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BIPM

BUREAU INTERNATIONAL DES POIDS ET MESURES

Circular T 55 (1992 August 31)

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	Jun 26	Jul 6	Jul 16	Jul 26
MJD	48799	48809	48819	48829
Laboratory k	UTC-UTC(k) (Unit = 1 microsecond)			
AOS (Borowiec)	-1.43	-1.88	-2.10	-2.79
APL (Laurel)	0.86	1.28	1.74	2.14
AUS (Canberra)	-0.08	-0.09	-0.11	-0.13
BEV (Wien)	2.89	2.00	0.97	-0.02
CAO (Cagliari)	-19.01	-19.41	-19.86	-20.34
CH (Bern)	0.78	0.70	0.61	0.54
CRL (Tokyo)	2.20	2.21	2.21	2.24
CSAO (Lintong)	-0.66	-0.63	-0.67	-0.63
DPT (Pretoria)	-22.37	-22.09	-21.91	-21.76
FTZ (Darmstadt)	25.36	25.42	-	-
IEN (Torino)	-0.69	-0.64	-0.55	-0.48
IFAG (Wettzell)	0.24	0.48	0.71	1.03
IGMA (Buenos Aires) (1)	-1.91	-1.92	-1.96	-2.01
INPL (Jerusalem) (2)	-2.41	-2.23	-2.05	-1.85
JATC (Lintong)	0.40	0.36	0.20	0.21
KRIS (Taejon)	0.46	0.56	0.69	0.82
LDS (Leeds)	-37.10	-38.14	-39.20	-40.24
MSL (Lower Hutt) (3)	-2.60	-2.69	-2.83	-2.74
NAOM (Mizusawa)	-4.27	-4.02	-3.79	-3.55
NAOT (Tokyo)	0.59	0.56	0.50	0.47
NIM (Beijing)	7.66	7.72	7.60	7.54
NIST (Boulder)	0.09	0.07	0.04	-0.02
NMC (Sofiya)	6.96	-	-	-
NPL (Teddington)	-0.02	-0.02	-0.03	-0.05
NPLI (New-Delhi)	-	-	-	-
NRC (Ottawa)	-0.43	-0.51	-0.58	-0.66
NRLM (Tsukuba)	-1.81	-2.28	-2.74	-3.17
OMH (Budapest)	-	-	-	0.88
ONBA (Buenos Aires) (4)	-57.23	-58.62	-59.73	-60.68
ONRJ (Rio de Janeiro)	-2.59	-3.00	-3.44	-3.73
OP (Paris)	-0.91	-0.83	-0.80	-0.80
ORB (Bruxelles)	0.56	0.33	0.35	0.45
PKNM (Warszawa)	0.81	0.92	1.04	1.16
PTB (Braunschweig)	3.04	3.02	3.00	2.97
RC (Habana)	-3.37	-3.28	-3.34	-3.27
ROA (San Fernando)	3.28	3.28	3.31	3.31
SCL (Wan Chai) (5)	-	-0.72	-2.16	-3.56
SNT (Stockholm)	0.07	0.05	0.03	0.05
SO (Shanghai)	1.88	1.96	2.04	1.89
SU (Moskva)	2.68	2.57	2.46	2.33
TL (Chung-Li)	1.23	1.25	1.26	1.32
TP (Praha)	-0.33	-0.32	-0.33	-0.32
TUG (Graz)	-0.43	-0.11	0.23	0.53
USNO (Washington DC)(USNO MC)	-0.08	-0.09	-0.11	-0.13
VSL (Delft)	0.95	0.87	0.75	0.70

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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		Jun 26	Jul 6	Jul 16	Jul 26
MJD		48799	48809	48819	48829
Laboratory k		TAI-TA(k) (Unit = 1 microsecond)			
APL (Laurel)		0.12	0.54	1.00	1.40
AUS (Canberra)		-41.15	-41.25	-41.37	-41.49
CH (Bern)		-73.20	-73.30	-73.42	-73.52
CRL (Tokyo)		12.89	13.21	13.53	13.87
CSAO (Lintong)		21.63	21.58	21.50	21.50
F (Paris)		103.85	104.19	104.51	104.83
JATC (Lintong)		2.12	2.44	2.71	2.84
KRIS (Taejon)		-33.48	-33.52	-33.56	-33.59
NIM (Beijing)		-10.08	-10.00	-10.09	-10.13
NISA (Boulder)	(6)	-45087.56	-45087.93	-45088.31	-45088.70
NIST (Boulder)		-45192.20	-45192.85	-45193.50	-45194.17
NRC (Ottawa)		15.64	15.56	15.49	15.41
PTB (Braunschweig)		-360.36	-360.38	-360.40	-360.43
RC (Habana)	(7)	-304.96	-305.42	-306.09	-306.63
SO (Shanghai)		-45.66	-45.59	-45.54	-45.68
SU (Moskva)		2827252.68	2827252.57	2827252.46	2827252.33
USNO (Washington DC)	(8)	-34652.43	-34653.11	-34653.78	-34654.47

3 - Notes on sections 1 and 2.

(1) IGMA. Corrected value : UTC-UTC(IGMA) = -1.85 µs on MJD=48789.

(2) INPL. Corrected value : UTC-UTC(INPL) = -2.52 µs on MJD=48789.

(3) MSL . Measurement Standards Laboratory, Lower Hutt (New Zealand), formerly PEL.

(4) ONBA. Corrected values of UTC-UTC(ONBA) :

MJD	UTC-UTC(ONBA)
48729	-48.95
48739	-50.10
48789	-56.12

(5) SCL . Honk Kong Government Standards and Calibration Laboratory, Wan Chai (Honk Kong).

(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 (until 1992 July 1, 0hUTC)
UTC - GPS time = -8s + C0 (from 1992 July 1, 0hUTC)
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 12h20m	PRN11 NAV 8 16h52m	PRN13 NAV 9 22h44m	PRN 6 NAV 3 4h24m	PRN12 NAV10 7h20m
Jun 26	48799	-55	-4	-10	12	-	-1
Jun 27	48800	-52	5	11	0	-	-14
Jun 28	48801	-48	3	-14	-15	-	-2
Jun 29	48802	-46	12	-	-	-	10

			r(ns)	Block I		
Date 1992 0hUTC	MJD	C0 (ns)	PRN12 NAV10 8h 8m	PRN 3 NAV11 11h52m	PRN11 NAV 8 16h24m	PRN13 NAV 9 22h16m
Jun 30	48803	-56	-1	8	29	-11
Jul 1	48804	-56	-2	4	-5	0
Jul 2	48805	-62	5	3	-14	-3
Jul 3	48806	-69	1	7	12	-8
Jul 4	48807	-69	-17	2	9	-2
Jul 5	48808	-64	-4	14	14	-15
Jul 6	48809	-58	-3	5	-	-14
Jul 7	48810	-57	6	1	17	-1
Jul 8	48811	-59	11	5	-23	-16
Jul 9	48812	-66	1	15	28	-3
Jul 10	48813	-74	-11	-3	-17	-5
Jul 11	48814	-81	1	2	16	-2
Jul 12	48815	-88	22	1	-5	-9
Jul 13	48816	-101	-26	13	-14	1
Jul 14	48817	-112	13	8	-6	-3
Jul 15	48818	-117	-29	5	20	-3
Jul 16	48819	-118	13	2	0	-1
Jul 17	48820	-121	12	8	-23	-1
Jul 18	48821	-122	-20	2	-	3
Jul 19	48822	-119	-8	11	8	0
Jul 20	48823	-116	-9	3	28	-12
Jul 21	48824	-118	-15	3	-	-7
Jul 22	48825	-121	10	9	8	-
Jul 23	48826	-124	-14	11	-	-23
Jul 24	48827	-126	5	5	13	2
Jul 25	48828	-125	-10	5	-4	-18
Jul 26	48829	-125	7	7	24	-24

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 15h 0m	PRN17 NAV17 15h48m	PRN21 NAV21 16h 4m	PRN15 NAV15 17h56m	PRN14 NAV14 20h52m	PRN18 NAV18 21h56m
Jun 26	48799	-55	-115	64	5	16	-35	61
Jun 27	48800	-52	33	62	43	11	-20	31
Jun 28	48801	-48	-23	-31	50	15	28	30
Jun 29	48802	-46	-	-	-	-	-	-34

r(ns) Block II

Date 1992 0hUTC	MJD	C0 (ns)	PRN24 NAV24 0h 8m	PRN16 NAV16 2h 0m	PRN19 NAV19 2h48m	PRN 2 NAV13 5h44m	PRN20 NAV20 8h56m	PRN25 NAV25 10h48m	PRN28 NAV28 14h 0m
Jun 30	48803	-56	-54	12	-16	-53	-6	-109	-19
Jul 1	48804	-56	-	91	14	-29	29	20	-
Jul 2	48805	-62	-6	-49	-1	-11	-20	-32	38
Jul 3	48806	-69	81	-46	-3	-4	-30	-	14
Jul 4	48807	-69	58	-3	12	-52	72	-30	-10
Jul 5	48808	-64	-75	33	-93	-27	92	-58	2
Jul 6	48809	-58	0	-33	-87	-14	29	26	24
Jul 7	48810	-57	-21	14	-35	-72	-45	79	-1
Jul 8	48811	-59	-26	7	-107	-3	50	31	-61
Jul 9	48812	-66	-38	-13	-90	-20	-25	-43	-55
Jul 10	48813	-74	94	-14	-35	-101	-100	44	3
Jul 11	48814	-81	-42	-2	-93	-2	-3	7	-44
Jul 12	48815	-88	8	80	-8	22	45	40	17
Jul 13	48816	-101	-	-64	-47	23	-93	-6	-22
Jul 14	48817	-112	12	-17	-65	-8	-8	128	-48
Jul 15	48818	-117	49	26	19	37	48	-106	4
Jul 16	48819	-118	-	50	-66	-15	50	-13	17
Jul 17	48820	-121	-17	-117	-53	14	3	13	9
Jul 18	48821	-122	-23	-75	26	50	52	8	-21
Jul 19	48822	-119	4	-72	-40	-77	-1	-104	20
Jul 20	48823	-116	-5	-18	-54	74	71	45	1
Jul 21	48824	-118	-43	9	27	-41	-45	39	26
Jul 22	48825	-121	-13	-6	-21	1	40	-12	-64
Jul 23	48826	-124	14	-21	-73	33	-60	-56	65
Jul 24	48827	-126	41	-32	-111	-39	49	-43	-84
Jul 25	48828	-125	49	46	-36	1	48	21	-87
Jul 26	48829	-125	1	-1	-68	-107	20	28	64

Section 4 (Cont.)

r(ns) Block II

Date 1992 0hUTC	MJD	C0 (ns)	PRN24 NAV24 0h24m	PRN19 NAV19 0h40m	PRN16 NAV16 2h48m	PRN 2 NAV13 6h16m	PRN20 NAV20 9h28m
Jun 26	48799	-55	28	-47	-11	-78	-68
Jun 27	48800	-52	-110	-38	18	29	-24
Jun 28	48801	-48	2	-13	9	45	-38
Jun 29	48802	-46	47	-23	-41	-77	36

r(ns) Block II

Date 1992 0hUTC	MJD	C0 (ns)	PRN23 NAV23 14h32m	PRN17 NAV17 15h20m	PRN21 NAV21 15h36m	PRN15 NAV15 17h28m	PRN14 NAV14 20h24m	PRN18 NAV18 23h20m
Jun 30	48803	-56	-18	50	86	40	-3	-76
Jul 1	48804	-56	-16	-79	-36	-29	-27	-29
Jul 2	48805	-62	-12	-39	-3	-31	-50	-37
Jul 3	48806	-69	23	6	-16	6	-91	14
Jul 4	48807	-69	-39	42	2	-12	3	-8
Jul 5	48808	-64	6	17	68	4	-19	16
Jul 6	48809	-58	-4	-43	94	-16	7	-17
Jul 7	48810	-57	-10	54	42	-6	-75	-72
Jul 8	48811	-59	-26	3	-10	6	-52	-24
Jul 9	48812	-66	-2	-81	-48	2	-32	0
Jul 10	48813	-74	-1	20	33	3	60	0
Jul 11	48814	-81	-24	85	66	-26	5	-44
Jul 12	48815	-88	51	6	35	-15	-36	125
Jul 13	48816	-101	11	-21	48	-28	0	-26
Jul 14	48817	-112	-24	-44	6	-12	-30	-25
Jul 15	48818	-117	-32	16	130	5	-30	50
Jul 16	48819	-118	50	54	-20	-14	51	38
Jul 17	48820	-121	103	0	30	9	66	0
Jul 18	48821	-122	82	34	86	-7	1	-8
Jul 19	48822	-119	-42	-2	-7	-31	-2	33
Jul 20	48823	-116	9	20	1	15	41	24
Jul 21	48824	-118	-59	-101	27	-12	-11	-1
Jul 22	48825	-121	13	6	-3	38	-23	40
Jul 23	48826	-124	52	82	-9	-2	8	56
Jul 24	48827	-126	-73	38	87	-36	-4	-52
Jul 25	48828	-125	-9	16	56	-46	-21	74
Jul 26	48829	-125	-77	-51	-108	55	-78	24

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)
Jun 26	48799	-9.50	0.05
Jul 6	48809	-9.68	0.06
Jul 16	48819	-9.84	0.06
Jul 26	48829	-10.07	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	48769-48829	+3.2	10.0
PTB-CS1	48769-48829	-0.4	3.0
PTB-CS2	48769-48829	+3.6	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:

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

in SI second on the rotating geoid, for the two-month interval 48769-48829 .