ISSN 1143-1393

BIPM

BUREAU INTERNATIONAL DES POIDS ET MESURES

Circular T 57 (1992 November 2)

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

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

Date 1992 0hUTC	Aug 25	Sep 4	Sep 14	Sep 24
MJD	48859	48869	48879	48889
Laboratory k	UTC-UTC(k) (Unit = 1 microsecond)			
AOS (Borowiec)	-2.35	-1.42	-0.33	0.99
APL (Laurel)	-0.16	-0.19	-0.22	-0.26
AUS (Canberra)	-0.16	-0.17	-0.16	-0.14
BEV (Wien)	-3.16	-3.95	-4.99	-6.13
CAO (Cagliari)	-21.87	-22.28	-22.64	-23.05
CH (Bern)	0.35	0.26	0.20	0.11
CRL (Tokyo)	2.25	2.25	2.26	2.26
CSAO (Lintong)	-0.47	-0.43	-0.50	-0.50
DPT (Pretoria)	-21.55	-21.47	-21.25	-20.99
FTZ (Darmstadt)	-	-	-	-
IEN (Torino)	-0.25	-0.20	-0.16	-0.13
IFAG (Wettzell)	2.29	2.69	2.88	3.07
IGMA (Buenos Aires)	-1.95	-1.94	-1.92	-1.89
INPL (Jerusalem)	-1.26	-1.10	-0.98	-0.91
JATC (Lintong)	0.26	0.29	0.10	-0.03
KRIS (Taejon)	-	-	-	-
LDS (Leeds)	-	8.46	7.50	6.54
MSL (Lower Hutt)	-2.99	-3.20	-3.26	-3.33
NAOM (Mizusawa)	-2.80	-2.54	-2.27	-2.01
NAOT (Tokyo)	0.26	0.17	0.13	0.12
NIM (Beijing)	7.39	7.35	7.32	7.36
NIST (Boulder)	-0.13	-0.16	-0.19	-0.22
NMC (Sofiya)	1.88	2.59	3.31	1.84
NPL (Teddington)	-0.06	-0.05	-0.03	-0.03
NPLI (New-Delhi)	-	-	-	40.60
NRC (Ottawa)	-0.82	-0.87	-0.92	-0.94
NRLM (Tsukuba)	-4.61	-5.12	-5.61	-6.15
OMH (Budapest)	-	-	-	-
ONBA (Buenos Aires)	-63.10	-64.24	-65.16	-65.90
ONRJ (Rio de Janeiro)	-4.68	-4.04	-3.30	-2.27
OP (Paris)	-0.70	-0.66	-0.61	-0.59
ORB (Bruxelles)	0.00	-0.05	0.02	-0.06
PKNM (Warszawa)	1.54	1.47	1.43	1.40
PTB (Braunschweig)	2.92	2.91	2.90	2.88
RC (Habana)	-3.31	-3.31	-3.04	-3.08
ROA (San Fernando)	3.35	3.34	3.32	3.32
SCL (Wan Chai)	-7.97	-9.44	-10.90	-12.28
SNT (Stockholm)	0.08	0.10	0.07	0.02
SO (Shanghai)	2.03	1.86	1.59	1.55
SU (Moskva)	2.03	1.93	1.82	1.72
TL (Chung-Li)	1.22	1.18	1.14	1.11
TP (Praha)	-0.40	-0.41	-0.42	-0.45
TUG (Graz)	1.55	1.86	2.19	2.45
USNO (Washington DC)(USNO MC)	-0.16	-0.17	-0.16	-0.14
VSL (Delft)	0.62	0.54	0.44	0.39

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		Aug 25	Sep 4	Sep 14	Sep 24
MJD		48859	48869	48879	48889
Laboratory k		TAI-TA(k) (Unit = 1 microsecond)			
APL (Laurel)		1.30	1.27	1.25	1.20
AUS (Canberra)		-42.04	-42.23	-42.40	-42.56
CH (Bern)		-73.78	-73.89	-73.97	-74.08
CRL (Tokyo)		14.85	15.17	15.50	15.83
CSAO (Lintong)		21.53	21.53	21.42	21.37
F (Paris)		105.83	106.18	106.53	106.87
JATC (Lintong)		3.56	3.67	3.55	3.72
KRIS (Taejon)		-	-	-	-
NIM (Beijing)		-10.21	-10.23	-10.24	-10.18
NISA (Boulder)	(1)	-45089.82	-45090.18	-45090.55	-45090.92
NIST (Boulder)		-45196.10	-45196.73	-45197.36	-45198.00
NRC (Ottawa)		15.25	15.20	15.15	15.13
PTB (Braunschweig)		-360.48	-360.49	-360.50	-360.52
RC (Habana)	(2)	-308.57	-309.17	-309.42	-310.07
SO (Shanghai)		-45.53	-45.68	-45.94	-45.97
SU (Moskva)		2827252.03	2827251.93	2827251.82	2827251.72
USNO (Washington DC)	(3)	-34656.49	-34657.16	-34657.82	-34658.50

3 - Notes on sections 1 and 2.

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

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

(3) 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 4h24m	PRN 3 NAV11 8h 8m	PRN11 NAV 8 12h40m	PRN13 NAV 9 18h32m
Aug 25	48859	-126	-9	2	10	-
Aug 26	48860	-124	-14	4	-	11
Aug 27	48861	-124	-8	-9	1	4
Aug 28	48862	-125	0	1	1	-
Aug 29	48863	-124	-15	3	8	-7
Aug 30	48864	-119	-1	3	10	4
Aug 31	48865	-116	-	6	-2	-3
Sep 1	48866	-118	-5	1	-5	-3
Sep 2	48867	-120	-3	9	-	11
Sep 3	48868	-121	-15	-5	-3	-3
Sep 4	48869	-121	-3	5	1	-6
Sep 5	48870	-120	-5	13	2	-9
Sep 6	48871	-123	-5	10	-12	12
Sep 7	48872	-126	-13	4	-7	-12
Sep 8	48873	-125	-4	-	11	7
Sep 9	48874	-122	-16	6	4	8
Sep 10	48875	-126	-9	11	0	-14
Sep 11	48876	-135	-5	5	-3	-18
Sep 12	48877	-138	1	13	10	-
Sep 13	48878	-139	-10	-2	16	-14
Sep 14	48879	-138	3	7	-5	-15
Sep 15	48880	-136	6	4	9	-16
Sep 16	48881	-128	1	9	9	-13
Sep 17	48882	-119	-5	-2	-	4
Sep 18	48883	-112	-2	1	-9	9
Sep 19	48884	-112	-3	8	-11	1
Sep 20	48885	-116	-1	3	0	6
Sep 21	48886	-122	-8	1	-3	-13
Sep 22	48887	-124	-5	-4	-	10
Sep 23	48888	-122	-3	15	0	-6
Sep 24	48889	-123	1	-6	4	-

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 20h20m	PRN16 NAV16 22h12m	PRN19 NAV19 23h 0m	PRN 2 NAV13 2h 0m	PRN20 NAV20 5h12m	PRN25 NAV25 7h 4m	PRN28 NAV28 10h16m
Aug 25	48859	-126	-80	16	-37	17	14	9	-20
Aug 26	48860	-124	-6	-1	-48	-78	14	70	2
Aug 27	48861	-124	-53	109	-8	-57	2	-47	-17
Aug 28	48862	-125	68	15	-45	-103	21	-23	42
Aug 29	48863	-124	46	-22	-32	4	-14	-93	13
Aug 30	48864	-119	58	11	-17	128	8	-30	111
Aug 31	48865	-116	90	-26	-39	-	13	69	-
Sep 1	48866	-118	11	11	-15	-10	-7	2	0
Sep 2	48867	-120	9	-14	-22	6	-13	-3	2
Sep 3	48868	-121	-2	-5	-16	-20	12	-1	3
Sep 4	48869	-121	0	20	-35	-19	-7	0	-1
Sep 5	48870	-120	0	-17	-28	3	10	-1	-3
Sep 6	48871	-123	4	6	-16	1	7	6	6
Sep 7	48872	-126	-2	-14	-30	-	-5	-1	10
Sep 8	48873	-125	7	1	-20	2	13	2	-1
Sep 9	48874	-122	4	-9	-17	9	1	5	2
Sep 10	48875	-126	-1	10	-26	-2	-8	-1	2
Sep 11	48876	-135	15	-42	-17	-16	3	0	-2
Sep 12	48877	-138	7	37	-24	-4	14	3	1
Sep 13	48878	-139	-2	11	-26	6	9	0	4
Sep 14	48879	-138	5	14	-29	12	17	1	1
Sep 15	48880	-136	1	4	-28	-1	-20	-1	5
Sep 16	48881	-128	-2	-1	-13	-13	7	1	-2
Sep 17	48882	-119	-3	6	-6	9	13	-1	8
Sep 18	48883	-112	-13	5	-4	-1	4	5	-2
Sep 19	48884	-112	2	1	-25	9	16	7	4
Sep 20	48885	-116	1	15	-13	-2	6	6	7
Sep 21	48886	-122	-97	10	-39	-7	-6	4	4
Sep 22	48887	-124	-110	37	-74	-29	-10	-19	20
Sep 23	48888	-122	-4	23	-66	-	20	-76	28
Sep 24	48889	-123	57	-58	-88	40	-13	-69	37

Section 4 (Cont.)

r(ns) Block II

Date 1992 0hUTC	MJD	C0 (ns)	PRN23 NAV23 10h48m	PRN17 NAV17 11h36m	PRN21 NAV21 11h52m	PRN15 NAV15 13h44m	PRN14 NAV14 16h40m	PRN18 NAV18 19h36m
Aug 25	48859	-126	1	7	93	4	-7	106
Aug 26	48860	-124	17	-79	-45	-2	-48	-27
Aug 27	48861	-124	-47	70	-25	0	-9	-47
Aug 28	48862	-125	1	34	3	-3	-23	-7
Aug 29	48863	-124	148	72	-15	0	58	-17
Aug 30	48864	-119	-75	23	-19	1	-	-12
Aug 31	48865	-116	-18	-45	117	-4	31	-31
Sep 1	48866	-118	4	7	-12	-24	-9	1
Sep 2	48867	-120	-11	-12	-11	-3	-9	3
Sep 3	48868	-121	2	10	17	-21	5	-4
Sep 4	48869	-121	-5	-10	2	-1	-5	-
Sep 5	48870	-120	4	-19	1	24	-3	-7
Sep 6	48871	-123	2	-9	21	9	-1	-7
Sep 7	48872	-126	3	18	-22	-32	-6	-15
Sep 8	48873	-125	7	-6	16	5	-5	2
Sep 9	48874	-122	15	7	8	-2	-4	4
Sep 10	48875	-126	19	-10	14	21	10	-3
Sep 11	48876	-135	-10	-1	-10	-34	-9	-6
Sep 12	48877	-138	-4	-10	9	-49	9	4
Sep 13	48878	-139	3	6	1	26	-5	8
Sep 14	48879	-138	2	-3	5	-30	-2	16
Sep 15	48880	-136	-5	9	-24	-34	6	-7
Sep 16	48881	-128	4	7	15	-10	-3	-5
Sep 17	48882	-119	0	1	10	-9	4	16
Sep 18	48883	-112	1	-10	15	-4	-5	-11
Sep 19	48884	-112	8	-3	-12	-7	-5	12
Sep 20	48885	-116	3	-4	20	-13	3	-6
Sep 21	48886	-122	-6	-5	-4	7	13	9
Sep 22	48887	-124	9	-1	32	-13	-	32
Sep 23	48888	-122	-18	-51	-74	-2	23	-2
Sep 24	48889	-123	-62	-31	-16	-23	3	64

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)
Aug 25	48859	-10.66	0.05
Sep 4	48869	-10.83	0.06
Sep 14	48879	-11.01	0.05
Sep 24	48889	-11.19	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	48829-48889	+5.4	10.0
PTB-CS1	48829-48889	-1.7	3.0
PTB-CS2	48829-48889	+1.5	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 48829-48889 .