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BUREAU INTERNATIONAL DES POIDS ET MESURES

Circular T 84 (1995 January 24)

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

(From 1994 July 1, 0hUTC, TAI-UTC = 29 s)

Date 1994 0h UTC	Nov 23	Dec 3	Dec 13	Dec 23
MJD	49679	49689	49699	49709
Laboratory k	UTC-UTC(k) (Unit = 1 microsecond)			
AOS (Borowiec)	-1.175	-1.086	-1.012	-1.066
APL (Laurel)	0.752	0.785	0.798	0.805
AUS (Canberra)	-0.428	-0.496	-0.484	-0.468
BEV (Wien)	-18.41	-	-	-
CAO (Cagliari)	-4.313	-4.486	-4.750	-4.986
CH (Bern)	-0.095	-0.067	-0.021	0.025
CRL (Tokyo)	1.467	1.443	1.411	1.382
CSAO (Lintong)	-0.461	-0.473	-0.423	-0.338
CSIR (Pretoria)	-2.658	-2.528	-2.432	-2.245
FTZ (Darmstadt)	0.090	0.075	0.058	0.059
GUM (Warszawa)	1.294	0.812	0.208	-0.401
IEN (Torino)	0.596	0.592	0.587	0.580
IFAG (Wettzell)	-2.883	-3.502	-3.957	-4.671
IGMA (Buenos Aires)	-2.30	-2.46	-2.66	-2.67
INPL (Jerusalem)	-0.010	-0.179	-0.436	-0.661
JATC (Lintong)	0.210	0.301	0.381	0.463
KRIS (Taejon)	-0.104	-0.090	-0.069	-0.051
LDS (Leeds)	-0.689	-0.701	-0.733	-0.725
MSL (Lower Hutt)	-2.592	-2.669	-2.761	-2.821
NAOM (Mizusawa)	-1.715	-1.748	-1.758	-1.790
NAOT (Tokyo)	-1.775	-1.668	-1.569	-1.436
NIM (Beijing)	7.30	7.32	7.32	7.38
NIST (Boulder)	-0.065	-0.074	-0.080	-0.091
NMC (Sofiya)	-	-	-	-
NPL (Teddington)	-0.027	-0.014	-0.008	0.000
NPLI (New-Delhi)	-	-	-	-
NRC (Ottawa)	5.263	5.183	5.103	5.002
NRLM (Tsukuba)	-11.188	-11.033	-10.870	-10.716
OMH (Budapest)	7.520	7.587	7.800	8.011
ONBA (Buenos Aires)	1.03	1.35	1.88	2.38
ONRJ (Rio de Janeiro)	-20.725	-20.368	-19.942	-19.436
OP (Paris)	-0.090	-0.099	-0.099	-0.104
ORB (Bruxelles)	-0.325	-0.283	-0.261	-0.231
PTB (Braunschweig)	2.566	2.565	2.574	2.575
RC (Habana) (2)	-0.33	-	-	-
ROA (San Fernando)	2.123	2.187	2.219	2.211
SCL (Hong Kong)	-0.582	-0.295	0.072	0.126
SNT (Stockholm)	-0.015	-0.016	-0.041	-0.090
SO (Shanghai)	2.05	2.07	2.08	2.07
SU (Moskva)	-5.516	-5.613	-5.704	-5.798
TL (Chung-Li)	-1.405	-1.319	-1.250	-1.201
TP (Praha)	-0.824	-0.808	-0.806	-0.780
TUG (Graz)	-2.255	-2.141	-2.016	-1.917
UME (Gebze-Kocaeli)	-2.338	-2.406	-2.469	-2.526
USNO (Washington DC)(USNO MC)	0.008	0.015	0.019	0.019
VSL (Delft)	0.727	0.865	0.902	1.006

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		Nov 23	Dec 3	Dec 13	Dec 23
MJD		49679	49689	49699	49709
Laboratory k		TAI-TA(k) (Unit = 1 microsecond)			
APL (Laurel)		2.215	2.248	2.261	2.268
AUS (Canberra)		-55.973	-56.309	-56.532	-56.785
CH (Bern)		-71.845	-71.707	-71.551	-71.395
CRL (Tokyo)		46.938	47.358	47.769	48.182
CSAO (Lintong)		11.633	11.491	11.411	11.367
F (Paris)		136.583	136.933	137.293	137.648
INPL (Jerusalem)		-243.010	-245.183	-247.430	-249.633
JATC (Lintong)		13.969	13.989	13.967	13.980
KRIS (Taejon)		0.566	0.620	0.701	0.789
NIM (Beijing)		-8.73	-8.69	-8.67	-8.60
NISA (Boulder)	(3)	-45121.131	-45121.562	-45121.998	-45122.439
NRC (Ottawa)		23.607	23.701	23.796	23.866
PTB (Braunschweig)		-360.834	-360.835	-360.826	-360.825
RC (Habana)	(2)(4)	-324.55	-	-	-
SO (Shanghai)		-45.58	-45.54	-45.51	-45.51
SU (Moskva)	(5)	27244.484	27244.387	27244.296	27244.202
USNO (Washington DC)	(6)	-34711.999	-34712.666	-34713.336	-34714.006

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) RC .

MJD	UTC-UTC(RC)	TAI-TA(RC) - 18 s
49659	-0.36	-324.66
49669	-0.50	-324.76

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

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

(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] = -10 s + C0, [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)
Nov 23	49679	22	36	7
Nov 24	49680	29	35	8
Nov 25	49681	35	38	8
Nov 26	49682	35	38	8
Nov 27	49683	33	44	9
Nov 28	49684	34	47	10
Nov 29	49685	37	35	7
Nov 30	49686	39	33	7
Dec 1	49687	36	41	9
Dec 2	49688	31	38	8
Dec 3	49689	32	39	8
Dec 4	49690	38	41	9
Dec 5	49691	38	39	8
Dec 6	49692	32	33	7
Dec 7	49693	24	43	9
Dec 8	49694	19	45	10
Dec 9	49695	20	50	11
Dec 10	49696	24	55	12
Dec 11	49697	28	32	7
Dec 12	49698	29	44	9
Dec 13	49699	34	42	9
Dec 14	49700	38	36	8
Dec 15	49701	30	34	12
Dec 16	49702	29	42	11
Dec 17	49703	28	32	7
Dec 18	49704	29	42	9
Dec 19	49705	35	35	7
Dec 20	49706	41	43	10
Dec 21	49707	46	36	8
Dec 22	49708	56	44	9
Dec 23	49709	74	42	9

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)
Nov 23	49679	-15.65	0.04
Dec 3	49689	-15.61	0.04
Dec 13	49699	-15.60	0.04
Dec 23	49709	-15.56	0.03

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

Interval of validity		f(EAL)-f(TAI)
1993 Apr. 22 - 1994 Dec 23	49099-49709	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	49649-49709	-1.0	3.0
PTB-CS2	49649-49709	+0.2	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:

$$1 - 0.7 \times 10^{-14} \pm 2.0 \times 10^{-14}$$

in SI second on the rotating geoid, for the two-month interval 49649-49709 .

* The frequencies of the primary frequency standards Cs1 from CRL, JPO from LPTF, and NIST-7 from NIST, are corrected for the black body radiation shift.