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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	JUL 29	AUG 3	AUG 8	AUG 13	AUG 18	AUG 23	AUG 28	
MJD	52849	52854	52859	52864	52869	52874	52879	
Laboratory *k*				[*UTC-UTC*(*k*)]/ns				
AOS (Borowiec)	127.3	150.4	167.8	177.6	183.5	-6.8	-1.5	(1)
AUS (Sydney)	-329.2	-349.5	-353.3	-357.0	-355.4	-359.6	-370.1	
BEV (Wien)	-6.7	0.0	2.8	-3.1	-16.5	-28.4	-27.2	
BIRM (Beijing)	1150.9	1164.6	1169.0	1179.0	1197.5	1218.5	1228.4	
CAO (Cagliari)	-4079.4	-4081.9	-4093.4	-4104.3	-4105.3	-4108.2	-4113.4	
CH (Bern)	22.8	18.0	11.8	2.9	-2.8	-14.6	-28.6	
CNM (Queretaro)	45.4	39.6	38.2	37.6	29.1	24.4	20.4	
CRL (Tokyo)	-14.1	-9.8	-7.5	-10.2	-10.6	-8.5	-9.8	
CSIR (Pretoria)	-2436.8	-2476.7	-2510.0	-2552.3	-2578.5	-2606.5	-2650.0	
DLR (Oberpfaffenhofen)	6.8	5.1	9.0	6.7	3.3	1.9	-2.3	
DTAG (Darmstadt)	313.6	311.6	316.9	313.9	307.2	299.7	303.1	
IEN (Torino)	51.4	57.8	56.0	53.7	54.4	55.3	65.5	
IFAG (Wettzell)	-2147.5	-2192.8	-2198.1	-2210.5	-2214.6	-2226.5	-2238.2	
IGMA (Buenos Aires)	-81.2	-84.5	-99.4	-96.4	-89.3	-85.0	-89.0	
INPL (Jerusalem)	-8221.5	-8252.4	-8287.7	-8320.2	-8349.7	-8379.7	-8410.7	
IPQ (Monte de Caparica)	-	-	-	-	-	-	-	
JATC (Lintong)	-11495.1	-11468.3	-11411.1	-11403.8	-11388.0	-11369.6	-11359.2	
JV (Kjeller)	-9016.8	-9127.4	-9252.3	-9361.3	-9466.8	-9583.5	-9670.3	
KRIS (Daejon)	-181.2	-210.6	-206.3	-210.7	-243.4	-269.3	-292.6	
LDS (Leeds)	3733.8	3755.4	3767.6	3789.1	3828.4	3864.4	3893.9	
LT (Vilnius)	-131.5	-144.4	-141.4	9875.0	9882.3	9898.8	9916.8	(2)
MSL (Lower Hutt)	219.3	205.9	198.1	178.5	135.5	124.4	103.6	
NAO (Mizusawa)	11.6	10.7	18.1	23.3	20.8	16.8	8.5	
NIM (Beijing)	-2624.9	-2620.5	-2636.6	-2637.3	-2627.5	-2629.4	-2627.7	
NIMB (Bucharest)	-671.3	-682.1	-108.7	-143.6	-143.0	-136.0	-131.7	
NIMT (Bangkok)	-51.1	-65.9	-77.5	-97.1	-115.6	-127.0	-146.7	
NIST (Boulder)	10.7	11.2	10.2	10.2	8.0	7.7	7.7	
NMC (Sofiya)	-2976.5	-2984.9	-2981.8	-2981.7	-3022.7	-3040.5	-3065.1	
NMIJ (Tsukuba)	-14.9	-8.1	-3.2	4.8	12.3	24.9	26.6	
NMLS (Shah Alam)	298.4	325.5	327.5	327.9	333.4	345.2	338.8	

Date 2003 0h UTC	JUL 29	AUG 3	AUG 8	AUG 13	AUG 18	AUG 23	AUG 28
MJD	52849	52854	52859	52864	52869	52874	52879
Laboratory *k*				[*UTC-UTC*(*k*)]/ns			
NPL (Teddington)	22.1	23.5	23.0	22.3	21.7	23.2	27.1
NPLI (New-Delhi)	-	-	-	-	-	-	-
NRC (Ottawa)	27.9	12.5	12.7	10.9	13.1	9.8	22.3
NTSC (Lintong)	23.8	27.6	26.4	15.9	2.2	-7.4	-12.8
OMH (Budapest)	8203.3	8228.6	8262.3	8293.8	8345.0	8372.5	8414.4
ONBA (Buenos Aires)	-486.3	-448.2	-483.1	-537.8	-603.4	-748.3	-728.9
ONRJ (Rio de Janeiro)	5629.2	5645.7	5649.9	5661.1	5672.2	5675.7	5676.8
OP (Paris)	37.0	35.7	39.2	38.0	37.7	33.8	39.3
ORB (Bruxelles)	-33.4	-26.7	-20.8	-12.2	-3.6	-0.8	1.4
PL (Warszawa)	-75.6	-87.0	-103.9	-114.1	-123.7	-136.8	-148.9
PTB (Braunschweig)	-5.3	-2.2	2.5	-4.8	-5.6	-5.6	-4.8
ROA (San Fernando)	57.7	60.9	65.8	60.8	60.7	67.6	71.3
SCL (Hong Kong)	45.9	47.8	47.0	47.7	48.0	52.8	42.3
SG (Singapore)	-20.1	-22.5	-19.0	-17.9	-11.6	-6.6	-5.4
SMU (Bratislava)	-8494.6	-8514.5	-8546.1	-8585.3	-8605.7	-8642.8	-8663.9
SP (Boras)	-105.0	-99.1	-88.9	-89.8	-83.5	-77.1	-64.4
SU (Moskva)	25.6	32.7	30.9	30.2	25.8	26.1	23.9
TCC (Concepcion)	-3850.0	-3892.4	-3953.5	-4005.9	-4092.0	-4136.3	-4232.5
TL (Chung-Li)	-41.1	-30.9	-25.8	-27.4	-19.8	-12.2	-8.1
TP (Praha)	68.7	63.0	57.9	65.7	65.0	63.2	72.2
UME (Gebze-Kocaeli)	-2.3	4.1	9.9	12.9	11.9	22.9	21.6
USNO (Washington DC)	-1.8	-2.0	-1.4	-1.6	-2.9	-1.9	-1.1
VSL (Delft)	31.6	34.4	37.9	29.5	27.6	27.2	29.0

- Notes on section 1:

(1) AOS : Time step of UTC(AOS) of +200 ns on MJD 52871.4
(2) LT : Apparent time step of [*UTC* - *UTC*(*LT*)] of +10000 ns between MJD 52859 and 52864 due to GPS receiver failure.

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

Date 2003 0h UTC	JUL 29	AUG 3	AUG 8	AUG 13	AUG 18	AUG 23	AUG 28	
MJD	52849	52854	52859	52864	52869	52874	52879	
Laboratory *k*				[*TAI*-*TA*(*k*)]/ns				
CH (Bern)	34696.3	34868.8	35039.8	35208.2	35379.7	35545.1	35708.4	
CRL (Tokyo)	175773.1	175980.1	176183.6	176387.2	176586.5	176789.1	176990.4	
F (Paris)	169179.2	169190.3	169199.4	169207.6	169214.6	169226.0	169234.8	
IEN (Torino)	28925.4	29049.1	29172.6	29287.9	29401.8	29526.4	29655.1	
JATC (Lintong)	-31491.1	-31583.3	-31647.1	-31759.8	-31861.0	-31958.6	-32065.2	
KRIS (Taejon)	6176.5	6175.0	6186.5	6192.1	6184.5	6181.3	6175.2	
NIST (Boulder)	-45252573.7	-45252770.7	-45252969.2	-45253166.7	-45253366.4	-45253564.2	-45253761.7	
NRC (Ottawa)	28593.7	28582.6	28587.0	28589.7	28595.2	28597.0	28613.3	
NTSC (Lintong)	119.6	133.4	137.9	140.5	150.1	161.9	167.3	
PL (Warszawa)	-1583.6	-1595.0	-1606.9	-1621.1	-1635.7	-1646.8	-1658.9	
PTB (Braunschweig)	-359435.2	-359427.0	-359417.4	-359419.7	-359415.4	-359410.5	-359404.8	
SU (Moskva)	27241025.6	27241032.7	27241030.9	27241030.2	27241025.8	27241026.1	27241023.9	(1)
USNO (Washington DC)	-34913679.0	-34913989.5	-34914298.3	-34914608.7	-34914918.8	-34915227.4	-34915536.4	

- 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 foreseen for October 2003		
2003 Sep 27 - 2003 Oct 27	52909-52939	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
CRL-01	52839 52854	1.8	5.2	4.3	T148	0.8	2.0	7.1	(1)
PTB-CS1	52849 52879	9.8	5.0	8.0	T148	0.0	1.0	9.5	(2)
PTB-CS2	52849 52879	5.4	3.0	12.0	T148	0.0	1.0	12.4	(2)

Notes:
(1) Report 5 Aug. by CRL.
(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 52459-52849, 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*
52849-52879	$+6.0 \times 10^{-15}$	2.5×10^{-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 = 2.9 ns, σ_1 = 25.0 ns

Date 2003	0h UTC	MJD	C_0/ns	N_0	C_1/ns	N_1
JUL	29	52849	-1.1	41	142.3	42
JUL	30	52850	-2.0	42	153.9	60
JUL	31	52851	0.2	40	143.2	54
AUG	1	52852	-0.7	43	144.7	76
AUG	2	52853	-2.6	39	147.1	66
AUG	3	52854	-2.8	43	141.8	62
AUG	4	52855	-9.1	43	153.4	58
AUG	5	52856	-13.3	44	195.1	60
AUG	6	52857	-13.1	44	204.6	57
AUG	7	52858	-15.5	43	174.9	52
AUG	8	52859	-19.5	44	170.6	64
AUG	9	52860	-19.2	44	172.4	73
AUG	10	52861	-18.4	42	149.7	67
AUG	11	52862	-19.0	38	129.9	63
AUG	12	52863	-18.0	44	128.8	60
AUG	13	52864	-16.5	44	136.2	59
AUG	14	52865	-14.9	43	134.6	56
AUG	15	52866	-12.9	43	119.9	60
AUG	16	52867	-10.8	42	109.8	64
AUG	17	52868	-6.3	43	94.6	67
AUG	18	52869	-8.6	39	90.4	65
AUG	19	52870	-8.5	42	96.4	53
AUG	20	52871	-6.6	43	106.8	53
AUG	21	52872	-5.9	41	111.8	59
AUG	22	52873	-4.6	43	115.6	41
AUG	23	52874	-4.7	41	119.1	53
AUG	24	52875	-8.8	37	122.3	58
AUG	25	52876	-8.2	39	126.6	71
AUG	26	52877	-8.3	39	143.1	61
AUG	27	52878	-8.6	37	139.6	62
AUG	28	52879	-9.1	40	131.6	55

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 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 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