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BUREAU INTERNATIONAL DES POIDS ET MESURES

Circular T 85 (1995 February 24)

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

(From 1994 July 1, 0hUTC, TAI-UTC = 29 s)

| Date 1994/95 0h UTC | Dec 23 | Jan 2 | Jan 12 | Jan 22 |
|---|---|---|---|---|
| MJD | 49709 | 49719 | 49729 | 49739 |
| Laboratory k | UTC-UTC(k) (Unit = 1 microsecond) | | | |
| AOS (Borowiec) | -1.067 | -0.916 | -0.627 | -0.612 |
| APL (Laurel) | 0.804 | 0.827 | 0.841 | 0.754 |
| AUS (Canberra) | -0.469 | -0.341 | -0.323 | -0.294 |
| BEV (Wien) | - | - | - | - |
| CAO (Cagliari) | -4.987 | -5.038 | -5.198 | -5.405 |
| CH (Bern) | 0.024 | 0.057 | 0.105 | 0.151 |
| CRL (Tokyo) | 1.381 | 1.338 | 1.319 | 1.296 |
| CSAO (Lintong) | -0.339 | -0.204 | -0.259 | -0.283 |
| CSIR (Pretoria) | -2.246 | -2.077 | -1.876 | -1.765 |
| FTZ (Darmstadt) | 0.058 | 0.045 | 0.055 | 0.054 |
| GUM (Warszawa) | -0.402 | -0.914 | -1.198 | -1.120 |
| IEN (Torino) | 0.579 | 0.569 | 0.569 | 0.573 |
| IFAG (Wettzell) | -4.672 | -5.381 | -6.107 | -6.824 |
| IGMA (Buenos Aires) | -2.67 | -2.61 | -2.45 | -2.45 |
| INPL (Jerusalem) | -0.662 | -0.912 | -1.112 | -1.330 |
| JATC (Lintong) | 0.462 | 0.609 | 0.654 | 0.741 |
| KRIS (Taejon) | -0.052 | -0.068 | -0.039 | -0.011 |
| LDS (Leeds) | -0.726 | -0.560 | -0.532 | -0.546 |
| MSL (Lower Hutt) | -2.822 | -2.723 | -2.734 | -2.896 |
| NAOM (Mizusawa) | -1.791 | -1.850 | -1.912 | -1.980 |
| NAOT (Tokyo) | -1.437 | -1.361 | -1.314 | -1.301 |
| NIM (Beijing) | 7.38 | 7.50 | 7.59 | 7.63 |
| NIST (Boulder) | -0.092 | -0.090 | -0.088 | -0.079 |
| NMC (Sofiya) | - | - | - | - |
| NPL (Teddington) | -0.001 | -0.005 | 0.008 | 0.018 |
| NPLI (New-Delhi) | - | - | - | - |
| NRC (Ottawa) (2) | 5.001 | - | -0.195 | -0.112 |
| NRLM (Tsukuba) | -10.717 | -10.575 | -10.417 | -10.266 |
| OMH (Budapest) | 8.010 | 8.362 | 8.678 | 8.993 |
| ONBA (Buenos Aires) | 2.38 | - | - | - |
| ONRJ (Rio de Janeiro) | -19.437 | -19.217 | -19.275 | -18.529 |
| OP (Paris) | -0.105 | -0.108 | -0.114 | -0.120 |
| ORB (Bruxelles) | -0.232 | -0.241 | -0.212 | -0.189 |
| PTB (Braunschweig) | 2.574 | 2.562 | 2.559 | 2.552 |
| RC (Habana) | - | - | - | - |
| ROA (San Fernando) | 2.210 | 2.180 | 2.192 | 2.185 |
| SCL (Hong Kong) | 0.125 | -0.031 | -0.087 | -0.173 |
| SNT (Stockholm) | -0.091 | 0.172 | 0.331 | 0.452 |
| SO (Shanghai) | 2.07 | 2.15 | 2.17 | 2.16 |
| SU (Moskva) | -5.799 | -5.901 | -6.003 | -6.099 |
| TL (Chung-Li) | -1.202 | -1.160 | -1.101 | -1.030 |
| TP (Praha) | -0.781 | -0.772 | -0.745 | -0.716 |
| TUG (Graz) | -1.918 | -1.829 | -1.703 | -1.573 |
| UME (Gebze-Kocaeli) | -2.527 | -2.612 | -2.683 | -2.756 |
| USNO (Washington DC)(USNO MC) | 0.018 | 0.024 | 0.020 | 0.026 |
| VSL (Delft) (3) | 1.005 | 0.932 | 0.672 | 0.407 |

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

The following table gives the computed values of TAI-TA(k) (1).

| Date 1994/95 0h UTC | | Dec 23 | Jan 2 | Jan 12 | Jan 22 |
|---|---|---|---|---|---|
| MJD | | 49709 | 49719 | 49729 | 49739 |
| Laboratory k | | TAI-TA(k) (Unit = 1 microsecond) | | | |
| APL (Laurel) | | 2.267 | 2.290 | 2.304 | 2.217 |
| AUS (Canberra) | | -56.786 | -56.975 | -57.215 | -57.443 |
| CH (Bern) | | -71.396 | -71.253 | -71.095 | -70.939 |
| CRL (Tokyo) | | 48.181 | 48.581 | 49.006 | 49.421 |
| CSAO (Lintong) | | 11.366 | 11.371 | 11.186 | 11.033 |
| F (Paris) | | 137.647 | 137.999 | 138.370 | 138.739 |
| INPL (Jerusalem) | | -249.634 | -251.873 | -254.097 | -256.374 |
| JATC (Lintong) | | 13.979 | 14.060 | 13.976 | 13.862 |
| KRIS (Taejon) | | 0.788 | 0.882 | 1.061 | 1.249 |
| NIM (Beijing) | | -8.60 | -8.46 | -8.34 | -8.28 |
| NISA (Boulder) | (4) | -45122.440 | -45122.869 | -45123.307 | -45123.738 |
| NRC (Ottawa) | | 23.865 | - | 23.806 | 23.872 |
| PTB (Braunschweig) | | -360.826 | -360.838 | -360.841 | -360.848 |
| RC (Habana) | | - | - | - | - |
| SO (Shanghai) | | -45.51 | -45.40 | -45.42 | -45.42 |
| SU (Moskva) | (5) | 27244.201 | 27244.099 | 27243.997 | 27243.901 |
| USNO (Washington DC) | (6) | -34714.007 | -34714.670 | -34715.339 | -34716.004 |

3 - Notes on sections 1 and 2.

(1) Values UTC-UTC(k) and TAI-TA(k) are published within 1 ns except for laboratories which are not linked through GPS common views.

(2) NRC . Time step of UTC(NRC) of 5.0 μs on MJD = 49718.00

(3) VSL . Change of master clock on MJD = 49716.49

(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 scale A1(MEAN) of USNO.

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

[UTC - GPS time] = -10 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 $\sigma$,
- the daily C0 value is characterized by the standard deviation of the mean $\sigma/\sqrt{N}$.

| Date 1994/95 0h UTC | MJD | C0 (ns) | $\sigma$ (ns) | $\sigma/\sqrt{N}$ (ns) |
|---|---|---|---|---|
| Dec 23 | 49709 | 73 | 42 | 9 |
| Dec 24 | 49710 | 94 | 35 | 7 |
| Dec 25 | 49711 | 107 | 37 | 8 |
| Dec 26 | 49712 | 119 | 52 | 11 |
| Dec 27 | 49713 | 132 | 33 | 7 |
| Dec 28 | 49714 | 144 | 32 | 7 |
| Dec 29 | 49715 | 155 | 49 | 11 |
| Dec 30 | 49716 | 170 | 45 | 11 |
| Dec 31 | 49717 | 185 | 47 | 11 |
| Jan 1 | 49718 | 197 | 50 | 11 |
| Jan 2 | 49719 | 209 | 38 | 9 |
| Jan 3 | 49720 | 219 | 38 | 8 |
| Jan 4 | 49721 | 229 | 43 | 9 |
| Jan 5 | 49722 | 236 | 32 | 7 |
| Jan 6 | 49723 | 243 | 44 | 11 |
| Jan 7 | 49724 | 255 | 45 | 10 |
| Jan 8 | 49725 | 270 | 32 | 7 |
| Jan 9 | 49726 | 280 | 42 | 9 |
| Jan 10 | 49727 | 281 | 57 | 12 |
| Jan 11 | 49728 | 280 | 39 | 8 |
| Jan 12 | 49729 | 280 | 30 | 6 |
| Jan 13 | 49730 | 282 | 44 | 9 |
| Jan 14 | 49731 | 286 | 45 | 10 |
| Jan 15 | 49732 | 291 | 44 | 10 |
| Jan 16 | 49733 | 297 | 46 | 10 |
| Jan 17 | 49734 | 298 | 38 | 8 |
| Jan 18 | 49735 | 300 | 32 | 7 |
| Jan 19 | 49736 | 301 | 36 | 8 |
| Jan 20 | 49737 | 298 | 46 | 12 |
| Jan 21 | 49738 | 296 | 36 | 8 |
| Jan 22 | 49739 | 296 | 50 | 11 |

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 ten-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 1994/95 0h UTC | MJD | C1 (μs) | σ (μs) |
|---|---|---|---|
| Dec 23 | 49709 | -15.56 | 0.03 |
| Jan 2 | 49719 | -15.45 | 0.04 |
| Jan 12 | 49729 | -15.48 | 0.04 |
| Jan 22 | 49739 | -15.52 | 0.06 |

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

| Interval of validity | | f(EAL)-f(TAI) |
|---|---|---|
| 1993 Apr. 22 - 1995 Jan 22 | 49099-49739 | $7.40 \times 10^{-13}$ |

7 - Duration of the TAI scale interval.

The following table gives the departure D of the duration of the TAI scale interval from the SI second on the rotating geoid as realized by a given primary standard occasionally evaluated or continuously operating as a clock. In the later case the chosen two-month period of observation is also indicated. The last communicated estimate of the inaccuracy of the standard provides the uncertainty σ of the D value.

D and σ are expressed in units of $10^{-14}$ second.

| Standard | Obs. period | D | σ |
|---|---|---|---|
| PTB-CS1 | 49679-49739 | -0.5 | 3.0 |
| PTB-CS2 | 49679-49739 | +0.3 | 1.5 |

The estimate of the duration of the TAI scale interval, computed by the BIPM, from all the available measurements of the TAI frequency, obtained by comparison with primary frequency standards continuously observed or occasionally evaluated (*CRL, *LPTF, *NIST, NRC, PTB, SU), is:

$$1 - 0.5 \times 10^{-14} \pm 2.0 \times 10^{-14}$$

in SI second on the rotating geoid, for the two-month interval 49679-49739 .

* The frequencies of the primary frequency standards Cs1 from CRL, JPO from LPTF, and NIST-7 from NIST, are corrected for the black body radiation shift.