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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	MAY 30	JUN 4	JUN 9	JUN 14	JUN 19	JUN 24	JUN 29	
MJD	52789	52794	52799	52804	52809	52814	52819	
Laboratory *k*				[*UTC-UTC*(*k*)]/ns				
AOS (Borowiec)	-340.1	-362.0	41.6	51.1	68.7	76.2	79.2	(1)
AUS (Sydney)	-311.4	-303.0	-302.5	-292.9	-304.7	-293.4	-277.5	
BEV (Wien)	-13.0	-7.2	-6.3	-7.9	-10.2	-11.7	-8.0	
BIRM (Beijing)	975.0	996.4	1012.6	1031.9	1048.6	1067.5	1091.3	
CAO (Cagliari)	-4063.3	-4051.5	-4050.5	-4058.0	-4064.0	-4085.7	-4086.3	
CH (Bern)	2.1	6.9	20.7	8.4	19.5	31.9	38.2	
CNM (Queretaro)	44.7	48.1	53.6	51.9	51.9	47.2	50.3	
CRL (Tokyo)	-4.4	0.1	-0.8	-2.2	-3.9	-7.5	-6.6	
CSIR (Pretoria)	-	-	-	-	-	-	-	
DLR (Oberpfaffenhofen)	-	-335.5	-346.6	-352.7	-364.6	-367.6	-324.3	
DTAG (Darmstadt)	373.4	383.9	378.4	361.1	356.0	361.5	353.7	
IEN (Torino)	35.2	41.4	45.8	47.3	48.1	47.4	45.3	
IFAG (Wettzell)	-2049.1	-2056.9	-2071.7	-2084.1	-2089.1	-2098.9	-2105.7	
IGMA (Buenos Aires)	-92.0	-92.5	-88.4	-94.8	-92.9	-93.1	-89.8	
INPL (Jerusalem)	-7873.6	-7897.9	-7928.7	-7956.2	-7979.1	-8008.3	-8039.3	
IPQ (Monte de Caparica)	-	-	-	-	-	-	-	
JATC (Lintong)	-11720.8	-11699.6	-11683.2	-11668.7	-11650.1	-11630.6	-11611.1	
JV (Kjeller)	-7614.6	-7749.4	-7860.5	-7975.1	-8097.0	-8214.8	-8306.7	
KRIS (Daejon)	-68.2	-65.8	-70.0	-74.9	-73.0	-73.5	-70.3	
LDS (Leeds)	3480.8	3498.4	3523.2	3543.9	3576.4	3596.6	3617.9	
LT (Vilnius)	-186.0	-173.0	-164.8	-161.5	-177.8	-159.4	-150.1	
MSL (Lower Hutt)	105.5	169.5	181.1	175.4	170.7	161.8	182.9	
NAO (Mizusawa)	-1.2	-0.5	1.6	2.1	5.6	11.1	8.8	
NIM (Beijing)	-2628.8	-2630.0	-2628.8	-2631.5	-2629.1	-2627.8	-2625.4	
NIMB (Bucharest)	-450.9	-467.0	-484.0	-519.9	-530.7	-543.3	-555.0	
NIMT (Bangkok)	-1034.0	-1057.0	-1077.1	-1094.2	95.8	73.0	50.4	(2)
NIST (Boulder)	0.6	2.6	3.8	5.5	7.5	9.4	9.2	
NMC (Sofiya)	-2786.1	-2822.6	-2817.3	-2834.5	-2850.6	-2905.5	-2887.4	
NMIJ (Tsukuba)	28.5	22.0	7.9	-6.9	-17.2	-16.9	-15.1	
NMLS (Shah Alam)	322.4	341.2	352.3	363.0	370.2	384.1	400.0	

Date 2003 0h UTC	MAY 30	JUN 4	JUN 9	JUN 14	JUN 19	JUN 24	JUN 29
MJD	52789	52794	52799	52804	52809	52814	52819
Laboratory *k*				[*UTC*-*UTC*(*k*)]/ns			
NPL (Teddington)	24.8	25.8	25.8	23.7	23.9	22.7	23.6
NPLI (New-Delhi)	4357.5	-	-	-	-	-	-
NRC (Ottawa)	15.2	25.5	15.7	20.0	22.0	27.1	17.7
NTSC (Lintong)	1.4	12.9	13.0	21.5	20.1	28.7	33.2
OMH (Budapest)	7879.8	7902.9	7944.9	7972.6	7982.6	8015.6	8040.6
ONBA (Buenos Aires)	-838.0	-835.1	-790.0	-702.8	-702.0	-603.8	-394.4
ONRJ (Rio de Janeiro)	5495.0	5504.6	5509.4	5529.2	5545.7	5551.0	5566.4
OP (Paris)	31.8	36.8	37.4	41.4	40.6	42.9	47.6
ORB (Bruxelles)	-52.8	-37.4	-23.9	-19.2	-14.5	-9.9	-8.4
PL (Warszawa)	70.7	56.6	51.9	41.9	29.4	17.6	2.2
PTB (Braunschweig)	10.0	11.3	7.2	0.2	-4.5	-2.1	-3.7
ROA (San Fernando)	66.8	68.2	64.2	57.3	52.6	55.1	52.2
SCL (Hong Kong)	-26.4	-20.4	-6.7	-7.8	3.0	8.6	20.6
SG (Singapore)	317.6	265.2	272.6	282.5	282.1	284.1	298.3
SMU (Bratislava)	-8163.9	-8186.8	-8224.5	-8252.4	-8274.5	-8307.4	-8319.8
SP (Boras)	-118.2	-123.4	-126.5	-131.3	-120.8	-139.3	-133.7
SU (Moskva)	36.8	35.9	39.6	37.1	31.1	34.2	33.5
TCC (Concepcion)	-3236.5	-3267.1	-3297.2	-3344.8	-3394.6	-3469.1	-3522.8
TL (Chung-Li)	-53.3	-51.4	-54.1	-54.3	-56.9	-54.9	-52.1
TP (Praha)	-8.3	1.5	10.5	20.2	37.7	33.4	42.5
UME (Gebze-Kocaeli)	-22.6	-14.7	-11.4	-11.0	-8.2	-12.8	-12.8
USNO (Washington DC)	-2.3	-1.7	-2.2	-2.6	-2.3	-2.6	-3.4
VSL (Delft)	-13.8	-3.4	4.1	8.1	12.6	26.6	34.3

- Notes on section 1:

(1) AOS : Time step of UTC(AOS) of -400 ns on MJD 52794.6
(2) NIMT: Apparent time step of [*UTC* - *UTC*(*NIMT*)] between MJD 52804 and 52809

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

Date 2003 0h UTC	MAY 30	JUN 4	JUN 9	JUN 14	JUN 19	JUN 24	JUN 29	
MJD	52789	52794	52799	52804	52809	52814	52819	
Laboratory *k*				[*TAI-TA*(*k*)]/ns				
AUS (Sydney)	-121353.4	-121459.0	-121547.5	-121635.9	-121726.7	-121828.4	-121917.5	
CH (Bern)	32627.5	32797.2	32975.9	33128.6	33304.6	33482.0	33653.2	
CRL (Tokyo)	173356.3	173561.9	173764.5	173966.0	174161.6	174365.8	174568.4	
F (Paris)	169069.0	169079.6	169085.8	169095.5	169103.8	169114.4	169126.0	
IEN (Torino)	27597.3	27723.4	27844.8	27969.3	28090.1	28210.4	28328.3	
JATC (Lintong)	-30285.8	-30374.6	-30478.2	-30580.7	-30685.1	-30783.6	-30875.1	
KRIS (Taejon)	6022.5	6028.5	6035.7	6040.2	6037.5	6038.3	6040.0	
NIST (Boulder)	-45250197.6	-45250393.6	-45250592.4	-45250790.7	-45250988.7	-45251186.0	-45251385.0	
NRC (Ottawa)	28528.8	28543.2	28538.0	28546.6	28553.0	28562.3	28557.2	
NTSC (Lintong)	34.9	44.4	51.4	57.6	60.4	69.9	82.5	
PL (Warszawa)	-1431.3	-1444.4	-1456.1	-1469.1	-1482.6	-1494.4	-1504.8	
PTB (Braunschweig)	-359480.1	-359473.8	-359472.9	-359475.0	-359474.6	-359467.5	-359464.1	
SU (Moskva)	27241036.8	27241035.9	27241039.6	27241037.1	27241031.1	27241034.2	27241033.5	(1)
USNO (Washington DC)	-34909965.0	-34910271.7	-34910581.4	-34910891.6	-34911200.3	-34911510.7	-34911822.0	

- 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. 30 - 2003 July 29	52789-52849	6.960×10^{-13}

No new steering correction foreseen for Aug. 2003

2003 July 29 - 2003 Aug 28	52849-52879	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	52764-52789	1.8	0.2	0.6	T183	1.3	1.2	1.9	(1)
SYRTE-JPO	52749-52764	11.1	0.6	8.0	T160	0.3	2.	8.3	(2)
PTB CS1	52789-52819	3.5	5.	8.	T148	0.	1.	9.	(3)
PTB CS2	52789-52819	10.9	3.	12.	T148	0.	1.	12.	(3)

Notes:

(1) Report 7 July by BNM-SYRTE.
(2) Report 16 June by BNM-SYRTE.
(3) 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 52429-52819, 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*
52789-52819	$+4.9 \times 10^{-15}$	2.3×10^{-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 = 2.8 ns, σ_1 = 29.2 ns

Date 2003, 0h UTC	MJD	C_0/ns	N_0	C_1/ns	N_1
MAY 30	52789	-9.5	42	131.6	66
MAY 31	52790	-9.1	44	133.6	67
JUN 1	52791	-10.1	45	149.8	51
JUN 2	52792	-10.5	44	147.1	59
JUN 3	52793	-9.8	23	128.5	64
JUN 4	52794	-10.4	41	122.2	71
JUN 5	52795	-9.1	44	130.9	80
JUN 6	52796	-7.0	43	141.0	77
JUN 7	52797	-6.2	44	143.2	65
JUN 8	52798	-4.6	43	144.1	60
JUN 9	52799	-6.3	44	154.9	51
JUN 10	52800	-9.0	44	170.4	43
JUN 11	52801	-14.1	44	161.5	59
JUN 12	52802	-14.2	44	160.3	53
JUN 13	52803	-13.4	45	154.8	72
JUN 14	52804	-11.7	43	154.4	70
JUN 15	52805	-8.7	43	160.1	58
JUN 16	52806	-9.4	44	151.4	57
JUN 17	52807	-8.3	44	146.6	55
JUN 18	52808	-11.3	44	152.4	71
JUN 19	52809	-10.9	44	154.2	67
JUN 20	52810	-11.3	44	153.7	77
JUN 21	52811	-11.4	44	161.3	62
JUN 22	52812	-9.8	43	179.5	70
JUN 23	52813	-10.6	42	180.2	64
JUN 24	52814	-11.1	44	158.6	41
JUN 25	52815	-11.6	45	151.9	59
JUN 26	52816	-11.5	43	150.9	61
JUN 27	52817	-10.7	44	157.5	64
JUN 28	52818	-7.9	44	169.1	77
JUN 29	52819	-6.7	43	162.9	32

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 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 P3
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