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BIPM

BUREAU INTERNATIONAL DES POIDS ET MESURES

Circular T 49 (1992 February 28)

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

(Since 1991 January 1, 0hUTC, TAI-UTC=26s)

Date 1991/92 0hUTC		Dec 29	Jan 8	Jan 18	Jan 28
MJD		48619	48629	48639	48649
Laboratory k		UTC-UTC(k) (Unit = 1 microsecond)			
AOS (Borowiec)		-2.18	-1.50	-1.35	-1.81
APL (Laurel)		-1.01	-0.98	-0.93	-0.97
AUS (Canberra)		0.20	0.17	0.14	0.11
BEV (Wien)		1.22	0.33	-0.58	-1.54
CAO (Cagliari)	(1)	-1.61	-2.10	-0.78	-0.89
CH (Bern)		1.21	1.22	1.23	1.24
CRL (Tokyo)		2.50	2.50	2.50	2.49
CSAO (Lintong)		-2.64	-2.54	-2.46	-2.32
DPT (Pretoria)		-24.53	-24.49	-24.40	-24.30
FTZ (Darmstadt)		23.31	23.40	23.49	23.68
IEN (Torino)	(2)	-1.12	-1.07	-1.04	-0.82
IFAG (Wettzell)		1.39	1.43	1.41	1.31
IGMA (Buenos Aires)		-1.41	-1.43	-1.45	-1.50
INPL (Jerusalem)		-1.59	-1.74	-1.89	-2.04
JATC (Lintong)	(3)	-26.63	0.32	0.21	0.19
KRIS (Taejon)		0.41	0.21	0.06	-0.04
LDS (Leeds)		-	-	-20.66	-21.62
NAOM (Mizusawa)		-7.74	-7.57	-7.40	-7.20
NIM (Beijing)		8.04	7.93	7.93	7.87
NIST (Boulder)		-0.82	-0.76	-0.71	-0.65
NMC (Sofiya)		-0.91	0.10	0.08	0.55
NPL (Teddington)		-0.06	0.03	0.07	0.08
NPLI (New-Delhi)		15.50	17.19	18.03	18.84
NRC (Ottawa)		1.40	1.33	1.28	1.23
NRLM (Tsukuba)		-119.48	-126.54	-133.64	-140.92
OMH (Budapest)		-	-	-	-
ONRJ (Rio de Janeiro)		-	-	-	-
OP (Paris)		-0.68	-0.71	-0.77	-0.77
ORB (Bruxelles)		1.47	1.48	1.43	1.50
PEL (Lower Hutt)		-1.38	-1.34	-1.18	-1.12
PKNM (Warszawa)	(4)	-0.01	0.72	0.67	0.65
PTB (Braunschweig)		3.26	3.25	3.26	3.24
RC (Habana)		-2.58	-2.46	-2.55	-2.66
ROA (San Fernando)		4.77	4.67	4.59	4.48
SNT (Stockholm)		0.12	0.15	0.17	0.19
SO (Shanghai)		2.40	2.46	2.32	2.35
SU (Moskva)	(5)	4.39	4.35	4.27	4.18
TAO (Tokyo)		1.22	1.20	1.19	1.17
TL (Chung-Li)		2.11	1.94	1.80	1.70
TP (Praha)		-1.30	-1.36	-1.24	-1.15
TUG (Graz)		2.53	2.90	3.22	3.59
USNO (Washington DC)	(USNO MC)	0.20	0.17	0.14	0.11
VSL (Delft)		2.44	2.47	2.38	2.32
YUZM (Beograd)		-	-	-	-

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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).

Date 1991/92 OhUTC		Dec 29	Jan 8	Jan 18	Jan 28
MJD		48619	48629	48639	48649
Laboratory k		TAI-TA(k) (Unit = 1 microsecond)			
APL (Laurel)		-1.52	-1.49	-1.44	-1.48
AUS (Canberra)		-38.60	-38.81	-38.87	-39.02
CH (Bern)		-72.15	-72.21	-72.27	-72.33
CRL (Tokyo)		7.91	8.18	8.45	8.73
CSAO (Lintong)		23.00	22.91	22.78	22.72
F (Paris)		98.39	98.70	99.01	99.31
JATC (Lintong)		-0.19	-0.01	0.10	0.29
KRIS (Taejon)		-24.57	-25.16	-25.62	-26.11
NIM (Beijing)		-10.09	-10.18	-10.16	-10.21
NISA (Boulder)	(6)	-45081.26	-45081.60	-45081.96	-45082.31
NIST (Boulder)		-45180.46	-45181.12	-45181.80	-45182.47
NRC (Ottawa)		17.47	17.40	17.35	17.29
PTB (Braunschweig)		-360.14	-360.15	-360.14	-360.16
RC (Habana)	(7)	-297.85	-298.03	-298.45	-298.76
SO (Shanghai)		-45.03	-44.97	-45.11	-45.10
SU (Moskva)		2827254.39	2827254.35	2827254.27	2827254.18
USNO (Washington DC)	(8)	-34640.31	-34640.98	-34641.65	-34642.32

3 - Notes on sections 1 and 2.

(1) CAO . Time step of UTC-UTC(CAO) between MJD=48629 and MJD=48639 due to the introduction of GPS time link.

(2) IEN . Time step of UTC(IEN) of - 0.200 µs on MJD=48643.5

(3) JATC. Time step of UTC(JATC) of - 27 µs on MJD=48622.0

(4) PKNM. Time step of UTC-UTC(PKNM) between MJD=48619 and MJD=48629 due to the introduction of GPS time link.

(5) SU . Introduction of GPS time link on MJD=48629.

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

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

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

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

UTC - GPS time = -7s + 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 1991/92 0hUTC	MJD	C0 (ns)	PRN 3 NAV11 0h24m	PRN11 NAV 8 4h56m	PRN13 NAV 9 10h48m	PRN 6 NAV 3 16h24m	PRN12 NAV10 19h20m
Dec 29	48619	241	5	-9	2	2	-
Dec 30	48620	236	-4	0	-1	-4	14
Dec 31	48621	233	2	4	-	-10	5
Jan 1	48622	232	-1	-14	2	6	-
Jan 2	48623	231	-7	1	4	-6	-
Jan 3	48624	229	-	4	-	-	-
Jan 4	48625	222	-	14	-16	-	-
Jan 5	48626	216	-8	11	-	-	-
Jan 6	48627	215	3	-5	0	3	10
Jan 7	48628	215	8	0	-1	-6	-13
Jan 8	48629	214	10	9	-13	3	-
Jan 9	48630	209	-3	-2	-12	-3	14
Jan 10	48631	204	1	-17	5	5	2
Jan 11	48632	196	2	9	9	-8	-12
Jan 12	48633	187	16	-5	-3	2	-
Jan 13	48634	183	3	-13	-16	7	-
Jan 14	48635	183	-10	3	-7	7	19
Jan 15	48636	183	1	-1	-7	-2	-7
Jan 16	48637	182	1	2	2	1	-
Jan 17	48638	179	3	4	11	-2	-9
Jan 18	48639	170	3	-7	-5	18	-12
Jan 19	48640	164	-8	7	3	-3	-
Jan 20	48641	160	0	-8	0	-3	-
Jan 21	48642	163	2	-6	0	-8	14
Jan 22	48643	166	8	2	-5	-	11
Jan 23	48644	162	-6	0	-13	-8	-6
Jan 24	48645	155	2	-5	11	5	-
Jan 25	48646	154	6	-6	1	0	-
Jan 26	48647	156	-3	-20	-7	-7	18
Jan 27	48648	159	0	12	-5	-3	-
Jan 28	48649	153	-13	-2	10	-2	-3

Section 4 (Cont.)

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

			r(ns) Block II				
Date 1991/92 0hUTC	MJD	C0 (ns)	PRN23 NAV23 3h 4m	PRN17 NAV17 3h52m	PRN15 NAV15 6h 0m	PRN14 NAV14 8h56m	PRN18 NAV18 10h 0m
Dec 29	48619	241	-1	-79	17	11	-
Dec 30	48620	236	13	61	-28	-83	-35
Dec 31	48621	233	-14	34	-35	54	-5
Jan 1	48622	232	0	-64	-29	67	-
Jan 2	48623	231	-17	73	19	35	-22
Jan 3	48624	229	-28	107	54	-	-
Jan 4	48625	222	68	-39	-16	-5	19
Jan 5	48626	216	43	43	65	-	-
Jan 6	48627	215	0	108	28	-114	-81
Jan 7	48628	215	-69	27	-77	22	45
Jan 8	48629	214	-58	-64	31	-16	17
Jan 9	48630	209	-8	-	39	39	18
Jan 10	48631	204	-50	-18	-11	44	20
Jan 11	48632	196	24	-21	7	47	91
Jan 12	48633	187	46	-69	31	33	13
Jan 13	48634	183	44	49	-71	9	27
Jan 14	48635	183	-38	-53	34	18	-23
Jan 15	48636	183	12	-49	44	96	-63
Jan 16	48637	182	-67	33	84	94	33
Jan 17	48638	179	-12	59	-32	-	36
Jan 18	48639	170	-50	4	30	-24	-36
Jan 19	48640	164	4	3	-15	-5	55
Jan 20	48641	160	13	-30	28	-11	55
Jan 21	48642	163	73	-3	-38	-17	-34
Jan 22	48643	166	22	22	-	81	69
Jan 23	48644	162	-12	-38	18	-71	-34
Jan 24	48645	155	-10	-16	46	-92	-37
Jan 25	48646	154	4	-10	93	16	25
Jan 26	48647	156	99	-18	20	10	-17
Jan 27	48648	159	131	-32	-90	20	92
Jan 28	48649	153	42	18	-1	-56	-56

Section 4 (Cont.)

			r(ns) Block II				
Date 1991/92 0hUTC	MJD	C0 (ns)	PRN24 NAV24 12h24m	PRN19 NAV19 12h40m	PRN16 NAV16 14h48m	PRN 2 NAV13 18h16m	PRN20 NAV20 21h28m
Dec 29	48619	241	49	7	-1	-79	27
Dec 30	48620	236	-44	-10	-30	93	-28
Dec 31	48621	233	-49	-31	50	34	7
Jan 1	48622	232	5	-15	-65	-54	-37
Jan 2	48623	231	-17	-8	23	-54	7
Jan 3	48624	229	-	-	-	-	-
Jan 4	48625	222	-40	5	-	-	-
Jan 5	48626	216	-	-	-	-	-
Jan 6	48627	215	-3	-23	-29	58	13
Jan 7	48628	215	39	38	-23	122	-48
Jan 8	48629	214	29	25	-54	-11	11
Jan 9	48630	209	7	4	32	-1	-63
Jan 10	48631	204	-105	48	90	-34	-89
Jan 11	48632	196	-28	-49	51	-36	79
Jan 12	48633	187	-96	-50	-49	-12	-61
Jan 13	48634	183	-86	-	26	40	-78
Jan 14	48635	183	39	-58	11	5	-16
Jan 15	48636	183	67	35	-26	124	48
Jan 16	48637	182	-9	-35	-	-52	-20
Jan 17	48638	179	74	-81	3	78	-46
Jan 18	48639	170	-80	-65	24	-15	-33
Jan 19	48640	164	119	4	-41	82	-25
Jan 20	48641	160	7	-34	9	-82	78
Jan 21	48642	163	-14	42	10	12	-78
Jan 22	48643	166	-71	-95	7	21	44
Jan 23	48644	162	11	16	-53	35	-8
Jan 24	48645	155	-32	23	52	30	-12
Jan 25	48646	154	-28	-40	20	66	3
Jan 26	48647	156	42	8	13	-7	44
Jan 27	48648	159	-33	-91	-25	46	34
Jan 28	48649	153	7	-65	14	50	29

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 1991/92 0hUTC	MJD	C1 (μs)	SD (μs)
Dec 29	48619	-8.32	0.06
Jan 8	48629	-8.44	0.06
Jan 18	48639	-8.58	0.05
Jan 28	48649	-8.64	0.06

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	48589-48649	+8.2	10.0
PTB-CS1	48589-48649	-1.1	3.0
PTB-CS2	48589-48649	+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, NIST, NRC, PTB, SU), is:

$$1 + 0 \times 10^{-14} \pm 2 \times 10^{-14}$$

in SI second on the rotating geoid, for the two-month interval 48589-48649 .