61	-3.9	38.6	27.2
12/01/2028	14	41	40.919	-13	59	54.21	1.4426169	0.7202709	11.57	-3.9	38.1	27.0
12/02/2028	14	46	33.036	-14	23	24.43	1.4472633	0.7203797	11.53	-3.9	37.8	26.8
12/03/2028	14	51	26.280	-14	46	33.95	1.4518721	0.7204908	11.49	-3.9	37.4	26.5
12/04/2028	14	56	20.666	-15	09	21.99	1.4564434	0.7206041	11.46	-3.9	37.0	26.3
12/05/2028	15	01	16.207	-15	31	47.74	1.4609768	0.7207195	11.42	-3.9	36.6	26.1
12/06/2028	15	06	12.916	-15	53	50.41	1.4654722	0.7208370	11.39	-3.9	36.3	25.9
12/07/2028	15	11	10.802	-16	15	29.19	1.4699292	0.7209565	11.35	-3.9	35.9	25.6
12/08/2028	15	16	09.873	-16	36	43.27	1.4743477	0.7210777	11.32	-3.9	35.6	25.4
12/09/2028	15	21	10.137	-16	57	31.87	1.4787272	0.7212008	11.29	-3.9	35.2	25.2
12/10/2028	15	26	11.597	-17	17	54.19	1.4830674	0.7213255	11.25	-3.9	34.9	24.9
12/11/2028	15	31	14.255	-17	37	49.46	1.4873680	0.7214517	11.22	-3.9	34.6	24.7
12/12/2028	15	36	18.112	-17	57	16.91	1.4916289	0.7215794	11.19	-3.9	34.3	24.5
12/13/2028	15	41	23.162	-18	16	15.79	1.4958497	0.7217085	11.16	-3.9	34.0	24.2
12/14/2028	15	46	29.398	-18	34	45.36	1.5000305	0.7218388	11.13	-3.9	33.6	24.0
12/15/2028	15	51	36.808	-18	52	44.86	1.5041711	0.7219703	11.09	-3.9	33.3	23.8
12/16/2028	15	56	45.378	-19	10	13.58	1.5082717	0.7221028	11.06	-3.9	33.0	23.5
12/17/2028	16	01	55.090	-19	27	10.80	1.5123323	0.7222363	11.03	-3.9	32.6	23.3
12/18/2028	16	07	05.926	-19	43	35.80	1.5163531	0.7223706	11.01	-3.9	32.3	23.1
12/19/2028	16	12	17.865	-19	59	27.88	1.5203344	0.7225056	10.98	-3.9	31.9	22.8
12/20/2028	16	17	30.886	-20	14	46.38	1.5242765	0.7226412	10.95	-3.9	31.6	22.6
12/21/2028	16	22	44.967	-20	29	30.63	1.5281795	0.7227774	10.92	-3.9	31.2	22.4
12/22/2028	16	28	00.084	-20	43	39.99	1.5320437	0.7229140	10.89	-3.9	30.9	22.1
12/23/2028	16	33	16.209	-20	57	13.85	1.5358695	0.7230509	10.87	-3.9	30.5	21.9
12/24/2028	16	38	33.316	-21	10	11.60	1.5396569	0.7231879	10.84	-3.9	30.1	21.7
12/25/2028	16	43	51.373	-21	22	32.68	1.5434064	0.7233251	10.81	-3.9	29.7	21.4
12/26/2028	16	49	10.349	-21	34	16.51	1.5471180	0.7234622	10.79	-3.9	29.3	21.2
12/27/2028	16	54	30.208	-21	45	22.57	1.5507921	0.7235993	10.76	-3.9	29.0	21.0
12/28/2028	16	59	50.914	-21	55	50.35	1.5544287	0.7237360	10.74	-3.9	28.6	20.7
12/29/2028	17	05	12.428	-22	05	39.36	1.5580281	0.7238725	10.71	-3.9	28.2	20.5
12/30/2028	17	10	34.706	-22	14	49.14	1.5615904	0.7240085	10.69	-3.9	27.8	20.2
12/31/2028	17	15	57.706	-22	23	19.25	1.5651157	0.7241439	10.66	-3.9	27.4	20.0
01/01/2029	17	21	21.380	-22	31	09.25	1.5686040	0.7242787	10.64	-3.9	27.1	19.8

03/22/2028 12:28:15 Venus East of the Sun 46.1 degrees.

08/10/2028 16:04:15 Venus West of the Sun 45.8 degrees.

Mars - Apparent data

Date	Right Ascension		Declination		Earth	Solar	Equatorial	Mag.	Phase	Solar		
	h	m	s	d	m	s	Distance		Diameter	Angle	Sep.	
0h TT						au	au	arc sec	deg.	deg.		
12/31/2027	19	57	38.651	-21	48	58.90	2.2947937	1.3940021	4.08	1.2	12.6	18.1
01/01/2028	20	00	56.747	-21	39	44.98	2.2962920	1.3934174	4.08	1.2	12.4	17.9
01/02/2028	20	04	14.541	-21	30	16.38	2.2977768	1.3928455	4.08	1.2	12.2	17.6
01/03/2028	20	07	32.020	-21	20	33.22	2.2992486	1.3922864	4.07	1.2	12.1	17.4
01/04/2028	20	10	49.175	-21	10	35.64	2.3007078	1.3917403	4.07	1.2	11.9	17.2
01/05/2028	20	14	05.996	-21	00	23.78	2.3021547	1.3912073	4.07	1.2	11.7	16.9
01/06/2028	20	17	22.474	-20	49	57.79	2.3035897	1.3906873	4.07	1.2	11.5	16.7
01/07/2028	20	20	38.602	-20	39	17.83	2.3050133	1.3901805	4.06	1.2	11.4	16.5
01/08/2028	20	23	54.371	-20	28	24.03	2.3064261	1.3896869	4.06	1.2	11.2	16.2
01/09/2028	20	27	09.775	-20	17	16.58	2.3078285	1.3892066	4.06	1.2	11.1	16.0
01/10/2028	20	30	24.806	-20	05	55.64	2.3092210	1.3887397	4.06	1.2	10.9	15.8
01/11/2028	20	33	39.457	-19	54	21.36	2.3106041	1.3882862	4.05	1.2	10.8	15.5
01/12/2028	20	36	53.720	-19	42	33.93	2.3119783	1.3878463	4.05	1.2	10.7	15.3
01/13/2028	20	40	07.589	-19	30	33.49	2.3133440	1.3874199	4.05	1.2	10.5	15.1
01/14/2028	20	43	21.057	-19	18	20.21	2.3147014	1.3870071	4.05	1.2	10.4	14.8
01/15/2028	20	46	34.123	-19	05	54.22	2.3160506	1.3866080	4.04	1.2	10.2	14.6
01/16/2028	20	49	46.783	-18	53	15.68	2.3173917	1.3862226	4.04	1.2	10.1	14.4
01/17/2028	20	52	59.039	-18	40	24.75	2.3187246	1.3858510	4.04	1.2	10.0	14.1
01/18/2028	20	56	10.889	-18	27	21.58	2.3200492	1.3854933	4.04	1.2	9.8	13.9
01/19/2028	20	59	22.331	-18	14	06.37	2.3213652	1.3851494	4.03	1.2	9.7	13.7
01/20/2028	21	02	33.365	-18	00	39.29	2.3226725	1.3848195	4.03	1.2	9.5	13.5
01/21/2028	21	05	43.986	-17	47	00.54	2.3239709	1.3845036	4.03	1.2	9.4	13.2
01/22/2028	21	08	54.191	-17	33	10.33	2.3252603	1.3842017	4.03	1.2	9.2	13.0
01/23/2028	21	12	03.976	-17	19	08.85	2.3265404	1.3839139	4.03	1.2	9.1	12.8
01/24/2028	21	15	13.336	-17	04	56.31	2.3278113	1.3836402	4.02	1.2	8.9	12.5
01/25/2028	21	18	22.269	-16	50	32.92	2.3290729	1.3833807	4.02	1.2	8.7	12.3
01/26/2028	21	21	30.770	-16	35	58.88	2.3303250	1.3831354	4.02	1.2	8.5	12.1
01/27/2028	21	24	38.838	-16	21	14.40	2.3315679	1.3829043	4.02	1.2	8.4	11.9
01/28/2028	21	27	46.469	-16	06	19.69	2.3328015	1.3826874	4.01	1.2	8.2	11.6
01/29/2028	21	30	53.663	-15	51	14.95	2.3340259	1.3824849	4.01	1.2	8.0	11.4
01/30/2028	21	34	00.419	-15	36	00.39	2.3352413	1.3822966	4.01	1.1	7.8	11.2
01/31/2028	21	37	06.738	-15	20	36.20	2.3364478	1.3821227	4.01	1.1	7.7	11.0
02/01/2028	21	40	12.621	-15	05	02.61	2.3376457	1.3819632	4.01	1.1	7.5	10.7
02/02/2028	21	43	18.068	-14	49	19.82	2.3388351	1.3818181	4.00	1.1	7.3	10.5
02/03/2028	21	46	23.082	-14	33	28.04	2.3400164	1.3816874	4.00	1.1	7.1	10.3
02/04/2028	21	49	27.666	-14	17	27.48	2.3411898	1.3815712	4.00	1.1	7.0	10.1
02/05/2028	21	52	31.820	-14	01	18.36	2.3423558	1.3814694	4.00	1.1	6.8	9.9
02/06/2028	21	55	35.548	-13	45	00.89	2.3435146	1.3813820	4.00	1.1	6.7	9.6
02/07/2028	21	58	38.852	-13	28	35.29	2.3446667	1.3813092	3.99	1.1	6.5	9.4
02/08/2028	22	01	41.733	-13	12	01.78	2.3458124	1.3812508	3.99	1.1	6.4	9.2
02/09/2028	22	04	44.194	-12	55	20.57	2.3469521	1.3812069	3.99	1.1	6.2	9.0
02/10/2028	22	07	46.238	-12	38	31.86	2.3480862	1.3811776	3.99	1.1	6.1	8.8
02/11/2028	22	10	47.870	-12	21	35.84	2.3492149	1.3811627	3.99	1.1	6.0	8.5
02/12/2028	22	13	49.096	-12	04	32.71	2.3503384	1.3811624	3.98	1.1	5.8	8.3
02/13/2028	22	16	49.925	-11	47	22.64	2.3514565	1.3811766	3.98	1.1	5.7	8.1
02/14/2028	22	19	50.366	-11	30	05.81	2.3525692	1.3812053	3.98	1.1	5.6	7.9
02/15/2028	22	22	50.429	-11	12	42.42	2.3536762	1.3812485	3.98	1.1	5.4	7.7
02/16/2028	22	25	50.120	-10	55	12.66	2.3547772	1.3813061	3.98	1.1	5.3	7.4
02/17/2028	22	28	49.445	-10	37	36.76	2.3558720	1.3813783	3.98	1.1	5.2	7.2
02/18/2028	22	31	48.411	-10	19	54.93	2.3569601	1.3814650	3.97	1.1	5.0	7.0
02/19/2028	22	34	47.021	-10	02	07.40	2.3580414	1.3815661	3.97	1.1	4.9	6.8
02/20/2028	22	37	45.280	-09	44	14.37	2.3591154	1.3816817	3.97	1.1	4.7	6.6
02/21/2028	22	40	43.192	-09	26	16.07	2.3601820	1.3818118	3.97	1.1	4.5	6.4
02/22/2028	22	43	40.761	-09	08	12.73	2.3612409	1.3819562	3.97	1.1	4.4	6.1
02/23/2028	22	46	37.993	-08	50	04.57	2.3622919	1.3821151	3.96	1.1	4.2	5.9

Mars - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Phase	Solar			
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
02/24/2028	22	49	34.892	-08	31	51.79	2.3633348	1.3822883	3.96	1.1	4.0	5.7
02/25/2028	22	52	31.465	-08	13	34.62	2.3643695	1.3824759	3.96	1.1	3.8	5.5
02/26/2028	22	55	27.716	-07	55	13.27	2.3653960	1.3826777	3.96	1.1	3.7	5.3
02/27/2028	22	58	23.654	-07	36	47.95	2.3664140	1.3828939	3.96	1.1	3.5	5.1
02/28/2028	23	01	19.283	-07	18	18.88	2.3674236	1.3831244	3.96	1.1	3.3	4.9
02/29/2028	23	04	14.612	-06	59	46.26	2.3684248	1.3833691	3.95	1.1	3.2	4.6
03/01/2028	23	07	09.647	-06	41	10.31	2.3694176	1.3836280	3.95	1.1	3.0	4.4
03/02/2028	23	10	04.396	-06	22	31.23	2.3704022	1.3839010	3.95	1.1	2.8	4.2
03/03/2028	23	12	58.865	-06	03	49.24	2.3713786	1.3841882	3.95	1.1	2.7	4.0
03/04/2028	23	15	53.061	-05	45	04.54	2.3723470	1.3844894	3.95	1.1	2.5	3.8
03/05/2028	23	18	46.991	-05	26	17.35	2.3733076	1.3848047	3.95	1.1	2.4	3.6
03/06/2028	23	21	40.661	-05	07	27.87	2.3742606	1.3851340	3.94	1.1	2.2	3.4
03/07/2028	23	24	34.076	-04	48	36.33	2.3752064	1.3854772	3.94	1.1	2.1	3.2
03/08/2028	23	27	27.244	-04	29	42.92	2.3761450	1.3858344	3.94	1.1	1.9	3.0
03/09/2028	23	30	20.172	-04	10	47.83	2.3770768	1.3862053	3.94	1.1	1.8	2.7
03/10/2028	23	33	12.868	-03	51	51.26	2.3780019	1.3865901	3.94	1.1	1.7	2.5
03/11/2028	23	36	05.344	-03	32	53.38	2.3789205	1.3869886	3.94	1.1	1.6	2.3
03/12/2028	23	38	57.613	-03	13	54.36	2.3798323	1.3874008	3.94	1.1	1.4	2.1
03/13/2028	23	41	49.687	-02	54	54.36	2.3807374	1.3878266	3.93	1.1	1.3	1.9
03/14/2028	23	44	41.577	-02	35	53.56	2.3816353	1.3882660	3.93	1.1	1.2	1.8
03/15/2028	23	47	33.295	-02	16	52.13	2.3825257	1.3887189	3.93	1.1	1.1	1.6
03/16/2028	23	50	24.849	-01	57	50.29	2.3834082	1.3891852	3.93	1.1	1.0	1.4
03/17/2028	23	53	16.247	-01	38	48.22	2.3842823	1.3896650	3.93	1.1	0.9	1.2
03/18/2028	23	56	07.496	-01	19	46.13	2.3851475	1.3901580	3.93	1.1	0.8	1.1
03/19/2028	23	58	58.602	-01	00	44.23	2.3860034	1.3906642	3.93	1.1	0.7	0.9
03/20/2028	00	01	49.571	-00	41	42.71	2.3868496	1.3911837	3.92	1.1	0.6	0.9
03/21/2028	00	04	40.409	-00	22	41.75	2.3876857	1.3917162	3.92	1.1	0.6	0.8
03/22/2028	00	07	31.126	-00	03	41.52	2.3885113	1.3922618	3.92	1.1	0.6	0.8
03/23/2028	00	10	21.729	00	15	17.79	2.3893260	1.3928203	3.92	1.1	0.7	0.9
03/24/2028	00	13	12.229	00	34	15.96	2.3901295	1.3933917	3.92	1.1	0.8	1.0
03/25/2028	00	16	02.633	00	53	12.79	2.3909215	1.3939759	3.92	1.1	0.9	1.1
03/26/2028	00	18	52.947	01	12	08.07	2.3917017	1.3945728	3.92	1.1	1.0	1.3
03/27/2028	00	21	43.180	01	31	01.62	2.3924700	1.3951823	3.91	1.1	1.2	1.5
03/28/2028	00	24	33.339	01	49	53.26	2.3932260	1.3958044	3.91	1.1	1.3	1.7
03/29/2028	00	27	23.431	02	08	42.79	2.3939697	1.3964390	3.91	1.1	1.5	1.9
03/30/2028	00	30	13.462	02	27	30.04	2.3947010	1.3970859	3.91	1.1	1.7	2.0
03/31/2028	00	33	03.441	02	46	14.81	2.3954198	1.3977452	3.91	1.1	1.8	2.2
04/01/2028	00	35	53.372	03	04	56.93	2.3961261	1.3984166	3.91	1.1	2.0	2.4
04/02/2028	00	38	43.261	03	23	36.20	2.3968199	1.3991002	3.91	1.1	2.1	2.6
04/03/2028	00	41	33.113	03	42	12.44	2.3975014	1.3997957	3.91	1.1	2.3	2.9
04/04/2028	00	44	22.935	04	00	45.47	2.3981706	1.4005032	3.91	1.2	2.4	3.1
04/05/2028	00	47	12.733	04	19	15.11	2.3988277	1.4012226	3.90	1.2	2.5	3.3
04/06/2028	00	50	02.513	04	37	41.17	2.3994727	1.4019537	3.90	1.2	2.7	3.5
04/07/2028	00	52	52.286	04	56	03.52	2.4001059	1.4026964	3.90	1.2	2.8	3.7
04/08/2028	00	55	42.061	05	14	21.98	2.4007271	1.4034507	3.90	1.2	2.9	3.9
04/09/2028	00	58	31.850	05	32	36.42	2.4013363	1.4042164	3.90	1.2	3.0	4.1
04/10/2028	01	01	21.665	05	50	46.71	2.4019333	1.4049935	3.90	1.2	3.2	4.3
04/11/2028	01	04	11.515	06	08	52.68	2.4025178	1.4057818	3.90	1.2	3.3	4.5
04/12/2028	01	07	01.409	06	26	54.19	2.4030893	1.4065812	3.90	1.2	3.4	4.7
04/13/2028	01	09	51.355	06	44	51.09	2.4036474	1.4073917	3.90	1.2	3.6	5.0
04/14/2028	01	12	41.358	07	02	43.19	2.4041916	1.4082132	3.90	1.2	3.7	5.2
04/15/2028	01	15	31.426	07	20	30.34	2.4047212	1.4090454	3.89	1.2	3.8	5.4
04/16/2028	01	18	21.563	07	38	12.35	2.4052358	1.4098884	3.89	1.2	4.0	5.6
04/17/2028	01	21	11.775	07	55	49.06	2.4057348	1.4107420	3.89	1.2	4.1	5.8
04/18/2028	01	24	02.068	08	13	20.30	2.4062175	1.4116060	3.89	1.2	4.3	6.0

Mars - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
04/19/2028	01	26	52.448	08	30	45.89	2.4066836	1.4124805	3.89	1.2	4.5	6.2
04/20/2028	01	29	42.921	08	48	05.69	2.4071325	1.4133652	3.89	1.2	4.6	6.5
04/21/2028	01	32	33.492	09	05	19.51	2.4075638	1.4142602	3.89	1.2	4.8	6.7
04/22/2028	01	35	24.167	09	22	27.21	2.4079769	1.4151651	3.89	1.2	5.0	6.9
04/23/2028	01	38	14.951	09	39	28.62	2.4083715	1.4160800	3.89	1.2	5.1	7.1
04/24/2028	01	41	05.851	09	56	23.58	2.4087471	1.4170048	3.89	1.2	5.3	7.3
04/25/2028	01	43	56.869	10	13	11.94	2.4091035	1.4179392	3.89	1.2	5.5	7.5
04/26/2028	01	46	48.011	10	29	53.56	2.4094402	1.4188833	3.89	1.2	5.7	7.8
04/27/2028	01	49	39.280	10	46	28.26	2.4097570	1.4198368	3.89	1.2	5.8	8.0
04/28/2028	01	52	30.678	11	02	55.90	2.4100538	1.4207997	3.89	1.2	6.0	8.2
04/29/2028	01	55	22.207	11	19	16.33	2.4103304	1.4217718	3.89	1.3	6.2	8.4
04/30/2028	01	58	13.869	11	35	29.38	2.4105868	1.4227530	3.89	1.3	6.3	8.6
05/01/2028	02	01	05.665	11	51	34.89	2.4108229	1.4237433	3.88	1.3	6.5	8.9
05/02/2028	02	03	57.597	12	07	32.72	2.4110387	1.4247424	3.88	1.3	6.6	9.1
05/03/2028	02	06	49.667	12	23	22.72	2.4112343	1.4257503	3.88	1.3	6.8	9.3
05/04/2028	02	09	41.882	12	39	04.74	2.4114097	1.4267668	3.88	1.3	6.9	9.5
05/05/2028	02	12	34.245	12	54	38.65	2.4115650	1.4277919	3.88	1.3	7.0	9.7
05/06/2028	02	15	26.764	13	10	04.33	2.4117001	1.4288253	3.88	1.3	7.2	10.0
05/07/2028	02	18	19.445	13	25	21.68	2.4118149	1.4298670	3.88	1.3	7.3	10.2
05/08/2028	02	21	12.295	13	40	30.56	2.4119092	1.4309169	3.88	1.3	7.4	10.4
05/09/2028	02	24	05.319	13	55	30.88	2.4119826	1.4319748	3.88	1.3	7.6	10.6
05/10/2028	02	26	58.521	14	10	22.52	2.4120349	1.4330405	3.88	1.3	7.7	10.9
05/11/2028	02	29	51.903	14	25	05.33	2.4120655	1.4341141	3.88	1.3	7.8	11.1
05/12/2028	02	32	45.468	14	39	39.20	2.4120739	1.4351953	3.88	1.3	8.0	11.3
05/13/2028	02	35	39.216	14	54	03.99	2.4120594	1.4362841	3.88	1.3	8.1	11.5
05/14/2028	02	38	33.149	15	08	19.57	2.4120216	1.4373802	3.88	1.3	8.2	11.8
05/15/2028	02	41	27.269	15	22	25.79	2.4119597	1.4384836	3.88	1.3	8.4	12.0
05/16/2028	02	44	21.577	15	36	22.54	2.4118732	1.4395942	3.88	1.3	8.5	12.2
05/17/2028	02	47	16.074	15	50	09.67	2.4117614	1.4407117	3.88	1.3	8.7	12.4
05/18/2028	02	50	10.761	16	03	47.07	2.4116239	1.4418362	3.88	1.3	8.9	12.7
05/19/2028	02	53	05.639	16	17	14.61	2.4114600	1.4429674	3.88	1.3	9.0	12.9
05/20/2028	02	56	00.709	16	30	32.17	2.4112691	1.4441053	3.88	1.3	9.2	13.1
05/21/2028	02	58	55.971	16	43	39.63	2.4110508	1.4452497	3.88	1.3	9.4	13.3
05/22/2028	03	01	51.425	16	56	36.88	2.4108045	1.4464004	3.88	1.3	9.6	13.6
05/23/2028	03	04	47.069	17	09	23.82	2.4105297	1.4475575	3.89	1.3	9.7	13.8
05/24/2028	03	07	42.901	17	22	00.32	2.4102261	1.4487206	3.89	1.3	9.9	14.0
05/25/2028	03	10	38.918	17	34	26.29	2.4098932	1.4498897	3.89	1.4	10.1	14.3
05/26/2028	03	13	35.115	17	46	41.61	2.4095308	1.4510648	3.89	1.4	10.2	14.5
05/27/2028	03	16	31.488	17	58	46.17	2.4091387	1.4522455	3.89	1.4	10.4	14.7
05/28/2028	03	19	28.031	18	10	39.86	2.4087166	1.4534319	3.89	1.4	10.6	15.0
05/29/2028	03	22	24.740	18	22	22.56	2.4082647	1.4546237	3.89	1.4	10.7	15.2
05/30/2028	03	25	21.609	18	33	54.18	2.4077827	1.4558209	3.89	1.4	10.9	15.4
05/31/2028	03	28	18.637	18	45	14.60	2.4072708	1.4570234	3.89	1.4	11.0	15.7
06/01/2028	03	31	15.822	18	56	23.73	2.4067290	1.4582309	3.89	1.4	11.2	15.9
06/02/2028	03	34	13.164	19	07	21.49	2.4061572	1.4594434	3.89	1.4	11.3	16.1
06/03/2028	03	37	10.663	19	18	07.81	2.4055554	1.4606608	3.89	1.4	11.4	16.4
06/04/2028	03	40	08.318	19	28	42.62	2.4049236	1.4618829	3.89	1.4	11.6	16.6
06/05/2028	03	43	06.129	19	39	05.84	2.4042614	1.4631096	3.90	1.4	11.7	16.9
06/06/2028	03	46	04.093	19	49	17.43	2.4035688	1.4643407	3.90	1.4	11.8	17.1
06/07/2028	03	49	02.208	19	59	17.29	2.4028453	1.4655762	3.90	1.4	12.0	17.3
06/08/2028	03	52	00.469	20	09	05.37	2.4020904	1.4668158	3.90	1.4	12.1	17.6
06/09/2028	03	54	58.871	20	18	41.58	2.4013038	1.4680596	3.90	1.4	12.2	17.8
06/10/2028	03	57	57.411	20	28	05.84	2.4004848	1.4693073	3.90	1.4	12.4	18.1
06/11/2028	04	00	56.083	20	37	18.08	2.3996330	1.4705589	3.90	1.4	12.5	18.3
06/12/2028	04	03	54.883	20	46	18.22	2.3987476	1.4718141	3.90	1.4	12.7	18.5

Mars - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Phase	Solar			
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
06/13/2028	04	06	53.806	20	55	06.18	2.3978281	1.4730729	3.91	1.4	12.8	18.8
06/14/2028	04	09	52.847	21	03	41.89	2.3968739	1.4743352	3.91	1.4	13.0	19.0
06/15/2028	04	12	52.002	21	12	05.30	2.3958843	1.4756008	3.91	1.4	13.1	19.3
06/16/2028	04	15	51.264	21	20	16.33	2.3948589	1.4768696	3.91	1.4	13.3	19.5
06/17/2028	04	18	50.630	21	28	14.94	2.3937969	1.4781415	3.91	1.4	13.5	19.8
06/18/2028	04	21	50.091	21	36	01.08	2.3926979	1.4794163	3.91	1.4	13.6	20.0
06/19/2028	04	24	49.642	21	43	34.69	2.3915612	1.4806939	3.92	1.4	13.8	20.3
06/20/2028	04	27	49.274	21	50	55.73	2.3903863	1.4819743	3.92	1.4	14.0	20.5
06/21/2028	04	30	48.979	21	58	04.17	2.3891728	1.4832572	3.92	1.4	14.2	20.8
06/22/2028	04	33	48.747	22	04	59.97	2.3879202	1.4845426	3.92	1.5	14.3	21.0
06/23/2028	04	36	48.565	22	11	43.09	2.3866282	1.4858303	3.92	1.5	14.5	21.3
06/24/2028	04	39	48.423	22	18	13.49	2.3852964	1.4871202	3.93	1.5	14.7	21.5
06/25/2028	04	42	48.308	22	24	31.12	2.3839248	1.4884122	3.93	1.5	14.8	21.8
06/26/2028	04	45	48.208	22	30	35.96	2.3825132	1.4897062	3.93	1.5	15.0	22.0
06/27/2028	04	48	48.115	22	36	27.96	2.3810616	1.4910020	3.93	1.5	15.2	22.3
06/28/2028	04	51	48.020	22	42	07.09	2.3795702	1.4922995	3.94	1.5	15.3	22.5
06/29/2028	04	54	47.917	22	47	33.33	2.3780388	1.4935987	3.94	1.5	15.5	22.8
06/30/2028	04	57	47.799	22	52	46.67	2.3764675	1.4948993	3.94	1.5	15.6	23.0
07/01/2028	05	00	47.661	22	57	47.11	2.3748565	1.4962013	3.94	1.5	15.7	23.3
07/02/2028	05	03	47.497	23	02	34.66	2.3732055	1.4975046	3.95	1.5	15.9	23.6
07/03/2028	05	06	47.298	23	07	09.32	2.3715145	1.4988089	3.95	1.5	16.0	23.8
07/04/2028	05	09	47.058	23	11	31.09	2.3697832	1.5001143	3.95	1.5	16.1	24.1
07/05/2028	05	12	46.768	23	15	39.97	2.3680115	1.5014206	3.95	1.5	16.3	24.3
07/06/2028	05	15	46.418	23	19	35.97	2.3661989	1.5027277	3.96	1.5	16.4	24.6
07/07/2028	05	18	46.001	23	23	19.08	2.3643451	1.5040354	3.96	1.5	16.5	24.9
07/08/2028	05	21	45.507	23	26	49.30	2.3624497	1.5053436	3.96	1.5	16.7	25.1
07/09/2028	05	24	44.927	23	30	06.62	2.3605120	1.5066523	3.97	1.5	16.8	25.4
07/10/2028	05	27	44.254	23	33	11.06	2.3585317	1.5079614	3.97	1.5	17.0	25.7
07/11/2028	05	30	43.480	23	36	02.62	2.3565081	1.5092706	3.97	1.5	17.1	25.9
07/12/2028	05	33	42.596	23	38	41.31	2.3544407	1.5105799	3.98	1.5	17.3	26.2
07/13/2028	05	36	41.594	23	41	07.13	2.3523290	1.5118892	3.98	1.5	17.4	26.5
07/14/2028	05	39	40.466	23	43	20.13	2.3501723	1.5131983	3.98	1.5	17.6	26.7
07/15/2028	05	42	39.203	23	45	20.31	2.3479702	1.5145072	3.99	1.5	17.8	27.0
07/16/2028	05	45	37.795	23	47	07.72	2.3457220	1.5158157	3.99	1.5	17.9	27.3
07/17/2028	05	48	36.235	23	48	42.39	2.3434273	1.5171238	4.00	1.5	18.1	27.6
07/18/2028	05	51	34.509	23	50	04.36	2.3410854	1.5184313	4.00	1.5	18.3	27.8
07/19/2028	05	54	32.609	23	51	13.68	2.3386960	1.5197381	4.00	1.5	18.4	28.1
07/20/2028	05	57	30.520	23	52	10.39	2.3362585	1.5210441	4.01	1.5	18.6	28.4
07/21/2028	06	00	28.229	23	52	54.56	2.3337726	1.5223492	4.01	1.5	18.8	28.7
07/22/2028	06	03	25.721	23	53	26.22	2.3312380	1.5236533	4.02	1.5	19.0	28.9
07/23/2028	06	06	22.984	23	53	45.42	2.3286546	1.5249563	4.02	1.5	19.1	29.2
07/24/2028	06	09	20.003	23	53	52.20	2.3260221	1.5262580	4.03	1.5	19.3	29.5
07/25/2028	06	12	16.769	23	53	46.61	2.3233408	1.5275584	4.03	1.5	19.4	29.8
07/26/2028	06	15	13.274	23	53	28.70	2.3206106	1.5288574	4.04	1.5	19.6	30.1
07/27/2028	06	18	09.509	23	52	58.53	2.3178318	1.5301548	4.04	1.5	19.7	30.4
07/28/2028	06	21	05.469	23	52	16.17	2.3150043	1.5314507	4.05	1.5	19.9	30.6
07/29/2028	06	24	01.146	23	51	21.70	2.3121284	1.5327447	4.05	1.5	20.0	30.9
07/30/2028	06	26	56.534	23	50	15.20	2.3092041	1.5340369	4.06	1.5	20.2	31.2
07/31/2028	06	29	51.623	23	48	56.75	2.3062313	1.5353272	4.06	1.6	20.3	31.5
08/01/2028	06	32	46.407	23	47	26.42	2.3032100	1.5366154	4.07	1.6	20.4	31.8
08/02/2028	06	35	40.877	23	45	44.29	2.3001400	1.5379015	4.07	1.6	20.6	32.1
08/03/2028	06	38	35.024	23	43	50.42	2.2970210	1.5391853	4.08	1.6	20.7	32.4
08/04/2028	06	41	28.843	23	41	44.90	2.2938529	1.5404668	4.08	1.6	20.8	32.7
08/05/2028	06	44	22.324	23	39	27.79	2.2906352	1.5417458	4.09	1.6	21.0	33.0
08/06/2028	06	47	15.463	23	36	59.16	2.2873677	1.5430223	4.09	1.6	21.1	33.3

Mars - Apparent data

Date 0h TT	Right Ascension			Declination		Earth	Solar	Equatorial	Phase	Solar		
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
08/07/2028	06	50	08.252	23	34	19.08	2.2840499	1.5442962	4.10	1.6	21.2	33.6
08/08/2028	06	53	00.685	23	31	27.64	2.2806814	1.5455673	4.11	1.6	21.4	33.9
08/09/2028	06	55	52.758	23	28	24.92	2.2772617	1.5468356	4.11	1.6	21.5	34.2
08/10/2028	06	58	44.464	23	25	10.99	2.2737904	1.5481010	4.12	1.6	21.7	34.5
08/11/2028	07	01	35.797	23	21	45.96	2.2702671	1.5493633	4.13	1.6	21.9	34.8
08/12/2028	07	04	26.753	23	18	09.91	2.2666912	1.5506226	4.13	1.6	22.0	35.1
08/13/2028	07	07	17.323	23	14	22.95	2.2630623	1.5518786	4.14	1.6	22.2	35.4
08/14/2028	07	10	07.502	23	10	25.18	2.2593798	1.5531314	4.15	1.6	22.4	35.7
08/15/2028	07	12	57.282	23	06	16.71	2.2556435	1.5543807	4.15	1.6	22.5	36.0
08/16/2028	07	15	46.654	23	01	57.65	2.2518527	1.5556266	4.16	1.6	22.7	36.3
08/17/2028	07	18	35.609	22	57	28.12	2.2480072	1.5568689	4.17	1.6	22.9	36.6
08/18/2028	07	21	24.138	22	52	48.24	2.2441065	1.5581076	4.17	1.6	23.1	36.9
08/19/2028	07	24	12.229	22	47	58.11	2.2401504	1.5593425	4.18	1.6	23.2	37.2
08/20/2028	07	26	59.873	22	42	57.86	2.2361388	1.5605736	4.19	1.6	23.4	37.5
08/21/2028	07	29	47.061	22	37	47.58	2.2320717	1.5618008	4.20	1.6	23.5	37.8
08/22/2028	07	32	33.787	22	32	27.38	2.2279491	1.5630240	4.20	1.6	23.7	38.2
08/23/2028	07	35	20.046	22	26	57.37	2.2237712	1.5642431	4.21	1.6	23.9	38.5
08/24/2028	07	38	05.835	22	21	17.66	2.2195383	1.5654580	4.22	1.6	24.0	38.8
08/25/2028	07	40	51.150	22	15	28.39	2.2152506	1.5666686	4.23	1.6	24.1	39.1
08/26/2028	07	43	35.990	22	09	29.68	2.2109085	1.5678749	4.24	1.6	24.3	39.4
08/27/2028	07	46	20.348	22	03	21.65	2.2065120	1.5690768	4.24	1.6	24.4	39.8
08/28/2028	07	49	04.222	21	57	04.42	2.2020613	1.5702742	4.25	1.6	24.5	40.1
08/29/2028	07	51	47.608	21	50	38.13	2.1975564	1.5714670	4.26	1.6	24.7	40.4
08/30/2028	07	54	30.501	21	44	02.88	2.1929974	1.5726551	4.27	1.6	24.8	40.7
08/31/2028	07	57	12.899	21	37	18.78	2.1883843	1.5738385	4.28	1.6	24.9	41.1
09/01/2028	07	59	54.799	21	30	25.95	2.1837168	1.5750170	4.29	1.6	25.1	41.4
09/02/2028	08	02	36.199	21	23	24.50	2.1789950	1.5761907	4.30	1.6	25.2	41.7
09/03/2028	08	05	17.098	21	16	14.54	2.1742185	1.5773593	4.31	1.6	25.3	42.1
09/04/2028	08	07	57.494	21	08	56.17	2.1693871	1.5785229	4.32	1.6	25.5	42.4
09/05/2028	08	10	37.387	21	01	29.51	2.1645007	1.5796814	4.33	1.6	25.6	42.7
09/06/2028	08	13	16.777	20	53	54.68	2.1595588	1.5808347	4.34	1.6	25.7	43.1
09/07/2028	08	15	55.662	20	46	11.80	2.1545613	1.5819826	4.35	1.6	25.9	43.4
09/08/2028	08	18	34.042	20	38	20.99	2.1495078	1.5831252	4.36	1.6	26.1	43.7
09/09/2028	08	21	11.916	20	30	22.37	2.1443979	1.5842624	4.37	1.5	26.2	44.1
09/10/2028	08	23	49.282	20	22	16.08	2.1392314	1.5853941	4.38	1.5	26.4	44.4
09/11/2028	08	26	26.138	20	14	02.25	2.1340078	1.5865201	4.39	1.5	26.5	44.8
09/12/2028	08	29	02.481	20	05	41.02	2.1287270	1.5876406	4.40	1.5	26.7	45.1
09/13/2028	08	31	38.307	19	57	12.54	2.1233885	1.5887553	4.41	1.5	26.9	45.5
09/14/2028	08	34	13.613	19	48	36.95	2.1179921	1.5898642	4.42	1.5	27.0	45.8
09/15/2028	08	36	48.392	19	39	54.38	2.1125375	1.5909672	4.43	1.5	27.2	46.2
09/16/2028	08	39	22.639	19	31	05.00	2.1070247	1.5920643	4.44	1.5	27.4	46.5
09/17/2028	08	41	56.350	19	22	08.92	2.1014535	1.5931554	4.46	1.5	27.5	46.9
09/18/2028	08	44	29.521	19	13	06.29	2.0958240	1.5942405	4.47	1.5	27.7	47.2
09/19/2028	08	47	02.149	19	03	57.24	2.0901365	1.5953194	4.48	1.5	27.8	47.6
09/20/2028	08	49	34.236	18	54	41.89	2.0843911	1.5963921	4.49	1.5	28.0	47.9
09/21/2028	08	52	05.779	18	45	20.39	2.0785884	1.5974585	4.51	1.5	28.1	48.3
09/22/2028	08	54	36.781	18	35	52.88	2.0727287	1.5985186	4.52	1.5	28.2	48.7
09/23/2028	08	57	07.239	18	26	19.51	2.0668126	1.5995723	4.53	1.5	28.4	49.0
09/24/2028	08	59	37.154	18	16	40.40	2.0608403	1.6006196	4.54	1.5	28.5	49.4
09/25/2028	09	02	06.524	18	06	55.70	2.0548123	1.6016603	4.56	1.5	28.6	49.8
09/26/2028	09	04	35.348	17	57	05.54	2.0487288	1.6026944	4.57	1.5	28.7	50.1
09/27/2028	09	07	03.628	17	47	10.04	2.0425900	1.6037219	4.59	1.5	28.8	50.5
09/28/2028	09	09	31.363	17	37	09.32	2.0363962	1.6047427	4.60	1.5	29.0	50.9
09/29/2028	09	11	58.554	17	27	03.51	2.0301474	1.6057567	4.61	1.5	29.1	51.2
09/30/2028	09	14	25.204	17	16	52.71	2.0238437	1.6067639	4.63	1.5	29.2	51.6

Mars - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Phase	Solar			
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
10/01/2028	09	16	51.314	17	06	37.05	2.0174852	1.6077642	4.64	1.5	29.3	52.0
10/02/2028	09	19	16.888	16	56	16.65	2.0110718	1.6087576	4.66	1.5	29.5	52.4
10/03/2028	09	21	41.926	16	45	51.61	2.0046036	1.6097439	4.67	1.5	29.6	52.7
10/04/2028	09	24	06.433	16	35	22.07	1.9980805	1.6107232	4.69	1.5	29.7	53.1
10/05/2028	09	26	30.410	16	24	48.14	1.9915024	1.6116954	4.70	1.5	29.8	53.5
10/06/2028	09	28	53.859	16	14	09.96	1.9848692	1.6126604	4.72	1.5	30.0	53.9
10/07/2028	09	31	16.781	16	03	27.65	1.9781808	1.6136182	4.73	1.5	30.1	54.3
10/08/2028	09	33	39.179	15	52	41.35	1.9714370	1.6145687	4.75	1.5	30.3	54.7
10/09/2028	09	36	01.050	15	41	51.20	1.9646378	1.6155118	4.77	1.5	30.4	55.1
10/10/2028	09	38	22.395	15	30	57.35	1.9577830	1.6164476	4.78	1.5	30.6	55.5
10/11/2028	09	40	43.211	15	19	59.93	1.9508724	1.6173759	4.80	1.5	30.7	55.8
10/12/2028	09	43	03.497	15	08	59.10	1.9439060	1.6182967	4.82	1.5	30.9	56.2
10/13/2028	09	45	23.248	14	57	55.00	1.9368838	1.6192100	4.84	1.5	31.0	56.6
10/14/2028	09	47	42.463	14	46	47.79	1.9298058	1.6201157	4.85	1.4	31.2	57.0
10/15/2028	09	50	01.138	14	35	37.60	1.9226721	1.6210137	4.87	1.4	31.3	57.4
10/16/2028	09	52	19.272	14	24	24.57	1.9154830	1.6219041	4.89	1.4	31.4	57.8
10/17/2028	09	54	36.864	14	13	08.84	1.9082387	1.6227866	4.91	1.4	31.6	58.3
10/18/2028	09	56	53.915	14	01	50.55	1.9009399	1.6236614	4.93	1.4	31.7	58.7
10/19/2028	09	59	10.423	13	50	29.83	1.8935870	1.6245284	4.95	1.4	31.8	59.1
10/20/2028	10	01	26.390	13	39	06.84	1.8861807	1.6253874	4.97	1.4	31.9	59.5
10/21/2028	10	03	41.812	13	27	41.71	1.8787218	1.6262386	4.98	1.4	32.1	59.9
10/22/2028	10	05	56.690	13	16	14.58	1.8712108	1.6270817	5.00	1.4	32.2	60.3
10/23/2028	10	08	11.021	13	04	45.59	1.8636484	1.6279168	5.03	1.4	32.3	60.7
10/24/2028	10	10	24.805	12	53	14.87	1.8560352	1.6287438	5.05	1.4	32.4	61.1
10/25/2028	10	12	38.043	12	41	42.53	1.8483717	1.6295628	5.07	1.4	32.5	61.6
10/26/2028	10	14	50.735	12	30	08.69	1.8406583	1.6303735	5.09	1.4	32.6	62.0
10/27/2028	10	17	02.883	12	18	33.47	1.8328955	1.6311761	5.11	1.4	32.7	62.4
10/28/2028	10	19	14.488	12	06	56.98	1.8250836	1.6319704	5.13	1.4	32.8	62.8
10/29/2028	10	21	25.551	11	55	19.33	1.8172230	1.6327564	5.15	1.4	32.9	63.3
10/30/2028	10	23	36.076	11	43	40.64	1.8093139	1.6335341	5.18	1.4	33.0	63.7
10/31/2028	10	25	46.063	11	32	01.02	1.8013567	1.6343034	5.20	1.4	33.1	64.1
11/01/2028	10	27	55.515	11	20	20.58	1.7933516	1.6350643	5.22	1.3	33.2	64.6
11/02/2028	10	30	04.433	11	08	39.45	1.7852988	1.6358167	5.25	1.3	33.3	65.0
11/03/2028	10	32	12.817	10	56	57.75	1.7771985	1.6365607	5.27	1.3	33.4	65.5
11/04/2028	10	34	20.668	10	45	15.61	1.7690509	1.6372961	5.29	1.3	33.5	65.9
11/05/2028	10	36	27.985	10	33	33.16	1.7608560	1.6380229	5.32	1.3	33.6	66.3
11/06/2028	10	38	34.765	10	21	50.54	1.7526140	1.6387412	5.34	1.3	33.7	66.8
11/07/2028	10	40	41.005	10	10	07.89	1.7443252	1.6394508	5.37	1.3	33.8	67.2
11/08/2028	10	42	46.702	09	58	25.36	1.7359895	1.6401517	5.39	1.3	34.0	67.7
11/09/2028	10	44	51.850	09	46	43.10	1.7276072	1.6408439	5.42	1.3	34.1	68.2
11/10/2028	10	46	56.446	09	35	01.25	1.7191785	1.6415274	5.45	1.3	34.2	68.6
11/11/2028	10	49	00.484	09	23	19.98	1.7107038	1.6422021	5.47	1.3	34.3	69.1
11/12/2028	10	51	03.960	09	11	39.41	1.7021834	1.6428680	5.50	1.3	34.4	69.5
11/13/2028	10	53	06.868	08	59	59.69	1.6936179	1.6435250	5.53	1.3	34.5	70.0
11/14/2028	10	55	09.207	08	48	20.96	1.6850077	1.6441731	5.56	1.2	34.6	70.5
11/15/2028	10	57	10.970	08	36	43.37	1.6763538	1.6448123	5.59	1.2	34.7	70.9
11/16/2028	10	59	12.154	08	25	07.06	1.6676569	1.6454426	5.62	1.2	34.8	71.4
11/17/2028	11	01	12.753	08	13	32.18	1.6589179	1.6460638	5.65	1.2	34.9	71.9
11/18/2028	11	03	12.761	08	01	58.87	1.6501379	1.6466761	5.68	1.2	35.0	72.4
11/19/2028	11	05	12.171	07	50	27.27	1.6413178	1.6472793	5.71	1.2	35.0	72.8
11/20/2028	11	07	10.979	07	38	57.52	1.6324586	1.6478735	5.74	1.2	35.1	73.3
11/21/2028	11	09	09.178	07	27	29.75	1.6235611	1.6484585	5.77	1.2	35.2	73.8
11/22/2028	11	11	06.765	07	16	04.07	1.6146264	1.6490344	5.80	1.2	35.2	74.3
11/23/2028	11	13	03.736	07	04	40.62	1.6056552	1.6496012	5.83	1.2	35.3	74.8
11/24/2028	11	15	00.088	06	53	19.50	1.5966483	1.6501588	5.87	1.1	35.3	75.3

Mars - Apparent data

Date Oh TT	Earth			Solar	Equatorial	Phase Solar		
	Right Ascension h m s	Declination d m s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Solar Sep. deg.
11/25/2028	11 16 55.818	06 42 00.82	1.5876065	1.6507071	5.90	1.1	35.4	75.8
11/26/2028	11 18 50.922	06 30 44.71	1.5785305	1.6512463	5.93	1.1	35.4	76.3
11/27/2028	11 20 45.399	06 19 31.27	1.5694210	1.6517761	5.97	1.1	35.5	76.8
11/28/2028	11 22 39.243	06 08 20.62	1.5602785	1.6522967	6.00	1.1	35.5	77.3
11/29/2028	11 24 32.452	05 57 12.88	1.5511039	1.6528079	6.04	1.1	35.6	77.8
11/30/2028	11 26 25.021	05 46 08.18	1.5418976	1.6533098	6.07	1.1	35.6	78.3
12/01/2028	11 28 16.944	05 35 06.63	1.5326603	1.6538023	6.11	1.1	35.7	78.8
12/02/2028	11 30 08.215	05 24 08.37	1.5233924	1.6542855	6.15	1.1	35.8	79.3
12/03/2028	11 31 58.827	05 13 13.55	1.5140945	1.6547592	6.19	1.0	35.8	79.8
12/04/2028	11 33 48.771	05 02 22.30	1.5047671	1.6552235	6.22	1.0	35.9	80.4
12/05/2028	11 35 38.037	04 51 34.77	1.4954106	1.6556783	6.26	1.0	35.9	80.9
12/06/2028	11 37 26.613	04 40 51.14	1.4860255	1.6561236	6.30	1.0	36.0	81.4
12/07/2028	11 39 14.487	04 30 11.55	1.4766125	1.6565595	6.34	1.0	36.1	82.0
12/08/2028	11 41 01.649	04 19 36.18	1.4671721	1.6569858	6.38	1.0	36.1	82.5
12/09/2028	11 42 48.084	04 09 05.17	1.4577050	1.6574026	6.42	1.0	36.2	83.0
12/10/2028	11 44 33.781	03 58 38.68	1.4482120	1.6578098	6.47	1.0	36.2	83.6
12/11/2028	11 46 18.727	03 48 16.88	1.4386940	1.6582074	6.51	0.9	36.3	84.1
12/12/2028	11 48 02.909	03 37 59.93	1.4291521	1.6585955	6.55	0.9	36.3	84.7
12/13/2028	11 49 46.312	03 27 47.97	1.4195873	1.6589739	6.60	0.9	36.3	85.2
12/14/2028	11 51 28.921	03 17 41.17	1.4100008	1.6593426	6.64	0.9	36.3	85.8
12/15/2028	11 53 10.719	03 07 39.70	1.4003941	1.6597018	6.69	0.9	36.4	86.3
12/16/2028	11 54 51.691	02 57 43.71	1.3907686	1.6600512	6.73	0.9	36.4	86.9
12/17/2028	11 56 31.819	02 47 53.37	1.3811255	1.6603910	6.78	0.9	36.4	87.5
12/18/2028	11 58 11.088	02 38 08.82	1.3714664	1.6607210	6.83	0.8	36.3	88.1
12/19/2028	11 59 49.480	02 28 30.21	1.3617927	1.6610414	6.88	0.8	36.3	88.6
12/20/2028	12 01 26.983	02 18 57.68	1.3521057	1.6613520	6.93	0.8	36.3	89.2
12/21/2028	12 03 03.581	02 09 31.37	1.3424068	1.6616528	6.98	0.8	36.3	89.8
12/22/2028	12 04 39.261	02 00 11.39	1.3326972	1.6619439	7.03	0.8	36.3	90.4
12/23/2028	12 06 14.007	01 50 57.89	1.3229784	1.6622252	7.08	0.8	36.2	91.0
12/24/2028	12 07 47.806	01 41 50.99	1.3132515	1.6624968	7.13	0.8	36.2	91.6
12/25/2028	12 09 20.643	01 32 50.83	1.3035178	1.6627585	7.18	0.7	36.1	92.2
12/26/2028	12 10 52.501	01 23 57.54	1.2937784	1.6630104	7.24	0.7	36.1	92.8
12/27/2028	12 12 23.366	01 15 11.27	1.2840346	1.6632525	7.29	0.7	36.1	93.4
12/28/2028	12 13 53.218	01 06 32.14	1.2742875	1.6634847	7.35	0.7	36.0	94.0
12/29/2028	12 15 22.042	00 58 00.31	1.2645383	1.6637071	7.41	0.7	36.0	94.6
12/30/2028	12 16 49.815	00 49 35.93	1.2547881	1.6639197	7.46	0.7	35.9	95.3
12/31/2028	12 18 16.519	00 41 19.17	1.2450378	1.6641224	7.52	0.6	35.9	95.9
01/01/2029	12 19 42.129	00 33 10.19	1.2352887	1.6643152	7.58	0.6	35.9	96.5

Jupiter - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase Solar		
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
12/31/2027	11	51	58.866	02	14	28.05	5.1357125	5.4227880	38.39	-2.1	10.2	101.8
01/01/2028	11	52	07.567	02	13	49.71	5.1200729	5.4229560	38.50	-2.1	10.2	102.8
01/02/2028	11	52	15.581	02	13	15.88	5.1044943	5.4231236	38.62	-2.1	10.1	103.8
01/03/2028	11	52	22.906	02	12	46.55	5.0889816	5.4232908	38.74	-2.1	10.1	104.7
01/04/2028	11	52	29.540	02	12	21.74	5.0735398	5.4234576	38.86	-2.2	10.0	105.7
01/05/2028	11	52	35.482	02	12	01.44	5.0581737	5.4236239	38.98	-2.2	10.0	106.7
01/06/2028	11	52	40.730	02	11	45.66	5.0428881	5.4237898	39.09	-2.2	9.9	107.7
01/07/2028	11	52	45.284	02	11	34.40	5.0276879	5.4239553	39.21	-2.2	9.8	108.7
01/08/2028	11	52	49.143	02	11	27.66	5.0125776	5.4241203	39.33	-2.2	9.8	109.7
01/09/2028	11	52	52.305	02	11	25.44	4.9975621	5.4242849	39.45	-2.2	9.7	110.7
01/10/2028	11	52	54.770	02	11	27.74	4.9826458	5.4244491	39.57	-2.2	9.6	111.7
01/11/2028	11	52	56.535	02	11	34.59	4.9678334	5.4246128	39.68	-2.2	9.6	112.8
01/12/2028	11	52	57.596	02	11	45.99	4.9531292	5.4247761	39.80	-2.2	9.5	113.8
01/13/2028	11	52	57.949	02	12	01.96	4.9385379	5.4249390	39.92	-2.2	9.4	114.8
01/14/2028	11	52	57.593	02	12	22.53	4.9240638	5.4251014	40.04	-2.2	9.3	115.8
01/15/2028	11	52	56.526	02	12	47.68	4.9097116	5.4252634	40.15	-2.2	9.3	116.8
01/16/2028	11	52	54.747	02	13	17.41	4.8954860	5.4254250	40.27	-2.2	9.2	117.9
01/17/2028	11	52	52.259	02	13	51.72	4.8813919	5.4255861	40.39	-2.2	9.1	118.9
01/18/2028	11	52	49.063	02	14	30.58	4.8674343	5.4257468	40.50	-2.2	9.0	119.9
01/19/2028	11	52	45.160	02	15	13.98	4.8536181	5.4259071	40.62	-2.3	8.9	121.0
01/20/2028	11	52	40.551	02	16	01.89	4.8399487	5.4260669	40.73	-2.3	8.8	122.0
01/21/2028	11	52	35.238	02	16	54.32	4.8264311	5.4262263	40.85	-2.3	8.7	123.0
01/22/2028	11	52	29.221	02	17	51.24	4.8130707	5.4263853	40.96	-2.3	8.6	124.1
01/23/2028	11	52	22.501	02	18	52.64	4.7998725	5.4265438	41.07	-2.3	8.5	125.1
01/24/2028	11	52	15.081	02	19	58.49	4.7868419	5.4267019	41.18	-2.3	8.4	126.2
01/25/2028	11	52	06.962	02	21	08.78	4.7739840	5.4268596	41.30	-2.3	8.3	127.3
01/26/2028	11	51	58.147	02	22	23.46	4.7613040	5.4270168	41.41	-2.3	8.2	128.3
01/27/2028	11	51	48.641	02	23	42.51	4.7488068	5.4271735	41.51	-2.3	8.0	129.4
01/28/2028	11	51	38.449	02	25	05.88	4.7364976	5.4273299	41.62	-2.3	7.9	130.4
01/29/2028	11	51	27.575	02	26	33.52	4.7243811	5.4274858	41.73	-2.3	7.8	131.5
01/30/2028	11	51	16.028	02	28	05.38	4.7124623	5.4276412	41.83	-2.3	7.6	132.6
01/31/2028	11	51	03.815	02	29	41.39	4.7007458	5.4277963	41.94	-2.3	7.5	133.6
02/01/2028	11	50	50.944	02	31	21.49	4.6892363	5.4279509	42.04	-2.3	7.4	134.7
02/02/2028	11	50	37.423	02	33	05.61	4.6779384	5.4281050	42.14	-2.3	7.2	135.8
02/03/2028	11	50	23.263	02	34	53.69	4.6668563	5.4282587	42.24	-2.3	7.1	136.9
02/04/2028	11	50	08.473	02	36	45.64	4.6559944	5.4284120	42.34	-2.4	6.9	138.0
02/05/2028	11	49	53.061	02	38	41.41	4.6453569	5.4285648	42.44	-2.4	6.8	139.0
02/06/2028	11	49	37.039	02	40	40.92	4.6349477	5.4287172	42.53	-2.4	6.6	140.1
02/07/2028	11	49	20.414	02	42	44.09	4.6247707	5.4288691	42.63	-2.4	6.5	141.2
02/08/2028	11	49	03.195	02	44	50.88	4.6148297	5.4290206	42.72	-2.4	6.3	142.3
02/09/2028	11	48	45.391	02	47	01.22	4.6051282	5.4291717	42.81	-2.4	6.2	143.4
02/10/2028	11	48	27.009	02	49	15.04	4.5956699	5.4293223	42.90	-2.4	6.0	144.5
02/11/2028	11	48	08.060	02	51	32.28	4.5864583	5.4294725	42.98	-2.4	5.9	145.6
02/12/2028	11	47	48.554	02	53	52.85	4.5779468	5.4296222	43.07	-2.4	5.7	146.7
02/13/2028	11	47	28.505	02	56	16.67	4.5687890	5.4297715	43.15	-2.4	5.5	147.8
02/14/2028	11	47	07.926	02	58	43.63	4.5603386	5.4299203	43.23	-2.4	5.4	148.9
02/15/2028	11	46	46.830	03	01	13.63	4.5521493	5.4300688	43.31	-2.4	5.2	150.0
02/16/2028	11	46	25.231	03	03	46.59	4.5442248	5.4302167	43.38	-2.4	5.0	151.1
02/17/2028	11	46	03.143	03	06	22.40	4.5365686	5.4303642	43.46	-2.4	4.9	152.2
02/18/2028	11	45	40.579	03	09	00.96	4.5291844	5.4305113	43.53	-2.4	4.7	153.3
02/19/2028	11	45	17.551	03	11	42.19	4.5220758	5.4306579	43.60	-2.4	4.5	154.5
02/20/2028	11	44	54.075	03	14	25.98	4.5152460	5.4308041	43.66	-2.4	4.3	155.6
02/21/2028	11	44	30.165	03	17	12.22	4.5086983	5.4309499	43.73	-2.4	4.1	156.7
02/22/2028	11	44	05.836	03	20	00.80	4.5024359	5.4310952	43.79	-2.4	3.9	157.8
02/23/2028	11	43	41.105	03	22	51.61	4.4964617	5.4312400	43.84	-2.4	3.7	158.9

Jupiter - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase Solar		
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
02/24/2028	11	43	15.989	03	25	44.51	4.4907786	5.4313844	43.90	-2.4	3.5	160.0
02/25/2028	11	42	50.505	03	28	39.39	4.4853890	5.4315284	43.95	-2.4	3.4	161.2
02/26/2028	11	42	24.673	03	31	36.11	4.4802956	5.4316719	44.00	-2.5	3.2	162.3
02/27/2028	11	41	58.512	03	34	34.53	4.4755005	5.4318150	44.05	-2.5	3.0	163.4
02/28/2028	11	41	32.043	03	37	34.52	4.4710059	5.4319576	44.09	-2.5	2.8	164.5
02/29/2028	11	41	05.286	03	40	35.93	4.4668135	5.4320998	44.14	-2.5	2.5	165.6
03/01/2028	11	40	38.261	03	43	38.62	4.4629251	5.4322415	44.17	-2.5	2.3	166.8
03/02/2028	11	40	10.989	03	46	42.46	4.4593422	5.4323828	44.21	-2.5	2.1	167.9
03/03/2028	11	39	43.492	03	49	47.29	4.4560660	5.4325236	44.24	-2.5	1.9	169.0
03/04/2028	11	39	15.789	03	52	52.99	4.4530975	5.4326640	44.27	-2.5	1.7	170.1
03/05/2028	11	38	47.901	03	55	59.42	4.4504377	5.4328039	44.30	-2.5	1.5	171.2
03/06/2028	11	38	19.845	03	59	06.47	4.4480872	5.4329434	44.32	-2.5	1.3	172.3
03/07/2028	11	37	51.642	04	02	13.99	4.4460464	5.4330824	44.34	-2.5	1.1	173.4
03/08/2028	11	37	23.309	04	05	21.89	4.4443157	5.4332210	44.36	-2.5	0.9	174.5
03/09/2028	11	36	54.864	04	08	30.02	4.4428953	5.4333592	44.37	-2.5	0.8	175.6
03/10/2028	11	36	26.327	04	11	38.28	4.4417853	5.4334969	44.38	-2.5	0.6	176.6
03/11/2028	11	35	57.718	04	14	46.51	4.4409858	5.4336341	44.39	-2.5	0.4	177.6
03/12/2028	11	35	29.059	04	17	54.59	4.4404968	5.4337709	44.40	-2.5	0.3	178.3
03/13/2028	11	35	00.371	04	21	02.37	4.4403184	5.4339073	44.40	-2.5	0.3	178.4
03/14/2028	11	34	31.675	04	24	09.71	4.4404507	5.4340432	44.40	-2.5	0.4	177.9
03/15/2028	11	34	02.991	04	27	16.49	4.4408937	5.4341786	44.39	-2.5	0.6	177.0
03/16/2028	11	33	34.340	04	30	22.58	4.4416474	5.4343136	44.39	-2.5	0.7	175.9
03/17/2028	11	33	05.740	04	33	27.86	4.4427115	5.4344481	44.38	-2.5	0.9	174.9
03/18/2028	11	32	37.210	04	36	32.20	4.4440857	5.4345822	44.36	-2.5	1.1	173.8
03/19/2028	11	32	08.770	04	39	35.48	4.4457695	5.4347159	44.34	-2.5	1.3	172.7
03/20/2028	11	31	40.438	04	42	37.57	4.4477622	5.4348491	44.32	-2.5	1.5	171.6
03/21/2028	11	31	12.236	04	45	38.35	4.4500629	5.4349818	44.30	-2.5	1.7	170.5
03/22/2028	11	30	44.183	04	48	37.68	4.4526706	5.4351141	44.28	-2.5	1.9	169.4
03/23/2028	11	30	16.299	04	51	35.43	4.4555840	5.4352459	44.25	-2.5	2.2	168.3
03/24/2028	11	29	48.606	04	54	31.47	4.4588018	5.4353773	44.21	-2.5	2.4	167.2
03/25/2028	11	29	21.124	04	57	25.67	4.4623222	5.4355082	44.18	-2.5	2.6	166.1
03/26/2028	11	28	53.874	05	00	17.90	4.4661435	5.4356387	44.14	-2.5	2.8	165.0
03/27/2028	11	28	26.877	05	03	08.02	4.4702637	5.4357687	44.10	-2.5	3.0	163.8
03/28/2028	11	28	00.153	05	05	55.92	4.4746806	5.4358983	44.06	-2.5	3.2	162.7
03/29/2028	11	27	33.723	05	08	41.47	4.4793918	5.4360274	44.01	-2.5	3.4	161.6
03/30/2028	11	27	07.605	05	11	24.55	4.4843948	5.4361561	43.96	-2.4	3.6	160.5
03/31/2028	11	26	41.818	05	14	05.07	4.4896868	5.4362843	43.91	-2.4	3.8	159.4
04/01/2028	11	26	16.379	05	16	42.91	4.4952648	5.4364120	43.86	-2.4	3.9	158.3
04/02/2028	11	25	51.305	05	19	17.99	4.5011259	5.4365393	43.80	-2.4	4.1	157.2
04/03/2028	11	25	26.609	05	21	50.23	4.5072669	5.4366662	43.74	-2.4	4.3	156.1
04/04/2028	11	25	02.307	05	24	19.53	4.5136843	5.4367926	43.68	-2.4	4.5	155.1
04/05/2028	11	24	38.411	05	26	45.83	4.5203749	5.4369185	43.61	-2.4	4.7	154.0
04/06/2028	11	24	14.937	05	29	09.04	4.5273351	5.4370440	43.55	-2.4	4.9	152.9
04/07/2028	11	23	51.897	05	31	29.08	4.5345616	5.4371690	43.48	-2.4	5.0	151.8
04/08/2028	11	23	29.308	05	33	45.88	4.5420509	5.4372936	43.40	-2.4	5.2	150.7
04/09/2028	11	23	07.183	05	35	59.33	4.5497996	5.4374177	43.33	-2.4	5.4	149.6
04/10/2028	11	22	45.536	05	38	09.38	4.5578044	5.4375414	43.25	-2.4	5.5	148.5
04/11/2028	11	22	24.382	05	40	15.93	4.5660620	5.4376646	43.18	-2.4	5.7	147.5
04/12/2028	11	22	03.732	05	42	18.93	4.5745691	5.4377874	43.10	-2.4	5.9	146.4
04/13/2028	11	21	43.597	05	44	18.33	4.5833224	5.4379096	43.01	-2.4	6.0	145.3
04/14/2028	11	21	23.987	05	46	14.07	4.5923186	5.4380315	42.93	-2.4	6.2	144.3
04/15/2028	11	21	04.912	05	48	06.09	4.6015540	5.4381529	42.84	-2.4	6.3	143.2
04/16/2028	11	20	46.382	05	49	54.34	4.6110253	5.4382738	42.76	-2.4	6.5	142.1
04/17/2028	11	20	28.406	05	51	38.77	4.6207285	5.4383943	42.67	-2.4	6.7	141.1
04/18/2028	11	20	10.996	05	53	19.32	4.6306600	5.4385143	42.57	-2.4	6.8	140.0

Jupiter - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Phase	Solar
	h	m s	d	m s	Distance au	Distance au	Diameter arc sec	Mag.	Angle Sep. deg. deg.
04/19/2028	11	19 54.160	05	54 55.94	4.6408159	5.4386338	42.48	-2.4	7.0 139.0
04/20/2028	11	19 37.909	05	56 28.57	4.6511920	5.4387529	42.39	-2.3	7.1 137.9
04/21/2028	11	19 22.253	05	57 57.15	4.6617844	5.4388716	42.29	-2.3	7.3 136.9
04/22/2028	11	19 07.201	05	59 21.64	4.6725887	5.4389897	42.19	-2.3	7.4 135.8
04/23/2028	11	18 52.763	06	00 41.98	4.6836007	5.4391075	42.09	-2.3	7.6 134.8
04/24/2028	11	18 38.948	06	01 58.13	4.6948159	5.4392247	41.99	-2.3	7.7 133.8
04/25/2028	11	18 25.764	06	03 10.05	4.7062299	5.4393415	41.89	-2.3	7.9 132.7
04/26/2028	11	18 13.219	06	04 17.71	4.7178379	5.4394579	41.79	-2.3	8.0 131.7
04/27/2028	11	18 01.320	06	05 21.07	4.7296354	5.4395738	41.68	-2.3	8.1 130.7
04/28/2028	11	17 50.070	06	06 20.11	4.7416174	5.4396892	41.58	-2.3	8.2 129.7
04/29/2028	11	17 39.476	06	07 14.83	4.7537792	5.4398042	41.47	-2.3	8.4 128.6
04/30/2028	11	17 29.539	06	08 05.22	4.7661159	5.4399187	41.36	-2.3	8.5 127.6
05/01/2028	11	17 20.262	06	08 51.28	4.7786225	5.4400327	41.26	-2.3	8.6 126.6
05/02/2028	11	17 11.647	06	09 32.99	4.7912942	5.4401463	41.15	-2.3	8.7 125.6
05/03/2028	11	17 03.695	06	10 10.38	4.8041261	5.4402594	41.04	-2.3	8.8 124.6
05/04/2028	11	16 56.409	06	10 43.42	4.8171134	5.4403721	40.93	-2.3	8.9 123.6
05/05/2028	11	16 49.790	06	11 12.11	4.8302515	5.4404843	40.81	-2.3	9.0 122.6
05/06/2028	11	16 43.842	06	11 36.44	4.8435357	5.4405961	40.70	-2.3	9.1 121.6
05/07/2028	11	16 38.567	06	11 56.41	4.8569616	5.4407074	40.59	-2.2	9.2 120.6
05/08/2028	11	16 33.967	06	12 12.02	4.8705249	5.4408182	40.48	-2.2	9.3 119.6
05/09/2028	11	16 30.043	06	12 23.26	4.8842213	5.4409286	40.36	-2.2	9.4 118.7
05/10/2028	11	16 26.795	06	12 30.16	4.8980467	5.4410385	40.25	-2.2	9.5 117.7
05/11/2028	11	16 24.221	06	12 32.73	4.9119968	5.4411479	40.14	-2.2	9.5 116.7
05/12/2028	11	16 22.320	06	12 30.98	4.9260676	5.4412569	40.02	-2.2	9.6 115.7
05/13/2028	11	16 21.091	06	12 24.92	4.9402549	5.4413654	39.91	-2.2	9.7 114.8
05/14/2028	11	16 20.532	06	12 14.58	4.9545544	5.4414735	39.79	-2.2	9.8 113.8
05/15/2028	11	16 20.642	06	11 59.95	4.9689620	5.4415811	39.68	-2.2	9.9 112.8
05/16/2028	11	16 21.421	06	11 41.05	4.9834733	5.4416882	39.56	-2.2	9.9 111.9
05/17/2028	11	16 22.868	06	11 17.88	4.9980841	5.4417949	39.44	-2.2	10.0 110.9
05/18/2028	11	16 24.983	06	10 50.44	5.0127898	5.4419011	39.33	-2.2	10.1 110.0
05/19/2028	11	16 27.765	06	10 18.75	5.0275863	5.4420068	39.21	-2.2	10.1 109.0
05/20/2028	11	16 31.214	06	09 42.80	5.0424690	5.4421121	39.10	-2.2	10.2 108.1
05/21/2028	11	16 35.330	06	09 02.62	5.0574334	5.4422169	38.98	-2.1	10.3 107.1
05/22/2028	11	16 40.111	06	08 18.20	5.0724752	5.4423213	38.87	-2.1	10.3 106.2
05/23/2028	11	16 45.556	06	07 29.56	5.0875896	5.4424252	38.75	-2.1	10.4 105.3
05/24/2028	11	16 51.663	06	06 36.72	5.1027723	5.4425286	38.64	-2.1	10.4 104.3
05/25/2028	11	16 58.430	06	05 39.71	5.1180184	5.4426316	38.52	-2.1	10.5 103.4
05/26/2028	11	17 05.851	06	04 38.56	5.1333235	5.4427341	38.41	-2.1	10.5 102.5
05/27/2028	11	17 13.923	06	03 33.31	5.1486828	5.4428361	38.29	-2.1	10.6 101.6
05/28/2028	11	17 22.638	06	02 23.99	5.1640919	5.4429377	38.18	-2.1	10.6 100.6
05/29/2028	11	17 31.992	06	01 10.64	5.1795460	5.4430388	38.06	-2.1	10.6 99.7
05/30/2028	11	17 41.978	05	59 53.32	5.1950408	5.4431395	37.95	-2.1	10.6 98.8
05/31/2028	11	17 52.592	05	58 32.04	5.2105719	5.4432397	37.84	-2.1	10.7 97.9
06/01/2028	11	18 03.830	05	57 06.83	5.2261351	5.4433394	37.72	-2.1	10.7 97.0
06/02/2028	11	18 15.686	05	55 37.73	5.2417264	5.4434387	37.61	-2.1	10.7 96.1
06/03/2028	11	18 28.158	05	54 04.75	5.2573416	5.4435375	37.50	-2.1	10.7 95.2
06/04/2028	11	18 41.241	05	52 27.93	5.2729772	5.4436358	37.39	-2.1	10.7 94.3
06/05/2028	11	18 54.932	05	50 47.29	5.2886293	5.4437337	37.28	-2.1	10.7 93.4
06/06/2028	11	19 09.223	05	49 02.88	5.3042945	5.4438311	37.17	-2.0	10.7 92.5
06/07/2028	11	19 24.109	05	47 14.75	5.3199692	5.4439280	37.06	-2.0	10.7 91.6
06/08/2028	11	19 39.583	05	45 22.92	5.3356500	5.4440245	36.95	-2.0	10.7 90.7
06/09/2028	11	19 55.639	05	43 27.44	5.3513334	5.4441205	36.84	-2.0	10.7 89.9
06/10/2028	11	20 12.270	05	41 28.35	5.3670161	5.4442161	36.73	-2.0	10.7 89.0
06/11/2028	11	20 29.471	05	39 25.68	5.3826945	5.4443112	36.63	-2.0	10.7 88.1
06/12/2028	11	20 47.236	05	37 19.46	5.3983653	5.4444058	36.52	-2.0	10.7 87.2

Jupiter - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
06/13/2028	11	21	05.560	05	35	09.72	5.4140249	5.4445000	36.41	-2.0	10.7	86.4
06/14/2028	11	21	24.438	05	32	56.48	5.4296698	5.4445936	36.31	-2.0	10.7	85.5
06/15/2028	11	21	43.868	05	30	39.77	5.4452966	5.4446869	36.20	-2.0	10.7	84.6
06/16/2028	11	22	03.844	05	28	19.61	5.4609017	5.4447796	36.10	-2.0	10.7	83.8
06/17/2028	11	22	24.363	05	25	56.03	5.4764815	5.4448719	36.00	-2.0	10.7	82.9
06/18/2028	11	22	45.421	05	23	29.05	5.4920325	5.4449638	35.90	-2.0	10.7	82.0
06/19/2028	11	23	07.013	05	20	58.70	5.5075512	5.4450551	35.80	-2.0	10.7	81.2
06/20/2028	11	23	29.134	05	18	25.00	5.5230338	5.4451460	35.70	-2.0	10.6	80.3
06/21/2028	11	23	51.780	05	15	48.00	5.5384768	5.4452365	35.60	-1.9	10.6	79.5
06/22/2028	11	24	14.944	05	13	07.73	5.5538765	5.4453264	35.50	-1.9	10.6	78.6
06/23/2028	11	24	38.620	05	10	24.24	5.5692292	5.4454159	35.40	-1.9	10.6	77.8
06/24/2028	11	25	02.799	05	07	37.58	5.5845313	5.4455050	35.30	-1.9	10.5	76.9
06/25/2028	11	25	27.474	05	04	47.81	5.5997792	5.4455935	35.21	-1.9	10.5	76.1
06/26/2028	11	25	52.636	05	01	54.96	5.6149693	5.4456816	35.11	-1.9	10.4	75.3
06/27/2028	11	26	18.279	04	58	59.08	5.6300981	5.4457693	35.02	-1.9	10.4	74.4
06/28/2028	11	26	44.396	04	56	00.20	5.6451625	5.4458565	34.92	-1.9	10.3	73.6
06/29/2028	11	27	10.984	04	52	58.37	5.6601593	5.4459432	34.83	-1.9	10.3	72.8
06/30/2028	11	27	38.036	04	49	53.60	5.6750856	5.4460294	34.74	-1.9	10.2	71.9
07/01/2028	11	28	05.548	04	46	45.93	5.6899384	5.4461152	34.65	-1.9	10.2	71.1
07/02/2028	11	28	33.514	04	43	35.40	5.7047150	5.4462005	34.56	-1.9	10.1	70.3
07/03/2028	11	29	01.928	04	40	22.04	5.7194129	5.4462853	34.47	-1.9	10.1	69.4
07/04/2028	11	29	30.783	04	37	05.91	5.7340295	5.4463697	34.38	-1.9	10.0	68.6
07/05/2028	11	30	00.071	04	33	47.04	5.7485623	5.4464536	34.29	-1.9	10.0	67.8
07/06/2028	11	30	29.785	04	30	25.49	5.7630089	5.4465371	34.21	-1.9	9.9	67.0
07/07/2028	11	30	59.919	04	27	01.28	5.7773668	5.4466200	34.12	-1.9	9.8	66.2
07/08/2028	11	31	30.465	04	23	34.47	5.7916336	5.4467025	34.04	-1.9	9.8	65.4
07/09/2028	11	32	01.419	04	20	05.08	5.8058069	5.4467846	33.96	-1.9	9.7	64.5
07/10/2028	11	32	32.774	04	16	33.14	5.8198841	5.4468662	33.87	-1.8	9.6	63.7
07/11/2028	11	33	04.526	04	12	58.69	5.8338629	5.4469473	33.79	-1.8	9.6	62.9
07/12/2028	11	33	36.671	04	09	21.74	5.8477407	5.4470279	33.71	-1.8	9.5	62.1
07/13/2028	11	34	09.203	04	05	42.32	5.8615150	5.4471081	33.63	-1.8	9.4	61.3
07/14/2028	11	34	42.120	04	02	00.47	5.8751832	5.4471878	33.56	-1.8	9.4	60.5
07/15/2028	11	35	15.417	03	58	16.19	5.8887428	5.4472670	33.48	-1.8	9.3	59.7
07/16/2028	11	35	49.091	03	54	29.53	5.9021912	5.4473458	33.40	-1.8	9.2	58.9
07/17/2028	11	36	23.136	03	50	40.50	5.9155258	5.4474241	33.33	-1.8	9.2	58.1
07/18/2028	11	36	57.548	03	46	49.15	5.9287440	5.4475019	33.25	-1.8	9.1	57.3
07/19/2028	11	37	32.322	03	42	55.50	5.9418431	5.4475793	33.18	-1.8	9.0	56.5
07/20/2028	11	38	07.451	03	38	59.60	5.9548204	5.4476562	33.11	-1.8	8.9	55.7
07/21/2028	11	38	42.929	03	35	01.49	5.9676733	5.4477326	33.04	-1.8	8.8	54.9
07/22/2028	11	39	18.748	03	31	01.23	5.9803990	5.4478086	32.97	-1.8	8.7	54.1
07/23/2028	11	39	54.901	03	26	58.86	5.9929949	5.4478841	32.90	-1.8	8.6	53.4
07/24/2028	11	40	31.381	03	22	54.42	6.0054584	5.4479591	32.83	-1.8	8.6	52.6
07/25/2028	11	41	08.182	03	18	47.96	6.0177870	5.4480336	32.76	-1.8	8.5	51.8
07/26/2028	11	41	45.300	03	14	39.50	6.0299786	5.4481077	32.69	-1.8	8.4	51.0
07/27/2028	11	42	22.731	03	10	29.08	6.0420309	5.4481813	32.63	-1.8	8.3	50.2
07/28/2028	11	43	00.470	03	06	16.71	6.0539420	5.4482545	32.56	-1.8	8.2	49.4
07/29/2028	11	43	38.513	03	02	02.44	6.0657100	5.4483272	32.50	-1.8	8.0	48.6
07/30/2028	11	44	16.854	02	57	46.30	6.0773333	5.4483994	32.44	-1.8	7.9	47.9
07/31/2028	11	44	55.487	02	53	28.33	6.0888100	5.4484711	32.38	-1.8	7.8	47.1
08/01/2028	11	45	34.406	02	49	08.58	6.1001386	5.4485424	32.32	-1.8	7.7	46.3
08/02/2028	11	46	13.604	02	44	47.08	6.1113175	5.4486132	32.26	-1.8	7.6	45.5
08/03/2028	11	46	53.075	02	40	23.88	6.1223451	5.4486835	32.20	-1.7	7.5	44.7
08/04/2028	11	47	32.813	02	35	59.01	6.1332200	5.4487534	32.14	-1.7	7.4	44.0
08/05/2028	11	48	12.813	02	31	32.51	6.1439404	5.4488228	32.09	-1.7	7.3	43.2
08/06/2028	11	48	53.070	02	27	04.42	6.1545049	5.4488917	32.03	-1.7	7.2	42.4

Jupiter - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
08/07/2028	11	49	33.581	02	22	34.74	6.1649118	5.4489601	31.98	-1.7	7.1	41.6
08/08/2028	11	50	14.340	02	18	03.52	6.1751595	5.4490281	31.93	-1.7	7.0	40.9
08/09/2028	11	50	55.345	02	13	30.77	6.1852464	5.4490956	31.87	-1.7	6.9	40.1
08/10/2028	11	51	36.593	02	08	56.52	6.1951709	5.4491626	31.82	-1.7	6.8	39.3
08/11/2028	11	52	18.080	02	04	20.80	6.2049311	5.4492292	31.77	-1.7	6.7	38.6
08/12/2028	11	52	59.804	01	59	43.62	6.2145254	5.4492953	31.72	-1.7	6.6	37.8
08/13/2028	11	53	41.760	01	55	05.00	6.2239521	5.4493609	31.68	-1.7	6.5	37.0
08/14/2028	11	54	23.944	01	50	24.99	6.2332094	5.4494261	31.63	-1.7	6.4	36.3
08/15/2028	11	55	06.354	01	45	43.62	6.2422955	5.4494908	31.58	-1.7	6.2	35.5
08/16/2028	11	55	48.983	01	41	00.91	6.2512085	5.4495550	31.54	-1.7	6.1	34.7
08/17/2028	11	56	31.826	01	36	16.90	6.2599468	5.4496187	31.49	-1.7	6.0	34.0
08/18/2028	11	57	14.877	01	31	31.65	6.2685083	5.4496820	31.45	-1.7	5.9	33.2
08/19/2028	11	57	58.129	01	26	45.20	6.2768912	5.4497448	31.41	-1.7	5.8	32.4
08/20/2028	11	58	41.577	01	21	57.60	6.2850937	5.4498071	31.37	-1.7	5.6	31.7
08/21/2028	11	59	25.214	01	17	08.88	6.2931141	5.4498689	31.33	-1.7	5.5	30.9
08/22/2028	12	00	09.037	01	12	19.08	6.3009508	5.4499303	31.29	-1.7	5.4	30.1
08/23/2028	12	00	53.043	01	07	28.22	6.3086022	5.4499912	31.25	-1.7	5.2	29.4
08/24/2028	12	01	37.228	01	02	36.32	6.3160672	5.4500517	31.21	-1.7	5.1	28.6
08/25/2028	12	02	21.589	00	57	43.43	6.3233446	5.4501116	31.18	-1.7	5.0	27.9
08/26/2028	12	03	06.121	00	52	49.56	6.3304334	5.4501711	31.14	-1.7	4.8	27.1
08/27/2028	12	03	50.819	00	47	54.77	6.3373327	5.4502302	31.11	-1.7	4.7	26.3
08/28/2028	12	04	35.676	00	42	59.09	6.3440416	5.4502887	31.08	-1.7	4.6	25.6
08/29/2028	12	05	20.687	00	38	02.56	6.3505593	5.4503468	31.04	-1.7	4.5	24.8
08/30/2028	12	06	05.846	00	33	05.22	6.3568851	5.4504044	31.01	-1.7	4.3	24.0
08/31/2028	12	06	51.149	00	28	07.11	6.3630182	5.4504615	30.98	-1.7	4.2	23.3
09/01/2028	12	07	36.589	00	23	08.26	6.3689577	5.4505182	30.95	-1.7	4.1	22.5
09/02/2028	12	08	22.163	00	18	08.71	6.3747029	5.4505744	30.93	-1.7	3.9	21.8
09/03/2028	12	09	07.868	00	13	08.49	6.3802529	5.4506301	30.90	-1.7	3.8	21.0
09/04/2028	12	09	53.700	00	08	07.61	6.3856070	5.4506853	30.87	-1.7	3.7	20.2
09/05/2028	12	10	39.655	00	03	06.10	6.3907644	5.4507401	30.85	-1.7	3.6	19.5
09/06/2028	12	11	25.732	-00	01	56.01	6.3957240	5.4507944	30.82	-1.7	3.4	18.7
09/07/2028	12	12	11.927	-00	06	58.70	6.4004851	5.4508482	30.80	-1.7	3.3	18.0
09/08/2028	12	12	58.239	-00	12	01.95	6.4050468	5.4509016	30.78	-1.7	3.2	17.2
09/09/2028	12	13	44.663	-00	17	05.74	6.4094080	5.4509545	30.76	-1.7	3.0	16.5
09/10/2028	12	14	31.196	-00	22	10.04	6.4135679	5.4510069	30.74	-1.7	2.9	15.7
09/11/2028	12	15	17.835	-00	27	14.81	6.4175254	5.4510588	30.72	-1.7	2.8	14.9
09/12/2028	12	16	04.576	-00	32	20.03	6.4212795	5.4511103	30.70	-1.7	2.6	14.2
09/13/2028	12	16	51.413	-00	37	25.66	6.4248293	5.4511612	30.68	-1.7	2.5	13.4
09/14/2028	12	17	38.341	-00	42	31.65	6.4281736	5.4512117	30.67	-1.7	2.4	12.7
09/15/2028	12	18	25.355	-00	47	37.97	6.4313113	5.4512618	30.65	-1.7	2.2	11.9
09/16/2028	12	19	12.449	-00	52	44.56	6.4342416	5.4513113	30.64	-1.7	2.1	11.2
09/17/2028	12	19	59.617	-00	57	51.39	6.4369632	5.4513604	30.63	-1.7	1.9	10.4
09/18/2028	12	20	46.855	-01	02	58.42	6.4394754	5.4514090	30.62	-1.7	1.8	9.6
09/19/2028	12	21	34.161	-01	08	05.62	6.4417772	5.4514572	30.60	-1.7	1.7	8.9
09/20/2028	12	22	21.530	-01	13	12.96	6.4438681	5.4515049	30.59	-1.7	1.5	8.1
09/21/2028	12	23	08.961	-01	18	20.43	6.4457476	5.4515520	30.59	-1.7	1.4	7.4
09/22/2028	12	23	56.449	-01	23	27.98	6.4474154	5.4515988	30.58	-1.7	1.2	6.6
09/23/2028	12	24	43.988	-01	28	35.59	6.4488714	5.4516450	30.57	-1.7	1.1	5.9
09/24/2028	12	25	31.574	-01	33	43.20	6.4501154	5.4516908	30.56	-1.7	0.9	5.1
09/25/2028	12	26	19.200	-01	38	50.79	6.4511474	5.4517361	30.56	-1.7	0.8	4.4
09/26/2028	12	27	06.860	-01	43	58.30	6.4519674	5.4517809	30.56	-1.7	0.7	3.6
09/27/2028	12	27	54.550	-01	49	05.69	6.4525756	5.4518252	30.55	-1.7	0.5	2.9
09/28/2028	12	28	42.264	-01	54	12.92	6.4529718	5.4518691	30.55	-1.7	0.4	2.2
09/29/2028	12	29	29.998	-01	59	19.93	6.4531562	5.4519125	30.55	-1.7	0.3	1.6
09/30/2028	12	30	17.744	-02	04	26.63	6.4531286	5.4519554	30.55	-1.7	0.2	1.2

Jupiter - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Phase	Solar	
	h	m s	d	m s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
10/01/2028	12 31	05.489	-02 09	33.16	6.4528893	5.4519979	30.55	-1.7	0.2	1.2
10/02/2028	12 31	53.249	-02 14	39.63	6.4524380	5.4520398	30.55	-1.7	0.3	1.6
10/03/2028	12 32	41.022	-02 19	45.79	6.4517749	5.4520813	30.56	-1.7	0.4	2.2
10/04/2028	12 33	28.799	-02 24	51.60	6.4508999	5.4521224	30.56	-1.7	0.5	2.9
10/05/2028	12 34	16.578	-02 29	57.05	6.4498129	5.4521629	30.57	-1.7	0.6	3.6
10/06/2028	12 35	04.354	-02 35	02.14	6.4485138	5.4522030	30.57	-1.7	0.8	4.3
10/07/2028	12 35	52.123	-02 40	06.84	6.4470026	5.4522426	30.58	-1.7	0.9	5.1
10/08/2028	12 36	39.883	-02 45	11.12	6.4452791	5.4522817	30.59	-1.7	1.0	5.8
10/09/2028	12 37	27.628	-02 50	14.95	6.4433432	5.4523203	30.60	-1.7	1.2	6.6
10/10/2028	12 38	15.353	-02 55	18.30	6.4411947	5.4523585	30.61	-1.7	1.3	7.4
10/11/2028	12 39	03.054	-03 00	21.13	6.4388334	5.4523962	30.62	-1.7	1.4	8.1
10/12/2028	12 39	50.724	-03 05	23.39	6.4362592	5.4524334	30.63	-1.7	1.6	8.9
10/13/2028	12 40	38.359	-03 10	25.05	6.4334719	5.4524701	30.64	-1.7	1.7	9.7
10/14/2028	12 41	25.951	-03 15	26.05	6.4304713	5.4525064	30.66	-1.7	1.9	10.4
10/15/2028	12 42	13.496	-03 20	26.36	6.4272574	5.4525422	30.67	-1.7	2.0	11.2
10/16/2028	12 43	00.991	-03 25	25.95	6.4238301	5.4525775	30.69	-1.7	2.1	12.0
10/17/2028	12 43	48.431	-03 30	24.78	6.4201896	5.4526123	30.71	-1.7	2.3	12.8
10/18/2028	12 44	35.814	-03 35	22.83	6.4163362	5.4526467	30.73	-1.7	2.4	13.5
10/19/2028	12 45	23.135	-03 40	20.07	6.4122703	5.4526805	30.75	-1.7	2.6	14.3
10/20/2028	12 46	10.389	-03 45	16.48	6.4079925	5.4527139	30.77	-1.7	2.7	15.1
10/21/2028	12 46	57.571	-03 50	12.00	6.4035037	5.4527469	30.79	-1.7	2.9	15.9
10/22/2028	12 47	44.672	-03 55	06.60	6.3988047	5.4527793	30.81	-1.7	3.0	16.6
10/23/2028	12 48	31.686	-04 00	00.23	6.3938964	5.4528113	30.83	-1.7	3.1	17.4
10/24/2028	12 49	18.607	-04 04	52.86	6.3887798	5.4528427	30.86	-1.7	3.3	18.2
10/25/2028	12 50	05.429	-04 09	44.43	6.3834558	5.4528738	30.88	-1.7	3.4	19.0
10/26/2028	12 50	52.146	-04 14	34.91	6.3779255	5.4529043	30.91	-1.7	3.5	19.8
10/27/2028	12 51	38.755	-04 19	24.28	6.3721898	5.4529343	30.94	-1.7	3.7	20.6
10/28/2028	12 52	25.251	-04 24	12.50	6.3662497	5.4529639	30.97	-1.7	3.8	21.4
10/29/2028	12 53	11.629	-04 28	59.54	6.3601062	5.4529930	31.00	-1.7	3.9	22.1
10/30/2028	12 53	57.887	-04 33	45.39	6.3537603	5.4530216	31.03	-1.7	4.1	22.9
10/31/2028	12 54	44.021	-04 38	30.01	6.3472128	5.4530498	31.06	-1.7	4.2	23.7
11/01/2028	12 55	30.027	-04 43	13.38	6.3404649	5.4530774	31.09	-1.7	4.3	24.5
11/02/2028	12 56	15.902	-04 47	55.47	6.3335173	5.4531046	31.13	-1.7	4.4	25.3
11/03/2028	12 57	01.640	-04 52	36.27	6.3263710	5.4531313	31.16	-1.7	4.6	26.1
11/04/2028	12 57	47.238	-04 57	15.74	6.3190269	5.4531575	31.20	-1.7	4.7	26.9
11/05/2028	12 58	32.691	-05 01	53.85	6.3114860	5.4531833	31.24	-1.7	4.8	27.7
11/06/2028	12 59	17.993	-05 06	30.57	6.3037490	5.4532086	31.27	-1.7	4.9	28.5
11/07/2028	13 00	03.137	-05 11	05.85	6.2958168	5.4532334	31.31	-1.7	5.1	29.3
11/08/2028	13 00	48.117	-05 15	39.66	6.2876902	5.4532577	31.35	-1.7	5.2	30.1
11/09/2028	13 01	32.926	-05 20	11.94	6.2793701	5.4532815	31.40	-1.7	5.3	30.9
11/10/2028	13 02	17.558	-05 24	42.66	6.2708574	5.4533048	31.44	-1.7	5.4	31.7
11/11/2028	13 03	02.008	-05 29	11.77	6.2621531	5.4533277	31.48	-1.7	5.6	32.5
11/12/2028	13 03	46.269	-05 33	39.24	6.2532580	5.4533501	31.53	-1.7	5.7	33.3
11/13/2028	13 04	30.337	-05 38	05.03	6.2441735	5.4533720	31.57	-1.7	5.8	34.1
11/14/2028	13 05	14.208	-05 42	29.11	6.2349007	5.4533935	31.62	-1.7	5.9	34.9
11/15/2028	13 05	57.877	-05 46	51.47	6.2254410	5.4534144	31.67	-1.7	6.1	35.8
11/16/2028	13 06	41.338	-05 51	12.06	6.2157959	5.4534349	31.72	-1.7	6.2	36.6
11/17/2028	13 07	24.585	-05 55	30.86	6.2059674	5.4534549	31.77	-1.7	6.3	37.4
11/18/2028	13 08	07.608	-05 59	47.82	6.1959571	5.4534744	31.82	-1.7	6.4	38.2
11/19/2028	13 08	50.401	-06 04	02.89	6.1857672	5.4534934	31.87	-1.7	6.6	39.0
11/20/2028	13 09	32.954	-06 08	16.03	6.1753997	5.4535120	31.92	-1.7	6.7	39.8
11/21/2028	13 10	15.261	-06 12	27.21	6.1648566	5.4535301	31.98	-1.7	6.8	40.7
11/22/2028	13 10	57.315	-06 16	36.36	6.1541401	5.4535477	32.03	-1.7	6.9	41.5
11/23/2028	13 11	39.110	-06 20	43.47	6.1432524	5.4535648	32.09	-1.7	7.0	42.3
11/24/2028	13 12	20.640	-06 24	48.51	6.1321955	5.4535814	32.15	-1.7	7.1	43.1

Jupiter - Apparent data

Date Oh TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
11/25/2028	13	13	01.901	-06	28	51.43	6.1209716	5.4535976	32.21	-1.7	7.2	44.0
11/26/2028	13	13	42.887	-06	32	52.22	6.1095829	5.4536132	32.27	-1.7	7.3	44.8
11/27/2028	13	14	23.594	-06	36	50.86	6.0980314	5.4536284	32.33	-1.8	7.4	45.6
11/28/2028	13	15	04.017	-06	40	47.30	6.0863193	5.4536432	32.39	-1.8	7.5	46.4
11/29/2028	13	15	44.151	-06	44	41.55	6.0744488	5.4536574	32.45	-1.8	7.6	47.3
11/30/2028	13	16	23.990	-06	48	33.56	6.0624219	5.4536712	32.52	-1.8	7.7	48.1
12/01/2028	13	17	03.530	-06	52	23.31	6.0502407	5.4536844	32.58	-1.8	7.8	49.0
12/02/2028	13	17	42.765	-06	56	10.77	6.0379074	5.4536972	32.65	-1.8	7.9	49.8
12/03/2028	13	18	21.686	-06	59	55.91	6.0254240	5.4537095	32.72	-1.8	8.0	50.6
12/04/2028	13	19	00.288	-07	03	38.70	6.0127925	5.4537214	32.79	-1.8	8.1	51.5
12/05/2028	13	19	38.562	-07	07	19.08	6.0000150	5.4537327	32.86	-1.8	8.2	52.3
12/06/2028	13	20	16.501	-07	10	57.01	5.9870935	5.4537436	32.93	-1.8	8.3	53.2
12/07/2028	13	20	54.097	-07	14	32.46	5.9740301	5.4537540	33.00	-1.8	8.4	54.0
12/08/2028	13	21	31.343	-07	18	05.37	5.9608268	5.4537639	33.07	-1.8	8.5	54.9
12/09/2028	13	22	08.233	-07	21	35.72	5.9474860	5.4537734	33.15	-1.8	8.6	55.7
12/10/2028	13	22	44.760	-07	25	03.46	5.9340099	5.4537823	33.22	-1.8	8.6	56.6
12/11/2028	13	23	20.919	-07	28	28.56	5.9204008	5.4537908	33.30	-1.8	8.7	57.4
12/12/2028	13	23	56.703	-07	31	51.01	5.9066615	5.4537988	33.38	-1.8	8.8	58.3
12/13/2028	13	24	32.108	-07	35	10.78	5.8927945	5.4538063	33.46	-1.8	8.9	59.1
12/14/2028	13	25	07.123	-07	38	27.82	5.8788028	5.4538133	33.53	-1.8	9.0	60.0
12/15/2028	13	25	41.742	-07	41	42.11	5.8646894	5.4538199	33.62	-1.8	9.1	60.9
12/16/2028	13	26	15.954	-07	44	53.60	5.8504575	5.4538260	33.70	-1.8	9.2	61.7
12/17/2028	13	26	49.750	-07	48	02.25	5.8361102	5.4538316	33.78	-1.8	9.2	62.6
12/18/2028	13	27	23.122	-07	51	08.01	5.8216510	5.4538367	33.86	-1.8	9.3	63.5
12/19/2028	13	27	56.062	-07	54	10.84	5.8070833	5.4538413	33.95	-1.8	9.4	64.4
12/20/2028	13	28	28.561	-07	57	10.72	5.7924104	5.4538455	34.04	-1.9	9.4	65.2
12/21/2028	13	29	00.613	-08	00	07.60	5.7776357	5.4538491	34.12	-1.9	9.5	66.1
12/22/2028	13	29	32.213	-08	03	01.45	5.7627627	5.4538523	34.21	-1.9	9.6	67.0
12/23/2028	13	30	03.355	-08	05	52.26	5.7477948	5.4538550	34.30	-1.9	9.6	67.9
12/24/2028	13	30	34.032	-08	08	40.00	5.7327354	5.4538573	34.39	-1.9	9.7	68.7
12/25/2028	13	31	04.240	-08	11	24.65	5.7175879	5.4538590	34.48	-1.9	9.7	69.6
12/26/2028	13	31	33.972	-08	14	06.18	5.7023558	5.4538603	34.57	-1.9	9.8	70.5
12/27/2028	13	32	03.223	-08	16	44.57	5.6870425	5.4538611	34.67	-1.9	9.8	71.4
12/28/2028	13	32	31.988	-08	19	19.81	5.6716513	5.4538614	34.76	-1.9	9.9	72.3
12/29/2028	13	33	00.259	-08	21	51.87	5.6561856	5.4538612	34.85	-1.9	9.9	73.2
12/30/2028	13	33	28.029	-08	24	20.72	5.6406489	5.4538606	34.95	-1.9	9.9	74.1
12/31/2028	13	33	55.292	-08	26	46.33	5.6250445	5.4538594	35.05	-1.9	10.0	75.0
01/01/2029	13	34	22.039	-08	29	08.66	5.6093755	5.4538578	35.15	-1.9	10.0	75.9

03/12/2028 15:36:42 Jupiter at max angle from sun 178.486 degrees.

Saturn - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
12/31/2027	01	21	41.919	05	51	05.66	9.0463997	9.3005486	18.37	0.5	5.9	102.0
01/01/2028	01	21	44.561	05	51	39.95	9.0626632	9.3002687	18.34	0.5	6.0	101.0
01/02/2028	01	21	47.615	05	52	16.71	9.0789815	9.2999889	18.31	0.5	6.0	100.0
01/03/2028	01	21	51.082	05	52	55.92	9.0953492	9.2997092	18.27	0.5	6.0	99.0
01/04/2028	01	21	54.961	05	53	37.57	9.1117610	9.2994295	18.24	0.5	6.0	98.0
01/05/2028	01	21	59.252	05	54	21.66	9.1282116	9.2991500	18.21	0.5	6.0	97.0
01/06/2028	01	22	03.953	05	55	08.18	9.1446960	9.2988705	18.17	0.5	6.0	96.0
01/07/2028	01	22	09.066	05	55	57.11	9.1612091	9.2985911	18.14	0.5	6.0	95.0
01/08/2028	01	22	14.588	05	56	48.45	9.1777457	9.2983118	18.11	0.5	6.0	94.0
01/09/2028	01	22	20.518	05	57	42.19	9.1943011	9.2980325	18.08	0.5	6.0	93.0
01/10/2028	01	22	26.854	05	58	38.30	9.2108704	9.2977533	18.04	0.5	6.0	92.0
01/11/2028	01	22	33.591	05	59	36.76	9.2274490	9.2974743	18.01	0.5	6.0	91.0
01/12/2028	01	22	40.724	06	00	37.54	9.2440323	9.2971952	17.98	0.5	6.0	90.1
01/13/2028	01	22	48.251	06	01	40.61	9.2606159	9.2969163	17.95	0.5	6.0	89.1
01/14/2028	01	22	56.167	06	02	45.93	9.2771954	9.2966374	17.91	0.5	6.0	88.1
01/15/2028	01	23	04.470	06	03	53.49	9.2937663	9.2963587	17.88	0.5	6.0	87.1
01/16/2028	01	23	13.160	06	05	03.26	9.3103243	9.2960800	17.85	0.5	6.0	86.1
01/17/2028	01	23	22.237	06	06	15.25	9.3268648	9.2958013	17.82	0.5	6.0	85.2
01/18/2028	01	23	31.702	06	07	29.44	9.3433831	9.2955228	17.79	0.5	6.0	84.2
01/19/2028	01	23	41.554	06	08	45.83	9.3598747	9.2952443	17.76	0.5	6.0	83.2
01/20/2028	01	23	51.791	06	10	04.42	9.3763348	9.2949659	17.72	0.5	6.0	82.3
01/21/2028	01	24	02.411	06	11	25.18	9.3927585	9.2946876	17.69	0.5	6.0	81.3
01/22/2028	01	24	13.411	06	12	48.09	9.4091410	9.2944094	17.66	0.5	6.0	80.3
01/23/2028	01	24	24.788	06	14	13.13	9.4254775	9.2941312	17.63	0.5	6.0	79.4
01/24/2028	01	24	36.537	06	15	40.27	9.4417632	9.2938532	17.60	0.5	5.9	78.4
01/25/2028	01	24	48.655	06	17	09.47	9.4579933	9.2935752	17.57	0.5	5.9	77.4
01/26/2028	01	25	01.138	06	18	40.70	9.4741629	9.2932973	17.54	0.6	5.9	76.5
01/27/2028	01	25	13.982	06	20	13.93	9.4902675	9.2930194	17.51	0.6	5.9	75.5
01/28/2028	01	25	27.184	06	21	49.13	9.5063022	9.2927417	17.48	0.6	5.9	74.6
01/29/2028	01	25	40.741	06	23	26.28	9.5222625	9.2924640	17.45	0.6	5.8	73.6
01/30/2028	01	25	54.650	06	25	05.33	9.5381439	9.2921864	17.42	0.6	5.8	72.7
01/31/2028	01	26	08.908	06	26	46.28	9.5539419	9.2919089	17.40	0.6	5.8	71.7
02/01/2028	01	26	23.512	06	28	29.09	9.5696523	9.2916315	17.37	0.6	5.7	70.8
02/02/2028	01	26	38.460	06	30	13.75	9.5852706	9.2913541	17.34	0.6	5.7	69.8
02/03/2028	01	26	53.748	06	32	00.22	9.6007929	9.2910768	17.31	0.6	5.7	68.9
02/04/2028	01	27	09.374	06	33	48.49	9.6162149	9.2907997	17.28	0.6	5.6	67.9
02/05/2028	01	27	25.333	06	35	38.54	9.6315329	9.2905225	17.26	0.6	5.6	67.0
02/06/2028	01	27	41.622	06	37	30.32	9.6467430	9.2902455	17.23	0.6	5.5	66.0
02/07/2028	01	27	58.235	06	39	23.82	9.6618415	9.2899686	17.20	0.6	5.5	65.1
02/08/2028	01	28	15.166	06	41	18.99	9.6768250	9.2896917	17.17	0.6	5.4	64.2
02/09/2028	01	28	32.409	06	43	15.80	9.6916899	9.2894149	17.15	0.6	5.4	63.2
02/10/2028	01	28	49.958	06	45	14.20	9.7064332	9.2891382	17.12	0.6	5.4	62.3
02/11/2028	01	29	07.809	06	47	14.14	9.7210515	9.2888616	17.10	0.6	5.3	61.4
02/12/2028	01	29	25.958	06	49	15.60	9.7355417	9.2885851	17.07	0.6	5.3	60.5
02/13/2028	01	29	44.404	06	51	18.57	9.7499005	9.2883086	17.05	0.6	5.2	59.5
02/14/2028	01	30	03.146	06	53	23.02	9.7641247	9.2880323	17.02	0.6	5.2	58.6
02/15/2028	01	30	22.182	06	55	28.95	9.7782109	9.2877560	17.00	0.6	5.1	57.7
02/16/2028	01	30	41.510	06	57	36.35	9.7921557	9.2874798	16.97	0.6	5.1	56.8
02/17/2028	01	31	01.127	06	59	45.19	9.8059555	9.2872037	16.95	0.6	5.0	55.8
02/18/2028	01	31	21.028	07	01	55.44	9.8196070	9.2869276	16.92	0.6	5.0	54.9
02/19/2028	01	31	41.208	07	04	07.07	9.8331065	9.2866517	16.90	0.6	4.9	54.0
02/20/2028	01	32	01.662	07	06	20.05	9.8464507	9.2863758	16.88	0.6	4.9	53.1
02/21/2028	01	32	22.385	07	08	34.34	9.8596361	9.2861000	16.86	0.6	4.8	52.2
02/22/2028	01	32	43.372	07	10	49.91	9.8726592	9.2858243	16.83	0.6	4.8	51.3
02/23/2028	01	33	04.619	07	13	06.71	9.8855168	9.2855487	16.81	0.6	4.7	50.4

Saturn - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
02/24/2028	01	33	26.121	07	15	24.71	9.8982057	9.2852732	16.79	0.6	4.6	49.4
02/25/2028	01	33	47.874	07	17	43.87	9.9107225	9.2849978	16.77	0.6	4.6	48.5
02/26/2028	01	34	09.874	07	20	04.18	9.9230643	9.2847224	16.75	0.6	4.5	47.6
02/27/2028	01	34	32.118	07	22	25.59	9.9352280	9.2844471	16.73	0.6	4.4	46.7
02/28/2028	01	34	54.602	07	24	48.08	9.9472107	9.2841719	16.71	0.6	4.4	45.8
02/29/2028	01	35	17.322	07	27	11.63	9.9590095	9.2838968	16.69	0.6	4.3	44.9
03/01/2028	01	35	40.275	07	29	36.20	9.9706218	9.2836218	16.67	0.5	4.2	44.0
03/02/2028	01	36	03.457	07	32	01.78	9.9820449	9.2833469	16.65	0.5	4.2	43.1
03/03/2028	01	36	26.864	07	34	28.33	9.9932765	9.2830720	16.63	0.5	4.1	42.2
03/04/2028	01	36	50.491	07	36	55.84	10.0043141	9.2827972	16.61	0.5	4.0	41.3
03/05/2028	01	37	14.333	07	39	24.25	10.0151555	9.2825226	16.59	0.5	3.9	40.4
03/06/2028	01	37	38.383	07	41	53.56	10.0257987	9.2822480	16.58	0.5	3.9	39.5
03/07/2028	01	38	02.635	07	44	23.70	10.0362416	9.2819734	16.56	0.5	3.8	38.7
03/08/2028	01	38	27.083	07	46	54.64	10.0464826	9.2816990	16.54	0.5	3.7	37.8
03/09/2028	01	38	51.721	07	49	26.33	10.0565198	9.2814247	16.53	0.5	3.6	36.9
03/10/2028	01	39	16.545	07	51	58.75	10.0663517	9.2811504	16.51	0.5	3.6	36.0
03/11/2028	01	39	41.552	07	54	31.86	10.0759765	9.2808763	16.49	0.5	3.5	35.1
03/12/2028	01	40	06.741	07	57	05.65	10.0853926	9.2806022	16.48	0.5	3.4	34.2
03/13/2028	01	40	32.110	07	59	40.10	10.0945983	9.2803282	16.46	0.5	3.4	33.3
03/14/2028	01	40	57.656	08	02	15.22	10.1035918	9.2800543	16.45	0.5	3.3	32.5
03/15/2028	01	41	23.378	08	04	50.97	10.1123712	9.2797805	16.43	0.5	3.2	31.6
03/16/2028	01	41	49.270	08	07	27.34	10.1209345	9.2795067	16.42	0.5	3.1	30.7
03/17/2028	01	42	15.328	08	10	04.30	10.1292798	9.2792331	16.41	0.5	3.0	29.8
03/18/2028	01	42	41.545	08	12	41.81	10.1374052	9.2789595	16.39	0.5	3.0	28.9
03/19/2028	01	43	07.917	08	15	19.84	10.1453087	9.2786861	16.38	0.5	2.9	28.1
03/20/2028	01	43	34.439	08	17	58.35	10.1529886	9.2784127	16.37	0.5	2.8	27.2
03/21/2028	01	44	01.105	08	20	37.31	10.1604429	9.2781394	16.36	0.5	2.7	26.3
03/22/2028	01	44	27.912	08	23	16.68	10.1676701	9.2778662	16.35	0.5	2.6	25.5
03/23/2028	01	44	54.855	08	25	56.43	10.1746683	9.2775931	16.33	0.5	2.6	24.6
03/24/2028	01	45	21.930	08	28	36.54	10.1814360	9.2773200	16.32	0.5	2.5	23.7
03/25/2028	01	45	49.134	08	31	16.96	10.1879718	9.2770471	16.31	0.5	2.4	22.9
03/26/2028	01	46	16.462	08	33	57.69	10.1942741	9.2767743	16.30	0.5	2.3	22.0
03/27/2028	01	46	43.912	08	36	38.69	10.2003417	9.2765015	16.29	0.5	2.2	21.1
03/28/2028	01	47	11.480	08	39	19.95	10.2061733	9.2762288	16.28	0.5	2.1	20.3
03/29/2028	01	47	39.163	08	42	01.44	10.2117679	9.2759562	16.27	0.5	2.0	19.4
03/30/2028	01	48	06.955	08	44	43.13	10.2171243	9.2756837	16.27	0.5	1.9	18.5
03/31/2028	01	48	34.852	08	47	25.01	10.2222419	9.2754113	16.26	0.5	1.8	17.7
04/01/2028	01	49	02.849	08	50	07.04	10.2271198	9.2751390	16.25	0.5	1.8	16.8
04/02/2028	01	49	30.941	08	52	49.19	10.2317573	9.2748668	16.24	0.4	1.7	16.0
04/03/2028	01	49	59.120	08	55	31.44	10.2361541	9.2745946	16.24	0.4	1.6	15.1
04/04/2028	01	50	27.381	08	58	13.73	10.2403097	9.2743226	16.23	0.4	1.5	14.3
04/05/2028	01	50	55.719	09	00	56.04	10.2442238	9.2740506	16.22	0.4	1.4	13.4
04/06/2028	01	51	24.128	09	03	38.32	10.2478962	9.2737788	16.22	0.4	1.3	12.6
04/07/2028	01	51	52.605	09	06	20.56	10.2513268	9.2735070	16.21	0.4	1.2	11.7
04/08/2028	01	52	21.148	09	09	02.73	10.2545154	9.2732353	16.21	0.4	1.1	10.9
04/09/2028	01	52	49.756	09	11	44.83	10.2574619	9.2729637	16.20	0.4	1.1	10.1
04/10/2028	01	53	18.427	09	14	26.83	10.2601658	9.2726922	16.20	0.4	1.0	9.2
04/11/2028	01	53	47.159	09	17	08.75	10.2626270	9.2724208	16.19	0.4	0.9	8.4
04/12/2028	01	54	15.947	09	19	50.55	10.2648450	9.2721494	16.19	0.4	0.8	7.6
04/13/2028	01	54	44.788	09	22	32.22	10.2668193	9.2718782	16.19	0.4	0.7	6.8
04/14/2028	01	55	13.675	09	25	13.74	10.2685495	9.2716070	16.18	0.4	0.6	6.0
04/15/2028	01	55	42.604	09	27	55.05	10.2700350	9.2713360	16.18	0.4	0.6	5.2
04/16/2028	01	56	11.569	09	30	36.15	10.2712754	9.2710650	16.18	0.4	0.5	4.4
04/17/2028	01	56	40.565	09	33	16.97	10.2722704	9.2707941	16.18	0.4	0.4	3.7
04/18/2028	01	57	09.589	09	35	57.51	10.2730196	9.2705233	16.18	0.4	0.3	3.1

Saturn - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Mag.	Phase	Solar		
	h	m	s	d	m	s	Distance		Distance	Diameter	Angle	Sep.
							au	au	arc sec	deg.	deg.	
04/19/2028	01	57	38.635	09	38	37.71	10.2735226	9.2702527	16.18	0.4	0.3	2.6
04/20/2028	01	58	07.698	09	41	17.56	10.2737794	9.2699821	16.18	0.4	0.2	2.3
04/21/2028	01	58	36.773	09	43	57.08	10.2737896	9.2697115	16.18	0.4	0.2	2.3
04/22/2028	01	59	05.862	09	46	36.26	10.2735534	9.2694411	16.18	0.4	0.3	2.6
04/23/2028	01	59	34.962	09	49	15.05	10.2730707	9.2691708	16.18	0.4	0.3	3.1
04/24/2028	02	00	04.068	09	51	53.41	10.2723415	9.2689006	16.18	0.4	0.4	3.7
04/25/2028	02	00	33.177	09	54	31.32	10.2713662	9.2686304	16.18	0.4	0.5	4.4
04/26/2028	02	01	02.284	09	57	08.76	10.2701451	9.2683604	16.18	0.4	0.6	5.2
04/27/2028	02	01	31.384	09	59	45.73	10.2686785	9.2680904	16.18	0.4	0.7	5.9
04/28/2028	02	02	00.473	10	02	22.18	10.2669670	9.2678205	16.19	0.4	0.8	6.7
04/29/2028	02	02	29.544	10	04	58.11	10.2650114	9.2675508	16.19	0.5	0.8	7.5
04/30/2028	02	02	58.592	10	07	33.49	10.2628124	9.2672811	16.19	0.5	0.9	8.3
05/01/2028	02	03	27.610	10	10	08.27	10.2603710	9.2670115	16.20	0.5	1.0	9.2
05/02/2028	02	03	56.593	10	12	42.43	10.2576881	9.2667420	16.20	0.5	1.1	10.0
05/03/2028	02	04	25.536	10	15	15.93	10.2547648	9.2664726	16.21	0.5	1.2	10.8
05/04/2028	02	04	54.435	10	17	48.76	10.2516023	9.2662033	16.21	0.5	1.3	11.6
05/05/2028	02	05	23.289	10	20	20.89	10.2482017	9.2659341	16.22	0.5	1.4	12.5
05/06/2028	02	05	52.095	10	22	52.31	10.2445641	9.2656650	16.22	0.5	1.5	13.3
05/07/2028	02	06	20.851	10	25	23.03	10.2406905	9.2653960	16.23	0.5	1.5	14.1
05/08/2028	02	06	49.557	10	27	53.02	10.2365821	9.2651270	16.24	0.5	1.6	14.9
05/09/2028	02	07	18.207	10	30	22.30	10.2322397	9.2648582	16.24	0.5	1.7	15.8
05/10/2028	02	07	46.799	10	32	50.84	10.2276642	9.2645895	16.25	0.5	1.8	16.6
05/11/2028	02	08	15.327	10	35	18.61	10.2228565	9.2643208	16.26	0.5	1.9	17.4
05/12/2028	02	08	43.786	10	37	45.61	10.2178173	9.2640523	16.27	0.5	2.0	18.3
05/13/2028	02	09	12.170	10	40	11.80	10.2125474	9.2637838	16.27	0.5	2.0	19.1
05/14/2028	02	09	40.475	10	42	37.14	10.2070477	9.2635154	16.28	0.5	2.1	20.0
05/15/2028	02	10	08.697	10	45	01.62	10.2013191	9.2632472	16.29	0.5	2.2	20.8
05/16/2028	02	10	36.830	10	47	25.21	10.1953624	9.2629790	16.30	0.5	2.3	21.6
05/17/2028	02	11	04.872	10	49	47.88	10.1891787	9.2627109	16.31	0.5	2.4	22.5
05/18/2028	02	11	32.818	10	52	09.62	10.1827691	9.2624429	16.32	0.5	2.5	23.3
05/19/2028	02	12	00.666	10	54	30.41	10.1761346	9.2621751	16.33	0.5	2.6	24.1
05/20/2028	02	12	28.412	10	56	50.23	10.1692765	9.2619073	16.34	0.5	2.7	25.0
05/21/2028	02	12	56.053	10	59	09.07	10.1621960	9.2616396	16.35	0.5	2.7	25.8
05/22/2028	02	13	23.585	11	01	26.91	10.1548945	9.2613720	16.37	0.5	2.8	26.7
05/23/2028	02	13	51.004	11	03	43.74	10.1473735	9.2611045	16.38	0.5	2.9	27.5
05/24/2028	02	14	18.307	11	05	59.55	10.1396345	9.2608370	16.39	0.5	3.0	28.3
05/25/2028	02	14	45.488	11	08	14.32	10.1316793	9.2605697	16.40	0.5	3.1	29.2
05/26/2028	02	15	12.542	11	10	28.03	10.1235096	9.2603025	16.42	0.5	3.2	30.0
05/27/2028	02	15	39.462	11	12	40.66	10.1151275	9.2600354	16.43	0.5	3.2	30.9
05/28/2028	02	16	06.242	11	14	52.17	10.1065349	9.2597684	16.44	0.5	3.3	31.7
05/29/2028	02	16	32.877	11	17	02.54	10.0977341	9.2595014	16.46	0.5	3.4	32.6
05/30/2028	02	16	59.360	11	19	11.74	10.0887273	9.2592346	16.47	0.5	3.5	33.4
05/31/2028	02	17	25.690	11	21	19.75	10.0795168	9.2589679	16.49	0.5	3.6	34.2
06/01/2028	02	17	51.862	11	23	26.55	10.0701049	9.2587012	16.50	0.5	3.6	35.1
06/02/2028	02	18	17.875	11	25	32.13	10.0604938	9.2584347	16.52	0.5	3.7	35.9
06/03/2028	02	18	43.727	11	27	36.49	10.0506859	9.2581682	16.54	0.5	3.8	36.8
06/04/2028	02	19	09.416	11	29	39.63	10.0406833	9.2579019	16.55	0.5	3.9	37.6
06/05/2028	02	19	34.940	11	31	41.55	10.0304881	9.2576356	16.57	0.5	3.9	38.5
06/06/2028	02	20	00.294	11	33	42.23	10.0201025	9.2573695	16.59	0.5	4.0	39.3
06/07/2028	02	20	25.473	11	35	41.67	10.0095284	9.2571034	16.60	0.5	4.1	40.2
06/08/2028	02	20	50.473	11	37	39.85	9.9987678	9.2568374	16.62	0.5	4.1	41.0
06/09/2028	02	21	15.289	11	39	36.74	9.9878227	9.2565716	16.64	0.5	4.2	41.9
06/10/2028	02	21	39.914	11	41	32.32	9.9766951	9.2563058	16.66	0.5	4.3	42.7
06/11/2028	02	22	04.345	11	43	26.57	9.9653869	9.2560401	16.68	0.5	4.3	43.6
06/12/2028	02	22	28.577	11	45	19.46	9.9539001	9.2557745	16.70	0.5	4.4	44.4

Saturn - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
06/13/2028	02	22	52.606	11	47	10.97	9.9422370	9.2555091	16.72	0.5	4.5	45.3
06/14/2028	02	23	16.429	11	49	01.10	9.9303995	9.2552437	16.74	0.5	4.5	46.1
06/15/2028	02	23	40.043	11	50	49.81	9.9183900	9.2549784	16.76	0.5	4.6	47.0
06/16/2028	02	24	03.443	11	52	37.10	9.9062107	9.2547132	16.78	0.5	4.7	47.8
06/17/2028	02	24	26.628	11	54	22.96	9.8938640	9.2544481	16.80	0.5	4.7	48.7
06/18/2028	02	24	49.592	11	56	07.38	9.8813523	9.2541831	16.82	0.5	4.8	49.5
06/19/2028	02	25	12.334	11	57	50.35	9.8686782	9.2539182	16.84	0.5	4.9	50.4
06/20/2028	02	25	34.848	11	59	31.86	9.8558442	9.2536534	16.86	0.5	4.9	51.2
06/21/2028	02	25	57.131	12	01	11.90	9.8428531	9.2533887	16.88	0.5	5.0	52.1
06/22/2028	02	26	19.176	12	02	50.45	9.8297078	9.2531241	16.91	0.5	5.1	53.0
06/23/2028	02	26	40.978	12	04	27.50	9.8164113	9.2528596	16.93	0.5	5.1	53.8
06/24/2028	02	27	02.530	12	06	03.03	9.8029667	9.2525952	16.95	0.5	5.2	54.7
06/25/2028	02	27	23.826	12	07	37.00	9.7893772	9.2523309	16.98	0.5	5.2	55.5
06/26/2028	02	27	44.861	12	09	09.39	9.7756462	9.2520667	17.00	0.5	5.3	56.4
06/27/2028	02	28	05.631	12	10	40.18	9.7617771	9.2518025	17.03	0.5	5.3	57.3
06/28/2028	02	28	26.133	12	12	09.36	9.7477732	9.2515385	17.05	0.5	5.4	58.1
06/29/2028	02	28	46.364	12	13	36.91	9.7336381	9.2512746	17.07	0.5	5.4	59.0
06/30/2028	02	29	06.325	12	15	02.85	9.7193750	9.2510108	17.10	0.5	5.5	59.9
07/01/2028	02	29	26.012	12	16	27.17	9.7049873	9.2507471	17.12	0.5	5.5	60.7
07/02/2028	02	29	45.424	12	17	49.87	9.6904781	9.2504834	17.15	0.5	5.6	61.6
07/03/2028	02	30	04.556	12	19	10.96	9.6758508	9.2502199	17.18	0.5	5.6	62.5
07/04/2028	02	30	23.405	12	20	30.42	9.6611083	9.2499565	17.20	0.5	5.6	63.4
07/05/2028	02	30	41.965	12	21	48.24	9.6462539	9.2496931	17.23	0.5	5.7	64.2
07/06/2028	02	31	00.233	12	23	04.42	9.6312905	9.2494299	17.26	0.5	5.7	65.1
07/07/2028	02	31	18.203	12	24	18.91	9.6162212	9.2491668	17.28	0.4	5.8	66.0
07/08/2028	02	31	35.870	12	25	31.72	9.6010491	9.2489037	17.31	0.4	5.8	66.9
07/09/2028	02	31	53.231	12	26	42.81	9.5857772	9.2486408	17.34	0.4	5.8	67.7
07/10/2028	02	32	10.282	12	27	52.18	9.5704087	9.2483779	17.37	0.4	5.9	68.6
07/11/2028	02	32	27.020	12	28	59.81	9.5549468	9.2481152	17.39	0.4	5.9	69.5
07/12/2028	02	32	43.441	12	30	05.68	9.5393948	9.2478525	17.42	0.4	5.9	70.4
07/13/2028	02	32	59.543	12	31	09.80	9.5237558	9.2475900	17.45	0.4	6.0	71.3
07/14/2028	02	33	15.324	12	32	12.14	9.5080334	9.2473275	17.48	0.4	6.0	72.2
07/15/2028	02	33	30.779	12	33	12.71	9.4922310	9.2470652	17.51	0.4	6.0	73.0
07/16/2028	02	33	45.906	12	34	11.50	9.4763521	9.2468029	17.54	0.4	6.1	73.9
07/17/2028	02	34	00.702	12	35	08.51	9.4604003	9.2465408	17.57	0.4	6.1	74.8
07/18/2028	02	34	15.163	12	36	03.74	9.4443794	9.2462787	17.60	0.4	6.1	75.7
07/19/2028	02	34	29.284	12	36	57.16	9.4282931	9.2460168	17.63	0.4	6.2	76.6
07/20/2028	02	34	43.061	12	37	48.79	9.4121455	9.2457549	17.66	0.4	6.2	77.5
07/21/2028	02	34	56.488	12	38	38.59	9.3959407	9.2454932	17.69	0.4	6.2	78.4
07/22/2028	02	35	09.559	12	39	26.56	9.3796828	9.2452315	17.72	0.4	6.2	79.3
07/23/2028	02	35	22.269	12	40	12.65	9.3633761	9.2449699	17.75	0.4	6.2	80.2
07/24/2028	02	35	34.613	12	40	56.87	9.3470252	9.2447085	17.78	0.4	6.3	81.1
07/25/2028	02	35	46.590	12	41	39.19	9.3306344	9.2444471	17.81	0.4	6.3	82.0
07/26/2028	02	35	58.200	12	42	19.61	9.3142081	9.2441859	17.84	0.4	6.3	82.9
07/27/2028	02	36	09.440	12	42	58.14	9.2977508	9.2439247	17.87	0.4	6.3	83.8
07/28/2028	02	36	20.311	12	43	34.78	9.2812668	9.2436636	17.91	0.4	6.3	84.7
07/29/2028	02	36	30.812	12	44	09.55	9.2647603	9.2434027	17.94	0.4	6.3	85.6
07/30/2028	02	36	40.941	12	44	42.46	9.2482355	9.2431418	17.97	0.4	6.3	86.6
07/31/2028	02	36	50.694	12	45	13.49	9.2316965	9.2428811	18.00	0.4	6.3	87.5
08/01/2028	02	37	00.068	12	45	42.66	9.2151473	9.2426204	18.03	0.4	6.3	88.4
08/02/2028	02	37	09.059	12	46	09.94	9.1985919	9.2423598	18.07	0.4	6.3	89.3
08/03/2028	02	37	17.665	12	46	35.34	9.1820344	9.2420994	18.10	0.4	6.3	90.2
08/04/2028	02	37	25.882	12	46	58.82	9.1654786	9.2418390	18.13	0.4	6.3	91.2
08/05/2028	02	37	33.707	12	47	20.40	9.1489287	9.2415788	18.17	0.4	6.3	92.1
08/06/2028	02	37	41.138	12	47	40.04	9.1323885	9.2413186	18.20	0.3	6.3	93.0

Saturn - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
08/07/2028	02	37	48.174	12	47	57.76	9.1158622	9.2410585	18.23	0.3	6.3	93.9
08/08/2028	02	37	54.812	12	48	13.54	9.0993539	9.2407986	18.26	0.3	6.3	94.9
08/09/2028	02	38	01.052	12	48	27.38	9.0828676	9.2405387	18.30	0.3	6.3	95.8
08/10/2028	02	38	06.892	12	48	39.28	9.0664077	9.2402790	18.33	0.3	6.3	96.7
08/11/2028	02	38	12.332	12	48	49.24	9.0499783	9.2400193	18.36	0.3	6.3	97.7
08/12/2028	02	38	17.371	12	48	57.28	9.0335838	9.2397598	18.40	0.3	6.2	98.6
08/13/2028	02	38	22.006	12	49	03.38	9.0172285	9.2395003	18.43	0.3	6.2	99.5
08/14/2028	02	38	26.237	12	49	07.57	9.0009170	9.2392410	18.46	0.3	6.2	100.5
08/15/2028	02	38	30.061	12	49	09.83	8.9846537	9.2389817	18.50	0.3	6.2	101.4
08/16/2028	02	38	33.476	12	49	10.17	8.9684434	9.2387226	18.53	0.3	6.2	102.4
08/17/2028	02	38	36.478	12	49	08.59	8.9522907	9.2384635	18.56	0.3	6.1	103.3
08/18/2028	02	38	39.066	12	49	05.08	8.9362006	9.2382046	18.60	0.3	6.1	104.3
08/19/2028	02	38	41.234	12	48	59.63	8.9201779	9.2379458	18.63	0.3	6.1	105.2
08/20/2028	02	38	42.982	12	48	52.23	8.9042277	9.2376870	18.66	0.3	6.1	106.2
08/21/2028	02	38	44.309	12	48	42.86	8.8883551	9.2374284	18.70	0.3	6.0	107.1
08/22/2028	02	38	45.215	12	48	31.54	8.8725652	9.2371698	18.73	0.3	6.0	108.1
08/23/2028	02	38	45.704	12	48	18.28	8.8568630	9.2369114	18.76	0.3	6.0	109.1
08/24/2028	02	38	45.777	12	48	03.10	8.8412536	9.2366531	18.80	0.3	5.9	110.0
08/25/2028	02	38	45.438	12	47	46.02	8.8257416	9.2363949	18.83	0.3	5.9	111.0
08/26/2028	02	38	44.687	12	47	27.07	8.8103318	9.2361367	18.86	0.3	5.8	112.0
08/27/2028	02	38	43.525	12	47	06.25	8.7950288	9.2358787	18.90	0.2	5.8	112.9
08/28/2028	02	38	41.951	12	46	43.59	8.7798372	9.2356208	18.93	0.2	5.7	113.9
08/29/2028	02	38	39.965	12	46	19.08	8.7647612	9.2353630	18.96	0.2	5.7	114.9
08/30/2028	02	38	37.567	12	45	52.73	8.7498053	9.2351052	18.99	0.2	5.6	115.9
08/31/2028	02	38	34.758	12	45	24.54	8.7349739	9.2348476	19.03	0.2	5.6	116.8
09/01/2028	02	38	31.537	12	44	54.51	8.7202711	9.2345901	19.06	0.2	5.5	117.8
09/02/2028	02	38	27.906	12	44	22.64	8.7057015	9.2343327	19.09	0.2	5.5	118.8
09/03/2028	02	38	23.867	12	43	48.95	8.6912691	9.2340754	19.12	0.2	5.4	119.8
09/04/2028	02	38	19.422	12	43	13.44	8.6769784	9.2338182	19.15	0.2	5.4	120.8
09/05/2028	02	38	14.574	12	42	36.13	8.6628336	9.2335611	19.18	0.2	5.3	121.8
09/06/2028	02	38	09.325	12	41	57.03	8.6488391	9.2333041	19.22	0.2	5.3	122.8
09/07/2028	02	38	03.679	12	41	16.16	8.6349992	9.2330472	19.25	0.2	5.2	123.7
09/08/2028	02	37	57.638	12	40	33.54	8.6213183	9.2327904	19.28	0.2	5.2	124.7
09/09/2028	02	37	51.204	12	39	49.19	8.6078007	9.2325337	19.31	0.2	5.1	125.7
09/10/2028	02	37	44.382	12	39	03.13	8.5944510	9.2322772	19.34	0.2	5.0	126.7
09/11/2028	02	37	37.172	12	38	15.39	8.5812735	9.2320207	19.37	0.2	5.0	127.7
09/12/2028	02	37	29.577	12	37	25.97	8.5682727	9.2317643	19.40	0.2	4.9	128.7
09/13/2028	02	37	21.599	12	36	34.91	8.5554533	9.2315080	19.43	0.1	4.8	129.8
09/14/2028	02	37	13.239	12	35	42.20	8.5428198	9.2312519	19.45	0.1	4.8	130.8
09/15/2028	02	37	04.499	12	34	47.87	8.5303768	9.2309958	19.48	0.1	4.7	131.8
09/16/2028	02	36	55.381	12	33	51.92	8.5181291	9.2307399	19.51	0.1	4.6	132.8
09/17/2028	02	36	45.888	12	32	54.36	8.5060813	9.2304840	19.54	0.1	4.5	133.8
09/18/2028	02	36	36.026	12	31	55.21	8.4942381	9.2302283	19.57	0.1	4.5	134.8
09/19/2028	02	36	25.801	12	30	54.50	8.4826043	9.2299726	19.59	0.1	4.4	135.8
09/20/2028	02	36	15.221	12	29	52.26	8.4711841	9.2297171	19.62	0.1	4.3	136.9
09/21/2028	02	36	04.293	12	28	48.55	8.4599821	9.2294616	19.64	0.1	4.2	137.9
09/22/2028	02	35	53.025	12	27	43.41	8.4490023	9.2292063	19.67	0.1	4.1	138.9
09/23/2028	02	35	41.423	12	26	36.89	8.4382486	9.2289511	19.70	0.1	4.0	139.9
09/24/2028	02	35	29.490	12	25	29.00	8.4277250	9.2286960	19.72	0.1	3.9	141.0
09/25/2028	02	35	17.232	12	24	19.78	8.4174349	9.2284410	19.74	0.1	3.8	142.0
09/26/2028	02	35	04.654	12	23	09.26	8.4073819	9.2281860	19.77	0.1	3.7	143.0
09/27/2028	02	34	51.761	12	21	57.46	8.3975694	9.2279312	19.79	0.1	3.7	144.1
09/28/2028	02	34	38.559	12	20	44.40	8.3880007	9.2276765	19.81	0.1	3.6	145.1
09/29/2028	02	34	25.054	12	19	30.10	8.3786791	9.2274220	19.84	0.1	3.5	146.1
09/30/2028	02	34	11.253	12	18	14.61	8.3696079	9.2271675	19.86	0.0	3.4	147.2

Saturn - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Phase Solar		
	h	m s	d	m s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
10/01/2028	02	33 57.164	12	16 57.94	8.3607901	9.2269131	19.88	0.0	3.3	148.2
10/02/2028	02	33 42.795	12	15 40.15	8.3522288	9.2266588	19.90	0.0	3.2	149.3
10/03/2028	02	33 28.153	12	14 21.25	8.3439271	9.2264046	19.92	0.0	3.1	150.3
10/04/2028	02	33 13.247	12	13 01.31	8.3358880	9.2261506	19.94	0.0	3.0	151.3
10/05/2028	02	32 58.085	12	11 40.35	8.3281144	9.2258966	19.96	0.0	2.9	152.4
10/06/2028	02	32 42.675	12	10 18.42	8.3206092	9.2256428	19.97	0.0	2.8	153.4
10/07/2028	02	32 27.024	12	08 55.57	8.3133754	9.2253890	19.99	0.0	2.7	154.5
10/08/2028	02	32 11.141	12	07 31.84	8.3064159	9.2251354	20.01	-0.0	2.6	155.5
10/09/2028	02	31 55.033	12	06 07.27	8.2997334	9.2248819	20.02	-0.0	2.5	156.6
10/10/2028	02	31 38.706	12	04 41.90	8.2933309	9.2246284	20.04	-0.0	2.4	157.6
10/11/2028	02	31 22.168	12	03 15.78	8.2872110	9.2243751	20.05	-0.0	2.3	158.7
10/12/2028	02	31 05.425	12	01 48.92	8.2813766	9.2241219	20.07	-0.0	2.2	159.7
10/13/2028	02	30 48.485	12	00 21.38	8.2758304	9.2238688	20.08	-0.0	2.1	160.8
10/14/2028	02	30 31.356	11	58 53.17	8.2705752	9.2236158	20.09	-0.0	2.0	161.8
10/15/2028	02	30 14.047	11	57 24.35	8.2656135	9.2233629	20.11	-0.0	1.8	162.9
10/16/2028	02	29 56.569	11	55 54.96	8.2609478	9.2231101	20.12	-0.0	1.7	163.9
10/17/2028	02	29 38.934	11	54 25.05	8.2565806	9.2228575	20.13	-0.1	1.6	165.0
10/18/2028	02	29 21.155	11	52 54.69	8.2525140	9.2226049	20.14	-0.1	1.5	166.0
10/19/2028	02	29 03.244	11	51 23.95	8.2487499	9.2223524	20.15	-0.1	1.4	167.1
10/20/2028	02	28 45.211	11	49 52.89	8.2452901	9.2221001	20.16	-0.1	1.3	168.1
10/21/2028	02	28 27.067	11	48 21.57	8.2421358	9.2218479	20.16	-0.1	1.2	169.2
10/22/2028	02	28 08.820	11	46 50.04	8.2392884	9.2215957	20.17	-0.1	1.1	170.2
10/23/2028	02	27 50.479	11	45 18.35	8.2367488	9.2213437	20.18	-0.1	0.9	171.2
10/24/2028	02	27 32.054	11	43 46.53	8.2345179	9.2210918	20.18	-0.1	0.8	172.3
10/25/2028	02	27 13.553	11	42 14.63	8.2325964	9.2208400	20.19	-0.1	0.7	173.3
10/26/2028	02	26 54.988	11	40 42.69	8.2309848	9.2205883	20.19	-0.1	0.6	174.2
10/27/2028	02	26 36.368	11	39 10.75	8.2296837	9.2203367	20.19	-0.1	0.5	175.1
10/28/2028	02	26 17.704	11	37 38.87	8.2286933	9.2200852	20.20	-0.1	0.4	176.0
10/29/2028	02	25 59.008	11	36 07.11	8.2280140	9.2198339	20.20	-0.1	0.4	176.7
10/30/2028	02	25 40.290	11	34 35.50	8.2276460	9.2195826	20.20	-0.1	0.3	177.2
10/31/2028	02	25 21.562	11	33 04.10	8.2275893	9.2193315	20.20	-0.1	0.3	177.3
11/01/2028	02	25 02.836	11	31 32.98	8.2278441	9.2190804	20.20	-0.1	0.3	177.0
11/02/2028	02	24 44.121	11	30 02.19	8.2284101	9.2188295	20.20	-0.1	0.4	176.4
11/03/2028	02	24 25.428	11	28 31.79	8.2292873	9.2185787	20.20	-0.1	0.5	175.6
11/04/2028	02	24 06.767	11	27 01.83	8.2304755	9.2183280	20.19	-0.1	0.6	174.7
11/05/2028	02	23 48.149	11	25 32.36	8.2319744	9.2180774	20.19	-0.1	0.7	173.7
11/06/2028	02	23 29.581	11	24 03.44	8.2337838	9.2178269	20.18	-0.1	0.8	172.7
11/07/2028	02	23 11.073	11	22 35.10	8.2359033	9.2175766	20.18	-0.1	0.9	171.7
11/08/2028	02	22 52.633	11	21 07.41	8.2383325	9.2173263	20.17	-0.2	1.0	170.7
11/09/2028	02	22 34.270	11	19 40.38	8.2410709	9.2170762	20.17	-0.1	1.1	169.6
11/10/2028	02	22 15.993	11	18 14.08	8.2441179	9.2168261	20.16	-0.1	1.2	168.6
11/11/2028	02	21 57.813	11	16 48.53	8.2474730	9.2165762	20.15	-0.1	1.3	167.5
11/12/2028	02	21 39.740	11	15 23.80	8.2511353	9.2163264	20.14	-0.1	1.4	166.5
11/13/2028	02	21 21.787	11	13 59.94	8.2551040	9.2160767	20.13	-0.1	1.5	165.4
11/14/2028	02	21 03.967	11	12 37.01	8.2593778	9.2158271	20.12	-0.1	1.6	164.3
11/15/2028	02	20 46.292	11	11 15.08	8.2639554	9.2155776	20.11	-0.1	1.8	163.3
11/16/2028	02	20 28.773	11	09 54.22	8.2688352	9.2153283	20.10	-0.1	1.9	162.2
11/17/2028	02	20 11.422	11	08 34.48	8.2740155	9.2150790	20.09	-0.1	2.0	161.1
11/18/2028	02	19 54.246	11	07 15.93	8.2794941	9.2148299	20.07	-0.1	2.1	160.1
11/19/2028	02	19 37.254	11	05 58.59	8.2852687	9.2145809	20.06	-0.1	2.2	159.0
11/20/2028	02	19 20.455	11	04 42.51	8.2913368	9.2143320	20.04	-0.1	2.3	157.9
11/21/2028	02	19 03.855	11	03 27.72	8.2976957	9.2140832	20.03	-0.1	2.4	156.8
11/22/2028	02	18 47.465	11	02 14.26	8.3043429	9.2138345	20.01	-0.1	2.5	155.8
11/23/2028	02	18 31.293	11	01 02.17	8.3112753	9.2135859	20.00	-0.1	2.6	154.7
11/24/2028	02	18 15.348	10	59 51.48	8.3184901	9.2133375	19.98	-0.0	2.7	153.6

Saturn - Apparent data

Date Oh TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase Solar		
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Solar Sep. deg.
11/25/2028	02	17	59.640	10	58	42.25	8.3259842	9.2130891	19.96	-0.0	2.8	152.5
11/26/2028	02	17	44.178	10	57	34.50	8.3337546	9.2128409	19.94	-0.0	2.9	151.5
11/27/2028	02	17	28.971	10	56	28.30	8.3417982	9.2125928	19.92	-0.0	3.0	150.4
11/28/2028	02	17	14.028	10	55	23.67	8.3501117	9.2123448	19.90	-0.0	3.1	149.3
11/29/2028	02	16	59.356	10	54	20.66	8.3586919	9.2120969	19.88	-0.0	3.2	148.3
11/30/2028	02	16	44.965	10	53	19.32	8.3675355	9.2118491	19.86	-0.0	3.3	147.2
12/01/2028	02	16	30.862	10	52	19.68	8.3766392	9.2116015	19.84	0.0	3.4	146.1
12/02/2028	02	16	17.053	10	51	21.79	8.3859995	9.2113539	19.82	0.0	3.5	145.1
12/03/2028	02	16	03.544	10	50	25.67	8.3956132	9.2111065	19.80	0.0	3.6	144.0
12/04/2028	02	15	50.340	10	49	31.35	8.4054769	9.2108592	19.77	0.0	3.7	142.9
12/05/2028	02	15	37.448	10	48	38.87	8.4155871	9.2106120	19.75	0.0	3.8	141.9
12/06/2028	02	15	24.870	10	47	48.23	8.4259405	9.2103649	19.72	0.0	3.9	140.8
12/07/2028	02	15	12.614	10	46	59.47	8.4365335	9.2101179	19.70	0.0	3.9	139.7
12/08/2028	02	15	00.685	10	46	12.60	8.4473628	9.2098711	19.67	0.1	4.0	138.7
12/09/2028	02	14	49.091	10	45	27.65	8.4584246	9.2096243	19.65	0.1	4.1	137.6
12/10/2028	02	14	37.838	10	44	44.66	8.4697152	9.2093777	19.62	0.1	4.2	136.5
12/11/2028	02	14	26.936	10	44	03.66	8.4812309	9.2091312	19.60	0.1	4.3	135.5
12/12/2028	02	14	16.392	10	43	24.69	8.4929676	9.2088848	19.57	0.1	4.4	134.4
12/13/2028	02	14	06.213	10	42	47.80	8.5049211	9.2086385	19.54	0.1	4.4	133.4
12/14/2028	02	13	56.405	10	42	13.01	8.5170870	9.2083923	19.51	0.1	4.5	132.3
12/15/2028	02	13	46.974	10	41	40.36	8.5294609	9.2081463	19.48	0.1	4.6	131.3
12/16/2028	02	13	37.923	10	41	09.87	8.5420380	9.2079004	19.46	0.1	4.7	130.2
12/17/2028	02	13	29.254	10	40	41.54	8.5548134	9.2076546	19.43	0.1	4.8	129.1
12/18/2028	02	13	20.972	10	40	15.40	8.5677823	9.2074089	19.40	0.1	4.8	128.1
12/19/2028	02	13	13.079	10	39	51.43	8.5809397	9.2071633	19.37	0.1	4.9	127.0
12/20/2028	02	13	05.579	10	39	29.65	8.5942804	9.2069178	19.34	0.1	5.0	126.0
12/21/2028	02	12	58.476	10	39	10.07	8.6077994	9.2066725	19.31	0.1	5.0	125.0
12/22/2028	02	12	51.775	10	38	52.71	8.6214916	9.2064272	19.28	0.1	5.1	123.9
12/23/2028	02	12	45.478	10	38	37.57	8.6353520	9.2061821	19.25	0.2	5.2	122.9
12/24/2028	02	12	39.591	10	38	24.66	8.6493754	9.2059371	19.21	0.2	5.2	121.8
12/25/2028	02	12	34.116	10	38	14.01	8.6635567	9.2056922	19.18	0.2	5.3	120.8
12/26/2028	02	12	29.056	10	38	05.62	8.6778909	9.2054475	19.15	0.2	5.3	119.7
12/27/2028	02	12	24.415	10	37	59.51	8.6923730	9.2052028	19.12	0.2	5.4	118.7
12/28/2028	02	12	20.194	10	37	55.69	8.7069979	9.2049583	19.09	0.2	5.4	117.7
12/29/2028	02	12	16.395	10	37	54.15	8.7217607	9.2047139	19.06	0.2	5.5	116.6
12/30/2028	02	12	13.020	10	37	54.92	8.7366564	9.2044696	19.02	0.2	5.5	115.6
12/31/2028	02	12	10.067	10	37	57.99	8.7516801	9.2042254	18.99	0.2	5.6	114.6
01/01/2029	02	12	07.537	10	38	03.35	8.7668271	9.2039813	18.96	0.2	5.6	113.6

10/30/2028 17:36:22 Saturn at max angle from sun 177.295 degrees.

Uranus - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Phase Solar				
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
12/31/2027	04	19	35.771	21	20	57.85	18.5194527	19.3574488	3.81	5.6	1.6	147.7
01/01/2028	04	19	27.275	21	20	38.30	18.5286737	19.3572628	3.80	5.6	1.6	146.6
01/02/2028	04	19	18.918	21	20	19.06	18.5381559	19.3570767	3.80	5.6	1.6	145.6
01/03/2028	04	19	10.706	21	20	00.13	18.5478956	19.3568906	3.80	5.6	1.7	144.5
01/04/2028	04	19	02.642	21	19	41.51	18.5578892	19.3567045	3.80	5.6	1.7	143.5
01/05/2028	04	18	54.732	21	19	23.22	18.5681327	19.3565184	3.80	5.6	1.8	142.4
01/06/2028	04	18	46.980	21	19	05.28	18.5786224	19.3563322	3.79	5.6	1.8	141.4
01/07/2028	04	18	39.390	21	18	47.69	18.5893542	19.3561461	3.79	5.6	1.9	140.3
01/08/2028	04	18	31.966	21	18	30.49	18.6003242	19.3559600	3.79	5.6	1.9	139.3
01/09/2028	04	18	24.712	21	18	13.67	18.6115284	19.3557738	3.79	5.6	1.9	138.2
01/10/2028	04	18	17.629	21	17	57.28	18.6229628	19.3555877	3.78	5.6	2.0	137.2
01/11/2028	04	18	10.719	21	17	41.30	18.6346233	19.3554015	3.78	5.6	2.0	136.1
01/12/2028	04	18	03.981	21	17	25.76	18.6465061	19.3552153	3.78	5.6	2.0	135.1
01/13/2028	04	17	57.416	21	17	10.64	18.6586071	19.3550291	3.78	5.6	2.1	134.0
01/14/2028	04	17	51.024	21	16	55.93	18.6709227	19.3548429	3.77	5.6	2.1	133.0
01/15/2028	04	17	44.808	21	16	41.64	18.6834490	19.3546567	3.77	5.6	2.2	131.9
01/16/2028	04	17	38.772	21	16	27.74	18.6961822	19.3544705	3.77	5.6	2.2	130.9
01/17/2028	04	17	32.922	21	16	14.27	18.7091183	19.3542843	3.77	5.6	2.2	129.9
01/18/2028	04	17	27.262	21	16	01.22	18.7222533	19.3540981	3.76	5.6	2.3	128.8
01/19/2028	04	17	21.797	21	15	48.63	18.7355830	19.3539118	3.76	5.6	2.3	127.8
01/20/2028	04	17	16.529	21	15	36.50	18.7491031	19.3537256	3.76	5.6	2.3	126.7
01/21/2028	04	17	11.461	21	15	24.87	18.7628091	19.3535393	3.76	5.6	2.4	125.7
01/22/2028	04	17	06.595	21	15	13.73	18.7766963	19.3533530	3.75	5.6	2.4	124.7
01/23/2028	04	17	01.931	21	15	03.10	18.7907602	19.3531668	3.75	5.6	2.4	123.6
01/24/2028	04	16	57.471	21	14	52.98	18.8049958	19.3529805	3.75	5.6	2.5	122.6
01/25/2028	04	16	53.215	21	14	43.37	18.8193981	19.3527942	3.75	5.6	2.5	121.6
01/26/2028	04	16	49.165	21	14	34.28	18.8339621	19.3526079	3.74	5.6	2.5	120.5
01/27/2028	04	16	45.322	21	14	25.70	18.8486827	19.3524216	3.74	5.6	2.5	119.5
01/28/2028	04	16	41.687	21	14	17.62	18.8635546	19.3522352	3.74	5.6	2.6	118.5
01/29/2028	04	16	38.262	21	14	10.05	18.8785725	19.3520489	3.73	5.6	2.6	117.4
01/30/2028	04	16	35.050	21	14	02.99	18.8937313	19.3518626	3.73	5.6	2.6	116.4
01/31/2028	04	16	32.054	21	13	56.44	18.9090255	19.3516762	3.73	5.6	2.6	115.4
02/01/2028	04	16	29.275	21	13	50.41	18.9244497	19.3514899	3.72	5.6	2.7	114.4
02/02/2028	04	16	26.715	21	13	44.89	18.9399987	19.3513035	3.72	5.6	2.7	113.3
02/03/2028	04	16	24.377	21	13	39.91	18.9556669	19.3511171	3.72	5.6	2.7	112.3
02/04/2028	04	16	22.263	21	13	35.47	18.9714491	19.3509307	3.72	5.6	2.7	111.3
02/05/2028	04	16	20.374	21	13	31.58	18.9873398	19.3507443	3.71	5.6	2.7	110.3
02/06/2028	04	16	18.709	21	13	28.26	19.0033338	19.3505579	3.71	5.6	2.8	109.2
02/07/2028	04	16	17.269	21	13	25.51	19.0194258	19.3503715	3.71	5.6	2.8	108.2
02/08/2028	04	16	16.052	21	13	23.34	19.0356106	19.3501851	3.70	5.6	2.8	107.2
02/09/2028	04	16	15.055	21	13	21.73	19.0518832	19.3499987	3.70	5.6	2.8	106.2
02/10/2028	04	16	14.276	21	13	20.67	19.0682387	19.3498122	3.70	5.7	2.8	105.2
02/11/2028	04	16	13.716	21	13	20.15	19.0846722	19.3496258	3.69	5.7	2.8	104.2
02/12/2028	04	16	13.374	21	13	20.16	19.1011790	19.3494393	3.69	5.7	2.8	103.1
02/13/2028	04	16	13.254	21	13	20.69	19.1177542	19.3492528	3.69	5.7	2.8	102.1
02/14/2028	04	16	13.358	21	13	21.74	19.1343931	19.3490664	3.68	5.7	2.9	101.1
02/15/2028	04	16	13.689	21	13	23.34	19.1510909	19.3488799	3.68	5.7	2.9	100.1
02/16/2028	04	16	14.249	21	13	25.49	19.1678425	19.3486934	3.68	5.7	2.9	99.1
02/17/2028	04	16	15.037	21	13	28.20	19.1846428	19.3485069	3.67	5.7	2.9	98.1
02/18/2028	04	16	16.054	21	13	31.50	19.2014868	19.3483204	3.67	5.7	2.9	97.1
02/19/2028	04	16	17.297	21	13	35.37	19.2183691	19.3481339	3.67	5.7	2.9	96.1
02/20/2028	04	16	18.765	21	13	39.81	19.2352845	19.3479474	3.66	5.7	2.9	95.1
02/21/2028	04	16	20.458	21	13	44.82	19.2522275	19.3477608	3.66	5.7	2.9	94.1
02/22/2028	04	16	22.374	21	13	50.40	19.2691927	19.3475743	3.66	5.7	2.9	93.1
02/23/2028	04	16	24.512	21	13	56.53	19.2861748	19.3473877	3.65	5.7	2.9	92.1

Uranus - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
02/24/2028	04	16	26.871	21	14	03.20	19.3031683	19.3472012	3.65	5.7	2.9	91.1
02/25/2028	04	16	29.453	21	14	10.41	19.3201677	19.3470146	3.65	5.7	2.9	90.1
02/26/2028	04	16	32.255	21	14	18.15	19.3371675	19.3468281	3.64	5.7	2.9	89.1
02/27/2028	04	16	35.279	21	14	26.41	19.3541625	19.3466415	3.64	5.7	2.9	88.1
02/28/2028	04	16	38.526	21	14	35.20	19.3711470	19.3464549	3.64	5.7	2.9	87.1
02/29/2028	04	16	41.994	21	14	44.51	19.3881159	19.3462683	3.64	5.7	2.9	86.1
03/01/2028	04	16	45.685	21	14	54.34	19.4050637	19.3460817	3.63	5.7	2.9	85.1
03/02/2028	04	16	49.598	21	15	04.71	19.4219852	19.3458951	3.63	5.7	2.9	84.1
03/03/2028	04	16	53.733	21	15	15.61	19.4388752	19.3457085	3.63	5.7	2.9	83.2
03/04/2028	04	16	58.087	21	15	27.04	19.4557286	19.3455219	3.62	5.7	2.9	82.2
03/05/2028	04	17	02.659	21	15	39.02	19.4725404	19.3453352	3.62	5.7	2.9	81.2
03/06/2028	04	17	07.446	21	15	51.53	19.4893057	19.3451486	3.62	5.7	2.9	80.2
03/07/2028	04	17	12.444	21	16	04.57	19.5060197	19.3449619	3.61	5.7	2.9	79.2
03/08/2028	04	17	17.650	21	16	18.13	19.5226779	19.3447753	3.61	5.7	2.9	78.2
03/09/2028	04	17	23.060	21	16	32.18	19.5392757	19.3445886	3.61	5.7	2.9	77.3
03/10/2028	04	17	28.672	21	16	46.70	19.5558089	19.3444020	3.60	5.7	2.8	76.3
03/11/2028	04	17	34.488	21	17	01.67	19.5722732	19.3442153	3.60	5.7	2.8	75.3
03/12/2028	04	17	40.507	21	17	17.10	19.5886643	19.3440286	3.60	5.7	2.8	74.3
03/13/2028	04	17	46.731	21	17	32.99	19.6049781	19.3438419	3.60	5.7	2.8	73.4
03/14/2028	04	17	53.161	21	17	49.34	19.6212104	19.3436552	3.59	5.7	2.8	72.4
03/15/2028	04	17	59.795	21	18	06.17	19.6373569	19.3434685	3.59	5.7	2.8	71.4
03/16/2028	04	18	06.632	21	18	23.48	19.6534131	19.3432818	3.59	5.7	2.8	70.5
03/17/2028	04	18	13.668	21	18	41.27	19.6693746	19.3430951	3.58	5.7	2.8	69.5
03/18/2028	04	18	20.901	21	18	59.54	19.6852369	19.3429084	3.58	5.7	2.7	68.5
03/19/2028	04	18	28.328	21	19	18.27	19.7009955	19.3427216	3.58	5.7	2.7	67.6
03/20/2028	04	18	35.945	21	19	37.45	19.7166458	19.3425349	3.57	5.7	2.7	66.6
03/21/2028	04	18	43.751	21	19	57.08	19.7321835	19.3423481	3.57	5.7	2.7	65.6
03/22/2028	04	18	51.744	21	20	17.12	19.7476039	19.3421614	3.57	5.7	2.7	64.7
03/23/2028	04	18	59.922	21	20	37.58	19.7629027	19.3419746	3.57	5.7	2.6	63.7
03/24/2028	04	19	08.283	21	20	58.44	19.7780754	19.3417879	3.56	5.7	2.6	62.7
03/25/2028	04	19	16.827	21	21	19.69	19.7931175	19.3416011	3.56	5.7	2.6	61.8
03/26/2028	04	19	25.552	21	21	41.33	19.8080249	19.3414143	3.56	5.7	2.6	60.8
03/27/2028	04	19	34.457	21	22	03.35	19.8227932	19.3412275	3.56	5.7	2.6	59.9
03/28/2028	04	19	43.542	21	22	25.74	19.8374182	19.3410408	3.55	5.7	2.5	58.9
03/29/2028	04	19	52.805	21	22	48.52	19.8518958	19.3408540	3.55	5.7	2.5	58.0
03/30/2028	04	20	02.244	21	23	11.67	19.8662219	19.3406672	3.55	5.7	2.5	57.0
03/31/2028	04	20	11.856	21	23	35.21	19.8803928	19.3404803	3.55	5.7	2.5	56.1
04/01/2028	04	20	21.638	21	23	59.12	19.8944046	19.3402935	3.54	5.7	2.4	55.1
04/02/2028	04	20	31.586	21	24	23.40	19.9082537	19.3401067	3.54	5.7	2.4	54.2
04/03/2028	04	20	41.697	21	24	48.04	19.9219365	19.3399199	3.54	5.7	2.4	53.2
04/04/2028	04	20	51.965	21	25	13.04	19.9354498	19.3397330	3.54	5.7	2.3	52.3
04/05/2028	04	21	02.387	21	25	38.36	19.9487903	19.3395462	3.53	5.7	2.3	51.3
04/06/2028	04	21	12.958	21	26	03.98	19.9619550	19.3393594	3.53	5.7	2.3	50.4
04/07/2028	04	21	23.679	21	26	29.89	19.9749409	19.3391725	3.53	5.7	2.2	49.5
04/08/2028	04	21	34.547	21	26	56.08	19.9877453	19.3389857	3.53	5.8	2.2	48.5
04/09/2028	04	21	45.563	21	27	22.53	20.0003653	19.3387988	3.52	5.8	2.2	47.6
04/10/2028	04	21	56.728	21	27	49.26	20.0127983	19.3386119	3.52	5.8	2.1	46.6
04/11/2028	04	22	08.040	21	28	16.27	20.0250413	19.3384251	3.52	5.8	2.1	45.7
04/12/2028	04	22	19.496	21	28	43.56	20.0370917	19.3382382	3.52	5.8	2.1	44.8
04/13/2028	04	22	31.094	21	29	11.15	20.0489463	19.3380513	3.52	5.8	2.1	43.8
04/14/2028	04	22	42.828	21	29	39.03	20.0606024	19.3378644	3.51	5.8	2.0	42.9
04/15/2028	04	22	54.697	21	30	07.17	20.0720569	19.3376775	3.51	5.8	2.0	42.0
04/16/2028	04	23	06.694	21	30	35.57	20.0833068	19.3374906	3.51	5.8	2.0	41.0
04/17/2028	04	23	18.818	21	31	04.22	20.0943492	19.3373037	3.51	5.8	1.9	40.1
04/18/2028	04	23	31.066	21	31	33.09	20.1051812	19.3371168	3.51	5.8	1.9	39.2

Uranus - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
04/19/2028	04	23	43.435	21	32	02.18	20.1157998	19.3369298	3.50	5.8	1.8	38.2
04/20/2028	04	23	55.923	21	32	31.46	20.1262023	19.3367429	3.50	5.8	1.8	37.3
04/21/2028	04	24	08.528	21	33	00.94	20.1363857	19.3365560	3.50	5.8	1.8	36.4
04/22/2028	04	24	21.248	21	33	30.59	20.1463474	19.3363690	3.50	5.8	1.7	35.5
04/23/2028	04	24	34.083	21	34	00.42	20.1560847	19.3361821	3.50	5.8	1.7	34.5
04/24/2028	04	24	47.030	21	34	30.42	20.1655951	19.3359952	3.50	5.8	1.6	33.6
04/25/2028	04	25	00.088	21	35	00.59	20.1748759	19.3358082	3.49	5.8	1.6	32.7
04/26/2028	04	25	13.254	21	35	30.93	20.1839249	19.3356212	3.49	5.8	1.6	31.8
04/27/2028	04	25	26.526	21	36	01.44	20.1927396	19.3354343	3.49	5.8	1.5	30.8
04/28/2028	04	25	39.899	21	36	32.12	20.2013181	19.3352473	3.49	5.8	1.5	29.9
04/29/2028	04	25	53.370	21	37	02.96	20.2096581	19.3350603	3.49	5.8	1.4	29.0
04/30/2028	04	26	06.933	21	37	33.95	20.2177580	19.3348734	3.49	5.8	1.4	28.1
05/01/2028	04	26	20.584	21	38	05.09	20.2256159	19.3346864	3.48	5.8	1.4	27.2
05/02/2028	04	26	34.319	21	38	36.34	20.2332304	19.3344994	3.48	5.8	1.3	26.3
05/03/2028	04	26	48.133	21	39	07.70	20.2406000	19.3343124	3.48	5.8	1.3	25.3
05/04/2028	04	27	02.024	21	39	39.14	20.2477234	19.3341254	3.48	5.8	1.2	24.4
05/05/2028	04	27	15.991	21	40	10.64	20.2545994	19.3339384	3.48	5.8	1.2	23.5
05/06/2028	04	27	30.033	21	40	42.20	20.2612270	19.3337514	3.48	5.8	1.1	22.6
05/07/2028	04	27	44.150	21	41	13.83	20.2676051	19.3335644	3.48	5.8	1.1	21.7
05/08/2028	04	27	58.340	21	41	45.52	20.2737326	19.3333774	3.48	5.8	1.1	20.8
05/09/2028	04	28	12.602	21	42	17.29	20.2796084	19.3331904	3.48	5.8	1.0	19.9
05/10/2028	04	28	26.933	21	42	49.13	20.2852313	19.3330033	3.47	5.8	1.0	19.0
05/11/2028	04	28	41.327	21	43	21.05	20.2906002	19.3328163	3.47	5.8	0.9	18.0
05/12/2028	04	28	55.782	21	43	53.04	20.2957138	19.3326293	3.47	5.8	0.9	17.1
05/13/2028	04	29	10.292	21	44	25.09	20.3005709	19.3324422	3.47	5.8	0.8	16.2
05/14/2028	04	29	24.855	21	44	57.18	20.3051702	19.3322552	3.47	5.8	0.8	15.3
05/15/2028	04	29	39.465	21	45	29.29	20.3095106	19.3320682	3.47	5.8	0.7	14.4
05/16/2028	04	29	54.122	21	46	01.41	20.3135908	19.3318811	3.47	5.8	0.7	13.5
05/17/2028	04	30	08.823	21	46	33.53	20.3174096	19.3316941	3.47	5.8	0.7	12.6
05/18/2028	04	30	23.565	21	47	05.64	20.3209660	19.3315070	3.47	5.8	0.6	11.7
05/19/2028	04	30	38.347	21	47	37.74	20.3242590	19.3313200	3.47	5.8	0.6	10.8
05/20/2028	04	30	53.166	21	48	09.80	20.3272876	19.3311329	3.47	5.8	0.5	9.9
05/21/2028	04	31	08.022	21	48	41.83	20.3300508	19.3309458	3.47	5.8	0.5	9.0
05/22/2028	04	31	22.913	21	49	13.84	20.3325479	19.3307588	3.47	5.8	0.4	8.1
05/23/2028	04	31	37.835	21	49	45.81	20.3347781	19.3305717	3.47	5.8	0.4	7.2
05/24/2028	04	31	52.787	21	50	17.76	20.3367408	19.3303846	3.47	5.8	0.3	6.3
05/25/2028	04	32	07.765	21	50	49.68	20.3384355	19.3301975	3.47	5.8	0.3	5.4
05/26/2028	04	32	22.765	21	51	21.57	20.3398618	19.3300105	3.47	5.8	0.2	4.5
05/27/2028	04	32	37.782	21	51	53.43	20.3410196	19.3298234	3.46	5.8	0.2	3.6
05/28/2028	04	32	52.812	21	52	25.25	20.3419087	19.3296363	3.46	5.8	0.1	2.7
05/29/2028	04	33	07.851	21	52	57.00	20.3425293	19.3294492	3.46	5.8	0.1	1.8
05/30/2028	04	33	22.905	21	53	28.68	20.3428817	19.3292621	3.46	5.8	0.0	0.9
05/31/2028	04	33	37.655	21	53	54.66	20.3429661	19.3290750	3.46	5.8	0.0	0.1
06/01/2028	04	33	52.903	21	54	31.55	20.3427832	19.3288879	3.46	5.8	0.1	0.9
06/02/2028	04	34	07.951	21	55	02.93	20.3423335	19.3287008	3.46	5.8	0.1	1.8
06/03/2028	04	34	22.984	21	55	34.15	20.3416174	19.3285137	3.46	5.8	0.2	2.7
06/04/2028	04	34	38.010	21	56	05.25	20.3406358	19.3283266	3.47	5.8	0.2	3.6
06/05/2028	04	34	53.030	21	56	36.24	20.3393891	19.3281395	3.47	5.8	0.2	4.5
06/06/2028	04	35	08.039	21	57	07.13	20.3378778	19.3279523	3.47	5.8	0.3	5.4
06/07/2028	04	35	23.036	21	57	37.91	20.3361026	19.3277652	3.47	5.8	0.3	6.3
06/08/2028	04	35	38.016	21	58	08.60	20.3340638	19.3275781	3.47	5.8	0.4	7.2
06/09/2028	04	35	52.974	21	58	39.17	20.3317620	19.3273910	3.47	5.8	0.4	8.1
06/10/2028	04	36	07.907	21	59	09.62	20.3291975	19.3272038	3.47	5.8	0.5	9.0
06/11/2028	04	36	22.812	21	59	39.93	20.3263708	19.3270167	3.47	5.8	0.5	9.9
06/12/2028	04	36	37.685	22	00	10.09	20.3232823	19.3268296	3.47	5.8	0.6	10.8

Uranus - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
06/13/2028	04	36	52.523	22	00	40.09	20.3199326	19.3266424	3.47	5.8	0.6	11.7
06/14/2028	04	37	07.326	22	01	09.91	20.3163222	19.3264553	3.47	5.8	0.7	12.6
06/15/2028	04	37	22.090	22	01	39.56	20.3124516	19.3262681	3.47	5.8	0.7	13.5
06/16/2028	04	37	36.815	22	02	09.03	20.3083216	19.3260810	3.47	5.8	0.7	14.4
06/17/2028	04	37	51.498	22	02	38.31	20.3039328	19.3258938	3.47	5.8	0.8	15.3
06/18/2028	04	38	06.139	22	03	07.40	20.2992860	19.3257067	3.47	5.8	0.8	16.2
06/19/2028	04	38	20.734	22	03	36.31	20.2943821	19.3255195	3.47	5.8	0.9	17.1
06/20/2028	04	38	35.281	22	04	05.03	20.2892220	19.3253323	3.47	5.8	0.9	18.0
06/21/2028	04	38	49.778	22	04	33.59	20.2838068	19.3251452	3.47	5.8	1.0	18.9
06/22/2028	04	39	04.221	22	05	01.96	20.2781377	19.3249580	3.48	5.8	1.0	19.8
06/23/2028	04	39	18.604	22	05	30.16	20.2722160	19.3247708	3.48	5.8	1.1	20.7
06/24/2028	04	39	32.923	22	05	58.18	20.2660433	19.3245836	3.48	5.8	1.1	21.6
06/25/2028	04	39	47.172	22	06	26.00	20.2596211	19.3243965	3.48	5.8	1.2	22.5
06/26/2028	04	40	01.347	22	06	53.61	20.2529513	19.3242093	3.48	5.8	1.2	23.4
06/27/2028	04	40	15.445	22	07	20.98	20.2460358	19.3240221	3.48	5.8	1.3	24.3
06/28/2028	04	40	29.465	22	07	48.10	20.2388767	19.3238349	3.48	5.8	1.3	25.2
06/29/2028	04	40	43.405	22	08	14.97	20.2314762	19.3236477	3.48	5.8	1.3	26.1
06/30/2028	04	40	57.266	22	08	41.59	20.2238364	19.3234605	3.49	5.8	1.4	27.0
07/01/2028	04	41	11.046	22	09	07.96	20.2159595	19.3232733	3.49	5.8	1.4	27.9
07/02/2028	04	41	24.745	22	09	34.10	20.2078476	19.3230861	3.49	5.8	1.5	28.8
07/03/2028	04	41	38.359	22	10	00.01	20.1995029	19.3228989	3.49	5.8	1.5	29.7
07/04/2028	04	41	51.885	22	10	25.70	20.1909274	19.3227117	3.49	5.8	1.5	30.6
07/05/2028	04	42	05.320	22	10	51.16	20.1821232	19.3225245	3.49	5.8	1.6	31.5
07/06/2028	04	42	18.659	22	11	16.40	20.1730923	19.3223372	3.49	5.8	1.6	32.4
07/07/2028	04	42	31.898	22	11	41.39	20.1638367	19.3221500	3.50	5.8	1.7	33.3
07/08/2028	04	42	45.034	22	12	06.14	20.1543585	19.3219628	3.50	5.8	1.7	34.2
07/09/2028	04	42	58.065	22	12	30.64	20.1446595	19.3217755	3.50	5.8	1.7	35.1
07/10/2028	04	43	10.987	22	12	54.86	20.1347419	19.3215883	3.50	5.8	1.8	36.0
07/11/2028	04	43	23.799	22	13	18.80	20.1246076	19.3214011	3.50	5.8	1.8	36.9
07/12/2028	04	43	36.499	22	13	42.46	20.1142588	19.3212138	3.50	5.8	1.8	37.8
07/13/2028	04	43	49.085	22	14	05.83	20.1036976	19.3210266	3.51	5.8	1.9	38.7
07/14/2028	04	44	01.557	22	14	28.91	20.0929262	19.3208393	3.51	5.8	1.9	39.6
07/15/2028	04	44	13.912	22	14	51.71	20.0819470	19.3206521	3.51	5.8	2.0	40.5
07/16/2028	04	44	26.149	22	15	14.21	20.0707622	19.3204648	3.51	5.8	2.0	41.4
07/17/2028	04	44	38.266	22	15	36.44	20.0593742	19.3202775	3.51	5.8	2.0	42.3
07/18/2028	04	44	50.260	22	15	58.39	20.0477857	19.3200902	3.52	5.8	2.1	43.2
07/19/2028	04	45	02.129	22	16	20.07	20.0359991	19.3199030	3.52	5.8	2.1	44.2
07/20/2028	04	45	13.868	22	16	41.48	20.0240172	19.3197157	3.52	5.8	2.1	45.1
07/21/2028	04	45	25.473	22	17	02.62	20.0118430	19.3195284	3.52	5.8	2.2	46.0
07/22/2028	04	45	36.938	22	17	23.48	19.9994795	19.3193411	3.52	5.7	2.2	46.9
07/23/2028	04	45	48.259	22	17	44.04	19.9869299	19.3191538	3.53	5.7	2.2	47.8
07/24/2028	04	45	59.433	22	18	04.30	19.9741976	19.3189665	3.53	5.7	2.3	48.7
07/25/2028	04	46	10.458	22	18	24.22	19.9612860	19.3187792	3.53	5.7	2.3	49.6
07/26/2028	04	46	21.333	22	18	43.81	19.9481988	19.3185919	3.53	5.7	2.3	50.5
07/27/2028	04	46	32.059	22	19	03.06	19.9349396	19.3184046	3.54	5.7	2.4	51.4
07/28/2028	04	46	42.635	22	19	21.98	19.9215121	19.3182173	3.54	5.7	2.4	52.4
07/29/2028	04	46	53.061	22	19	40.59	19.9079197	19.3180299	3.54	5.7	2.4	53.3
07/30/2028	04	47	03.335	22	19	58.90	19.8941661	19.3178426	3.54	5.7	2.5	54.2
07/31/2028	04	47	13.454	22	20	16.90	19.8802548	19.3176553	3.55	5.7	2.5	55.1
08/01/2028	04	47	23.415	22	20	34.61	19.8661893	19.3174679	3.55	5.7	2.5	56.0
08/02/2028	04	47	33.213	22	20	52.02	19.8519729	19.3172806	3.55	5.7	2.5	56.9
08/03/2028	04	47	42.847	22	21	09.13	19.8376090	19.3170933	3.55	5.7	2.6	57.9
08/04/2028	04	47	52.312	22	21	25.93	19.8231011	19.3169059	3.56	5.7	2.6	58.8
08/05/2028	04	48	01.607	22	21	42.40	19.8084525	19.3167185	3.56	5.7	2.6	59.7
08/06/2028	04	48	10.729	22	21	58.54	19.7936666	19.3165312	3.56	5.7	2.6	60.6

Uranus - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
08/07/2028	04	48	19.676	22	22	14.34	19.7787468	19.3163438	3.56	5.7	2.6	61.6
08/08/2028	04	48	28.448	22	22	29.80	19.7636964	19.3161565	3.57	5.7	2.7	62.5
08/09/2028	04	48	37.043	22	22	44.91	19.7485191	19.3159691	3.57	5.7	2.7	63.4
08/10/2028	04	48	45.462	22	22	59.67	19.7332183	19.3157817	3.57	5.7	2.7	64.3
08/11/2028	04	48	53.701	22	23	14.08	19.7177976	19.3155943	3.57	5.7	2.7	65.3
08/12/2028	04	49	01.762	22	23	28.15	19.7022606	19.3154069	3.58	5.7	2.8	66.2
08/13/2028	04	49	09.642	22	23	41.88	19.6866110	19.3152195	3.58	5.7	2.8	67.1
08/14/2028	04	49	17.339	22	23	55.28	19.6708525	19.3150321	3.58	5.7	2.8	68.0
08/15/2028	04	49	24.853	22	24	08.35	19.6549892	19.3148447	3.59	5.7	2.8	69.0
08/16/2028	04	49	32.179	22	24	21.10	19.6390248	19.3146573	3.59	5.7	2.8	69.9
08/17/2028	04	49	39.314	22	24	33.53	19.6229635	19.3144699	3.59	5.7	2.8	70.8
08/18/2028	04	49	46.254	22	24	45.64	19.6068096	19.3142825	3.59	5.7	2.9	71.8
08/19/2028	04	49	52.995	22	24	57.41	19.5905672	19.3140951	3.60	5.7	2.9	72.7
08/20/2028	04	49	59.534	22	25	08.84	19.5742411	19.3139077	3.60	5.7	2.9	73.7
08/21/2028	04	50	05.869	22	25	19.89	19.5578358	19.3137202	3.60	5.7	2.9	74.6
08/22/2028	04	50	11.999	22	25	30.57	19.5413561	19.3135328	3.61	5.7	2.9	75.5
08/23/2028	04	50	17.927	22	25	40.86	19.5248069	19.3133454	3.61	5.7	2.9	76.5
08/24/2028	04	50	23.652	22	25	50.78	19.5081929	19.3131579	3.61	5.7	2.9	77.4
08/25/2028	04	50	29.176	22	26	00.34	19.4915189	19.3129705	3.62	5.7	2.9	78.4
08/26/2028	04	50	34.498	22	26	09.55	19.4747897	19.3127830	3.62	5.7	3.0	79.3
08/27/2028	04	50	39.616	22	26	18.42	19.4580100	19.3125955	3.62	5.7	3.0	80.2
08/28/2028	04	50	44.527	22	26	26.97	19.4411842	19.3124081	3.63	5.7	3.0	81.2
08/29/2028	04	50	49.230	22	26	35.18	19.4243169	19.3122206	3.63	5.7	3.0	82.1
08/30/2028	04	50	53.721	22	26	43.05	19.4074125	19.3120331	3.63	5.7	3.0	83.1
08/31/2028	04	50	57.999	22	26	50.58	19.3904755	19.3118457	3.63	5.7	3.0	84.0
09/01/2028	04	51	02.062	22	26	57.76	19.3735103	19.3116582	3.64	5.7	3.0	85.0
09/02/2028	04	51	05.909	22	27	04.58	19.3565212	19.3114707	3.64	5.7	3.0	85.9
09/03/2028	04	51	09.540	22	27	11.03	19.3395127	19.3112832	3.64	5.7	3.0	86.9
09/04/2028	04	51	12.954	22	27	17.11	19.3224891	19.3110957	3.65	5.7	3.0	87.9
09/05/2028	04	51	16.152	22	27	22.81	19.3054548	19.3109082	3.65	5.7	3.0	88.8
09/06/2028	04	51	19.133	22	27	28.13	19.2884143	19.3107207	3.65	5.7	3.0	89.8
09/07/2028	04	51	21.898	22	27	33.09	19.2713721	19.3105332	3.66	5.7	3.0	90.7
09/08/2028	04	51	24.448	22	27	37.67	19.2543325	19.3103456	3.66	5.7	3.0	91.7
09/09/2028	04	51	26.782	22	27	41.89	19.2373002	19.3101581	3.66	5.7	3.0	92.6
09/10/2028	04	51	28.900	22	27	45.75	19.2202798	19.3099706	3.67	5.7	3.0	93.6
09/11/2028	04	51	30.801	22	27	49.27	19.2032759	19.3097830	3.67	5.7	3.0	94.6
09/12/2028	04	51	32.484	22	27	52.44	19.1862932	19.3095955	3.67	5.7	3.0	95.5
09/13/2028	04	51	33.947	22	27	55.26	19.1693365	19.3094079	3.68	5.7	3.0	96.5
09/14/2028	04	51	35.188	22	27	57.75	19.1524108	19.3092204	3.68	5.7	3.0	97.5
09/15/2028	04	51	36.204	22	27	59.89	19.1355210	19.3090328	3.68	5.7	3.0	98.4
09/16/2028	04	51	36.994	22	28	01.67	19.1186722	19.3088453	3.69	5.7	3.0	99.4
09/17/2028	04	51	37.555	22	28	03.07	19.1018697	19.3086577	3.69	5.6	2.9	100.4
09/18/2028	04	51	37.889	22	28	04.09	19.0851189	19.3084701	3.69	5.6	2.9	101.4
09/19/2028	04	51	37.998	22	28	04.72	19.0684251	19.3082826	3.70	5.6	2.9	102.3
09/20/2028	04	51	37.884	22	28	04.95	19.0517938	19.3080950	3.70	5.6	2.9	103.3
09/21/2028	04	51	37.550	22	28	04.80	19.0352302	19.3079074	3.70	5.6	2.9	104.3
09/22/2028	04	51	36.998	22	28	04.30	19.0187398	19.3077198	3.71	5.6	2.9	105.3
09/23/2028	04	51	36.228	22	28	03.44	19.0023276	19.3075322	3.71	5.6	2.9	106.3
09/24/2028	04	51	35.239	22	28	02.25	18.9859988	19.3073446	3.71	5.6	2.8	107.2
09/25/2028	04	51	34.030	22	28	00.72	18.9697582	19.3071570	3.72	5.6	2.8	108.2
09/26/2028	04	51	32.600	22	27	58.86	18.9536106	19.3069693	3.72	5.6	2.8	109.2
09/27/2028	04	51	30.950	22	27	56.65	18.9375609	19.3067817	3.72	5.6	2.8	110.2
09/28/2028	04	51	29.078	22	27	54.09	18.9216136	19.3065941	3.72	5.6	2.8	111.2
09/29/2028	04	51	26.986	22	27	51.17	18.9057735	19.3064065	3.73	5.6	2.8	112.2
09/30/2028	04	51	24.675	22	27	47.89	18.8900451	19.3062188	3.73	5.6	2.7	113.2

Uranus - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase Solar		
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
10/01/2028	04	51	22.147	22	27	44.24	18.8744331	19.3060312	3.73	5.6	2.7	114.2
10/02/2028	04	51	19.403	22	27	40.22	18.8589419	19.3058435	3.74	5.6	2.7	115.2
10/03/2028	04	51	16.445	22	27	35.83	18.8435761	19.3056559	3.74	5.6	2.7	116.2
10/04/2028	04	51	13.276	22	27	31.08	18.8283401	19.3054682	3.74	5.6	2.6	117.2
10/05/2028	04	51	09.899	22	27	25.96	18.8132386	19.3052805	3.75	5.6	2.6	118.1
10/06/2028	04	51	06.314	22	27	20.49	18.7982759	19.3050929	3.75	5.6	2.6	119.1
10/07/2028	04	51	02.524	22	27	14.67	18.7834567	19.3049052	3.75	5.6	2.6	120.1
10/08/2028	04	50	58.530	22	27	08.52	18.7687854	19.3047175	3.76	5.6	2.5	121.2
10/09/2028	04	50	54.332	22	27	02.04	18.7542667	19.3045298	3.76	5.6	2.5	122.2
10/10/2028	04	50	49.932	22	26	55.24	18.7399050	19.3043421	3.76	5.6	2.5	123.2
10/11/2028	04	50	45.328	22	26	48.12	18.7257051	19.3041544	3.76	5.6	2.5	124.2
10/12/2028	04	50	40.521	22	26	40.67	18.7116717	19.3039667	3.77	5.6	2.4	125.2
10/13/2028	04	50	35.511	22	26	32.89	18.6978094	19.3037790	3.77	5.6	2.4	126.2
10/14/2028	04	50	30.299	22	26	24.76	18.6841232	19.3035913	3.77	5.6	2.4	127.2
10/15/2028	04	50	24.887	22	26	16.29	18.6706178	19.3034036	3.77	5.6	2.3	128.2
10/16/2028	04	50	19.278	22	26	07.46	18.6572981	19.3032158	3.78	5.6	2.3	129.2
10/17/2028	04	50	13.476	22	25	58.27	18.6441690	19.3030281	3.78	5.6	2.3	130.2
10/18/2028	04	50	07.487	22	25	48.72	18.6312354	19.3028404	3.78	5.6	2.2	131.3
10/19/2028	04	50	01.315	22	25	38.85	18.6185020	19.3026526	3.79	5.6	2.2	132.3
10/20/2028	04	49	54.963	22	25	28.67	18.6059732	19.3024649	3.79	5.6	2.2	133.3
10/21/2028	04	49	48.433	22	25	18.18	18.5936536	19.3022771	3.79	5.6	2.1	134.3
10/22/2028	04	49	41.727	22	25	07.41	18.5815473	19.3020893	3.79	5.6	2.1	135.3
10/23/2028	04	49	34.844	22	24	56.36	18.5696584	19.3019016	3.80	5.6	2.0	136.4
10/24/2028	04	49	27.787	22	24	45.01	18.5579907	19.3017138	3.80	5.6	2.0	137.4
10/25/2028	04	49	20.558	22	24	33.37	18.5465481	19.3015260	3.80	5.6	2.0	138.4
10/26/2028	04	49	13.160	22	24	21.42	18.5353342	19.3013382	3.80	5.6	1.9	139.4
10/27/2028	04	49	05.596	22	24	09.18	18.5243525	19.3011505	3.80	5.6	1.9	140.5
10/28/2028	04	48	57.869	22	23	56.62	18.5136066	19.3009627	3.81	5.6	1.8	141.5
10/29/2028	04	48	49.984	22	23	43.77	18.5030998	19.3007749	3.81	5.6	1.8	142.5
10/30/2028	04	48	41.945	22	23	30.61	18.4928355	19.3005871	3.81	5.6	1.7	143.5
10/31/2028	04	48	33.757	22	23	17.16	18.4828171	19.3003993	3.81	5.6	1.7	144.6
11/01/2028	04	48	25.423	22	23	03.41	18.4730476	19.3002114	3.82	5.6	1.7	145.6
11/02/2028	04	48	16.950	22	22	49.39	18.4635303	19.3000236	3.82	5.6	1.6	146.6
11/03/2028	04	48	08.339	22	22	35.11	18.4542682	19.2998358	3.82	5.6	1.6	147.7
11/04/2028	04	47	59.595	22	22	20.57	18.4452645	19.2996480	3.82	5.6	1.5	148.7
11/05/2028	04	47	50.721	22	22	05.79	18.4365223	19.2994602	3.82	5.6	1.5	149.7
11/06/2028	04	47	41.719	22	21	50.78	18.4280444	19.2992723	3.82	5.6	1.4	150.8
11/07/2028	04	47	32.591	22	21	35.53	18.4198341	19.2990845	3.83	5.6	1.4	151.8
11/08/2028	04	47	23.339	22	21	20.07	18.4118943	19.2988967	3.83	5.6	1.4	152.9
11/09/2028	04	47	13.967	22	21	04.37	18.4042280	19.2987088	3.83	5.6	1.3	153.9
11/10/2028	04	47	04.475	22	20	48.44	18.3968383	19.2985210	3.83	5.6	1.3	154.9
11/11/2028	04	46	54.869	22	20	32.27	18.3897282	19.2983331	3.83	5.6	1.2	156.0
11/12/2028	04	46	45.153	22	20	15.86	18.3829007	19.2981453	3.83	5.6	1.2	157.0
11/13/2028	04	46	35.333	22	19	59.20	18.3763587	19.2979574	3.84	5.6	1.1	158.1
11/14/2028	04	46	25.416	22	19	42.32	18.3701051	19.2977695	3.84	5.6	1.1	159.1
11/15/2028	04	46	15.408	22	19	25.22	18.3641426	19.2975817	3.84	5.6	1.0	160.2
11/16/2028	04	46	05.316	22	19	07.92	18.3584736	19.2973938	3.84	5.6	1.0	161.2
11/17/2028	04	45	55.143	22	18	50.46	18.3531007	19.2972059	3.84	5.6	0.9	162.3
11/18/2028	04	45	44.893	22	18	32.84	18.3480258	19.2970181	3.84	5.6	0.8	163.3
11/19/2028	04	45	34.568	22	18	15.08	18.3432510	19.2968302	3.84	5.6	0.8	164.4
11/20/2028	04	45	24.172	22	17	57.17	18.3387778	19.2966423	3.84	5.6	0.7	165.4
11/21/2028	04	45	13.708	22	17	39.12	18.3346077	19.2964544	3.84	5.6	0.7	166.5
11/22/2028	04	45	03.180	22	17	20.92	18.3307422	19.2962665	3.84	5.6	0.6	167.5
11/23/2028	04	44	52.594	22	17	02.57	18.3271823	19.2960786	3.85	5.6	0.6	168.6
11/24/2028	04	44	41.953	22	16	44.07	18.3239292	19.2958907	3.85	5.6	0.5	169.6

Uranus - Apparent data

Date Oh TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase Solar		
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Solar Sep. deg.
11/25/2028	04	44	31.264	22	16	25.44	18.3209838	19.2957028	3.85	5.6	0.5	170.7
11/26/2028	04	44	20.534	22	16	06.66	18.3183469	19.2955149	3.85	5.6	0.4	171.7
11/27/2028	04	44	09.766	22	15	47.77	18.3160192	19.2953270	3.85	5.6	0.4	172.8
11/28/2028	04	43	58.969	22	15	28.75	18.3140015	19.2951391	3.85	5.6	0.3	173.8
11/29/2028	04	43	48.146	22	15	09.63	18.3122941	19.2949512	3.85	5.6	0.3	174.9
11/30/2028	04	43	37.304	22	14	50.43	18.3108977	19.2947633	3.85	5.6	0.2	175.9
12/01/2028	04	43	26.448	22	14	31.16	18.3098125	19.2945754	3.85	5.6	0.2	177.0
12/02/2028	04	43	15.581	22	14	11.83	18.3090390	19.2943874	3.85	5.6	0.1	178.0
12/03/2028	04	43	04.708	22	13	52.46	18.3085773	19.2941995	3.85	5.6	0.1	179.1
12/04/2028	04	42	53.831	22	13	33.06	18.3084277	19.2940116	3.85	5.5	0.0	179.8
12/05/2028	04	42	42.954	22	13	13.63	18.3085904	19.2938237	3.85	5.6	0.1	178.8
12/06/2028	04	42	32.080	22	12	54.18	18.3090656	19.2936357	3.85	5.6	0.1	177.7
12/07/2028	04	42	21.212	22	12	34.71	18.3098535	19.2934478	3.85	5.6	0.2	176.7
12/08/2028	04	42	10.354	22	12	15.20	18.3109542	19.2932599	3.85	5.6	0.2	175.6
12/09/2028	04	41	59.512	22	11	55.67	18.3123678	19.2930719	3.85	5.6	0.3	174.6
12/10/2028	04	41	48.693	22	11	36.11	18.3140941	19.2928840	3.85	5.6	0.3	173.5
12/11/2028	04	41	37.904	22	11	16.54	18.3161332	19.2926960	3.85	5.6	0.4	172.4
12/12/2028	04	41	27.152	22	10	56.98	18.3184848	19.2925081	3.85	5.6	0.4	171.4
12/13/2028	04	41	16.442	22	10	37.44	18.3211483	19.2923201	3.85	5.6	0.5	170.3
12/14/2028	04	41	05.781	22	10	17.96	18.3241232	19.2921322	3.85	5.6	0.5	169.3
12/15/2028	04	40	55.173	22	09	58.54	18.3274085	19.2919442	3.85	5.6	0.6	168.2
12/16/2028	04	40	44.620	22	09	39.22	18.3310033	19.2917563	3.84	5.6	0.6	167.1
12/17/2028	04	40	34.127	22	09	19.98	18.3349062	19.2915683	3.84	5.6	0.7	166.1
12/18/2028	04	40	23.695	22	09	00.85	18.3391156	19.2913804	3.84	5.6	0.8	165.0
12/19/2028	04	40	13.330	22	08	41.81	18.3436299	19.2911924	3.84	5.6	0.8	164.0
12/20/2028	04	40	03.036	22	08	22.87	18.3484472	19.2910044	3.84	5.6	0.9	162.9
12/21/2028	04	39	52.817	22	08	04.02	18.3535655	19.2908165	3.84	5.6	0.9	161.9
12/22/2028	04	39	42.680	22	07	45.28	18.3589827	19.2906285	3.84	5.6	1.0	160.8
12/23/2028	04	39	32.629	22	07	26.65	18.3646965	19.2904405	3.84	5.6	1.0	159.7
12/24/2028	04	39	22.671	22	07	08.15	18.3707046	19.2902525	3.84	5.6	1.1	158.7
12/25/2028	04	39	12.811	22	06	49.78	18.3770046	19.2900646	3.84	5.6	1.1	157.6
12/26/2028	04	39	03.054	22	06	31.55	18.3835939	19.2898766	3.83	5.6	1.2	156.6
12/27/2028	04	38	53.405	22	06	13.49	18.3904701	19.2896886	3.83	5.6	1.2	155.5
12/28/2028	04	38	43.869	22	05	55.61	18.3976304	19.2895006	3.83	5.6	1.3	154.5
12/29/2028	04	38	34.450	22	05	37.93	18.4050721	19.2893126	3.83	5.6	1.3	153.4
12/30/2028	04	38	25.150	22	05	20.46	18.4127925	19.2891247	3.83	5.6	1.4	152.3
12/31/2028	04	38	15.974	22	05	03.22	18.4207888	19.2889367	3.83	5.6	1.4	151.3
01/01/2029	04	38	06.922	22	04	46.21	18.4290582	19.2887487	3.82	5.6	1.4	150.2

12/03/2028 20:29:49 Uranus at max angle from sun 179.972 degrees.

Neptune - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
12/31/2027	00	16	39.454	00	15	16.19	29.9399604	29.8679652	2.28	7.9	1.9	84.9
01/01/2028	00	16	41.437	00	15	31.85	29.9572404	29.8679451	2.28	7.9	1.9	83.9
01/02/2028	00	16	43.544	00	15	48.29	29.9744871	29.8679249	2.28	7.9	1.9	82.8
01/03/2028	00	16	45.776	00	16	05.54	29.9916949	29.8679048	2.28	7.9	1.9	81.8
01/04/2028	00	16	48.132	00	16	23.58	30.0088585	29.8678846	2.28	7.9	1.9	80.8
01/05/2028	00	16	50.613	00	16	42.41	30.0259728	29.8678645	2.27	7.9	1.9	79.8
01/06/2028	00	16	53.219	00	17	02.04	30.0430324	29.8678443	2.27	7.9	1.8	78.8
01/07/2028	00	16	55.951	00	17	22.47	30.0600322	29.8678242	2.27	7.9	1.8	77.8
01/08/2028	00	16	58.809	00	17	43.70	30.0769674	29.8678041	2.27	7.9	1.8	76.8
01/09/2028	00	17	01.793	00	18	05.73	30.0938329	29.8677840	2.27	7.9	1.8	75.8
01/10/2028	00	17	04.900	00	18	28.54	30.1106241	29.8677639	2.27	7.9	1.8	74.8
01/11/2028	00	17	08.129	00	18	52.13	30.1273362	29.8677438	2.27	7.9	1.8	73.8
01/12/2028	00	17	11.476	00	19	16.46	30.1439647	29.8677237	2.27	7.9	1.8	72.8
01/13/2028	00	17	14.939	00	19	41.53	30.1605051	29.8677037	2.26	7.9	1.8	71.8
01/14/2028	00	17	18.515	00	20	07.31	30.1769529	29.8676836	2.26	7.9	1.8	70.8
01/15/2028	00	17	22.203	00	20	33.80	30.1933037	29.8676635	2.26	7.9	1.8	69.8
01/16/2028	00	17	26.005	00	21	00.99	30.2095528	29.8676435	2.26	7.9	1.8	68.8
01/17/2028	00	17	29.920	00	21	28.91	30.2256956	29.8676234	2.26	7.9	1.7	67.8
01/18/2028	00	17	33.951	00	21	57.54	30.2417273	29.8676034	2.26	7.9	1.7	66.8
01/19/2028	00	17	38.098	00	22	26.91	30.2576432	29.8675834	2.26	7.9	1.7	65.8
01/20/2028	00	17	42.360	00	22	57.00	30.2734383	29.8675634	2.26	7.9	1.7	64.8
01/21/2028	00	17	46.738	00	23	27.81	30.2891079	29.8675434	2.25	7.9	1.7	63.8
01/22/2028	00	17	51.229	00	23	59.32	30.3046470	29.8675234	2.25	7.9	1.7	62.8
01/23/2028	00	17	55.830	00	24	31.54	30.3200507	29.8675034	2.25	7.9	1.7	61.8
01/24/2028	00	18	00.541	00	25	04.43	30.3353143	29.8674834	2.25	7.9	1.6	60.8
01/25/2028	00	18	05.358	00	25	37.98	30.3504331	29.8674634	2.25	7.9	1.6	59.8
01/26/2028	00	18	10.279	00	26	12.18	30.3654022	29.8674434	2.25	7.9	1.6	58.8
01/27/2028	00	18	15.303	00	26	47.02	30.3802172	29.8674235	2.25	7.9	1.6	57.8
01/28/2028	00	18	20.428	00	27	22.48	30.3948735	29.8674035	2.25	7.9	1.6	56.8
01/29/2028	00	18	25.654	00	27	58.56	30.4093666	29.8673836	2.25	7.9	1.6	55.8
01/30/2028	00	18	30.979	00	28	35.24	30.4236922	29.8673636	2.24	7.9	1.5	54.8
01/31/2028	00	18	36.402	00	29	12.53	30.4378462	29.8673437	2.24	7.9	1.5	53.9
02/01/2028	00	18	41.924	00	29	50.42	30.4518244	29.8673238	2.24	7.9	1.5	52.9
02/02/2028	00	18	47.543	00	30	28.90	30.4656228	29.8673039	2.24	7.9	1.5	51.9
02/03/2028	00	18	53.260	00	31	07.97	30.4792375	29.8672840	2.24	7.9	1.5	50.9
02/04/2028	00	18	59.073	00	31	47.63	30.4926648	29.8672641	2.24	7.9	1.4	49.9
02/05/2028	00	19	04.981	00	32	27.87	30.5059011	29.8672442	2.24	7.9	1.4	48.9
02/06/2028	00	19	10.983	00	33	08.67	30.5189430	29.8672244	2.24	7.9	1.4	47.9
02/07/2028	00	19	17.075	00	33	50.03	30.5317871	29.8672045	2.24	7.9	1.4	46.9
02/08/2028	00	19	23.256	00	34	31.92	30.5444301	29.8671847	2.24	7.9	1.3	46.0
02/09/2028	00	19	29.521	00	35	14.31	30.5568692	29.8671648	2.23	7.9	1.3	45.0
02/10/2028	00	19	35.866	00	35	57.19	30.5691012	29.8671450	2.23	7.9	1.3	44.0
02/11/2028	00	19	42.289	00	36	40.53	30.5811232	29.8671252	2.23	7.9	1.3	43.0
02/12/2028	00	19	48.789	00	37	24.33	30.5929324	29.8671054	2.23	7.9	1.3	42.0
02/13/2028	00	19	55.367	00	38	08.58	30.6045257	29.8670856	2.23	7.9	1.2	41.0
02/14/2028	00	20	02.024	00	38	53.30	30.6159000	29.8670658	2.23	7.9	1.2	40.1
02/15/2028	00	20	08.759	00	39	38.49	30.6270522	29.8670460	2.23	7.9	1.2	39.1
02/16/2028	00	20	15.573	00	40	24.15	30.6379792	29.8670262	2.23	7.9	1.2	38.1
02/17/2028	00	20	22.464	00	41	10.26	30.6486778	29.8670065	2.23	7.9	1.1	37.1
02/18/2028	00	20	29.430	00	41	56.81	30.6591447	29.8669867	2.23	7.9	1.1	36.2
02/19/2028	00	20	36.468	00	42	43.78	30.6693769	29.8669670	2.23	7.9	1.1	35.2
02/20/2028	00	20	43.575	00	43	31.16	30.6793713	29.8669473	2.23	7.9	1.1	34.2
02/21/2028	00	20	50.749	00	44	18.93	30.6891250	29.8669275	2.23	7.9	1.0	33.2
02/22/2028	00	20	57.987	00	45	07.07	30.6986351	29.8669078	2.22	7.9	1.0	32.3
02/23/2028	00	21	05.286	00	45	55.56	30.7078988	29.8668881	2.22	7.9	1.0	31.3

Neptune - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Phase	Solar	
	h	m s	d	m s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
02/24/2028	00	21 12.645	00	46 44.39	30.7169134	29.8668684	2.22	7.9	1.0	30.3
02/25/2028	00	21 20.062	00	47 33.54	30.7256763	29.8668488	2.22	7.9	0.9	29.3
02/26/2028	00	21 27.535	00	48 23.01	30.7341851	29.8668291	2.22	7.9	0.9	28.4
02/27/2028	00	21 35.064	00	49 12.78	30.7424375	29.8668094	2.22	7.9	0.9	27.4
02/28/2028	00	21 42.647	00	50 02.86	30.7504312	29.8667898	2.22	7.9	0.8	26.4
02/29/2028	00	21 50.284	00	50 53.23	30.7581642	29.8667702	2.22	7.9	0.8	25.5
03/01/2028	00	21 57.973	00	51 43.88	30.7656347	29.8667505	2.22	7.9	0.8	24.5
03/02/2028	00	22 05.714	00	52 34.82	30.7728407	29.8667309	2.22	7.9	0.8	23.5
03/03/2028	00	22 13.505	00	53 26.03	30.7797806	29.8667113	2.22	7.9	0.7	22.6
03/04/2028	00	22 21.344	00	54 17.50	30.7864530	29.8666917	2.22	7.9	0.7	21.6
03/05/2028	00	22 29.228	00	55 09.21	30.7928565	29.8666721	2.22	7.9	0.7	20.6
03/06/2028	00	22 37.154	00	56 01.14	30.7989899	29.8666526	2.22	7.9	0.6	19.7
03/07/2028	00	22 45.119	00	56 53.28	30.8048521	29.8666330	2.22	7.9	0.6	18.7
03/08/2028	00	22 53.119	00	57 45.58	30.8104421	29.8666135	2.22	7.9	0.6	17.7
03/09/2028	00	23 01.150	00	58 38.04	30.8157591	29.8665939	2.22	7.9	0.5	16.8
03/10/2028	00	23 09.211	00	59 30.64	30.8208023	29.8665744	2.22	8.0	0.5	15.8
03/11/2028	00	23 17.300	01	00 23.37	30.8255707	29.8665549	2.22	8.0	0.5	14.9
03/12/2028	00	23 25.420	01	01 16.24	30.8300636	29.8665354	2.22	8.0	0.5	13.9
03/13/2028	00	23 33.569	01	02 09.24	30.8342798	29.8665159	2.21	8.0	0.4	13.0
03/14/2028	00	23 41.748	01	03 02.39	30.8382186	29.8664964	2.21	8.0	0.4	12.0
03/15/2028	00	23 49.956	01	03 55.67	30.8418787	29.8664769	2.21	8.0	0.4	11.0
03/16/2028	00	23 58.191	01	04 49.07	30.8452591	29.8664574	2.21	8.0	0.3	10.1
03/17/2028	00	24 06.449	01	05 42.57	30.8483589	29.8664380	2.21	8.0	0.3	9.2
03/18/2028	00	24 14.728	01	06 36.15	30.8511770	29.8664185	2.21	8.0	0.3	8.2
03/19/2028	00	24 23.024	01	07 29.79	30.8537126	29.8663991	2.21	8.0	0.2	7.3
03/20/2028	00	24 31.335	01	08 23.48	30.8559649	29.8663797	2.21	8.0	0.2	6.3
03/21/2028	00	24 39.659	01	09 17.19	30.8579333	29.8663603	2.21	8.0	0.2	5.4
03/22/2028	00	24 47.992	01	10 10.90	30.8596172	29.8663409	2.21	8.0	0.1	4.5
03/23/2028	00	24 56.334	01	11 04.61	30.8610160	29.8663215	2.21	8.0	0.1	3.6
03/24/2028	00	25 04.684	01	11 58.29	30.8621296	29.8663021	2.21	8.0	0.1	2.7
03/25/2028	00	25 13.039	01	12 51.90	30.8629577	29.8662828	2.21	8.0	0.1	2.0
03/26/2028	00	25 21.395	01	13 45.40	30.8635001	29.8662634	2.21	8.0	0.0	1.5
03/27/2028	00	25 29.742	01	14 38.93	30.8637570	29.8662441	2.21	8.0	0.1	1.5
03/28/2028	00	25 38.096	01	15 32.60	30.8637284	29.8662247	2.21	8.0	0.1	2.0
03/29/2028	00	25 46.458	01	16 26.19	30.8634148	29.8662054	2.21	8.0	0.1	2.8
03/30/2028	00	25 54.821	01	17 19.69	30.8628165	29.8661861	2.21	8.0	0.1	3.6
03/31/2028	00	26 03.182	01	18 13.09	30.8619342	29.8661668	2.21	8.0	0.2	4.5
04/01/2028	00	26 11.537	01	19 06.41	30.8607686	29.8661475	2.21	8.0	0.2	5.4
04/02/2028	00	26 19.884	01	19 59.61	30.8593205	29.8661283	2.21	8.0	0.2	6.4
04/03/2028	00	26 28.220	01	20 52.69	30.8575911	29.8661090	2.21	8.0	0.3	7.3
04/04/2028	00	26 36.541	01	21 45.61	30.8555813	29.8660898	2.21	8.0	0.3	8.2
04/05/2028	00	26 44.843	01	22 38.37	30.8532923	29.8660705	2.21	8.0	0.3	9.2
04/06/2028	00	26 53.125	01	23 30.93	30.8507254	29.8660513	2.21	8.0	0.3	10.1
04/07/2028	00	27 01.385	01	24 23.30	30.8478818	29.8660321	2.21	8.0	0.4	11.0
04/08/2028	00	27 09.623	01	25 15.48	30.8447628	29.8660129	2.21	8.0	0.4	12.0
04/09/2028	00	27 17.840	01	26 07.46	30.8413696	29.8659937	2.21	8.0	0.4	12.9
04/10/2028	00	27 26.037	01	26 59.25	30.8377032	29.8659745	2.21	8.0	0.5	13.8
04/11/2028	00	27 34.212	01	27 50.84	30.8337647	29.8659553	2.21	8.0	0.5	14.8
04/12/2028	00	27 42.364	01	28 42.25	30.8295552	29.8659362	2.22	8.0	0.5	15.7
04/13/2028	00	27 50.491	01	29 33.43	30.8250756	29.8659170	2.22	8.0	0.6	16.7
04/14/2028	00	27 58.589	01	30 24.38	30.8203271	29.8658979	2.22	8.0	0.6	17.6
04/15/2028	00	28 06.655	01	31 15.08	30.8153106	29.8658787	2.22	7.9	0.6	18.5
04/16/2028	00	28 14.686	01	32 05.51	30.8100275	29.8658596	2.22	7.9	0.6	19.5
04/17/2028	00	28 22.680	01	32 55.64	30.8044790	29.8658405	2.22	7.9	0.7	20.4
04/18/2028	00	28 30.635	01	33 45.47	30.7986665	29.8658214	2.22	7.9	0.7	21.4

Neptune - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
04/19/2028	00	28	38.549	01	34	34.98	30.7925915	29.8658023	2.22	7.9	0.7	22.3
04/20/2028	00	28	46.420	01	35	24.16	30.7862555	29.8657833	2.22	7.9	0.8	23.2
04/21/2028	00	28	54.247	01	36	13.01	30.7796603	29.8657642	2.22	7.9	0.8	24.2
04/22/2028	00	29	02.030	01	37	01.52	30.7728078	29.8657452	2.22	7.9	0.8	25.1
04/23/2028	00	29	09.768	01	37	49.68	30.7656997	29.8657261	2.22	7.9	0.9	26.1
04/24/2028	00	29	17.459	01	38	37.49	30.7583382	29.8657071	2.22	7.9	0.9	27.0
04/25/2028	00	29	25.104	01	39	24.95	30.7507254	29.8656881	2.22	7.9	0.9	27.9
04/26/2028	00	29	32.700	01	40	12.05	30.7428637	29.8656691	2.22	7.9	0.9	28.9
04/27/2028	00	29	40.246	01	40	58.77	30.7347554	29.8656501	2.22	7.9	1.0	29.8
04/28/2028	00	29	47.741	01	41	45.11	30.7264032	29.8656311	2.22	7.9	1.0	30.8
04/29/2028	00	29	55.180	01	42	31.05	30.7178098	29.8656122	2.22	7.9	1.0	31.7
04/30/2028	00	30	02.562	01	43	16.58	30.7089779	29.8655932	2.22	7.9	1.1	32.6
05/01/2028	00	30	09.882	01	44	01.66	30.6999104	29.8655743	2.22	7.9	1.1	33.6
05/02/2028	00	30	17.138	01	44	46.29	30.6906104	29.8655554	2.23	7.9	1.1	34.5
05/03/2028	00	30	24.328	01	45	30.44	30.6810807	29.8655364	2.23	7.9	1.1	35.4
05/04/2028	00	30	31.450	01	46	14.12	30.6713245	29.8655175	2.23	7.9	1.2	36.4
05/05/2028	00	30	38.505	01	46	57.30	30.6613446	29.8654986	2.23	7.9	1.2	37.3
05/06/2028	00	30	45.493	01	47	40.01	30.6511441	29.8654798	2.23	7.9	1.2	38.3
05/07/2028	00	30	52.414	01	48	22.25	30.6407258	29.8654609	2.23	7.9	1.2	39.2
05/08/2028	00	30	59.268	01	49	04.01	30.6300925	29.8654420	2.23	7.9	1.3	40.1
05/09/2028	00	31	06.056	01	49	45.30	30.6192470	29.8654232	2.23	7.9	1.3	41.1
05/10/2028	00	31	12.774	01	50	26.10	30.6081921	29.8654044	2.23	7.9	1.3	42.0
05/11/2028	00	31	19.421	01	51	06.41	30.5969304	29.8653855	2.23	7.9	1.3	42.9
05/12/2028	00	31	25.994	01	51	46.19	30.5854647	29.8653667	2.23	7.9	1.3	43.9
05/13/2028	00	31	32.489	01	52	25.45	30.5737977	29.8653479	2.23	7.9	1.4	44.8
05/14/2028	00	31	38.905	01	53	04.15	30.5619323	29.8653291	2.23	7.9	1.4	45.7
05/15/2028	00	31	45.239	01	53	42.29	30.5498715	29.8653104	2.24	7.9	1.4	46.7
05/16/2028	00	31	51.490	01	54	19.86	30.5376183	29.8652916	2.24	7.9	1.4	47.6
05/17/2028	00	31	57.657	01	54	56.84	30.5251757	29.8652729	2.24	7.9	1.5	48.5
05/18/2028	00	32	03.739	01	55	33.23	30.5125470	29.8652541	2.24	7.9	1.5	49.5
05/19/2028	00	32	09.735	01	56	09.04	30.4997355	29.8652354	2.24	7.9	1.5	50.4
05/20/2028	00	32	15.645	01	56	44.25	30.4867446	29.8652167	2.24	7.9	1.5	51.4
05/21/2028	00	32	21.469	01	57	18.86	30.4735778	29.8651980	2.24	7.9	1.5	52.3
05/22/2028	00	32	27.207	01	57	52.88	30.4602386	29.8651793	2.24	7.9	1.6	53.2
05/23/2028	00	32	32.857	01	58	26.31	30.4467308	29.8651606	2.24	7.9	1.6	54.2
05/24/2028	00	32	38.419	01	58	59.12	30.4330582	29.8651419	2.24	7.9	1.6	55.1
05/25/2028	00	32	43.891	01	59	31.33	30.4192247	29.8651233	2.24	7.9	1.6	56.0
05/26/2028	00	32	49.271	02	00	02.91	30.4052345	29.8651046	2.25	7.9	1.6	57.0
05/27/2028	00	32	54.556	02	00	33.86	30.3910916	29.8650860	2.25	7.9	1.7	57.9
05/28/2028	00	32	59.743	02	01	04.14	30.3768002	29.8650673	2.25	7.9	1.7	58.8
05/29/2028	00	33	04.829	02	01	33.76	30.3623648	29.8650487	2.25	7.9	1.7	59.8
05/30/2028	00	33	09.813	02	02	02.68	30.3477895	29.8650301	2.25	7.9	1.7	60.7
05/31/2028	00	33	14.694	02	02	30.91	30.3330788	29.8650115	2.25	7.9	1.7	61.7
06/01/2028	00	33	19.472	02	02	58.45	30.3182367	29.8649929	2.25	7.9	1.7	62.6
06/02/2028	00	33	24.148	02	03	25.30	30.3032676	29.8649744	2.25	7.9	1.7	63.5
06/03/2028	00	33	28.723	02	03	51.48	30.2881756	29.8649558	2.25	7.9	1.8	64.5
06/04/2028	00	33	33.198	02	04	16.98	30.2729647	29.8649372	2.26	7.9	1.8	65.4
06/05/2028	00	33	37.572	02	04	41.81	30.2576390	29.8649187	2.26	7.9	1.8	66.3
06/06/2028	00	33	41.845	02	05	05.96	30.2422022	29.8649002	2.26	7.9	1.8	67.3
06/07/2028	00	33	46.014	02	05	29.44	30.2266584	29.8648817	2.26	7.9	1.8	68.2
06/08/2028	00	33	50.079	02	05	52.22	30.2110113	29.8648631	2.26	7.9	1.8	69.1
06/09/2028	00	33	54.036	02	06	14.29	30.1952649	29.8648446	2.26	7.9	1.8	70.1
06/10/2028	00	33	57.884	02	06	35.64	30.1794230	29.8648262	2.26	7.9	1.8	71.0
06/11/2028	00	34	01.620	02	06	56.25	30.1634897	29.8648077	2.26	7.9	1.9	72.0
06/12/2028	00	34	05.245	02	07	16.13	30.1474690	29.8647892	2.27	7.9	1.9	72.9

Neptune - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
06/13/2028	00	34	08.756	02	07	35.26	30.1313649	29.8647707	2.27	7.9	1.9	73.8
06/14/2028	00	34	12.154	02	07	53.64	30.1151816	29.8647523	2.27	7.9	1.9	74.8
06/15/2028	00	34	15.440	02	08	11.28	30.0989234	29.8647339	2.27	7.9	1.9	75.7
06/16/2028	00	34	18.612	02	08	28.17	30.0825946	29.8647154	2.27	7.9	1.9	76.7
06/17/2028	00	34	21.671	02	08	44.32	30.0661996	29.8646970	2.27	7.9	1.9	77.6
06/18/2028	00	34	24.619	02	08	59.72	30.0497428	29.8646786	2.27	7.9	1.9	78.5
06/19/2028	00	34	27.453	02	09	14.39	30.0332287	29.8646602	2.27	7.9	1.9	79.5
06/20/2028	00	34	30.176	02	09	28.32	30.0166621	29.8646418	2.28	7.9	1.9	80.4
06/21/2028	00	34	32.785	02	09	41.51	30.0000477	29.8646234	2.28	7.9	1.9	81.4
06/22/2028	00	34	35.280	02	09	53.96	29.9833902	29.8646051	2.28	7.9	1.9	82.3
06/23/2028	00	34	37.658	02	10	05.65	29.9666946	29.8645867	2.28	7.9	1.9	83.3
06/24/2028	00	34	39.917	02	10	16.57	29.9499660	29.8645683	2.28	7.9	2.0	84.2
06/25/2028	00	34	42.055	02	10	26.71	29.9332092	29.8645500	2.28	7.9	2.0	85.2
06/26/2028	00	34	44.071	02	10	36.05	29.9164294	29.8645317	2.28	7.9	2.0	86.1
06/27/2028	00	34	45.963	02	10	44.60	29.8996316	29.8645133	2.28	7.9	2.0	87.0
06/28/2028	00	34	47.733	02	10	52.36	29.8828207	29.8644950	2.29	7.9	2.0	88.0
06/29/2028	00	34	49.383	02	10	59.33	29.8660016	29.8644767	2.29	7.9	2.0	88.9
06/30/2028	00	34	50.913	02	11	05.53	29.8491790	29.8644584	2.29	7.9	2.0	89.9
07/01/2028	00	34	52.326	02	11	10.97	29.8323576	29.8644401	2.29	7.9	2.0	90.8
07/02/2028	00	34	53.623	02	11	15.66	29.8155419	29.8644219	2.29	7.9	2.0	91.8
07/03/2028	00	34	54.803	02	11	19.60	29.7987365	29.8644036	2.29	7.9	1.9	92.7
07/04/2028	00	34	55.866	02	11	22.80	29.7819457	29.8643853	2.29	7.9	1.9	93.7
07/05/2028	00	34	56.810	02	11	25.23	29.7651739	29.8643671	2.29	7.9	1.9	94.6
07/06/2028	00	34	57.635	02	11	26.91	29.7484254	29.8643488	2.30	7.9	1.9	95.6
07/07/2028	00	34	58.338	02	11	27.81	29.7317045	29.8643306	2.30	7.9	1.9	96.5
07/08/2028	00	34	58.919	02	11	27.93	29.7150157	29.8643124	2.30	7.9	1.9	97.5
07/09/2028	00	34	59.378	02	11	27.27	29.6983633	29.8642941	2.30	7.9	1.9	98.4
07/10/2028	00	34	59.713	02	11	25.83	29.6817516	29.8642759	2.30	7.9	1.9	99.4
07/11/2028	00	34	59.927	02	11	23.60	29.6651853	29.8642577	2.30	7.9	1.9	100.3
07/12/2028	00	35	00.019	02	11	20.60	29.6486687	29.8642395	2.30	7.9	1.9	101.3
07/13/2028	00	34	59.991	02	11	16.83	29.6322065	29.8642214	2.30	7.9	1.9	102.2
07/14/2028	00	34	59.843	02	11	12.30	29.6158031	29.8642032	2.31	7.9	1.9	103.2
07/15/2028	00	34	59.577	02	11	07.02	29.5994634	29.8641850	2.31	7.9	1.9	104.1
07/16/2028	00	34	59.193	02	11	00.98	29.5831919	29.8641668	2.31	7.9	1.9	105.1
07/17/2028	00	34	58.693	02	10	54.21	29.5669934	29.8641487	2.31	7.9	1.9	106.1
07/18/2028	00	34	58.077	02	10	46.71	29.5508727	29.8641306	2.31	7.9	1.9	107.0
07/19/2028	00	34	57.344	02	10	38.47	29.5348347	29.8641124	2.31	7.9	1.9	108.0
07/20/2028	00	34	56.494	02	10	29.50	29.5188843	29.8640943	2.31	7.9	1.9	108.9
07/21/2028	00	34	55.526	02	10	19.78	29.5030265	29.8640762	2.31	7.9	1.8	109.9
07/22/2028	00	34	54.438	02	10	09.32	29.4872662	29.8640581	2.32	7.9	1.8	110.8
07/23/2028	00	34	53.229	02	09	58.10	29.4716086	29.8640400	2.32	7.9	1.8	111.8
07/24/2028	00	34	51.899	02	09	46.12	29.4560586	29.8640219	2.32	7.9	1.8	112.8
07/25/2028	00	34	50.448	02	09	33.38	29.4406211	29.8640038	2.32	7.9	1.8	113.7
07/26/2028	00	34	48.881	02	09	19.91	29.4253008	29.8639857	2.32	7.8	1.8	114.7
07/27/2028	00	34	47.199	02	09	05.72	29.4101024	29.8639676	2.32	7.8	1.8	115.7
07/28/2028	00	34	45.405	02	08	50.83	29.3950304	29.8639496	2.32	7.8	1.7	116.6
07/29/2028	00	34	43.501	02	08	35.26	29.3800890	29.8639315	2.32	7.8	1.7	117.6
07/30/2028	00	34	41.488	02	08	19.02	29.3652826	29.8639135	2.33	7.8	1.7	118.5
07/31/2028	00	34	39.367	02	08	02.10	29.3506151	29.8638954	2.33	7.8	1.7	119.5
08/01/2028	00	34	37.137	02	07	44.52	29.3360907	29.8638774	2.33	7.8	1.7	120.5
08/02/2028	00	34	34.799	02	07	26.27	29.3217133	29.8638594	2.33	7.8	1.7	121.4
08/03/2028	00	34	32.350	02	07	07.35	29.3074868	29.8638414	2.33	7.8	1.6	122.4
08/04/2028	00	34	29.793	02	06	47.75	29.2934152	29.8638234	2.33	7.8	1.6	123.4
08/05/2028	00	34	27.126	02	06	27.48	29.2795025	29.8638054	2.33	7.8	1.6	124.4
08/06/2028	00	34	24.351	02	06	06.55	29.2657523	29.8637874	2.33	7.8	1.6	125.3

Neptune - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase Solar		
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
08/07/2028	00	34	21.469	02	05	44.96	29.2521688	29.8637694	2.33	7.8	1.6	126.3
08/08/2028	00	34	18.482	02	05	22.72	29.2387558	29.8637514	2.34	7.8	1.6	127.3
08/09/2028	00	34	15.391	02	04	59.84	29.2255173	29.8637335	2.34	7.8	1.5	128.2
08/10/2028	00	34	12.198	02	04	36.34	29.2124571	29.8637155	2.34	7.8	1.5	129.2
08/11/2028	00	34	08.907	02	04	12.23	29.1995793	29.8636976	2.34	7.8	1.5	130.2
08/12/2028	00	34	05.517	02	03	47.52	29.1868877	29.8636797	2.34	7.8	1.5	131.2
08/13/2028	00	34	02.032	02	03	22.23	29.1743865	29.8636617	2.34	7.8	1.4	132.1
08/14/2028	00	33	58.452	02	02	56.37	29.1620795	29.8636438	2.34	7.8	1.4	133.1
08/15/2028	00	33	54.780	02	02	29.95	29.1499708	29.8636259	2.34	7.8	1.4	134.1
08/16/2028	00	33	51.014	02	02	02.98	29.1380644	29.8636080	2.34	7.8	1.4	135.1
08/17/2028	00	33	47.156	02	01	35.45	29.1263643	29.8635901	2.34	7.8	1.4	136.0
08/18/2028	00	33	43.205	02	01	07.36	29.1148747	29.8635722	2.35	7.8	1.3	137.0
08/19/2028	00	33	39.161	02	00	38.72	29.1035996	29.8635543	2.35	7.8	1.3	138.0
08/20/2028	00	33	35.024	02	00	09.52	29.0925429	29.8635365	2.35	7.8	1.3	139.0
08/21/2028	00	33	30.795	01	59	39.77	29.0817085	29.8635186	2.35	7.8	1.3	140.0
08/22/2028	00	33	26.477	01	59	09.50	29.0711003	29.8635007	2.35	7.8	1.2	141.0
08/23/2028	00	33	22.075	01	58	38.71	29.0607218	29.8634829	2.35	7.8	1.2	141.9
08/24/2028	00	33	17.592	01	58	07.45	29.0505764	29.8634650	2.35	7.8	1.2	142.9
08/25/2028	00	33	13.031	01	57	35.74	29.0406673	29.8634472	2.35	7.8	1.1	143.9
08/26/2028	00	33	08.396	01	57	03.59	29.0309974	29.8634294	2.35	7.8	1.1	144.9
08/27/2028	00	33	03.687	01	56	31.02	29.0215696	29.8634116	2.35	7.8	1.1	145.9
08/28/2028	00	32	58.905	01	55	58.02	29.0123867	29.8633938	2.35	7.8	1.1	146.9
08/29/2028	00	32	54.051	01	55	24.62	29.0034513	29.8633760	2.35	7.8	1.0	147.8
08/30/2028	00	32	49.124	01	54	50.80	28.9947660	29.8633582	2.36	7.8	1.0	148.8
08/31/2028	00	32	44.127	01	54	16.57	28.9863332	29.8633404	2.36	7.8	1.0	149.8
09/01/2028	00	32	39.060	01	53	41.95	28.9781555	29.8633226	2.36	7.8	0.9	150.8
09/02/2028	00	32	33.924	01	53	06.93	28.9702353	29.8633048	2.36	7.8	0.9	151.8
09/03/2028	00	32	28.723	01	52	31.54	28.9625750	29.8632871	2.36	7.8	0.9	152.8
09/04/2028	00	32	23.458	01	51	55.79	28.9551769	29.8632693	2.36	7.8	0.9	153.8
09/05/2028	00	32	18.131	01	51	19.69	28.9480435	29.8632516	2.36	7.8	0.8	154.8
09/06/2028	00	32	12.747	01	50	43.26	28.9411770	29.8632338	2.36	7.8	0.8	155.8
09/07/2028	00	32	07.307	01	50	06.53	28.9345797	29.8632161	2.36	7.8	0.8	156.8
09/08/2028	00	32	01.814	01	49	29.51	28.9282539	29.8631984	2.36	7.8	0.7	157.8
09/09/2028	00	31	56.272	01	48	52.21	28.9222019	29.8631807	2.36	7.8	0.7	158.7
09/10/2028	00	31	50.682	01	48	14.66	28.9164258	29.8631630	2.36	7.8	0.7	159.7
09/11/2028	00	31	45.046	01	47	36.87	28.9109280	29.8631453	2.36	7.8	0.6	160.7
09/12/2028	00	31	39.366	01	46	58.86	28.9057107	29.8631276	2.36	7.8	0.6	161.7
09/13/2028	00	31	33.643	01	46	20.62	28.9007758	29.8631099	2.36	7.8	0.6	162.7
09/14/2028	00	31	27.878	01	45	42.17	28.8961257	29.8630922	2.36	7.8	0.5	163.7
09/15/2028	00	31	22.071	01	45	03.51	28.8917625	29.8630746	2.36	7.8	0.5	164.7
09/16/2028	00	31	16.224	01	44	24.64	28.8876880	29.8630569	2.36	7.8	0.5	165.7
09/17/2028	00	31	10.337	01	43	45.58	28.8839044	29.8630393	2.36	7.8	0.5	166.7
09/18/2028	00	31	04.413	01	43	06.33	28.8804134	29.8630216	2.36	7.8	0.4	167.7
09/19/2028	00	30	58.457	01	42	26.93	28.8772165	29.8630040	2.36	7.8	0.4	168.7
09/20/2028	00	30	52.474	01	41	47.41	28.8743153	29.8629864	2.37	7.8	0.3	169.7
09/21/2028	00	30	46.468	01	41	07.80	28.8717108	29.8629687	2.37	7.8	0.3	170.7
09/22/2028	00	30	40.443	01	40	28.12	28.8694040	29.8629511	2.37	7.8	0.3	171.7
09/23/2028	00	30	34.400	01	39	48.39	28.8673955	29.8629335	2.37	7.8	0.2	172.7
09/24/2028	00	30	28.343	01	39	08.63	28.8656860	29.8629159	2.37	7.8	0.2	173.6
09/25/2028	00	30	22.270	01	38	28.83	28.8642759	29.8628983	2.37	7.8	0.2	174.6
09/26/2028	00	30	16.183	01	37	49.00	28.8631654	29.8628808	2.37	7.8	0.1	175.6
09/27/2028	00	30	10.084	01	37	09.15	28.8623548	29.8628632	2.37	7.8	0.1	176.5
09/28/2028	00	30	03.974	01	36	29.29	28.8618444	29.8628456	2.37	7.8	0.1	177.4
09/29/2028	00	29	57.856	01	35	49.44	28.8616341	29.8628281	2.37	7.8	0.1	178.1
09/30/2028	00	29	51.731	01	35	09.60	28.8617242	29.8628105	2.37	7.8	0.1	178.5

Neptune - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Phase Solar				
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Solar Sep. deg.
10/01/2028	00	29	45.602	01	34	29.80	28.8621146	29.8627930	2.37	7.8	0.1	178.3
10/02/2028	00	29	39.474	01	33	50.05	28.8628052	29.8627755	2.37	7.8	0.1	177.6
10/03/2028	00	29	33.347	01	33	10.37	28.8637961	29.8627580	2.37	7.8	0.1	176.7
10/04/2028	00	29	27.227	01	32	30.79	28.8650870	29.8627404	2.37	7.8	0.1	175.8
10/05/2028	00	29	21.117	01	31	51.32	28.8666778	29.8627229	2.37	7.8	0.2	174.8
10/06/2028	00	29	15.018	01	31	11.98	28.8685684	29.8627055	2.37	7.8	0.2	173.9
10/07/2028	00	29	08.934	01	30	32.80	28.8707585	29.8626880	2.37	7.8	0.2	172.9
10/08/2028	00	29	02.868	01	29	53.79	28.8732477	29.8626705	2.37	7.8	0.3	171.9
10/09/2028	00	28	56.820	01	29	14.96	28.8760359	29.8626530	2.36	7.8	0.3	170.9
10/10/2028	00	28	50.794	01	28	36.33	28.8791225	29.8626356	2.36	7.8	0.3	169.9
10/11/2028	00	28	44.788	01	27	57.89	28.8825073	29.8626181	2.36	7.8	0.4	168.9
10/12/2028	00	28	38.806	01	27	19.66	28.8861898	29.8626007	2.36	7.8	0.4	167.9
10/13/2028	00	28	32.847	01	26	41.64	28.8901693	29.8625832	2.36	7.8	0.4	166.9
10/14/2028	00	28	26.914	01	26	03.85	28.8944453	29.8625658	2.36	7.8	0.5	165.8
10/15/2028	00	28	21.008	01	25	26.29	28.8990170	29.8625484	2.36	7.8	0.5	164.8
10/16/2028	00	28	15.134	01	24	48.98	28.9038834	29.8625310	2.36	7.8	0.5	163.8
10/17/2028	00	28	09.295	01	24	11.96	28.9090434	29.8625136	2.36	7.8	0.6	162.8
10/18/2028	00	28	03.497	01	23	35.26	28.9144956	29.8624962	2.36	7.8	0.6	161.8
10/19/2028	00	27	57.744	01	22	58.91	28.9202384	29.8624788	2.36	7.8	0.6	160.8
10/20/2028	00	27	52.039	01	22	22.92	28.9262700	29.8624614	2.36	7.8	0.7	159.8
10/21/2028	00	27	46.384	01	21	47.31	28.9325882	29.8624441	2.36	7.8	0.7	158.7
10/22/2028	00	27	40.778	01	21	12.08	28.9391910	29.8624267	2.36	7.8	0.7	157.7
10/23/2028	00	27	35.224	01	20	37.24	28.9460759	29.8624094	2.36	7.8	0.8	156.7
10/24/2028	00	27	29.721	01	20	02.79	28.9532407	29.8623921	2.36	7.8	0.8	155.7
10/25/2028	00	27	24.272	01	19	28.73	28.9606827	29.8623747	2.36	7.8	0.8	154.7
10/26/2028	00	27	18.877	01	18	55.09	28.9683996	29.8623574	2.36	7.8	0.8	153.6
10/27/2028	00	27	13.540	01	18	21.87	28.9763887	29.8623401	2.36	7.8	0.9	152.6
10/28/2028	00	27	08.262	01	17	49.08	28.9846474	29.8623228	2.36	7.8	0.9	151.6
10/29/2028	00	27	03.047	01	17	16.74	28.9931732	29.8623055	2.36	7.8	0.9	150.6
10/30/2028	00	26	57.897	01	16	44.88	29.0019633	29.8622883	2.35	7.8	1.0	149.6
10/31/2028	00	26	52.815	01	16	13.50	29.0110149	29.8622710	2.35	7.8	1.0	148.5
11/01/2028	00	26	47.805	01	15	42.63	29.0203254	29.8622538	2.35	7.8	1.0	147.5
11/02/2028	00	26	42.868	01	15	12.28	29.0298920	29.8622365	2.35	7.8	1.0	146.5
11/03/2028	00	26	38.008	01	14	42.47	29.0397118	29.8622193	2.35	7.8	1.1	145.5
11/04/2028	00	26	33.226	01	14	13.21	29.0497821	29.8622021	2.35	7.8	1.1	144.5
11/05/2028	00	26	28.524	01	13	44.52	29.0600999	29.8621849	2.35	7.8	1.1	143.4
11/06/2028	00	26	23.903	01	13	16.40	29.0706624	29.8621677	2.35	7.8	1.2	142.4
11/07/2028	00	26	19.363	01	12	48.85	29.0814666	29.8621505	2.35	7.8	1.2	141.4
11/08/2028	00	26	14.905	01	12	21.88	29.0925097	29.8621333	2.35	7.8	1.2	140.4
11/09/2028	00	26	10.530	01	11	55.48	29.1037885	29.8621161	2.35	7.8	1.2	139.3
11/10/2028	00	26	06.238	01	11	29.68	29.1152999	29.8620990	2.35	7.8	1.3	138.3
11/11/2028	00	26	02.031	01	11	04.46	29.1270408	29.8620818	2.34	7.8	1.3	137.3
11/12/2028	00	25	57.912	01	10	39.86	29.1390077	29.8620647	2.34	7.8	1.3	136.3
11/13/2028	00	25	53.885	01	10	15.88	29.1511972	29.8620476	2.34	7.8	1.3	135.3
11/14/2028	00	25	49.953	01	09	52.56	29.1636055	29.8620304	2.34	7.8	1.4	134.2
11/15/2028	00	25	46.119	01	09	29.91	29.1762287	29.8620133	2.34	7.8	1.4	133.2
11/16/2028	00	25	42.387	01	09	07.96	29.1890629	29.8619962	2.34	7.8	1.4	132.2
11/17/2028	00	25	38.759	01	08	46.72	29.2021036	29.8619792	2.34	7.8	1.4	131.2
11/18/2028	00	25	35.234	01	08	26.19	29.2153464	29.8619621	2.34	7.8	1.5	130.1
11/19/2028	00	25	31.813	01	08	06.37	29.2287869	29.8619450	2.34	7.8	1.5	129.1
11/20/2028	00	25	28.495	01	07	47.25	29.2424203	29.8619280	2.34	7.8	1.5	128.1
11/21/2028	00	25	25.281	01	07	28.84	29.2562419	29.8619109	2.33	7.8	1.5	127.1
11/22/2028	00	25	22.171	01	07	11.14	29.2702473	29.8618939	2.33	7.8	1.5	126.0
11/23/2028	00	25	19.166	01	06	54.15	29.2844315	29.8618769	2.33	7.8	1.6	125.0
11/24/2028	00	25	16.268	01	06	37.89	29.2987899	29.8618599	2.33	7.8	1.6	124.0

Neptune - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
11/25/2028	00	25	13.480	01	06	22.35	29.3133179	29.8618429	2.33	7.8	1.6	123.0
11/26/2028	00	25	10.802	01	06	07.56	29.3280107	29.8618259	2.33	7.8	1.6	121.9
11/27/2028	00	25	08.237	01	05	53.53	29.3428636	29.8618089	2.33	7.8	1.6	120.9
11/28/2028	00	25	05.788	01	05	40.26	29.3578719	29.8617919	2.33	7.8	1.6	119.9
11/29/2028	00	25	03.455	01	05	27.77	29.3730310	29.8617750	2.32	7.8	1.7	118.9
11/30/2028	00	25	01.240	01	05	16.07	29.3883361	29.8617580	2.32	7.8	1.7	117.9
12/01/2028	00	24	59.145	01	05	05.17	29.4037826	29.8617411	2.32	7.8	1.7	116.8
12/02/2028	00	24	57.170	01	04	55.07	29.4193658	29.8617242	2.32	7.8	1.7	115.8
12/03/2028	00	24	55.315	01	04	45.76	29.4350812	29.8617073	2.32	7.8	1.7	114.8
12/04/2028	00	24	53.580	01	04	37.26	29.4509240	29.8616904	2.32	7.9	1.7	113.8
12/05/2028	00	24	51.965	01	04	29.55	29.4668898	29.8616735	2.32	7.9	1.7	112.7
12/06/2028	00	24	50.467	01	04	22.63	29.4829738	29.8616566	2.32	7.9	1.7	111.7
12/07/2028	00	24	49.089	01	04	16.50	29.4991714	29.8616397	2.31	7.9	1.8	110.7
12/08/2028	00	24	47.829	01	04	11.15	29.5154778	29.8616229	2.31	7.9	1.8	109.7
12/09/2028	00	24	46.690	01	04	06.59	29.5318883	29.8616060	2.31	7.9	1.8	108.7
12/10/2028	00	24	45.673	01	04	02.84	29.5483979	29.8615892	2.31	7.9	1.8	107.6
12/11/2028	00	24	44.781	01	03	59.92	29.5650015	29.8615723	2.31	7.9	1.8	106.6
12/12/2028	00	24	44.017	01	03	57.83	29.5816939	29.8615555	2.31	7.9	1.8	105.6
12/13/2028	00	24	43.382	01	03	56.59	29.5984698	29.8615387	2.31	7.9	1.8	104.6
12/14/2028	00	24	42.878	01	03	56.20	29.6153238	29.8615219	2.31	7.9	1.8	103.6
12/15/2028	00	24	42.504	01	03	56.67	29.6322502	29.8615051	2.30	7.9	1.8	102.6
12/16/2028	00	24	42.259	01	03	57.99	29.6492434	29.8614884	2.30	7.9	1.9	101.5
12/17/2028	00	24	42.142	01	04	00.15	29.6662977	29.8614716	2.30	7.9	1.9	100.5
12/18/2028	00	24	42.152	01	04	03.13	29.6834074	29.8614549	2.30	7.9	1.9	99.5
12/19/2028	00	24	42.287	01	04	06.94	29.7005668	29.8614381	2.30	7.9	1.9	98.5
12/20/2028	00	24	42.549	01	04	11.56	29.7177702	29.8614214	2.30	7.9	1.9	97.5
12/21/2028	00	24	42.936	01	04	17.00	29.7350120	29.8614047	2.30	7.9	1.9	96.4
12/22/2028	00	24	43.450	01	04	23.26	29.7522867	29.8613880	2.30	7.9	1.9	95.4
12/23/2028	00	24	44.091	01	04	30.34	29.7695886	29.8613713	2.29	7.9	1.9	94.4
12/24/2028	00	24	44.860	01	04	38.25	29.7869125	29.8613546	2.29	7.9	1.9	93.4
12/25/2028	00	24	45.759	01	04	46.99	29.8042529	29.8613379	2.29	7.9	1.9	92.4
12/26/2028	00	24	46.788	01	04	56.56	29.8216044	29.8613212	2.29	7.9	1.9	91.4
12/27/2028	00	24	47.946	01	05	06.97	29.8389618	29.8613046	2.29	7.9	1.9	90.4
12/28/2028	00	24	49.236	01	05	18.23	29.8563198	29.8612879	2.29	7.9	1.9	89.4
12/29/2028	00	24	50.655	01	05	30.31	29.8736733	29.8612713	2.29	7.9	1.9	88.3
12/30/2028	00	24	52.204	01	05	43.23	29.8910172	29.8612547	2.28	7.9	1.9	87.3
12/31/2028	00	24	53.881	01	05	56.97	29.9083465	29.8612381	2.28	7.9	1.9	86.3
01/01/2029	00	24	55.684	01	06	11.53	29.9256563	29.8612215	2.28	7.9	1.9	85.3

09/30/2028 02:49:06 Neptune at max angle from sun 178.495 degrees.

Pluto - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
12/31/2027	20	38	19.133	-23	22	10.71	36.7997113	35.9283866	0.09	14.7	0.7	27.3
01/01/2028	20	38	26.428	-23	21	45.40	36.8081045	35.9290879	0.09	14.7	0.7	26.3
01/02/2028	20	38	33.771	-23	21	20.01	36.8162310	35.9297893	0.09	14.7	0.7	25.3
01/03/2028	20	38	41.161	-23	20	54.55	36.8240890	35.9304907	0.09	14.7	0.6	24.3
01/04/2028	20	38	48.597	-23	20	29.02	36.8316764	35.9311921	0.09	14.7	0.6	23.4
01/05/2028	20	38	56.079	-23	20	03.41	36.8389915	35.9318935	0.09	14.7	0.6	22.4
01/06/2028	20	39	03.605	-23	19	37.75	36.8460328	35.9325949	0.09	14.7	0.6	21.4
01/07/2028	20	39	11.176	-23	19	12.02	36.8527986	35.9332963	0.09	14.7	0.5	20.5
01/08/2028	20	39	18.790	-23	18	46.24	36.8592877	35.9339978	0.09	14.7	0.5	19.5
01/09/2028	20	39	26.447	-23	18	20.42	36.8654987	35.9346992	0.09	14.7	0.5	18.6
01/10/2028	20	39	34.143	-23	17	54.59	36.8714304	35.9354007	0.09	14.7	0.5	17.6
01/11/2028	20	39	41.876	-23	17	28.76	36.8770819	35.9361022	0.09	14.7	0.4	16.7
01/12/2028	20	39	49.641	-23	17	02.95	36.8824520	35.9368037	0.09	14.7	0.4	15.7
01/13/2028	20	39	57.434	-23	16	37.18	36.8875396	35.9375052	0.09	14.7	0.4	14.8
01/14/2028	20	40	05.251	-23	16	11.43	36.8923437	35.9382067	0.09	14.7	0.4	13.9
01/15/2028	20	40	13.090	-23	15	45.71	36.8968630	35.9389083	0.09	14.7	0.4	12.9
01/16/2028	20	40	20.951	-23	15	20.00	36.9010963	35.9396099	0.09	14.7	0.3	12.0
01/17/2028	20	40	28.834	-23	14	54.31	36.9050424	35.9403114	0.09	14.7	0.3	11.1
01/18/2028	20	40	36.739	-23	14	28.62	36.9087000	35.9410130	0.09	14.7	0.3	10.2
01/19/2028	20	40	44.666	-23	14	02.96	36.9120680	35.9417146	0.09	14.7	0.3	9.4
01/20/2028	20	40	52.616	-23	13	37.32	36.9151452	35.9424163	0.09	14.7	0.2	8.5
01/21/2028	20	41	00.585	-23	13	11.74	36.9179308	35.9431179	0.09	14.7	0.2	7.7
01/22/2028	20	41	08.571	-23	12	46.22	36.9204237	35.9438195	0.09	14.7	0.2	7.0
01/23/2028	20	41	16.571	-23	12	20.78	36.9226234	35.9445212	0.09	14.7	0.2	6.3
01/24/2028	20	41	24.582	-23	11	55.44	36.9245292	35.9452229	0.09	14.7	0.2	5.7
01/25/2028	20	41	32.600	-23	11	30.21	36.9261407	35.9459246	0.09	14.7	0.1	5.2
01/26/2028	20	41	40.622	-23	11	05.09	36.9274577	35.9466263	0.09	14.7	0.1	4.9
01/27/2028	20	41	48.645	-23	10	40.08	36.9284799	35.9473281	0.09	14.7	0.1	4.8
01/28/2028	20	41	56.668	-23	10	15.19	36.9292073	35.9480298	0.09	14.7	0.1	4.8
01/29/2028	20	42	04.688	-23	09	50.41	36.9296403	35.9487316	0.09	14.7	0.1	5.1
01/30/2028	20	42	12.704	-23	09	25.75	36.9297789	35.9494333	0.09	14.7	0.2	5.5
01/31/2028	20	42	20.715	-23	09	01.21	36.9296238	35.9501351	0.09	14.7	0.2	6.0
02/01/2028	20	42	28.721	-23	08	36.80	36.9291753	35.9508370	0.09	14.7	0.2	6.7
02/02/2028	20	42	36.719	-23	08	12.52	36.9284343	35.9515388	0.09	14.7	0.2	7.4
02/03/2028	20	42	44.711	-23	07	48.38	36.9274016	35.9522406	0.09	14.7	0.2	8.2
02/04/2028	20	42	52.693	-23	07	24.39	36.9260780	35.9529425	0.09	14.7	0.3	9.0
02/05/2028	20	43	00.666	-23	07	00.55	36.9244646	35.9536444	0.09	14.7	0.3	9.9
02/06/2028	20	43	08.628	-23	06	36.89	36.9225627	35.9543463	0.09	14.7	0.3	10.7
02/07/2028	20	43	16.575	-23	06	13.42	36.9203733	35.9550482	0.09	14.7	0.3	11.6
02/08/2028	20	43	24.503	-23	05	50.15	36.9178978	35.9557501	0.09	14.7	0.3	12.5
02/09/2028	20	43	32.410	-23	05	27.11	36.9151376	35.9564520	0.09	14.7	0.4	13.4
02/10/2028	20	43	40.290	-23	05	04.30	36.9120939	35.9571540	0.09	14.7	0.4	14.4
02/11/2028	20	43	48.141	-23	04	41.71	36.9087680	35.9578560	0.09	14.7	0.4	15.3
02/12/2028	20	43	55.961	-23	04	19.33	36.9051610	35.9585580	0.09	14.7	0.4	16.2
02/13/2028	20	44	03.750	-23	03	57.16	36.9012742	35.9592600	0.09	14.7	0.5	17.2
02/14/2028	20	44	11.509	-23	03	35.20	36.8971085	35.9599620	0.09	14.7	0.5	18.1
02/15/2028	20	44	19.239	-23	03	13.43	36.8926652	35.9606640	0.09	14.7	0.5	19.1
02/16/2028	20	44	26.940	-23	02	51.88	36.8879454	35.9613661	0.09	14.7	0.5	20.0
02/17/2028	20	44	34.610	-23	02	30.57	36.8829504	35.9620681	0.09	14.7	0.6	21.0
02/18/2028	20	44	42.246	-23	02	09.50	36.8776815	35.9627702	0.09	14.7	0.6	21.9
02/19/2028	20	44	49.846	-23	01	48.70	36.8721404	35.9634723	0.09	14.7	0.6	22.9
02/20/2028	20	44	57.407	-23	01	28.18	36.8663287	35.9641744	0.09	14.7	0.6	23.8
02/21/2028	20	45	04.925	-23	01	07.94	36.8602482	35.9648766	0.09	14.7	0.7	24.8
02/22/2028	20	45	12.397	-23	00	48.00	36.8539009	35.9655787	0.09	14.7	0.7	25.7
02/23/2028	20	45	19.822	-23	00	28.36	36.8472889	35.9662809	0.09	14.7	0.7	26.7

Pluto - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Mag.	Phase	Solar		
	h	m	s	d	m	s	Distance		Distance	Diameter	Angle	Sep.
							au	au	arc sec	deg.	deg.	
02/24/2028	20	45	27.196	-23	00	09.03	36.8404144	35.9669831	0.09	14.7	0.7	27.7
02/25/2028	20	45	34.518	-22	59	49.99	36.8332797	35.9676852	0.09	14.7	0.8	28.6
02/26/2028	20	45	41.786	-22	59	31.27	36.8258873	35.9683875	0.09	14.7	0.8	29.6
02/27/2028	20	45	49.000	-22	59	12.84	36.8182398	35.9690897	0.09	14.7	0.8	30.6
02/28/2028	20	45	56.158	-22	58	54.72	36.8103400	35.9697919	0.09	14.7	0.8	31.5
02/29/2028	20	46	03.261	-22	58	36.90	36.8021907	35.9704942	0.09	14.7	0.9	32.5
03/01/2028	20	46	10.308	-22	58	19.40	36.7937949	35.9711965	0.09	14.7	0.9	33.4
03/02/2028	20	46	17.298	-22	58	02.21	36.7851555	35.9718987	0.09	14.7	0.9	34.4
03/03/2028	20	46	24.230	-22	57	45.34	36.7762758	35.9726010	0.09	14.7	0.9	35.4
03/04/2028	20	46	31.102	-22	57	28.82	36.7671589	35.9733034	0.09	14.7	0.9	36.3
03/05/2028	20	46	37.913	-22	57	12.64	36.7578081	35.9740057	0.09	14.7	1.0	37.3
03/06/2028	20	46	44.660	-22	56	56.84	36.7482268	35.9747080	0.09	14.7	1.0	38.3
03/07/2028	20	46	51.339	-22	56	41.41	36.7384183	35.9754104	0.09	14.7	1.0	39.2
03/08/2028	20	46	57.947	-22	56	26.37	36.7283861	35.9761128	0.09	14.7	1.0	40.2
03/09/2028	20	47	04.480	-22	56	11.72	36.7181333	35.9768152	0.09	14.7	1.0	41.2
03/10/2028	20	47	10.937	-22	55	57.45	36.7076633	35.9775176	0.09	14.7	1.1	42.1
03/11/2028	20	47	17.318	-22	55	43.55	36.6969792	35.9782200	0.09	14.7	1.1	43.1
03/12/2028	20	47	23.622	-22	55	30.01	36.6860841	35.9789225	0.09	14.7	1.1	44.1
03/13/2028	20	47	29.853	-22	55	16.82	36.6749810	35.9796249	0.09	14.7	1.1	45.0
03/14/2028	20	47	36.010	-22	55	04.00	36.6636730	35.9803274	0.09	14.7	1.1	46.0
03/15/2028	20	47	42.093	-22	54	51.54	36.6521633	35.9810299	0.09	14.7	1.2	47.0
03/16/2028	20	47	48.100	-22	54	39.48	36.6404549	35.9817324	0.09	14.7	1.2	47.9
03/17/2028	20	47	54.029	-22	54	27.82	36.6285512	35.9824349	0.09	14.7	1.2	48.9
03/18/2028	20	47	59.878	-22	54	16.57	36.6164557	35.9831374	0.09	14.7	1.2	49.9
03/19/2028	20	48	05.642	-22	54	05.76	36.6041718	35.9838400	0.09	14.7	1.2	50.8
03/20/2028	20	48	11.320	-22	53	55.38	36.5917032	35.9845426	0.09	14.6	1.2	51.8
03/21/2028	20	48	16.909	-22	53	45.43	36.5790537	35.9852451	0.09	14.6	1.3	52.8
03/22/2028	20	48	22.408	-22	53	35.91	36.5662273	35.9859477	0.09	14.6	1.3	53.7
03/23/2028	20	48	27.816	-22	53	26.83	36.5532278	35.9866503	0.09	14.6	1.3	54.7
03/24/2028	20	48	33.131	-22	53	18.18	36.5400594	35.9873530	0.09	14.6	1.3	55.7
03/25/2028	20	48	38.352	-22	53	09.96	36.5267263	35.9880556	0.09	14.6	1.3	56.6
03/26/2028	20	48	43.480	-22	53	02.16	36.5132327	35.9887583	0.09	14.6	1.3	57.6
03/27/2028	20	48	48.515	-22	52	54.79	36.4995830	35.9894609	0.09	14.6	1.4	58.6
03/28/2028	20	48	53.456	-22	52	47.84	36.4857818	35.9901636	0.09	14.6	1.4	59.5
03/29/2028	20	48	58.304	-22	52	41.32	36.4718334	35.9908663	0.09	14.6	1.4	60.5
03/30/2028	20	49	03.057	-22	52	35.24	36.4577425	35.9915690	0.09	14.6	1.4	61.5
03/31/2028	20	49	07.717	-22	52	29.60	36.4435138	35.9922717	0.09	14.6	1.4	62.4
04/01/2028	20	49	12.280	-22	52	24.41	36.4291520	35.9929745	0.09	14.6	1.4	63.4
04/02/2028	20	49	16.744	-22	52	19.69	36.4146616	35.9936772	0.09	14.6	1.4	64.4
04/03/2028	20	49	21.108	-22	52	15.44	36.4000475	35.9943800	0.09	14.6	1.4	65.3
04/04/2028	20	49	25.369	-22	52	11.67	36.3853143	35.9950828	0.09	14.6	1.5	66.3
04/05/2028	20	49	29.524	-22	52	08.39	36.3704666	35.9957856	0.09	14.6	1.5	67.3
04/06/2028	20	49	33.571	-22	52	05.57	36.3555089	35.9964884	0.09	14.6	1.5	68.2
04/07/2028	20	49	37.511	-22	52	03.22	36.3404457	35.9971912	0.09	14.6	1.5	69.2
04/08/2028	20	49	41.343	-22	52	01.31	36.3252814	35.9978940	0.09	14.6	1.5	70.2
04/09/2028	20	49	45.070	-22	51	59.85	36.3100202	35.9985969	0.09	14.6	1.5	71.1
04/10/2028	20	49	48.694	-22	51	58.81	36.2946664	35.9992997	0.09	14.6	1.5	72.1
04/11/2028	20	49	52.215	-22	51	58.21	36.2792240	36.0000026	0.09	14.6	1.5	73.1
04/12/2028	20	49	55.634	-22	51	58.07	36.2636973	36.0007055	0.09	14.6	1.5	74.0
04/13/2028	20	49	58.948	-22	51	58.39	36.2480907	36.0014084	0.09	14.6	1.5	75.0
04/14/2028	20	50	02.155	-22	51	59.18	36.2324083	36.0021113	0.09	14.6	1.5	75.9
04/15/2028	20	50	05.253	-22	52	00.47	36.2166548	36.0028143	0.09	14.6	1.6	76.9
04/16/2028	20	50	08.241	-22	52	02.24	36.2008347	36.0035172	0.09	14.6	1.6	77.9
04/17/2028	20	50	11.115	-22	52	04.49	36.1849525	36.0042202	0.09	14.6	1.6	78.8
04/18/2028	20	50	13.876	-22	52	07.23	36.1690131	36.0049231	0.09	14.6	1.6	79.8

Pluto - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Mag.	Phase	Solar		
	h	m	s	d	m	s	Distance		Distance	Diameter	Angle	Sep.
						au	au	arc sec	deg.	deg.		
04/19/2028	20	50	16.522	-22	52	10.46	36.1530213	36.0056261	0.09	14.6	1.6	80.8
04/20/2028	20	50	19.053	-22	52	14.15	36.1369818	36.0063291	0.09	14.6	1.6	81.7
04/21/2028	20	50	21.470	-22	52	18.31	36.1208997	36.0070321	0.09	14.6	1.6	82.7
04/22/2028	20	50	23.771	-22	52	22.94	36.1047799	36.0077352	0.09	14.6	1.6	83.7
04/23/2028	20	50	25.960	-22	52	28.01	36.0886275	36.0084382	0.09	14.6	1.6	84.6
04/24/2028	20	50	28.035	-22	52	33.54	36.0724476	36.0091413	0.09	14.6	1.6	85.6
04/25/2028	20	50	29.998	-22	52	39.52	36.0562453	36.0098443	0.09	14.6	1.6	86.6
04/26/2028	20	50	31.850	-22	52	45.95	36.0400258	36.0105474	0.09	14.6	1.6	87.5
04/27/2028	20	50	33.590	-22	52	52.84	36.0237943	36.0112505	0.09	14.6	1.6	88.5
04/28/2028	20	50	35.217	-22	53	00.19	36.0075560	36.0119536	0.09	14.6	1.6	89.4
04/29/2028	20	50	36.732	-22	53	08.01	35.9913162	36.0126567	0.09	14.6	1.6	90.4
04/30/2028	20	50	38.131	-22	53	16.31	35.9750799	36.0133599	0.09	14.6	1.6	91.4
05/01/2028	20	50	39.414	-22	53	25.09	35.9588523	36.0140630	0.09	14.6	1.6	92.3
05/02/2028	20	50	40.578	-22	53	34.34	35.9426384	36.0147662	0.09	14.6	1.6	93.3
05/03/2028	20	50	41.622	-22	53	44.06	35.9264431	36.0154693	0.09	14.6	1.6	94.3
05/04/2028	20	50	42.547	-22	53	54.24	35.9102711	36.0161725	0.09	14.6	1.6	95.2
05/05/2028	20	50	43.354	-22	54	04.85	35.8941272	36.0168757	0.09	14.6	1.6	96.2
05/06/2028	20	50	44.045	-22	54	15.88	35.8780159	36.0175789	0.09	14.6	1.6	97.1
05/07/2028	20	50	44.623	-22	54	27.33	35.8619417	36.0182821	0.09	14.6	1.6	98.1
05/08/2028	20	50	45.089	-22	54	39.18	35.8459090	36.0189854	0.09	14.6	1.6	99.1
05/09/2028	20	50	45.445	-22	54	51.45	35.8299220	36.0196886	0.09	14.6	1.6	100.0
05/10/2028	20	50	45.691	-22	55	04.14	35.8139853	36.0203918	0.09	14.6	1.6	101.0
05/11/2028	20	50	45.826	-22	55	17.27	35.7981031	36.0210951	0.09	14.6	1.6	102.0
05/12/2028	20	50	45.847	-22	55	30.83	35.7822800	36.0217984	0.09	14.6	1.6	102.9
05/13/2028	20	50	45.754	-22	55	44.84	35.7665205	36.0225017	0.09	14.6	1.6	103.9
05/14/2028	20	50	45.545	-22	55	59.28	35.7508290	36.0232050	0.09	14.6	1.6	104.8
05/15/2028	20	50	45.220	-22	56	14.16	35.7352103	36.0239083	0.09	14.6	1.5	105.8
05/16/2028	20	50	44.778	-22	56	29.46	35.7196691	36.0246116	0.09	14.6	1.5	106.8
05/17/2028	20	50	44.221	-22	56	45.17	35.7042100	36.0253149	0.09	14.6	1.5	107.7
05/18/2028	20	50	43.549	-22	57	01.28	35.6888378	36.0260183	0.09	14.6	1.5	108.7
05/19/2028	20	50	42.764	-22	57	17.78	35.6735572	36.0267217	0.09	14.6	1.5	109.7
05/20/2028	20	50	41.866	-22	57	34.67	35.6583731	36.0274250	0.09	14.6	1.5	110.6
05/21/2028	20	50	40.857	-22	57	51.93	35.6432903	36.0281284	0.09	14.6	1.5	111.6
05/22/2028	20	50	39.740	-22	58	09.56	35.6283136	36.0288318	0.09	14.6	1.5	112.6
05/23/2028	20	50	38.516	-22	58	27.55	35.6134478	36.0295352	0.09	14.6	1.5	113.5
05/24/2028	20	50	37.185	-22	58	45.91	35.5986977	36.0302386	0.09	14.6	1.5	114.5
05/25/2028	20	50	35.749	-22	59	04.63	35.5840682	36.0309420	0.09	14.6	1.5	115.4
05/26/2028	20	50	34.207	-22	59	23.73	35.5695641	36.0316454	0.09	14.6	1.4	116.4
05/27/2028	20	50	32.558	-22	59	43.19	35.5551900	36.0323489	0.09	14.6	1.4	117.4
05/28/2028	20	50	30.801	-23	00	03.04	35.5409505	36.0330523	0.09	14.6	1.4	118.3
05/29/2028	20	50	28.935	-23	00	23.25	35.5268501	36.0337558	0.09	14.6	1.4	119.3
05/30/2028	20	50	26.961	-23	00	43.82	35.5128932	36.0344593	0.09	14.6	1.4	120.3
05/31/2028	20	50	24.878	-23	01	04.73	35.4990840	36.0351627	0.09	14.6	1.4	121.2
06/01/2028	20	50	22.690	-23	01	25.95	35.4854265	36.0358662	0.09	14.6	1.4	122.2
06/02/2028	20	50	20.398	-23	01	47.48	35.4719246	36.0365697	0.09	14.6	1.3	123.1
06/03/2028	20	50	18.006	-23	02	09.30	35.4585820	36.0372732	0.09	14.6	1.3	124.1
06/04/2028	20	50	15.517	-23	02	31.40	35.4454025	36.0379767	0.09	14.6	1.3	125.1
06/05/2028	20	50	12.933	-23	02	53.77	35.4323897	36.0386803	0.09	14.6	1.3	126.0
06/06/2028	20	50	10.256	-23	03	16.43	35.4195471	36.0393838	0.09	14.6	1.3	127.0
06/07/2028	20	50	07.485	-23	03	39.37	35.4068782	36.0400873	0.09	14.6	1.3	128.0
06/08/2028	20	50	04.620	-23	04	02.60	35.3943867	36.0407909	0.09	14.6	1.3	128.9
06/09/2028	20	50	01.660	-23	04	26.13	35.3820761	36.0414945	0.09	14.6	1.2	129.9
06/10/2028	20	49	58.605	-23	04	49.94	35.3699499	36.0421980	0.09	14.6	1.2	130.8
06/11/2028	20	49	55.455	-23	05	14.03	35.3580119	36.0429016	0.09	14.6	1.2	131.8
06/12/2028	20	49	52.211	-23	05	38.38	35.3462656	36.0436052	0.09	14.6	1.2	132.8

Pluto - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Phase Solar				
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
06/13/2028	20	49	48.873	-23	06	03.00	35.3347148	36.0443088	0.09	14.6	1.2	133.7
06/14/2028	20	49	45.444	-23	06	27.85	35.3233630	36.0450124	0.09	14.6	1.2	134.7
06/15/2028	20	49	41.925	-23	06	52.92	35.3122140	36.0457160	0.09	14.6	1.1	135.7
06/16/2028	20	49	38.318	-23	07	18.21	35.3012714	36.0464197	0.09	14.6	1.1	136.6
06/17/2028	20	49	34.627	-23	07	43.71	35.2905388	36.0471233	0.09	14.6	1.1	137.6
06/18/2028	20	49	30.853	-23	08	09.39	35.2800198	36.0478269	0.09	14.6	1.1	138.5
06/19/2028	20	49	26.999	-23	08	35.26	35.2697181	36.0485306	0.09	14.6	1.1	139.5
06/20/2028	20	49	23.067	-23	09	01.31	35.2596373	36.0492342	0.09	14.6	1.0	140.5
06/21/2028	20	49	19.059	-23	09	27.53	35.2497807	36.0499379	0.09	14.6	1.0	141.4
06/22/2028	20	49	14.976	-23	09	53.94	35.2401520	36.0506416	0.09	14.6	1.0	142.4
06/23/2028	20	49	10.817	-23	10	20.52	35.2307544	36.0513453	0.09	14.6	1.0	143.3
06/24/2028	20	49	06.583	-23	10	47.29	35.2215913	36.0520490	0.09	14.6	0.9	144.3
06/25/2028	20	49	02.273	-23	11	14.24	35.2126659	36.0527527	0.09	14.6	0.9	145.3
06/26/2028	20	48	57.887	-23	11	41.35	35.2039810	36.0534564	0.09	14.6	0.9	146.2
06/27/2028	20	48	53.426	-23	12	08.60	35.1955394	36.0541601	0.09	14.6	0.9	147.2
06/28/2028	20	48	48.894	-23	12	35.97	35.1873436	36.0548638	0.09	14.6	0.9	148.1
06/29/2028	20	48	44.293	-23	13	03.43	35.1793962	36.0555675	0.09	14.6	0.8	149.1
06/30/2028	20	48	39.628	-23	13	30.99	35.1716994	36.0562713	0.09	14.6	0.8	150.1
07/01/2028	20	48	34.903	-23	13	58.61	35.1642552	36.0569750	0.09	14.6	0.8	151.0
07/02/2028	20	48	30.120	-23	14	26.30	35.1570657	36.0576788	0.09	14.6	0.8	152.0
07/03/2028	20	48	25.282	-23	14	54.05	35.1501328	36.0583825	0.09	14.6	0.7	152.9
07/04/2028	20	48	20.389	-23	15	21.88	35.1434585	36.0590863	0.09	14.6	0.7	153.9
07/05/2028	20	48	15.443	-23	15	49.77	35.1370446	36.0597901	0.09	14.6	0.7	154.8
07/06/2028	20	48	10.443	-23	16	17.74	35.1308931	36.0604939	0.09	14.6	0.7	155.8
07/07/2028	20	48	05.390	-23	16	45.77	35.1250057	36.0611977	0.09	14.6	0.6	156.7
07/08/2028	20	48	00.284	-23	17	13.86	35.1193844	36.0619015	0.09	14.6	0.6	157.7
07/09/2028	20	47	55.126	-23	17	42.00	35.1140310	36.0626053	0.09	14.6	0.6	158.6
07/10/2028	20	47	49.918	-23	18	10.17	35.1089474	36.0633091	0.09	14.6	0.6	159.6
07/11/2028	20	47	44.662	-23	18	38.35	35.1041354	36.0640129	0.09	14.6	0.5	160.5
07/12/2028	20	47	39.361	-23	19	06.54	35.0995968	36.0647167	0.09	14.6	0.5	161.4
07/13/2028	20	47	34.017	-23	19	34.71	35.0953335	36.0654206	0.09	14.6	0.5	162.4
07/14/2028	20	47	28.633	-23	20	02.86	35.0913471	36.0661244	0.09	14.6	0.5	163.3
07/15/2028	20	47	23.212	-23	20	30.97	35.0876394	36.0668283	0.09	14.6	0.4	164.2
07/16/2028	20	47	17.758	-23	20	59.03	35.0842120	36.0675321	0.09	14.6	0.4	165.1
07/17/2028	20	47	12.273	-23	21	27.05	35.0810666	36.0682360	0.09	14.6	0.4	166.0
07/18/2028	20	47	06.760	-23	21	55.00	35.0782047	36.0689399	0.09	14.6	0.4	166.9
07/19/2028	20	47	01.220	-23	22	22.90	35.0756278	36.0696438	0.09	14.6	0.3	167.8
07/20/2028	20	46	55.655	-23	22	50.74	35.0733373	36.0703477	0.09	14.6	0.3	168.7
07/21/2028	20	46	50.065	-23	23	18.52	35.0713345	36.0710516	0.09	14.6	0.3	169.5
07/22/2028	20	46	44.450	-23	23	46.25	35.0696206	36.0717555	0.09	14.6	0.3	170.4
07/23/2028	20	46	38.809	-23	24	13.91	35.0681964	36.0724594	0.09	14.6	0.2	171.2
07/24/2028	20	46	33.145	-23	24	41.48	35.0670628	36.0731633	0.09	14.6	0.2	171.9
07/25/2028	20	46	27.459	-23	25	08.95	35.0662203	36.0738673	0.09	14.6	0.2	172.6
07/26/2028	20	46	21.756	-23	25	36.28	35.0656692	36.0745712	0.09	14.6	0.2	173.3
07/27/2028	20	46	16.041	-23	26	03.45	35.0654096	36.0752752	0.09	14.6	0.2	173.8
07/28/2028	20	46	10.317	-23	26	30.47	35.0654416	36.0759791	0.09	14.6	0.2	174.3
07/29/2028	20	46	04.589	-23	26	57.31	35.0657650	36.0766831	0.09	14.6	0.2	174.6
07/30/2028	20	45	58.859	-23	27	23.98	35.0663796	36.0773871	0.09	14.6	0.1	174.7
07/31/2028	20	45	53.128	-23	27	50.49	35.0672851	36.0780910	0.09	14.6	0.2	174.7
08/01/2028	20	45	47.398	-23	28	16.84	35.0684813	36.0787950	0.09	14.6	0.2	174.5
08/02/2028	20	45	41.669	-23	28	43.02	35.0699678	36.0794990	0.09	14.6	0.2	174.1
08/03/2028	20	45	35.942	-23	29	09.04	35.0717443	36.0802030	0.09	14.6	0.2	173.6
08/04/2028	20	45	30.217	-23	29	34.88	35.0738104	36.0809071	0.09	14.6	0.2	173.0
08/05/2028	20	45	24.495	-23	30	00.54	35.0761659	36.0816111	0.09	14.6	0.2	172.3
08/06/2028	20	45	18.780	-23	30	26.01	35.0788102	36.0823151	0.09	14.6	0.2	171.5

Pluto - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Phase Solar		
	h	m s	d	m s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
08/07/2028	20 45	13.071	-23 30	51.26	35.0817430	36.0830192	0.09	14.6	0.3	170.8
08/08/2028	20 45	07.373	-23 31	16.29	35.0849639	36.0837232	0.09	14.6	0.3	169.9
08/09/2028	20 45	01.688	-23 31	41.09	35.0884723	36.0844273	0.09	14.6	0.3	169.1
08/10/2028	20 44	56.019	-23 32	05.63	35.0922678	36.0851313	0.09	14.6	0.3	168.2
08/11/2028	20 44	50.369	-23 32	29.92	35.0963498	36.0858354	0.09	14.6	0.3	167.3
08/12/2028	20 44	44.742	-23 32	53.93	35.1007176	36.0865395	0.09	14.6	0.4	166.4
08/13/2028	20 44	39.141	-23 33	17.68	35.1053707	36.0872436	0.09	14.6	0.4	165.5
08/14/2028	20 44	33.567	-23 33	41.15	35.1103083	36.0879477	0.09	14.6	0.4	164.6
08/15/2028	20 44	28.024	-23 34	04.34	35.1155295	36.0886518	0.09	14.6	0.4	163.7
08/16/2028	20 44	22.512	-23 34	27.26	35.1210334	36.0893559	0.09	14.6	0.5	162.8
08/17/2028	20 44	17.033	-23 34	49.91	35.1268191	36.0900600	0.09	14.6	0.5	161.8
08/18/2028	20 44	11.587	-23 35	12.28	35.1328855	36.0907641	0.09	14.6	0.5	160.9
08/19/2028	20 44	06.173	-23 35	34.37	35.1392313	36.0914683	0.09	14.6	0.6	159.9
08/20/2028	20 44	00.793	-23 35	56.18	35.1458550	36.0921724	0.09	14.6	0.6	159.0
08/21/2028	20 43	55.448	-23 36	17.68	35.1527548	36.0928766	0.09	14.6	0.6	158.0
08/22/2028	20 43	50.141	-23 36	38.85	35.1599291	36.0935807	0.09	14.6	0.6	157.1
08/23/2028	20 43	44.877	-23 36	59.67	35.1673755	36.0942849	0.09	14.6	0.7	156.1
08/24/2028	20 43	39.661	-23 37	20.12	35.1750918	36.0949891	0.09	14.6	0.7	155.2
08/25/2028	20 43	34.496	-23 37	40.21	35.1830755	36.0956933	0.09	14.6	0.7	154.2
08/26/2028	20 43	29.386	-23 37	59.93	35.1913243	36.0963974	0.09	14.6	0.7	153.2
08/27/2028	20 43	24.332	-23 38	19.29	35.1998354	36.0971016	0.09	14.6	0.7	152.3
08/28/2028	20 43	19.334	-23 38	38.30	35.2086064	36.0978059	0.09	14.6	0.8	151.3
08/29/2028	20 43	14.394	-23 38	56.96	35.2176346	36.0985101	0.09	14.6	0.8	150.3
08/30/2028	20 43	09.511	-23 39	15.27	35.2269175	36.0992143	0.09	14.6	0.8	149.4
08/31/2028	20 43	04.685	-23 39	33.23	35.2364524	36.0999185	0.09	14.6	0.8	148.4
09/01/2028	20 42	59.919	-23 39	50.83	35.2462368	36.1006228	0.09	14.6	0.9	147.4
09/02/2028	20 42	55.213	-23 40	08.06	35.2562680	36.1013270	0.09	14.6	0.9	146.5
09/03/2028	20 42	50.568	-23 40	24.91	35.2665435	36.1020313	0.09	14.6	0.9	145.5
09/04/2028	20 42	45.988	-23 40	41.36	35.2770605	36.1027356	0.09	14.6	0.9	144.5
09/05/2028	20 42	41.474	-23 40	57.42	35.2878164	36.1034398	0.09	14.6	0.9	143.5
09/06/2028	20 42	37.029	-23 41	13.07	35.2988085	36.1041441	0.09	14.6	1.0	142.6
09/07/2028	20 42	32.656	-23 41	28.30	35.3100340	36.1048484	0.09	14.6	1.0	141.6
09/08/2028	20 42	28.358	-23 41	43.11	35.3214903	36.1055527	0.09	14.6	1.0	140.6
09/09/2028	20 42	24.138	-23 41	57.49	35.3331744	36.1062570	0.09	14.6	1.0	139.6
09/10/2028	20 42	19.997	-23 42	11.45	35.3450835	36.1069614	0.09	14.6	1.1	138.6
09/11/2028	20 42	15.937	-23 42	24.98	35.3572147	36.1076657	0.09	14.6	1.1	137.7
09/12/2028	20 42	11.959	-23 42	38.09	35.3695649	36.1083700	0.09	14.6	1.1	136.7
09/13/2028	20 42	08.065	-23 42	50.79	35.3821312	36.1090744	0.09	14.6	1.1	135.7
09/14/2028	20 42	04.254	-23 43	03.07	35.3949103	36.1097787	0.09	14.6	1.1	134.7
09/15/2028	20 42	00.526	-23 43	14.95	35.4078988	36.1104831	0.09	14.6	1.2	133.7
09/16/2028	20 41	56.881	-23 43	26.40	35.4210935	36.1111875	0.09	14.6	1.2	132.8
09/17/2028	20 41	53.319	-23 43	37.43	35.4344906	36.1118918	0.09	14.6	1.2	131.8
09/18/2028	20 41	49.843	-23 43	48.02	35.4480864	36.1125962	0.09	14.6	1.2	130.8
09/19/2028	20 41	46.455	-23 43	58.14	35.4618768	36.1133006	0.09	14.6	1.2	129.8
09/20/2028	20 41	43.160	-23 44	07.78	35.4758576	36.1140051	0.09	14.6	1.2	128.8
09/21/2028	20 41	39.961	-23 44	16.94	35.4900245	36.1147095	0.09	14.6	1.3	127.9
09/22/2028	20 41	36.863	-23 44	25.62	35.5043732	36.1154139	0.09	14.6	1.3	126.9
09/23/2028	20 41	33.865	-23 44	33.84	35.5188990	36.1161183	0.09	14.6	1.3	125.9
09/24/2028	20 41	30.969	-23 44	41.59	35.5335975	36.1168228	0.09	14.6	1.3	124.9
09/25/2028	20 41	28.173	-23 44	48.90	35.5484644	36.1175272	0.09	14.6	1.3	123.9
09/26/2028	20 41	25.477	-23 44	55.77	35.5634952	36.1182317	0.09	14.6	1.3	122.9
09/27/2028	20 41	22.881	-23 45	02.20	35.5786854	36.1189362	0.09	14.6	1.4	121.9
09/28/2028	20 41	20.385	-23 45	08.18	35.5940309	36.1196407	0.09	14.6	1.4	121.0
09/29/2028	20 41	17.988	-23 45	13.72	35.6095271	36.1203452	0.09	14.6	1.4	120.0
09/30/2028	20 41	15.693	-23 45	18.79	35.6251698	36.1210497	0.09	14.6	1.4	119.0

Pluto - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Phase Solar				
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
10/01/2028	20	41	13.501	-23	45	23.41	35.6409547	36.1217542	0.09	14.6	1.4	118.0
10/02/2028	20	41	11.413	-23	45	27.55	35.6568775	36.1224587	0.09	14.6	1.4	117.0
10/03/2028	20	41	09.431	-23	45	31.22	35.6729339	36.1231632	0.09	14.6	1.4	116.0
10/04/2028	20	41	07.557	-23	45	34.41	35.6891195	36.1238678	0.09	14.6	1.4	115.0
10/05/2028	20	41	05.793	-23	45	37.11	35.7054300	36.1245723	0.09	14.6	1.4	114.1
10/06/2028	20	41	04.140	-23	45	39.34	35.7218612	36.1252769	0.09	14.6	1.5	113.1
10/07/2028	20	41	02.601	-23	45	41.08	35.7384086	36.1259815	0.09	14.6	1.5	112.1
10/08/2028	20	41	01.176	-23	45	42.35	35.7550679	36.1266861	0.09	14.6	1.5	111.1
10/09/2028	20	40	59.865	-23	45	43.16	35.7718346	36.1273907	0.09	14.6	1.5	110.1
10/10/2028	20	40	58.669	-23	45	43.51	35.7887044	36.1280953	0.09	14.6	1.5	109.1
10/11/2028	20	40	57.586	-23	45	43.41	35.8056727	36.1287999	0.09	14.6	1.5	108.1
10/12/2028	20	40	56.617	-23	45	42.86	35.8227348	36.1295045	0.09	14.6	1.5	107.2
10/13/2028	20	40	55.759	-23	45	41.86	35.8398860	36.1302091	0.09	14.6	1.5	106.2
10/14/2028	20	40	55.013	-23	45	40.42	35.8571217	36.1309138	0.09	14.6	1.5	105.2
10/15/2028	20	40	54.380	-23	45	38.51	35.8744366	36.1316184	0.09	14.6	1.5	104.2
10/16/2028	20	40	53.859	-23	45	36.13	35.8918259	36.1323231	0.09	14.6	1.5	103.2
10/17/2028	20	40	53.455	-23	45	33.26	35.9092842	36.1330278	0.09	14.6	1.5	102.2
10/18/2028	20	40	53.171	-23	45	29.90	35.9268061	36.1337325	0.09	14.6	1.6	101.2
10/19/2028	20	40	53.009	-23	45	26.04	35.9443861	36.1344372	0.09	14.6	1.6	100.2
10/20/2028	20	40	52.970	-23	45	21.71	35.9620188	36.1351419	0.09	14.6	1.6	99.2
10/21/2028	20	40	53.054	-23	45	16.91	35.9796986	36.1358466	0.09	14.6	1.6	98.2
10/22/2028	20	40	53.260	-23	45	11.67	35.9974202	36.1365514	0.09	14.6	1.6	97.3
10/23/2028	20	40	53.585	-23	45	06.00	36.0151781	36.1372561	0.09	14.6	1.6	96.3
10/24/2028	20	40	54.029	-23	44	59.89	36.0329670	36.1379609	0.09	14.6	1.6	95.3
10/25/2028	20	40	54.589	-23	44	53.36	36.0507817	36.1386656	0.09	14.6	1.6	94.3
10/26/2028	20	40	55.266	-23	44	46.39	36.0686172	36.1393704	0.09	14.6	1.6	93.3
10/27/2028	20	40	56.059	-23	44	38.99	36.0864683	36.1400752	0.09	14.6	1.6	92.3
10/28/2028	20	40	56.969	-23	44	31.16	36.1043299	36.1407800	0.09	14.6	1.6	91.3
10/29/2028	20	40	57.995	-23	44	22.88	36.1221971	36.1414848	0.09	14.6	1.6	90.3
10/30/2028	20	40	59.140	-23	44	14.17	36.1400650	36.1421897	0.09	14.6	1.6	89.3
10/31/2028	20	41	00.404	-23	44	05.00	36.1579286	36.1428945	0.09	14.6	1.6	88.4
11/01/2028	20	41	01.788	-23	43	55.40	36.1757831	36.1435993	0.09	14.6	1.6	87.4
11/02/2028	20	41	03.293	-23	43	45.35	36.1936236	36.1443042	0.09	14.6	1.6	86.4
11/03/2028	20	41	04.918	-23	43	34.87	36.2114453	36.1450091	0.09	14.6	1.6	85.4
11/04/2028	20	41	06.665	-23	43	23.97	36.2292434	36.1457140	0.09	14.6	1.6	84.4
11/05/2028	20	41	08.533	-23	43	12.64	36.2470131	36.1464189	0.09	14.6	1.6	83.4
11/06/2028	20	41	10.521	-23	43	00.92	36.2647497	36.1471238	0.09	14.6	1.6	82.4
11/07/2028	20	41	12.627	-23	42	48.80	36.2824483	36.1478287	0.09	14.6	1.6	81.4
11/08/2028	20	41	14.850	-23	42	36.29	36.3001041	36.1485336	0.09	14.6	1.5	80.4
11/09/2028	20	41	17.186	-23	42	23.41	36.3177121	36.1492385	0.09	14.6	1.5	79.4
11/10/2028	20	41	19.636	-23	42	10.14	36.3352673	36.1499435	0.09	14.6	1.5	78.5
11/11/2028	20	41	22.199	-23	41	56.48	36.3527648	36.1506485	0.09	14.6	1.5	77.5
11/12/2028	20	41	24.874	-23	41	42.42	36.3701993	36.1513534	0.09	14.6	1.5	76.5
11/13/2028	20	41	27.663	-23	41	27.97	36.3875657	36.1520584	0.09	14.6	1.5	75.5
11/14/2028	20	41	30.567	-23	41	13.10	36.4048586	36.1527634	0.09	14.6	1.5	74.5
11/15/2028	20	41	33.589	-23	40	57.82	36.4220726	36.1534684	0.09	14.6	1.5	73.5
11/16/2028	20	41	36.730	-23	40	42.15	36.4392023	36.1541734	0.09	14.7	1.5	72.5
11/17/2028	20	41	39.988	-23	40	26.09	36.4562425	36.1548785	0.09	14.7	1.5	71.5
11/18/2028	20	41	43.362	-23	40	09.68	36.4731876	36.1555835	0.09	14.7	1.5	70.5
11/19/2028	20	41	46.850	-23	39	52.92	36.4900327	36.1562885	0.09	14.7	1.5	69.5
11/20/2028	20	41	50.447	-23	39	35.83	36.5067725	36.1569936	0.09	14.7	1.5	68.5
11/21/2028	20	41	54.153	-23	39	18.41	36.5234022	36.1576987	0.09	14.7	1.4	67.6
11/22/2028	20	41	57.964	-23	39	00.66	36.5399168	36.1584038	0.09	14.7	1.4	66.6
11/23/2028	20	42	01.880	-23	38	42.60	36.5563117	36.1591089	0.09	14.7	1.4	65.6
11/24/2028	20	42	05.900	-23	38	24.20	36.5725823	36.1598140	0.09	14.7	1.4	64.6

Pluto - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
11/25/2028	20	42	10.024	-23	38	05.48	36.5887241	36.1605191	0.09	14.7	1.4	63.6
11/26/2028	20	42	14.251	-23	37	46.43	36.6047326	36.1612242	0.09	14.7	1.4	62.6
11/27/2028	20	42	18.582	-23	37	27.05	36.6206034	36.1619294	0.09	14.7	1.4	61.6
11/28/2028	20	42	23.016	-23	37	07.35	36.6363322	36.1626345	0.09	14.7	1.4	60.6
11/29/2028	20	42	27.554	-23	36	47.34	36.6519150	36.1633397	0.09	14.7	1.3	59.6
11/30/2028	20	42	32.195	-23	36	27.00	36.6673474	36.1640448	0.09	14.7	1.3	58.7
12/01/2028	20	42	36.939	-23	36	06.37	36.6826256	36.1647500	0.09	14.7	1.3	57.7
12/02/2028	20	42	41.784	-23	35	45.45	36.6977453	36.1654552	0.09	14.7	1.3	56.7
12/03/2028	20	42	46.729	-23	35	24.25	36.7127028	36.1661604	0.09	14.7	1.3	55.7
12/04/2028	20	42	51.772	-23	35	02.79	36.7274939	36.1668656	0.09	14.7	1.3	54.7
12/05/2028	20	42	56.909	-23	34	41.08	36.7421149	36.1675709	0.09	14.7	1.3	53.7
12/06/2028	20	43	02.137	-23	34	19.13	36.7565617	36.1682761	0.09	14.7	1.2	52.7
12/07/2028	20	43	07.455	-23	33	56.94	36.7708303	36.1689813	0.09	14.7	1.2	51.7
12/08/2028	20	43	12.860	-23	33	34.50	36.7849167	36.1696866	0.09	14.7	1.2	50.8
12/09/2028	20	43	18.353	-23	33	11.82	36.7988168	36.1703919	0.09	14.7	1.2	49.8
12/10/2028	20	43	23.932	-23	32	48.88	36.8125266	36.1710972	0.09	14.7	1.2	48.8
12/11/2028	20	43	29.600	-23	32	25.68	36.8260418	36.1718024	0.09	14.7	1.2	47.8
12/12/2028	20	43	35.356	-23	32	02.23	36.8393583	36.1725077	0.09	14.7	1.1	46.8
12/13/2028	20	43	41.202	-23	31	38.54	36.8524719	36.1732131	0.09	14.7	1.1	45.8
12/14/2028	20	43	47.135	-23	31	14.61	36.8653786	36.1739184	0.09	14.7	1.1	44.8
12/15/2028	20	43	53.155	-23	30	50.47	36.8780743	36.1746237	0.09	14.7	1.1	43.8
12/16/2028	20	43	59.259	-23	30	26.15	36.8905551	36.1753291	0.09	14.7	1.1	42.9
12/17/2028	20	44	05.442	-23	30	01.64	36.9028172	36.1760344	0.09	14.7	1.0	41.9
12/18/2028	20	44	11.701	-23	29	36.97	36.9148570	36.1767398	0.09	14.7	1.0	40.9
12/19/2028	20	44	18.033	-23	29	12.15	36.9266711	36.1774452	0.09	14.7	1.0	39.9
12/20/2028	20	44	24.436	-23	28	47.16	36.9382561	36.1781505	0.09	14.7	1.0	38.9
12/21/2028	20	44	30.909	-23	28	22.03	36.9496090	36.1788559	0.09	14.7	1.0	37.9
12/22/2028	20	44	37.450	-23	27	56.73	36.9607266	36.1795613	0.09	14.7	0.9	37.0
12/23/2028	20	44	44.059	-23	27	31.28	36.9716061	36.1802668	0.09	14.7	0.9	36.0
12/24/2028	20	44	50.734	-23	27	05.68	36.9822447	36.1809722	0.09	14.7	0.9	35.0
12/25/2028	20	44	57.476	-23	26	39.93	36.9926398	36.1816776	0.09	14.7	0.9	34.0
12/26/2028	20	45	04.283	-23	26	14.04	37.0027888	36.1823831	0.09	14.7	0.8	33.0
12/27/2028	20	45	11.155	-23	25	48.01	37.0126891	36.1830885	0.09	14.7	0.8	32.1
12/28/2028	20	45	18.091	-23	25	21.85	37.0223385	36.1837940	0.09	14.7	0.8	31.1
12/29/2028	20	45	25.089	-23	24	55.59	37.0317346	36.1844995	0.09	14.7	0.8	30.1
12/30/2028	20	45	32.148	-23	24	29.22	37.0408753	36.1852050	0.09	14.7	0.8	29.1
12/31/2028	20	45	39.264	-23	24	02.77	37.0497584	36.1859105	0.09	14.7	0.7	28.2
01/01/2029	20	45	46.434	-23	23	36.26	37.0583819	36.1866160	0.09	14.7	0.7	27.2

07/30/2028 05:54:22 Pluto at max angle from sun 174.725 degrees.

NUTATION AND OBLIQUITY

Date	Julian Day	NUTATION		True Obl.		
		in Long. arc sec.	in Obl. arc sec.	Epsilon d m s		
12/31/2027	2461770.5	14.78117	4.58812	23	26	12.88178
01/01/2028	2461771.5	14.79305	4.62964	23	26	12.92202
01/02/2028	2461772.5	14.76899	4.66289	23	26	12.95398
01/03/2028	2461773.5	14.71964	4.68264	23	26	12.97245
01/04/2028	2461774.5	14.65939	4.68557	23	26	12.97410
01/05/2028	2461775.5	14.60523	4.67062	23	26	12.95786
01/06/2028	2461776.5	14.57522	4.63940	23	26	12.92536
01/07/2028	2461777.5	14.58645	4.59663	23	26	12.88131
01/08/2028	2461778.5	14.65184	4.55025	23	26	12.83365
01/09/2028	2461779.5	14.77575	4.51092	23	26	12.79304
01/10/2028	2461780.5	14.94943	4.49015	23	26	12.77099
01/11/2028	2461781.5	15.14875	4.49698	23	26	12.77654
01/12/2028	2461782.5	15.33759	4.53385	23	26	12.81212
01/13/2028	2461783.5	15.47852	4.59391	23	26	12.87090
01/14/2028	2461784.5	15.54712	4.66227	23	26	12.93798
01/15/2028	2461785.5	15.54194	4.72123	23	26	12.99566
01/16/2028	2461786.5	15.48399	4.75697	23	26	13.03011
01/17/2028	2461787.5	15.40676	4.76389	23	26	13.03575
01/18/2028	2461788.5	15.34342	4.74502	23	26	13.01559
01/19/2028	2461789.5	15.31764	4.70931	23	26	12.97860
01/20/2028	2461790.5	15.33998	4.66817	23	26	12.93618
01/21/2028	2461791.5	15.40871	4.63245	23	26	12.89918
01/22/2028	2461792.5	15.51282	4.61053	23	26	12.87598
01/23/2028	2461793.5	15.63568	4.60742	23	26	12.87158
01/24/2028	2461794.5	15.75861	4.62447	23	26	12.88736
01/25/2028	2461795.5	15.86394	4.65973	23	26	12.92133
01/26/2028	2461796.5	15.93757	4.70851	23	26	12.96883
01/27/2028	2461797.5	15.97076	4.76434	23	26	13.02338
01/28/2028	2461798.5	15.96107	4.82001	23	26	13.07777
01/29/2028	2461799.5	15.91236	4.86863	23	26	13.12510
01/30/2028	2461800.5	15.83404	4.90451	23	26	13.15970
01/31/2028	2461801.5	15.73971	4.92390	23	26	13.17781
02/01/2028	2461802.5	15.64562	4.92537	23	26	13.17800
02/02/2028	2461803.5	15.56884	4.91010	23	26	13.16144
02/03/2028	2461804.5	15.52540	4.88194	23	26	13.13200
02/04/2028	2461805.5	15.52809	4.84739	23	26	13.09617
02/05/2028	2461806.5	15.58363	4.81522	23	26	13.06272
02/06/2028	2461807.5	15.68948	4.79551	23	26	13.04172
02/07/2028	2461808.5	15.83098	4.79768	23	26	13.04261
02/08/2028	2461809.5	15.98087	4.82748	23	26	13.07112
02/09/2028	2461810.5	16.10373	4.88361	23	26	13.12598
02/10/2028	2461811.5	16.16682	4.95593	23	26	13.19701
02/11/2028	2461812.5	16.15371	5.02741	23	26	13.26721
02/12/2028	2461813.5	16.07294	5.08023	23	26	13.31875
02/13/2028	2461814.5	15.95486	5.10296	23	26	13.34020
02/14/2028	2461815.5	15.83815	5.09447	23	26	13.33042
02/15/2028	2461816.5	15.75485	5.06281	23	26	13.29748
02/16/2028	2461817.5	15.72159	5.02078	23	26	13.25417
02/17/2028	2461818.5	15.73898	4.98124	23	26	13.21335
02/18/2028	2461819.5	15.79589	4.95410	23	26	13.18492
02/19/2028	2461820.5	15.87485	4.94515	23	26	13.17469
02/20/2028	2461821.5	15.95671	4.95614	23	26	13.18440
02/21/2028	2461822.5	16.02375	4.98540	23	26	13.21238
02/22/2028	2461823.5	16.06176	5.02866	23	26	13.25436
02/23/2028	2461824.5	16.06137	5.07990	23	26	13.30431

NUTATION AND OBLIQUITY

Date	Julian Day	NUTATION		True Obl.		
		in Long. arc sec.	in Obl. arc sec.	Epsilon d m s		
02/24/2028	2461825.5	16.01885	5.13217	23	26	13.35530
02/25/2028	2461826.5	15.93641	5.17852	23	26	13.40036
02/26/2028	2461827.5	15.82197	5.21287	23	26	13.43344
02/27/2028	2461828.5	15.68818	5.23087	23	26	13.45015
02/28/2028	2461829.5	15.55089	5.23050	23	26	13.44850
02/29/2028	2461830.5	15.42714	5.21246	23	26	13.42918
03/01/2028	2461831.5	15.33290	5.18023	23	26	13.39567
03/02/2028	2461832.5	15.28072	5.13982	23	26	13.35398
03/03/2028	2461833.5	15.27751	5.09919	23	26	13.31207
03/04/2028	2461834.5	15.32242	5.06729	23	26	13.27888
03/05/2028	2461835.5	15.40519	5.05268	23	26	13.26298
03/06/2028	2461836.5	15.50561	5.06151	23	26	13.27053
03/07/2028	2461837.5	15.59547	5.09521	23	26	13.30295
03/08/2028	2461838.5	15.64426	5.14840	23	26	13.35486
03/09/2028	2461839.5	15.62878	5.20854	23	26	13.41371
03/10/2028	2461840.5	15.54376	5.25870	23	26	13.46260
03/11/2028	2461841.5	15.40699	5.28351	23	26	13.48612
03/12/2028	2461842.5	15.25385	5.27537	23	26	13.47670
03/13/2028	2461843.5	15.12307	5.23742	23	26	13.43747
03/14/2028	2461844.5	15.04184	5.18135	23	26	13.38012
03/15/2028	2461845.5	15.01861	5.12205	23	26	13.31953
03/16/2028	2461846.5	15.04482	5.07242	23	26	13.26862
03/17/2028	2461847.5	15.10176	5.04064	23	26	13.23556
03/18/2028	2461848.5	15.16762	5.02970	23	26	13.22334
03/19/2028	2461849.5	15.22245	5.03832	23	26	13.23068
03/20/2028	2461850.5	15.25072	5.06226	23	26	13.25334
03/21/2028	2461851.5	15.24238	5.09551	23	26	13.28530
03/22/2028	2461852.5	15.19303	5.13121	23	26	13.31972
03/23/2028	2461853.5	15.10396	5.16245	23	26	13.34967
03/24/2028	2461854.5	14.98181	5.18298	23	26	13.36892
03/25/2028	2461855.5	14.83805	5.18796	23	26	13.37262
03/26/2028	2461856.5	14.68787	5.17464	23	26	13.35802
03/27/2028	2461857.5	14.54843	5.14296	23	26	13.32505
03/28/2028	2461858.5	14.43647	5.09580	23	26	13.27662
03/29/2028	2461859.5	14.36556	5.03888	23	26	13.21841
03/30/2028	2461860.5	14.34341	4.98004	23	26	13.15829
03/31/2028	2461861.5	14.36978	4.92814	23	26	13.10510
04/01/2028	2461862.5	14.43543	4.89150	23	26	13.06719
04/02/2028	2461863.5	14.52242	4.87615	23	26	13.05055
04/03/2028	2461864.5	14.60631	4.88407	23	26	13.05719
04/04/2028	2461865.5	14.66051	4.91182	23	26	13.08366
04/05/2028	2461866.5	14.66277	4.95013	23	26	13.12069
04/06/2028	2461867.5	14.60275	4.98524	23	26	13.15452
04/07/2028	2461868.5	14.48789	5.00239	23	26	13.17039
04/08/2028	2461869.5	14.34377	4.99078	23	26	13.15748
04/09/2028	2461870.5	14.20652	4.94789	23	26	13.11332
04/10/2028	2461871.5	14.10978	4.88077	23	26	13.04491
04/11/2028	2461872.5	14.07268	4.80301	23	26	12.96587
04/12/2028	2461873.5	14.09509	4.72958	23	26	12.89116
04/13/2028	2461874.5	14.16117	4.67200	23	26	12.83230
04/14/2028	2461875.5	14.24727	4.63608	23	26	12.79509
04/15/2028	2461876.5	14.32960	4.62205	23	26	12.77978
04/16/2028	2461877.5	14.38904	4.62607	23	26	12.78252
04/17/2028	2461878.5	14.41316	4.64194	23	26	12.79711
04/18/2028	2461879.5	14.39630	4.66249	23	26	12.81638

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Date	Julian Day	NUTATION		True Obl.		
		in Long. arc sec.	in Obl. arc sec.	Epsilon d m s		
04/19/2028	2461880.5	14.33895	4.68061	23	26	12.83321
04/20/2028	2461881.5	14.24697	4.68986	23	26	12.84118
04/21/2028	2461882.5	14.13084	4.68510	23	26	12.83514
04/22/2028	2461883.5	14.00482	4.66298	23	26	12.81174
04/23/2028	2461884.5	13.88569	4.62256	23	26	12.77004
04/24/2028	2461885.5	13.79085	4.56577	23	26	12.71196
04/25/2028	2461886.5	13.73557	4.49758	23	26	12.64249
04/26/2028	2461887.5	13.72983	4.42560	23	26	12.56923
04/27/2028	2461888.5	13.77541	4.35903	23	26	12.50137
04/28/2028	2461889.5	13.86414	4.30684	23	26	12.44790
04/29/2028	2461890.5	13.97832	4.27574	23	26	12.41552
04/30/2028	2461891.5	14.09352	4.26823	23	26	12.40673
05/01/2028	2461892.5	14.18359	4.28147	23	26	12.41869
05/02/2028	2461893.5	14.22687	4.30727	23	26	12.44320
05/03/2028	2461894.5	14.21230	4.33349	23	26	12.46814
05/04/2028	2461895.5	14.14366	4.34683	23	26	12.48020
05/05/2028	2461896.5	14.04018	4.33647	23	26	12.46856
05/06/2028	2461897.5	13.93214	4.29753	23	26	12.42834
05/07/2028	2461898.5	13.85217	4.23299	23	26	12.36252
05/08/2028	2461899.5	13.82482	4.15297	23	26	12.28121
05/09/2028	2461900.5	13.85896	4.07136	23	26	12.19831
05/10/2028	2461901.5	13.94634	4.00132	23	26	12.12700
05/11/2028	2461902.5	14.06624	3.95171	23	26	12.07610
05/12/2028	2461903.5	14.19319	3.92548	23	26	12.04859
05/13/2028	2461904.5	14.30400	3.92037	23	26	12.04220
05/14/2028	2461905.5	14.38205	3.93057	23	26	12.05111
05/15/2028	2461906.5	14.41867	3.94859	23	26	12.06786
05/16/2028	2461907.5	14.41259	3.96681	23	26	12.08479
05/17/2028	2461908.5	14.36874	3.97835	23	26	12.09505
05/18/2028	2461909.5	14.29687	3.97769	23	26	12.09311
05/19/2028	2461910.5	14.21043	3.96107	23	26	12.07520
05/20/2028	2461911.5	14.12546	3.92684	23	26	12.03969
05/21/2028	2461912.5	14.05922	3.87593	23	26	11.98750
05/22/2028	2461913.5	14.02813	3.81214	23	26	11.92243
05/23/2028	2461914.5	14.04486	3.74219	23	26	11.85119
05/24/2028	2461915.5	14.11489	3.67508	23	26	11.78280
05/25/2028	2461916.5	14.23352	3.62059	23	26	11.72703
05/26/2028	2461917.5	14.38472	3.58693	23	26	11.69209
05/27/2028	2461918.5	14.54336	3.57824	23	26	11.68212
05/28/2028	2461919.5	14.68072	3.59277	23	26	11.69536
05/29/2028	2461920.5	14.77225	3.62270	23	26	11.72401
05/30/2028	2461921.5	14.80469	3.65588	23	26	11.75591
05/31/2028	2461922.5	14.78018	3.67903	23	26	11.77777
06/01/2028	2461923.5	14.71593	3.68128	23	26	11.77875
06/02/2028	2461924.5	14.63960	3.65720	23	26	11.75338
06/03/2028	2461925.5	14.58173	3.60817	23	26	11.70307
06/04/2028	2461926.5	14.56744	3.54196	23	26	11.63558
06/05/2028	2461927.5	14.60987	3.47044	23	26	11.56278
06/06/2028	2461928.5	14.70722	3.40625	23	26	11.49731
06/07/2028	2461929.5	14.84450	3.35947	23	26	11.44925
06/08/2028	2461930.5	14.99868	3.33541	23	26	11.42390
06/09/2028	2461931.5	15.14539	3.33404	23	26	11.42125
06/10/2028	2461932.5	15.26446	3.35093	23	26	11.43686
06/11/2028	2461933.5	15.34324	3.37898	23	26	11.46362
06/12/2028	2461934.5	15.37734	3.41019	23	26	11.49355

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Date	Julian Day	NUTATION		True Obl.		
		in Long. arc sec.	in Obl. arc sec.	Epsilon d m s		
06/13/2028	2461935.5	15.36973	3.43708	23	26	11.51915
06/14/2028	2461936.5	15.32913	3.45352	23	26	11.53431
06/15/2028	2461937.5	15.26831	3.45527	23	26	11.53478
06/16/2028	2461938.5	15.20266	3.44018	23	26	11.51841
06/17/2028	2461939.5	15.14883	3.40843	23	26	11.48538
06/18/2028	2461940.5	15.12327	3.36274	23	26	11.43840
06/19/2028	2461941.5	15.14013	3.30853	23	26	11.38291
06/20/2028	2461942.5	15.20840	3.25374	23	26	11.32684
06/21/2028	2461943.5	15.32848	3.20800	23	26	11.27982
06/22/2028	2461944.5	15.48943	3.18074	23	26	11.25128
06/23/2028	2461945.5	15.66860	3.17853	23	26	11.24778
06/24/2028	2461946.5	15.83559	3.20226	23	26	11.27023
06/25/2028	2461947.5	15.96045	3.24570	23	26	11.31239
06/26/2028	2461948.5	16.02358	3.29663	23	26	11.36203
06/27/2028	2461949.5	16.02262	3.34034	23	26	11.40446
06/28/2028	2461950.5	15.97323	3.36436	23	26	11.42720
06/29/2028	2461951.5	15.90345	3.36207	23	26	11.42363
06/30/2028	2461952.5	15.84467	3.33414	23	26	11.39442
07/01/2028	2461953.5	15.82288	3.28767	23	26	11.34667
07/02/2028	2461954.5	15.85278	3.23372	23	26	11.29143
07/03/2028	2461955.5	15.93549	3.18424	23	26	11.24067
07/04/2028	2461956.5	16.05992	3.14934	23	26	11.20449
07/05/2028	2461957.5	16.20653	3.13527	23	26	11.18914
07/06/2028	2461958.5	16.35252	3.14361	23	26	11.19619
07/07/2028	2461959.5	16.47688	3.17153	23	26	11.22284
07/08/2028	2461960.5	16.56426	3.21298	23	26	11.26300
07/09/2028	2461961.5	16.60700	3.26021	23	26	11.30894
07/10/2028	2461962.5	16.60526	3.30538	23	26	11.35283
07/11/2028	2461963.5	16.56595	3.34174	23	26	11.38791
07/12/2028	2461964.5	16.50084	3.36438	23	26	11.40927
07/13/2028	2461965.5	16.42478	3.37061	23	26	11.41422
07/14/2028	2461966.5	16.35393	3.36006	23	26	11.40239
07/15/2028	2461967.5	16.30433	3.33476	23	26	11.37580
07/16/2028	2461968.5	16.29025	3.29909	23	26	11.33885
07/17/2028	2461969.5	16.32225	3.25970	23	26	11.29818
07/18/2028	2461970.5	16.40458	3.22510	23	26	11.26229
07/19/2028	2461971.5	16.53231	3.20457	23	26	11.24048
07/20/2028	2461972.5	16.68920	3.20621	23	26	11.24084
07/21/2028	2461973.5	16.84831	3.23410	23	26	11.26745
07/22/2028	2461974.5	16.97734	3.28563	23	26	11.31770
07/23/2028	2461975.5	17.04862	3.35063	23	26	11.38141
07/24/2028	2461976.5	17.05013	3.41366	23	26	11.44316
07/25/2028	2461977.5	16.99126	3.45929	23	26	11.48751
07/26/2028	2461978.5	16.89946	3.47760	23	26	11.50454
07/27/2028	2461979.5	16.80955	3.46728	23	26	11.49293
07/28/2028	2461980.5	16.75174	3.43502	23	26	11.45939
07/29/2028	2461981.5	16.74367	3.39233	23	26	11.41542
07/30/2028	2461982.5	16.78814	3.35176	23	26	11.37356
07/31/2028	2461983.5	16.87536	3.32379	23	26	11.34432
08/01/2028	2461984.5	16.98727	3.31510	23	26	11.33435
08/02/2028	2461985.5	17.10250	3.32795	23	26	11.34591
08/03/2028	2461986.5	17.20063	3.36047	23	26	11.37715
08/04/2028	2461987.5	17.26561	3.40757	23	26	11.42297
08/05/2028	2461988.5	17.28789	3.46218	23	26	11.47629
08/06/2028	2461989.5	17.26521	3.51656	23	26	11.52939

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Date	Julian Day	NUTATION		True Obl.		
		in Long. arc sec.	in Obl. arc sec.	Epsilon d m s		
08/07/2028	2461990.5	17.20224	3.56360	23	26	11.57515
08/08/2028	2461991.5	17.10928	3.59777	23	26	11.60803
08/09/2028	2461992.5	17.00042	3.61568	23	26	11.62467
08/10/2028	2461993.5	16.89154	3.61644	23	26	11.62414
08/11/2028	2461994.5	16.79850	3.60155	23	26	11.60797
08/12/2028	2461995.5	16.73542	3.57481	23	26	11.57995
08/13/2028	2461996.5	16.71308	3.54205	23	26	11.54590
08/14/2028	2461997.5	16.73716	3.51067	23	26	11.51324
08/15/2028	2461998.5	16.80632	3.48900	23	26	11.49029
08/16/2028	2461999.5	16.91025	3.48500	23	26	11.48501
08/17/2028	2462000.5	17.02876	3.50439	23	26	11.50312
08/18/2028	2462001.5	17.13364	3.54808	23	26	11.54553
08/19/2028	2462002.5	17.19478	3.61011	23	26	11.60627
08/20/2028	2462003.5	17.19053	3.67748	23	26	11.67236
08/21/2028	2462004.5	17.11816	3.73348	23	26	11.72708
08/22/2028	2462005.5	16.99766	3.76379	23	26	11.75611
08/23/2028	2462006.5	16.86473	3.76230	23	26	11.75333
08/24/2028	2462007.5	16.75634	3.73311	23	26	11.72286
08/25/2028	2462008.5	16.69743	3.68795	23	26	11.67642
08/26/2028	2462009.5	16.69509	3.64111	23	26	11.62830
08/27/2028	2462010.5	16.74049	3.60493	23	26	11.59083
08/28/2028	2462011.5	16.81496	3.58728	23	26	11.57190
08/29/2028	2462012.5	16.89630	3.59102	23	26	11.57436
08/30/2028	2462013.5	16.96373	3.61468	23	26	11.59674
08/31/2028	2462014.5	17.00093	3.65356	23	26	11.63433
09/01/2028	2462015.5	16.99768	3.70100	23	26	11.68050
09/02/2028	2462016.5	16.95047	3.74958	23	26	11.72779
09/03/2028	2462017.5	16.86232	3.79213	23	26	11.76906
09/04/2028	2462018.5	16.74197	3.82274	23	26	11.79839
09/05/2028	2462019.5	16.60245	3.83742	23	26	11.81178
09/06/2028	2462020.5	16.45928	3.83457	23	26	11.80765
09/07/2028	2462021.5	16.32845	3.81517	23	26	11.78697
09/08/2028	2462022.5	16.22434	3.78260	23	26	11.75311
09/09/2028	2462023.5	16.15798	3.74229	23	26	11.71152
09/10/2028	2462024.5	16.13546	3.70116	23	26	11.66911
09/11/2028	2462025.5	16.15657	3.66684	23	26	11.63350
09/12/2028	2462026.5	16.21376	3.64666	23	26	11.61205
09/13/2028	2462027.5	16.29164	3.64637	23	26	11.61047
09/14/2028	2462028.5	16.36773	3.66839	23	26	11.63121
09/15/2028	2462029.5	16.41564	3.71003	23	26	11.67157
09/16/2028	2462030.5	16.41149	3.76241	23	26	11.72267
09/17/2028	2462031.5	16.34305	3.81127	23	26	11.77025
09/18/2028	2462032.5	16.21770	3.84085	23	26	11.79854
09/19/2028	2462033.5	16.06342	3.83984	23	26	11.79625
09/20/2028	2462034.5	15.91930	3.80657	23	26	11.76169
09/21/2028	2462035.5	15.81983	3.74974	23	26	11.70358
09/22/2028	2462036.5	15.78196	3.68444	23	26	11.63700
09/23/2028	2462037.5	15.80201	3.62594	23	26	11.57722
09/24/2028	2462038.5	15.86119	3.58506	23	26	11.53506
09/25/2028	2462039.5	15.93454	3.56649	23	26	11.51520
09/26/2028	2462040.5	15.99831	3.56937	23	26	11.51681
09/27/2028	2462041.5	16.03420	3.58905	23	26	11.53520
09/28/2028	2462042.5	16.03098	3.61876	23	26	11.56363
09/29/2028	2462043.5	15.98450	3.65102	23	26	11.59461
09/30/2028	2462044.5	15.89700	3.67864	23	26	11.62095

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		in Long. arc sec.	in Obl. arc sec.	Epsilon d m s		
10/01/2028	2462045.5	15.77621	3.69552	23	26	11.63655
10/02/2028	2462046.5	15.63420	3.69725	23	26	11.63699
10/03/2028	2462047.5	15.48590	3.68161	23	26	11.62007
10/04/2028	2462048.5	15.34735	3.64887	23	26	11.58605
10/05/2028	2462049.5	15.23361	3.60189	23	26	11.53778
10/06/2028	2462050.5	15.15664	3.54577	23	26	11.48038
10/07/2028	2462051.5	15.12332	3.48732	23	26	11.42065
10/08/2028	2462052.5	15.13408	3.43410	23	26	11.36615
10/09/2028	2462053.5	15.18212	3.39332	23	26	11.32408
10/10/2028	2462054.5	15.25362	3.37055	23	26	11.30004
10/11/2028	2462055.5	15.32897	3.36848	23	26	11.29668
10/12/2028	2462056.5	15.38535	3.38564	23	26	11.31255
10/13/2028	2462057.5	15.40118	3.41568	23	26	11.34131
10/14/2028	2462058.5	15.36210	3.44758	23	26	11.37193
10/15/2028	2462059.5	15.26753	3.46753	23	26	11.39060
10/16/2028	2462060.5	15.13463	3.46286	23	26	11.38465
10/17/2028	2462061.5	14.99581	3.42694	23	26	11.34745
10/18/2028	2462062.5	14.88833	3.36269	23	26	11.28191
10/19/2028	2462063.5	14.83984	3.28201	23	26	11.19996
10/20/2028	2462064.5	14.85802	3.20119	23	26	11.11785
10/21/2028	2462065.5	14.92987	3.13468	23	26	11.05005
10/22/2028	2462066.5	15.02957	3.09086	23	26	11.00496
10/23/2028	2462067.5	15.12879	3.07115	23	26	10.98397
10/24/2028	2462068.5	15.20434	3.07152	23	26	10.98305
10/25/2028	2462069.5	15.24159	3.08487	23	26	10.99512
10/26/2028	2462070.5	15.23467	3.10315	23	26	11.01211
10/27/2028	2462071.5	15.18516	3.11869	23	26	11.02638
10/28/2028	2462072.5	15.10039	3.12509	23	26	11.03149
10/29/2028	2462073.5	14.99191	3.11760	23	26	11.02272
10/30/2028	2462074.5	14.87416	3.09355	23	26	10.99738
10/31/2028	2462075.5	14.76298	3.05254	23	26	10.95509
11/01/2028	2462076.5	14.67397	2.99667	23	26	10.89794
11/02/2028	2462077.5	14.62039	2.93048	23	26	10.83047
11/03/2028	2462078.5	14.61089	2.86053	23	26	10.75923
11/04/2028	2462079.5	14.64753	2.79457	23	26	10.69199
11/05/2028	2462080.5	14.72453	2.74028	23	26	10.63642
11/06/2028	2462081.5	14.82834	2.70376	23	26	10.59862
11/07/2028	2462082.5	14.93942	2.68809	23	26	10.58166
11/08/2028	2462083.5	15.03542	2.69220	23	26	10.58449
11/09/2028	2462084.5	15.09567	2.71055	23	26	10.60156
11/10/2028	2462085.5	15.10618	2.73357	23	26	10.62330
11/11/2028	2462086.5	15.06427	2.74930	23	26	10.63775
11/12/2028	2462087.5	14.98144	2.74612	23	26	10.63328
11/13/2028	2462088.5	14.88268	2.71616	23	26	10.60204
11/14/2028	2462089.5	14.80078	2.65844	23	26	10.54304
11/15/2028	2462090.5	14.76631	2.58015	23	26	10.46347
11/16/2028	2462091.5	14.79668	2.49479	23	26	10.37682
11/17/2028	2462092.5	14.88989	2.41763	23	26	10.29838
11/18/2028	2462093.5	15.02619	2.36058	23	26	10.24005
11/19/2028	2462094.5	15.17651	2.32894	23	26	10.20713
11/20/2028	2462095.5	15.31239	2.32113	23	26	10.19804
11/21/2028	2462096.5	15.41310	2.33073	23	26	10.20635
11/22/2028	2462097.5	15.46829	2.34910	23	26	10.22344
11/23/2028	2462098.5	15.47716	2.36764	23	26	10.24070
11/24/2028	2462099.5	15.44626	2.37909	23	26	10.25087

NUTATION AND OBLIQUITY

Date	Julian Day	NUTATION		True Obl. Epsilon		
		in Long. arc sec.	in Obl. arc sec.	d	m	s
11/25/2028	2462100.5	15.38698	2.37816	23	26	10.24866
11/26/2028	2462101.5	15.31363	2.36171	23	26	10.23092
11/27/2028	2462102.5	15.24194	2.32883	23	26	10.19676
11/28/2028	2462103.5	15.18759	2.28093	23	26	10.14757
11/29/2028	2462104.5	15.16476	2.22168	23	26	10.08705
11/30/2028	2462105.5	15.18409	2.15696	23	26	10.02105
12/01/2028	2462106.5	15.25046	2.09430	23	26	09.95711
12/02/2028	2462107.5	15.36092	2.04186	23	26	09.90338
12/03/2028	2462108.5	15.50366	2.00683	23	26	09.86707
12/04/2028	2462109.5	15.65903	1.99359	23	26	09.85255
12/05/2028	2462110.5	15.80297	2.00212	23	26	09.85979
12/06/2028	2462111.5	15.91248	2.02733	23	26	09.88372
12/07/2028	2462112.5	15.97163	2.05978	23	26	09.91488
12/08/2028	2462113.5	15.97641	2.08764	23	26	09.94146
12/09/2028	2462114.5	15.93666	2.09959	23	26	09.95214
12/10/2028	2462115.5	15.87451	2.08781	23	26	09.93907
12/11/2028	2462116.5	15.81924	2.05027	23	26	09.90025
12/12/2028	2462117.5	15.79965	1.99171	23	26	09.84041
12/13/2028	2462118.5	15.83587	1.92262	23	26	09.77003
12/14/2028	2462119.5	15.93322	1.85643	23	26	09.70256
12/15/2028	2462120.5	16.08060	1.80566	23	26	09.65051
12/16/2028	2462121.5	16.25437	1.77832	23	26	09.62189
12/17/2028	2462122.5	16.42597	1.77617	23	26	09.61845
12/18/2028	2462123.5	16.57018	1.79508	23	26	09.63608
12/19/2028	2462124.5	16.67066	1.82713	23	26	09.66685
12/20/2028	2462125.5	16.72175	1.86310	23	26	09.70154
12/21/2028	2462126.5	16.72720	1.89462	23	26	09.73178
12/22/2028	2462127.5	16.69744	1.91531	23	26	09.75118
12/23/2028	2462128.5	16.64675	1.92125	23	26	09.75584
12/24/2028	2462129.5	16.59101	1.91100	23	26	09.74431
12/25/2028	2462130.5	16.54605	1.88542	23	26	09.71745
12/26/2028	2462131.5	16.52636	1.84749	23	26	09.67824
12/27/2028	2462132.5	16.54367	1.80220	23	26	09.63166
12/28/2028	2462133.5	16.60535	1.75625	23	26	09.58443
12/29/2028	2462134.5	16.71227	1.71749	23	26	09.54439
12/30/2028	2462135.5	16.85689	1.69378	23	26	09.51940
12/31/2028	2462136.5	17.02255	1.69123	23	26	09.51556
01/01/2029	2462137.5	17.18515	1.71204	23	26	09.53509

Prime Meridian Transit Times (UT1)

Date	Sun			Moon			Venus			Mars			Jupiter			Saturn		
	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s
12/31/2027	12	02	51.7	14	52	42.6	14	31	01.4	13	20	29.1	5	14	20.8	18	41	51.3
01/01/2028	12	03	20.3	15	33	35.0	14	31	59.1	13	19	50.5	5	10	33.4	18	37	58.3
01/02/2028	12	03	48.6	16	13	20.9	14	32	55.2	13	19	11.6	5	06	45.3	18	34	05.8
01/03/2028	12	04	16.5	16	53	03.5	14	33	49.9	13	18	32.3	5	02	56.6	18	30	13.6
01/04/2028	12	04	44.0	17	33	51.7	14	34	43.2	13	17	52.8	4	59	07.1	18	26	21.9
01/05/2028	12	05	11.1	18	16	58.1	14	35	34.9	13	17	12.9	4	55	17.0	18	22	30.6
01/06/2028	12	05	37.7	19	03	36.3	14	36	25.2	13	16	32.6	4	51	26.1	18	18	39.6
01/07/2028	12	06	03.9	19	54	49.5	14	37	14.0	13	15	52.0	4	47	34.6	18	14	49.1
01/08/2028	12	06	29.6	20	51	08.1	14	38	01.4	13	15	11.0	4	43	42.4	18	10	59.0
01/09/2028	12	06	54.7	21	51	57.9	14	38	47.4	13	14	29.7	4	39	49.5	18	07	09.3
01/10/2028	12	07	19.3	22	55	22.4	14	39	32.0	13	13	48.0	4	35	55.9	18	03	20.0
01/11/2028	12	07	43.3	23	58	34.5	14	40	15.1	13	13	05.9	4	32	01.6	17	59	31.1
01/12/2028	12	08	06.8				14	40	56.9	13	12	23.4	4	28	06.6	17	55	42.5
01/13/2028	12	08	29.6	0	59	08.8	14	41	37.3	13	11	40.5	4	24	10.9	17	51	54.4
01/14/2028	12	08	51.8	1	55	57.2	14	42	16.4	13	10	57.2	4	20	14.5	17	48	06.6
01/15/2028	12	09	13.4	2	49	09.1	14	42	54.3	13	10	13.5	4	16	17.4	17	44	19.3
01/16/2028	12	09	34.3	3	39	42.2	14	43	30.8	13	09	29.4	4	12	19.6	17	40	32.3
01/17/2028	12	09	54.6	4	28	51.5	14	44	06.1	13	08	44.9	4	08	21.1	17	36	45.7
01/18/2028	12	10	14.2	5	17	51.0	14	44	40.1	13	08	00.0	4	04	21.9	17	32	59.5
01/19/2028	12	10	33.1	6	07	40.7	14	45	13.0	13	07	14.7	4	00	22.0	17	29	13.7
01/20/2028	12	10	51.3	6	58	56.8	14	45	44.7	13	06	29.0	3	56	21.4	17	25	28.2
01/21/2028	12	11	08.7	7	51	41.2	14	46	15.3	13	05	42.8	3	52	20.1	17	21	43.1
01/22/2028	12	11	25.4	8	45	17.5	14	46	44.8	13	04	56.3	3	48	18.1	17	17	58.4
01/23/2028	12	11	41.4	9	38	38.9	14	47	13.3	13	04	09.3	3	44	15.3	17	14	14.1
01/24/2028	12	11	56.6	10	30	30.5	14	47	40.6	13	03	21.9	3	40	11.9	17	10	30.1
01/25/2028	12	12	11.0	11	19	54.8	14	48	07.0	13	02	34.0	3	36	07.8	17	06	46.5
01/26/2028	12	12	24.6	12	06	26.4	14	48	32.4	13	01	45.8	3	32	03.1	17	03	03.3
01/27/2028	12	12	37.5	12	50	12.7	14	48	56.8	13	00	57.1	3	27	57.6	16	59	20.4
01/28/2028	12	12	49.5	13	31	45.0	14	49	20.3	13	00	07.9	3	23	51.5	16	55	37.9
01/29/2028	12	13	00.7	14	11	49.4	14	49	42.9	12	59	18.4	3	19	44.6	16	51	55.7
01/30/2028	12	13	11.0	14	51	20.5	14	50	04.7	12	58	28.4	3	15	37.2	16	48	13.9
01/31/2028	12	13	20.6	15	31	18.4	14	50	25.5	12	57	37.9	3	11	29.0	16	44	32.4
02/01/2028	12	13	29.3	16	12	47.2	14	50	45.6	12	56	47.1	3	07	20.2	16	40	51.3
02/02/2028	12	13	37.2	16	56	52.9	14	51	04.9	12	55	55.8	3	03	10.8	16	37	10.5
02/03/2028	12	13	44.2	17	44	38.5	14	51	23.5	12	55	04.0	2	59	00.7	16	33	30.0
02/04/2028	12	13	50.4	18	36	50.4	14	51	41.3	12	54	11.8	2	54	50.0	16	29	49.9
02/05/2028	12	13	55.8	19	33	36.5	14	51	58.4	12	53	19.2	2	50	38.7	16	26	10.0
02/06/2028	12	14	00.4	20	34	02.8	14	52	14.9	12	52	26.2	2	46	26.8	16	22	30.6
02/07/2028	12	14	04.1	21	36	12.0	14	52	30.7	12	51	32.7	2	42	14.3	16	18	51.4
02/08/2028	12	14	07.1	22	37	43.0	14	52	45.8	12	50	38.9	2	38	01.2	16	15	12.5
02/09/2028	12	14	09.2	23	36	49.7	14	53	00.4	12	49	44.6	2	33	47.5	16	11	34.0
02/10/2028	12	14	10.6				14	53	14.5	12	48	49.9	2	29	33.3	16	07	55.7
02/11/2028	12	14	11.1	0	32	54.0	14	53	28.0	12	47	54.8	2	25	18.5	16	04	17.8
02/12/2028	12	14	10.9	1	26	18.5	14	53	41.0	12	46	59.3	2	21	03.1	16	00	40.1
02/13/2028	12	14	10.0	2	17	59.8	14	53	53.5	12	46	03.4	2	16	47.2	15	57	02.8
02/14/2028	12	14	08.3	3	09	04.8	14	54	05.6	12	45	07.1	2	12	30.8	15	53	25.7
02/15/2028	12	14	05.9	4	00	32.4	14	54	17.3	12	44	10.5	2	08	13.9	15	49	48.9
02/16/2028	12	14	02.8	4	53	00.6	14	54	28.6	12	43	13.4	2	03	56.4	15	46	12.4
02/17/2028	12	13	59.0	5	46	35.8	14	54	39.6	12	42	16.1	1	59	38.5	15	42	36.2
02/18/2028	12	13	54.5	6	40	48.5	14	54	50.2	12	41	18.3	1	55	20.1	15	39	00.3
02/19/2028	12	13	49.4	7	34	40.0	14	55	00.5	12	40	20.2	1	51	01.3	15	35	24.6
02/20/2028	12	13	43.6	8	27	02.3	14	55	10.6	12	39	21.8	1	46	42.0	15	31	49.2
02/21/2028	12	13	37.1	9	17	01.2	14	55	20.3	12	38	23.0	1	42	22.3	15	28	14.1
02/22/2028	12	13	30.0	10	04	11.2	14	55	29.8	12	37	23.9	1	38	02.2	15	24	39.2
02/23/2028	12	13	22.3	10	48	36.6	14	55	39.1	12	36	24.4	1	33	41.6	15	21	04.6

Prime Meridian Transit Times (UT1)

Date	Sun			Moon			Venus			Mars			Jupiter			Saturn		
	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s
02/24/2028	12	13	14.0	11	30	44.6	14	55	48.1	12	35	24.6	1	29	20.7	15	17	30.3
02/25/2028	12	13	05.1	12	11	16.9	14	55	57.0	12	34	24.5	1	24	59.5	15	13	56.2
02/26/2028	12	12	55.6	12	51	02.9	14	56	05.6	12	33	24.1	1	20	37.9	15	10	22.3
02/27/2028	12	12	45.5	13	30	56.5	14	56	14.0	12	32	23.4	1	16	15.9	15	06	48.7
02/28/2028	12	12	34.9	14	11	54.3	14	56	22.3	12	31	22.3	1	11	53.7	15	03	15.3
02/29/2028	12	12	23.8	14	54	54.0	14	56	30.3	12	30	21.0	1	07	31.2	14	59	42.1
03/01/2028	12	12	12.1	15	40	50.1	14	56	38.2	12	29	19.4	1	03	08.4	14	56	09.2
03/02/2028	12	11	59.9	16	30	25.5	14	56	45.9	12	28	17.5	0	58	45.4	14	52	36.5
03/03/2028	12	11	47.3	17	23	56.8	14	56	53.3	12	27	15.3	0	54	22.1	14	49	04.0
03/04/2028	12	11	34.1	18	20	57.1	14	57	00.6	12	26	12.8	0	49	58.6	14	45	31.7
03/05/2028	12	11	20.6	19	20	09.9	14	57	07.7	12	25	10.1	0	45	35.0	14	41	59.7
03/06/2028	12	11	06.5	20	19	48.0	14	57	14.5	12	24	07.1	0	41	11.2	14	38	27.8
03/07/2028	12	10	52.1	21	18	13.5	14	57	21.1	12	23	03.9	0	36	47.2	14	34	56.1
03/08/2028	12	10	37.3	22	14	33.2	14	57	27.5	12	22	00.4	0	32	23.1	14	31	24.7
03/09/2028	12	10	22.1	23	08	46.6	14	57	33.6	12	20	56.7	0	27	58.9	14	27	53.4
03/10/2028	12	10	06.5				14	57	39.4	12	19	52.8	0	23	34.7	14	24	22.3
03/11/2028	12	09	50.7	0	01	32.8	14	57	44.9	12	18	48.7	0	19	10.3	14	20	51.4
03/12/2028	12	09	34.5	0	53	49.6	14	57	50.1	12	17	44.4	0	14	45.9	14	17	20.6
03/13/2028	12	09	18.1	1	46	34.1	14	57	54.9	12	16	39.8	0	10	21.5	14	13	50.1
03/14/2028	12	09	01.4	2	40	27.0	14	57	59.4	12	15	35.1	0	05	57.1	14	10	19.7
03/15/2028	12	08	44.5	3	35	37.3	14	58	03.4	12	14	30.3	0	01	32.6	14	06	49.5
03/15/2028													23	57	08.3			
03/16/2028	12	08	27.4	4	31	34.5	14	58	07.1	12	13	25.2	23	52	43.9	14	03	19.4
03/17/2028	12	08	10.1	5	27	13.9	14	58	10.3	12	12	20.0	23	48	19.6	13	59	49.5
03/18/2028	12	07	52.7	6	21	18.4	14	58	13.0	12	11	14.7	23	43	55.4	13	56	19.8
03/19/2028	12	07	35.1	7	12	46.1	14	58	15.1	12	10	09.2	23	39	31.4	13	52	50.2
03/20/2028	12	07	17.4	8	01	07.5	14	58	16.6	12	09	03.6	23	35	07.4	13	49	20.7
03/21/2028	12	06	59.6	8	46	27.0	14	58	17.5	12	07	57.9	23	30	43.6	13	45	51.4
03/22/2028	12	06	41.7	9	29	14.0	14	58	17.7	12	06	52.1	23	26	20.0	13	42	22.3
03/23/2028	12	06	23.8	10	10	12.6	14	58	17.1	12	05	46.1	23	21	56.5	13	38	53.3
03/24/2028	12	06	05.8	10	50	14.2	14	58	15.7	12	04	40.1	23	17	33.3	13	35	24.4
03/25/2028	12	05	47.7	11	30	13.2	14	58	13.3	12	03	33.9	23	13	10.3	13	31	55.6
03/26/2028	12	05	29.7	12	11	05.5	14	58	10.0	12	02	27.7	23	08	47.5	13	28	27.0
03/27/2028	12	05	11.7	12	53	46.2	14	58	05.6	12	01	21.4	23	04	25.1	13	24	58.4
03/28/2028	12	04	53.7	13	39	06.2	14	58	00.0	12	00	15.0	23	00	02.9	13	21	30.0
03/29/2028	12	04	35.7	14	27	44.4	14	57	53.1	11	59	08.6	22	55	41.0	13	18	01.7
03/30/2028	12	04	17.8	15	19	55.2	14	57	44.9	11	58	02.1	22	51	19.4	13	14	33.5
03/31/2028	12	04	00.0	16	15	14.8	14	57	35.2	11	56	55.5	22	46	58.2	13	11	05.4
04/01/2028	12	03	42.3	17	12	36.5	14	57	23.9	11	55	48.9	22	42	37.3	13	07	37.4
04/02/2028	12	03	24.6	18	10	26.2	14	57	10.8	11	54	42.3	22	38	16.8	13	04	09.5
04/03/2028	12	03	07.1	19	07	16.0	14	56	55.9	11	53	35.6	22	33	56.7	13	00	41.6
04/04/2028	12	02	49.8	20	02	15.2	14	56	39.0	11	52	28.9	22	29	37.0	12	57	13.9
04/05/2028	12	02	32.5	20	55	20.1	14	56	20.0	11	51	22.2	22	25	17.8	12	53	46.2
04/06/2028	12	02	15.5	21	47	05.4	14	55	58.7	11	50	15.5	22	20	58.9	12	50	18.6
04/07/2028	12	01	58.7	22	38	27.7	14	55	35.0	11	49	08.8	22	16	40.5	12	46	51.1
04/08/2028	12	01	42.1	23	30	29.5	14	55	08.7	11	48	02.0	22	12	22.6	12	43	23.6
04/09/2028	12	01	25.7				14	54	39.7	11	46	55.3	22	08	05.1	12	39	56.2
04/10/2028	12	01	09.7	0	24	02.3	14	54	07.9	11	45	48.7	22	03	48.2	12	36	28.8
04/11/2028	12	00	53.9	1	19	30.0	14	53	32.9	11	44	42.0	21	59	31.7	12	33	01.6
04/12/2028	12	00	38.4	2	16	33.4	14	52	54.8	11	43	35.5	21	55	15.7	12	29	34.3
04/13/2028	12	00	23.2	3	14	06.4	14	52	13.2	11	42	28.9	21	51	00.2	12	26	07.1
04/14/2028	12	00	08.4	4	10	34.4	14	51	28.1	11	41	22.4	21	46	45.3	12	22	40.0
04/15/2028	11	59	54.0	5	04	29.8	14	50	39.2	11	40	16.0	21	42	30.9	12	19	12.8
04/16/2028	11	59	39.9	5	55	01.1	14	49	46.3	11	39	09.7	21	38	17.1	12	15	45.8
04/17/2028	11	59	26.2	6	42	01.1	14	48	49.2	11	38	03.5	21	34	03.8	12	12	18.7

Prime Meridian Transit Times (UT1)

Date	Sun			Moon			Venus			Mars			Jupiter			Saturn		
	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s
04/18/2028	11	59	13.0	7	25	56.8	14	47	47.8	11	36	57.3	21	29	51.1	12	08	51.7
04/19/2028	11	59	00.1	8	07	35.3	14	46	41.7	11	35	51.2	21	25	39.0	12	05	24.7
04/20/2028	11	58	47.7	8	47	53.0	14	45	30.8	11	34	45.2	21	21	27.4	12	01	57.7
04/21/2028	11	58	35.8	9	27	49.5	14	44	14.7	11	33	39.4	21	17	16.5	11	58	30.7
04/22/2028	11	58	24.3	10	08	25.6	14	42	53.4	11	32	33.6	21	13	06.2	11	55	03.8
04/23/2028	11	58	13.2	10	50	41.0	14	41	26.4	11	31	27.9	21	08	56.5	11	51	36.8
04/24/2028	11	58	02.7	11	35	31.4	14	39	53.6	11	30	22.4	21	04	47.4	11	48	09.9
04/25/2028	11	57	52.6	12	23	41.2	14	38	14.7	11	29	17.0	21	00	38.9	11	44	42.9
04/26/2028	11	57	43.0	13	15	30.3	14	36	29.4	11	28	11.6	20	56	31.1	11	41	16.0
04/27/2028	11	57	34.0	14	10	38.4	14	34	37.3	11	27	06.5	20	52	23.9	11	37	49.0
04/28/2028	11	57	25.4	15	07	57.5	14	32	38.3	11	26	01.4	20	48	17.4	11	34	22.0
04/29/2028	11	57	17.3	16	05	46.3	14	30	32.0	11	24	56.5	20	44	11.5	11	30	55.0
04/30/2028	11	57	09.7	17	02	26.0	14	28	18.1	11	23	51.7	20	40	06.3	11	27	28.0
05/01/2028	11	57	02.7	17	56	56.2	14	25	56.3	11	22	47.1	20	36	01.7	11	24	00.9
05/02/2028	11	56	56.1	18	49	07.6	14	23	26.3	11	21	42.5	20	31	57.8	11	20	33.9
05/03/2028	11	56	50.1	19	39	33.6	14	20	47.8	11	20	38.2	20	27	54.5	11	17	06.7
05/04/2028	11	56	44.7	20	29	13.2	14	18	00.6	11	19	34.0	20	23	51.9	11	13	39.5
05/05/2028	11	56	39.7	21	19	15.1	14	15	04.3	11	18	29.9	20	19	50.0	11	10	12.3
05/06/2028	11	56	35.4	22	10	44.6	14	11	58.6	11	17	26.0	20	15	48.8	11	06	45.1
05/07/2028	11	56	31.5	23	04	27.4	14	08	43.5	11	16	22.2	20	11	48.2	11	03	17.7
05/08/2028	11	56	28.3				14	05	18.5	11	15	18.7	20	07	48.3	10	59	50.4
05/09/2028	11	56	25.6	0	00	32.5	14	01	43.5	11	14	15.3	20	03	49.0	10	56	22.9
05/10/2028	11	56	23.4	0	58	16.8	13	57	58.4	11	13	12.0	19	59	50.4	10	52	55.4
05/11/2028	11	56	21.9	1	56	08.8	13	54	03.0	11	12	09.0	19	55	52.5	10	49	27.9
05/12/2028	11	56	20.9	2	52	19.1	13	49	57.1	11	11	06.1	19	51	55.2	10	46	00.2
05/13/2028	11	56	20.5	3	45	21.8	13	45	40.8	11	10	03.4	19	47	58.7	10	42	32.5
05/14/2028	11	56	20.7	4	34	39.5	13	41	14.0	11	09	00.9	19	44	02.7	10	39	04.7
05/15/2028	11	56	21.5	5	20	22.1	13	36	36.7	11	07	58.6	19	40	07.5	10	35	36.9
05/16/2028	11	56	22.9	6	03	10.3	13	31	49.0	11	06	56.5	19	36	12.9	10	32	08.9
05/17/2028	11	56	24.8	6	44	01.2	13	26	51.0	11	05	54.6	19	32	19.0	10	28	40.8
05/18/2028	11	56	27.3	7	23	57.7	13	21	43.0	11	04	52.9	19	28	25.7	10	25	12.7
05/19/2028	11	56	30.4	8	04	05.3	13	16	25.2	11	03	51.3	19	24	33.1	10	21	44.5
05/20/2028	11	56	34.1	8	45	29.7	13	10	58.0	11	02	50.0	19	20	41.2	10	18	16.1
05/21/2028	11	56	38.2	9	29	14.8	13	05	21.7	11	01	48.8	19	16	49.9	10	14	47.7
05/22/2028	11	56	43.0	10	16	17.4	12	59	36.9	11	00	47.8	19	12	59.3	10	11	19.1
05/23/2028	11	56	48.2	11	07	14.8	12	53	44.1	10	59	47.1	19	09	09.3	10	07	50.4
05/24/2028	11	56	54.0	12	02	06.3	12	47	43.9	10	58	46.5	19	05	20.0	10	04	21.6
05/25/2028	11	57	00.2	12	59	56.5	12	41	37.1	10	57	46.0	19	01	31.3	10	00	52.7
05/26/2028	11	57	07.0	13	58	59.2	12	35	24.4	10	56	45.8	18	57	43.3	9	57	23.6
05/27/2028	11	57	14.2	14	57	12.8	12	29	06.7	10	55	45.7	18	53	55.9	9	53	54.4
05/28/2028	11	57	21.8	15	53	07.7	12	22	44.8	10	54	45.8	18	50	09.2	9	50	25.1
05/29/2028	11	57	29.9	16	46	12.2	12	16	19.7	10	53	46.1	18	46	23.0	9	46	55.6
05/30/2028	11	57	38.4	17	36	48.0	12	09	52.4	10	52	46.5	18	42	37.6	9	43	26.0
05/31/2028	11	57	47.2	18	25	51.2	12	03	23.8	10	51	47.1	18	38	52.7	9	39	56.2
06/01/2028	11	57	56.5	19	14	32.9	11	56	54.9	10	50	47.8	18	35	08.4	9	36	26.3
06/02/2028	11	58	06.1	20	04	05.4	11	50	26.8	10	49	48.8	18	31	24.8	9	32	56.2
06/03/2028	11	58	16.0	20	55	29.7	11	44	00.5	10	48	49.8	18	27	41.8	9	29	25.9
06/04/2028	11	58	26.3	21	49	20.3	11	37	37.0	10	47	51.0	18	23	59.3	9	25	55.5
06/05/2028	11	58	36.9	22	45	27.7	11	31	17.1	10	46	52.4	18	20	17.5	9	22	24.9
06/06/2028	11	58	47.8	23	42	49.3	11	25	01.7	10	45	53.9	18	16	36.3	9	18	54.2
06/07/2028	11	58	59.0				11	18	51.8	10	44	55.5	18	12	55.6	9	15	23.2
06/08/2028	11	59	10.5	0	39	43.1	11	12	48.1	10	43	57.3	18	09	15.5	9	11	52.1
06/09/2028	11	59	22.2	1	34	24.4	11	06	51.1	10	42	59.3	18	05	36.0	9	08	20.8
06/10/2028	11	59	34.2	2	25	43.6	11	01	01.7	10	42	01.4	18	01	57.0	9	04	49.3
06/11/2028	11	59	46.3	3	13	21.2	10	55	20.2	10	41	03.6	17	58	18.7	9	01	17.6

Prime Meridian Transit Times (UT1)

Date	Sun			Moon			Venus			Mars			Jupiter			Saturn		
	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s
06/12/2028	11	59	58.7	3	57	39.6	10	49	47.1	10	40	05.9	17	54	40.8	8	57	45.8
06/13/2028	12	00	11.3	4	39	26.2	10	44	22.8	10	39	08.4	17	51	03.6	8	54	13.7
06/14/2028	12	00	24.0	5	19	40.9	10	39	07.6	10	38	10.9	17	47	26.9	8	50	41.4
06/15/2028	12	00	36.8	5	59	28.5	10	34	01.6	10	37	13.6	17	43	50.7	8	47	08.9
06/16/2028	12	00	49.8	6	39	55.8	10	29	05.2	10	36	16.4	17	40	15.0	8	43	36.2
06/17/2028	12	01	02.8	7	22	10.6	10	24	18.2	10	35	19.3	17	36	39.9	8	40	03.3
06/18/2028	12	01	15.9	8	07	18.3	10	19	40.9	10	34	22.3	17	33	05.4	8	36	30.1
06/19/2028	12	01	29.1	8	56	13.7	10	15	13.1	10	33	25.4	17	29	31.3	8	32	56.8
06/20/2028	12	01	42.2	9	49	25.2	10	10	54.8	10	32	28.5	17	25	57.8	8	29	23.2
06/21/2028	12	01	55.4	10	46	32.1	10	06	45.9	10	31	31.7	17	22	24.8	8	25	49.3
06/22/2028	12	02	08.5	11	46	11.6	10	02	46.4	10	30	35.0	17	18	52.3	8	22	15.3
06/23/2028	12	02	21.5	12	46	16.1	9	58	55.9	10	29	38.3	17	15	20.3	8	18	40.9
06/24/2028	12	02	34.5	13	44	42.3	9	55	14.5	10	28	41.6	17	11	48.8	8	15	06.4
06/25/2028	12	02	47.3	14	40	18.3	9	51	41.8	10	27	45.0	17	08	17.7	8	11	31.6
06/26/2028	12	02	59.9	15	32	55.9	9	48	17.7	10	26	48.4	17	04	47.2	8	07	56.5
06/27/2028	12	03	12.4	16	23	15.7	9	45	02.0	10	25	51.8	17	01	17.1	8	04	21.2
06/28/2028	12	03	24.6	17	12	23.4	9	41	54.5	10	24	55.2	16	57	47.6	8	00	45.5
06/29/2028	12	03	36.7	18	01	32.1	9	38	54.9	10	23	58.5	16	54	18.4	7	57	09.7
06/30/2028	12	03	48.4	18	51	48.4	9	36	03.1	10	23	01.9	16	50	49.8	7	53	33.5
07/01/2028	12	03	59.9	19	43	59.8	9	33	18.8	10	22	05.2	16	47	21.5	7	49	57.1
07/02/2028	12	04	11.1	20	38	19.9	9	30	41.9	10	21	08.5	16	43	53.8	7	46	20.4
07/03/2028	12	04	22.0	21	34	16.5	9	28	12.1	10	20	11.8	16	40	26.4	7	42	43.5
07/04/2028	12	04	32.6	22	30	32.8	9	25	49.2	10	19	15.0	16	36	59.5	7	39	06.2
07/05/2028	12	04	42.8	23	25	32.0	9	23	33.0	10	18	18.2	16	33	33.0	7	35	28.7
07/06/2028	12	04	52.6				9	21	23.3	10	17	21.3	16	30	07.0	7	31	50.8
07/07/2028	12	05	02.1	0	17	51.8	9	19	20.0	10	16	24.3	16	26	41.3	7	28	12.7
07/08/2028	12	05	11.2	1	06	50.2	9	17	22.8	10	15	27.2	16	23	16.1	7	24	34.2
07/09/2028	12	05	19.9	1	52	27.6	9	15	31.5	10	14	30.1	16	19	51.2	7	20	55.5
07/10/2028	12	05	28.1	2	35	16.3	9	13	45.9	10	13	32.9	16	16	26.8	7	17	16.5
07/11/2028	12	05	36.0	3	16	06.0	9	12	06.0	10	12	35.5	16	13	02.7	7	13	37.1
07/12/2028	12	05	43.4	3	55	55.3	9	10	31.4	10	11	38.1	16	09	39.1	7	09	57.4
07/13/2028	12	05	50.3	4	35	46.4	9	09	02.0	10	10	40.5	16	06	15.8	7	06	17.5
07/14/2028	12	05	56.8	5	16	43.9	9	07	37.7	10	09	42.8	16	02	52.9	7	02	37.2
07/15/2028	12	06	02.7	5	59	52.7	9	06	18.2	10	08	45.0	15	59	30.3	6	58	56.5
07/16/2028	12	06	08.2	6	46	13.8	9	05	03.5	10	07	47.0	15	56	08.2	6	55	15.6
07/17/2028	12	06	13.2	7	36	34.1	9	03	53.4	10	06	48.9	15	52	46.4	6	51	34.3
07/18/2028	12	06	17.6	8	31	08.1	9	02	47.7	10	05	50.5	15	49	24.9	6	47	52.7
07/19/2028	12	06	21.6	9	29	17.5	9	01	46.2	10	04	52.0	15	46	03.9	6	44	10.7
07/20/2028	12	06	24.9	10	29	26.4	9	00	48.9	10	03	53.3	15	42	43.1	6	40	28.4
07/21/2028	12	06	27.8	11	29	28.3	8	59	55.6	10	02	54.4	15	39	22.7	6	36	45.7
07/22/2028	12	06	30.0	12	27	37.2	8	59	06.2	10	01	55.3	15	36	02.7	6	33	02.7
07/23/2028	12	06	31.7	13	23	03.4	8	58	20.6	10	00	55.9	15	32	42.9	6	29	19.3
07/24/2028	12	06	32.7	14	15	56.1	8	57	38.5	9	59	56.4	15	29	23.5	6	25	35.6
07/25/2028	12	06	33.2	15	07	03.6	8	57	00.0	9	58	56.5	15	26	04.5	6	21	51.5
07/26/2028	12	06	33.0	15	57	31.5	8	56	24.9	9	57	56.4	15	22	45.7	6	18	07.1
07/27/2028	12	06	32.3	16	48	25.2	8	55	53.1	9	56	56.0	15	19	27.2	6	14	22.2
07/28/2028	12	06	30.9	17	40	35.5	8	55	24.5	9	55	55.3	15	16	09.1	6	10	37.1
07/29/2028	12	06	28.9	18	34	25.6	8	54	59.0	9	54	54.4	15	12	51.2	6	06	51.5
07/30/2028	12	06	26.2	19	29	39.6	8	54	36.6	9	53	53.1	15	09	33.6	6	03	05.6
07/31/2028	12	06	22.9	20	25	21.1	8	54	17.2	9	52	51.6	15	06	16.3	5	59	19.3
08/01/2028	12	06	19.1	21	20	08.9	8	54	00.6	9	51	49.7	15	02	59.3	5	55	32.6
08/02/2028	12	06	14.5	22	12	45.5	8	53	46.8	9	50	47.5	14	59	42.5	5	51	45.5
08/03/2028	12	06	09.4	23	02	22.6	8	53	35.7	9	49	45.0	14	56	26.1	5	47	58.1
08/04/2028	12	06	03.7	23	48	49.1	8	53	27.3	9	48	42.2	14	53	09.9	5	44	10.2
08/05/2028	12	05	57.3				8	53	21.4	9	47	39.0	14	49	53.9	5	40	22.0

Prime Meridian Transit Times (UT1)

Date	Sun			Moon			Venus			Mars			Jupiter			Saturn		
	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s
08/06/2028	12	05	50.4	0	32	25.3	8	53	18.0	9	46	35.5	14	46	38.2	5	36	33.4
08/07/2028	12	05	42.9	1	13	51.4	8	53	17.0	9	45	31.7	14	43	22.8	5	32	44.4
08/08/2028	12	05	34.8	1	53	57.8	8	53	18.3	9	44	27.4	14	40	07.6	5	28	55.0
08/09/2028	12	05	26.1	2	33	40.2	8	53	21.9	9	43	22.9	14	36	52.6	5	25	05.2
08/10/2028	12	05	16.9	3	13	56.3	8	53	27.7	9	42	17.9	14	33	37.9	5	21	15.0
08/11/2028	12	05	07.1	3	55	44.7	8	53	35.5	9	41	12.6	14	30	23.4	5	17	24.4
08/12/2028	12	04	56.7	4	40	02.5	8	53	45.4	9	40	06.9	14	27	09.2	5	13	33.5
08/13/2028	12	04	45.9	5	27	38.9	8	53	57.2	9	39	00.8	14	23	55.2	5	09	42.1
08/14/2028	12	04	34.5	6	19	03.8	8	54	10.9	9	37	54.3	14	20	41.3	5	05	50.3
08/15/2028	12	04	22.6	7	14	11.3	8	54	26.4	9	36	47.4	14	17	27.8	5	01	58.1
08/16/2028	12	04	10.1	8	12	07.8	8	54	43.6	9	35	40.1	14	14	14.4	4	58	05.5
08/17/2028	12	03	57.2	9	11	18.7	8	55	02.5	9	34	32.4	14	11	01.2	4	54	12.5
08/18/2028	12	03	43.8	10	10	00.4	8	55	22.9	9	33	24.3	14	07	48.3	4	50	19.0
08/19/2028	12	03	29.9	11	07	00.0	8	55	44.9	9	32	15.7	14	04	35.5	4	46	25.2
08/20/2028	12	03	15.6	12	01	55.2	8	56	08.2	9	31	06.6	14	01	23.0	4	42	30.9
08/21/2028	12	03	00.7	12	55	09.2	8	56	32.9	9	29	57.1	13	58	10.6	4	38	36.3
08/22/2028	12	02	45.5	13	47	32.7	8	56	58.9	9	28	47.2	13	54	58.4	4	34	41.2
08/23/2028	12	02	29.7	14	40	04.3	8	57	26.1	9	27	36.8	13	51	46.4	4	30	45.7
08/24/2028	12	02	13.6	15	33	33.4	8	57	54.4	9	26	25.9	13	48	34.5	4	26	49.8
08/25/2028	12	01	57.0	16	28	24.6	8	58	23.9	9	25	14.5	13	45	22.9	4	22	53.5
08/26/2028	12	01	39.9	17	24	26.0	8	58	54.3	9	24	02.7	13	42	11.4	4	18	56.7
08/27/2028	12	01	22.5	18	20	46.6	8	59	25.8	9	22	50.3	13	39	00.0	4	14	59.6
08/28/2028	12	01	04.7	19	16	10.5	8	59	58.1	9	21	37.5	13	35	48.8	4	11	02.1
08/29/2028	12	00	46.6	20	09	23.7	9	00	31.3	9	20	24.2	13	32	37.8	4	07	04.1
08/30/2028	12	00	28.0	20	59	38.4	9	01	05.3	9	19	10.4	13	29	26.9	4	03	05.7
08/31/2028	12	00	09.2	21	46	42.2	9	01	40.0	9	17	56.1	13	26	16.1	3	59	07.0
09/01/2028	11	59	50.0	22	30	52.7	9	02	15.5	9	16	41.4	13	23	05.5	3	55	07.8
09/02/2028	11	59	30.6	23	12	47.1	9	02	51.6	9	15	26.1	13	19	55.0	3	51	08.2
09/03/2028	11	59	10.9	23	53	12.7	9	03	28.2	9	14	10.3	13	16	44.7	3	47	08.2
09/04/2028	11	58	50.9				9	04	05.5	9	12	54.0	13	13	34.5	3	43	07.8
09/05/2028	11	58	30.7	0	33	01.2	9	04	43.2	9	11	37.2	13	10	24.4	3	39	07.0
09/06/2028	11	58	10.3	1	13	05.6	9	05	21.3	9	10	20.0	13	07	14.4	3	35	05.9
09/07/2028	11	57	49.7	1	54	18.8	9	05	59.9	9	09	02.2	13	04	04.5	3	31	04.3
09/08/2028	11	57	28.9	2	37	31.5	9	06	38.8	9	07	43.9	13	00	54.7	3	27	02.3
09/09/2028	11	57	08.0	3	23	27.8	9	07	17.9	9	06	25.1	12	57	45.1	3	23	00.0
09/10/2028	11	56	47.0	4	12	37.1	9	07	57.4	9	05	05.8	12	54	35.5	3	18	57.2
09/11/2028	11	56	25.8	5	05	02.9	9	08	37.0	9	03	46.0	12	51	26.1	3	14	54.1
09/12/2028	11	56	04.6	6	00	13.2	9	09	16.9	9	02	25.6	12	48	16.7	3	10	50.6
09/13/2028	11	55	43.3	6	57	01.7	9	09	56.8	9	01	04.8	12	45	07.5	3	06	46.7
09/14/2028	11	55	22.0	7	54	07.0	9	10	36.9	8	59	43.4	12	41	58.3	3	02	42.4
09/15/2028	11	55	00.6	8	50	21.3	9	11	16.9	8	58	21.5	12	38	49.2	2	58	37.7
09/16/2028	11	54	39.3	9	45	13.0	9	11	57.0	8	56	59.1	12	35	40.2	2	54	32.7
09/17/2028	11	54	17.9	10	38	50.9	9	12	37.1	8	55	36.1	12	32	31.3	2	50	27.3
09/18/2028	11	53	56.6	11	31	54.1	9	13	17.1	8	54	12.6	12	29	22.4	2	46	21.6
09/19/2028	11	53	35.3	12	25	16.3	9	13	57.0	8	52	48.6	12	26	13.6	2	42	15.5
09/20/2028	11	53	14.1	13	19	47.7	9	14	36.7	8	51	24.0	12	23	04.9	2	38	09.0
09/21/2028	11	52	52.9	14	15	57.4	9	15	16.3	8	49	58.9	12	19	56.2	2	34	02.2
09/22/2028	11	52	31.9	15	13	36.2	9	15	55.8	8	48	33.2	12	16	47.6	2	29	55.0
09/23/2028	11	52	10.9	16	11	50.2	9	16	35.0	8	47	07.0	12	13	39.0	2	25	47.6
09/24/2028	11	51	50.1	17	09	13.2	9	17	14.0	8	45	40.2	12	10	30.5	2	21	39.7
09/25/2028	11	51	29.4	18	04	17.7	9	17	52.8	8	44	12.9	12	07	22.0	2	17	31.6
09/26/2028	11	51	08.8	18	56	05.8	9	18	31.3	8	42	45.1	12	04	13.5	2	13	23.2
09/27/2028	11	50	48.5	19	44	21.3	9	19	09.6	8	41	16.7	12	01	05.1	2	09	14.4
09/28/2028	11	50	28.3	20	29	22.6	9	19	47.6	8	39	47.8	11	57	56.7	2	05	05.3
09/29/2028	11	50	08.4	21	11	50.4	9	20	25.4	8	38	18.3	11	54	48.3	2	00	56.0

Prime Meridian Transit Times (UT1)

Date	Sun			Moon			Venus			Mars			Jupiter			Saturn		
	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s
09/30/2028	11	49	48.8	21	52	35.2	9	21	02.8	8	36	48.3	11	51	39.9	1	56	46.3
10/01/2028	11	49	29.4	22	32	31.3	9	21	40.0	8	35	17.8	11	48	31.5	1	52	36.4
10/02/2028	11	49	10.3	23	12	32.8	9	22	17.0	8	33	46.7	11	45	23.1	1	48	26.2
10/03/2028	11	48	51.5	23	53	32.5	9	22	53.6	8	32	15.1	11	42	14.8	1	44	15.7
10/04/2028	11	48	33.1				9	23	30.0	8	30	43.0	11	39	06.4	1	40	05.0
10/05/2028	11	48	15.0	0	36	19.3	9	24	06.0	8	29	10.3	11	35	58.0	1	35	54.0
10/06/2028	11	47	57.4	1	21	34.6	9	24	41.9	8	27	37.1	11	32	49.7	1	31	42.7
10/07/2028	11	47	40.1	2	09	45.1	9	25	17.4	8	26	03.4	11	29	41.3	1	27	31.2
10/08/2028	11	47	23.3	3	00	53.1	9	25	52.7	8	24	29.2	11	26	32.9	1	23	19.5
10/09/2028	11	47	06.9	3	54	29.1	9	26	27.7	8	22	54.4	11	23	24.5	1	19	07.6
10/10/2028	11	46	51.0	4	49	33.5	9	27	02.5	8	21	19.1	11	20	16.1	1	14	55.4
10/11/2028	11	46	35.6	5	44	53.4	9	27	37.1	8	19	43.3	11	17	07.6	1	10	43.0
10/12/2028	11	46	20.7	6	39	27.7	9	28	11.4	8	18	06.9	11	13	59.1	1	06	30.5
10/13/2028	11	46	06.4	7	32	46.9	9	28	45.6	8	16	30.1	11	10	50.6	1	02	17.7
10/14/2028	11	45	52.6	8	24	58.5	9	29	19.5	8	14	52.6	11	07	42.0	0	58	04.8
10/15/2028	11	45	39.4	9	16	40.3	9	29	53.2	8	13	14.7	11	04	33.4	0	53	51.6
10/16/2028	11	45	26.8	10	08	48.3	9	30	26.8	8	11	36.2	11	01	24.7	0	49	38.3
10/17/2028	11	45	14.7	11	02	21.5	9	31	00.2	8	09	57.2	10	58	16.0	0	45	24.9
10/18/2028	11	45	03.3	11	58	05.2	9	31	33.5	8	08	17.6	10	55	07.2	0	41	11.3
10/19/2028	11	44	52.5	12	56	10.0	9	32	06.6	8	06	37.5	10	51	58.4	0	36	57.6
10/20/2028	11	44	42.4	13	55	53.4	9	32	39.6	8	04	56.8	10	48	49.5	0	32	43.8
10/21/2028	11	44	32.9	14	55	41.9	9	33	12.6	8	03	15.6	10	45	40.5	0	28	29.8
10/22/2028	11	44	24.0	15	53	41.0	9	33	45.5	8	01	33.9	10	42	31.4	0	24	15.7
10/23/2028	11	44	15.8	16	48	19.8	9	34	18.3	7	59	51.6	10	39	22.2	0	20	01.6
10/24/2028	11	44	08.3	17	38	58.3	9	34	51.1	7	58	08.8	10	36	12.9	0	15	47.3
10/25/2028	11	44	01.5	18	25	45.6	9	35	24.0	7	56	25.4	10	33	03.6	0	11	33.0
10/26/2028	11	43	55.4	19	09	22.5	9	35	56.9	7	54	41.5	10	29	54.1	0	07	18.7
10/27/2028	11	43	50.0	19	50	45.1	9	36	29.8	7	52	57.0	10	26	44.5	0	03	04.2
10/27/2028																		23 58 49.8
10/28/2028	11	43	45.4	20	30	54.0	9	37	02.9	7	51	12.0	10	23	34.8	23	54	35.3
10/29/2028	11	43	41.5	21	10	49.8	9	37	36.1	7	49	26.5	10	20	25.0	23	50	20.8
10/30/2028	11	43	38.4	21	51	30.6	9	38	09.4	7	47	40.4	10	17	15.1	23	46	06.3
10/31/2028	11	43	36.0	22	33	50.9	9	38	43.0	7	45	53.8	10	14	05.1	23	41	51.7
11/01/2028	11	43	34.5	23	18	37.4	9	39	16.7	7	44	06.7	10	10	54.9	23	37	37.2
11/02/2028	11	43	33.7				9	39	50.8	7	42	19.0	10	07	44.6	23	33	22.7
11/03/2028	11	43	33.8	0	06	22.0	9	40	25.1	7	40	30.8	10	04	34.1	23	29	08.3
11/04/2028	11	43	34.7	0	57	11.0	9	40	59.8	7	38	42.1	10	01	23.5	23	24	53.8
11/05/2028	11	43	36.4	1	50	35.7	9	41	34.8	7	36	52.8	9	58	12.8	23	20	39.4
11/06/2028	11	43	38.9	2	45	32.5	9	42	10.2	7	35	03.0	9	55	01.9	23	16	25.1
11/07/2028	11	43	42.3	3	40	39.5	9	42	46.1	7	33	12.6	9	51	50.8	23	12	10.9
11/08/2028	11	43	46.6	4	34	45.5	9	43	22.4	7	31	21.7	9	48	39.6	23	07	56.7
11/09/2028	11	43	51.7	5	27	12.7	9	43	59.2	7	29	30.3	9	45	28.2	23	03	42.6
11/10/2028	11	43	57.7	6	18	04.1	9	44	36.5	7	27	38.3	9	42	16.6	22	59	28.6
11/11/2028	11	44	04.6	7	07	56.4	9	45	14.4	7	25	45.8	9	39	04.9	22	55	14.7
11/12/2028	11	44	12.3	7	57	48.1	9	45	52.9	7	23	52.7	9	35	52.9	22	51	01.0
11/13/2028	11	44	20.9	8	48	46.7	9	46	32.0	7	21	59.0	9	32	40.8	22	46	47.3
11/14/2028	11	44	30.4	9	41	55.5	9	47	11.7	7	20	04.8	9	29	28.5	22	42	33.9
11/15/2028	11	44	40.7	10	37	55.2	9	47	52.1	7	18	09.9	9	26	15.9	22	38	20.5
11/16/2028	11	44	51.9	11	36	41.0	9	48	33.2	7	16	14.5	9	23	03.2	22	34	07.3
11/17/2028	11	45	03.9	12	37	06.2	9	49	15.1	7	14	18.6	9	19	50.2	22	29	54.3
11/18/2028	11	45	16.8	13	37	12.1	9	49	57.7	7	12	22.0	9	16	37.0	22	25	41.5
11/19/2028	11	45	30.4	14	34	52.1	9	50	41.1	7	10	24.8	9	13	23.6	22	21	28.9
11/20/2028	11	45	44.9	15	28	40.8	9	51	25.3	7	08	27.0	9	10	09.9	22	17	16.4
11/21/2028	11	46	00.1	16	18	13.6	9	52	10.3	7	06	28.6	9	06	56.0	22	13	04.2
11/22/2028	11	46	16.2	17	03	55.2	9	52	56.3	7	04	29.7	9	03	41.8	22	08	52.2

Prime Meridian Transit Times (UT1)

Date	Sun			Moon			Venus			Mars			Jupiter			Saturn		
	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s
11/23/2028	11	46	33.0	17	46	38.2	9	53	43.1	7	02	30.1	9	00	27.4	22	04	40.4
11/24/2028	11	46	50.5	18	27	26.4	9	54	30.8	7	00	29.8	8	57	12.7	22	00	28.9
11/25/2028	11	47	08.8	19	07	25.6	9	55	19.5	6	58	29.0	8	53	57.8	21	56	17.6
11/26/2028	11	47	27.8	19	47	40.7	9	56	09.2	6	56	27.5	8	50	42.5	21	52	06.5
11/27/2028	11	47	47.5	20	29	13.6	9	56	59.9	6	54	25.5	8	47	27.0	21	47	55.7
11/28/2028	11	48	07.9	21	13	01.1	9	57	51.6	6	52	22.7	8	44	11.2	21	43	45.2
11/29/2028	11	48	29.0	21	59	48.5	9	58	44.4	6	50	19.4	8	40	55.2	21	39	35.0
11/30/2028	11	48	50.8	22	49	58.9	9	59	38.2	6	48	15.4	8	37	38.8	21	35	25.0
12/01/2028	11	49	13.2	23	43	19.3	10	00	33.2	6	46	10.8	8	34	22.1	21	31	15.3
12/02/2028	11	49	36.2				10	01	29.2	6	44	05.5	8	31	05.1	21	27	05.9
12/03/2028	11	49	59.9	0	38	52.7	10	02	26.4	6	41	59.5	8	27	47.8	21	22	56.9
12/04/2028	11	50	24.1	1	35	09.0	10	03	24.8	6	39	52.9	8	24	30.2	21	18	48.1
12/05/2028	11	50	48.9	2	30	34.6	10	04	24.3	6	37	45.6	8	21	12.2	21	14	39.6
12/06/2028	11	51	14.2	3	24	06.7	10	05	25.0	6	35	37.6	8	17	54.0	21	10	31.5
12/07/2028	11	51	40.1	4	15	28.5	10	06	26.8	6	33	28.9	8	14	35.3	21	06	23.7
12/08/2028	11	52	06.4	5	05	05.6	10	07	29.9	6	31	19.5	8	11	16.4	21	02	16.2
12/09/2028	11	52	33.3	5	53	51.9	10	08	34.2	6	29	09.4	8	07	57.0	20	58	09.1
12/10/2028	11	53	00.6	6	42	55.2	10	09	39.6	6	26	58.5	8	04	37.3	20	54	02.3
12/11/2028	11	53	28.3	7	33	26.0	10	10	46.3	6	24	46.9	8	01	17.3	20	49	55.8
12/12/2028	11	53	56.3	8	26	23.1	10	11	54.2	6	22	34.5	7	57	56.9	20	45	49.8
12/13/2028	11	54	24.8	9	22	15.8	10	13	03.2	6	20	21.4	7	54	36.0	20	41	44.0
12/14/2028	11	54	53.5	10	20	42.5	10	14	13.5	6	18	07.4	7	51	14.8	20	37	38.7
12/15/2028	11	55	22.5	11	20	21.4	10	15	24.9	6	15	52.7	7	47	53.2	20	33	33.7
12/16/2028	11	55	51.8	12	19	10.4	10	16	37.4	6	13	37.1	7	44	31.2	20	29	29.1
12/17/2028	11	56	21.2	13	15	14.2	10	17	51.1	6	11	20.6	7	41	08.8	20	25	24.9
12/18/2028	11	56	50.8	14	07	25.2	10	19	05.9	6	09	03.3	7	37	45.9	20	21	21.1
12/19/2028	11	57	20.6	14	55	33.6	10	20	21.8	6	06	45.1	7	34	22.7	20	17	17.6
12/20/2028	11	57	50.4	15	40	12.0	10	21	38.8	6	04	26.1	7	30	58.9	20	13	14.6
12/21/2028	11	58	20.3	16	22	15.3	10	22	56.9	6	02	06.1	7	27	34.8	20	09	12.0
12/22/2028	11	58	50.1	17	02	47.4	10	24	16.0	5	59	45.2	7	24	10.2	20	05	09.7
12/23/2028	11	59	20.0	17	42	53.7	10	25	36.0	5	57	23.4	7	20	45.1	20	01	07.9
12/24/2028	11	59	49.8	18	23	38.9	10	26	57.1	5	55	00.7	7	17	19.6	19	57	06.5
12/25/2028	12	00	19.5	19	06	05.2	10	28	19.1	5	52	37.0	7	13	53.6	19	53	05.5
12/26/2028	12	00	49.1	19	51	08.8	10	29	42.0	5	50	12.3	7	10	27.1	19	49	04.9
12/27/2028	12	01	18.5	20	39	31.8	10	31	05.7	5	47	46.6	7	07	00.2	19	45	04.7
12/28/2028	12	01	47.7	21	31	28.6	10	32	30.3	5	45	19.9	7	03	32.7	19	41	04.9
12/29/2028	12	02	16.8	22	26	32.0	10	33	55.7	5	42	52.1	7	00	04.8	19	37	05.6
12/30/2028	12	02	45.5	23	23	28.4	10	35	21.8	5	40	23.4	6	56	36.3	19	33	06.7
12/31/2028	12	03	14.0				10	36	48.6	5	37	53.5	6	53	07.4	19	29	08.1
01/01/2029	12	03	42.2	0	20	36.9	10	38	16.1	5	35	22.5	6	49	37.9	19	25	10.0

Universal and Greenwich Sidereal Times

Date 0h UT1	Julian Date	-- SIDEREAL TIME --		E of E	UT1 at GMST 0h		
		Apparent	Mean		s	h	m
		h	m	s			
12/31/2027	2461770.5	6 36	48.3702	47.4661	0.9041	17 20	21.6292
01/01/2028	2461771.5	6 40	44.9263	44.0214	0.9048	17 16	25.7197
01/02/2028	2461772.5	6 44	41.4802	40.5768	0.9034	17 12	29.8102
01/03/2028	2461773.5	6 48	38.0325	37.1322	0.9003	17 08	33.9008
01/04/2028	2461774.5	6 52	34.5842	33.6875	0.8967	17 04	37.9913
01/05/2028	2461775.5	6 56	31.1363	30.2429	0.8933	17 00	42.0818
01/06/2028	2461776.5	7 00	27.6898	26.7983	0.8915	16 56	46.1724
01/07/2028	2461777.5	7 04	24.2458	23.3536	0.8922	16 52	50.2629
01/08/2028	2461778.5	7 08	20.8052	19.9090	0.8962	16 48	54.3534
01/09/2028	2461779.5	7 12	17.3682	16.4644	0.9038	16 44	58.4439
01/10/2028	2461780.5	7 16	13.9342	13.0197	0.9144	16 41	02.5345
01/11/2028	2461781.5	7 20	10.5017	9.5751	0.9266	16 37	06.6250
01/12/2028	2461782.5	7 24	07.0686	6.1305	0.9382	16 33	10.7155
01/13/2028	2461783.5	7 28	03.6326	2.6859	0.9468	16 29	14.8061
01/14/2028	2461784.5	7 32	00.1922	59.2412	0.9510	16 25	18.8966
01/15/2028	2461785.5	7 35	56.7472	55.7966	0.9506	16 21	22.9871
01/16/2028	2461786.5	7 39	53.2991	52.3520	0.9471	16 17	27.0777
01/17/2028	2461787.5	7 43	49.8497	48.9073	0.9424	16 13	31.1682
01/18/2028	2461788.5	7 47	46.4012	45.4627	0.9385	16 09	35.2587
01/19/2028	2461789.5	7 51	42.9550	42.0181	0.9369	16 05	39.3492
01/20/2028	2461790.5	7 55	39.5117	38.5734	0.9383	16 01	43.4398
01/21/2028	2461791.5	7 59	36.0713	35.1288	0.9425	15 57	47.5303
01/22/2028	2461792.5	8 03	32.6330	31.6842	0.9489	15 53	51.6208
01/23/2028	2461793.5	8 07	29.1959	28.2395	0.9564	15 49	55.7114
01/24/2028	2461794.5	8 11	25.7588	24.7949	0.9639	15 45	59.8019
01/25/2028	2461795.5	8 15	22.3206	21.3503	0.9703	15 42	03.8924
01/26/2028	2461796.5	8 19	18.8805	17.9056	0.9748	15 38	07.9830
01/27/2028	2461797.5	8 23	15.4379	14.4610	0.9769	15 34	12.0735
01/28/2028	2461798.5	8 27	11.9927	11.0164	0.9763	15 30	16.1640
01/29/2028	2461799.5	8 31	08.5451	7.5718	0.9733	15 26	20.2545
01/30/2028	2461800.5	8 35	05.0956	4.1271	0.9685	15 22	24.3451
01/31/2028	2461801.5	8 39	01.6452	0.6825	0.9627	15 18	28.4356
02/01/2028	2461802.5	8 42	58.1948	57.2379	0.9570	15 14	32.5261
02/02/2028	2461803.5	8 46	54.7455	53.7932	0.9523	15 10	36.6167
02/03/2028	2461804.5	8 50	51.2982	50.3486	0.9496	15 06	40.7072
02/04/2028	2461805.5	8 54	47.8538	46.9040	0.9498	15 02	44.7977
02/05/2028	2461806.5	8 58	44.4125	43.4593	0.9532	14 58	48.8883
02/06/2028	2461807.5	9 02	40.9744	40.0147	0.9597	14 54	52.9788
02/07/2028	2461808.5	9 06	37.5384	36.5701	0.9683	14 50	57.0693
02/08/2028	2461809.5	9 10	34.1029	33.1254	0.9775	14 47	01.1598
02/09/2028	2461810.5	9 14	30.6658	29.6808	0.9850	14 43	05.2504
02/10/2028	2461811.5	9 18	27.2250	26.2362	0.9889	14 39	09.3409
02/11/2028	2461812.5	9 22	23.7796	22.7915	0.9881	14 35	13.4314
02/12/2028	2461813.5	9 26	20.3300	19.3469	0.9831	14 31	17.5220
02/13/2028	2461814.5	9 30	16.8782	15.9023	0.9759	14 27	21.6125
02/14/2028	2461815.5	9 34	13.4264	12.4577	0.9688	14 23	25.7030
02/15/2028	2461816.5	9 38	09.9767	9.0130	0.9637	14 19	29.7936
02/16/2028	2461817.5	9 42	06.5300	5.5684	0.9616	14 15	33.8841
02/17/2028	2461818.5	9 46	03.0865	2.1238	0.9627	14 11	37.9746
02/18/2028	2461819.5	9 49	59.6453	58.6791	0.9662	14 07	42.0651
02/19/2028	2461820.5	9 53	56.2055	55.2345	0.9710	14 03	46.1557
02/20/2028	2461821.5	9 57	52.7659	51.7899	0.9760	13 59	50.2462
02/21/2028	2461822.5	10 01	49.3254	48.3452	0.9801	13 55	54.3367
02/22/2028	2461823.5	10 05	45.8830	44.9006	0.9824	13 51	58.4273

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02/23/2028	2461824.5	10 09 42.4384	41.4560	0.9824	13 48 02.5178				
02/24/2028	2461825.5	10 13 38.9912	38.0113	0.9798	13 44 06.6083				
02/25/2028	2461826.5	10 17 35.5415	34.5667	0.9748	13 40 10.6989				
02/26/2028	2461827.5	10 21 32.0898	31.1221	0.9678	13 36 14.7894				
02/27/2028	2461828.5	10 25 28.6370	27.6775	0.9596	13 32 18.8799				
02/28/2028	2461829.5	10 29 25.1840	24.2328	0.9512	13 28 22.9704				
02/29/2028	2461830.5	10 33 21.7318	20.7882	0.9436	13 24 27.0610				
03/01/2028	2461831.5	10 37 18.2814	17.3436	0.9379	13 20 31.1515				
03/02/2028	2461832.5	10 41 14.8336	13.8989	0.9347	13 16 35.2420				
03/03/2028	2461833.5	10 45 11.3888	10.4543	0.9345	13 12 39.3326				
03/04/2028	2461834.5	10 49 07.9469	7.0097	0.9372	13 08 43.4231				
03/05/2028	2461835.5	10 53 04.5073	3.5650	0.9423	13 04 47.5136				
03/06/2028	2461836.5	10 57 01.0688	0.1204	0.9484	13 00 51.6042				
03/07/2028	2461837.5	11 00 57.6297	56.6758	0.9539	12 56 55.6947				
03/08/2028	2461838.5	11 04 54.1880	53.2311	0.9569	12 52 59.7852				
03/09/2028	2461839.5	11 08 50.7425	49.7865	0.9560	12 49 03.8757				
03/10/2028	2461840.5	11 12 47.2926	46.3419	0.9508	12 45 07.9663				
03/11/2028	2461841.5	11 16 43.8396	42.8972	0.9424	12 41 12.0568				
03/12/2028	2461842.5	11 20 40.3856	39.4526	0.9330	12 37 16.1473				
03/13/2028	2461843.5	11 24 36.9330	36.0080	0.9250	12 33 20.2379				
03/14/2028	2461844.5	11 28 33.4834	32.5634	0.9201	12 29 24.3284				
03/15/2028	2461845.5	11 32 30.0374	29.1187	0.9186	12 25 28.4189				
03/16/2028	2461846.5	11 36 26.5943	25.6741	0.9202	12 21 32.5095				
03/17/2028	2461847.5	11 40 23.1532	22.2295	0.9237	12 17 36.6000				
03/18/2028	2461848.5	11 44 19.7126	18.7848	0.9278	12 13 40.6905				
03/19/2028	2461849.5	11 48 16.2713	15.3402	0.9311	12 09 44.7810				
03/20/2028	2461850.5	11 52 12.8284	11.8956	0.9328	12 05 48.8716				
03/21/2028	2461851.5	11 56 09.3833	8.4509	0.9323	12 01 52.9621				
03/22/2028	2461852.5	12 00 05.9356	5.0063	0.9293	11 57 57.0526				
03/23/2028	2461853.5	12 04 02.4855	1.5617	0.9239	11 54 01.1432				
03/24/2028	2461854.5	12 07 59.0334	58.1170	0.9164	11 50 05.2337				
03/25/2028	2461855.5	12 11 55.5800	54.6724	0.9076	11 46 09.3242				
03/26/2028	2461856.5	12 15 52.1262	51.2278	0.8984	11 42 13.4148				
03/27/2028	2461857.5	12 19 48.6730	47.7831	0.8899	11 38 17.5053				
03/28/2028	2461858.5	12 23 45.2215	44.3385	0.8830	11 34 21.5958				
03/29/2028	2461859.5	12 27 41.7726	40.8939	0.8787	11 30 25.6863				
03/30/2028	2461860.5	12 31 38.3266	37.4493	0.8773	11 26 29.7769				
03/31/2028	2461861.5	12 35 34.8836	34.0046	0.8790	11 22 33.8674				
04/01/2028	2461862.5	12 39 31.4430	30.5600	0.8830	11 18 37.9579				
04/02/2028	2461863.5	12 43 28.0037	27.1154	0.8883	11 14 42.0485				
04/03/2028	2461864.5	12 47 24.5641	23.6707	0.8934	11 10 46.1390				
04/04/2028	2461865.5	12 51 21.1228	20.2261	0.8967	11 06 50.2295				
04/05/2028	2461866.5	12 55 17.6783	16.7815	0.8969	11 02 54.3201				
04/06/2028	2461867.5	12 59 14.2300	13.3368	0.8932	10 58 58.4106				
04/07/2028	2461868.5	13 03 10.7784	9.8922	0.8862	10 55 02.5011				
04/08/2028	2461869.5	13 07 07.3249	6.4476	0.8774	10 51 06.5916				
04/09/2028	2461870.5	13 11 03.8719	3.0029	0.8690	10 47 10.6822				
04/10/2028	2461871.5	13 15 00.4214	59.5583	0.8630	10 43 14.7727				
04/11/2028	2461872.5	13 18 56.9745	56.1137	0.8608	10 39 18.8632				
04/12/2028	2461873.5	13 22 53.5312	52.6690	0.8622	10 35 22.9538				
04/13/2028	2461874.5	13 26 50.0906	49.2244	0.8662	10 31 27.0443				
04/14/2028	2461875.5	13 30 46.6512	45.7798	0.8715	10 27 31.1348				
04/15/2028	2461876.5	13 34 43.2117	42.3352	0.8765	10 23 35.2253				
04/16/2028	2461877.5	13 38 39.7707	38.8905	0.8801	10 19 39.3159				

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04/17/2028	2461878.5	13	42	36.3275	35.4459	0.8816	10	15	43.4064
04/18/2028	2461879.5	13	46	32.8818	32.0013	0.8806	10	11	47.4969
04/19/2028	2461880.5	13	50	29.4337	28.5566	0.8771	10	07	51.5875
04/20/2028	2461881.5	13	54	25.9834	25.1120	0.8714	10	03	55.6780
04/21/2028	2461882.5	13	58	22.5317	21.6674	0.8643	9	59	59.7685
04/22/2028	2461883.5	14	02	19.0794	18.2227	0.8566	9	56	03.8591
04/23/2028	2461884.5	14	06	15.6274	14.7781	0.8493	9	52	07.9496
04/24/2028	2461885.5	14	10	12.1770	11.3335	0.8435	9	48	12.0401
04/25/2028	2461886.5	14	14	08.7290	7.8888	0.8402	9	44	16.1306
04/26/2028	2461887.5	14	18	05.2840	4.4442	0.8398	9	40	20.2212
04/27/2028	2461888.5	14	22	01.8422	0.9996	0.8426	9	36	24.3117
04/28/2028	2461889.5	14	25	58.4030	57.5549	0.8480	9	32	28.4022
04/29/2028	2461890.5	14	29	54.9653	54.1103	0.8550	9	28	32.4928
04/30/2028	2461891.5	14	33	51.5277	50.6657	0.8621	9	24	36.5833
05/01/2028	2461892.5	14	37	48.0886	47.2211	0.8676	9	20	40.6738
05/02/2028	2461893.5	14	41	44.6466	43.7764	0.8702	9	16	44.7644
05/03/2028	2461894.5	14	45	41.2011	40.3318	0.8693	9	12	48.8549
05/04/2028	2461895.5	14	49	37.7523	36.8872	0.8651	9	08	52.9454
05/05/2028	2461896.5	14	53	34.3013	33.4425	0.8588	9	04	57.0359
05/06/2028	2461897.5	14	57	30.8501	29.9979	0.8522	9	01	01.1265
05/07/2028	2461898.5	15	01	27.4006	26.5533	0.8473	8	57	05.2170
05/08/2028	2461899.5	15	05	23.9543	23.1086	0.8456	8	53	09.3075
05/09/2028	2461900.5	15	09	20.5117	19.6640	0.8477	8	49	13.3981
05/10/2028	2461901.5	15	13	17.0724	16.2194	0.8531	8	45	17.4886
05/11/2028	2461902.5	15	17	13.6351	12.7747	0.8604	8	41	21.5791
05/12/2028	2461903.5	15	21	10.1983	9.3301	0.8682	8	37	25.6697
05/13/2028	2461904.5	15	25	06.7604	5.8855	0.8749	8	33	29.7602
05/14/2028	2461905.5	15	29	03.3206	2.4409	0.8797	8	29	33.8507
05/15/2028	2461906.5	15	32	59.8782	58.9962	0.8819	8	25	37.9412
05/16/2028	2461907.5	15	36	56.4332	55.5516	0.8816	8	21	42.0318
05/17/2028	2461908.5	15	40	52.9858	52.1070	0.8789	8	17	46.1223
05/18/2028	2461909.5	15	44	49.5368	48.6623	0.8745	8	13	50.2128
05/19/2028	2461910.5	15	48	46.0869	45.2177	0.8692	8	09	54.3034
05/20/2028	2461911.5	15	52	42.6371	41.7731	0.8640	8	05	58.3939
05/21/2028	2461912.5	15	56	39.1884	38.3284	0.8600	8	02	02.4844
05/22/2028	2461913.5	16	00	35.7419	34.8838	0.8581	7	58	06.5750
05/23/2028	2461914.5	16	04	32.2983	31.4392	0.8591	7	54	10.6655
05/24/2028	2461915.5	16	08	28.8579	27.9945	0.8634	7	50	14.7560
05/25/2028	2461916.5	16	12	25.4205	24.5499	0.8706	7	46	18.8465
05/26/2028	2461917.5	16	16	21.9852	21.1053	0.8799	7	42	22.9371
05/27/2028	2461918.5	16	20	18.5502	17.6606	0.8896	7	38	27.0276
05/28/2028	2461919.5	16	24	15.1140	14.2160	0.8980	7	34	31.1181
05/29/2028	2461920.5	16	28	11.6750	10.7714	0.9036	7	30	35.2087
05/30/2028	2461921.5	16	32	08.2323	7.3268	0.9056	7	26	39.2992
05/31/2028	2461922.5	16	36	04.7862	3.8821	0.9041	7	22	43.3897
06/01/2028	2461923.5	16	40	01.3376	0.4375	0.9001	7	18	47.4803
06/02/2028	2461924.5	16	43	57.8883	56.9929	0.8955	7	14	51.5708
06/03/2028	2461925.5	16	47	54.4401	53.5482	0.8919	7	10	55.6613
06/04/2028	2461926.5	16	51	50.9946	50.1036	0.8910	7	06	59.7518
06/05/2028	2461927.5	16	55	47.5526	46.6590	0.8936	7	03	03.8424
06/06/2028	2461928.5	16	59	44.1139	43.2143	0.8996	6	59	07.9329
06/07/2028	2461929.5	17	03	40.6777	39.7697	0.9080	6	55	12.0234
06/08/2028	2461930.5	17	07	37.2425	36.3251	0.9174	6	51	16.1140
06/09/2028	2461931.5	17	11	33.8068	32.8804	0.9264	6	47	20.2045

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06/10/2028	2461932.5	17	15	30.3695	29.4358	0.9337	6	43	24.2950
06/11/2028	2461933.5	17	19	26.9297	25.9912	0.9385	6	39	28.3856
06/12/2028	2461934.5	17	23	23.4871	22.5465	0.9406	6	35	32.4761
06/13/2028	2461935.5	17	27	20.0420	19.1019	0.9401	6	31	36.5666
06/14/2028	2461936.5	17	31	16.5949	15.6573	0.9376	6	27	40.6571
06/15/2028	2461937.5	17	35	13.1466	12.2127	0.9339	6	23	44.7477
06/16/2028	2461938.5	17	39	09.6979	8.7680	0.9299	6	19	48.8382
06/17/2028	2461939.5	17	43	06.2500	5.3234	0.9266	6	15	52.9287
06/18/2028	2461940.5	17	47	02.8038	1.8788	0.9250	6	11	57.0193
06/19/2028	2461941.5	17	50	59.3602	58.4341	0.9261	6	08	01.1098
06/20/2028	2461942.5	17	54	55.9198	54.9895	0.9303	6	04	05.2003
06/21/2028	2461943.5	17	58	52.4825	51.5449	0.9376	6	00	09.2909
06/22/2028	2461944.5	18	02	49.0477	48.1002	0.9474	5	56	13.3814
06/23/2028	2461945.5	18	06	45.6140	44.6556	0.9584	5	52	17.4719
06/24/2028	2461946.5	18	10	42.1796	41.2110	0.9686	5	48	21.5624
06/25/2028	2461947.5	18	14	38.7426	37.7663	0.9763	5	44	25.6530
06/26/2028	2461948.5	18	18	35.3018	34.3217	0.9801	5	40	29.7435
06/27/2028	2461949.5	18	22	31.8571	30.8771	0.9801	5	36	33.8340
06/28/2028	2461950.5	18	26	28.4095	27.4324	0.9770	5	32	37.9246
06/29/2028	2461951.5	18	30	24.9606	23.9878	0.9728	5	28	42.0151
06/30/2028	2461952.5	18	34	21.5124	20.5432	0.9692	5	24	46.1056
07/01/2028	2461953.5	18	38	18.0664	17.0986	0.9678	5	20	50.1962
07/02/2028	2461954.5	18	42	14.6236	13.6539	0.9697	5	16	54.2867
07/03/2028	2461955.5	18	46	11.1840	10.2093	0.9747	5	12	58.3772
07/04/2028	2461956.5	18	50	07.7470	6.7647	0.9823	5	09	02.4677
07/05/2028	2461957.5	18	54	04.3113	3.3200	0.9913	5	05	06.5583
07/06/2028	2461958.5	18	58	00.8756	59.8754	1.0002	5	01	10.6488
07/07/2028	2461959.5	19	01	57.4386	56.4308	1.0078	4	57	14.7393
07/08/2028	2461960.5	19	05	53.9993	52.9861	1.0132	4	53	18.8299
07/09/2028	2461961.5	19	09	50.5573	49.5415	1.0158	4	49	22.9204
07/10/2028	2461962.5	19	13	47.1126	46.0969	1.0157	4	45	27.0109
07/11/2028	2461963.5	19	17	43.6655	42.6522	1.0133	4	41	31.1015
07/12/2028	2461964.5	19	21	40.2169	39.2076	1.0093	4	37	35.1920
07/13/2028	2461965.5	19	25	36.7676	35.7630	1.0046	4	33	39.2825
07/14/2028	2461966.5	19	29	33.3187	32.3184	1.0003	4	29	43.3730
07/15/2028	2461967.5	19	33	29.8710	28.8737	0.9973	4	25	47.4636
07/16/2028	2461968.5	19	37	26.4255	25.4291	0.9964	4	21	51.5541
07/17/2028	2461969.5	19	41	22.9828	21.9845	0.9984	4	17	55.6446
07/18/2028	2461970.5	19	45	19.5432	18.5398	1.0034	4	13	59.7352
07/19/2028	2461971.5	19	49	16.1064	15.0952	1.0112	4	10	03.8257
07/20/2028	2461972.5	19	53	12.6714	11.6506	1.0208	4	06	07.9162
07/21/2028	2461973.5	19	57	09.2365	8.2059	1.0306	4	02	12.0067
07/22/2028	2461974.5	20	01	05.7998	4.7613	1.0385	3	58	16.0973
07/23/2028	2461975.5	20	05	02.3595	1.3167	1.0428	3	54	20.1878
07/24/2028	2461976.5	20	08	58.9149	57.8720	1.0429	3	50	24.2783
07/25/2028	2461977.5	20	12	55.4667	54.4274	1.0393	3	46	28.3689
07/26/2028	2461978.5	20	16	52.0165	50.9828	1.0337	3	42	32.4594
07/27/2028	2461979.5	20	20	48.5663	47.5381	1.0282	3	38	36.5499
07/28/2028	2461980.5	20	24	45.1182	44.0935	1.0246	3	34	40.6405
07/29/2028	2461981.5	20	28	41.6730	40.6489	1.0242	3	30	44.7310
07/30/2028	2461982.5	20	32	38.2311	37.2043	1.0269	3	26	48.8215
07/31/2028	2461983.5	20	36	34.7918	33.7596	1.0322	3	22	52.9120
08/01/2028	2461984.5	20	40	31.3541	30.3150	1.0391	3	18	57.0026
08/02/2028	2461985.5	20	44	27.9165	26.8704	1.0461	3	15	01.0931

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08/03/2028	2461986.5	20 48 24.4778	23.4257	1.0521	3 11 05.1836			
08/04/2028	2461987.5	20 52 21.0372	19.9811	1.0561	3 07 09.2742			
08/05/2028	2461988.5	20 56 17.5939	16.5365	1.0574	3 03 13.3647			
08/06/2028	2461989.5	21 00 14.1479	13.0918	1.0561	2 59 17.4552			
08/07/2028	2461990.5	21 04 10.6994	9.6472	1.0522	2 55 21.5458			
08/08/2028	2461991.5	21 08 07.2491	6.2026	1.0465	2 51 25.6363			
08/09/2028	2461992.5	21 12 03.7978	2.7579	1.0399	2 47 29.7268			
08/10/2028	2461993.5	21 16 00.3465	59.3133	1.0332	2 43 33.8173			
08/11/2028	2461994.5	21 19 56.8962	55.8687	1.0275	2 39 37.9079			
08/12/2028	2461995.5	21 23 53.4477	52.4240	1.0236	2 35 41.9984			
08/13/2028	2461996.5	21 27 50.0017	48.9794	1.0223	2 31 46.0889			
08/14/2028	2461997.5	21 31 46.5585	45.5348	1.0238	2 27 50.1795			
08/15/2028	2461998.5	21 35 43.1181	42.0902	1.0280	2 23 54.2700			
08/16/2028	2461999.5	21 39 39.6799	38.6455	1.0344	2 19 58.3605			
08/17/2028	2462000.5	21 43 36.2425	35.2009	1.0416	2 16 02.4511			
08/18/2028	2462001.5	21 47 32.8043	31.7563	1.0480	2 12 06.5416			
08/19/2028	2462002.5	21 51 29.3634	28.3116	1.0518	2 08 10.6321			
08/20/2028	2462003.5	21 55 25.9185	24.8670	1.0515	2 04 14.7226			
08/21/2028	2462004.5	21 59 22.4694	21.4224	1.0471	2 00 18.8132			
08/22/2028	2462005.5	22 03 19.0174	17.9777	1.0397	1 56 22.9037			
08/23/2028	2462006.5	22 07 15.5647	14.5331	1.0316	1 52 26.9942			
08/24/2028	2462007.5	22 11 12.1134	11.0885	1.0249	1 48 31.0848			
08/25/2028	2462008.5	22 15 08.6652	7.6438	1.0213	1 44 35.1753			
08/26/2028	2462009.5	22 19 05.2204	4.1992	1.0212	1 40 39.2658			
08/27/2028	2462010.5	22 23 01.7785	0.7546	1.0240	1 36 43.3564			
08/28/2028	2462011.5	22 26 58.3385	57.3099	1.0285	1 32 47.4469			
08/29/2028	2462012.5	22 30 54.8988	53.8653	1.0335	1 28 51.5374			
08/30/2028	2462013.5	22 34 51.4583	50.4207	1.0376	1 24 55.6279			
08/31/2028	2462014.5	22 38 48.0159	46.9761	1.0399	1 20 59.7185			
09/01/2028	2462015.5	22 42 44.5711	43.5314	1.0397	1 17 03.8090			
09/02/2028	2462016.5	22 46 41.1236	40.0868	1.0368	1 13 07.8995			
09/03/2028	2462017.5	22 50 37.6736	36.6422	1.0314	1 09 11.9901			
09/04/2028	2462018.5	22 54 34.2216	33.1975	1.0240	1 05 16.0806			
09/05/2028	2462019.5	22 58 30.7684	29.7529	1.0155	1 01 20.1711			
09/06/2028	2462020.5	23 02 27.3150	26.3083	1.0068	0 57 24.2617			
09/07/2028	2462021.5	23 06 23.8624	22.8636	0.9988	0 53 28.3522			
09/08/2028	2462022.5	23 10 20.4114	19.4190	0.9924	0 49 32.4427			
09/09/2028	2462023.5	23 14 16.9627	15.9744	0.9883	0 45 36.5332			
09/10/2028	2462024.5	23 18 13.5167	12.5297	0.9870	0 41 40.6238			
09/11/2028	2462025.5	23 22 10.0734	9.0851	0.9882	0 37 44.7143			
09/12/2028	2462026.5	23 26 06.6322	5.6405	0.9917	0 33 48.8048			
09/13/2028	2462027.5	23 30 03.1924	2.1959	0.9965	0 29 52.8954			
09/14/2028	2462028.5	23 33 59.7524	58.7512	1.0012	0 25 56.9859			
09/15/2028	2462029.5	23 37 56.3107	55.3066	1.0041	0 22 01.0764			
09/16/2028	2462030.5	23 41 52.8658	51.8620	1.0038	0 18 05.1670			
09/17/2028	2462031.5	23 45 49.4170	48.4173	0.9996	0 14 09.2575			
09/18/2028	2462032.5	23 49 45.9647	44.9727	0.9920	0 10 13.3480			
09/19/2028	2462033.5	23 53 42.5106	41.5281	0.9825	0 06 17.4385			
09/20/2028	2462034.5	23 57 39.0572	38.0834	0.9737	0 02 21.5291			
09/21/2028	2462035.5	0 01 35.6064	34.6388	0.9676	23 58 25.6196			
09/22/2028	2462036.5	0 05 32.1595	31.1942	0.9653	23 50 33.8007			
09/23/2028	2462037.5	0 09 28.7161	27.7495	0.9666	23 46 37.8912			
09/24/2028	2462038.5	0 13 25.2751	24.3049	0.9702	23 42 41.9817			

Universal and Greenwich Sidereal Times

Date 0h UT1	Julian Date	-- SIDEREAL TIME --				E of E s	UT1 at GMST 0h		
		Apparent		Mean s	h		m	s	
		h	m s						
09/25/2028	2462039.5	0 17	21.8349	20.8603	0.9747	23 38	46.0723		
09/26/2028	2462040.5	0 21	18.3942	17.4156	0.9786	23 34	50.1628		
09/27/2028	2462041.5	0 25	14.9518	13.9710	0.9808	23 30	54.2533		
09/28/2028	2462042.5	0 29	11.5069	10.5264	0.9806	23 26	58.3438		
09/29/2028	2462043.5	0 33	08.0595	7.0818	0.9777	23 23	02.4344		
09/30/2028	2462044.5	0 37	04.6095	3.6371	0.9724	23 19	06.5249		
10/01/2028	2462045.5	0 41	01.1575	0.1925	0.9650	23 15	10.6154		
10/02/2028	2462046.5	0 44	57.7041	56.7479	0.9563	23 11	14.7060		
10/03/2028	2462047.5	0 48	54.2504	53.3032	0.9472	23 07	18.7965		
10/04/2028	2462048.5	0 52	50.7973	49.8586	0.9387	23 03	22.8870		
10/05/2028	2462049.5	0 56	47.3458	46.4140	0.9318	22 59	26.9776		
10/06/2028	2462050.5	1 00	43.8964	42.9693	0.9271	22 55	31.0681		
10/07/2028	2462051.5	1 04	40.4497	39.5247	0.9250	22 51	35.1586		
10/08/2028	2462052.5	1 08	37.0058	36.0801	0.9257	22 47	39.2491		
10/09/2028	2462053.5	1 12	33.5641	32.6354	0.9286	22 43	43.3397		
10/10/2028	2462054.5	1 16	30.1238	29.1908	0.9330	22 39	47.4302		
10/11/2028	2462055.5	1 20	26.6838	25.7462	0.9376	22 35	51.5207		
10/12/2028	2462056.5	1 24	23.2426	22.3015	0.9411	22 31	55.6113		
10/13/2028	2462057.5	1 28	19.7990	18.8569	0.9420	22 27	59.7018		
10/14/2028	2462058.5	1 32	16.3519	15.4123	0.9396	22 24	03.7923		
10/15/2028	2462059.5	1 36	12.9015	11.9677	0.9339	22 20	07.8828		
10/16/2028	2462060.5	1 40	09.4488	8.5230	0.9257	22 16	11.9734		
10/17/2028	2462061.5	1 44	05.9956	5.0784	0.9172	22 12	16.0639		
10/18/2028	2462062.5	1 48	02.5444	1.6338	0.9107	22 08	20.1544		
10/19/2028	2462063.5	1 51	59.0968	58.1891	0.9077	22 04	24.2450		
10/20/2028	2462064.5	1 55	55.6533	54.7445	0.9088	22 00	28.3355		
10/21/2028	2462065.5	1 59	52.2131	51.2999	0.9132	21 56	32.4260		
10/22/2028	2462066.5	2 03	48.7746	47.8552	0.9193	21 52	36.5166		
10/23/2028	2462067.5	2 07	45.3360	44.4106	0.9254	21 48	40.6071		
10/24/2028	2462068.5	2 11	41.8960	40.9660	0.9300	21 44	44.6976		
10/25/2028	2462069.5	2 15	38.4536	37.5213	0.9323	21 40	48.7881		
10/26/2028	2462070.5	2 19	35.0086	34.0767	0.9319	21 36	52.8787		
10/27/2028	2462071.5	2 23	31.5609	30.6321	0.9288	21 32	56.9692		
10/28/2028	2462072.5	2 27	28.1111	27.1875	0.9236	21 29	01.0597		
10/29/2028	2462073.5	2 31	24.6598	23.7428	0.9170	21 25	05.1503		
10/30/2028	2462074.5	2 35	21.2080	20.2982	0.9098	21 21	09.2408		
10/31/2028	2462075.5	2 39	17.7566	16.8536	0.9030	21 17	13.3313		
11/01/2028	2462076.5	2 43	14.3065	13.4089	0.8976	21 13	17.4219		
11/02/2028	2462077.5	2 47	10.8586	9.9643	0.8943	21 09	21.5124		
11/03/2028	2462078.5	2 51	07.4134	6.5197	0.8937	21 05	25.6029		
11/04/2028	2462079.5	2 55	03.9710	3.0750	0.8959	21 01	29.6934		
11/05/2028	2462080.5	2 59	00.5311	59.6304	0.9007	20 57	33.7840		
11/06/2028	2462081.5	3 02	57.0928	56.1858	0.9070	20 53	37.8745		
11/07/2028	2462082.5	3 06	53.6549	52.7411	0.9138	20 49	41.9650		
11/08/2028	2462083.5	3 10	50.2162	49.2965	0.9197	20 45	46.0556		
11/09/2028	2462084.5	3 14	46.7752	45.8519	0.9234	20 41	50.1461		
11/10/2028	2462085.5	3 18	43.3312	42.4072	0.9240	20 37	54.2366		
11/11/2028	2462086.5	3 22	39.8840	38.9626	0.9214	20 33	58.3272		
11/12/2028	2462087.5	3 26	36.4343	35.5180	0.9164	20 30	02.4177		
11/13/2028	2462088.5	3 30	32.9837	32.0734	0.9103	20 26	06.5082		
11/14/2028	2462089.5	3 34	29.5340	28.6287	0.9053	20 22	10.5987		
11/15/2028	2462090.5	3 38	26.0873	25.1841	0.9032	20 18	14.6893		
11/16/2028	2462091.5	3 42	22.6445	21.7395	0.9051	20 14	18.7798		
11/17/2028	2462092.5	3 46	19.2056	18.2948	0.9108	20 10	22.8703		

Universal and Greenwich Sidereal Times

Date 0h UT1	Julian Date	-- SIDEREAL TIME --		E of E	UT1 at GMST 0h
		Apparent	Mean		
		h m s	s	s	h m s
11/18/2028	2462093.5	3 50 15.7693	14.8502	0.9191	20 06 26.9609
11/19/2028	2462094.5	3 54 12.3339	11.4056	0.9283	20 02 31.0514
11/20/2028	2462095.5	3 58 08.8976	7.9609	0.9366	19 58 35.1419
11/21/2028	2462096.5	4 02 05.4591	4.5163	0.9428	19 54 39.2325
11/22/2028	2462097.5	4 06 02.0178	1.0717	0.9461	19 50 43.3230
11/23/2028	2462098.5	4 09 58.5737	57.6270	0.9467	19 46 47.4135
11/24/2028	2462099.5	4 13 55.1272	54.1824	0.9448	19 42 51.5040
11/25/2028	2462100.5	4 17 51.6789	50.7378	0.9412	19 38 55.5946
11/26/2028	2462101.5	4 21 48.2298	47.2931	0.9367	19 34 59.6851
11/27/2028	2462102.5	4 25 44.7808	43.8485	0.9323	19 31 03.7756
11/28/2028	2462103.5	4 29 41.3329	40.4039	0.9290	19 27 07.8662
11/29/2028	2462104.5	4 33 37.8868	36.9593	0.9276	19 23 11.9567
11/30/2028	2462105.5	4 37 34.4434	33.5146	0.9288	19 19 16.0472
12/01/2028	2462106.5	4 41 31.0028	30.0700	0.9328	19 15 20.1378
12/02/2028	2462107.5	4 45 27.5649	26.6254	0.9396	19 11 24.2283
12/03/2028	2462108.5	4 49 24.1290	23.1807	0.9483	19 07 28.3188
12/04/2028	2462109.5	4 53 20.6939	19.7361	0.9578	19 03 32.4093
12/05/2028	2462110.5	4 57 17.2581	16.2915	0.9666	18 59 36.4999
12/06/2028	2462111.5	5 01 13.8202	12.8468	0.9733	18 55 40.5904
12/07/2028	2462112.5	5 05 10.3791	9.4022	0.9769	18 51 44.6809
12/08/2028	2462113.5	5 09 06.9348	5.9576	0.9772	18 47 48.7715
12/09/2028	2462114.5	5 13 03.4877	2.5129	0.9748	18 43 52.8620
12/10/2028	2462115.5	5 17 00.0393	59.0683	0.9710	18 39 56.9525
12/11/2028	2462116.5	5 20 56.5913	55.6237	0.9676	18 36 01.0431
12/12/2028	2462117.5	5 24 53.1455	52.1790	0.9664	18 32 05.1336
12/13/2028	2462118.5	5 28 49.7031	48.7344	0.9686	18 28 09.2241
12/14/2028	2462119.5	5 32 46.2644	45.2898	0.9746	18 24 13.3146
12/15/2028	2462120.5	5 36 42.8288	41.8452	0.9836	18 20 17.4052
12/16/2028	2462121.5	5 40 39.3948	38.4005	0.9942	18 16 21.4957
12/17/2028	2462122.5	5 44 35.9606	34.9559	1.0047	18 12 25.5862
12/18/2028	2462123.5	5 48 32.5248	31.5113	1.0136	18 08 29.6768
12/19/2028	2462124.5	5 52 29.0863	28.0666	1.0197	18 04 33.7673
12/20/2028	2462125.5	5 56 25.6448	24.6220	1.0228	18 00 37.8578
12/21/2028	2462126.5	6 00 22.2005	21.1774	1.0232	17 56 41.9484
12/22/2028	2462127.5	6 04 18.7541	17.7327	1.0213	17 52 46.0389
12/23/2028	2462128.5	6 08 15.3063	14.2881	1.0182	17 48 50.1294
12/24/2028	2462129.5	6 12 11.8583	10.8435	1.0148	17 44 54.2199
12/25/2028	2462130.5	6 16 08.4109	7.3988	1.0121	17 40 58.3105
12/26/2028	2462131.5	6 20 04.9651	3.9542	1.0109	17 37 02.4010
12/27/2028	2462132.5	6 24 01.5215	0.5096	1.0119	17 33 06.4915
12/28/2028	2462133.5	6 27 58.0807	57.0650	1.0157	17 29 10.5821
12/29/2028	2462134.5	6 31 54.6426	53.6203	1.0222	17 25 14.6726
12/30/2028	2462135.5	6 35 51.2068	50.1757	1.0311	17 21 18.7631
12/31/2028	2462136.5	6 39 47.7723	46.7311	1.0412	17 17 22.8537
01/01/2029	2462137.5	6 43 44.3376	43.2864	1.0512	17 13 26.9442

NOTES

GAST is the apparent sidereal time on the Greenwich meridian.
 GMST is the mean sidereal time on the Greenwich meridian.
 "E of E" is the Equation of Equinoxes (in SI seconds) = GAST - GMST.
 The last column is the time (UT1) when Greenwich Mean Sidereal Time (GMST) is zero.

Deriving UT1 and UTC from TT

The table below lists DUT1 and DUTC for the first of each month in the year 2028.

For a given date and time in TT, locate the line in the table below nearest to that date, and subtract DUT1 to get UT1, or subtract DUTC to get UTC. The data below are expressed in SI seconds. Times thus obtained should be accurate to within 0.2 seconds.

Date	DUT1	DUTC
01/01/2028	69.018	69.184
02/01/2028	69.015	69.184
03/01/2028	69.012	69.184
04/01/2028	69.008	69.184
05/01/2028	69.005	69.184
06/01/2028	69.002	69.184
07/01/2028	68.998	69.184
08/01/2028	68.994	69.184
09/01/2028	68.991	69.184
10/01/2028	68.989	69.184
11/01/2028	68.988	69.184
12/01/2028	68.987	69.184
01/01/2029	68.984	69.184

Percent illumination versus phase angle.

Phase	%Illum.	Phase
0.00000	100.0	360.00000
5.00000	99.8	355.00000
10.00000	99.2	350.00000
15.00000	98.3	345.00000
20.00000	97.0	340.00000
25.00000	95.3	335.00000
30.00000	93.3	330.00000
35.00000	91.0	325.00000
36.86990	90.0	323.13010
40.00000	88.3	320.00000
45.00000	85.4	315.00000
45.57300	85.0	314.42700
50.00000	82.1	310.00000
53.13010	80.0	306.86990
55.00000	78.7	305.00000
60.00000	75.0	300.00000
65.00000	71.1	295.00000
66.42182	70.0	293.57818
70.00000	67.1	290.00000
72.54240	65.0	287.45760
75.00000	62.9	285.00000
78.46304	60.0	281.53696
80.00000	58.7	280.00000
84.26083	55.0	275.73917
85.00000	54.4	275.00000
90.00000	50.0	270.00000
95.00000	45.6	265.00000
95.73917	45.0	264.26083
100.00000	41.3	260.00000
101.53696	40.0	258.46304
105.00000	37.1	255.00000
107.45760	35.0	252.54240
110.00000	32.9	250.00000
113.57818	30.0	246.42182
115.00000	28.9	245.00000
120.00000	25.0	240.00000
125.00000	21.3	235.00000
126.86990	20.0	233.13010
130.00000	17.9	230.00000
134.42700	15.0	225.57300
135.00000	14.6	225.00000
140.00000	11.7	220.00000
143.13010	10.0	216.86990
145.00000	9.0	215.00000
150.00000	6.7	210.00000
154.15807	5.0	205.84193
155.00000	4.7	205.00000
160.00000	3.0	200.00000
165.00000	1.7	195.00000
168.52166	1.0	191.47834
169.11252	0.9	190.88748
170.00000	0.8	190.00000
170.40136	0.7	189.59864
171.11488	0.6	188.88512
171.89039	0.5	188.10961
172.74775	0.4	187.25225
173.72042	0.3	186.27958
175.00000	0.2	185.00000
176.37569	0.1	183.62431
180.00000	0.0	180.00000

NOTES

In general, all dates and times listed here are in Terrestrial Time (TT). But, in all cases, the time scale (TT, TTB, UT1, GAST, or GMST) is shown. The calculations involving positions and velocities of solar system bodies are based on JPL's DE440 digital ephemeris, using Barycentric Dynamical Time (TDB) with appropriate conversion from TT.

The relationships between TT, UT1, and UTC times TT are:

$$\text{UTC} = \text{TT} - \text{DUTC}$$

$$\text{UT1} = \text{TT} - \text{DUT1}$$

The value used for DUTC at the start of 2028 was 69.184 seconds, with corresponding values for DUT1 throughout the year, but this has no effect on any of the tables where the date and time are in TT. For the table of transit times where the time scale is UT1, any errors in predicted values of DUT1 have only a minor effect on the transit times expressed in UT1. For the table of Sidereal Times versus UT1, for practical purposes UT1 is defined by GAST and TT is at most a minor factor.

For the tables titled "Apparent Data", the listed distances are the apparent distances taking into account the time needed for light travel between object centers. Data are titled "True" when they pertain exactly to the listed date and time, and the time for light to travel is not a factor. It follows, therefore, that "True" values for distant objects would require adjustment when used for actual observations.

The visual diameter of an object has been calculated using the equatorial diameter of the object and the apparent distance of the object.

For the Moon, the listed parallax is based on the apparent distance, not the "true" distance.

For the planets and the moon, the model is that light leaves the Sun at time t_1 , arrives at the object at time t_2 , is reflected toward the Earth at time t_2 , and arrives at the Earth at time t_3 . The Solar Distance, therefore, is $c(t_2-t_1)$ where c is the speed of light, and the Earth Distance is $c(t_3-t_2)$. The sizes of the Sun, object, and Earth were not factored into the calculations for phase angles or magnitudes.

The phase angle, unless noted otherwise, is rigorously calculated as the angular difference at time t_2 between the line from the object to the Sun (as the Sun was at time t_1), and from the object at time t_2 to the Earth where it would be at time t_3 . The tabulated time is time t_3 when an Earth-bound observer sees the object as it was when illuminated at time t_2 .

Also, note that it has been traditional to calculate the phase angle of a planet or the moon based on ecliptic longitudes of the Sun, and of the object. This is legitimate only when the object is very close to the Earth's ecliptic plane - a rare occasion. The calculations employed here are based on the actual Sun-object-Earth angle in order to calculate the phase angle and percent of apparent illumination. However, the effect of close proximity to the Sun has not been taken into account.

For the planets, the precise times when the angle between the apparent position of Sun and the apparent position of the planet is maximal are listed after the daily data.

These tables were created on 2025-OCT-18 20:45:21 UTC.
ephemerides.py (version 2.5)