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BUREAU INTERNATIONAL DES POIDS ET MESURES

Circular T 79 (1994 August 24)

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		Jun 26	Jul 6	Jul 16	Jul 26
MJD		49529	49539	49549	49559
Laboratory k		UTC-UTC(k) (Unit = 1 microsecond)			
AOS (Borowiec)		-0.892	-1.483	-1.617	-1.484
APL (Laurel)		1.266	1.203	1.154	1.171
AUS (Canberra)		0.246	0.223	0.233	0.204
BEV (Wien)		-	-	-	-
CAO (Cagliari)		-0.950	-1.216	-1.042	-1.373
CH (Bern)		1.010	0.864	0.744	0.604
CRL (Tokyo)		1.832	1.789	1.772	1.752
CSAO (Lintong)		-0.180	-0.251	-0.292	-0.328
CSIR (Pretoria)	(2)	-2.862	-3.700	-3.967	-4.229
FTZ (Darmstadt)		0.299	0.278	0.243	0.226
GUM (Warszawa)		-0.095	0.427	0.943	0.962
IEN (Torino)		0.501	0.563	0.666	0.738
IFAG (Wettzell)		0.825	1.363	1.871	2.369
IGMA (Buenos Aires)		-2.96	-3.01	-3.04	-3.07
INPL (Jerusalem)		-1.305	-1.130	-0.953	-0.725
JATC (Lintong)		0.879	0.457	0.025	-0.222
KRIS (Taejon)		-0.162	-0.170	-0.188	-0.191
LDS (Leeds)		-0.450	-0.466	-0.458	-0.489
MSL (Lower Hutt)		-0.692	-0.792	-1.014	-1.093
NAOM (Mizusawa)		-1.642	-1.652	-1.665	-1.656
NAOT (Tokyo)		-2.629	-2.868	-2.731	-2.541
NIM (Beijing)		8.33	8.37	8.45	8.70
NIST (Boulder)		-0.104	-0.085	-0.065	-0.040
NMC (Sofiya)		-	-	-	-
NPL (Teddington)		0.063	0.050	0.040	0.030
NPLI (New-Delhi)		-2.628	-	-	-
NRC (Ottawa)		6.153	6.307	6.295	6.229
NRLM (Tsukuba)		-13.628	-13.463	-13.305	-13.129
OMH (Budapest)		6.513	6.577	6.617	6.609
ONBA (Buenos Aires)		4.59	3.85	3.16	2.68
ONRJ (Rio de Janeiro)		-18.158	-	-	-
OP (Paris)		0.004	0.002	-0.012	-0.018
ORB (Bruxelles)	(3)	-1.948	-0.204	-0.175	-0.198
PTB (Braunschweig)		2.708	2.698	2.688	2.677
RC (Habana)		-	-	-	-
ROA (San Fernando)		2.514	2.483	2.412	2.345
SCL (Hong Kong)		0.694	0.497	0.226	0.035
SNT (Stockholm)		0.076	0.110	0.138	0.100
SO (Shanghai)		2.13	2.11	2.07	2.07
SU (Moskva)		-4.141	-4.227	-4.317	-4.404
TL (Chung-Li)		-2.472	-2.400	-2.350	-2.276
TP (Praha)		-1.023	-0.996	-0.991	-0.981
TUG (Graz)		-3.737	-3.647	-3.566	-3.479
USNO (Washington DC)	(USNO MC)	0.055	0.047	0.036	0.039
VSL (Delft)		0.243	0.317	0.341	0.394

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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		Jun 26	Jul 6	Jul 16	Jul 26
MJD		49529	49539	49549	49559
Laboratory k		TAI-TA(k) (Unit = 1 microsecond)			
APL (Laurel)		2.729	2.666	2.617	2.634
AUS (Canberra)		-52.391	-52.554	-52.717	-52.994
CH (Bern)		-73.890	-73.776	-73.636	-73.516
CRL (Tokyo)		40.483	40.903	41.323	41.756
CSAO (Lintong)		14.122	13.921	13.751	13.585
F (Paris)		131.242	131.627	132.000	132.355
INPL (Jerusalem)		-212.601	-214.562	-216.547	-218.506
JATC (Lintong)		12.995	13.137	13.323	13.512
KRIS (Taejon)		-1.592	-1.440	-1.318	-1.161
NIM (Beijing)		-8.00	-7.94	-7.85	-7.58
NISA (Boulder)	(4)	-45114.844	-45115.240	-45115.640	-45116.035
NRC (Ottawa)		22.222	22.299	22.394	22.501
PTB (Braunschweig)		-360.692	-360.702	-360.712	-360.723
RC (Habana)		-	-	-	-
SO (Shanghai)		-45.49	-45.51	-45.55	-45.53
SU (Moskva)	(5)	27245.859	27245.773	27245.683	27245.596
USNO (Washington DC)	(6)	-34701.914	-34702.586	-34703.260	-34703.928

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) CSIR. Change of GPS time receiver on MJD = 49537.59

(3) ORB . Change of master clok on MJD = 49538 and time step of UTC(ORB) of - 2.0 μs on MJD = 49538.35

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

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

(6) 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)
Jun 26	49529	60	22	6
Jun 27	49530	60	36	10
Jun 28	49531	56	33	9
Jun 29	49532	51	27	9
Jun 30	49533	52	57	20
Jul 1	49534	52	32	9
Jul 2	49535	53	40	11
Jul 3	49536	47	34	9
Jul 4	49537	45	48	13
Jul 5	49538	49	46	12
Jul 6	49539	56	40	10
Jul 7	49540	60	27	8
Jul 8	49541	57	38	11
Jul 9	49542	58	30	8
Jul 10	49543	65	23	7
Jul 11	49544	71	32	8
Jul 12	49545	72	26	7
Jul 13	49546	70	45	13
Jul 14	49547	71	44	12
Jul 15	49548	72	42	12
Jul 16	49549	77	33	9
Jul 17	49550	77	45	12
Jul 18	49551	73	40	11
Jul 19	49552	69	32	9
Jul 20	49553	70	35	10
Jul 21	49554	67	34	10
Jul 22	49555	56	42	17
Jul 23	49556	49	36	12
Jul 24	49557	51	36	11
Jul 25	49558	60	43	16
Jul 26	49559	58	50	22

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)
Jun 26	49529	-17.14	0.03
Jul 6	49539	-17.04	0.03
Jul 16	49549	-16.91	0.03
Jul 26	49559	-16.84	0.07

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

Interval of validity		f(EAL)-f(TAI)
1993 Apr. 22 - 1994 Jul. 26	49099-49559	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	49499-49559	+1.4	3.0
PTB-CS2	49499-49559	+1.1	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 49499-49559 .