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BUREAU INTERNATIONAL DES POIDS ET MESURES
ORGANISATION INTERGOUVERNEMENTALE DE LA CONVENTION DU METRE
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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 2003/04 0h UTC	DEC 31	JAN 5	JAN 10	JAN 15	JAN 20	JAN 25	JAN 30
MJD	53004	53009	53014	53019	53024	53029	53034
Laboratory *k*				[*UTC-UTC(k)*]/ns			
AOS (Borowiec)	0.3	-9.3	-20.5	-25.3	-22.1	-25.6	-27.0
APL (Laurel)	-309.5	-289.8	-274.0	-255.7	-232.5	-223.4	-208.1
AUS (Sydney)	-428.0	-438.8	-462.3	-465.4	-463.8	-453.5	-461.1
BEV (Wien)	9.2	7.8	6.8	15.0	16.8	22.5	27.0
BIRM (Beijing)	1596.1	1613.7	1622.2	1639.6	1651.3	1658.5	1671.5
CAO (Cagliari)	-4196.5	-4154.4	-4148.0	-4126.4	-4101.6	-4090.2	-4073.7
CH (Bern)	25.1	13.2	5.7	3.3	1.5	-2.5	-1.8
CNM (Queretaro)	44.3	50.1	44.2	38.1	24.4	8.5	1.9
CNMP (Panama)	-1912.4	-1965.1	-2013.5	-2062.6	-2118.2	-2164.1	-2217.8
CRL (Tokyo)	-4.3	-7.4	-7.0	-10.4	-11.2	-13.9	-12.8
CSIR (Pretoria)	3397.2	3305.7	3235.4	3165.1	3104.4	3013.6	2947.5
DLR (Oberpfaffenhofen)	16.6	12.5	9.2	11.3	9.1	16.4	17.0
DTAG (Darmstadt)	230.8	229.6	228.0	221.8	222.9	225.3	221.6
IEN (Torino)	-45.3	-35.4	-41.6	-37.6	-31.2	-28.2	-26.9
IFAG (Wettzell)	-2579.0	-2591.7	-2606.1	-2615.0	-2626.7	-2638.2	-2658.1
IGMA (Buenos Aires)	-82.2	-83.7	-85.7	-80.1	-83.5	-88.1	-83.6
INPL (Jerusalem)	-9186.7	-9208.4	-9228.0	-9261.5	-9289.8	-9315.1	-9348.9
JATC (Lintong)	-11116.0	-11111.6	-11107.3	-11096.0	-11087.9	-11088.7	-11080.5
JV (Kjeller)	-10055.9	-10024.6	-10003.2	-9970.2	-9952.1	-9911.5	-9864.9
KRIS (Daejon)	3.1	8.0	12.2	17.1	20.2	23.7	18.0
LDS (Leeds)	4671.1	4722.9	4742.5	4795.8	4837.1	4856.5	4893.2
LT (Vilnius)	146.3	132.7	144.9	138.4	145.6	139.0	124.7
MSL (Lower Hutt)	-126.4	-111.5	-101.3	-58.1	-70.2	-82.6	-80.8
NAO (Mizusawa)	40.6	21.7	-8.1	-7.8	-18.3	-28.6	-30.1
NIM (Beijing)	-2637.0	-2632.5	-2642.7	-2640.5	-2641.7	-2652.6	-2658.1
NIMB (Bucharest)	-346.2	-345.5	-330.5	-335.7	-321.7	-336.1	-324.1
NIMT (Bangkok)	-776.4	-794.5	-812.9	-826.8	-848.7	-864.5	-882.4
NIST (Boulder)	-3.7	-3.6	-3.8	-4.2	-4.8	-4.6	-3.1
NMC (Sofiya)	-3455.1	-3462.9	-3477.8	-3506.2	-3545.4	-3585.2	-3584.3
NMIJ (Tsukuba)	75.2	81.0	90.2	87.0	84.1	86.2	88.7

Date 2003/04 0h UTC	DEC 31	JAN 5	JAN 10	JAN 15	JAN 20	JAN 25	JAN 30	
MJD	53004	53009	53014	53019	53024	53029	53034	
Laboratory *k*				[*UTC*-*UTC*(*k*)]/ns				
NMLS (Shah Alam)	314.4	305.9	306.9	323.9	324.1	321.2	336.2	
NPL (Teddington)	50.7	53.3	53.8	55.8	56.8	59.9	61.7	
NPLI (New-Delhi)	6311.5	6338.4	6371.1	6400.1	6431.5	6460.7	6495.5	
NRC (Ottawa)	50.4	45.4	49.6	46.7	58.1	60.9	59.1	
NTSC (Lintong)	39.1	35.8	35.6	39.7	26.7	18.5	4.2	
OMH (Budapest)	8776.6	8781.7	8780.8	8773.1	8772.6	8778.9	8779.1	
ONBA (Buenos Aires)	-2410.9	-2563.9	-2675.8	-2796.0	-823.5	-788.6	-902.7	(1)
ONRJ (Rio de Janeiro)	5940.8	5877.9	5825.5	5690.6	5589.7	5511.0	5434.2	
OP (Paris)	33.6	38.0	36.6	30.9	32.9	34.0	35.1	
ORB (Bruxelles)	-28.4	-34.0	-40.6	-43.1	-39.4	-34.9	-33.4	
PL (Warszawa)	-22.0	-30.8	-40.0	-41.7	-53.8	-64.7	-72.9	
PTB (Braunschweig)	-2.4	-0.8	-3.5	-2.7	-2.5	-1.8	-0.3	
ROA (San Fernando)	43.3	39.5	32.4	18.9	6.2	4.9	10.1	
SCL (Hong Kong)	-59.4	-60.4	-52.3	-41.7	-41.6	-54.1	-51.7	
SG (Singapore)	79.0	76.1	82.2	87.6	87.9	93.5	99.0	
SMU (Bratislava)	-9278.2	-9305.6	-9321.4	-9343.3	-9362.5	-9386.0	-9410.6	
SP (Boras)	125.8	136.6	149.3	156.4	163.0	169.2	174.7	
SU (Moskva)	-26.4	-23.2	-27.4	-26.6	-27.0	-28.1	-28.1	
TCC (Concepcion)	-5570.6	-5655.9	-5699.7	-5761.4	-5829.5	-5905.6	-5958.6	
TL (Chung-Li)	10.8	2.9	5.3	-0.9	6.1	10.7	12.7	
TP (Praha)	16.0	14.3	19.0	18.4	16.9	19.2	14.5	
UME (Gebze-Kocaeli)	99.4	92.6	120.9	128.8	126.2	136.2	140.0	
USNO (Washington DC)	8.5	9.9	12.4	13.1	12.3	10.9	12.6	
VSL (Delft)	-35.2	-36.2	-49.7	-40.9	-44.6	-46.9	-42.7	

- Note on section 1:

(1) ONBA: Time step of UTC(ONBA) of -2000 ns on MJD = 53019.58

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

Date 2003/04 0h UTC	DEC 31	JAN 5	JAN 10	JAN 15	JAN 20	JAN 25	JAN 30	
MJD	53004	53009	53014	53019	53024	53029	53034	
Laboratory *k*	[*TAI*-*TA*(*k*)]/ns							
CH (Bern)	39634.6	39777.1	39924.1	40074.0	40215.8	40355.3	40499.6	
CRL (Tokyo)	182049.7	182249.1	182447.7	182648.7	182847.1	183046.9	183248.7	
F (Paris)	169361.8	169363.9	169361.0	169359.8	169361.4	169362.7	169365.1	
IEN (Torino)	32720.1	32841.2	32965.6	33090.1	33208.8	33324.4	33447.3	
JATC (Lintong)	-34339.0	-34316.6	-34271.3	-34210.0	-34155.9	-34110.7	-34056.5	
KRIS (Taejon)	6578.5	6608.3	6634.8	6662.0	6687.4	6713.3	6730.1	
NIST (Boulder)	-45258702.7	-45258900.1	-45259097.8	-45259295.7	-45259493.9	-45259691.4	-45259887.7	
NRC (Ottawa)	28750.0	28749.4	28758.2	28759.4	28775.3	28782.5	28785.0	
NTSC (Lintong)	385.7	392.4	391.7	406.5	411.4	410.2	414.1	
PL (Warszawa)	-1996.0	-2014.8	-2024.0	-2035.7	-2046.8	-2062.7	-2074.9	
PTB (Braunschweig)	-359277.3	-359270.7	-359268.7	-359262.7	-359257.6	-359252.1	-359245.4	
SU (Moskva)	27240973.6	27240976.8	27240972.6	27240973.4	27240973.0	27240971.9	27240971.9	(1)
USNO (Washington DC)	-34923253.0	-34923560.2	-34923867.5	-34924176.5	-34924484.9	-34924793.9	-34925100.1	

- 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*)	
Steering correction	52969 - 53034	6.940×10^{-13}	(2003 NOV 26 - 2004 JAN 30)
New correction foreseen	53034 - 53094	6.930×10^{-13}	(2004 JAN 30 - 2004 MAR 30)

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 $6.0\times10^{-15} / \sqrt{\tau}$, (2) a flicker frequency noise of 0.6×10^{-15} and (3) a random walk frequency noise of $1.6\times10^{-16} \times \sqrt{\tau}$. 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-JPO	53004	53034	18.2	0.6	6.5	T160	0.3	1.0	6.6	(1)
PTB-CSF1	52999	53014	13.2	1.0	0.9	T162	0.1	2.0	2.4	(2)
CRL-O1	53019	53034	-2.5	11.0	5.5	T148	0.8	2.0	12.5	(3)
PTB-CS1	53004	53034	0.4	5.0	8.0	T148	0.0	1.0	9.5	(4)
PTB-CS2	53004	53034	4.6	3.0	12.0	T148	0.0	1.0	12.4	(4)

Notes:
(1) Report 4 Feb. 2004 by BNM-SYRTE.
(2) Report 6 Feb. 2004 by PTB.
(3) Report 3 Feb. 2004 by CRL.
(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 52644-53034, 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*	
53004-53034	10.6×10^{-15}	1.8×10^{-15}	(2003 DEC 31 - 2004 JAN 30)

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, clocks and ionosphere maps. The C_1 values are obtained using the values [*UTC-UTC*(*VSL*)] and the GLONASS data taken at the NMi Van Swinden Laboratorium (VSL). N_0 and N_1 are the numbers of measurements. The standard deviations σ_0 and σ_1 characterize the dispersion of individual measurements. The actual uncertainty of user's access to GPS and GLONASS times may differ from these values.
For this circular, σ_0 = 2.2 ns, σ_1 = 28.7 ns

Date 2003/04 0h UTC	MJD	C_0/ns	N_0	C_1/ns	N_1
DEC 31	53004	2.1	44	185.4	74
JAN 1	53005	0.6	40	161.9	64
JAN 2	53006	2.7	2	155.5	39
JAN 3	53007	5.2	14	176.3	42
JAN 4	53008	5.0	44	175.8	46
JAN 5	53009	3.0	44	176.3	60
JAN 6	53010	3.4	44	166.7	66
JAN 7	53011	1.1	44	171.8	24
JAN 8	53012	-1.8	44	181.6	73
JAN 9	53013	-2.3	42	172.9	69
JAN 10	53014	-2.8	40	155.8	34
JAN 11	53015	-1.5	44	148.8	58
JAN 12	53016	0.4	43	158.4	53
JAN 13	53017	-0.1	44	162.7	54
JAN 14	53018	2.3	41	164.2	54
JAN 15	53019	3.8	44	173.7	77
JAN 16	53020	5.3	43	165.3	72
JAN 17	53021	4.6	39	161.4	67
JAN 18	53022	2.8	44	177.3	46
JAN 19	53023	2.1	45	169.8	52
JAN 20	53024	0.6	41	173.0	64
JAN 21	53025	-0.6	44	187.9	57
JAN 22	53026	-2.4	42	178.2	65
JAN 23	53027	-4.7	44	167.6	71
JAN 24	53028	-7.1	43	171.9	44
JAN 25	53029	-4.5	43	197.1	63
JAN 26	53030	-0.9	42	189.5	60
JAN 27	53031	0.9	43	188.6	55
JAN 28	53032	0.4	43	202.4	51
JAN 29	53033	0.3	42	203.0	62
JAN 30	53034	0.2	43	205.5	29

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 P3 for GPS common-view multi-channel dual-frequency P code 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 /PTB	GPS MC
APL /USNO	GPS MC
AUS /CRL	GPS MC
BEV /PTB	GPS MC
BIRM/CRL	GPS MC
CAO /PTB	GPS SC
CH /PTB	GPS SC
CNM /NIST	GPS SC
CNMP/USNO	GPS MC
CRL /PTB	GPS MC
CSIR/PTB	GPS MC
DLR /PTB	GPS P3
DTAG/PTB	GPS SC
IEN /PTB	TWSTFT
IFAG/PTB	GPS P3
IGMA/NIST	GPS GT
INPL/PTB	GPS SC
JATC/NTSC	INT LK
JV /PTB	GPS GT
KRIS/CRL	GPS MC
LDS /PTB	GPS SC
LT /PTB	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

Link	Type
NMLS/CRL	GPS MC
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 P3
PL /PTB	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