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BIPM

BUREAU INTERNATIONAL DES POIDS ET MESURES

Circular T 56 (1992 September 28)

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

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

Date 1992 0hUTC		Jul 26	Aug 5	Aug 15	Aug 25
MJD		48829	48839	48849	48859
Laboratory k		UTC-UTC(k) (Unit = 1 microsecond)			
AOS (Borowiec)		-2.79	-3.13	-3.01	-2.35
APL (Laurel)	(1)	2.13	-0.03	-0.13	-0.16
AUS (Canberra)		-0.14	-0.14	-0.15	-0.16
BEV (Wien)		-0.02	-1.12	-2.24	-3.16
CAO (Cagliari)		-20.34	-20.83	-21.35	-21.87
CH (Bern)		0.54	0.47	0.40	0.35
CRL (Tokyo)		2.23	2.22	2.23	2.25
CSAO (Lintong)		-0.63	-0.55	-0.48	-0.47
DPT (Pretoria)		-21.76	-21.61	-21.55	-21.55
FTZ (Darmstadt)		-	-	-	-
IEN (Torino)		-0.48	-0.40	-0.31	-0.25
IFAG (Wettzell)		1.03	1.43	1.90	2.29
IGMA (Buenos Aires)		-1.96	-1.95	-1.95	-1.95
INPL (Jerusalem)		-1.85	-1.66	-1.47	-1.26
JATC (Lintong)		0.21	0.35	0.29	0.26
KRIS (Taejon)		0.82	0.95	1.04	-
LDS (Leeds)		-40.24	-41.35	-42.45	-
MSL (Lower Hutt)		-2.74	-2.82	-2.84	-2.99
NAOM (Mizusawa)		-3.55	-3.31	-3.07	-2.80
NAOT (Tokyo)		0.47	0.38	0.33	0.26
NIM (Beijing)		7.54	7.44	7.41	7.39
NIST (Boulder)		-0.02	-0.04	-0.09	-0.13
NMC (Sofiya)		-	-	1.27	1.88
NPL (Teddington)		-0.05	-0.05	-0.06	-0.06
NPLI (New-Delhi)		-	-	-	-
NRC (Ottawa)		-0.66	-0.72	-0.77	-0.82
NRLM (Tsukuba)		-3.18	-3.66	-4.15	-4.61
OMH (Budapest)		0.88	0.88	-	-
ONBA (Buenos Aires)		-60.63	-61.25	-62.18	-63.10
ONRJ (Rio de Janeiro)		-3.73	-4.19	-4.53	-4.68
OP (Paris)		-0.80	-0.78	-0.75	-0.70
ORB (Bruxelles)		0.45	0.47	0.08	0.00
PKNM (Warszawa)		1.15	1.28	1.42	1.54
PTB (Braunschweig)		2.96	2.95	2.94	2.92
RC (Habana)		-3.27	-3.40	-3.42	-3.31
ROA (San Fernando)		3.31	3.36	3.36	3.35
SCL (Hong Kong)		-3.56	-5.01	-6.47	-7.97
SNT (Stockholm)		0.05	0.08	0.09	0.08
SO (Shanghai)		1.89	1.94	1.93	2.03
SU (Moskva)		2.33	2.23	2.13	2.03
TL (Chung-Li)		1.31	1.23	1.21	1.22
TP (Praha)		-0.33	-0.32	-0.35	-0.40
TUG (Graz)		0.53	0.88	1.23	1.55
USNO (Washington DC)(USNO MC)		-0.14	-0.14	-0.15	-0.16
VSL (Delft)		0.70	0.66	0.67	0.62

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		Jul 26	Aug 5	Aug 15	Aug 25
MJD		48829	48839	48849	48859
Laboratory k		TAI-TA(k) (Unit = 1 microsecond)			
APL (Laurel)		1.40	1.44	1.33	1.30
AUS (Canberra)		-41.49	-41.68	-41.85	-42.04
CH (Bern)		-73.52	-73.62	-73.70	-73.78
CRL (Tokyo)		13.87	14.18	14.51	14.85
CSAO (Lintong)		21.50	21.54	21.57	21.53
F (Paris)		104.83	105.16	105.49	105.83
JATC (Lintong)		2.84	3.20	3.34	3.56
KRIS (Taejon)		-33.59	-	-	-
NIM (Beijing)		-10.13	-10.20	-10.22	-10.21
NISA (Boulder)	(2)	-45088.70	-45089.07	-45089.44	-45089.82
NIST (Boulder)		-45194.17	-45194.80	-45195.45	-45196.10
NRC (Ottawa)		15.41	15.35	15.30	15.25
PTB (Braunschweig)		-360.44	-360.44	-360.46	-360.48
RC (Habana)	(3)	-306.63	-307.36	-308.03	-308.57
SO (Shanghai)		-45.68	-45.62	-45.64	-45.53
SU (Moskva)		2827252.33	2827252.23	2827252.13	2827252.03
USNO (Washington DC)	(4)	-34654.47	-34655.15	-34655.82	-34656.49

3 - Notes on sections 1 and 2.

(1) APL . Time step of UTC(APL) of 2.200 µs on MJD = 48838.

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

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

(4) 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 6h24m	PRN 3 NAV11 10h 8m	PRN11 NAV 8 14h40m	PRN13 NAV 9 20h32m
Jul 26	48829	-127	7	7	24	-24
Jul 27	48830	-125	3	8	11	-14
Jul 28	48831	-125	5	14	-13	-16
Jul 29	48832	-124	0	8	15	-
Jul 30	48833	-124	0	13	0	-14
Jul 31	48834	-123	-6	10	-9	-3
Aug 1	48835	-118	-4	8	17	-15
Aug 2	48836	-111	-3	2	-15	14
Aug 3	48837	-105	-3	8	-12	-6
Aug 4	48838	-102	-9	-1	-	-2
Aug 5	48839	-97	-13	8	21	0
Aug 6	48840	-90	-16	6	2	-5
Aug 7	48841	-85	-6	-4	-6	13
Aug 8	48842	-84	-8	2	16	-13
Aug 9	48843	-87	-2	10	-	-1
Aug 10	48844	-98	-3	5	1	-19
Aug 11	48845	-107	-3	15	11	-
Aug 12	48846	-113	-4	-6	16	-
Aug 13	48847	-114	-5	-1	-5	-24
Aug 14	48848	-109	11	7	18	-12
Aug 15	48849	-98	2	3	7	17
Aug 16	48850	-89	-4	-3	8	-23
Aug 17	48851	-86	-2	10	3	-11
Aug 18	48852	-83	-4	5	22	-
Aug 19	48853	-86	-3	8	-6	-7
Aug 20	48854	-97	0	6	-7	4
Aug 21	48855	-109	1	12	-4	-2
Aug 22	48856	-119	-10	-3	19	-9
Aug 23	48857	-125	-4	3	5	11
Aug 24	48858	-127	-14	-4	8	7
Aug 25	48859	-127	-7	4	11	-26

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)	PRN24 NAV24 22h20m	PRN16 NAV16 0h16m	PRN19 NAV19 1h 4m	PRN 2 NAV13 4h 0m	PRN20 NAV20 7h12m	PRN25 NAV25 9h 4m	PRN28 NAV28 12h16m
Jul 26	48829	-127	1	-1	-68	-107	20	28	64
Jul 27	48830	-125	-45	2	17	23	-17	7	-27
Jul 28	48831	-125	-2	-85	-3	-52	-58	32	94
Jul 29	48832	-124	-108	-	-58	-77	-58	-31	-58
Jul 30	48833	-124	-23	-13	-19	-90	5	-27	-64
Jul 31	48834	-123	-85	-91	-63	-39	-12	-26	-35
Aug 1	48835	-118	58	33	-25	-70	33	-19	12
Aug 2	48836	-111	35	34	-26	4	25	5	65
Aug 3	48837	-105	-42	23	-10	-50	8	79	-66
Aug 4	48838	-102	-52	41	4	-12	1	-71	-23
Aug 5	48839	-97	-	35	92	-18	15	46	14
Aug 6	48840	-90	42	55	60	-25	10	21	60
Aug 7	48841	-85	-18	49	-46	-10	4	39	91
Aug 8	48842	-84	2	77	57	-58	14	44	-26
Aug 9	48843	-87	59	-83	-96	-43	0	6	-24
Aug 10	48844	-98	-89	13	-	12	-4	64	-
Aug 11	48845	-107	-22	-190	-112	-71	-21	22	4
Aug 12	48846	-113	-29	-59	43	35	10	-85	-29
Aug 13	48847	-114	-30	74	7	4	1	-60	44
Aug 14	48848	-109	-35	87	-4	23	-8	-47	73
Aug 15	48849	-98	-48	-67	15	20	-9	58	23
Aug 16	48850	-89	65	12	-20	17	-6	-29	-33
Aug 17	48851	-86	56	-2	-17	44	9	-1	-7
Aug 18	48852	-83	-29	10	-151	-14	18	37	-2
Aug 19	48853	-86	-42	47	-17	7	12	90	6
Aug 20	48854	-97	-10	66	-54	-11	3	-2	-47
Aug 21	48855	-109	83	29	15	-70	-10	3	29
Aug 22	48856	-119	-93	-28	-67	-39	5	135	34
Aug 23	48857	-125	-29	-91	12	25	13	-6	28
Aug 24	48858	-127	89	18	-47	-13	14	-2	63
Aug 25	48859	-127	-81	16	-37	16	13	9	-20

Section 4 (Cont.)

			r(ns) Block II					
Date 1992 0hUTC	MJD	CO (ns)	PRN23 NAV23 12h48m	PRN17 NAV17 13h36m	PRN21 NAV21 13h52m	PRN15 NAV15 15h44m	PRN14 NAV14 18h40m	PRN18 NAV18 21h36m
Jul 26	48829	-127	-77	-51	-108	55	-78	24
Jul 27	48830	-125	83	-64	44	-27	22	65
Jul 28	48831	-125	-50	60	47	-33	22	-17
Jul 29	48832	-124	40	-36	-8	5	11	29
Jul 30	48833	-124	-56	5	14	6	7	6
Jul 31	48834	-123	-3	-60	-20	-14	-109	7
Aug 1	48835	-118	-13	26	13	0	-19	-10
Aug 2	48836	-111	6	-61	-99	-16	-47	-44
Aug 3	48837	-105	61	-53	-23	-2	23	-13
Aug 4	48838	-102	-54	20	-103	5	-98	-20
Aug 5	48839	-97	10	-68	-45	18	71	32
Aug 6	48840	-90	45	-71	2	-15	20	41
Aug 7	48841	-85	-27	-22	-3	-10	-38	55
Aug 8	48842	-84	18	53	-25	10	-46	36
Aug 9	48843	-87	-82	28	-63	-28	-17	-
Aug 10	48844	-98	-23	21	-45	-13	67	-36
Aug 11	48845	-107	-116	-31	115	-12	-48	-44
Aug 12	48846	-113	93	-92	31	-35	-10	47
Aug 13	48847	-114	-48	-12	84	-4	33	7
Aug 14	48848	-109	-12	-7	47	-23	-40	77
Aug 15	48849	-98	-69	-78	1	-21	-48	36
Aug 16	48850	-89	77	-6	-16	2	31	-64
Aug 17	48851	-86	59	-33	-23	7	-24	-26
Aug 18	48852	-83	-2	48	39	24	73	1
Aug 19	48853	-86	69	-19	3	9	-41	48
Aug 20	48854	-97	-23	11	30	-21	34	-90
Aug 21	48855	-109	23	-57	67	25	14	-60
Aug 22	48856	-119	11	47	-22	21	19	-124
Aug 23	48857	-125	-61	7	26	-3	-74	28
Aug 24	48858	-127	-14	-84	9	-5	-22	30
Aug 25	48859	-127	0	7	93	3	-7	106

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)
Jul 26	48829	-10.08	0.06
Aug 5	48839	-10.23	0.06
Aug 15	48849	-10.43	0.07
Aug 25	48859	-10.66	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	48799-48859	+7.6	10.0
PTB-CS1	48799-48859	-1.5	3.0
PTB-CS2	48799-48859	+2.4	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:

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

in SI second on the rotating geoid, for the two-month interval 48799-48859 .