BIPM ISSN 1143-1393

BUREAU INTERNATIONAL DES POIDS ET MESURES

Circular T 99 (1996 April 16)

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

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

Date 1996 0h UTC	Feb 26	Mar 2	Mar 7	Mar 12
MJD	50139	50144	50149	50154
Laboratory k	UTC-UTC(k) (Unit is one nanosecond)			
AOS (Borowiec)	126	152	187	257
APL (Laurel)	2205	2203	2217	2223
AUS (Canberra)	-590	-607	-620	-644
BEV (Wien)	7627	7449	7778	7539
BIRM (Beijing)	-807	-964	-882	-988
CAO (Cagliari)	-	-	-	-
CH (Bern)	354	359	369	385
CRL (Tokyo)	136	117	104	84
CSAO (Lintong)	-315	-300	-283	-244
CSIR (Pretoria)	5542	5590	5641	5680
DLR (Oberpfaffenhofen) (1)	-2087	-2086	-2090	-2098
FTZ (Darmstadt)	-293	-297	-313	-324
GUM (Warszawa)	-348	-352	-359	-359
IEN (Torino)	124	117	113	125
IFAG (Wettzell)	-4927	-4947	-4954	-4974
IGMA (Buenos Aires)	78	78	68	78
INPL (Jerusalem)	-2790	-2729	-2679	-2602
IPQ (Monte de Caparica)	-8755	-8802	-8853	-8890
JATC (Lintong)	1576	1619	1581	1660
KRIS (Taejon)	207	197	209	191
LDS (Leeds)	137	147	158	131
MSL (Lower Hutt)	-5103	-5045	-5010	-5057
NAOM (Mizusawa)	-3129	-3125	-3114	-3105
NAOT (Tokyo)	-2694	-2703	-2667	-2659
NIM (Beijing)	8219	8231	8241	8244
NIST (Boulder)	9	10	10	11
NPL (Teddington)	46	42	35	37
NPLI (New-Delhi)	-	-	-	-
NRC (Ottawa)	95	82	60	64
NRLM (Tsukuba)	-4511	-4450	-4382	-4315
OMH (Budapest)	15341	15378	15477	15553
ONBA (Buenos Aires)	-	-8455	-8503	-8421
ONRJ (Rio de Janeiro)	2355	2720	3215	3411
OP (Paris)	22	23	28	32
ORB (Bruxelles)	216	210	219	186
PTB (Braunschweig)	2162	2163	2168	2160
RC (Habana)	-	-	-	-
ROA (San Fernando)	138	135	132	125
SCL (Hong Kong)	208	207	189	192
SO (Shanghai)	1533	1508	1523	1483
SU (Moskva)	-7391	-7399	-7411	-7421
TL (Chung-Li)	55	67	82	83
TP (Praha)	-249	-237	-220	-198
TUG (Graz)	-60	-47	-33	-16
UME (Gebze-Kocaeli)	-3048	-3037	-3027	-3027
USNO (Washington DC)(USNO MC)	4	4	5	8
VSL (Delft)	-287	-286	-298	-289

PAVILLON DE BRETEUIL F - 92312 SÈVRES CEDEX

TÉL. (CENTRAL) : + 33 1 45 07 70 70 TELEX : BIPM 631351 F TÉLÉCOPIE : + 33 1 45 34 20 21

1 - Coordinated Universal Time UTC. (Cont.)

Date 1996 0h UTC	Mar 17	Mar 22	Mar 27
MJD	50159	50164	50169
Laboratory k	UTC-UTC(k)	(Unit is one nanosecond)	
AOS (Borowiec)	289	271	267
APL (Laurel)	2241	2237	2242
AUS (Canberra)	-657	-669	-630
BEV (Wien)	7367	7163	6979
BIRM (Beijing)	-1039	-1114	-1185
CAO (Cagliari)	-	-	-
CH (Bern)	390	398	402
CRL (Tokyo)	66	45	28
CSAO (Lintong)	-277	-279	-298
CSIR (Pretoria)	5705	5706	5731
DLR (Oberpfaffenhofen)	-2110	-2121	-2124
FTZ (Darmstadt)	-314	-310	-311
GUM (Warszawa)	-361	-359	-363
IEN (Torino) (2)	139	159	185
IFAG (Wettzell)	-4960	-4976	-4950
IGMA (Buenos Aires)	82	97	74
INPL (Jerusalem)	-2511	-2410	-2308
IPQ (Monte de Caparica)	-8947	-9002	-9060
JATC (Lintong)	1682	1731	1773
KRIS (Taejon)	188	183	174
LDS (Leeds)	156	153	143
MSL (Lower Hutt)	-5066	-5097	-5089
NAOM (Mizusawa)	-3097	-3082	-3063
NAOT (Tokyo)	-2676	-2689	-2676
NIM (Beijing)	8254	8279	8286
NIST (Boulder)	11	8	8
NPL (Teddington)	35	29	25
NPLI (New-Delhi)	-	-	-
NRC (Ottawa)	60	59	60
NRLM (Tsukuba)	-4243	-4173	-4104
OMH (Budapest)	15730	15940	16070
ONBA (Buenos Aires)	-8340	-8277	-8290
ONRJ (Rio de Janeiro)	3553	4057	4703
OP (Paris)	34	35	32
ORB (Bruxelles)	174	163	166
PTB (Braunschweig)	2161	2160	2158
RC (Habana)	-	-	-
ROA (San Fernando)	119	110	105
SCL (Hong Kong)	178	152	127
SO (Shanghai)	1469	1463	1442
SU (Moskva)	-7430	-7440	-7444
TL (Chung-Li)	93	97	105
TP (Praha)	-203	-182	-163
TUG (Graz)	0	8	24
UME (Gebze-Kocaeli)	-3024	-3016	-3002
USNO (Washington DC)(USNO MC)	8	7	9
VSL (Delft)	-290	-298	-300

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		Feb 26	Mar 2	Mar 7	Mar 12
MJD		50139	50144	50149	50154
Laboratory k		TAI-TA(k) (Unit is one nanosecond)			
APL (Laurel)		3668	3666	3680	3686
AUS (Canberra)		-67848	-67998	-68136	-68294
CH (Bern)		-62275	-62130	-61979	-61821
CRL (Tokyo)		66079	66283	66495	66702
CSAO (Lintong)		5935	5885	5837	5811
F (Paris)		152413	152582	152748	152916
IEN (Torino)		-359	-352	-342	-326
INPL (Jerusalem)		-326025	-326711	-327414	-328097
JATC (Lintong)		12410	12441	12392	12467
KRIS (Taejon)		2642	2678	2728	2755
NIM (Beijing)		-6498	-6466	-6441	-6411
NISA (Boulder)	(3)	-45141113	-45141329	-45141547	-45141763
NRC (Ottawa)		25746	25772	25789	25831
PTB (Braunschweig)		-361238	-361237	-361232	-361240
RC (Habana)		-	-	-	-
SO (Shanghai)		-45933	-45946	-45940	-45985
SU (Moskva)	(4)	27242609	27242601	27242589	27242579
USNO (Washington DC)	(5)	-34742549	-34742877	-34743206	-34743534

Date 1996 0h UTC		Mar 17	Mar 22	Mar 27
MJD		50159	50164	50169
Laboratory k		TAI-TA(k) (Unit is one nanosecond)		
APL (Laurel)		3704	3700	3705
AUS (Canberra)		-68391	-68521	-68628
CH (Bern)		-61668	-61511	-61359
CRL (Tokyo)		66906	67113	67318
CSAO (Lintong)		5714	5647	5563
F (Paris)		153074	153239	153418
IEN (Torino)		-311	-284	-257
INPL (Jerusalem)		-328773	-329445	-330125
JATC (Lintong)		12432	12431	12458
KRIS (Taejon)		2792	2830	2862
NIM (Beijing)		-6380	-6329	-6307
NISA (Boulder)	(3)	-45141981	-45142201	-45142419
NRC (Ottawa)		25866	25904	25941
PTB (Braunschweig)		-361239	-361240	-361242
RC (Habana)		-	-	-
SO (Shanghai)		-46000	-46010	-46030
SU (Moskva)	(4)	27242570	27242560	27242556
USNO (Washington DC)	(5)	-34743863	-34744193	-34744523

3 - Notes on sections 1 and 2.

(1) DLR . Deutche Forschungsanstalt fuer Luft und Raumfahrt, Oberpfaffenhofen, Germany.

(2) IEN . Change of master clock on MJD = 50167.

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

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

(5) 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 Feb. 26 - 1996 Apr. 26	50139-50199	7.33×10^{-13}

New steering correction foreseen for May-June 1996

1996 Apr. 26 - 1996 Jun. 30	50199-50264	7.32×10^{-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)
Feb 26	50139	26	56	12
Feb 27	50140	30	43	9
Feb 28	50141	31	48	10
Feb 29	50142	34	40	9
Mar 1	50143	42	35	7
Mar 2	50144	47	47	10
Mar 3	50145	46	58	12
Mar 4	50146	40	45	9
Mar 5	50147	38	44	9
Mar 6	50148	36	53	11
Mar 7	50149	32	47	10
Mar 8	50150	34	31	7
Mar 9	50151	42	51	11
Mar 10	50152	43	37	8
Mar 11	50153	39	37	8
Mar 12	50154	36	43	9
Mar 13	50155	37	55	12
Mar 14	50156	41	46	10
Mar 15	50157	40	44	9
Mar 16	50158	35	48	10
Mar 17	50159	35	38	8
Mar 18	50160	41	38	8
Mar 19	50161	45	57	12
Mar 20	50162	47	37	8
Mar 21	50163	46	53	11
Mar 22	50164	41	48	10
Mar 23	50165	37	34	7
Mar 24	50166	39	48	10
Mar 25	50167	39	40	9
Mar 26	50168	39	41	9
Mar 27	50169	39	34	7

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)
Feb 26	50139	-26300	46
Mar 2	50144	-26454	52
Mar 7	50149	-26627	45
Mar 12	50154	-26776	47
Mar 17	50159	-26916	37
Mar 22	50164	-27045	50
Mar 27	50169	-27191	47

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-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	50079-50084	+2.5	1.0
NIST-7	50144-50149	+1.9	1.0
PTB-CS2	50139-50169	+2.6	1.5
BIPM estimate	50109-50169	+2.0	1.0