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BUREAU INTERNATIONAL DES POIDS ET MESURES

Circular T 76 (1994 May 25)

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	Mar 28	Apr 7	Apr 17	Apr 27
MJD	49439	49449	49459	49469
Laboratory k	UTC-UTC(k) (Unit = 1 microsecond)			
AOS (Borowiec)	-1.153	-1.377	-1.520	-1.701
APL (Laurel)	1.249	1.181	1.126	1.061
AUS (Canberra)	0.498	0.476	0.447	0.408
BEV (Wien)	-	-	-	-
CAO (Cagliari)	-6.872	-7.066	-7.233	-7.483
CH (Bern)	1.929	1.921	1.826	1.693
CRL (Tokyo)	2.053	2.024	2.010	2.025
CSAO (Lintong)	-0.477	-0.452	-0.407	-0.402
CSIR (Pretoria)	-3.061	-2.924	-2.865	-2.826
FTZ (Darmstadt)	0.040	0.092	0.161	0.228
IEN (Torino)	0.065	0.103	0.131	0.177
IFAG (Wettzell)	-0.598	-0.575	-0.569	-0.522
IGMA (Buenos Aires)	-3.14	-3.14	-3.13	-3.15
INPL (Jerusalem)	-1.135	-1.280	-1.398	-1.474
JATC (Lintong)	-1.891	-1.283	-0.397	0.365
KRIS (Taejon)	-0.276	-0.289	-0.264	-0.251
LDS (Leeds)	-0.282	-0.281	-0.323	-0.356
MSL (Lower Hutt)	-0.434	-0.431	-0.388	-0.346
NAOM (Mizusawa)	-1.436	-1.477	-1.513	-1.539
NAOT (Tokyo)	-0.661	-0.876	-1.035	-1.262
NIM (Beijing)	7.78	7.81	7.78	7.80
NIST (Boulder)	-0.051	-0.068	-0.086	-0.094
NMC (Sofiya)	-	-	-	-
NPL (Teddington)	0.119	0.116	0.114	0.113
NPLI (New-Delhi) (2)	-3.12	-3.22	-	-3.18
NRC (Ottawa)	5.265	5.367	5.468	5.567
NRLM (Tsukuba)	-9.641	-9.937	-10.233	-10.521
OMH (Budapest)	6.489	6.510	6.502	6.559
ONBA (Buenos Aires)	5.65	5.57	5.70	5.48
ONRJ (Rio de Janeiro)	-13.877	-	-	-
OP (Paris)	-0.047	-0.029	-0.010	0.005
ORB (Bruxelles)	-1.673	-1.712	-1.666	-1.755
PKNM (Warszawa)	0.454	0.373	0.241	0.212
PTB (Braunschweig)	2.748	2.753	2.754	2.772
RC (Habana) (3)	-2.36	-3.00	-3.08	-2.80
ROA (San Fernando)	2.615	2.610	2.632	2.637
SCL (Hong Kong)	0.034	0.107	0.177	0.424
SNT (Stockholm)	0.065	0.085	0.086	0.067
SO (Shanghai)	2.14	-	2.16	1.78
SU (Moskva)	-3.375	-3.461	-3.548	-3.624
TL (Chung-Li)	-3.106	-3.049	-2.985	-2.914
TP (Praha)	-1.147	-1.135	-1.098	-1.069
TUG (Graz)	4.481	4.564	4.643	4.739
USNO (Washington DC)(USNO MC)	0.045	0.051	0.051	0.057
VSL (Delft)	0.094	0.132	0.166	0.174

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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		Mar 28	Apr 7	Apr 17	Apr 27
MJD		49439	49449	49459	49469
Laboratory k		TAI-TA(k) (Unit = 1 microsecond)			
APL (Laurel)		2.712	2.644	2.589	2.524
AUS (Canberra)		-50.849	-51.020	-51.106	-51.273
CH (Bern)		-75.231	-75.059	-74.894	-74.767
CRL (Tokyo)		36.656	37.065	37.496	37.948
CSAO (Lintong)		14.992	14.887	14.803	14.678
F (Paris)		127.851	128.227	128.604	128.987
INPL (Jerusalem)		-	-196.410	-198.459	-200.492
JATC (Lintong)		9.415	10.044	10.708	11.488
KRIS (Taejon)		-3.486	-3.279	-3.054	-2.811
NIM (Beijing)		-8.73	-8.68	-8.70	-8.66
NISA (Boulder)	(4)	-45111.238	-45111.631	-45112.029	-45112.417
NRC (Ottawa)		21.334	21.436	21.537	21.636
PTB (Braunschweig)		-360.652	-360.647	-360.646	-360.628
RC (Habana)	(3)(5)	-325.85	-326.53	-326.66	-326.42
SO (Shanghai)		-45.43	-	-45.40	-45.81
SU (Moskva)	(6)	27246.625	27246.539	27246.452	27246.376
USNO (Washington DC)	(7)	-34695.858	-34696.529	-34697.211	-34697.880

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) NPLI.

MJD	UTC-UTC(NPLI)
49419	-3.29
49429	-3.03

(3) RC .

MJD	UTC-UTC(RC)	TAI-TA(RC) - 18 s
49419	-2.78	-326.18
49429	-2.54	-325.99

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

(5) RC . Listed values are TAI-TA(RC) - 18 seconds.

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

(7) 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)
Mar 28	49439	61	51	12
Mar 29	49440	61	31	7
Mar 30	49441	60	42	10
Mar 31	49442	63	40	10
Apr 1	49443	70	44	11
Apr 2	49444	73	41	10
Apr 3	49445	73	39	10
Apr 4	49446	75	42	11
Apr 5	49447	80	53	13
Apr 6	49448	81	40	10
Apr 7	49449	80	37	10
Apr 8	49450	83	48	12
Apr 9	49451	91	33	9
Apr 10	49452	101	46	11
Apr 11	49453	104	28	7
Apr 12	49454	96	34	9
Apr 13	49455	92	42	11
Apr 14	49456	96	35	9
Apr 15	49457	97	29	7
Apr 16	49458	97	38	9
Apr 17	49459	97	32	8
Apr 18	49460	90	39	10
Apr 19	49461	81	20	5
Apr 20	49462	76	42	10
Apr 21	49463	75	45	11
Apr 22	49464	75	43	11
Apr 23	49465	72	47	11
Apr 24	49466	70	50	12
Apr 25	49467	75	48	11
Apr 26	49468	79	43	11
Apr 27	49469	73	42	10

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)
Mar 28	49439	-18.12	0.04
Apr 7	49449	-18.03	0.04
Apr 17	49459	-17.90	0.04
Apr 27	49469	-17.81	0.04

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

Interval of validity		f(EAL)-f(TAI)
1993 Apr. 22 - 1994 Apr. 27	49099-49469	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	49409-49469	-0.2	3.0
PTB-CS2	49409-49469	-0.4	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 49409-49469 .