

Polynomial Coefficients for ΔT and length of day (lod)
for years -720 to 2019 : Version 2020

Row	Years		Polynomial Coefficients			
	K_i	K_{i+1}	a_0	a_1	a_2	a_3
1	-720.0	-100.0	20371.848	-9999.586	776.247	409.160
2	-100.0	400.0	11557.668	-5822.270	1303.151	-503.433
3	400.0	1000.0	6535.116	-5671.519	-298.291	1085.087
4	1000.0	1150.0	1650.393	-753.210	184.811	-25.346
5	1150.0	1300.0	1056.647	-459.628	108.771	-24.641
6	1300.0	1500.0	681.149	-421.345	61.953	-29.414
7	1500.0	1600.0	292.343	-192.841	-6.572	16.197
8	1600.0	1650.0	109.127	-78.697	10.505	3.018
9	1650.0	1720.0	43.952	-68.089	38.333	-2.127
10	1720.0	1800.0	12.068	2.507	41.731	-37.939
11	1800.0	1810.0	18.367	-3.481	-1.126	1.918
12	1810.0	1820.0	15.678	0.021	4.629	-3.812
13	1820.0	1830.0	16.516	-2.157	-6.806	3.250
14	1830.0	1840.0	10.804	-6.018	2.944	-0.096
15	1840.0	1850.0	7.634	-0.416	2.658	-0.539
16	1850.0	1855.0	9.338	1.642	0.261	-0.883
17	1855.0	1860.0	10.357	-0.486	-2.389	1.558
18	1860.0	1865.0	9.040	-0.591	2.284	-2.477
19	1865.0	1870.0	8.255	-3.456	-5.148	2.720
20	1870.0	1875.0	2.371	-5.593	3.011	-0.914
21	1875.0	1880.0	-1.126	-2.314	0.269	-0.039
22	1880.0	1885.0	-3.210	-1.893	0.152	0.563
23	1885.0	1890.0	-4.388	0.101	1.842	-1.438
24	1890.0	1895.0	-3.884	-0.531	-2.474	1.871
25	1895.0	1900.0	-5.017	0.134	3.138	-0.232
26	1900.0	1905.0	-1.977	5.715	2.443	-1.257
27	1905.0	1910.0	4.923	6.828	-1.329	0.720
28	1910.0	1915.0	11.142	6.330	0.831	-0.825
29	1915.0	1920.0	17.479	5.518	-1.643	0.262
30	1920.0	1925.0	21.617	3.020	-0.856	0.008
31	1925.0	1930.0	23.789	1.333	-0.831	0.127
32	1930.0	1935.0	24.418	0.052	-0.449	0.142
33	1935.0	1940.0	24.164	-0.419	-0.022	0.702
34	1940.0	1945.0	24.426	1.645	2.086	-1.106
35	1945.0	1950.0	27.050	2.499	-1.232	0.614
36	1950.0	1953.0	28.932	1.127	0.220	-0.277
37	1953.0	1956.0	30.002	0.737	-0.610	0.631
38	1956.0	1959.0	30.760	1.409	1.282	-0.799
39	1959.0	1962.0	32.652	1.577	-1.115	0.507
40	1962.0	1965.0	33.621	0.868	0.406	0.199
41	1965.0	1968.0	35.093	2.275	1.002	-0.414
42	1968.0	1971.0	37.956	3.035	-0.242	0.202
43	1971.0	1974.0	40.951	3.157	0.364	-0.229
44	1974.0	1977.0	44.244	3.199	-0.323	0.172
45	1977.0	1980.0	47.291	3.069	0.193	-0.192
46	1980.0	1983.0	50.361	2.878	-0.384	0.081
47	1983.0	1986.0	52.936	2.354	-0.140	-0.165
48	1986.0	1989.0	54.984	1.577	-0.637	0.448
49	1989.0	1992.0	56.373	1.648	0.708	-0.276
50	1992.0	1995.0	58.453	2.235	-0.121	0.110

continued ...

Row	Years		Polynomial Coefficients			
	i	K_i	K_{i+1}	a_0	a_1	a_2
51	1995.0	1998.0	60.678	2.324	0.210	-0.313
52	1998.0	2001.0	62.898	1.804	-0.729	0.109
53	2001.0	2004.0	64.083	0.674	-0.402	0.199
54	2004.0	2007.0	64.553	0.466	0.194	-0.017
55	2007.0	2010.0	65.197	0.804	0.144	-0.084
56	2010.0	2013.0	66.061	0.839	-0.109	0.128
57	2013.0	2016.0	66.920	1.007	0.277	-0.095
58	2016.0	2019.0	68.109	1.277	-0.007	-0.139

The above table of polynomial coefficients enables evaluation of ΔT in seconds (s) and its derivative (the length of day lod) in milliseconds (ms) for any epoch between -720 and 2019 . It is not valid outside the specified range of years.

For the year and fraction Y , extract the coefficients a_0, a_1, a_2, a_3 from row i of the table, where $K_i \leq Y \leq K_{i+1}$, and then calculate

$$\Delta T = a_0 + a_1 t + a_2 t^2 + a_3 t^3 \quad \text{s}$$

$$\text{lod} = (a_1 + 2a_2 t + 3a_3 t^2) / (K_{i+1} - K_i) / 0.36525 \quad \text{ms}$$

where

$$t = \frac{Y - K_i}{K_{i+1} - K_i} \quad \text{and thus} \quad 0 \leq t < 1$$

These coefficients reproduce the spline approximation discussed by L.V. Morrison, F.R. Stephenson, C.Y. Hohenkerk and M. Zawilski, in their paper entitled *Addendum 2020 to 'Measurement of the Earth's Rotation: 720 BC to AD 2015'* published in the Royal Society Proceedings A, **478**, 2021, see <http://dx.doi.org/10.1098/rspa.2020.0776>

All the data is available from the website of HM Nautical Almanac Office at <http://astro.ukho.gov.uk/nao/lvm/>.

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