ISSN 1143-1393

BUREAU INTERNATIONAL DES POIDS ET MESURES

Circular T 114 (1997 July 16)
Circulaire T 114

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	May 31	Jun 5	Jun 10	Jun 15
MJD	50599	50604	50609	50614
Laboratory k	*UTC-UTC(k)* (Unit is one nanosecond)			
AOS (Borowiec)	237	258	273	234
APL (Laurel)	1794	1847	1904	1952
AUS (Canberra)	281	292	278	267
BEV (Wien)	-	-	-	-
BIRM (Beijing)	-5862	-5927	-5994	-6030
CAO (Cagliari)	-746	-786	-839	-860
CH (Bern)	-79	-104	-127	-136
CNM (Queretaro)	-3096	-3048	-2996	-2938
CRL (Tokyo)	19	20	15	17
CSAO (Lintong)	-20	14	-19	5
CSIR (Pretoria)	8999	9064	9166	9272
DLR (Oberpfaffenhofen)	123	88	50	14
DTAG (Darmstadt)	-716	-708	-714	-711
GUM (Warszawa)	413	429	448	474
IEN (Torino)	548	551	557	567
IFAG (Wettzell)	-1748	-1676	-1630	-1585
IGMA (Buenos Aires)	286	277	305	294
INPL (Jerusalem)	-3217	-3215	-3165	-3096
IPQ (Monte de Caparica)	474	482	490	509
JATC (Lintong)	3546	3569	3526	3537
KRIS (Taejon)	-189	-181	-175	-171
LDS (Leeds)	-87	-55	-66	-78
MSL (Lower Hutt) (1)	-5712	-5720	-5669	-5711
NAO (Mizusawa)	-2713	-2653	-2598	-2530
NIM (Beijing)	-1703	-1714	-1739	-1783
NIST (Boulder)	-6	-5	-5	-3
NML (Sydney)	449	451	462	463
NPL (Teddington)	70	70	67	67
NRC (Ottawa)	31	48	60	68
NRLM (Tsukuba)	97	97	99	108
OMH (Budapest)	715	729	758	769
ONBA (Buenos Aires)	-2041	-2560	-3175	-3782
ONRJ (Rio de Janeiro)	44121	44504	44925	45402
OP (Paris)	27	32	40	45
ORB (Bruxelles)	267	270	262	238
PTB (Braunschweig)	1725	1720	1716	1715
ROA (San Fernando)	-99	-97	-91	-75
SCL (Hong Kong)	65	-	-	-
SO (Shanghai)	995	1001	1003	980
SP (Boras)	321	324	327	335
SU (Moskva)	726	711	704	698
TL (Chung-Li) (2)	744	753	776	798
TP (Praha)	120	121	122	126
TUG (Graz)	2262	2302	2340	2374
UME (Gebze-Kocaeli)	530	533	540	551
USNO (Washington DC)(USNO MC)	14	16	15	14
VSL (Delft)	-326	-318	-309	-300

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1 - Coordinated Universal Time UTC. (Cont.)

Date 1997 0h UTC	Jun 20	Jun 25	Jun 30
MJD	50619	50624	50629
Laboratory k	*UTC-UTC(k)*	(Unit is one	nanosecond)
AOS (Borowiec)	194	196	207
APL (Laurel)	2007	2053	2118
AUS (Canberra)	258	265	266
BEV (Wien)	-	-	-
BIRM (Beijing)	-6099	-6162	-6221
CAO (Cagliari)	-902	-919	-951
CH (Bern)	-159	-174	-184
CNM (Queretaro)	-2889	-2841	-2784
CRL (Tokyo)	10	17	14
CSAO (Lintong)	-27	6	-3
CSIR (Pretoria)	9408	9537	9675
DLR (Oberpfaffenhofen)	-27	-69	-111
DTAG (Darmstadt)	-694	-681	-675
GUM (Warszawa)	491	516	520
IEN (Torino)	562	569	580
IFAG (Wettzell)	-1553	-1530	-1473
IGMA (Buenos Aires)	322	341	343
INPL (Jerusalem)	-2988	-2851	-2770
IPQ (Monte de Caparica)	513	526	533
JATC (Lintong)	3496	3522	3501
KRIS (Taejon)	-166	-168	-167
LDS (Leeds)	-78	-72	-74
MSL (Lower Hutt)	-5721	-5695	-5673
NAO (Mizusawa)	-2470	-2402	-2335
NIM (Beijing)	-1810	-1823	-1844
NIST (Boulder)	-3	-2	0
NML (Sydney)	485	505	512
NPL (Teddington)	66	63	63
NRC (Ottawa)	74	76	64
NRLM (Tsukuba)	105	108	110
OMH (Budapest)	787	818	826
ONBA (Buenos Aires)	-4292	-4758	-5240
ONRJ (Rio de Janeiro)	45883	46366	46802
OP (Paris)	53	70	75
ORB (Bruxelles)	263	261	285
PTB (Braunschweig)	1710	1706	1703
ROA (San Fernando)	-65	-59	-54
SCL (Hong Kong)	-	-	-
SO (Shanghai)	963	965	967
SP (Boras)	342	345	347
SU (Moskva)	690	683	668
TL (Chung-Li)	789	779	771
TP (Praha)	137	122	120
TUG (Graz)	2409	2442	2467
UME (Gebze-Kocaeli)	560	563	572
USNO (Washington DC)(USNO MC)	12	10	8
VSL (Delft)	-286	-277	-264

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		May 31	Jun 5	Jun 10	Jun 15
MJD		50599	50604	50609	50614
Laboratory k		*TAI-TA(k)* (Unit is one nanosecond)			
AMC (Col. Springs)	(3)	-364969	-364968	-364971	-364973
APL (Laurel)		3257	3310	3367	3415
AUS (Canberra)		-78532	-78602	-78688	-78814
CH (Bern)		-47294	-47136	-46979	-46808
CRL (Tokyo)		85238	85449	85657	85874
CSAO (Lintong)		265	234	136	96
F (Paris)		163082	163071	163064	163056
IEN (Torino)		3245	3290	3340	3395
INPL (Jerusalem)		-390844	-391626	-392360	-393103
JATC (Lintong)		13410	13429	13388	13388
KRIS (Taejon)		5387	5380	5382	5374
NISA (Boulder)	(4)	-45161107	-45161321	-45161536	-45161749
NML (Sydney)		486	488	499	500
NRC (Ottawa)		27060	27074	27081	27085
PTB (Braunschweig)		-361675	-361680	-361684	-361685
SO (Shanghai)		-46520	-46518	-46520	-46555
SU (Moskva)	(5)	27241726	27241711	27241704	27241698
USNO (Washington DC)	(6)	-34772570	-34772892	-34773214	-34773535

Date 1997 0h UTC		Jun 20	Jun 25	Jun 30
MJD		50619	50624	50629
Laboratory k		*TAI-TA(k)*	(Unit is one nanosecond)	
AMC (Col. Springs)	(3)	-364978	-364983	-364987
APL (Laurel)		3470	3516	3581
AUS (Canberra)		-78904	-79022	-79107
CH (Bern)		-46651	-46486	-46316
CRL (Tokyo)		86086	86301	86512
CSAO (Lintong)		-1	-33	-107
F (Paris)		163049	163043	163032
IEN (Torino)		3436	3484	3534
INPL (Jerusalem)		-393823	-394503	-395227
JATC (Lintong)		13339	13356	13323
KRIS (Taejon)		5369	5359	5355
NISA (Boulder)	(4)	-45161964	-45162178	-45162391
NML (Sydney)		522	542	549
NRC (Ottawa)		27087	27085	27081
PTB (Braunschweig)		-361690	-361694	-361697
SO (Shanghai)		-46587	-46589	-46584
SU (Moskva)	(5)	27241690	27241683	27241668
USNO (Washington DC)	(6)	-34773858	-34774180	-34774501

3 - Notes on sections 1 and 2.

(1) MSL . Apparent time step of *UTC-UTC(MSL)* of + 31 ns between MJD = 50604 and MJD = 50609 due to GPS equipment calibration.

(2) TL . Corrected values of *UTC-UTC(TL)* :

MJD	*UTC-UTC(TL)*	MJD	*UTC-UTC(TL)*	MJD	*UTC-UTC(TL)*
50464	479 ns	50509	568 ns	50554	652 ns
50469	492 ns	50514	580 ns	50559	656 ns
50474	495 ns	50519	592 ns	50564	668 ns
50479	511 ns	50524	594 ns	50569	680 ns
50484	524 ns	50529	609 ns	50574	686 ns
50489	545 ns	50534	620 ns	50579	687 ns
50494	563 ns	50539	631 ns	50584	700 ns
50499	570 ns	50544	637 ns	50589	711 ns
50504	574 ns	50549	640 ns	50594	725 ns

(3) AMC . TA(AMC) designates the atomic time scale computed by USNO with data from the Alternate Master Clock station, Colorado Springs, Colorado, USA.

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

(5) SU . Listed values are *TAI-TA(SU)* - 2,80 seconds.

(6) USNO. TA(USNO) designates the atomic time scale computed by USNO with data from the U.S. Naval Observatory, Washington D.C., USA.

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

Interval of validity		*f(EAL)-f(TAI)*
1997 Apr. 26 - 1997 June 30	50564-50629	$7{,}230\times10^{-13}$
New steering correction foreseen for July-August 1997		
1997 June 30 - 1997 Aug. 29	50629-50689	$7{,}210\times10^{-13}$

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 PTB CS2, PTB CS3, NIST-7 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})	σ (10^{-14})
PTB-CS2	50569-50629	+2,6	1,5
PTB-CS3	50569-50629	+4,9	1,4
NIST-7	50619-50629	+1,7	0,7
BIPM estimate	50569-50629	+2,3	1,0

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

[*UTC-GPS time*] = -11 s + C_0 (until 1997 July 1, 0h UTC)
[*UTC-GPS time*] = -12 s + C_0 (from 1997 July 1, 0h UTC)
[*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)
May 31	50599	31	47	9
Jun 1	50600	21	56	11
Jun 2	50601	17	50	10
Jun 3	50602	26	41	8
Jun 4	50603	33	37	7
Jun 5	50604	32	35	7
Jun 6	50605	32	46	9
Jun 7	50606	36	35	7
Jun 8	50607	42	50	10
Jun 9	50608	38	50	10
Jun 10	50609	32	50	12
Jun 11	50610	33	30	7
Jun 12	50611	32	37	9
Jun 13	50612	31	42	8
Jun 14	50613	32	36	7
Jun 15	50614	25	39	8
Jun 16	50615	17	36	7
Jun 17	50616	15	41	8
Jun 18	50617	15	49	10
Jun 19	50618	11	34	7
Jun 20	50619	10	43	9
Jun 21	50620	17	50	10
Jun 22	50621	25	56	11
Jun 23	50622	26	49	10
Jun 24	50623	24	30	6
Jun 25	50624	21	42	8
Jun 26	50625	23	38	8
Jun 27	50626	26	45	9
Jun 28	50627	28	43	9
Jun 29	50628	35	52	10
Jun 30	50629	40	49	10

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

[*UTC-GLONASS time*] = 0 s + C_1
[*TAI-GLONASS time*] = +30 s + C_1 (until 1997 July 1, 0h UTC)
[*TAI-GLONASS time*] = +31 s + C_1 (from 1997 July 1, 0h UTC)

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)
May 31	50599	-34899	20	4
Jun 1	50600	-34904	19	4
Jun 2	50601	-34905	19	5
Jun 3	50602	-34896	23	10
Jun 4	50603	-34892	17	12
Jun 5	50604	-34904	14	3
Jun 6	50605	-34918	19	4
Jun 7	50606	-34914	-	-
Jun 8	50607	-34908	-	-
Jun 9	50608	-34903	31	12
Jun 10	50609	-34905	19	4
Jun 11	50610	-34909	15	3
Jun 12	50611	-34914	19	4
Jun 13	50612	-34918	19	4
Jun 14	50613	-34918	16	4
Jun 15	50614	-34918	14	3
Jun 16	50615	-34915	23	6
Jun 17	50616	-34919	15	3
Jun 18	50617	-34931	23	5
Jun 19	50618	-34937	20	4
Jun 20	50619	-34942	16	3
Jun 21	50620	-34950	15	3
Jun 22	50621	-34959	17	4
Jun 23	50622	-34968	15	4
Jun 24	50623	-34972	16	3
Jun 25	50624	-34981	20	4
Jun 26	50625	-34989	19	5
Jun 27	50626	-34999	25	5
Jun 28	50627	-35007	15	3
Jun 29	50628	-35009	24	5
Jun 30	50629	-35007	22	7