ISSN 1143-1393

BIPM

BUREAU INTERNATIONAL DES POIDS ET MESURES

Circular T 58 (1992 November 30)

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

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

Date 1992 0hUTC		Sep 24	Oct 4	Oct 14	Oct 24
MJD		48889	48899	48909	48919
Laboratory k		UTC-UTC(k) (Unit = 1 microsecond)			
AOS (Borowiec)		0.99	1.68	1.29	1.29
APL (Laurel)		-0.25	-0.30	-0.36	-0.36
AUS (Canberra)		-0.14	-0.10	-0.07	-0.06
BEV (Wien)		-6.13	-7.21	-8.35	-9.48
CAO (Cagliari)		-23.05	-23.46	-23.84	-24.20
CH (Bern)		0.12	0.05	-0.05	-0.08
CRL (Tokyo)		2.26	2.28	2.30	2.32
CSAO (Lintong)		-0.50	-0.52	-0.49	-0.51
DPT (Pretoria)		-20.98	-20.72	-20.36	-20.04
FTZ (Darmstadt)		-	-	-	-
IEN (Torino)		-0.13	-0.07	-0.05	-0.02
IFAG (Wettzell)		3.08	3.29	3.52	3.61
IGMA (Buenos Aires)		-1.87	-1.76	-1.68	-1.61
INPL (Jerusalem)		-0.91	-0.84	-0.76	-0.69
JATC (Lintong)		-0.03	-0.24	-0.32	-0.52
KRIS (Taejon)		-	-	-	-
LDS (Leeds)		6.54	5.64	4.62	3.73
MSL (Lower Hutt)		-3.33	-3.44	-3.59	-3.72
NAOM (Mizusawa)		-2.01	-1.75	-1.50	-1.25
NAOT (Tokyo)		0.12	0.12	0.12	0.05
NIM (Beijing)		7.36	7.32	7.29	7.34
NIST (Boulder)		-0.22	-0.25	-0.27	-0.29
NMC (Sofiya)		1.84	-1.71	-2.83	-1.61
NPL (Teddington)		-0.03	-0.01	0.00	0.01
NPLI (New-Delhi)	(1)	40.60	-	41.57	-8.45
NRC (Ottawa)		-0.94	-0.81	-0.68	-0.54
NRLM (Tsukuba)		-6.15	-6.75	-7.34	-7.93
OMH (Budapest)		-	-	-	-
ONBA (Buenos Aires)		-65.87	-66.79	-67.44	-66.31
ONRJ (Rio de Janeiro)		-2.27	-1.53	-1.08	-1.01
OP (Paris)		-0.59	-0.58	-0.62	-0.68
ORB (Bruxelles)		-0.06	-0.02	0.02	0.15
PKNM (Warszawa)		1.40	1.35	1.29	1.12
PTB (Braunschweig)		2.89	2.87	2.85	2.83
RC (Habana)		-3.08	-3.37	-	-
ROA (San Fernando)		3.33	3.38	3.38	3.41
SCL (Wan Chai)		-12.27	-13.66	-14.97	-16.35
SNT (Stockholm)		0.02	-0.10	-0.21	-0.32
SO (Shanghai)		1.55	1.61	1.86	1.67
SU (Moskva)		1.72	1.61	1.50	1.40
TL (Chung-Li)		1.11	1.02	0.92	0.89
TP (Praha)		-0.45	-0.51	-0.59	-0.62
TUG (Graz)		2.46	2.74	3.06	3.35
USNO (Washington DC)(USNO MC)		-0.14	-0.10	-0.07	-0.06
VSL (Delft)		0.39	0.27	0.17	0.02

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		Sep 24	Oct 4	Oct 14	Oct 24
MJD		48889	48899	48909	48919
Laboratory k		TAI-TA(k) (Unit = 1 microsecond)			
APL (Laurel)		1.21	1.17	1.10	1.10
AUS (Canberra)		-42.56	-42.68	-42.87	-43.05
CH (Bern)		-74.07	-74.16	-74.28	-74.37
CRL (Tokyo)		15.83	16.17	16.51	16.85
CSAO (Lintong)		21.38	21.30	21.30	21.23
F (Paris)		106.87	107.23	107.59	107.96
JATC (Lintong)		3.72	3.84	4.07	4.06
KRIS (Taejon)		-	-	-	-
NIM (Beijing)		-10.18	-10.19	-10.21	-10.14
NISA (Boulder)	(2)	-45090.92	-45091.29	-45091.66	-45092.03
NIST (Boulder)		-45198.00	-45198.64	-45199.28	-45199.92
NRC (Ottawa)		15.13	15.26	15.39	15.53
PTB (Braunschweig)		-360.51	-360.53	-360.55	-360.56
RC (Habana)	(3)	-310.06	-310.96	-	-
SO (Shanghai)		-45.96	-45.90	-45.66	-45.81
SU (Moskva)		2827251.72	2827251.61	2827251.50	2827251.40
USNO (Washington DC)	(4)	-34658.50	-34659.17	-34659.84	-34660.52

3 - Notes on sections 1 and 2.

(1) NPLI. Time step of UTC(NPLI) of 50 μs on MJD=48910.25

(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 2h24m	PRN 3 NAV11 6h 8m	PRN11 NAV 8 10h40m	PRN13 NAV 9 16h32m
Sep 24	48889	-118	1	-6	4	-
Sep 25	48890	-121	-2	-4	-	0
Sep 26	48891	-123	2	8	1	-2
Sep 27	48892	-125	-5	1	6	-8
Sep 28	48893	-126	-7	1	-	-5
Sep 29	48894	-123	1	0	-	7
Sep 30	48895	-121	-5	-5	-	-9
Oct 1	48896	-119	-9	2	-	1
Oct 2	48897	-112	3	-4	-	-
Oct 3	48898	-106	-6	9	5	-8
Oct 4	48899	-103	-13	2	14	10
Oct 5	48900	-110	-16	-5	15	-6
Oct 6	48901	-115	2	0	-	-18
Oct 7	48902	-112	-3	-3	14	6
Oct 8	48903	-102	-5	8	11	-7
Oct 9	48904	-96	-5	-5	8	-14
Oct 10	48905	-89	-20	9	8	7
Oct 11	48906	-82	-11	-2	19	-8
Oct 12	48907	-78	-11	-3	3	-4
Oct 13	48908	-70	-7	1	13	8
Oct 14	48909	-63	-3	1	8	-15
Oct 15	48910	-59	1	-	14	-5
Oct 16	48911	-54	-3	0	5	-18
Oct 17	48912	-47	0	1	7	-1
Oct 18	48913	-39	2	4	-1	-
Oct 19	48914	-36	-8	11	0	-12
Oct 20	48915	-39	-4	2	10	12
Oct 21	48916	-47	-11	-3	5	-10
Oct 22	48917	-52	-2	4	5	-14
Oct 23	48918	-52	-1	14	13	-14
Oct 24	48919	-53	-3	10	12	-2

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 18h20m	PRN16 NAV16 20h12m	PRN19 NAV19 21h 0m	PRN 2 NAV13 0h 0m	PRN20 NAV20 3h12m	PRN25 NAV25 5h 4m	PRN28 NAV28 8h16m
Sep 24	48889	-118	57	-58	-88	40	-12	-68	38
Sep 25	48890	-121	-41	2	12	-30	11	93	47
Sep 26	48891	-123	-42	-52	-5	14	12	-41	13
Sep 27	48892	-125	138	-2	91	36	4	80	-42
Sep 28	48893	-126	81	43	-42	44	1	41	-29
Sep 29	48894	-123	-42	11	-89	25	-1	-	85
Sep 30	48895	-121	13	81	-48	27	0	13	58
Oct 1	48896	-119	-16	3	-62	-101	17	41	4
Oct 2	48897	-112	20	-46	-109	47	6	-88	-93
Oct 3	48898	-106	13	-28	68	72	1	29	5
Oct 4	48899	-103	5	120	-33	118	17	-34	47
Oct 5	48900	-110	2	133	-20	-80	19	78	-8
Oct 6	48901	-115	-4	6	-79	17	13	23	-135
Oct 7	48902	-112	8	31	-46	4	11	30	-8
Oct 8	48903	-102	18	-91	-40	49	7	-54	-13
Oct 9	48904	-96	12	37	-39	28	12	-7	94
Oct 10	48905	-89	-54	28	36	-29	26	-19	17
Oct 11	48906	-82	-6	-68	-15	-48	-2	83	-30
Oct 12	48907	-78	8	-12	25	75	20	-104	16
Oct 13	48908	-70	36	36	90	13	-24	2	58
Oct 14	48909	-63	-13	-38	-79	-79	7	46	12
Oct 15	48910	-59	-30	-58	-21	0	17	8	117
Oct 16	48911	-54	6	-55	72	64	4	3	-8
Oct 17	48912	-47	-120	27	-44	12	9	-18	-15
Oct 18	48913	-39	8	-28	-51	-56	20	18	-65
Oct 19	48914	-36	-14	-52	-11	43	-4	49	22
Oct 20	48915	-39	63	118	-82	53	11	79	54
Oct 21	48916	-47	3	3	-42	-9	20	-	-34
Oct 22	48917	-52	56	-29	-58	24	-6	-82	15
Oct 23	48918	-52	79	-79	-9	90	7	87	2
Oct 24	48919	-53	20	80	47	-10	-8	16	13

Section 4 (Cont.)

r(ns) Block II

Date 1992 0hUTC	MJD	C0 (ns)	PRN23 NAV23 8h48m	PRN17 NAV17 9h36m	PRN21 NAV21 9h52m	PRN15 NAV15 11h44m	PRN14 NAV14 14h40m	PRN18 NAV18 17h36m
Sep 24	48889	-118	-61	-31	-16	-22	3	65
Sep 25	48890	-121	26	-	-37	-40	-8	-57
Sep 26	48891	-123	-6	21	13	25	24	72
Sep 27	48892	-125	141	-36	-37	-13	10	104
Sep 28	48893	-126	52	33	20	19	18	-2
Sep 29	48894	-123	-68	-9	-14	16	51	27
Sep 30	48895	-121	6	-7	32	-16	-54	-17
Oct 1	48896	-119	14	3	-4	-3	-19	45
Oct 2	48897	-112	-3	71	-52	-9	13	-81
Oct 3	48898	-106	65	20	-59	4	12	-47
Oct 4	48899	-103	-28	21	30	2	-42	10
Oct 5	48900	-110	-	40	24	38	-66	-10
Oct 6	48901	-115	-	-58	-31	-22	44	-13
Oct 7	48902	-112	-19	22	-44	-23	-18	10
Oct 8	48903	-102	14	-74	116	-19	-30	-
Oct 9	48904	-96	-100	-48	-108	15	-45	24
Oct 10	48905	-89	11	-4	59	-2	-20	39
Oct 11	48906	-82	48	-68	13	15	-2	-57
Oct 12	48907	-78	54	39	61	11	-73	-18
Oct 13	48908	-70	-45	-14	-61	18	6	-32
Oct 14	48909	-63	-48	70	-92	-10	98	48
Oct 15	48910	-59	-47	88	-50	-8	-5	69
Oct 16	48911	-54	-21	31	-24	7	-2	10
Oct 17	48912	-47	76	124	39	4	-83	-1
Oct 18	48913	-39	-15	52	17	27	83	13
Oct 19	48914	-36	54	52	1	20	-55	-29
Oct 20	48915	-39	-54	-34	15	2	-18	8
Oct 21	48916	-47	-58	4	34	-3	11	7
Oct 22	48917	-52	-26	38	-115	4	51	-22
Oct 23	48918	-52	-4	5	-2	12	-112	44
Oct 24	48919	-53	-39	28	31	-10	6	-14

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)
Sep 24	48889	-11.19	0.06
Oct 4	48899	-11.42	0.06
Oct 14	48909	-11.68	0.05
Oct 24	48919	-11.85	0.07

6 - Measurement of UTC(j)-UTC(k).

Date 1992	MJD	Time comparisons (Unit : 1 microsecond)	uncert.	source	meth.
Oct 14	48909.05	UTC(CRL)-UTC(NAOT) = -2.254	0.005	CRL report	(1)

(1) Clock Transportation.

7 - 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	48859-48919	-5.5	10.0
PTB-CS1	48859-48919	-0.9	3.0
PTB-CS2	48859-48919	+1.7	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 48859-48919 .