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BUREAU INTERNATIONAL DES POIDS ET MESURES

Circular T 110 (1997 March 13)
Circulaire T 110

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

(From 1996 January 1, 0h UTC, to 1997 July 1, 0h UTC, TAI-UTC = 30 s)
(From 1997 July 1, 0h UTC, until further notice, TAI-UTC = 31 s)

Date 1997 0h UTC	Jan 31	Feb 5	Feb 10
MJD	50479	50484	50489
Laboratory k	UTC-UTC(k)	(Unit is one nanosecond)	
AOS (Borowiec)	1073	1012	919
APL (Laurel)	740	-	-
AUS (Canberra)	9	26	30
BEV (Wien)	-	-	-
BIRM (Beijing)	-4571	-4637	-4695
CAO (Cagliari)	-71	-102	-131
CH (Bern)	256	274	279
CNM (Queretaro)	-4321	-4297	-4242
CRL (Tokyo)	-17	-16	-20
CSAO (Lintong)	50	-21	42
CSIR (Pretoria)	8254	8335	8412
DLR (Oberpfaffenhofen)	623	632	636
DTAG (Darmstadt)	-642	-649	-658
GUM (Warszawa)	16	27	38
IEN (Torino)	475	485	493
IFAG (Wettzell)	-3415	-3344	-3263
IGMA (Buenos Aires)	168	166	171
INPL (Jerusalem)	-1011	-1086	-1128
IPQ (Monte de Caparica)	268	275	292
JATC (Lintong)	3577	3500	3578
KRIS (Taejon)	-239	-257	-262
LDS (Leeds)	-2	-11	-10
MSL (Lower Hutt)	-5647	-5627	-5620
NAO (Mizusawa)	-3426	-3474	-3519
NIM (Beijing)	-1353	-1360	-1386
NIST (Boulder)	29	30	27
NPL (Teddington)	79	80	80
NRC (Ottawa)	137	130	121
NRLM (Tsukuba)	6	14	19
OMH (Budapest)	-	-	-
ONBA (Buenos Aires) (1)	-15882	-16057	-16155
ONRJ (Rio de Janeiro)	34030	34496	34924
OP (Paris)	49	47	40
ORB (Bruxelles)	172	174	157
PTB (Braunschweig)	1842	1837	1832
ROA (San Fernando)	-16	-18	-21
SCL (Hong Kong)	-136	-109	-103
SO (Shanghai)	1119	1125	1119
SP (Boras)	233	244	241
SU (Moskva)	915	907	901
TL (Chung-Li)	443	506	438
TP (Praha)	128	124	132
TUG (Graz)	1404	1430	1461
UME (Gebze-Kocaeli)	305	315	323
USNO (Washington DC)(USNO MC)	15	17	18
VSL (Delft)	-412	-417	-415

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1 - Coordinated Universal Time UTC. (Cont.)

Date 1997 0h UTC	Feb 15	Feb 20	Feb 25
MJD	50494	50499	50504
Laboratory k	UTC-UTC(k)	(Unit is one nanosecond)	
AOS (Borowiec)	798	715	592
APL (Laurel)	-	-	-
AUS (Canberra)	58	82	89
BEV (Wien)	-	-	-
BIRM (Beijing)	-4734	-4796	-4864
CAO (Cagliari)	-154	-187	-215
CH (Bern)	266	257	246
CNM (Queretaro)	-4179	-4141	-4067
CRL (Tokyo)	-16	-21	-26
CSAO (Lintong)	17	11	1
CSIR (Pretoria)	8486	8531	8609
DLR (Oberpfaffenhofen)	634	625	613
DTAG (Darmstadt)	-657	-685	-705
GUM (Warszawa)	50	60	67
IEN (Torino)	494	512	517
IFAG (Wettzell)	-3181	-3106	-3042
IGMA (Buenos Aires)	168	175	170
INPL (Jerusalem)	-1154	-1193	-1251
IPQ (Monte de Caparica)	298	299	297
JATC (Lintong)	3562	3560	3552
KRIS (Taejon)	-258	-243	-225
LDS (Leeds)	0	2	-9
MSL (Lower Hutt)	-5670	-5651	-5590
NAO (Mizusawa)	-3557	-3607	-3670
NIM (Beijing)	-1400	-1402	-1404
NIST (Boulder)	22	21	22
NPL (Teddington)	78	75	71
NRC (Ottawa)	111	97	90
NRLM (Tsukuba)	17	21	12
OMH (Budapest)	-	-	-
ONBA (Buenos Aires)	-16293	-16368	-16552
ONRJ (Rio de Janeiro)	35306	35768	36142
OP (Paris)	30	23	6
ORB (Bruxelles)	171	175	183
PTB (Braunschweig)	1828	1824	1819
ROA (San Fernando)	-24	-29	-41
SCL (Hong Kong)	-105	-105	-105
SO (Shanghai)	1107	1127	1120
SP (Boras)	248	248	243
SU (Moskva)	892	884	871
TL (Chung-Li)	430	459	465
TP (Praha)	127	136	144
TUG (Graz)	1490	1511	1548
UME (Gebze-Kocaeli)	335	344	358
USNO (Washington DC)(USNO MC)	16	16	15
VSL (Delft)	-422	-433	-440

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		Jan 31	Feb 5	Feb 10
MJD		50479	50484	50489
Laboratory k		TAI-TA(k)	(Unit is one nanosecond)	
APL (Laurel)		2203	-	-
AUS (Canberra)		-75924	-76050	-76197
CH (Bern)		-51456	-51266	-51074
CRL (Tokyo)		80210	80416	80623
CSAO (Lintong)		1891	1755	1753
F (Paris)		163353	163341	163333
IEN (Torino)		2227	2268	2318
INPL (Jerusalem)		-372187	-372994	-373774
JATC (Lintong)		13507	13437	13498
KRIS (Taejon)		5442	5447	5461
NIM (Beijing)		-	-	-
NISA (Boulder)	(2)	-45155951	-45156163	-45156378
NRC (Ottawa)		27220	27214	27206
PTB (Braunschweig)		-361558	-361563	-361568
SO (Shanghai)		-46410	-46401	-46402
SU (Moskva)	(3)	27241915	27241907	27241901
USNO (Washington DC)	(4)	-34764834	-34765156	-34765478

Date 1997 0h UTC		Feb 15	Feb 20	Feb 25
MJD		50494	50499	50504
Laboratory k		TAI-TA(k)	(Unit is one nanosecond)	
APL (Laurel)		-	-	-
AUS (Canberra)		-76303	-76389	-76498
CH (Bern)		-50901	-50724	-50548
CRL (Tokyo)		80830	81033	81232
CSAO (Lintong)		1664	1593	1518
F (Paris)		163316	163305	163291
IEN (Torino)		2361	2414	2462
INPL (Jerusalem)		-374540	-375315	-376100
JATC (Lintong)		13478	13471	13455
KRIS (Taejon)		5487	5514	5547
NIM (Beijing)		-	-	-
NISA (Boulder)	(2)	-45156596	-45156809	-45157021
NRC (Ottawa)		27197	27184	27178
PTB (Braunschweig)		-361572	-361576	-361581
SO (Shanghai)		-46413	-46392	-46398
SU (Moskva)	(3)	27241892	27241884	27241871
USNO (Washington DC)	(4)	-34765805	-34766128	-34766451

3 - Notes on sections 1 and 2.

(1) ONBA.

MJD	UTC-UTC(ONBA)
50474	-15782 ns

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

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

(4) 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 Dec. 27 - 1997 Feb. 25	50444-50504	7.265×10^{-13}

New steering correction foreseen for March-April 1997

1997 Feb. 25 - 1997 Apr. 26	50504-50564	7.250×10^{-13}

5 - 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})
PTB-CS2	50444-50504	+2.8	1.5
PTB-CS3	50444-50504	+5.6	1.4
BIPM estimate	50444-50504	+2.6	1.0

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

[UTC - GPS time] = -11 s + C0 (until 1997 July 1, 0h UTC)
[UTC - GPS time] = -12 s + C0 (from 1997 July 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 1997 0h UTC	MJD	C0 (ns)	σ (ns)	$\sigma/\sqrt{N}$ (ns)
Jan 31	50479	41	53	11
Feb 1	50480	47	52	10
Feb 2	50481	46	43	9
Feb 3	50482	40	45	9
Feb 4	50483	33	52	10
Feb 5	50484	38	45	9
Feb 6	50485	44	45	9
Feb 7	50486	45	49	10
Feb 8	50487	46	49	10
Feb 9	50488	42	42	9
Feb 10	50489	39	35	7
Feb 11	50490	41	51	10
Feb 12	50491	45	47	9
Feb 13	50492	45	32	7
Feb 14	50493	43	48	10
Feb 15	50494	43	29	6
Feb 16	50495	42	45	9
Feb 17	50496	35	64	13
Feb 18	50497	35	48	10
Feb 19	50498	40	35	7
Feb 20	50499	43	54	11
Feb 21	50500	39	49	10
Feb 22	50501	30	43	9
Feb 23	50502	25	46	9
Feb 24	50503	30	56	17
Feb 25	50504	40	50	10

7 - [UTC - GLONASS time] and [TAI - GLONASS time].

[UTC - GLONASS time] = 0 s + C1
[TAI - GLONASS time] = +30 s + C1 (until 1997 July 1, 0h UTC)
[TAI - GLONASS time] = +31 s + C1 (from 1997 July 1, 0h UTC)

Daily values of C1 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 C1 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 C1 estimates on 1997, January 1 (MJD = 50449).

For a given day, where N measurements are used for estimation of C1 :
- the dispersion of individual measurements is characterized by a standard deviation σ,
- the daily C1 value is characterized by the standard deviation of the mean $\sigma/\sqrt{N}$.

Date 1997 0h UTC	MJD	C1 (ns)	σ (ns)	$\sigma/\sqrt{N}$ (ns)
Jan 31	50479	-34914	42	6
Feb 1	50480	-34915	23	4
Feb 2	50481	-34913	21	4
Feb 3	50482	-34912	-	-
Feb 4	50483	-34912	19	3
Feb 5	50484	-34911	19	3
Feb 6	50485	-34910	14	2
Feb 7	50486	-34908	18	3
Feb 8	50487	-34908	16	3
Feb 9	50488	-34907	27	5
Feb 10	50489	-34907	31	6
Feb 11	50490	-34907	24	4
Feb 12	50491	-34906	23	4
Feb 13	50492	-34907	13	5
Feb 14	50493	-34909	19	4
Feb 15	50494	-34909	18	3
Feb 16	50495	-34907	18	3
Feb 17	50496	-34906	17	3
Feb 18	50497	-34909	22	4
Feb 19	50498	-34913	22	4
Feb 20	50499	-34916	21	3
Feb 21	50500	-34916	19	3
Feb 22	50501	-34915	20	4
Feb 23	50502	-34914	19	3
Feb 24	50503	-34917	17	3
Feb 25	50504	-34918	19	3