ISSN 1143-1393

BIPM

BUREAU INTERNATIONAL DES POIDS ET MESURES

Circular T 54 (1992 July 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		May 27	Jun 6	Jun 16	Jun 26
MJD		48769	48779	48789	48799
Laboratory k		UTC-UTC(k) (Unit = 1 microsecond)			
AOS (Borowiec)		-1.36	-1.67	-1.43	-1.43
APL (Laurel)	(1)	0.03	0.22	0.64	0.86
AUS (Canberra)		-0.07	-0.06	-0.05	-0.08
BEV (Wien)		5.87	4.88	3.91	2.89
CAO (Cagliari)		-17.91	-18.24	-18.60	-19.01
CH (Bern)		0.97	0.92	0.87	0.79
CRL (Tokyo)		2.31	2.28	2.25	2.20
CSAO (Lintong)		-0.77	-0.63	-0.67	-0.66
DPT (Pretoria)	(2)	-22.88	-22.71	-22.51	-22.37
FTZ (Darmstadt)		24.85	24.94	25.01	25.36
IEN (Torino)		-0.74	-0.71	-0.69	-0.69
IFAG (Wettzell)		-0.16	-0.05	0.08	0.24
IGMA (Buenos Aires)	(3)	-1.82	-1.84	-1.88	-1.92
INPL (Jerusalem)	(4)	-2.80	-2.69	-2.66	-2.41
JATC (Lintong)		0.60	0.63	0.43	0.41
KRIS (Taejon)		0.47	0.46	0.46	0.46
LDS (Leeds)		-33.93	-34.81	-35.87	-37.10
NAOM (Mizusawa)		-4.95	-4.71	-4.48	-4.27
NAOT (Tokyo)		0.79	0.73	0.67	0.60
NIM (Beijing)		7.49	7.45	7.38	7.66
NIST (Boulder)		0.09	0.13	0.14	0.09
NMC (Sofiya)		3.00	3.49	4.89	-
NPL (Teddington)	(5)	0.04	0.02	0.01	-0.02
NPLI (New-Delhi)		34.22	-	-	-
NRC (Ottawa)	(6)	-0.48	-0.59	-0.69	-0.43
NRLM (Tsukuba)		-1.54	-1.59	-1.68	-1.81
OMH (Budapest)		-	-	-	-
ONBA (Buenos Aires)		-53.78	-54.94	-56.15	-57.23
ONRJ (Rio de Janeiro)		-1.03	-1.50	-2.02	-2.59
OP (Paris)		-0.86	-0.88	-0.88	-0.91
ORB (Bruxelles)		0.67	0.45	0.52	0.56
PEL (Lower Hutt)		-2.07	-2.24	-2.42	-2.60
PKNM (Warszawa)		0.70	0.67	0.78	0.81
PTB (Braunschweig)		3.14	3.12	3.10	3.04
RC (Habana)		-3.24	-3.25	-3.29	-3.37
ROA (San Fernando)		3.42	3.37	3.31	3.28
SNT (Stockholm)		0.12	0.12	0.12	0.07
SO (Shanghai)		1.88	1.77	1.84	1.88
SU (Moskva)		3.04	2.93	2.82	2.68
TL (Chung-Li)		1.22	1.26	1.25	1.24
TP (Praha)		-0.34	-0.26	-0.30	-0.33
TUG (Graz)		-1.37	-1.04	-0.72	-0.43
USNO (Washington DC)	(USNO)	-0.07	-0.06	-0.05	-0.08
VSL (Delft)		1.24	1.14	1.07	0.95

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		May 27	Jun 6	Jun 16	Jun 26
MJD		48769	48779	48789	48799
Laboratory k		TAI-TA(k) (Unit = 1 microsecond)			
APL (Laurel)		-0.47	-0.29	-0.10	0.12
AUS (Canberra)		-40.49	-40.63	-40.87	-41.15
CH (Bern)		-72.93	-73.01	-73.08	-73.20
CRL (Tokyo)		12.04	12.32	12.61	12.89
CSAO (Lintong)		21.87	21.86	21.72	21.63
F (Paris)		102.93	103.24	103.57	103.85
JATC (Lintong)		1.69	1.80	1.96	2.12
KRIS (Taejon)		-32.32	-32.74	-33.15	-33.48
NIM (Beijing)		-10.32	-10.34	-10.38	-10.08
NISA (Boulder)	(7)	-45086.48	-45086.81	-45087.16	-45087.56
NIST (Boulder)		-45190.24	-45190.88	-45191.52	-45192.20
NRC (Ottawa)		15.98	15.88	15.78	15.64
PTB (Braunschweig)		-360.25	-360.28	-360.30	-360.36
RC (Habana)	(8)	-303.27	-303.80	-304.35	-304.96
SO (Shanghai)		-45.63	-45.75	-45.72	-45.66
SU (Moskva)		2827253.04	2827252.93	2827252.82	2827252.68
USNO (Washington DC)	(9)	-34650.39	-34651.06	-34651.72	-34652.43

3 - Notes on sections 1 and 2.

(1) APL . Time steps of UTC(APL) of -0.080 µs on MJD = 48784.8
and of -0.150 µs on MJD = 48788.5

(2) DPT . Corrected value of UTC-UTC(DPT) :

MJD	UTC-UTC(DPT)
48749	-23.26

(3) IGMA . Corrected values of UTC-UTC(IGMA) :

MJD	UTC-UTC(IGMA)
48729	-1.72
48739	-1.74

(4) INPL . Apparent time step of UTC(INPL) of -0.130 µs on MJD = 48790.1

(5) NPL . Change of master clock on MJD = 48783

(6) NRC . Time step of UTC(NRC) of -0.400 µs on MJD = 48789.5

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

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

(9) 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 14h20m	PRN11 NAV 8 18h52m	PRN13 NAV 9 0h48m	PRN 6 NAV 3 6h24m	PRN12 NAV10 9h20m
May 27	48769	-76	6	-	-4	-	-3
May 28	48770	-80	6	-12	4	-	2
May 29	48771	-84	6	-	-6	-	-4
May 30	48772	-86	1	-9	-8	-	5
May 31	48773	-87	5	-	3	-	7
Jun 1	48774	-87	1	4	-14	-	-1
Jun 2	48775	-84	4	-	-12	-	3
Jun 3	48776	-79	2	-	-2	-	2
Jun 4	48777	-72	4	-13	2	-	5
Jun 5	48778	-63	4	-4	-18	-	8
Jun 6	48779	-51	-1	5	-6	-	4
Jun 7	48780	-39	1	2	-	-	-2
Jun 8	48781	-33	0	9	-14	-	-5
Jun 9	48782	-34	7	4	-13	-	-12
Jun 10	48783	-38	-	-	-	-	-
Jun 11	48784	-41	-	-	-	-	-
Jun 12	48785	-39	2	-	-1	-	1
Jun 13	48786	-35	9	-	-1	-	-4
Jun 14	48787	-35	5	-5	-8	-	-4
Jun 15	48788	-38	9	-	-10	-	5
Jun 16	48789	-44	1	-12	7	-	2
Jun 17	48790	-50	1	-5	-	-	7
Jun 18	48791	-53	1	-	-6	-	4
Jun 19	48792	-50	6	-	-8	-	-5
Jun 20	48793	-44	12	-	-4	-	3
Jun 21	48794	-42	6	-13	-11	-	0
Jun 22	48795	-42	4	-	-13	-	10
Jun 23	48796	-42	4	6	-10	-	1
Jun 24	48797	-43	3	-8	-	-	-2
Jun 25	48798	-48	7	-	-8	-	7
Jun 26	48799	-57	-3	-9	-	-	1

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 17h 0m	PRN17 NAV17 17h48m	PRN21 NAV21 18h 4m	PRN15 NAV15 19h56m	PRN14 NAV14 22h52m	PRN18 NAV18 0h 0m
May 27	48769	-76	-57	101	52	13	3	29
May 28	48770	-80	4	59	59	-74	-11	-39
May 29	48771	-84	2	41	-	-10	-16	-52
May 30	48772	-86	84	60	-35	-15	81	9
May 31	48773	-87	41	-14	-19	-61	69	-44
Jun 1	48774	-87	-5	5	23	-11	-140	-34
Jun 2	48775	-84	46	-47	-8	-27	-16	-17
Jun 3	48776	-79	-61	10	-25	-22	-37	-59
Jun 4	48777	-72	-8	5	25	1	-34	-27
Jun 5	48778	-63	14	-67	12	-35	27	-15
Jun 6	48779	-51	-9	-50	-69	-42	22	49
Jun 7	48780	-39	57	23	67	-46	45	-62
Jun 8	48781	-33	-46	44	54	-15	-	1
Jun 9	48782	-34	-6	32	96	120	78	65
Jun 10	48783	-38	-	-	-	-	-	-
Jun 11	48784	-41	-	-	-	-	-	-
Jun 12	48785	-39	-22	-13	48	-29	-32	3
Jun 13	48786	-35	-	58	27	59	-10	-62
Jun 14	48787	-35	20	72	73	-7	7	-15
Jun 15	48788	-38	71	25	54	-59	-27	0
Jun 16	48789	-44	-47	-34	6	-1	-	-76
Jun 17	48790	-50	-47	9	48	-27	-1	64
Jun 18	48791	-53	71	2	-72	22	38	-4
Jun 19	48792	-50	-9	0	-41	-53	10	-47
Jun 20	48793	-44	-	22	20	14	49	20
Jun 21	48794	-42	-52	-32	68	22	-49	-19
Jun 22	48795	-42	117	-34	-15	-23	-40	21
Jun 23	48796	-42	48	-54	15	9	-73	48
Jun 24	48797	-43	62	-20	66	16	-1	5
Jun 25	48798	-48	-61	-31	-20	0	-5	-2
Jun 26	48799	-57	-117	62	3	15	-36	59

Section 4 (Cont.)

r(ns) Block II

Date 1992 0hUTC	MJD	C0 (ns)	PRN24 NAV24 2h24m	PRN19 NAV19 2h40m	PRN16 NAV16 4h48m	PRN 2 NAV13 8h16m	PRN20 NAV20 11h28m
May 27	48769	-76	-15	-41	52	26	7
May 28	48770	-80	8	-8	77	-34	23
May 29	48771	-84	75	71	6	20	3
May 30	48772	-86	3	-50	-46	27	-7
May 31	48773	-87	38	23	34	-59	6
Jun 1	48774	-87	62	-31	14	-53	-2
Jun 2	48775	-84	-7	-62	67	-48	-71
Jun 3	48776	-79	34	-2	-6	40	83
Jun 4	48777	-72	25	-66	-55	25	67
Jun 5	48778	-63	55	-9	-1	28	-
Jun 6	48779	-51	-11	-98	-59	50	-1
Jun 7	48780	-39	-47	65	-37	2	-68
Jun 8	48781	-33	-54	22	-39	-51	19
Jun 9	48782	-34	27	-32	38	-3	-2
Jun 10	48783	-38	-23	-69	-47	-	-
Jun 11	48784	-41	-	-	-	-	-
Jun 12	48785	-39	-	-	-	-	46
Jun 13	48786	-35	61	62	45	-86	-65
Jun 14	48787	-35	52	-29	-59	98	60
Jun 15	48788	-38	117	5	-25	-17	53
Jun 16	48789	-44	-6	-64	47	7	50
Jun 17	48790	-50	27	-101	-30	-27	18
Jun 18	48791	-53	12	-46	27	-36	63
Jun 19	48792	-50	-86	8	28	-20	24
Jun 20	48793	-44	-22	8	-10	50	-15
Jun 21	48794	-42	30	-80	-	28	24
Jun 22	48795	-42	28	9	4	-8	0
Jun 23	48796	-42	-	-15	-39	-74	45
Jun 24	48797	-43	28	84	38	35	-24
Jun 25	48798	-48	79	39	28	-25	7
Jun 26	48799	-57	25	-50	-14	-80	-70

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)
May 27	48769	-8.99	0.05
Jun 6	48779	-9.11	0.07
Jun 16	48789	-9.26	0.06
Jun 26	48799	-9.51	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	48739-48799	+12.2	10.0
PTB-CS1	48739-48799	-0.3	3.0
PTB-CS2	48739-48799	+2.7	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:

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

in SI second on the rotating geoid, for the two-month interval 48739-48799 .