BIPM

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BUREAU INTERNATIONAL DES POIDS ET MESURES

Circular T 97 (1996 February 16)

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

(From 1994 July 1, 0hUTC, to 1996 January 1, 0hUTC, TAI-UTC = 29 s)
(From 1996 January 1, 0hUTC, until further notice, TAI-UTC = 30 s)

Date 1995/96 0h UTC	Dec 28	Jan 2	Jan 7	Jan 12
MJD	50079	50084	50089	50094
Laboratory k	UTC-UTC(k) (Unit is one nanosecond)			
AOS (Borowiec) (1)	-172	-450	-291	-225
APL (Laurel)	1967	1992	-	2025
AUS (Canberra)	-401	-413	-442	-473
BEV (Wien)	9885	9683	9506	9332
BIRM (Beijing)	-14	-93	-157	-225
CAO (Cagliari)	-	-	-	-
CH (Bern)	177	204	211	225
CRL (Tokyo)	311	302	292	275
CSAO (Lintong)	-292	-256	-197	-221
CSIR (Pretoria)	4855	4947	5051	5167
FTZ (Darmstadt)	-256	-256	-	-
GUM (Warszawa)	-343	-334	-336	-335
IEN (Torino)	8	16	24	45
IFAG (Wettzell)	-4668	-4722	-4768	-4771
IGMA (Buenos Aires) (2)	373	77	77	72
INPL (Jerusalem)	-2823	-2867	-2890	-2913
IPQ (Monte de Caparica)	-8116	-8171	-8213	-8270
JATC (Lintong)	1442	1553	1685	1620
KRIS (Taejon)	284	299	306	307
LDS (Leeds)	206	212	202	198
MSL (Lower Hutt)	-5326	-5342	-5316	-5297
NAOM (Mizusawa)	-3135	-3135	-3131	-3141
NAOT (Tokyo)	-3168	-3137	-3072	-3041
NIM (Beijing)	8006	8011	8020	8021
NIST (Boulder)	13	14	13	13
NPL (Teddington)	39	40	46	50
NPLI (New-Delhi)	-	-	-	-
NRC (Ottawa)	44	59	67	75
NRLM (Tsukuba)	-5342	-5278	-5201	-5133
OMH (Budapest)	13262	13502	13740	13921
ONBA (Buenos Aires) (3)	-8803	-8581	-8611	-8600
ONRJ (Rio de Janeiro)	655	948	1149	1259
OP (Paris)	53	60	56	56
ORB (Bruxelles)	305	289	277	255
PTB (Braunschweig) (4)	2221	2232	2232	2229
RC (Habana)	-	-	-	-
ROA (San Fernando)	122	127	139	146
SCL (Hong Kong)	388	293	242	230
SO (Shanghai)	1733	1676	1638	1615
SU (Moskva)	-7268	-7273	-7284	-7292
TL (Chung-Li)	-23	-21	-20	-26
TP (Praha)	-296	-286	-280	-274
TUG (Graz)	-217	-210	-186	-173
UME (Gebze-Kocaeli)	-3115	-3103	-3105	-3098
USNO (Washington DC)(USNO MC)	11	15	12	13
VSL (Delft)	-231	-231	-242	-250

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1 - Coordinated Universal Time UTC. (Cont.)

Date 1996 0h UTC	Jan 17	Jan 22	Jan 27
MJD	50099	50104	50109
Laboratory k	UTC-UTC(k)	(Unit is	one nanosecond)
AOS (Borowiec)	-133	-60	3
APL (Laurel)	2046	2059	2068
AUS (Canberra)	-483	-511	-510
BEV (Wien)	9152	8957	8816
BIRM (Beijing)	-314	-399	-490
CAO (Cagliari)	-	-	-
CH (Bern)	247	260	276
CRL (Tokyo)	258	245	223
CSAO (Lintong)	-191	-194	-207
CSIR (Pretoria)	5293	5345	5332
FTZ (Darmstadt)	-273	-277	-264
GUM (Warszawa)	-338	-342	-343
IEN (Torino)	59	70	83
IFAG (Wettzell)	-4792	-4813	-4843
IGMA (Buenos Aires)	70	70	67
INPL (Jerusalem)	-2923	-2950	-2976
IPQ (Monte de Caparica)	-8338	-8380	-8428
JATC (Lintong)	1592	1501	1545
KRIS (Taejon)	307	300	279
LDS (Leeds)	207	189	199
MSL (Lower Hutt)	-5240	-5246	-5254
NAOM (Mizusawa)	-3142	-3144	-3144
NAOT (Tokyo)	-2959	-2909	-2873
NIM (Beijing)	8077	8058	8093
NIST (Boulder)	13	14	15
NPL (Teddington)	53	58	62
NPLI (New-Delhi)	-	-	-
NRC (Ottawa)	85	108	120
NRLM (Tsukuba)	-5063	-4996	-4934
OMH (Budapest)	13981	14095	14361
ONBA (Buenos Aires)	-8757	-8704	-8650
ONRJ (Rio de Janeiro)	1394	1589	1645
OP (Paris)	49	45	36
ORB (Bruxelles)	263	263	249
PTB (Braunschweig)	2221	2211	2199
RC (Habana)	-	-	-
ROA (San Fernando)	137	138	134
SCL (Hong Kong)	207	222	241
SO (Shanghai)	1609	1577	1592
SU (Moskva)	-7302	-7305	-7315
TL (Chung-Li)	-9	-6	27
TP (Praha)	-277	-275	-262
TUG (Graz)	-165	-153	-145
UME (Gebze-Kocaeli)	-3088	-3078	-3075
USNO (Washington DC)(USNO MC)	11	11	8
VSL (Delft)	-244	-249	-258

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

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

Date 1995/96 0h UTC		Dec 28	Jan 2	Jan 7	Jan 12
MJD		50079	50084	50089	50094
Laboratory k		TAI-TA(k) (Unit is one nanosecond)			
APL (Laurel)		3430	3455	-	3488
AUS (Canberra)		-66277	-66447	-66571	-66712
CH (Bern)		-63930	-63789	-63668	-63539
CRL (Tokyo)		63571	63781	63996	64203
CSAO (Lintong)		6736	6707	6701	6612
F (Paris)		150472	150630	150795	150952
IEN (Torino)		-500	-493	-478	-464
INPL (Jerusalem)		-317888	-318567	-319231	-319901
JATC (Lintong)		12632	12711	12792	12743
KRIS (Taejon)		2160	2215	2261	2301
NIM (Beijing)		-6948	-6926	-6891	-6870
NISA (Boulder)	(5)	-45138497	-45138715	-45138934	-45139151
NRC (Ottawa)		25333	25369	25398	25428
PTB (Braunschweig)	(4)	-361179	-361168	-361168	-361171
RC (Habana)		-	-	-	-
SO (Shanghai)		-45790	-45822	-45852	-45875
SU (Moskva)	(6)	27242732	27242727	27242716	27242708
USNO (Washington DC)	(7)	-34738589	-34738918	-34739249	-34739579

Date 1996 0h UTC		Jan 17	Jan 22	Jan 27
MJD		50099	50104	50109
Laboratory k		TAI-TA(k) (Unit is one nanosecond)		
APL (Laurel)		3509	3522	3531
AUS (Canberra)		-66858	-66986	-67095
CH (Bern)		-63399	-63268	-63133
CRL (Tokyo)		64408	64616	64821
CSAO (Lintong)		6578	6510	6432
F (Paris)		151110	151273	151430
IEN (Torino)		-449	-438	-428
INPL (Jerusalem)		-320563	-321252	-321950
JATC (Lintong)		12766	12717	12698
KRIS (Taejon)		2341	2375	2396
NIM (Beijing)		-6801	-6799	-6752
NISA (Boulder)	(5)	-45139369	-45139585	-45139802
NRC (Ottawa)		25460	25504	25538
PTB (Braunschweig)		-361179	-361189	-361201
RC (Habana)		-	-	-
SO (Shanghai)		-45884	-45913	-45892
SU (Moskva)	(6)	27242698	27242695	27242685
USNO (Washington DC)	(7)	-34739909	-34740238	-34740571

3 - Notes on sections 1 and 2.

(1) AOS . Apparent time step of UTC-UTC(AOS) of - 370 ns on MJD = 50083 due to calibration of the GPS link.

(2) IGMA. Time step of UTC(IGMA) of + 300 ns on MJD = 50083.0

(3) ONBA. Corrected values of UTC-UTC(ONBA)

MJD	UTC-UTC(ONBA)	MJD	UTC-UTC(ONBA)
49939	-3883 ns	50009	-9348 ns
49949	-4983 ns	50019	-9410 ns
49959	-6021 ns	50029	-9401 ns
49969	-6455 ns	50039	-9393 ns
49979	-7297 ns	50049	-9309 ns
49989	-7991 ns	50059	-9233 ns
49999	-8693 ns	50069	-9095 ns

(4) PTB . Apparent time step of UTC-UTC(PTB) and TAI-TA(PTB) of + 9 ns on MJD = 50083 due to calibration of the GPS link.

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

[UTC - GPS time] = -10 s + C0 (until 1996 January 1, 0h UTC)
[UTC - GPS time] = -11 s + C0 (from 1996 January 1, 0h UTC)
[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 1995/96 0h UTC	MJD	C0 (ns)	σ (ns)	$\sigma/\sqrt{N}$ (ns)
Dec 28	50079	51	40	8
Dec 29	50080	53	38	8
Dec 30	50081	53	46	10
Dec 31	50082	55	50	10
Jan 1	50083	56	33	7
Jan 2	50084	55	39	8
Jan 3	50085	51	34	7
Jan 4	50086	49	37	8
Jan 5	50087	51	46	10
Jan 6	50088	48	45	11
Jan 7	50089	40	46	10
Jan 8	50090	36	52	12
Jan 9	50091	35	40	9
Jan 10	50092	35	48	10
Jan 11	50093	35	39	8
Jan 12	50094	33	45	10
Jan 13	50095	34	36	7
Jan 14	50096	36	37	8
Jan 15	50097	39	46	10
Jan 16	50098	40	50	11
Jan 17	50099	40	35	8
Jan 18	50100	39	41	9
Jan 19	50101	38	47	10
Jan 20	50102	40	43	10
Jan 21	50103	41	30	7
Jan 22	50104	42	42	9
Jan 23	50105	44	57	12
Jan 24	50106	49	36	7
Jan 25	50107	54	55	12
Jan 26	50108	55	33	7
Jan 27	50109	54	39	8

5 - [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 4.

Date 1995/96 0h UTC	MJD	C1 (ns)	σ (ns)
Dec 28	50079	-24569	60
Jan 2	50084	-24677	38
Jan 7	50089	-24812	37
Jan 12	50094	-24960	45
Jan 17	50099	-25088	42
Jan 22	50104	-25264	46
Jan 27	50109	-25390	45

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

Interval of validity		f(EAL)-f(TAI)
1995 Dec. 28 - 1996 Feb. 26	50079-50139	7.34×10^{-13}
New steering correction foreseen for March-April 1996		
1996 Feb. 26 - 1996 Apr. 26	50139-50199	7.33×10^{-13}

7 - Duration of the TAI scale interval.

The following table gives the duration of the TAI scale interval expressed as its departure d from the SI second on the rotating geoid, together with its relative uncertainty σ. 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 CS1, PTB CS2, PTB CS3, NIST-7 and SU MCsR 102 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})
SU MCsR 102	49959-50019	+3.5	5.0
SU MCsR 102	50019-50079	+4.3	5.0
PTB-CS2	50049-50109	+2.1	1.5
BIPM estimate	50049-50109	+2.7	1.0