BIPM

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BUREAU INTERNATIONAL DES POIDS ET MESURES

Circular T 103 (1996 August 20)

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

(From 1996 January 1, 0hUTC, TAI-UTC = 30 s)

Date 1996 0h UTC		Jun 30	Jul 5	Jul 10	Jul 15
MJD		50264	50269	50274	50279
Laboratory k		UTC-UTC(k) (Unit is one nanosecond)			
AOS (Borowiec)		58	162	169	234
APL (Laurel)		-290	-287	-281	-274
AUS (Canberra)		-49	-16	-16	23
BEV (Wien)		-	-	3067	2935
BIRM (Beijing)		-2140	-2203	-2252	-2300
CAO (Cagliari)		-	-	-	-
CH (Bern)		160	159	168	168
CNM (Mexico)		-1630	-1733	-1837	-1819
CRL (Tokyo)		-77	-85	-86	-93
CSAO (Lintong)		-30	-64	-37	-41
CSIR (Pretoria)		7094	7143	7186	7213
DLR (Oberpfaffenhofen)		-2233	-2239	-2244	-2247
DTAG (Darmstadt)		-415	-408	-397	-400
GUM (Warszawa)		-270	-270	-263	-254
IEN (Torino)		280	295	313	327
IFAG (Wettzell)		-	-4586	-4613	-4631
IGMA (Buenos Aires)		113	112	113	106
INPL (Jerusalem)		166	280	371	471
IPQ (Monte de Caparica)		-10	-12	-11	2
JATC (Lintong)		3462	3390	3370	3332
KRIS (Taejon)		84	87	86	81
LDS (Leeds)		128	114	93	93
MSL (Lower Hutt)		-4884	-4932	-4972	-5040
NAOM (Mizusawa)		-2934	-2912	-2904	-2877
NAOT (Tokyo)		-730	-657	-575	-507
NIM (Beijing)		8496	8506	8505	8523
NIST (Boulder)		-27	-25	-23	-22
NPL (Teddington)		2	0	-2	0
NRC (Ottawa)		-73	-63	-60	-55
NRLM (Tsukuba)		-2828	-2768	-2703	-2638
OMH (Budapest)		-	-	-	-
ONBA (Buenos Aires)	(1)	-15442	-16352	-16965	-4807
ONRJ (Rio de Janeiro)		16625	16926	17465	18161
OP (Paris)		10	4	2	9
ORB (Bruxelles)		43	71	60	83
PTB (Braunschweig)		2048	2039	2034	2025
ROA (San Fernando)		85	84	82	85
SCL (Hong Kong)	(2)	-341	-439	-345	-430
SO (Shanghai)		1296	1288	1250	1246
SP (Boras)		-7663	-7742	-7824	-7927
SU (Moskva)		-7689	-7704	-7705	-7715
TL (Chung-Li)		284	290	271	282
TP (Praha)		-10	-19	-7	-5
TUG (Graz)		338	361	380	393
UME (Gebze-Kocaeli)		116	124	130	147
USNO (Washington DC)(USNO MC)		-19	-15	-17	-18
VSL (Delft)		-444	-436	-431	-427

PAVILLON DE BRETEUIL F - 92312 SÈVRES CEDEX

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1 - Coordinated Universal Time UTC. (Cont.)

Date 1996 0h UTC		Jul 20	Jul 25	Jul 30
MJD		50284	50289	50294
Laboratory k		UTC-UTC(k)	(Unit is one nanosecond)	
AOS (Borowiec)		282	380	317
APL (Laurel)		-270	-271	-278
AUS (Canberra)		42	48	40
BEV (Wien)		2839	2722	2729
BIRM (Beijing)		-2358	-2403	-2459
CAO (Cagliari)		-	-	-
CH (Bern)		167	172	172
CNM (Mexico)		-1801	-1800	-1816
CRL (Tokyo)		-95	-97	-97
CSAO (Lintong)		-44	-12	-16
CSIR (Pretoria)		7188	7152	7084
DLR (Oberpfaffenhofen)		-2255	-2263	-2272
DTAG (Darmstadt)		-406	-402	-420
GUM (Warszawa)		-247	-243	-238
IEN (Torino)		349	366	382
IFAG (Wettzell)		-4607	-4610	-4611
IGMA (Buenos Aires)		109	102	126
INPL (Jerusalem)		540	615	678
IPQ (Monte de Caparica)		2	-3	3
JATC (Lintong)		3318	3302	3275
KRIS (Taejon)		64	51	31
LDS (Leeds)		102	122	121
MSL (Lower Hutt)		-4988	-4990	-5071
NAOM (Mizusawa)		-2858	-2840	-2835
NAOT (Tokyo)		-467	-411	-349
NIM (Beijing)		8537	8577	8612
NIST (Boulder)		-24	-24	-27
NPL (Teddington)		-1	-5	-6
NRC (Ottawa)		-49	-36	-30
NRLM (Tsukuba)		-2572	-2506	-2441
OMH (Budapest)		-	-	-
ONBA (Buenos Aires)		-5331	-5888	-6452
ONRJ (Rio de Janeiro)	(3)	18897	19521	19984
OP (Paris)		11	9	6
ORB (Bruxelles)		94	77	78
PTB (Braunschweig)		2016	2010	2008
ROA (San Fernando)		83	80	84
SCL (Hong Kong)	(2)	-428	-351	-325
SO (Shanghai)		1267	1274	1257
SP (Boras)		-8025	-8114	-8204
SU (Moskva)		-7729	-7745	-7759
TL (Chung-Li)		290	303	312
TP (Praha)		-9	-13	-21
TUG (Graz)		409	433	452
UME (Gebze-Kocaeli)		161	165	183
USNO (Washington DC)(USNO MC)		-19	-19	-17
VSL (Delft)		-427	-419	-420

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

The following tables give the computed values of TAI-TA(k).

Date 1996 0h UTC		Jun 30	Jul 5	Jul 10	Jul 15
MJD		50264	50269	50274	50279
Laboratory k		TAI-TA(k) (Unit is one nanosecond)			
APL (Laurel)		1173	1176	1182	1189
AUS (Canberra)		-70866	-71062	-71171	-71302
CH (Bern)		-58488	-58329	-58161	-58006
CRL (Tokyo)		71275	71483	71692	71902
CSAO (Lintong)		4599	4500	4462	4394
F (Paris)		156760	156939	157121	157305
IEN (Torino)		355	397	441	485
INPL (Jerusalem)		-342855	-343490	-344138	-344767
JATC (Lintong)		13857	13795	13772	13743
KRIS (Taejon)		3927	3991	4040	4082
NIM (Beijing)		-5758	-5738	-5716	-5690
NISA (Boulder)	(4)	-45146586	-45146804	-45147022	-45147241
NRC (Ottawa)		26443	26483	26513	26544
PTB (Braunschweig)		-361352	-361361	-361366	-361375
SO (Shanghai)		-46238	-46243	-46277	-46280
SU (Moskva)	(5)	27242311	27242296	27242295	27242285
USNO (Washington DC)	(6)	-34750789	-34751116	-34751447	-34751777

Date 1996 0h UTC		Jul 20	Jul 25	Jul 30
MJD		50284	50289	50294
Laboratory k		TAI-TA(k) (Unit is one nanosecond)		
APL (Laurel)		1193	1192	1185
AUS (Canberra)		-71403	-71577	-71774
CH (Bern)		-57852	-57692	-57538
CRL (Tokyo)		72113	72315	72521
CSAO (Lintong)		4326	4293	4224
F (Paris)		157479	157654	157833
IEN (Torino)		531	577	624
INPL (Jerusalem)		-345416	-346050	-346685
JATC (Lintong)		13731	13701	13682
KRIS (Taejon)		4113	4148	4171
NIM (Beijing)		-5655	-5599	-5558
NISA (Boulder)	(4)	-45147463	-45147683	-45147906
NRC (Ottawa)		26575	26614	26646
PTB (Braunschweig)		-361384	-361390	-361392
SO (Shanghai)		-46257	-46251	-46265
SU (Moskva)	(5)	27242271	27242255	27242241
USNO (Washington DC)	(6)	-34752107	-34752436	-34752763

3 - Notes on sections 1 and 2.

(1) ONBA. Time step of UTC(ONBA) of 12000 ns between MJD = 50274 and MJD = 50279 .

(2) SCL . Corrected value of UTC-UTC(SCL) :

MJD	UTC-UTC(SCL)
50259	-419 ns

Change of master clock on MJD = 50289.292

(3) ONRJ. Change of master clock on MJD = 50287.5

(4) NIST. TA(NISA) designates the scale AT1 of NIST.

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

(6) USNO. TA(USNO) designates the scale A1(MEAN) of USNO.

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

Interval of validity		f(EAL)-f(TAI)
1996 Jun. 30 - 1996 Aug. 29	50264-50324	7.310×10^{-13}

New steering correction foreseen for September-October 1996

1996 Aug. 29 - 1996 Oct. 28	50324-50384	7.295×10^{-13}

5 - [UTC - GPS time] and [TAI - GPS time].

[UTC - GPS time] = -11 s + C0, [TAI - GPS time] = 19 s + C0.

Daily values of C0 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 C0 are derived from them using linear interpolation of [UTC - UTC(OP)].

For a given day, where N measurements are used for estimation of C0 :
- the dispersion of individual measurements is characterized by a standard deviation σ,
- the daily C0 value is characterized by the standard deviation of the mean $\sigma/\sqrt{N}$.

Date 1996 0h UTC	MJD	C0 (ns)	σ (ns)	$\sigma/\sqrt{N}$ (ns)
Jun 30	50264	15	47	10
Jul 1	50265	18	43	9
Jul 2	50266	27	37	10
Jul 3	50267	25	44	13
Jul 4	50268	16	39	8
Jul 5	50269	16	44	9
Jul 6	50270	18	38	8
Jul 7	50271	13	38	8
Jul 8	50272	8	46	10
Jul 9	50273	-1	30	6
Jul 10	50274	-7	49	10
Jul 11	50275	-4	48	10
Jul 12	50276	-1	50	10
Jul 13	50277	-8	50	10
Jul 14	50278	-13	37	7
Jul 15	50279	-11	39	8
Jul 16	50280	-4	41	8
Jul 17	50281	2	34	7
Jul 18	50282	-1	49	10
Jul 19	50283	-4	42	8
Jul 20	50284	-2	27	6
Jul 21	50285	4	43	9
Jul 22	50286	9	44	9
Jul 23	50287	13	42	9
Jul 24	50288	14	33	7
Jul 25	50289	17	49	10
Jul 26	50290	22	38	8
Jul 27	50291	27	33	7
Jul 28	50292	23	47	10
Jul 29	50293	18	32	7
Jul 30	50294	20	38	8

6 - [UTC - GLONASS time].

[UTC - GLONASS time] = C1 (modulo 1 s).

From his current observations of both the GPS and GLONASS satellite systems Prof. P. Daly, University of Leeds, establishes and reports [GPS time - GLONASS time] at five-day intervals, together with the standard deviation σ of his daily GLONASS data. C1 is then derived using [UTC - GPS time] of section 5.

Date 1996 0h UTC	MJD	C1 (ns)	σ (ns)
Jun 30	50264	-29780	50
Jul 5	50269	-29912	51
Jul 10	50274	-30050	45
Jul 15	50279	-30199	49
Jul 20	50284	-30325	42
Jul 25	50289	-30451	35
Jul 30	50294	-30590	38

7 - Duration of the TAI scale interval.

The following table gives the duration uTAI of the TAI scale interval expressed as its departure d from the SI second on the rotating geoid, together with its relative uncertainty σ : uTAI = 1 + d in SI second. 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 uncertainty of the standard frequency), and

- with a combination computed by the BIPM of all available measurements from PTB CS2, PTB CS3, NIST-7, SU MCsR 102 and LPTF-FO1 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} s)	σ (10^{-14})
NIST-7	50199-50209	+2.5	1.0
PTB-CS2	50234-50294	+2.3	1.5
NIST-7	50264-50269	+0.9	1.0
BIPM estimate	50234-50294	+2.1	1.0