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BUREAU INTERNATIONAL DES POIDS ET MESURES

Circular T 78 (1994 July 27)

1 - Coordinated Universal Time UTC. Computed values of UTC-UTC(k) (1).

(From 1993 July 1, 0h UTC, to 1994 July 1, 0h UTC, TAI-UTC = 28 s)
(From 1994 July 1, 0h UTC, until further notice, TAI-UTC = 29 s)

Date 1994 0h UTC	May 27	Jun 6	Jun 16	Jun 26
MJD	49499	49509	49519	49529
Laboratory k	UTC-UTC(k) (Unit = 1 microsecond)			
AOS (Borowiec)	-1.095	-0.810	-0.703	-0.892
APL (Laurel)	1.203	1.315	1.327	1.266
AUS (Canberra)	0.296	0.305	0.245	0.246
BEV (Wien)	-	-	-	-
CAO (Cagliari)	-0.289	-0.501	-0.733	-0.950
CH (Bern)	1.381	1.297	1.151	1.010
CRL (Tokyo)	1.926	1.894	1.860	1.832
CSAO (Lintong)	-0.369	-0.175	-0.178	-0.180
CSIR (Pretoria)	-2.926	-2.958	-2.903	-2.862
FTZ (Darmstadt)	0.295	0.298	0.306	0.299
GUM (Warszawa)	0.085	-0.032	-0.072	-0.095
IEN (Torino)	0.335	0.361	0.434	0.501
IFAG (Wettzell)	0.010	0.248	0.487	0.825
IGMA (Buenos Aires)	-3.02	-2.98	-2.96	-2.96
INPL (Jerusalem)	-1.587	-1.560	-1.463	-1.305
JATC (Lintong)	0.991	1.163	1.011	0.879
KRIS (Taejon)	-0.192	-0.171	-0.179	-0.162
LDS (Leeds)	-0.403	-0.410	-0.436	-0.450
MSL (Lower Hutt)	-0.501	-0.552	-0.701	-0.692
NAOM (Mizusawa)	-1.599	-1.613	-1.631	-1.642
NAOT (Tokyo)	-1.827	-2.084	-2.371	-2.629
NIM (Beijing)	7.96	8.11	8.18	8.33
NIST (Boulder)	-0.109	-0.109	-0.116	-0.104
NMC (Sofiya)	-	-	-	-
NPL (Teddington)	0.086	0.079	0.069	0.063
NPLI (New-Delhi)	-2.940	-2.817	-	-2.628
NRC (Ottawa)	5.873	5.966	6.062	6.153
NRLM (Tsukuba) (2)	-11.410	-13.953	-13.795	-13.628
OMH (Budapest)	6.585	6.553	6.511	6.513
ONBA (Buenos Aires)	5.50	5.23	5.03	4.59
ONRJ (Rio de Janeiro)	-	-	-17.719	-18.158
OP (Paris)	0.007	0.012	0.008	0.004
ORB (Bruxelles)	-1.862	-1.841	-1.857	-1.948
PTB (Braunschweig)	2.735	2.722	2.714	2.708
RC (Habana)	-	-	-	-
ROA (San Fernando)	2.553	2.510	2.496	2.514
SCL (Hong Kong)	1.006	0.976	0.889	0.694
SNT (Stockholm)	0.083	0.084	0.062	0.076
SO (Shanghai)	2.13	2.16	2.16	2.13
SU (Moskva)	-3.884	-3.971	-4.058	-4.141
TL (Chung-Li)	-2.703	-2.626	-2.557	-2.472
TP (Praha)	-1.069	-1.053	-1.047	-1.023
TUG (Graz)	-3.994	-3.895	-3.825	-3.737
USNO (Washington DC)(USNO MC)	0.063	0.060	0.054	0.055
VSL (Delft)	0.216	0.174	0.202	0.243

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2 - International Atomic Time TAI and local atomic time scales TA(k).

The following table gives the computed values of TAI-TA(k) (1).

Date 1994 0h UTC		May 27	Jun 6	Jun 16	Jun 26
MJD		49499	49509	49519	49529
Laboratory k		TAI-TA(k) (Unit = 1 microsecond)			
APL (Laurel)		2.666	2.778	2.790	2.729
AUS (Canberra)		-51.835	-51.975	-52.187	-52.391
CH (Bern)		-74.299	-74.123	-74.009	-73.890
CRL (Tokyo)		39.208	39.640	40.063	40.483
CSAO (Lintong)		14.322	14.386	14.254	14.122
F (Paris)		130.111	130.495	130.874	131.242
INPL (Jerusalem)		-206.632	-208.663	-210.650	-212.601
JATC (Lintong)		12.324	12.665	12.857	12.995
KRIS (Taejon)		-2.142	-1.931	-1.779	-1.592
NIM (Beijing)		-8.44	-8.26	-8.17	-8.00
NISA (Boulder)	(3)	-45113.624	-45114.029	-45114.446	-45114.844
NRC (Ottawa)		21.942	22.035	22.131	22.222
PTB (Braunschweig)		-360.665	-360.678	-360.686	-360.692
RC (Habana)		-	-	-	-
SO (Shanghai)		-45.46	-45.47	-45.46	-45.49
SU (Moskva)	(4)	27246.116	27246.029	27245.942	27245.859
USNO (Washington DC)	(5)	-34699.894	-34700.567	-34701.245	-34701.914

3 - Notes on sections 1 and 2.

(1) Values UTC-UTC(k) and TAI-TA(k) are published within 1 ns except for laboratories which are not linked through GPS common views.

(2) NRLM. Change of master clock on MJD = 49503

(3) NIST. TA(NISA) designates the scale AT1 of NIST.

(4) SU . Listed values are TAI-TA(SU) - 2.80 seconds.

(5) USNO. TA(USNO) designates the scale A1(MEAN) of USNO.

4 - [UTC - GPS time] and [TAI - GPS time].

[UTC - GPS time] = -9 s + C0 (until 1994 July 1, 0h UTC)
[UTC - GPS time] = -10 s + C0 (from 1994 July 1, 0h UTC)
[TAI - GPS time] = 19 s + C0.

Daily values of C0 are given in the following table. They are obtained as follows: the GPS data taken at the Paris Observatory, for highest elevation, are first corrected for precise satellite ephemerides and for measured ionospheric delays, and then smoothed to obtain daily values of [UTC(OP) - GPS time] at 0h UTC; daily values of C0 are derived from them using linear interpolation of [UTC - UTC(OP)].

For a given day, where N measurements are used for estimation of C0 :
- the dispersion of individual measurements is characterized by a standard deviation σ,
- the daily C0 value is characterized by the standard deviation of the mean $\sigma/\sqrt{N}$.

Date 1994 0h UTC	MJD	C0 (ns)	σ (ns)	$\sigma/\sqrt{N}$ (ns)
May 27	49499	74	26	8
May 28	49500	79	23	6
May 29	49501	87	57	17
May 30	49502	94	42	13
May 31	49503	93	33	10
Jun 1	49504	91	34	11
Jun 2	49505	91	41	12
Jun 3	49506	95	36	10
Jun 4	49507	97	48	13
Jun 5	49508	99	54	16
Jun 6	49509	101	56	16
Jun 7	49510	101	32	9
Jun 8	49511	101	37	10
Jun 9	49512	106	34	9
Jun 10	49513	110	34	10
Jun 11	49514	109	36	10
Jun 12	49515	99	53	14
Jun 13	49516	86	36	10
Jun 14	49517	78	36	9
Jun 15	49518	74	36	9
Jun 16	49519	73	32	8
Jun 17	49520	73	37	10
Jun 18	49521	74	44	12
Jun 19	49522	74	29	8
Jun 20	49523	69	31	10
Jun 21	49524	68	33	9
Jun 22	49525	67	36	10
Jun 23	49526	67	36	10
Jun 24	49527	65	38	10
Jun 25	49528	60	58	16
Jun 26	49529	60	22	6

5 - [UTC - GLONASS time].

[UTC - GLONASS time] = C1 (modulo 1 s).

From his current observations of both the GPS and GLONASS satellite systems Prof. P. Daly, University of Leeds, establishes and reports [GPS time - GLONASS time] at ten-day intervals, together with the standard deviation σ of his daily GLONASS data. C1 is then derived using [UTC - GPS time] of section 4.

Date 1994 0h UTC	MJD	C1 (μs)	σ (μs)
May 27	49499	-17.46	0.04
Jun 6	49509	-17.36	0.07
Jun 16	49519	-17.24	0.04
Jun 26	49529	-17.14	0.03

6 - Difference between the normalized frequencies of EAL and TAI.

Interval of validity		f(EAL)-f(TAI)
1993 Apr. 22 - 1994 Jun. 26	49099-49529	7.40×10^{-13}

7 - Duration of the TAI scale interval.

The following table gives the departure D of the duration of the TAI scale interval from the SI second on the rotating geoid as realized by a given primary standard occasionally evaluated or continuously operating as a clock. In the later case the chosen two-month period of observation is also indicated. The last communicated estimate of the inaccuracy of the standard provides the uncertainty σ of the D value.

D and σ are expressed in units of 10^{-14} second.

Standard	Obs. period	D	σ
PTB-CS1	49469-49529	-0.4	3.0
PTB-CS2	49469-49529	+1.2	1.5

The estimate of the duration of the TAI scale interval, computed by the BIPM, from all the available measurements of the TAI frequency, obtained by comparison with primary frequency standards continuously observed or occasionally evaluated (CRL, LPTF, NIST, NRC, PTB, SU), is:

$$1 + 1 \times 10^{-14} \pm 2 \times 10^{-14}$$

in SI second on the rotating geoid, for the two-month interval 49469-49529 .