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Circular T 71 (1993 December 22)

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

(From 1993 July 1, 0hUTC, TAI-UTC = 28 s)

Date 1993 0hUTC	Oct 29	Nov 8	Nov 18	Nov 28
MJD	49289	49299	49309	49319
Laboratory k	UTC-UTC(k) (Unit = 1 microsecond)			
AOS (Borowiec)	-1.146	-1.136	-1.241	-1.138
APL (Laurel)	0.831	0.908	0.990	0.992
AUS (Canberra)	-0.036	-0.021	0.011	0.016
BEV (Wien)	-13.21	-14.37	-15.46	-16.41
CAO (Cagliari)	-3.573	-3.808	-4.050	-4.240
CH (Bern)	0.645	0.725	0.805	0.836
CRL (Tokyo)	2.651	2.607	2.545	2.462
CSAO (Lintong)	-0.764	-0.660	-0.808	-0.781
CSIR (Pretoria)	-3.535	-3.549	-3.515	-3.513
FTZ (Darmstadt)	0.809	0.697	0.575	0.459
IEN (Torino)	-0.133	-0.100	-0.097	-0.092
IFAG (Wettzell)	4.795	4.565	4.369	4.023
IGMA (Buenos Aires)	-0.74	-0.75	-0.76	-0.78
INPL (Jerusalem)	0.206	0.061	-0.065	-0.208
JATC (Lintong)	-1.223	-1.565	-1.913	-2.329
KRIS (Taejon)	0.270	0.351	0.053	-0.051
LDS (Leeds)	0.119	0.105	0.052	0.140
MSL (Lower Hutt)	-1.035	-0.985	-1.179	-
NAOM (Mizusawa)	-1.612	-1.526	-1.480	-1.434
NAOT (Tokyo)	-5.130	-5.257	-5.390	-4.551
NIM (Beijing)	7.37	7.30	7.22	7.55
NIST (Boulder)	-0.122	-0.101	-0.060	-0.050
NMC (Sofiya)	-	-	-	-
NPL (Teddington)	0.060	0.062	0.073	0.065
NPLI (New-Delhi)	-	-4.455	-4.357	-4.257
NRC (Ottawa)	3.786	3.893	4.002	4.118
NRLM (Tsukuba)	-5.306	-5.577	-5.845	-6.145
OMH (Budapest)	4.791	4.968	5.101	5.184
ONBA (Buenos Aires)	-	1.41	1.72	1.99
ONRJ (Rio de Janeiro)	-8.866	-9.013	-9.155	-9.451
OP (Paris)	-0.276	-0.251	-0.226	-0.210
ORB (Bruxelles)	-1.493	-1.528	-1.532	-1.477
PKNM (Warszawa)	-0.187	-0.371	-0.215	-0.126
PTB (Braunschweig)	2.752	2.744	2.754	2.734
RC (Habana)	-	-	-3.15	-3.22
ROA (San Fernando)	2.586	2.588	2.485	2.428
SCL (Hong Kong)	-0.357	-0.487	-0.607	-
SNT (Stockholm)	0.346	0.193	0.037	0.089
SO (Shanghai)	2.03	-	-	-
SU (Moskva)	-2.031	-2.120	-2.204	-2.310
TL (Chung-Li)	-2.362	-2.256	-2.142	-1.972
TP (Praha)	-1.536	-1.596	-1.521	-1.505
TUG (Graz)	3.415	3.497	3.581	3.641
USNO (Washington DC)(USNO MC)	-0.036	-0.021	0.011	0.016
VSL (Delft)	0.566	0.147	-0.123	-0.183

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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 1993 0hUTC		Oct 29	Nov 8	Nov 18	Nov 28
MJD		49289	49299	49309	49319
Laboratory k		TAI-TA(k) (Unit = 1 microsecond)			
APL (Laurel)		2.294	2.371	2.453	2.455
AUS (Canberra)		-48.537	-48.726	-48.877	-49.081
CH (Bern)		-76.475	-76.435	-76.395	-76.404
CRL (Tokyo)		30.576	30.977	31.355	31.716
CSAO (Lintong)		17.181	17.112	16.791	16.645
F (Paris)		122.105	122.495	122.884	123.254
INPL (Jerusalem)		-166.583	-168.346	-170.111	-171.914
JATC (Lintong)		9.370	9.397	9.105	8.794
KRIS (Taejon)		-6.030	-5.889	-5.817	-5.571
NIM (Beijing)		-9.40	-9.46	-9.52	-9.18
NISA (Boulder)	(2)	-45105.539	-45105.915	-45106.274	-45106.664
NRC (Ottawa)		19.855	19.962	20.071	20.187
PTB (Braunschweig)		-360.648	-360.656	-360.646	-360.666
RC (Habana)	(3)	-	-	-325.67	-326.00
SO (Shanghai)		-45.55	-	-	-
SU (Moskva)	(4)	27247.969	27247.880	27247.796	27247.690
USNO (Washington DC)	(5)	-34685.663	-34686.349	-34687.016	-34687.711

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) 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 = -9 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, from Block I only, are first corrected for the precise satellite ephemerides and for the measured ionospheric delays, and then smoothed to obtain daily values of UTC(OP) - GPS time at 0hUTC; daily values of C0 are derived from them using linear interpolation of UTC - UTC(OP).

This procedure also allows the computation of daily standard deviations obtained from Block I and Block II data from Paris Observatory according to the International GPS Common-View Schedule. They are given in the following table in order to show the quality of the dissemination of GPS time from Block I and Block II satellites.

Date 1993 0hUTC	MJD	C0 (ns)	SD(ns) Block I	SD(ns) Block II
Oct 29	49289	-10	7	40
Oct 30	49290	-12	8	41
Oct 31	49291	-12	4	47
Nov 1	49292	-8	9	47
Nov 2	49293	-5	8	60
Nov 3	49294	-4	2	38
Nov 4	49295	-3	8	44
Nov 5	49296	2	3	31
Nov 6	49297	10	6	40
Nov 7	49298	19	7	45
Nov 8	49299	24	3	30
Nov 9	49300	26	5	52
Nov 10	49301	25	4	25
Nov 11	49302	26	4	42
Nov 12	49303	28	5	31
Nov 13	49304	32	6	42
Nov 14	49305	34	4	44
Nov 15	49306	36	5	60
Nov 16	49307	34	2	36
Nov 17	49308	32	1	42
Nov 18	49309	32	1	21
Nov 19	49310	33	2	26
Nov 20	49311	33	2	37
Nov 21	49312	33	1	41
Nov 22	49313	34	5	42
Nov 23	49314	38	3	37
Nov 24	49315	45	9	43
Nov 25	49316	50	6	41
Nov 26	49317	51	3	47
Nov 27	49318	49	5	32
Nov 28	49319	50	5	45

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 SD of his daily GLONASS data. C1 is then derived using UTC - GPS time of section 4.

Date 1993 0hUTC	MJD	C1 (μs)	SD (μs)
Oct 29	49289	-16.79	0.04
Nov 8	49299	-17.08	0.04
Nov 18	49309	-17.43	0.03
Nov 28	49319	-17.84	0.04

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

Interval of validity		f(EAL)-f(TAI)
1993 Apr. 22 - 1993 Nov. 28	49099-49319	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	49259-49319	+0.6	3.0
PTB-CS2	49259-49319	+0.8	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 49259-49319 .