BUREAU INTERNATIONAL DES POIDS ET MESURES
ISSN 1143-1393

Circular T 183 (2003 April 16)
Circulaire T 183

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

(From 1999 January 1, 0h UTC, *TAI*-*UTC* = 32 s)

Date 2003 0h UTC	Feb 24	Mar 1	Mar 6	Mar 11
MJD	52694	52699	52704	52709
Laboratory *k*		[*UTC*-*UTC*(*k*)]/ns		
AOS (Borowiec)	-128	-133	-147	-151
AUS (Sydney)	-170	-174	-179	-199
BEV (Wien) (1)	124	-11	-9	-5
BIRM (Beijing)	-	830	836	837
CAO (Cagliari)	-	-	-	-
CH (Bern)	-11	-19	-28	-17
CNM (Queretaro)	107	103	99	94
CRL (Tokyo)	3	2	4	4
CSIR (Pretoria)	-	-	-	-
DLR (Oberpfaffenhofen)	-	-	-	-
DTAG (Darmstadt)	435	438	459	467
IEN (Torino)	11	-1	3	3
IFAG (Wettzell)	-1838	-1861	-1869	-1891
IGMA (Buenos Aires)	-84	-85	-85	-86
INPL (Jerusalem)	-7079	-7111	-7161	-7204
IPQ (Monte de Caparica)	-	-	-	-
JATC (Lintong)	-12023	-12020	-12001	-11990
JV (Kjeller) (2)	-	-5467	-5581	-5678
KRIS (Daejon)	-7	-26	-28	-30
LDS (Leeds)	3031	3067	3086	3119
LT (Vilnius)	-165	-169	-168	-170
MSL (Lower Hutt)	-62	-76	-78	-123
NAO (Mizusawa)	-16	-19	-11	-14
NIM (Beijing)	-2615	-2612	-2614	-2613
NIMB (Bucharest)	190	181	158	141
NIMT (Bangkok)	-584	-608	-628	-652
NIST (Boulder)	8	7	9	11
NMC (Sofiya)	-2514	-2530	-2544	-2536
NMIJ (Tsukuba)	190	194	188	185
NMLS (Shah Alam)	149	138	109	88
NPL (Teddington)	40	40	41	44
NPLI (New-Delhi)	3497	3529	3574	3609
NRC (Ottawa)	22	23	16	7
NTSC (Lintong)	-14	-14	-16	-25
OMH (Budapest)	7673	7681	7699	7713
ONBA (Buenos Aires)	-705	-787	-815	-746
ONRJ (Rio de Janeiro)	5300	5297	5323	5348
OP (Paris)	-50	-49	-43	-40
ORB (Bruxelles)	-5	-5	-3	-4
PL (Warszawa)	68	80	86	89
PTB (Braunschweig)	-4	-4	-2	-2
ROA (San Fernando)	94	97	102	92
SCL (Hong Kong)	4	3	-5	-2
SG (Singapore)	-90	-87	-91	-93
SMU (Bratislava)	-7760	-7789	-7797	-7809
SP (Boras)	-170	-168	-177	-177
SU (Moskva)	28	29	32	32
TCC (Concepcion)	-2262	-2329	-2395	-2427
TL (Chung-Li)	-47	-53	-51	-59
TP (Praha)	-39	-35	-37	-35
UME (Gebze-Kocaeli)	-855	-867	-864	-871
USNO (Washington DC)(USNO MC)	5	6	5	5
VSL (Delft)	-31	-23	-23	-19

ORGANISATION INTERGOUVERNEMENTALE DE LA CONVENTION DU MÈTRE
PAVILLON DE BRETEUIL F-92312 SÈVRES CEDEX TÉL. + 33 1 45 07 70 70 FAX + 33 1 45 34 20 21

1 - Coordinated Universal Time UTC. (Cont.)

Date 2003 0h UTC	Mar 16	Mar 21	Mar 26	Mar 31
MJD	52714	52719	52724	52729
Laboratory *k*		[*UTC*-*UTC*(*k*)]/ns		
AOS (Borowiec)	-163	-175	-198	-203
AUS (Sydney)	-190	-173	-186	-201
BEV (Wien)	-9	-11	-14	-13
BIRM (Beijing)	853	866	874	891
CAO (Cagliari)	-	-	-	-
CH (Bern)	-1	5	-4	-1
CNM (Queretaro)	90	88	92	94
CRL (Tokyo)	1	10	8	8
CSIR (Pretoria)	-	-	-	-
DLR (Oberpfaffenhofen)	-	-	-	-
DTAG (Darmstadt)	475	477	480	486
IEN (Torino)	-4	-2	0	0
IFAG (Wettzell)	-1894	-1923	-1930	-1914
IGMA (Buenos Aires)	-85	-88	-88	-82
INPL (Jerusalem)	-7262	-7316	-7367	-7418
IPQ (Monte de Caparica)	-	-	-	-
JATC (Lintong)	-11974	-11962	-11942	-11936
JV (Kjeller)	-5795	-5916	-	-6155
KRIS (Daejon)	-42	-40	-41	-22
LDS (Leeds)	3162	3175	3184	3213
LT (Vilnius)	-177	-175	-184	-169
MSL (Lower Hutt)	-129	-100	-71	-40
NAO (Mizusawa)	-6	-6	-1	3
NIM (Beijing)	-2614	-2616	-2621	-2617
NIMB (Bucharest)	127	96	74	84
NIMT (Bangkok)	-687	-705	-731	-745
NIST (Boulder)	11	12	12	11
NMC (Sofiya)	-2540	-2553	-2572	-2574
NMIJ (Tsukuba)	178	171	161	152
NMLS (Shah Alam)	69	56	38	16
NPL (Teddington)	45	49	47	43
NPLI (New-Delhi)	3654	3706	3756	3796
NRC (Ottawa)	10	17	19	23
NTSC (Lintong)	-28	-32	-23	-23
OMH (Budapest)	7736	7750	7758	7761
ONBA (Buenos Aires)	-808	-755	-653	-571
ONRJ (Rio de Janeiro)	5361	5363	5380	5397
OP (Paris)	-31	-17	-13	-5
ORB (Bruxelles)	-3	-6	-8	-13
PL (Warszawa)	94	96	112	122
PTB (Braunschweig)	1	1	1	1
ROA (San Fernando)	89	90	92	87
SCL (Hong Kong)	-7	-12	-30	-32
SG (Singapore)	-93	-74	-28	1
SMU (Bratislava)	-7840	-7863	-7870	-7893
SP (Boras)	-173	-164	-164	-166
SU (Moskva)	31	30	31	29
TCC (Concepcion)	-2492	-2553	-2609	-2630
TL (Chung-Li)	-60	-50	-54	-54
TP (Praha)	-41	-44	-39	-35
UME (Gebze-Kocaeli)	-890	-905	-912	-927
USNO (Washington DC)(USNO MC)	6	5	4	3
VSL (Delft)	-21	-20	-16	-9

2 - International Atomic Time TAI and local atomic time scales TA(*k*).

The following table gives the computed values of [*TAI*-*TA*(*k*)].

Date 2003 0h UTC	Feb 24	Mar 1	Mar 6	Mar 11
MJD	52694	52699	52704	52709
Laboratory *k*	[*TAI*-*TA*(*k*)]/ns			
AUS (Sydney)	-119780	-119842	-119940	-120037
CH (Bern)	29501	29665	29828	29992
CRL (Tokyo)	169514	169718	169921	170123
F (Paris)	168839	168856	168871	168883
IEN (Torino)	25297	25418	25538	25666
JATC (Lintong)	-28278	-28382	-28490	-28596
KRIS (Taejon)	6083	6068	6058	6051
NIST (Boulder)	-45246398	-45246601	-45246801	-45247001
NRC (Ottawa)	28454	28459	28457	28452
NTSC (Lintong)	-43	-41	-38	-37
PL (Warszawa)	-1186	-1198	-1208	-1218
PTB (Braunschweig)	-359589	-359584	-359577	-359572
SU (Moskva) (3)	27241028	27241029	27241032	27241032
USNO (Washington DC)	-34904072	-34904381	-34904693	-34905002

Date 2003 0h UTC	Mar 16	Mar 21	Mar 26	Mar 31
MJD	52714	52719	52724	52729
Laboratory *k*	[*TAI*-*TA*(*k*)]/ns			
AUS (Sydney)	-120118	-120214	-120262	-120327
CH (Bern)	30160	30321	30477	30645
CRL (Tokyo)	170323	170532	170732	170933
F (Paris)	168899	168912	168926	168935
IEN (Torino)	25778	25901	26024	26141
JATC (Lintong)	-28694	-28797	-28902	-29011
KRIS (Taejon)	6044	6047	6038	6037
NIST (Boulder)	-45247203	-45247404	-45247604	-45247805
NRC (Ottawa)	28459	28470	28477	28485
NTSC (Lintong)	-30	-26	-20	-19
PL (Warszawa)	-1236	-1247	-1261	-1263
PTB (Braunschweig)	-359564	-359559	-359554	-359549
SU (Moskva) (3)	27241031	27241030	27241031	27241029
USNO (Washington DC)	-34905311	-34905622	-34905933	-34906244

3 - Notes on sections 1 and 2.

(1) BEV . Time step of UTC(BEV) of +125 ns due to a change of master clock on MJD = 52698.5.

(2) JV . Justervesenet, Norwegian Metrology and Accreditation Service.

(3) SU . Listed values are *TAI*-*TA*(*SU*) - 2.80 seconds.

4 - Difference between the normalized frequencies of EAL and TAI.

Interval of validity		$f(EAL)-f(TAI)$
2003 Jan. 30 - 2003 Mar. 31	52669-52729	6.980×10^{-13}
New steering correction foreseen for April and May 2003		
2003 Mar. 31 - 2003 May 30	52729-52789	6.970×10^{-13}

5 - Duration of the TAI scale interval.

TAI is a realization of coordinate time TT. The following tables give the fractional deviation d of the scale interval of TAI from that of TT (the SI second on the geoid), i.e. the fractional frequency deviation of TAI with the opposite sign: $d = -y_{TAI}$. In this section, a frequency over a time interval is defined as the ratio of the end-point phase difference to the duration of the interval. Whenever needed, the instability of EAL should be expressed as the quadratic sum of three components:

a white frequency noise $6.0 \times 10^{-15} / \sqrt{\tau}$,
a flicker frequency noise 0.6×10^{-15},
a random walk frequency noise $1.6 \times 10^{-16} \times \sqrt{\tau}$,

with τ in days. The relation between EAL and TAI is given in Circular T and the Annual Report of the BIPM Time Section.

In the first table, d is obtained, on the given periods of estimation by comparison of the TAI frequency with that of the given individual primary standards (PFS). In this table

u_B is the combined uncertainty from systematic effects,
Ref(u_B) is a reference giving information on the stated value of uB or is the *Circular T* where this reference was first given,
u_A is the uncertainty originating in the instability of the PFS,
$u_{l/lab}$ is the uncertainty in the link between the PFS and the clock participating to TAI,
$u_{l/TAI}$ is the uncertainty in the link to TAI,
u is the quadratic sum of all four uncertainty values.

Standard	Period of estimation	$10^{15}d$	$10^{15}u_B$	Ref(u_B)	$10^{15}u_A$	$10^{15}u_{l/lab}$	$10^{15}u_{l/TAI}$	Notes	$10^{15}u$
SYRTE-FO2	52579-52584	7.2	0.8	[1]	0.6	2.3	6.	(1)	6.5
SYRTE-FO2	52604-52619	15.8	0.8	[1]	0.4	1.5	2.	(1)	2.7
NIST-F1	52694-52709	8.6	0.7	T182	1.2	0.3	2.	(2)	2.5
PTB CS1	52694-52729	-2.6	8.	T148	5.	0.	1.	(3)	9.
PTB CS2	52694-52729	3.7	12.	T148	3.	0.	1.	(3)	12.
SYRTE-JPO	52719-52729	13.2	8.	T160	1.1	0.3	3.	(4)	8.6

[1] Marion H. et al., *Phys. Rev. Lett.* (accepted March 2003).

Notes:

(1) BNM-SYRTE atomic caesium fountain, Report 25 March 2003 by BNM-SYRTE.
(2) Report 26 March 2003 by NIST.
(3) Continuously operating as a clock participating to TAI.
(4) Report 4 April 2003 by BNM-SYRTE.

The second table gives the BIPM estimate of d, based on measurements of CRL-O1, NIST-F1, PTB CS1, PTB CS2, PTBCSF1, SYRTE-FO2 and SYRTE-JPO over the period MJD 52334-52729, taking into account their individual uncertainties and characterizing the instability of EAL as noted above. u is the computed standard uncertainty of d.

Period of estimation	d	u
52694-52729	$+8.4 \times 10^{-15}$	2.0×10^{-15}

6 - [*UTC-GPS time*] and [*TAI-GPS time*].

[*UTC-GPS time*] = -13 s + C_0, [*TAI-GPS time*] = 19 s + C_0.

Daily values of C_0 are given in the following table. They are obtained as follows: the GPS data taken at the Paris Observatory, for highest elevation, are first corrected for precise satellite ephemerides and for measured ionospheric delays, and then smoothed to obtain daily values of [*UTC(OP)-GPS time*] at 0h UTC; daily values of C_0 are derived from them using linear interpolation of [*UTC-UTC(OP)*]. The global uncertainty of daily C_0 values is of order 10 ns.

In the following table, the standard deviation σ characterizes the dispersion of individual measurements, and N is the number of measurements used on a given day for estimation of the corresponding daily C_0 value.

Date 2003 0h UTC	MJD	C_0/ns	σ/ns	$(\sigma/\sqrt{N})$/ns
Feb 24	52694	0	3	0
Feb 25	52695	-1	3	0
Feb 26	52696	-2	3	0
Feb 27	52697	-2	3	1
Feb 28	52698	-2	4	1
Mar 1	52699	-1	3	1
Mar 2	52700	-3	3	0
Mar 3	52701	-2	3	0
Mar 4	52702	-5	3	0
Mar 5	52703	-5	3	0
Mar 6	52704	-1	3	0
Mar 7	52705	0	3	0
Mar 8	52706	-3	3	0
Mar 9	52707	-6	3	0
Mar 10	52708	-5	3	1
Mar 11	52709	-2	4	1
Mar 12	52710	-1	4	1
Mar 13	52711	-4	3	0
Mar 14	52712	-6	3	0
Mar 15	52713	-4	3	0
Mar 16	52714	-1	3	0
Mar 17	52715	0	3	0
Mar 18	52716	2	3	0
Mar 19	52717	-1	3	0
Mar 20	52718	-2	3	0
Mar 21	52719	-3	3	0
Mar 22	52720	-5	3	0
Mar 23	52721	-5	3	0
Mar 24	52722	-6	3	0
Mar 25	52723	-4	3	0
Mar 26	52724	-2	4	1
Mar 27	52725	-3	3	0
Mar 28	52726	-4	3	0
Mar 29	52727	-6	3	1
Mar 30	52728	-5	4	1
Mar 31	52729	0	3	0

7 - [*UTC-GLONASS time*] and [*TAI-GLONASS time*].

[*UTC-GLONASS time*] = 0 s + C_1, [*TAI-GLONASS time*] = +32 s + C_1.

Daily values of C_1 are given in the following table. They are obtained as follows: the GLONASS data taken at the NMi Van Swinden Laboratorium, Delft, The Netherlands, for highest elevation, are smoothed to obtain daily values of [*UTC*(*VSL*)-*GLONASS time*] at 0h UTC; daily values of C_1 are then derived from them using linear interpolation of [*UTC*-*UTC*(*VSL*)]. The global uncertainty of daily C_1 values is of order several hundreds of nanoseconds.

In the following table, the standard deviation σ characterizes the dispersion of individual measurements, and N is the number of measurements used on a given day for estimation of the corresponding daily C_1 value.

Date 2003 0h UTC	MJD	C_1/ns	σ/ns	$(\sigma/\sqrt{N})$/ns
Fev 24	52694	210	37	12
Fev 25	52695	210	29	9
Fev 26	52696	198	18	6
Fev 27	52697	219	14	4
Fev 28	52698	248	33	10
Mar 1	52699	250	21	7
Mar 2	52700	236	21	7
Mar 3	52701	218	34	11
Mar 4	52702	203	38	12
Mar 5	52703	208	31	10
Mar 6	52704	208	33	10
Mar 7	52705	194	14	4
Mar 8	52706	186	26	8
Mar 9	52707	182	18	5
Mar 10	52708	173	19	6
Mar 11	52709	172	26	8
Mar 12	52710	155	53	17
Mar 13	52711	137	24	7
Mar 14	52712	144	30	10
Mar 15	52713	150	18	6
Mar 16	52714	143	23	7
Mar 17	52715	140	10	3
Mar 18	52716	134	23	7
Mar 19	52717	132	20	6
Mar 20	52718	133	11	3
Mar 21	52719	118	43	15
Mar 22	52720	119	31	10
Mar 23	52721	114	32	10
Mar 24	52722	115	15	5
Mar 25	52723	123	13	4
Mar 26	52724	110	22	7
Mar 27	52725	112	18	6
Mar 28	52726	119	50	16
Mar 29	52727	101	46	14
Mar 30	52728	79	37	12
Mar 31	52729	77	26	8