BIPM ISSN 1143-1393

BUREAU INTERNATIONAL DES POIDS ET MESURES

Circular T 83 (1994 December 22)

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	Oct 24	Nov 3	Nov 13	Nov 23
MJD	49649	49659	49669	49679
Laboratory k	UTC-UTC(k) (Unit = 1 microsecond)			
AOS (Borowiec)	-1.470	-1.443	-1.342	-1.174
APL (Laurel)	0.759	0.759	0.763	0.753
AUS (Canberra)	-0.226	-0.287	-0.373	-0.427
BEV (Wien)	-17.34	-17.63	-18.03	-18.41
CAO (Cagliari)	-3.515	-3.773	-4.045	-4.312
CH (Bern)	-0.117	-0.110	-0.116	-0.094
CRL (Tokyo)	1.539	1.513	1.487	1.468
CSAO (Lintong)	-0.456	-0.458	-0.437	-0.460
CSIR (Pretoria)	-2.816	-2.781	-2.702	-2.657
FTZ (Darmstadt)	0.105	0.072	0.093	0.091
GUM (Warszawa)	1.002	1.321	1.577	1.295
IEN (Torino)	0.587	0.594	0.600	0.597
IFAG (Wettzell)	-1.383	-1.877	-2.364	-2.882
IGMA (Buenos Aires)	-2.78	-2.63	-2.39	-2.30
INPL (Jerusalem)	0.282	0.230	0.123	-0.009
JATC (Lintong)	0.036	0.043	0.121	0.211
KRIS (Taejon)	-0.151	-0.159	-0.143	-0.103
LDS (Leeds)	-0.612	-0.633	-0.677	-0.688
MSL (Lower Hutt)	-2.428	-2.457	-2.486	-2.591
NAOM (Mizusawa)	-1.678	-1.698	-1.700	-1.714
NAOT (Tokyo)	-2.014	-1.928	-1.846	-1.774
NIM (Beijing)	-	7.27	7.28	7.30
NIST (Boulder)	-0.041	-0.051	-0.056	-0.064
NMC (Sofiya)	-	-	-	-
NPL (Teddington)	-0.043	-0.037	-0.029	-0.026
NPLI (New-Delhi)	-	-	-	-
NRC (Ottawa)	5.514	5.417	5.331	5.264
NRLM (Tsukuba)	-11.666	-11.510	-11.348	-11.187
OMH (Budapest)	6.891	7.125	7.340	7.521
ONBA (Buenos Aires)	0.53	0.32	0.70	1.03
ONRJ (Rio de Janeiro)	-21.409	-21.319	-21.049	-20.724
OP (Paris)	-0.065	-0.083	-0.087	-0.089
ORB (Bruxelles)	-0.219	-0.287	-0.307	-0.324
PTB (Braunschweig)	2.588	2.577	2.573	2.567
RC (Habana)	-0.25	-	-	-
ROA (San Fernando)	2.057	2.101	2.107	2.124
SCL (Hong Kong)	-0.671	-0.832	-0.863	-0.581
SNT (Stockholm)	0.084	0.034	-0.016	-0.014
SO (Shanghai)	2.06	2.06	2.04	2.05
SU (Moskva)	-5.230	-5.328	-5.420	-5.515
TL (Chung-Li)	-1.624	-1.560	-1.478	-1.404
TP (Praha)	-0.862	-0.857	-0.826	-0.823
TUG (Graz)	-2.595	-2.480	-2.363	-2.254
UME (Gebze-Kocaeli)	-2.134	-2.207	-2.269	-2.337
USNO (Washington DC)(USNO MC)	-0.005	-0.002	0.006	0.009
VSL (Delft)	0.685	0.692	0.701	0.728

PAVILLON DE BRETEUIL F - 92312 SÈVRES CEDEX

TÉL. (CENTRAL) : + 33 1 45 07 70 70 TELEX : BIPM 631351 F TÉLÉCOPIE : + 33 1 45 34 20 21

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		Oct 24	Nov 3	Nov 13	Nov 23
MJD		49649	49659	49669	49679
Laboratory k		TAI-TA(k) (Unit = 1 microsecond)			
APL (Laurel)		2.222	2.222	2.226	2.216
AUS (Canberra)		-55.222	-55.433	-55.739	-55.972
CH (Bern)		-72.293	-72.136	-71.992	-71.844
CRL (Tokyo)		45.668	46.090	46.514	46.939
CSAO (Lintong)		12.027	11.895	11.786	11.634
F (Paris)		135.523	135.869	136.226	136.584
INPL (Jerusalem)		-236.553	-238.686	-240.848	-243.009
JATC (Lintong)		13.786	13.826	13.916	13.970
KRIS (Taejon)		0.229	0.241	0.397	0.567
NIM (Beijing)		-	-8.80	-8.78	-8.73
NISA (Boulder)	(2)	-45119.847	-45120.277	-45120.702	-45121.130
NRC (Ottawa)		23.340	23.416	23.502	23.608
PTB (Braunschweig)		-360.812	-360.823	-360.827	-360.833
RC (Habana)	(3)	-324.58	-	-	-
SO (Shanghai)		-45.63	-45.59	-45.59	-45.58
SU (Moskva)	(4)	27244.770	27244.672	27244.580	27244.485
USNO (Washington DC)	(5)	-34709.987	-34710.660	-34711.327	-34711.998

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

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

(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] = -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)
Oct 24	49649	15	35	7
Oct 25	49650	15	52	11
Oct 26	49651	20	52	11
Oct 27	49652	24	40	9
Oct 28	49653	23	45	9
Oct 29	49654	21	53	11
Oct 30	49655	21	46	10
Oct 31	49656	22	43	9
Nov 1	49657	22	43	9
Nov 2	49658	20	49	10
Nov 3	49659	20	37	8
Nov 4	49660	20	52	11
Nov 5	49661	18	38	8
Nov 6	49662	20	45	10
Nov 7	49663	20	42	9
Nov 8	49664	19	42	9
Nov 9	49665	14	26	5
Nov 10	49666	13	54	12
Nov 11	49667	17	42	9
Nov 12	49668	17	40	8
Nov 13	49669	13	45	9
Nov 14	49670	9	35	8
Nov 15	49671	11	39	8
Nov 16	49672	14	34	7
Nov 17	49673	13	36	8
Nov 18	49674	12	34	7
Nov 19	49675	19	30	6
Nov 20	49676	25	50	11
Nov 21	49677	25	42	9
Nov 22	49678	22	60	13
Nov 23	49679	24	36	7

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)
Oct 24	49649	-15.97	0.04
Nov 3	49659	-15.89	0.03
Nov 13	49669	-15.75	0.03
Nov 23	49679	-15.65	0.04

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

Interval of validity		f(EAL)-f(TAI)
1993 Apr. 22 - 1994 Nov. 23	49099-49679	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	49619-49679	-1.3	3.0
PTB-CS2	49619-49679	+0.7	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:

$$1 - 0.3 \times 10^{-14} \pm 2.0 \times 10^{-14}$$

in SI second on the rotating geoid, for the two-month interval 49619-49679 .

* 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.