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BUREAU INTERNATIONAL DES POIDS ET MESURES
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1 - Coordinated Universal Time UTC and its local realizations UTC(k). Computed values of [*UTC-UTC*(*k*)].
From 1999 January 1, 0h UTC, *TAI-UTC* = 32 s.

Date 2003 0h UTC	APR 30	MAY 5	MAY 10	MAY 15	MAY 20	MAY 25	MAY 30
MJD	52759	52764	52769	52774	52779	52784	52789
Laboratory *k*				[*UTC-UTC*(*k*)]/ns			
AOS (Borowiec)	-266.4	-271.8	-284.4	-292.4	-313.8	-321.9	-340.1
AUS (Sydney)	-238.2	-243.6	-263.0	-270.5	-293.4	-297.8	-311.4
BEV (Wien)	-20.1	-16.0	-16.8	-13.5	-14.7	-11.7	-13.0
BIRM (Beijing)	-	-	936.6	939.1	946.1	959.9	975.0
CAO (Cagliari)	-4011.8	-4011.7	-4025.1	-4033.7	-4052.9	-4055.5	-4063.3
CH (Bern)	2.5	12.6	4.3	12.2	16.4	8.6	2.1
CNM (Queretaro)	63.8	66.1	64.6	67.1	56.7	45.4	44.7
CRL (Tokyo)	8.9	6.7	6.9	3.0	1.7	-1.6	-4.4
CSIR (Pretoria)	-	-	-	-	-	-	-
DLR (Oberpfaffenhofen)	-	-	-	-	-	-	-
DTAG (Darmstadt)	425.8	417.5	412.3	397.1	394.6	377.1	373.4
IEN (Torino)	50.2	55.0	52.8	51.4	46.3	40.2	35.2
IFAG (Wettzell)	-1982.4	-1988.3	-2000.8	-2016.7	-2031.4	-2036.3	-2049.1
IGMA (Buenos Aires)	-91.0	-97.9	-92.1	-87.9	-103.2	-100.0	-92.0
INPL (Jerusalem)	-7611.4	-7662.1	-7705.8	-7747.3	-7793.8	-7832.6	-7873.6
IPQ (Monte de Caparica)	-	-	-	-	-	-	-
JATC (Lintong)	-11829.8	-11812.2	-11793.5	-11776.4	-11754.8	-11735.6	-11720.8
JV (Kjeller)	-6908.3	-7036.2	-7127.7	-7237.3	-7377.2	-7511.5	-7614.6
KRIS (Daejon)	-53.2	-53.6	-64.2	-66.6	-68.3	-66.3	-68.2
LDS (Leeds)	3340.7	3360.2	3401.2	3423.3	3441.3	3455.2	3480.8
LT (Vilnius)	-172.1	-175.1	-167.8	-167.9	-178.4	-191.5	-186.0
MSL (Lower Hutt)	81.4	74.1	84.9	119.8	113.1	106.7	105.5
NAO (Mizusawa)	-10.5	-18.7	-6.8	-7.2	-5.9	-3.3	-1.2
NIM (Beijing)	-2623.5	-2632.1	-2622.8	-2620.8	-2621.3	-2626.6	-2628.8
NIMB (Bucharest)	11.6	-	-	-437.1	-428.7	-466.7	-450.9
NIMT (Bangkok)	-893.3	-922.8	-958.5	-980.3	-998.8	-1019.0	-1034.0
NIST (Boulder)	8.9	10.5	10.4	10.1	4.0	0.3	0.6
NMC (Sofiya)	-2685.5	-2721.7	-2749.3	-2769.3	-2791.0	-2793.5	-2786.1
NMIJ (Tsukuba)	89.2	78.4	75.1	64.7	54.0	42.4	28.5
NMLS (Shah Alam)	281.6	278.8	290.3	297.6	290.2	314.4	322.4

Date 2003 0h UTC	APR 30	MAY 5	MAY 10	MAY 15	MAY 20	MAY 25	MAY 30	
MJD	52759	52764	52769	52774	52779	52784	52789	
Laboratory *k*				[*UTC*-*UTC*(*k*)]/ns				
NPL (Teddington)	31.6	32.3	30.0	28.9	25.9	27.1	24.8	
NPLI (New-Delhi)	4093.1	4138.8	4190.0	4235.1	4263.8	4311.0	4357.5	
NRC (Ottawa)	9.0	14.1	10.4	3.1	5.4	5.7	15.2	
NTSC (Lintong)	-6.1	-2.4	-1.1	-1.8	-1.7	-1.0	1.4	
OMH (Budapest)	7808.6	7803.3	7815.4	7844.7	7858.3	7859.8	7879.8	
ONBA (Buenos Aires)	-450.9	-363.3	-196.9	-196.1	19.8	-865.8	-838.0	(1)
ONRJ (Rio de Janeiro)	5435.0	5443.6	5461.0	5471.4	5477.0	5491.4	5495.0	
OP (Paris)	18.9	22.0	18.0	19.7	19.6	26.8	31.8	
ORB (Bruxelles)	-30.7	-35.4	-40.6	-46.3	-50.0	-52.7	-52.8	
PL (Warszawa)	124.1	122.7	109.1	101.1	94.3	85.3	70.7	
PTB (Braunschweig)	9.2	7.1	6.3	10.0	5.9	10.5	10.0	
ROA (San Fernando)	85.3	81.2	75.4	77.8	66.2	70.5	66.8	
SCL (Hong Kong)	-41.2	-38.0	-36.7	-39.7	-39.6	-35.8	-26.4	
SG (Singapore)	282.7	328.2	382.3	425.5	469.8	390.1	317.6	
SMU (Bratislava)	-8023.5	-8026.9	-8059.5	-8073.4	-8118.5	-8146.1	-8163.9	
SP (Boras)	-147.9	-146.3	-134.8	-136.1	-126.3	-117.6	-118.2	
SU (Moskva)	40.1	41.0	40.0	41.2	41.2	42.6	36.8	
TCC (Concepcion)	-2957.7	-3022.1	-3073.6	-3135.7	-3166.1	-3203.5	-3236.5	
TL (Chung-Li)	-54.9	-56.3	-55.7	-57.1	-60.3	-60.3	-53.3	(2)
TP (Praha)	-24.5	-37.3	-20.9	-24.8	-17.1	-10.5	-8.3	
UME (Gebze-Kocaeli)	-967.4	-1027.7	-	-	-	-	-22.6	
USNO (Washington DC)	-0.6	1.0	-0.7	-0.5	-2.3	-2.0	-2.3	
VSL (Delft)	-5.9	-7.7	-7.0	-5.3	-12.3	-17.0	-13.8	

- Notes on section 1:

(1) ONBA: Apparent time steps of *UTC* - *UTC*(*ONBA*) between MJD = 52769 and MJD = 52774
and between MJD = 52779 and MJD = 52784

(2) TL : Change of master clock on MJD = 52778.04

2 - International Atomic Time TAI and Local atomic time scales TA(k). Computed values of [*TAI-TA*(*k*)].

Date 2003 0h UTC	APR 30	MAY 5	MAY 10	MAY 15	MAY 20	MAY 25	MAY 30	
MJD	52759	52764	52769	52774	52779	52784	52789	
Laboratory *k*				[*TAI-TA*(*k*)]/ns				
AUS (Sydney)	-120864.2	-120942.6	-121042.0	-121113.5	-121206.4	-121292.8	-121353.4	
CH (Bern)	31638.2	31813.3	31969.9	32142.7	32311.9	32469.0	32627.5	
CRL (Tokyo)	172153.4	172353.7	172555.9	172755.6	172954.3	173154.8	173356.3	
F (Paris)	169014.6	169023.3	169029.9	169040.8	169047.2	169058.4	169069.0	
IEN (Torino)	26882.8	27001.0	27118.3	27236.8	27361.2	27477.5	27597.3	
JATC (Lintong)	-29649.8	-29757.2	-29861.5	-29971.4	-30078.8	-30181.6	-30285.8	
KRIS (Taejon)	6014.1	6017.6	6014.5	6014.6	6017.7	6022.9	6022.5	
NIST (Boulder)	-45249003.5	-45249201.7	-45249401.8	-45249602.1	-45249804.2	-45250002.9	-45250197.6	
NRC (Ottawa)	28496.8	28506.2	28506.7	28503.6	28510.3	28514.9	28528.8	
NTSC (Lintong)	6.3	7.6	13.8	16.3	23.7	30.0	34.9	
PL (Warszawa)	-1337.9	-1346.3	-1361.9	-1379.9	-1400.7	-1410.7	-1431.3	
PTB (Braunschweig)	-359510.5	-359507.6	-359503.4	-359494.7	-359493.9	-359484.6	-359480.1	
SU (Moskva)	27241040.1	27241041.0	27241040.0	27241041.2	27241041.2	27241042.6	27241036.8	(1)
USNO (Washington DC)	-34908105.3	-34908414.7	-34908725.4	-34909035.1	-34909345.7	-34909655.4	-34909965.0	

- Note on section 2:

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

3 - Difference between the normalized frequencies of EAL (free atomic time scale) and TAI.

Interval of validity		*f*(*EAL*)-*f*(*TAI*)
2003 Mar. 31 - 2003 May 30	52729-52789	6.970×10^{-13}
New steering correction for June and July 2003		
2003 May 30 - 2003 July 29	52789-52849	6.960×10^{-13}

4 - 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 with τ in days: (1) a white frequency noise of $6.0 \times 10^{-15} / \sqrt{\tau}$, (2) a flicker frequency noise of 0.6×10^{-15} and (3) a random walk frequency noise of $1.6 \times 10^{-16} \times \sqrt{\tau}$. 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 Frequency Standards (PFS). In this table: u_A is the uncertainty originating in the instability of the PFS, 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, $u_{l/lab}$ is the uncertainty in the link between the PFS and the clock participating to TAI, including the uncertainty due to the dead-time, $u_{l/TAI}$ is the uncertainty in the link to TAI, *u* is the quadratic sum of all four uncertainty values. All values are expressed in 10^{-15}.

Standard	Period of estimation	d	u_A	u_B	Ref(u_B)	$u_{l/lab}$	$u_{l/TAI}$	u	Note
SYRTE-FO2	52699-52734	8.5	0.2	0.5	T183	0.7	0.9	1.3	(1)
SYRTE-FOM	52704-52709	14.0	0.6	0.8	T184	2.0	6.	6.4	(2)
SYRTE-FOM	52739-52744	21.6	0.8	0.8	T184	2.4	6.	6.6	(2)
IEN-CSF1	52744-52754	17.2	1.3	2.0	[1]	0.4	3.	3.9	(3)
PTB CS1	52759-52789	11.3	5.	8.	T148	0.	1.	9.	(4)
PTB CS2	52759-52789	5.0	3.	12.	T148	0.	1.	12.	(4)

[1] Levi F. et al., *Proc. EFTF/FCS meeting*, 2003, in press.

Notes:

(1) Report 27 May by BNM-SYRTE.
(2) Report 12 June by BNM-SYRTE.
(3) IEN atomic caesium fountain. Report 4 June by IEN.
(4) Continuously operating as a clock participating to TAI.

The second table gives the BIPM estimate of *d*, based on all available PFS measurements over the period MJD 52399-52789, 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
52759-52789	$+9.8 \times 10^{-15}$	2.4×10^{-15}

5 - Relations of UTC and TAI with GPS time and GLONASS time.

[*UTC-GPS time*] = -13 s + C_0, [*TAI-GPS time*] = 19 s + C_0, global uncertainty is of order 10 ns.
[*UTC-GLONASS time*] = 0 s + C_1, [*TAI-GLONASS time*] = 32 s + C_1, global uncertainty is of order hundreds ns.

The C_0 values are obtained using the values [*UTC-UTC*(*OP*)] and the GPS data taken at the Paris Observatory, corrected for IGS precise orbits and ionosphere maps. The C_1 vaules are obtained using the values [*UTC-UTC*(*VSL*)] and the GLONASS data taken at the NMi Van Swinden Laboratorium (VSL). The standard deviations σ_0 and σ_1 characterize the dispersion of individual measurements. N_0 and N_1 are the numbers of measurements.
For this circular, σ_0 = 2.7 ns, σ_1 = 32.1 ns

Date 2003 0h UTC	MJD	C_0/ns	N_0	C_1/ns	N_1
APR 30	52759	-4.2	44	213.9	67
MAY 1	52760	-3.0	43	162.3	64
MAY 2	52761	-6.3	43	135.1	69
MAY 3	52762	-9.0	43	117.9	77
MAY 4	52763	-11.1	44	104.1	77
MAY 5	52764	-11.3	41	112.3	51
MAY 6	52765	-10.6	44	108.3	69
MAY 7	52766	-9.7	45	113.0	69
MAY 8	52767	-9.7	44	118.8	78
MAY 9	52768	-8.6	44	121.8	75
MAY 10	52769	-5.9	45	124.3	66
MAY 11	52770	-5.0	44	128.3	63
MAY 12	52771	-4.9	45	120.2	57
MAY 13	52772	-3.5	45	114.5	81
MAY 14	52773	-0.5	39	129.1	29
MAY 15	52774	-3.6	43	149.8	71
MAY 16	52775	-6.7	45	142.5	67
MAY 17	52776	-6.9	43	182.8	60
MAY 18	52777	-7.2	45	178.5	65
MAY 19	52778	-10.8	45	112.3	66
MAY 20	52779	-16.2	44	107.9	70
MAY 21	52780	-12.2	45	138.2	77
MAY 22	52781	-10.8	44	149.4	38
MAY 23	52782	-12.6	44	150.0	71
MAY 24	52783	-14.1	45	165.6	51
MAY 25	52784	-12.9	45	167.7	47
MAY 26	52785	-10.1	45	140.1	76
MAY 27	52786	-8.8	38	130.4	42
MAY 28	52787	-6.9	44	140.9	73
MAY 29	52788	-9.1	42	136.2	83
MAY 30	52789	-9.5	42	131.6	66

6 - Time links used for the computation of TAI.

The time links used in the elaboration of this *Circular T* are listed in this section. The type of link is indicated as follows: GPS SC for GPS common-view single-channel C/A data; GPS MC for GPS common-view multi-channel C/A data; GPS GT for 'GPS time' observations; INT LK for internal cable link and TWSTFT for two-way satellite time and frequency transfer data.

Link	Type
AOS /NPL	GPS MC
AUS /CRL	GPS MC
BEV /NPL	GPS MC
BIRM/CRL	GPS MC
CAO /PTB	GPS SC
CH /PTB	GPS SC
CNM /NIST	GPS SC
CRL /PTB	GPS SC
CSIR/NPL	GPS MC
DLR /PTB	GPS SC
DTAG/PTB	GPS SC
IEN /PTB	TWSTFT
IFAG/PTB	GPS SC
IGMA/NIST	GPS GT
INPL/PTB	GPS SC
IPQ /PTB	GPS SC
JATC/NTSC	INT LK
JV /PTB	GPS GT
KRIS/CRL	GPS SC
LDS /PTB	GPS SC
LT /NPL	GPS MC
MSL /CRL	GPS MC
NAO /CRL	GPS SC
NIM /CRL	GPS SC
NIMB/PTB	GPS SC
NIMT/CRL	GPS MC
NIST/PTB	TWSTFT
NMC /PTB	GPS GT
NMIJ/CRL	TWSTFT
NMLS/CRL	GPS MC

Link	Type
NPL /PTB	TWSTFT
NPLI/PTB	GPS SC
NRC /USNO	GPS SC
NTSC/CRL	TWSTFT
OMH /PTB	GPS SC
ONBA/USNO	GPS MC
ONRJ/NIST	GPS SC
OP /PTB	GPS SC
ORB /PTB	GPS SC
PL /NPL	GPS MC
ROA /PTB	TWSTFT
SCL /CRL	GPS SC
SG /CRL	GPS MC
SMU /PTB	GPS SC
SP /PTB	GPS SC
SU /PTB	GPS SC
TCC /NIST	GPS SC
TL /CRL	TWSTFT
TP /PTB	GPS SC
UME /PTB	GPS SC
USNO/PTB	TWSTFT
VSL /PTB	TWSTFT