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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 0h UTC	AUG 28	SEP 2	SEP 7	SEP 12	SEP 17	SEP 22	SEP 27	
MJD	52879	52884	52889	52894	52899	52904	52909	
Laboratory k	[UTC-UTC(k)]/ns							
AOS (Borowiec)	-1.5	5.4	7.7	2.9	18.4	28.9	32.3	
AUS (Sydney)	-370.1	-366.2	-365.5	-363.7	-367.9	-369.9	-386.4	
BEV (Wien)	-27.2	-30.9	-34.7	-11.6	1.6	-5.0	-15.0	
BIRM (Beijing)	1228.4	1247.0	1263.1	1273.7	1283.4	1298.4	1301.0	
CAO (Cagliari)	-4113.4	-4115.0	-4094.9	-4110.6	-4114.8	-4114.8	-4131.2	
CH (Bern)	-28.6	-35.2	-48.1	-53.7	-45.6	-41.4	-35.5	
CNM (Queretaro)	20.4	22.7	20.6	15.7	17.2	19.3	17.4	(1)
CRL (Tokyo)	-9.8	-8.0	-8.6	-15.9	-12.6	-13.1	-11.6	
CSIR (Pretoria)	-2650.0	-2685.0	-2729.0	-2756.3	-2780.4	-2815.9	-2854.0	
DLR (Oberpfaffenhofen)	-2.3	1.9	3.7	7.5	7.0	7.2	9.1	
DTAG (Darmstadt)	303.1	293.9	287.5	280.8	268.7	274.0	263.9	
IEN (Torino)	65.5	61.1	65.3	73.9	83.6	76.5	70.2	
IFAG (Wettzell)	-2238.2	-2250.4	-2261.2	-2281.2	-2293.4	-2306.5	-2315.9	
IGMA (Buenos Aires)	-89.0	-89.3	-90.6	-85.2	-88.6	-87.5	-91.3	
INPL (Jerusalem)	-8410.7	-8436.3	-8465.4	-8494.5	-8521.3	-8542.5	-8571.9	
IPQ (Monte de Caparica)	-	-	-	-	-	-	-	
JATC (Lintong)	-11359.2	-11348.3	-11325.8	-11318.7	-11310.4	-11292.2	-11275.3	
JV (Kjeller)	-9670.3	-9809.8	-9912.2	-10066.5	-10165.9	-10291.4	-10398.0	
KRIS (Daejon)	-292.6	-294.3	-285.1	-271.9	-249.8	-233.8	-219.7	
LDS (Leeds)	3893.9	3933.0	3978.1	4005.9	4040.4	4063.7	4084.4	
LT (Vilnius)	9916.8	9912.6	-78.0	-68.0	-43.1	-30.8	-26.5	(2)
MSL (Lower Hutt)	103.6	98.5	82.2	56.5	26.4	19.5	25.0	
NAO (Mizusawa)	8.5	10.7	8.6	12.1	5.6	10.3	12.1	
NIM (Beijing)	-2627.7	-2633.8	-2645.1	-2639.3	-2628.4	-2629.0	-2635.3	
NIMB (Bucharest)	-131.7	-144.2	-155.8	-154.9	-160.3	-170.6	-169.9	
NIMT (Bangkok)	-146.7	-168.3	-193.6	-215.6	-239.2	-251.1	-273.0	
NIST (Boulder)	7.7	9.2	7.6	8.3	7.5	5.2	7.9	
NMC (Sofiya)	-3065.1	-3083.2	-3084.0	-3096.0	-3103.0	-3106.7	-3128.8	
NMIJ (Tsukuba)	26.6	33.5	37.0	39.1	33.1	33.7	37.5	
NMLS (Shah Alam)	338.8	337.6	342.7	343.3	339.5	345.1	353.9	

Date 2003 0h UTC	AUG 28	SEP 2	SEP 7	SEP 12	SEP 17	SEP 22	SEP 27	
MJD	52879	52884	52889	52894	52899	52904	52909	
Laboratory k	[UTC-UTC(k)]/ns							
NPL (Teddington)	27.1	27.9	26.8	30.1	32.7	34.4	36.6	
NPLI (New-Delhi)	5245.0	5303.4	5357.8	5377.6	5412.6	5451.4	5503.5	
NRC (Ottawa)	22.3	16.5	15.9	27.0	28.1	23.2	25.8	
NTSC (Lintong)	-12.8	-14.2	-5.4	-9.7	-18.8	-28.7	-33.8	
OMH (Budapest)	8414.4	8444.8	8482.2	8495.3	8497.2	8521.5	8532.8	
ONBA (Buenos Aires)	-728.9	-617.1	-605.7	-705.4	-751.7	-722.5	-793.5	
ONRJ (Rio de Janeiro)	5676.8	5688.3	5712.2	5720.8	5730.8	5738.2	5748.1	
OP (Paris)	39.3	41.8	43.6	46.5	41.7	34.2	29.4	
ORB (Bruxelles)	1.4	-10.0	-12.1	-14.3	-18.4	-22.3	-21.2	(3)
PL (Warszawa)	-148.9	-159.5	-172.1	-181.8	-191.9	-189.7	-200.8	
PTB (Braunschweig)	-4.8	-4.3	-9.7	-11.8	-11.0	-13.9	-15.1	
ROA (San Fernando)	71.3	71.8	74.0	77.1	75.2	69.5	72.3	
SCL (Hong Kong)	42.3	44.2	37.2	22.5	13.6	13.2	-3.1	
SG (Singapore)	-5.4	-2.5	14.5	18.2	6.7	10.6	19.6	
SMU (Bratislava)	-8663.9	-8714.3	-8747.4	-8763.7	-8788.8	-8812.6	-8840.0	
SP (Boras)	-64.4	-48.9	-32.1	-18.0	-12.9	-9.5	4.7	
SU (Moskva)	23.9	23.3	20.1	19.9	15.1	12.8	13.2	
TCC (Concepcion)	-4232.5	-4292.7	-4357.8	-4406.9	-4474.7	-4490.9	-4542.6	
TL (Chung-Li)	-8.1	2.0	4.3	0.3	-4.4	-6.2	-3.4	
TP (Praha)	72.2	72.3	68.7	71.3	75.1	76.1	72.9	
UME (Gebze-Kocaeli)	21.6	25.2	-5.5	19.8	6.6	-2.3	8.5	
USNO (Washington DC)	-1.1	-1.9	-0.3	0.2	0.1	-0.4	0.4	
VSL (Delft)	29.0	27.8	29.1	21.2	17.0	13.4	11.8	

- Notes on section 1:

(1) CNM : Change of master clock on MJD = 52894.8
(2) LT : Apparent time step of [UTC - UTC(LT)] of -10000 ns between MJD 52884 and 52889 due to GPS receiver failure.
(3) ORB : Apparent time step of [UTC - UTC(ORB)] between MJD 52879 and 52884 due to calibration of GPS equipment.

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

Date 2003 0h UTC	AUG 28	SEP 2	SEP 7	SEP 12	SEP 17	SEP 22	SEP 27	
MJD	52879	52884	52889	52894	52899	52904	52909	
Laboratory k	[TAI-TA(k)]/ns							
CH (Bern)	35708.4	35879.0	36043.4	36203.0	36368.4	36529.8	36692.9	
CRL (Tokyo)	176990.4	177193.7	177393.2	177595.4	177796.5	178000.5	178205.9	
F (Paris)	169234.8	169246.2	169256.3	169264.4	169274.5	169277.6	169285.8	
IEN (Torino)	29655.1	29788.1	29910.4	30038.0	30162.8	30279.4	30400.6	
JATC (Lintong)	-32065.2	-32174.3	-32259.8	-32359.7	-32447.4	-32530.2	-32614.3	
KRIS (Taejon)	6175.2	6162.8	6147.3	6135.2	6130.3	6120.8	6109.3	
NIST (Boulder)	-45253761.7	-45253957.7	-45254156.8	-45254353.6	-45254551.9	-45254751.7	-45254946.5	
NRC (Ottawa)	28613.3	28612.1	28616.0	28631.5	28636.9	28636.4	28643.2	
NTSC (Lintong)	167.3	173.7	191.6	193.8	197.6	206.9	218.0	
PL (Warszawa)	-1658.9	-1671.5	-1684.1	-1692.8	-1706.9	-1711.7	-1726.8	
PTB (Braunschweig)	-359404.8	-359399.5	-359399.8	-359396.9	-359391.1	-359389.2	-359385.1	
SU (Moskva)	27241023.9	27241023.3	27241020.1	27241019.9	27241015.1	27241012.8	27241013.2	(1)
USNO (Washington DC)	-34915536.4	-34915846.6	-34916154.7	-34916464.8	-34916774.5	-34917084.7	-34917393.9	

- 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 May 30 - 2003 Sep 27	52789-52909	6.960×10^{-13}
New steering correction for October and November 2003		
2003 Sep 27 - 2003 Nov 26	52909-52969	6.950×10^{-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
NIST-F1	52869 52904	13.4	0.8	0.5	T182	0.3	0.9	1.3	(1)
PTB-CS1	52879 52909	-0.5	5.0	8.0	T148	0.0	1.0	9.5	(2)
PTB-CS2	52879 52909	9.4	3.0	12.0	T148	0.0	1.0	12.4	(2)

Notes:

(1) Report 29 September 2003 by NIST.
(2) 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 52519-52909, 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
52879-52909	$+11.9 \times 10^{-15}$	1.4×10^{-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 values 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 = 27.0 ns

Date 2003	0h UTC	MJD	C_0/ns	N_0	C_1/ns	N_1
AUG	28	52879	-9.1	40	131.6	55
AUG	29	52880	-14.7	43	141.2	54
AUG	30	52881	-17.2	41	157.4	51
AUG	31	52882	-17.1	43	156.8	59
SEP	1	52883	-13.1	41	152.5	65
SEP	2	52884	-9.8	40	136.1	58
SEP	3	52885	-7.6	42	154.5	56
SEP	4	52886	-7.9	42	165.0	62
SEP	5	52887	-10.5	42	171.0	61
SEP	6	52888	-9.9	39	161.6	61
SEP	7	52889	-10.6	41	162.5	60
SEP	8	52890	-9.4	39	163.5	62
SEP	9	52891	-6.0	40	166.3	80
SEP	10	52892	-6.1	40	168.9	71
SEP	11	52893	-4.2	40	154.1	63
SEP	12	52894	-4.9	39	161.5	60
SEP	13	52895	-3.3	41	172.6	60
SEP	14	52896	-3.0	41	167.4	40
SEP	15	52897	-6.5	41	175.7	48
SEP	16	52898	-7.5	40	173.0	65
SEP	17	52899	-8.9	37	159.8	47
SEP	18	52900	-7.5	38	148.1	50
SEP	19	52901	-3.7	39	152.9	60
SEP	20	52902	-4.3	38	153.3	62
SEP	21	52903	-4.4	40	155.8	60
SEP	22	52904	-6.5	39	151.8	52
SEP	23	52905	-8.3	39	149.6	50
SEP	24	52906	-7.5	36	141.9	65
SEP	25	52907	-11.0	40	138.6	69
SEP	26	52908	-9.4	39	133.9	60
SEP	27	52909	-11.1	37	130.1	76

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 /NPL	GPS MC
AUS /CRL	GPS MC
BEV /NPL	GPS SC
BIRM/CRL	GPS MC
CAO /PTB	GPS SC
CH /PTB	GPS SC
CNM /NIST	GPS SC
CRL /PTB	GPS P3
CSIR/NPL	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
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	GPS SC
NMC /PTB	GPS GT
NMIJ/CRL	TWSTFT
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 /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	GPS P3
VSL /PTB	TWSTFT