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Circular T 175 (2002 August 14)
Circulaire T 175

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

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

Date 2002 0h UTC	Jun 29	Jul 4	Jul 9	Jul 14
MJD	52454	52459	52464	52469
Laboratory *k*		[*UTC*-*UTC*(*k*)]/ns		
AOS (Borowiec)	-253	-244	-242	-223
AUS (Sydney)	-130	-132	-111	-101
BEV (Wien)	-21	-14	-8	4
BIRM (Beijing)	378	392	409	419
CAO (Cagliari)	-3350	-3394	-3434	-3469
CH (Bern)	11	21	26	29
CNM (Queretaro)	101	110	107	115
CRL (Tokyo)	45	42	38	27
CSIR (Pretoria)	-	-	-	-
DLR (Oberpfaffenhofen)	-	-	-	-
DTAG (Darmstadt)	37	44	40	31
IEN (Torino)	65	64	72	75
IFAG (Wettzell)	-1508	-1525	-1533	-1544
IGMA (Buenos Aires)	-5	-29	-11	-3
INPL (Jerusalem)	-4541	-4592	-4646	-4699
IPQ (Monte de Caparica)	-	-	-	-
JATC (Lintong)	-10158	-10205	-10247	-10305
KRIS (Taejon)	93	75	38	18
LDS (Leeds)	1832	1867	1894	1922
LT (Vilnius)	-263	-269	-247	-253
MSL (Lower Hutt)	330	353	365	384
NAO (Mizusawa)	-	-	-	-
NIM (Beijing)	-2619	-2624	-2623	-2630
NIMT (Bangkok)	-1259	-1286	-	92
NIST (Boulder)	5	3	0	0
NMC (Sofiya)	-1783	-1817	-1830	-1864
NMIJ (Tsukuba)	-280	-273	-280	-284
NMLS (Shah Alam)	172	147	122	90
NPL (Teddington)	3	1	-1	-3
NPLI (New-Delhi)	1256	1309	1359	1396
NRC (Ottawa)	7	4	-5	-18
NTSC (Lintong)	-10	-11	0	0
OMH (Budapest)	6895	6907	6946	6985
ONBA (Buenos Aires)	-	-	-	-
ONRJ (Rio de Janeiro)	4784	4786	4797	4795
OP (Paris)	26	38	38	45
ORB (Bruxelles)	-79	-89	-84	-76
PL (Warszawa)	6	-4	-9	-12
PTB (Braunschweig)	-1	5	5	5
ROA (San Fernando)	-21	-24	-13	5
SCL (Hong Kong)	38	29	18	25
SG (Singapore)	18	10	19	12
SMU (Bratislava)	-6390	-6414	-6453	-6483
SP (Boras)	615	591	573	549
SU (Moskva)	23	24	23	24
TL (Chung-Li)	-47	-47	-54	-51
TP (Praha)	1	4	23	26
UME (Gebze-Kocaeli)	-665	-661	-656	-651
USNO (Washington DC)(USNO MC)	-2	-2	-4	-4
VSL (Delft)	-6	-5	1	0

1 - Coordinated Universal Time UTC. (Cont.)

Date 2002 0h UTC	Jul 19	Jul 24	Jul 29
MJD	52474	52479	52484
Laboratory *k*		[*UTC*-*UTC*(*k*)]/ns	
AOS (Borowiec)	-201	-186	-175
AUS (Sydney)	-96	-88	-96
BEV (Wien)	13	15	21
BIRM (Beijing)	431	445	464
CAO (Cagliari)	-3513	-3559	-3604
CH (Bern)	38	40	30
CNM (Queretaro)	119	123	124
CRL (Tokyo)	17	11	6
CSIR (Pretoria)	-	-	-
DLR (Oberpfaffenhofen)	-	-	-
DTAG (Darmstadt)	12	14	25
IEN (Torino)	70	70	77
IFAG (Wettzell)	-1551	-1568	-1562
IGMA (Buenos Aires)	-4	7	15
INPL (Jerusalem)	-4758	-4820	-4872
IPQ (Monte de Caparica)	-	-	-
JATC (Lintong)	-10336	-10384	-10421
KRIS (Taejon)	2	-22	-41
LDS (Leeds)	1947	1973	1983
LT (Vilnius)	-252	-258	-254
MSL (Lower Hutt)	394	416	445
NAO (Mizusawa)	82	81	80
NIM (Beijing)	-2629	-2625	-2619
NIMT (Bangkok)	77	64	52
NIST (Boulder)	-3	-4	-7
NMC (Sofiya)	-1869	-2006	-1910
NMIJ (Tsukuba)	-281	-279	-278
NMLS (Shah Alam)	61	41	10
NPL (Teddington)	-5	-7	-11
NPLI (New-Delhi)	1441	1476	1538
NRC (Ottawa)	-17	-12	-17
NTSC (Lintong)	-1	8	19
OMH (Budapest)	7017	7066	7081
ONBA (Buenos Aires)	-	-	-
ONRJ (Rio de Janeiro)	4805	4816	4819
OP (Paris)	48	49	43
ORB (Bruxelles)	-74	-76	-83
PL (Warszawa)	-10	-27	-23
PTB (Braunschweig)	7	8	9
ROA (San Fernando)	18	35	42
SCL (Hong Kong)	17	15	9
SG (Singapore)	12	9	-7
SMU (Bratislava)	-6499	-6525	-6550
SP (Boras)	526	500	477
SU (Moskva)	26	26	26
TL (Chung-Li)	-60	-60	-57
TP (Praha)	20	25	28
UME (Gebze-Kocaeli)	-648	-642	-639
USNO (Washington DC)(USNO MC)	-4	-4	-5
VSL (Delft)	-2	-6	-7

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

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

Date 2002 0h UTC	Jun 29	Jul 4	Jul 9	Jul 14
MJD	52454	52459	52464	52469
Laboratory *k*	[*TAI-TA*(*k*)]/ns			
AUS (Sydney)	-115766	-115841	-115921	-116002
CH (Bern)	21030	21216	21397	21576
CRL (Tokyo)	159897	160102	160296	160494
F (Paris)	167780	167811	167839	167871
IEN (Torino)	19652	19771	19894	20015
JATC (Lintong)	-23378	-23476	-23568	-23672
KRIS (Taejon)	6059	6068	6064	6070
NIST (Boulder)	-45236681	-45236884	-45237088	-45237289
NRC (Ottawa)	28230	28232	28227	28218
NTSC (Lintong)	-156	-154	-148	-155
PL (Warszawa)	-781	-792	-802	-811
PTB (Braunschweig)	-359825	-359814	-359809	-359804
SU (Moskva) (1)	27241023	27241024	27241023	27241024
USNO (Washington DC)	-34889155	-34889470	-34889782	-34890092

Date 2002 0h UTC	Jul 19	Jul 24	Jul 29
MJD	52474	52479	52484
Laboratory *k*	[*TAI-TA*(*k*)]/ns		
AUS (Sydney)	-116079	-116164	-116253
CH (Bern)	21760	21945	22122
CRL (Tokyo)	160696	160896	161095
F (Paris)	167901	167931	167961
IEN (Torino)	20127	20238	20360
JATC (Lintong)	-23776	-23870	-23962
KRIS (Taejon)	6075	6076	6081
NIST (Boulder)	-45237493	-45237696	-45237900
NRC (Ottawa)	28223	28232	28232
NTSC (Lintong)	-152	-146	-138
PL (Warszawa)	-813	-822	-826
PTB (Braunschweig)	-359797	-359791	-359785
SU (Moskva) (1)	27241026	27241026	27241026
USNO (Washington DC)	-34890401	-34890712	-34891023

3 - Note on section 2.

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

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

Interval of validity		$f(EAL)-f(TAI)$
2002 May 30 - 2002 Jul. 29	52424-52484	7.020×10^{-13}

New steering correction foreseen for August and September 2002

Interval of validity		$f(EAL)-f(TAI)$
2002 Jul. 29 - 2002 Sep. 27	52484-52544	7.010×10^{-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: $d = -y_{\mathrm{TAI}}$. 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	$6.0\times10^{-15} / \sqrt{\tau}$,
a flicker frequency noise	0.6×10^{-15},
a random walk frequency noise	$1.6\times10^{-16} \times \sqrt{\tau}$,

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 u_{B} or is the *Circular T* where this reference was first given,
- u_{A} is the uncertainty originating in the instability of the PFS,
- $u_{\mathrm{l/lab}}$ is the uncertainty in the link between the PFS and the clock participating to TAI,
- $u_{\mathrm{l/TAI}}$ is the uncertainty in the link to TAI,
- u is the quadratic sum of all four uncertainty values.

Standard	Period of estimation	$10^{15}d$	$10^{15}u_{\mathrm{B}}$	Ref(u_{B})	$10^{15}u_{\mathrm{A}}$	$10^{15}u_{\mathrm{l/lab}}$	$10^{15}u_{\mathrm{l/TAI}}$	Notes	$10^{15}u$
PTB CS1	52454-52484	5.8	8.	T148	5.	0.	1.	(1)	9.
PTB CS2	52454-52484	1.6	12.	T148	3.	0.	1.	(1)	12.
PTBCSF1	52454-52474	13.6	0.9	T162	1.0	0.	1.5		2.0
CRL-O1	52469-52479	9.4	3.9	T148	8.4	0.8	3.0		9.8

Note:

(1) Continuously operating as a clock participating to TAI

The second table gives the BIPM estimate of d, based on measurements of CRL-O1, LPTF-JPO, NIST-7, NIST-F1, PTB CS1, PTB CS2, PTBCSF1 over the period MJD 52094-52484, 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
52454-52484	$+11.0\times10^{-15}$	1.7×10^{-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 2002 0h UTC	MJD	C_0/ns	σ/ns	$(\sigma/\sqrt{N})$/ns
Jun 29	52454	-14	5	1
Jun 30	52455	-12	2	1
Jul 1	52456	-16	3	1
Jul 2	52457	-17	2	1
Jul 3	52458	-14	2	1
Jul 4	52459	-12	2	1
Jul 5	52460	-11	3	1
Jul 6	52461	-11	3	1
Jul 7	52462	-14	3	1
Jul 8	52463	-8	9	2
Jul 9	52464	-6	3	1
Jul 10	52465	-6	3	1
Jul 11	52466	-5	3	1
Jul 12	52467	-3	3	1
Jul 13	52468	-5	3	1
Jul 14	52469	-6	3	1
Jul 15	52470	-8	3	1
Jul 16	52471	-11	3	1
Jul 17	52472	-13	4	1
Jul 18	52473	-14	4	1
Jul 19	52474	-14	4	1
Jul 20	52475	-19	3	1
Jul 21	52476	-18	4	1
Jul 22	52477	-15	3	1
Jul 23	52478	-13	3	1
Jul 24	52479	-13	3	1
Jul 25	52480	-12	3	1
Jul 26	52481	-12	3	1
Jul 27	52482	-14	11	2
Jul 28	52483	11	5	1
Jul 29	52484	9	10	2

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 2002 0h UTC	MJD	C_1/ns	σ/ns	$(\sigma/\sqrt{N})$/ns
Jun 29	52454	-392	27	5
Jun 30	52455	-396	12	2
Jul 1	52456	-408	6	1
Jul 2	52457	-409	27	6
Jul 3	52458	-392	22	5
Jul 4	52459	-349	39	13
Jul 5	52460	-374	16	4
Jul 6	52461	-386	14	4
Jul 7	52462	-390	13	4
Jul 8	52463	-400	14	4
Jul 9	52464	-355	22	10
Jul 10	52465	-301	-	-
Jul 11	52466	-316	29	14
Jul 12	52467	-357	-	-
Jul 13	52468	-382	21	12
Jul 14	52469	-361	-	-
Jul 15	52470	-346	17	7
Jul 16	52471	-366	8	2
Jul 17	52472	-379	20	14
Jul 18	52473	-379	13	6
Jul 19	52474	-376	20	12
Jul 20	52475	-361	-	-
Jul 21	52476	-348	16	9
Jul 22	52477	-359	9	4
Jul 23	52478	-381	-	-
Jul 24	52479	-373	-	-
Jul 25	52480	-352	22	11
Jul 26	52481	-363	18	10
Jul 27	52482	-372	31	15
Jul 28	52483	-352	-	-
Jul 29	52484	-345	2	1