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BUREAU INTERNATIONAL DES POIDS ET MESURES

Circular T 118 (1997 November 13)
Circulaire T 118

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

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

Date 1997 0h UTC		Sep 28	Oct 3	Oct 8	Oct 13
MJD		50719	50724	50729	50734
Laboratory k		*UTC-UTC(k)* (Unit is one nanosecond)			
AOS (Borowiec)		-547	-590	-719	-868
APL (Laurel)		3132	3190	3240	3283
AUS (Canberra)		210	219	196	202
BEV (Wien)		-	-	-	-
BIRM (Beijing)		-7242	-7297	-7349	-7414
CAO (Cagliari)		-1525	-1570	-1591	-1621
CH (Bern)		233	237	219	198
CNM (Queretaro)		-1762	-1700	-1633	-1576
CRL (Tokyo)		-14	-22	-29	-33
CSAO (Lintong)		-67	6	0	1
CSIR (Pretoria)		-618	-704	-795	-875
DLR (Oberpfaffenhofen)		-902	-952	-1000	-1047
DTAG (Darmstadt)		-572	-560	-558	-562
GUM (Warszawa)		872	897	914	931
IEN (Torino)	(1)	628	4	-12	-23
IFAG (Wettzell)		-729	-804	-851	-878
IGMA (Buenos Aires)		53	74	76	80
INPL (Jerusalem)		-291	-255	-231	-207
IPQ (Monte de Caparica)		796	794	809	823
JATC (Lintong)		3424	3489	3477	3479
KRIS (Taejon)		-15	-16	-22	-31
LDS (Leeds)		2	15	21	23
MSL (Lower Hutt)		-6011	-6030	-6077	-6122
NAO (Mizusawa)		-1189	-1114	-1064	-996
NIM (Beijing)		-2308	-2329	-2355	-2365
NIST (Boulder)		31	31	29	24
NML (Sydney)		752	751	777	776
NPL (Teddington)		82	80	83	85
NRC (Ottawa)		-13	-14	-17	-17
NRLM (Tsukuba)		210	213	225	231
OMH (Budapest)		1169	1171	1179	1195
ONBA (Buenos Aires)		-	-	-	-
ONRJ (Rio de Janeiro)		-19	-11	12	31
OP (Paris)		23	19	16	12
ORB (Bruxelles)		280	305	287	282
PSB (Singapore)	(2)	474	489	518	533
PTB (Braunschweig)		1776	1772	1773	1776
ROA (San Fernando)		15	14	18	13
SCL (Hong Kong)		-	-	-	-
SO (Shanghai)		897	911	885	901
SP (Boras)		517	528	531	527
SU (Moskva)		517	506	499	489
TL (Chung-Li)		568	560	554	552
TP (Praha)		211	214	208	203
TUG (Graz)		3188	3233	3278	3324
UME (Gebze-Kocaeli)		786	792	808	810
USNO (Washington DC)(USNO MC)		9	14	15	16
VSL (Delft)		-139	-133	-128	-110

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1 - Coordinated Universal Time UTC. (Cont.)

Date 1997 0h UTC	Oct 18	Oct 23	Oct 28
MJD	50739	50744	50749
Laboratory k	*UTC-UTC(k)*	(Unit is one	nanosecond)
AOS (Borowiec)	-1024	-1156	-1290
APL (Laurel)	3329	3370	3410
AUS (Canberra)	186	155	154
BEV (Wien)	-	-	-
BIRM (Beijing)	-7477	-7528	-7570
CAO (Cagliari)	-1649	-1682	-1729
CH (Bern)	171	155	147
CNM (Queretaro)	-1512	-1449	-1392
CRL (Tokyo)	-35	-42	-46
CSAO (Lintong)	11	-4	-7
CSIR (Pretoria)	-952	-1052	-1132
DLR (Oberpfaffenhofen)	-1097	-1143	-1183
DTAG (Darmstadt)	-556	-541	-522
GUM (Warszawa)	953	979	1006
IEN (Torino)	-20	-15	-4
IFAG (Wettzell)	-931	-997	-1065
IGMA (Buenos Aires)	91	94	99
INPL (Jerusalem)	-171	-125	-85
IPQ (Monte de Caparica)	836	844	861
JATC (Lintong)	3497	3570	3459
KRIS (Taejon)	-25	-29	-20
LDS (Leeds)	38	46	35
MSL (Lower Hutt)	-6103	-6095	-6078
NAO (Mizusawa)	-931	-869	-807
NIM (Beijing)	-2371	-2397	-2411
NIST (Boulder)	23	21	16
NML (Sydney)	795	782	802
NPL (Teddington)	85	87	87
NRC (Ottawa)	-20	-25	-25
NRLM (Tsukuba)	236	236	252
OMH (Budapest)	1207	1203	1212
ONBA (Buenos Aires)	-	-	-
ONRJ (Rio de Janeiro)	41	60	78
OP (Paris)	17	9	-1
ORB (Bruxelles)	309	293	312
PSB (Singapore)	564	584	607
PTB (Braunschweig)	1778	1782	1791
ROA (San Fernando)	15	17	20
SCL (Hong Kong)	-	-	-
SO (Shanghai)	888	894	874
SP (Boras)	548	565	575
SU (Moskva)	477	470	461
TL (Chung-Li)	549	542	539
TP (Praha)	206	215	217
TUG (Graz)	3370	3404	3455
UME (Gebze-Kocaeli)	819	827	839
USNO (Washington DC)(USNO MC)	17	16	10
VSL (Delft)	-99	-90	-76

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

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

Date 1997 0h UTC		Sep 28	Oct 3	Oct 8	Oct 13
MJD		50719	50724	50729	50734
Laboratory k		*TAI-TA(k)* (Unit is one nanosecond)			
AMC (Col. Springs)		-365030	-365040	-365041	-365045
APL (Laurel)		4595	4653	4704	4746
AUS (Canberra)		-81032	-81103	-81161	-81276
CH (Bern)		-43213	-43050	-42879	-42714
CRL (Tokyo)		90336	90546	90754	90962
CSAO (Lintong)		-1338	-1327	-1389	-1446
F (Paris)		162888	162874	162865	162855
IEN (Torino)		4398	4453	4482	4513
INPL (Jerusalem)		-398034	-397785	-397544	-397305
JATC (Lintong)		12714	12774	12771	12786
KRIS (Taejon)		5298	5293	5284	5278
NIST (Boulder)		-45166217	-45166428	-45166639	-45166855
NML (Sydney)		789	788	815	812
NRC (Ottawa)		27034	27034	27032	27030
PTB (Braunschweig)		-361624	-361628	-361626	-361624
SO (Shanghai)		-46592	-46577	-46596	-46576
SU (Moskva)	(3)	27241517	27241506	27241500	27241489
USNO (Washington DC)		-34780246	-34780559	-34780877	-34781196

Date 1997 0h UTC		Oct 18	Oct 23	Oct 28
MJD		50739	50744	50749
Laboratory k		*TAI-TA(k)* (Unit is one nanosecond)		
AMC (Col. Springs)		-365048	-365052	-365058
APL (Laurel)		4792	4833	4873
AUS (Canberra)		-81404	-81558	-81654
CH (Bern)		-42554	-42382	-42203
CRL (Tokyo)		91172	91380	91594
CSAO (Lintong)		-1493	-1565	-1625
F (Paris)		162848	162839	162837
IEN (Torino)		4560	4604	4658
INPL (Jerusalem)		-397053	-396791	-396535
JATC (Lintong)		12813	12898	12800
KRIS (Taejon)		5282	5272	5277
NIST (Boulder)		-45167066	-45167278	-45167493
NML (Sydney)		830	818	837
NRC (Ottawa)		27027	27022	27016
PTB (Braunschweig)		-361622	-361618	-361609
SO (Shanghai)		-46590	-46583	-46604
SU (Moskva)	(3)	27241477	27241470	27241461
USNO (Washington DC)		-34781514	-34781832	-34782155

3 - Notes on sections 1 and 2.

(1) IEN . Time step of UTC(IEN) of + 635 ns on MJD = 50721.37

(2) PSB . National Measurement Center, Singapore Productivity and Standards Board, Singapore.

MJD	*UTC-UTC(PSB)*	MJD	*UTC-UTC(PSB)*
50674	295 ns	50694	368 ns
50679	309 ns	50699	392 ns
50684	333 ns	50704	412 ns
50689	356 ns	50709	430 ns
		50714	451 ns

(3) 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)*
1997 Aug. 29 - 1997 Oct. 28	50689-50749	7.190×10^{-13}

New steering correction foreseen for November-December 1997

1997 Oct. 28 - 1997 Dec. 27	50749-50809	7.170×10^{-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 uncertainty of the standard frequency), and

- with a combination computed by the BIPM of all available measurements from NIST-7, PTB CS2, 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	50689-50749	+1.4	1.5
PTB-CS3	50689-50749	+3.8	1.4
NIST-7	50739-50749	-0.3	1.0
BIPM estimate	50689-50749	+1.2	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 1997 0h UTC	MJD	C_0 (ns)	σ (ns)	$\sigma/\sqrt{N}$ (ns)
Sep 28	50719	20	42	11
Sep 29	50720	6	39	13
Sep 30	50721	12	-	-
Oct 1	50722	17	41	7
Oct 2	50723	6	39	8
Oct 3	50724	4	43	8
Oct 4	50725	9	41	8
Oct 5	50726	15	44	8
Oct 6	50727	14	38	7
Oct 7	50728	10	39	7
Oct 8	50729	10	39	7
Oct 9	50730	14	33	6
Oct 10	50731	12	43	8
Oct 11	50732	8	32	6
Oct 12	50733	11	36	7
Oct 13	50734	19	45	8
Oct 14	50735	21	40	7
Oct 15	50736	17	45	8
Oct 16	50737	12	46	9
Oct 17	50738	13	44	8
Oct 18	50739	20	38	7
Oct 19	50740	23	33	6
Oct 20	50741	22	48	9
Oct 21	50742	14	32	6
Oct 22	50743	14	30	6
Oct 23	50744	19	27	5
Oct 24	50745	25	30	6
Oct 25	50746	24	37	7
Oct 26	50747	18	35	7
Oct 27	50748	10	40	7
Oct 28	50749	1	38	7

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 1997 0h UTC	MJD	C_1 (ns)	σ (ns)	$\sigma/\sqrt{N}$ (ns)
Sep 28	50719	268	21	4
Sep 29	50720	274	24	5
Sep 30	50721	278	19	3
Oct 1	50722	266	29	6
Oct 2	50723	280	36	8
Oct 3	50724	291	23	4
Oct 4	50725	293	29	6
Oct 5	50726	293	29	5
Oct 6	50727	293	26	5
Oct 7	50728	305	18	3
Oct 8	50729	314	20	3
Oct 9	50730	308	19	3
Oct 10	50731	296	27	5
Oct 11	50732	298	33	7
Oct 12	50733	303	26	5
Oct 13	50734	298	-	-
Oct 14	50735	290	20	4
Oct 15	50736	290	31	6
Oct 16	50737	301	31	6
Oct 17	50738	309	22	4
Oct 18	50739	301	29	4
Oct 19	50740	296	38	7
Oct 20	50741	307	24	5
Oct 21	50742	324	36	7
Oct 22	50743	337	33	6
Oct 23	50744	344	37	7
Oct 24	50745	340	28	5
Oct 25	50746	332	32	5
Oct 26	50747	324	30	5
Oct 27	50748	318	34	7
Oct 28	50749	327	39	10