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BUREAU INTERNATIONAL DES POIDS ET MESURES

Circular T 107 (1996 December 12)

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

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

Date 1996 0h UTC		Oct 28	Nov 2	Nov 7	Nov 12
MJD		50384	50389	50394	50399
Laboratory k		UTC-UTC(k) (Unit is one nanosecond)			
AOS (Borowiec)		-71	-25	-14	10
APL (Laurel)		-	93	136	178
AUS (Canberra)		-78	-95	-93	-88
BEV (Wien)		-	-	-	-
BIRM (Beijing)		-3409	-3468	-3557	-3612
CAO (Cagliari)		-1757	-1865	-1977	-2098
CH (Bern)		57	55	54	58
CNM (Mexico)		-3708	-3804	-3886	-3968
CRL (Tokyo)		-46	-40	-39	-38
CSAO (Lintong)		11	-17	34	-32
CSIR (Pretoria)		6867	6880	6899	6908
DLR (Oberpfaffenhofen)		-2265	-2261	-2250	-2242
DTAG (Darmstadt)		-514	-531	-529	-551
GUM (Warszawa)		-131	-125	-111	-99
IEN (Torino)		401	401	407	411
IFAG (Wettzell)		-4336	-4333	-4287	-4232
IGMA (Buenos Aires)		116	120	135	157
INPL (Jerusalem)		117	32	-35	-125
IPQ (Monte de Caparica)		155	161	171	171
JATC (Lintong)		3430	3407	3471	3413
KRIS (Taejon)		-83	-112	-119	-111
LDS (Leeds)		85	63	87	69
MSL (Lower Hutt)		-5435	-5464	-5517	-5606
NAOM (Mizusawa)		-2858	-2875	-2887	-2907
NAOT (Tokyo)		484	533	549	597
NIM (Beijing)		8629	-	-	-
NIST (Boulder)		8	13	17	23
NPL (Teddington)		37	41	48	55
NRC (Ottawa)		-43	-23	6	24
NRLM (Tsukuba)	(1)	-1311	-47	-45	-41
OMH (Budapest)		-	-	-	-
ONBA (Buenos Aires)		-13893	-14167	-14256	-14503
ONRJ (Rio de Janeiro)		27278	27706	28100	28472
OP (Paris)		13	19	27	24
ORB (Bruxelles)		81	84	78	80
PTB (Braunschweig)		1953	1948	1947	1943
ROA (San Fernando)		90	90	90	91
SCL (Hong Kong)		-568	-552	-515	-474
SO (Shanghai)		1219	1196	1209	1207
SP (Boras)		-25	-33	-27	-30
SU (Moskva)		-7939	-7945	-7949	-7957
TL (Chung-Li)		-	-	-	-
TP (Praha)		61	72	84	99
TUG (Graz)		853	878	905	939
UME (Gebze-Kocaeli)	(2)	324	339	335	148
USNO (Washington DC)(USNO MC)		9	14	15	19
VSL (Delft)		-383	-391	-386	-382

1 - Coordinated Universal Time UTC. (Cont.)

Date 1996 0h UTC		Nov 17	Nov 22	Nov 27
MJD		50404	50409	50414
Laboratory k		UTC-UTC(k)	(Unit is one	nanosecond)
AOS (Borowiec)		8	51	122
APL (Laurel)		220	257	287
AUS (Canberra)		-92	-98	-78
BEV (Wien)		-	-	-
BIRM (Beijing)		-3669	-3740	-3804
CAO (Cagliari)		-2203	-2294	-2387
CH (Bern)		59	69	82
CNM (Mexico)		-4072	-4140	-4229
CRL (Tokyo)		-38	-32	-30
CSAO (Lintong)		-23	22	-2
CSIR (Pretoria)		6935	6899	6933
DLR (Oberpfaffenhofen)	(3)	-2238	367	381
DTAG (Darmstadt)		-562	-550	-565
GUM (Warszawa)		-86	-68	-59
IEN (Torino)		424	435	444
IFAG (Wettzell)		-4168	-4131	-4094
IGMA (Buenos Aires)		125	139	163
INPL (Jerusalem)		-244	-285	-345
IPQ (Monte de Caparica)		173	180	176
JATC (Lintong)		3437	3501	3490
KRIS (Taejon)		-119	-128	-141
LDS (Leeds)		39	59	56
MSL (Lower Hutt)		-5619	-5607	-5582
NAOM (Mizusawa)		-2927	-2942	-2964
NAOT (Tokyo)		651	691	746
NIM (Beijing)		-	-	-
NIST (Boulder)		30	34	39
NPL (Teddington)		59	67	73
NRC (Ottawa)		49	78	100
NRLM (Tsukuba)		-37	-38	-29
OMH (Budapest)		-	-	-
ONBA (Buenos Aires)		-14617	-14659	-14785
ONRJ (Rio de Janeiro)		28870	29219	29512
OP (Paris)		24	36	40
ORB (Bruxelles)		106	88	91
PTB (Braunschweig)		1937	1938	1931
ROA (San Fernando)		87	86	76
SCL (Hong Kong)		-469	-426	-410
SO (Shanghai)		1171	1201	1192
SP (Boras)		-31	-27	-19
SU (Moskva)	(4)	-7967	-7972	1023
TL (Chung-Li)		-	-	-
TP (Praha)		94	93	93
TUG (Graz)		965	989	1008
UME (Gebze-Kocaeli)		144	152	165
USNO (Washington DC)(USNO MC)		20	20	22
VSL (Delft)		-391	-381	-379

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		Oct 28	Nov 2	Nov 7	Nov 12
MJD		50384	50389	50394	50399
Laboratory k		TAI-TA(k) (Unit is one nanosecond)			
APL (Laurel)		-	-	-	-
AUS (Canberra)		-73831	-73911	-74046	-74169
CH (Bern)		-54728	-54566	-54404	-54244
CRL (Tokyo)		76275	76483	76696	76897
CSAO (Lintong)		3084	2991	2977	2846
F (Paris)		161112	161300	161476	161646
IEN (Torino)		1479	1516	1552	1593
INPL (Jerusalem)		-358513	-359203	-359879	-360581
JATC (Lintong)		13623	13607	13652	13579
KRIS (Taejon)		5072	5094	5121	5163
NIM (Beijing)		-5259	-	-	-
NISA (Boulder)	(5)	-45151861	-45152076	-45152292	-45152506
NRC (Ottawa)		27002	27024	27053	27073
PTB (Braunschweig)		-361447	-361452	-361453	-361457
SO (Shanghai)		-46241	-46260	-46238	-46230
SU (Moskva)	(6)	27242061	27242055	27242051	27242043
USNO (Washington DC)	(7)	-34758667	-34758988	-34759314	-34759638

Date 1996 0h UTC		Nov 17	Nov 22	Nov 27
MJD		50404	50409	50414
Laboratory k		TAI-TA(k) (Unit is one nanosecond)		
APL (Laurel)		-	-	-
AUS (Canberra)		-74287	-74414	-74534
CH (Bern)		-54087	-53921	-53752
CRL (Tokyo)		77104	77312	77519
CSAO (Lintong)		2791	2771	2682
F (Paris)		161816	161995	162171
IEN (Torino)		1645	1692	1734
INPL (Jerusalem)		-361311	-361975	-362664
JATC (Lintong)		13576	13613	13581
KRIS (Taejon)		5190	5216	5235
NIM (Beijing)		-	-	-
NISA (Boulder)	(5)	-45152719	-45152935	-45153150
NRC (Ottawa)		27099	27129	27152
PTB (Braunschweig)		-361463	-361462	-361469
SO (Shanghai)		-46259	-46244	-46271
SU (Moskva)	(6)	27242033	27242028	27242023
USNO (Washington DC)	(7)	-34759964	-34760290	-34760615

3 - Notes on sections 1 and 2.

(1) NRLM. Change of master clock on MJD = 50386.0

(2) UME . Apparent time step of UTC-UTC(UME) of - 170 ns between MJD = 50394 and MJD = 50399 .

(3) DLR . Time step of UTC(DLR) of - 2600 ns on MJD = 50406 .

(4) SU . Time step of UTC(SU) of - 9000 ns on MJD = 50414 .

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

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

(7) 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 Oct. 28 - 1996 Dec. 27	50384-50444	7.280×10^{-13}

New steering correction foreseen for January-February 1997

1996 Dec. 27 - 1997 Feb. 25	50444-50504	7.265×10^{-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)
Oct 28	50384	51	42	9
Oct 29	50385	47	47	10
Oct 30	50386	45	48	10
Oct 31	50387	47	38	8
Nov 1	50388	48	32	7
Nov 2	50389	44	45	9
Nov 3	50390	40	45	9
Nov 4	50391	38	44	9
Nov 5	50392	39	44	9
Nov 6	50393	39	44	9
Nov 7	50394	45	31	6
Nov 8	50395	44	45	9
Nov 9	50396	39	48	10
Nov 10	50397	45	61	13
Nov 11	50398	58	44	13
Nov 12	50399	58	35	7
Nov 13	50400	56	46	10
Nov 14	50401	55	40	8
Nov 15	50402	60	54	11
Nov 16	50403	63	53	11
Nov 17	50404	63	57	12
Nov 18	50405	55	62	13
Nov 19	50406	42	36	8
Nov 20	50407	40	48	10
Nov 21	50408	44	53	11
Nov 22	50409	42	50	11
Nov 23	50410	46	45	10
Nov 24	50411	59	27	6
Nov 25	50412	66	43	9
Nov 26	50413	68	49	11
Nov 27	50414	69	43	9

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)
Oct 28	50384	-33078	46
Nov 2	50389	-33194	44
Nov 7	50394	-33307	42
Nov 12	50399	-33451	45
Nov 17	50404	-33585	48
Nov 22	50409	-33714	43
Nov 27	50414	-33828	43

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, NIST-7, SU MCsR 102 and LPTF-F01 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	50379-50389	+0.6	0.5
PTB-CS2	50354-50414	+2.5	1.5
PTB-CS3	50354-50414	+4.7	1.4
BIPM estimate	50354-50414	+1.5	1.0