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BUREAU INTERNATIONAL DES POIDS ET MESURES

Circular T 122 (1998 March 11)
Circulaire T 122

1 - Coordinated Universal Time UTC. Computed values of *UTC-UTC(k)*.

(From 1997 July 1, 0h UTC, *TAI-UTC* = 31 s)

Date 1998 0h UTC	Jan 31	Feb 5	Feb 10	Feb 15
MJD	50844	50849	50854	50859
Laboratory k	*UTC-UTC(k)* (Unit is one nanosecond)			
AOS (Borowiec)	-192	-166	-199	-242
APL (Laurel)	5127	5183	5227	5276
AUS (Canberra)	308	310	302	302
BIRM (Beijing)	-8508	-8563	-8608	-8654
CAO (Cagliari)	-2226	-2250	-2273	-2287
CH (Bern)	87	94	91	89
CNM (Queretaro)	-241	-186	-118	-63
CRL (Tokyo)	-92	-98	-101	-106
CSAO (Lintong)	-42	-52	-31	-56
CSIR (Pretoria)	-2638	-2724	-2780	-2872
DLR (Oberpfaffenhofen)	-2090	-2139	-2181	-2232
DTAG (Darmstadt)	-306	-300	-278	-262
GUM (Warszawa)	986	974	970	965
IEN (Torino)	95	90	87	84
IFAG (Wettzell)	-2019	-2063	-2079	-2110
IGMA (Buenos Aires)	85	117	101	101
INPL (Jerusalem)	-	-	-	-
IPQ (Monte de Caparica) (1)	1141	57	69	91
JATC (Lintong)	3360	3354	3380	3362
KRIS (Taejon)	82	86	80	87
LDS (Leeds)	138	146	138	152
MSL (Lower Hutt)	-5717	-5663	-5672	-5587
NAO (Mizusawa)	408	472	543	605
NIM (Beijing)	-2635	-2653	-2664	-2652
NIST (Boulder)	5	7	10	11
NML (Sydney)	952	969	979	980
NPL (Teddington)	75	73	72	72
NRC (Ottawa)	17	20	22	24
NRLM (Tsukuba)	356	367	377	387
OMH (Budapest)	1553	1573	1581	1606
ONBA (Buenos Aires)	203	519	937	1256
ONRJ (Rio de Janeiro)	353	362	374	385
OP (Paris)	15	9	12	13
ORB (Bruxelles)	233	229	246	255
PSB (Singapore)	1130	1156	1180	1207
PTB (Braunschweig)	-7	-8	1	2
ROA (San Fernando)	35	31	29	31
SCL (Hong Kong)	-319	-347	-337	-342
SO (Shanghai)	789	797	784	795
SP (Boras)	-	655	660	667
SU (Moskva)	323	321	316	307
TL (Chung-Li)	447	440	422	416
TP (Praha)	206	208	214	206
TUG (Graz)	4340	4388	4422	4466
UME (Gebze-Kocaeli)	1018	1030	1051	1057
USNO (Washington DC)(USNO MC)	-3	-2	2	4
VSL (Delft)	-8	-17	-26	-32

ORGANISATION INTERGOUVERNEMENTALE DE LA CONVENTION DU MÈTRE
PAVILLON DE BRETEUIL F-92312 SÈVRES CEDEX TÉL. + 33 1 45 07 70 70 FAX + 33 1 45 34 20 21

1 - Coordinated Universal Time UTC. (Cont.)

Date 1998 0h UTC	Feb 20	Feb 25
MJD	50864	50869
Laboratory k	*UTC-UTC(k)* (Unit is one nanosecond)	
AOS (Borowiec)	-367	-375
APL (Laurel)	5337	5383
AUS (Canberra)	291	285
BIRM (Beijing)	-	-8754
CAO (Cagliari)	-2309	-2321
CH (Bern)	96	83
CNM (Queretaro)	-36	-20
CRL (Tokyo)	-105	-101
CSAO (Lintong)	-23	-52
CSIR (Pretoria)	-2964	-3059
DLR (Oberpfaffenhofen)	-2277	-2325
DTAG (Darmstadt)	-237	-223
GUM (Warszawa)	965	968
IEN (Torino)	77	71
IFAG (Wettzell)	-2121	-2132
IGMA (Buenos Aires)	94	97
INPL (Jerusalem)	-	-65
IPQ (Monte de Caparica)	105	121
JATC (Lintong)	3398	3371
KRIS (Taejon)	88	109
LDS (Leeds)	143	152
MSL (Lower Hutt)	-5509	-5482
NAO (Mizusawa)	673	753
NIM (Beijing)	-2658	-2657
NIST (Boulder)	14	15
NML (Sydney)	975	974
NPL (Teddington)	69	71
NRC (Ottawa)	29	26
NRLM (Tsukuba)	382	385
OMH (Budapest)	1621	1623
ONBA (Buenos Aires)	1548	1800
ONRJ (Rio de Janeiro)	403	419
OP (Paris)	7	11
ORB (Bruxelles)	241	245
PSB (Singapore)	1235	1257
PTB (Braunschweig)	13	15
ROA (San Fernando)	29	28
SCL (Hong Kong)	-356	-327
SO (Shanghai)	782	781
SP (Boras)	671	673
SU (Moskva)	307	292
TL (Chung-Li)	400	396
TP (Praha)	204	210
TUG (Graz)	4519	4563
UME (Gebze-Kocaeli)	1066	1077
USNO (Washington DC)(USNO MC)	7	10
VSL (Delft)	-40	-35

2 - International Atomic Time TAI and local atomic time scales TA(k).

The following table gives the computed values of *TAI-TA(k)*.

Date 1998 0h UTC		Jan 31	Feb 5	Feb 10	Feb 15
MJD		50844	50849	50854	50859
Laboratory k		*TAI-TA(k)* (Unit is one nanosecond)			
AMC (Col. Springs)		-365171	-365181	-365183	-365188
APL (Laurel)		6590	6646	6690	6739
AUS (Canberra)		-83669	-83717	-83826	-83934
CH (Bern)		-38577	-38383	-38198	-38009
CRL (Tokyo)		95573	95779	95992	96200
CSAO (Lintong)		-2045	-2005	-1934	-1909
F (Paris)		162723	162714	162715	162712
IEN (Torino)		5527	5574	5619	5670
INPL (Jerusalem)		-	-	-	-
JATC (Lintong)		10583	10468	10385	10252
KRIS (Taejon)		5484	5500	5514	5536
NIST (Boulder)		-45171525	-45171735	-45171945	-45172156
NML (Sydney)	(2)	991	1007	1018	1021
NRC (Ottawa)	(3)	27000	27004	27006	27008
PTB (Braunschweig)		-361507	-361508	-361499	-361498
SO (Shanghai)		-46780	-46771	-46783	-46770
SU (Moskva)	(4)	27241323	27241321	27241316	27241307
USNO (Washington DC)		-34788200	-34788516	-34788833	-34789149

Date 1998 0h UTC		Feb 20	Feb 25
MJD		50864	50869
Laboratory k	*TAI-TA(k)* (Unit is one nanosecond)		
AMC (Col. Springs)		-365191	-365193
APL (Laurel)		6800	6846
AUS (Canberra)		-84049	-84145
CH (Bern)		-37811	-37633
CRL (Tokyo)		96411	96622
CSAO (Lintong)		-1826	-1805
F (Paris)		162709	162708
IEN (Torino)		5715	5763
INPL (Jerusalem)		-	-
JATC (Lintong)		10190	10071
KRIS (Taejon)		5552	5588
NIST (Boulder)		-45172366	-45172577
NML (Sydney)	(2)	1014	1012
NRC (Ottawa)		27013	27009
PTB (Braunschweig)		-361487	-361485
SO (Shanghai)		-46784	-46779
SU (Moskva)	(4)	27241307	27241292
USNO (Washington DC)		-34789463	-34789778

3 - Notes on sections 1 and 2.

(1) IPQ . Time step of UTC(IPQ) of + 1100 ns on MJD = 50847.76

(2) NML . Erratum :

MJD	*TAI-TA(NML)*
50824	967 ns

(3) NRC . Corrected values of *TAI-TA(NRC)* :

MJD	*TAI-TA(NRC)*	MJD	*TAI-TA(NRC)*
50819	26999 ns	50834	26997 ns
50824	26998 ns	50839	27001 ns
50829	26999 ns	50844	27000 ns

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

4 - Difference between the normalized frequencies of EAL and TAI.

Interval of validity		*f(EAL)-f(TAI)*
1998 Jan. 31 - 1998 Feb. 25	50844-50869	7.150×10^{-13}
New steering correction foreseen for March 1998		
1998 Feb. 25 - 1998 Mar. 27	50869-50899	7.140×10^{-13}
New steering correction foreseen for April 1998		
1998 Mar. 27 - 1998 Apr. 26	50899-50929	7.130×10^{-13}

5 - Duration of the TAI scale interval.

The following table gives the duration u_{TAI} of the TAI scale interval expressed as its relative departure d from the SI second on the rotating geoid, u_0, together with its uncertainty σ : $d = (u_{TAI}-u_0)/u_0$. This is obtained, on the given period of estimation, by comparison of the TAI frequency :

- with the frequency, corrected for the black-body radiation shift, of a given individual primary frequency standard (σ is then the last communicated estimate of the type B uncertainty of the standard), and

- with a combination computed by the BIPM of all available measurements from LPTF-FO1, NIST-7, PTB CS2 and PTB CS3 consistently corrected for the black-body radiation shift (σ is then estimated by the BIPM taking into account the individual uncertainties and parameters characteristic of TAI stability).

Standard	Period of estimation	d (10^{-14})	σ (10^{-14})
PTB-CS2	50844-50869	+0.5	1.5
PTB-CS3	50844-50869	+0.7	1.4
BIPM estimate	50809-50869	+0.8	1.0

6 - [*UTC-GPS time*] and [*TAI-GPS time*].

[*UTC-GPS time*] = -12 s + C_0, [*TAI-GPS time*] = 19 s + C_0.

Daily values of C_0 are given in the following table. They are obtained as follows: the GPS data taken at the Paris Observatory, for highest elevation, are first corrected for precise satellite ephemerides and for measured ionospheric delays, and then smoothed to obtain daily values of [*UTC(OP)-GPS time*] at 0h UTC; daily values of C_0 are derived from them using linear interpolation of [*UTC-UTC(OP)*]. The global uncertainty of daily C_0 values is of order 10 ns.

In the following table, the standard deviation σ characterizes the dispersion of individual measurements, and N is the number of measurements used on a given day for estimation of the corresponding daily C_0 value.

Date 1998 0h UTC	MJD	C_0 (ns)	σ (ns)	$\sigma/\sqrt{N}$ (ns)
Jan 31	50844	-3	46	8
Feb 1	50845	-6	31	6
Feb 2	50846	-6	48	9
Feb 3	50847	-5	36	7
Feb 4	50848	-6	50	9
Feb 5	50849	-11	51	9
Feb 6	50850	-10	38	7
Feb 7	50851	-5	48	9
Feb 8	50852	-1	27	11
Feb 9	50853	-1	49	12
Feb 10	50854	-4	43	8
Feb 11	50855	-8	46	9
Feb 12	50856	-9	42	8
Feb 13	50857	-5	52	9
Feb 14	50858	0	43	8
Feb 15	50859	3	30	6
Feb 16	50860	2	39	7
Feb 17	50861	-1	51	9
Feb 18	50862	-2	47	9
Feb 19	50863	3	42	8
Feb 20	50864	5	40	8
Feb 21	50865	3	33	6
Feb 22	50866	0	40	7
Feb 23	50867	0	34	6
Feb 24	50868	2	37	7
Feb 25	50869	-1	45	8

7 - [*UTC-GLONASS time*] and [*TAI-GLONASS time*].

[*UTC-GLONASS time*] = 0 s + C_1. [*TAI-GLONASS time*] = +31 s + C_1.

Daily values of C_1 are given in the following table. They are obtained as follows: the GLONASS data taken at the NMi Van Swinden Laboratorium, Delft, The Netherlands, for highest elevation, are smoothed to obtain daily values of [*UTC(VSL)-GLONASS time*] at 0h UTC; daily values of C_1 are then derived from them using linear interpolation of [*UTC-UTC(VSL)*]. A time correction of + 1285 ns is also applied in order to ensure continuity of C_1 estimates on 1997, January 1 (MJD = 50449). The global uncertainty of daily C_1 values is of order several hundreds of nanoseconds.

In the following table, the standard deviation σ characterizes the dispersion of individual measurements, and N is the number of measurements used on a given day for estimation of the corresponding daily C_1 value.

Date 1998 0h UTC	MJD	C_1 (ns)	σ (ns)	$\sigma/\sqrt{N}$ (ns)
Jan 31	50844	370	17	3
Feb 1	50845	376	18	3
Feb 2	50846	389	25	4
Feb 3	50847	391	12	3
Feb 4	50848	385	32	7
Feb 5	50849	381	18	4
Feb 6	50850	373	19	4
Feb 7	50851	365	21	3
Feb 8	50852	368	17	3
Feb 9	50853	375	16	3
Feb 10	50854	385	25	4
Feb 11	50855	393	15	3
Feb 12	50856	393	20	3
Feb 13	50857	390	25	4
Feb 14	50858	392	27	5
Feb 15	50859	389	23	4
Feb 16	50860	377	14	2
Feb 17	50861	371	20	3
Feb 18	50862	374	12	3
Feb 19	50863	381	27	5
Feb 20	50864	384	19	3
Feb 21	50865	389	16	3
Feb 22	50866	396	23	4
Feb 23	50867	396	21	4
Feb 24	50868	393	25	5
Feb 25	50869	394	24	6