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BIPM

BUREAU INTERNATIONAL DES POIDS ET MESURES

Circular T 59 (1992 December 21)

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

(Since 1992 July 1, 0hUTC, TAI-UTC=27s)

Date 1992 0hUTC		Oct 24	Nov 3	Nov 13	Nov 23
MJD		48919	48929	48939	48949
Laboratory k		UTC-UTC(k) (Unit = 1 microsecond)			
AOS (Borowiec)		1.29	1.50	1.37	1.34
APL (Laurel)		-0.36	-0.30	-0.35	-0.29
AUS (Canberra)		-0.06	-0.04	-0.04	-0.01
BEV (Wien)	(1)	-9.48	9.45	8.26	7.05
CAO (Cagliari)		-24.20	-24.59	-24.97	-25.27
CH (Bern)		-0.08	-0.07	-0.10	-0.11
CRL (Tokyo)		2.32	2.33	2.33	2.36
CSAO (Lintong)		-0.51	-0.52	-0.47	-0.46
DPT (Pretoria)		-20.04	-19.78	-19.51	-19.33
FTZ (Darmstadt)		-	-	-	-
IEN (Torino)		-0.02	0.01	0.02	0.06
IFAG (Wettzell)		3.61	3.59	3.58	3.53
IGMA (Buenos Aires)		-1.61	-1.59	-1.60	-1.58
INPL (Jerusalem)		-0.69	-0.63	-0.59	-0.53
JATC (Lintong)		-0.52	-0.65	-0.77	-0.96
KRIS (Taejon)		-	-0.10	-0.13	-0.08
LDS (Leeds)	(2)	3.73	7.42	5.98	4.78
MSL (Lower Hutt)		-3.72	-3.69	-3.82	-3.79
NAOM (Mizusawa)		-1.25	-1.00	-0.80	-0.55
NAOT (Tokyo)		0.05	-0.05	-0.17	-0.27
NIM (Beijing)		7.34	7.94	-	-
NIST (Boulder)		-0.29	-0.31	-0.32	-0.31
NMC (Sofiya)		-1.61	-	-	1.82
NPL (Teddington)		0.01	0.04	0.06	0.10
NPLI (New-Delhi)	(3)	-8.45	-8.32	-8.42	-8.51
NRC (Ottawa)		-0.54	-0.37	-0.22	-0.06
NRLM (Tsukuba)		-7.93	-8.50	-9.09	-9.64
OMH (Budapest)		-	-	-	-
ONBA (Buenos Aires)		-66.31	-67.07	-68.21	-69.40
ONRJ (Rio de Janeiro)		-1.01	-0.50	-0.81	-1.17
OP (Paris)		-0.68	-0.70	-0.77	-0.78
ORB (Bruxelles)		0.15	0.12	0.04	0.04
PKNM (Warszawa)		1.12	0.91	0.70	0.50
PTB (Braunschweig)		2.83	2.83	2.82	2.83
RC (Habana)	(4)	-3.73	-3.62	-3.88	-3.67
ROA (San Fernando)		3.41	3.45	3.49	3.55
SCL (Wan Chai)		-16.35	-17.83	-19.32	-20.85
SNT (Stockholm)		-0.32	-0.42	-0.42	-0.31
SO (Shanghai)		1.67	1.64	1.74	1.66
SU (Moskva)		1.40	1.30	1.20	1.11
TL (Chung-Li)		0.89	0.90	0.78	0.71
TP (Praha)		-0.62	-0.68	-0.77	-0.81
TUG (Graz)		3.35	3.66	3.95	4.28
USNO (Washington DC)(USNO MC)		-0.06	-0.04	-0.04	-0.01
VSL (Delft)		0.02	-0.09	-0.17	-0.29

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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).

Date 1992 0hUTC		Oct 24	Nov 3	Nov 13	Nov 23
MJD		48919	48929	48939	48949
Laboratory k		TAI-TA(k) (Unit = 1 microsecond)			
APL (Laurel)		1.10	1.17	1.11	1.17
AUS (Canberra)		-43.05	-43.20	-43.25	-43.40
CH (Bern)		-74.37	-74.45	-74.56	-74.66
CRL (Tokyo)		16.85	17.17	17.50	17.85
CSAO (Lintong)		21.23	21.18	21.14	21.05
F (Paris)		107.96	108.33	108.70	109.10
INPL (Jerusalem)		-	-	-106.51	-108.10
JATC (Lintong)		4.06	4.19	4.32	4.34
KRIS (Taejon)		-	-0.47	-0.52	-0.51
NIM (Beijing)		-10.14	-9.51	-	-
NISA (Boulder)	(5)	-45092.03	-45092.40	-45092.78	-45093.13
NIST (Boulder)		-45199.92	-45200.55	-45201.18	-45201.79
NRC (Ottawa)		15.53	15.70	15.85	16.01
PTB (Braunschweig)		-360.56	-360.57	-360.58	-360.57
RC (Habana)	(4)(6)	-312.53	-313.15	-314.11	-314.72
SO (Shanghai)		-45.81	-45.82	-45.74	-45.84
SU (Moskva)		2827251.40	2827251.30	2827251.20	2827251.12
USNO (Washington DC)	(7)	-34660.52	-34661.19	-34661.86	-34662.53

3 - Notes on sections 1 and 2.

(1) BEV . Time step of UTC(BEV) of -20 μs on MJD = 48921.5

(2) LDS . Apparent time step of UTC(LDS) between MJD=48919 and MJD=48929.

(3) NPLI.

MJD	UTC-UTC(NPLI)
48899	40.64

(4) RC .

MJD	UTC-UTC(RC)	TAI-TA(RC) - 18s
48909	-3.44	-311.59

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

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

(7) TA(USNO) designates the scale A1(MEAN) of USNO.

4 - UTC - GPS time and TAI - GPS time.

UTC - GPS time = -8s + C0, TAI - GPS time = 19s + C0.

The GPS data are taken at the Paris Observatory, from Block I satellites, and are usually corrected for the measured ionospheric delays. They are smoothed to obtain daily values of UTC(OP) - GPS time at 0hUTC. UTC - GPS time is derived from them using linear interpolation of UTC - UTC(OP).

The r values are the residuals to the smoothed data for the middle of the 13-minute tracking period. The reference times are given for the first date of the table only. The r values are reported here only to show the quality of the synchronization.

UTC may be derived at any site from observation of any listed satellite, by interpolating C0 to the tracking time. The quality of the access to UTC mainly depends upon local conditions of observation.

			r(ns)	Block I		
Date 1992 0hUTC	MJD	C0 (ns)	PRN12 NAV10 0h24m	PRN 3 NAV11 4h 8m	PRN11 NAV 8 8h40m	PRN13 NAV 9 14h32m
Oct 24	48919	-53	-4	8	11	-3
Oct 25	48920	-58	-4	-7	-2	1
Oct 26	48921	-65	-8	3	1	-
Oct 27	48922	-67	-4	0	9	1
Oct 28	48923	-64	4	1	-10	-13
Oct 29	48924	-55	-	1	18	-
Oct 30	48925	-45	-9	1	4	10
Oct 31	48926	-43	-3	8	-9	3
Nov 1	48927	-44	5	0	4	-17
Nov 2	48928	-45	2	1	-1	-
Nov 3	48929	-43	-4	10	10	-7
Nov 4	48930	-49	0	5	5	-18
Nov 5	48931	-51	1	4	7	11
Nov 6	48932	-47	-7	4	10	-7
Nov 7	48933	-39	-7	2	-	-18
Nov 8	48934	-28	-2	4	7	7
Nov 9	48935	-22	0	12	2	-
Nov 10	48936	-31	-2	8	5	-19
Nov 11	48937	-44	-1	-7	-1	-4
Nov 12	48938	-47	2	4	0	5
Nov 13	48939	-43	-5	6	2	-11
Nov 14	48940	-34	-4	-	0	4
Nov 15	48941	-29	-9	3	0	-13
Nov 16	48942	-27	1	17	0	-
Nov 17	48943	-27	-1	1	0	-16
Nov 18	48944	-26	-2	-2	5	-4
Nov 19	48945	-20	-9	3	18	4
Nov 20	48946	-15	-2	-9	-6	-
Nov 21	48947	-4	-9	12	8	-5
Nov 22	48948	7	-8	3	1	-2
Nov 23	48949	17	-5	7	12	-20

Section 4 (Cont.)

For Block II satellites, the r values are computed with respect to C0 obtained from Block I only.

Date 1992 0hUTC	MJD	C0 (ns)	r(ns) Block II PRN24 NAV24 16h20m	PRN16 NAV16 18h12m	PRN19 NAV19 19h 0m	PRN 2 NAV13 21h56m	PRN20 NAV20 1h12m	PRN25 NAV25 3h 4m	PRN28 NAV28 6h16m
Oct 24	48919	-53	20	80	47	-10	-8	16	13
Oct 25	48920	-58	44	-7	43	16	8	25	-29
Oct 26	48921	-65	70	8	49	-8	-3	38	-10
Oct 27	48922	-67	-13	-13	-2	-20	4	52	-19
Oct 28	48923	-64	-6	22	-38	-9	4	-7	-100
Oct 29	48924	-55	-8	85	32	-40	-1	-11	-15
Oct 30	48925	-45	-28	57	-65	-48	8	-4	46
Oct 31	48926	-43	-4	19	52	-35	-2	27	32
Nov 1	48927	-44	20	-29	3	-	27	47	-62
Nov 2	48928	-45	-8	58	-31	60	15	-19	-105
Nov 3	48929	-43	58	-43	3	-60	26	56	-
Nov 4	48930	-49	68	17	-41	11	-4	11	164
Nov 5	48931	-51	-42	65	-24	-4	14	27	-21
Nov 6	48932	-47	-35	59	50	-7	-2	4	-52
Nov 7	48933	-39	92	73	60	-8	7	25	-5
Nov 8	48934	-28	62	-35	5	-9	20	69	-22
Nov 9	48935	-22	-2	-9	35	15	1	22	41
Nov 10	48936	-31	-31	-27	5	-40	-	-68	59
Nov 11	48937	-44	15	48	18	-37	2	-119	76
Nov 12	48938	-47	24	-24	-8	46	8	38	-63
Nov 13	48939	-43	90	-113	-3	-30	9	-	14
Nov 14	48940	-34	-17	-2	24	-58	25	-1	-68
Nov 15	48941	-29	21	40	-	21	5	48	-
Nov 16	48942	-27	-34	-66	-41	-44	11	-14	67
Nov 17	48943	-27	85	17	34	33	11	68	37
Nov 18	48944	-26	-30	47	-7	-8	-1	27	-58
Nov 19	48945	-20	-5	13	-45	-83	24	21	-9
Nov 20	48946	-15	-25	1	3	-26	-9	113	-49
Nov 21	48947	-4	-55	6	-8	22	-2	22	81
Nov 22	48948	7	-29	13	-25	-2	18	70	76
Nov 23	48949	17	-36	-54	-	2	-6	27	10

Section 4 (Cont.)

Date 1992 0hUTC	MJD	C0 (ns)	r(ns) PRN23 NAV23 6h48m	Block II PRN17 NAV17 7h36m	PRN21 NAV21 7h52m	PRN15 NAV15 9h44m	PRN14 NAV14 12h40m	PRN18 NAV18 15h36m
Oct 24	48919	-53	-39	28	31	-10	6	-14
Oct 25	48920	-58	55	76	-14	9	-25	-29
Oct 26	48921	-65	3	-136	129	-2	49	32
Oct 27	48922	-67	-28	60	69	-7	26	-10
Oct 28	48923	-64	62	-6	13	14	-72	-15
Oct 29	48924	-55	-24	-25	81	19	-43	30
Oct 30	48925	-45	-43	36	-29	20	-35	-72
Oct 31	48926	-43	24	21	30	42	3	38
Nov 1	48927	-44	44	39	-3	12	39	-8
Nov 2	48928	-45	57	-26	-10	31	2	33
Nov 3	48929	-43	-32	18	-79	-11	-61	-21
Nov 4	48930	-49	28	66	-85	6	-	53
Nov 5	48931	-51	74	28	-71	38	-18	3
Nov 6	48932	-47	57	-38	14	25	-79	16
Nov 7	48933	-39	14	88	-	-	-14	36
Nov 8	48934	-28	46	-125	-19	29	22	-31
Nov 9	48935	-22	105	-28	13	7	-40	14
Nov 10	48936	-31	84	-27	7	-13	36	29
Nov 11	48937	-44	53	-49	-102	81	60	-1
Nov 12	48938	-47	-27	-20	-8	-41	30	-10
Nov 13	48939	-43	57	19	112	-60	-26	11
Nov 14	48940	-34	35	39	-	-26	72	31
Nov 15	48941	-29	-52	61	67	59	21	-31
Nov 16	48942	-27	-56	18	-72	37	-17	-8
Nov 17	48943	-27	47	37	-5	-67	29	-
Nov 18	48944	-26	43	71	61	-35	49	42
Nov 19	48945	-20	-	-9	10	-12	-42	-63
Nov 20	48946	-15	26	62	-7	4	-63	-10
Nov 21	48947	-4	25	41	-70	-96	17	93
Nov 22	48948	7	-31	-33	32	44	-22	12
Nov 23	48949	17	15	-34	32	-25	20	66

5 - UTC - GLONASS time.

UTC - GLONASS time = C1 (modulo 1s).

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 1992 0hUTC	MJD	C1 (μs)	SD (μs)
Oct 24	48919	-11.85	0.07
Nov 3	48929	-12.11	0.05
Nov 13	48939	-12.23	0.06
Nov 23	48949	-12.45	0.05

6 - 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 s of the D value.

D and s are expressed in units of 10^{-14} second.

Standard	Obs. period	D	s
NRC-CsV	48889-48949	-16.9	10.0
PTB-CS1	48889-48949	+0.8	3.0
PTB-CS2	48889-48949	+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, NIST, NRC, PTB, SU), is:

$$1 + 1\times10^{-14} \pm 2\times10^{-14}$$

in SI second on the rotating geoid, for the two-month interval 48889-48949 .