BIPM

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BUREAU INTERNATIONAL DES POIDS ET MESURES

Circular T 51 (1992 April 30)

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

(From 1991 January 1, 0hUTC, to 1992 July 1, 0hUTC, TAI-UTC=26s)
(From 1992 July 1, 0hUTC, until further notice, TAI-UTC=27s)

Date 1992 0hUTC		Feb 27	Mar 8	Mar 18	Mar 28
MJD		48679	48689	48699	48709
Laboratory k		UTC-UTC(k) (Unit = 1 microsecond)			
AOS (Borowiec)		-1.76	-1.84	-1.89	-1.68
APL (Laurel)		-1.03	-0.90	-0.79	-0.70
AUS (Canberra)		0.06	0.02	0.00	-0.03
BEV (Wien)	(1)	-4.70	-5.71	13.26	12.14
CAO (Cagliari)	(2)	-13.30	-13.93	-14.46	-15.09
CH (Bern)		1.19	1.16	1.15	1.14
CRL (Tokyo)		2.48	2.57	2.56	2.53
CSAO (Lintong)		-2.06	-1.98	-1.88	-1.68
DPT (Pretoria)		-23.98	-23.86	-23.71	-23.60
FTZ (Darmstadt)		24.00	24.05	24.11	24.21
IEN (Torino)		-0.85	-0.83	-0.84	-0.84
IFAG (Wettzell)		1.24	1.13	0.89	0.49
IGMA (Buenos Aires)		-1.53	-1.56	-1.62	-1.68
INPL (Jerusalem)	(3)	-2.27	-2.38	-2.90	-2.91
JATC (Lintong)		-0.12	-0.27	-0.29	-0.25
KRIS (Taejon)		-0.35	-0.33	-0.30	-0.33
LDS (Leeds)		-24.61	-25.70	-26.58	-27.67
NAOM (Mizusawa)		-6.71	-6.54	-6.36	-6.16
NIM (Beijing)		7.75	7.87	7.94	8.06
NIST (Boulder)		-0.43	-0.34	-0.27	-0.21
NMC (Sofiya)		0.56	1.14	-0.34	-1.20
NPL (Teddington)		0.01	-0.02	-0.03	-0.04
NPLI (New-Delhi)		23.31	24.34	25.60	26.46
NRC (Ottawa)		0.89	0.77	0.63	0.52
NRLM (Tsukuba)		-164.30	-172.56	-181.63	-189.42
OMH (Budapest)		2.37	2.38	3.37	3.02
ONBA (Buenos Aires)	(4)	-42.90	-43.99	-43.56	-44.36
ONRJ (Rio de Janeiro)		4.59	3.83	3.08	2.35
OP (Paris)		-0.89	-0.92	-0.89	-0.88
ORB (Bruxelles)		1.30	1.12	1.08	1.12
PEL (Lower Hutt)		-1.16	-1.32	-1.24	-1.32
PKNM (Warszawa)		0.82	0.87	0.84	0.82
PTB (Braunschweig)		3.24	3.23	3.21	3.21
RC (Habana)		-2.55	-2.60	-2.99	-3.05
ROA (San Fernando)		4.16	4.04	3.94	3.85
SNT (Stockholm)		0.20	0.09	0.14	0.13
SO (Shanghai)		2.20	2.16	2.27	2.27
SU (Moskva)		3.83	3.82	3.72	3.63
TAO (Tokyo)		1.09	1.06	1.03	1.01
TL (Chung-Li)		1.35	1.21	1.06	1.03
TP (Praha)		-0.63	-0.43	-0.62	-0.78
TUG (Graz)	(5)	4.58	-4.08	-3.74	-3.42
USNO (Washington DC)	(USNO MC)	0.06	0.02	0.00	-0.03
VSL (Delft)		2.07	1.98	1.88	1.75
YUZM (Beograd)		-	-	-	-

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).

Date 1992 0hUTC		Feb 27	Mar 8	Mar 18	Mar 28
MJD		48679	48689	48699	48709
Laboratory k		TAI-TA(k) (Unit = 1 microsecond)			
APL (Laurel)		-1.54	-1.41	-1.30	-1.20
AUS (Canberra)		-39.39	-39.53	-39.54	-39.69
CH (Bern)		-72.47	-72.53	-72.57	-72.61
CRL (Tokyo)		9.57	9.93	10.20	10.45
CSAO (Lintong)		22.38	22.26	22.16	22.16
F (Paris)		100.21	100.51	100.82	101.14
JATC (Lintong)		0.49	0.54	0.78	1.03
KRIS (Taejon)		-27.77	-28.34	-28.89	-29.48
NIM (Beijing)		-10.27	-10.13	-10.04	-9.89
NISA (Boulder)	(6)	-45083.37	-45083.71	-45084.06	-45084.42
NIST (Boulder)		-45184.44	-45185.07	-45185.72	-45186.38
NRC (Ottawa)		16.96	16.84	16.70	16.59
PTB (Braunschweig)		-360.16	-360.17	-360.19	-360.19
RC (Habana)	(7)	-299.47	-299.74	-300.34	-300.66
SO (Shanghai)		-45.22	-45.24	-45.17	-45.18
SU (Moskva)		2827253.83	2827253.82	2827253.72	2827253.63
USNO (Washington DC)	(8)	-34644.32	-34645.00	-34645.69	-34646.36

3 - Notes on sections 1 and 2.

(1) BEV . Time step of UTC(BEV) of - 20 µs on MJD=48698.

(2) CAO . Corrected values of UTC-UTC(CAO) :

MJD	UTC-UTC(CAO)
48639	-9.32
48649	-10.36
48659	-11.45
48669	-12.66

(3) INPL. Time step of UTC(INPL) of 0.288 µs on MJD=48697.0

(4) ONBA. Observatorio Naval, Buenos Aires, Argentina.

(5) TUG . Time step of UTC(TUG) of 9 µs on MJD=48683.

(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 1992 0hUTC	MJD	C0 (ns)	PRN 3 NAV11 20h20m	PRN11 NAV 8 0h56m	PRN13 NAV 9 6h48m	PRN 6 NAV 3 12h24m	PRN12 NAV10 15h20m
Feb 27	48679	81	7	6	-6	10	2
Feb 28	48680	77	-7	7	-9	2	-7
Feb 29	48681	69	6	12	0	-	1
Mar 1	48682	56	-4	-13	-7	13	3
Mar 2	48683	45	0	5	-12	10	-6
Mar 3	48684	34	-2	-5	-7	10	11
Mar 4	48685	24	-4	-3	-8	14	-1
Mar 5	48686	16	1	-1	-6	1	4
Mar 6	48687	8	1	4	-9	-2	3
Mar 7	48688	4	-3	5	0	-4	4
Mar 8	48689	1	9	-10	-17	8	6
Mar 9	48690	6	11	-1	-12	3	8
Mar 10	48691	7	-1	-1	-7	3	7
Mar 11	48692	5	3	-	-21	0	1
Mar 12	48693	8	-6	0	-5	9	5
Mar 13	48694	14	5	-2	-1	12	-8
Mar 14	48695	16	0	5	-3	-1	1
Mar 15	48696	18	7	-7	-14	3	1
Mar 16	48697	22	13	-4	-15	5	6
Mar 17	48698	29	5	-4	-10	-	4
Mar 18	48699	31	4	8	-2	4	-5
Mar 19	48700	26	-4	6	-15	-4	3
Mar 20	48701	21	4	2	-16	14	-3
Mar 21	48702	20	12	-2	-15	5	-3
Mar 22	48703	18	7	0	0	2	-1
Mar 23	48704	14	4	-	-18	3	0
Mar 24	48705	10	0	0	-	5	9
Mar 25	48706	9	-5	4	-17	7	0
Mar 26	48707	10	7	-	-10	11	1
Mar 27	48708	9	-	-5	-5	4	7
Mar 28	48709	6	-4	1	-15	4	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 1992 0hUTC	MJD	C0 (ns)	PRN23 NAV23 23h 0m	PRN17 NAV17 23h48m	PRN21 NAV21 0h 8m	PRN15 NAV15 2h 0m	PRN14 NAV14 4h56m	PRN18 NAV18 6h 0m
Feb 27	48679	81	-44	79	-5	-35	1	10
Feb 28	48680	77	-3	-13	-	85	88	90
Feb 29	48681	69	13	-6	-	2	2	13
Mar 1	48682	56	-4	-20	3	1	-9	2
Mar 2	48683	45	-65	64	79	19	-2	7
Mar 3	48684	34	121	17	24	22	40	43
Mar 4	48685	24	-27	-9	8	80	-24	85
Mar 5	48686	16	4	-9	-57	56	-8	-9
Mar 6	48687	8	-3	-3	95	-56	22	40
Mar 7	48688	4	-36	-56	-	-23	37	28
Mar 8	48689	1	-30	47	66	2	122	111
Mar 9	48690	6	-86	-31	18	5	-6	-16
Mar 10	48691	7	44	38	39	112	47	6
Mar 11	48692	5	85	-61	33	-49	-18	7
Mar 12	48693	8	8	8	-11	-19	-96	21
Mar 13	48694	14	96	3	71	-15	-77	97
Mar 14	48695	16	-15	-60	29	18	29	16
Mar 15	48696	18	78	-60	-8	57	-35	14
Mar 16	48697	22	30	19	5	40	5	-29
Mar 17	48698	29	23	56	16	21	68	-153
Mar 18	48699	31	81	-23	144	-49	36	-74
Mar 19	48700	26	8	31	14	98	31	7
Mar 20	48701	21	-14	45	-37	13	40	-1
Mar 21	48702	20	-24	0	-18	-59	13	-19
Mar 22	48703	18	-55	-20	-13	61	31	9
Mar 23	48704	14	18	-42	52	-38	56	-33
Mar 24	48705	10	-25	5	52	1	-23	74
Mar 25	48706	9	85	-34	56	6	70	-31
Mar 26	48707	10	6	-3	34	16	-9	4
Mar 27	48708	9	-71	-36	12	-	24	-8
Mar 28	48709	6	-20	-48	76	-	15	55

Section 4 (Cont.)

			r(ns) Block II				
Date 1992 0hUTC	MJD	C0 (ns)	PRN24 NAV24 8h24m	PRN19 NAV19 8h40m	PRN16 NAV16 10h48m	PRN 2 NAV13 14h16m	PRN20 NAV20 17h28m
Feb 27	48679	81	58	-11	-109	74	-79
Feb 28	48680	77	7	47	-	-3	4
Feb 29	48681	69	-4	-15	-24	-6	-8
Mar 1	48682	56	1	-4	-20	5	3
Mar 2	48683	45	2	-15	20	5	-20
Mar 3	48684	34	-94	-75	-69	-45	-27
Mar 4	48685	24	37	31	-18	-50	45
Mar 5	48686	16	17	6	-64	4	-65
Mar 6	48687	8	-12	-102	38	55	33
Mar 7	48688	4	-12	-10	109	16	-26
Mar 8	48689	1	-28	62	67	53	-111
Mar 9	48690	6	20	-3	1	19	48
Mar 10	48691	7	-31	-14	93	20	4
Mar 11	48692	5	38	-7	-37	-	-16
Mar 12	48693	8	40	30	6	0	8
Mar 13	48694	14	10	2	-34	64	-9
Mar 14	48695	16	-41	-15	41	-33	24
Mar 15	48696	18	36	52	-5	-13	7
Mar 16	48697	22	-124	-47	-29	-75	17
Mar 17	48698	29	24	-58	-	12	5
Mar 18	48699	31	61	5	-60	-18	35
Mar 19	48700	26	-48	-4	-63	-35	-87
Mar 20	48701	21	-13	-8	-10	0	-11
Mar 21	48702	20	33	-87	-35	43	-32
Mar 22	48703	18	16	-5	-78	-30	24
Mar 23	48704	14	-10	-50	0	-26	-32
Mar 24	48705	10	-60	67	-36	-24	-21
Mar 25	48706	9	132	103	2	11	11
Mar 26	48707	10	30	50	-33	12	-12
Mar 27	48708	9	7	-26	21	41	-48
Mar 28	48709	6	57	-19	-79	-27	-19

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)
Feb 27	48679	-8.79	0.05
Mar 8	48689	-8.79	0.06
Mar 18	48699	-8.71	0.05
Mar 28	48709	-8.64	0.07

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	48649-48709	+13.8	10.0
PTB-CS1	48649-48709	-1.2	3.0
PTB-CS2	48649-48709	+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, 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 48649-48709 .