

BUREAU INTERNATIONAL DES POIDS ET MESURES
ORGANISATION INTERGOUVERNEMENTALE DE LA CONVENTION DU METRE
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1 - Coordinated Universal Time UTC and its local realizations UTC(k). Computed values of [UTC-UTC(k)] and uncertainties valid for the period of this Circular.
From 2009 January 1, 0h UTC, TAI-UTC = 34 s. From 2012 July 1, 0h UTC, TAI-UTC = 35 s.

| Date 2012 MJD | 0h UTC | MAR 28 | APR 2 | APR 7 | APR 12 | APR 17 | APR 22 | APR 27 | Uncertainty/ns Notes | | |
|-------------------------|--------|-----------------|---------|---------|---------|--------|--------|--------|----------------------|-------|---------|
| | | 56014 | 56019 | 56024 | 56029 | 56034 | 56039 | 56044 | u_A | u_B | u |
| Laboratory k | | [UTC-UTC(k)]/ns | | | | | | | | | |
| AOS (Borowiec) | | 7.1 | -18.3 | 9.1 | 1.8 | -7.9 | 0.5 | 2.3 | 0.3 | 5.2 | 5.2 |
| APL (Laurel) | | -0.2 | 8.8 | 0.2 | 4.9 | 8.3 | 16.4 | 13.1 | 1.0 | 5.2 | 5.3 |
| AUS (Sydney) | | 637.1 | 632.6 | 620.8 | 622.2 | 618.4 | 607.9 | 602.0 | 0.3 | 5.2 | 5.2 |
| BEV (Wien) | | -23.1 | 10.0 | 13.5 | 22.6 | 27.4 | 39.9 | 44.9 | 0.3 | 3.4 | 3.4 (1) |
| BIM (Sofiya) | | 1476.2 | 1414.8 | 1418.5 | 1415.5 | 1419.6 | 1452.6 | 1451.0 | 1.5 | 7.2 | 7.3 (2) |
| BIRM (Beijing) | | 282.2 | 332.1 | 381.7 | 425.7 | - | - | - | 1.5 | 20.1 | 20.1 |
| BY (Minsk) | | -38.4 | -35.3 | -26.9 | -25.0 | -25.5 | -25.1 | -22.5 | 1.5 | 7.2 | 7.3 |
| CAO (Cagliari) | | -6331.1 | -6355.9 | -6359.0 | -6358.7 | - | - | - | 1.6 | 7.2 | 7.3 |
| CH (Bern) | | -1.8 | -3.8 | -6.0 | -7.4 | -7.2 | -8.2 | -8.1 | 0.3 | 1.8 | 1.9 |
| CNM (Queretaro) | | -14.0 | -9.6 | 101.2 | -0.6 | 1.1 | - | -3.0 | 2.0 | 5.2 | 5.6 (3) |
| CNMP (Panama) | | 76.4 | 57.2 | 24.7 | 0.1 | 24.5 | 33.0 | 47.1 | 3.0 | 5.2 | 6.0 |
| DLR (Oberpfaffenhofen) | | 42.3 | 57.8 | 55.4 | 67.7 | 53.7 | 34.4 | 14.0 | 0.7 | 5.2 | 5.3 |
| DMDM (Belgrade) | | -13.9 | -24.9 | -23.8 | -29.6 | -30.5 | -24.7 | -29.6 | 2.0 | 7.1 | 7.4 |
| DTAG (Frankfurt/M) | | 4.4 | 4.9 | 3.2 | 4.5 | 8.6 | -11.3 | -10.6 | 0.3 | 10.0 | 10.0 |
| EIM (Thessaloniki) | | - | - | - | - | - | - | - | - | - | - |
| HKO (Hong Kong) | | 196.7 | 202.8 | 206.7 | 220.7 | 221.1 | 228.4 | 231.0 | 2.5 | 5.2 | 5.8 |
| IFAG (Wetzell) | | -631.4 | -632.2 | -627.7 | -631.1 | -625.8 | -617.1 | -617.9 | 0.3 | 5.2 | 5.2 |
| IGNA (Buenos Aires) | | 6881.2 | 6943.4 | 6992.3 | 7047.7 | 7114.5 | 7182.0 | 7252.4 | 1.5 | 5.2 | 5.4 |
| INPL (Jerusalem) | | -15.9 | -29.8 | -34.5 | -38.3 | -41.2 | -47.1 | -56.4 | 0.7 | 20.1 | 20.1 |
| INTI (Buenos Aires) | | -76.1 | -68.1 | -41.1 | -36.4 | -19.0 | -3.2 | 16.8 | 3.0 | 20.1 | 20.3 |
| IPQ (Caparica) | | -8.8 | -8.4 | -9.6 | -5.7 | -14.3 | -4.9 | -4.7 | 0.4 | 7.1 | 7.1 |
| IT (Torino) | | 12.5 | 13.4 | 14.1 | 15.4 | 15.0 | 14.9 | 14.5 | 0.3 | 1.9 | 2.0 |
| JATC (Lintong) | | 13.0 | 17.8 | 6.2 | 2.5 | 1.5 | 0.3 | 8.8 | 1.4 | 5.1 | 5.3 |
| JV (Kjeller) | | 26.4 | 26.0 | 54.5 | 60.9 | 54.2 | 70.3 | 56.6 | 5.0 | 20.0 | 20.6 |
| KEBS (Nairobi) | | 3002.2 | 3099.1 | 3186.4 | 3281.1 | 3376.5 | 3469.7 | 3571.6 | 1.5 | 20.1 | 20.1 |
| KIM (Serpong-Tangerang) | | -112.1 | -124.2 | -136.0 | -123.0 | -115.9 | -149.5 | -135.2 | 2.0 | 20.0 | 20.1 |
| KRIS (Daejeon) | | -9.8 | -9.4 | -9.0 | -7.8 | -6.0 | -3.8 | -1.5 | 0.3 | 5.1 | 5.1 |
| KZ (Astana) | | -636.6 | -695.8 | -717.3 | -722.5 | -756.9 | -731.8 | -752.4 | 1.5 | 20.0 | 20.1 |
| LT (Vilnius) | | 32.7 | 16.0 | 32.4 | 37.7 | 42.7 | 49.1 | 39.5 | 2.0 | 5.2 | 5.6 |
| MIKE (Espoo) | | -6.8 | -6.2 | -6.5 | -6.8 | -5.7 | -4.9 | -3.9 | 0.3 | 7.1 | 7.1 |

| Date 2012 | 0h UTC | MAR 28 | APR 2 | APR 7 | APR 12 | APR 17 | APR 22 | APR 27 | Uncertainty/ns Notes | | |
|-----------------------|--------|-------------------|----------|----------|----------|----------|----------|----------|----------------------|-------|------|
| MJD | | 56014 | 56019 | 56024 | 56029 | 56034 | 56039 | 56044 | u_A | u_B | u |
| Laboratory k | | $[UTC-UTC(k)]/ns$ | | | | | | | | | |
| MKEH (Budapest) | | -63772.5 | -63980.4 | -64184.8 | -64390.6 | -64600.9 | -64798.6 | -65004.9 | 1.5 | 20.0 | 20.1 |
| MSL (Lower Hutt) | | 26.8 | 28.5 | 19.6 | -1.9 | -21.2 | -28.7 | -17.8 | 1.5 | 20.1 | 20.1 |
| NAO (Mizusawa) | | 60.4 | 59.3 | 65.6 | 62.0 | 69.2 | 85.6 | 96.3 | 2.0 | 19.9 | 20.0 |
| NICT (Tokyo) | | 8.6 | 13.4 | 14.0 | 13.8 | 13.4 | 13.7 | 15.6 | 0.3 | 4.8 | 4.8 |
| NIM (Beijing) | | -10.0 | -11.8 | -9.9 | -8.4 | -5.6 | -3.3 | -1.3 | 0.7 | 5.2 | 5.2 |
| NIMB (Bucharest) | | -930.8 | -943.2 | -958.7 | -956.8 | -941.8 | -949.6 | -948.6 | 0.3 | 20.0 | 20.1 |
| NIMT (Pathumthani) | | 1175.9 | 1180.3 | 1189.3 | 1188.4 | 1181.2 | 1186.0 | 1187.6 | 1.0 | 20.1 | 20.1 |
| NIS (Cairo) | | -816.9 | -827.0 | -838.1 | -841.4 | -848.3 | -854.0 | -865.3 | 0.8 | 7.1 | 7.2 |
| NIST (Boulder) | | -1.8 | -0.6 | 0.1 | 0.9 | 2.4 | 4.1 | 5.5 | 0.3 | 5.0 | 5.0 |
| NMIJ (Tsukuba) | | -3.5 | -3.8 | -4.2 | -4.4 | -3.7 | -2.1 | -1.5 | 0.4 | 5.1 | 5.1 |
| | | | | | | | | | | | |
| NMLS (Sepang) | | -677.3 | -689.2 | -700.1 | -708.1 | -716.6 | -733.8 | -754.9 | 1.5 | 20.1 | 20.1 |
| NPL (Teddington) | | 11.6 | 11.0 | 7.8 | 4.7 | 2.5 | 0.2 | -1.7 | 0.3 | 5.2 | 5.2 |
| NPLI (New-Delhi) | | 182.4 | 180.1 | 183.1 | 187.2 | 184.0 | 186.6 | 189.3 | 2.0 | 7.2 | 7.4 |
| NRC (Ottawa) | | -18.3 | -25.3 | -26.3 | -35.6 | -36.6 | -45.0 | -57.2 | 0.3 | 5.2 | 5.2 |
| NRL (Washington DC) | | 5.3 | 5.4 | 3.6 | 3.1 | 3.8 | 2.9 | 2.5 | 0.3 | 5.2 | 5.2 |
| NTSC (Lintong) | | 6.7 | 6.5 | 4.5 | 7.6 | 10.5 | 6.0 | 8.2 | 1.4 | 5.0 | 5.2 |
| ONBA (Buenos Aires) | | -5950.3 | -5975.5 | -5990.5 | -6011.6 | -6038.3 | -6058.7 | -6083.1 | 4.0 | 5.2 | 6.6 |
| ONRJ (Rio de Janeiro) | | 1.4 | -17.0 | -9.9 | -3.5 | -4.1 | 2.1 | -0.8 | 3.9 | 7.1 | 8.1 |
| OP (Paris) | | -11.2 | -5.9 | 0.6 | 0.1 | -2.6 | 1.7 | 3.2 | 0.3 | 1.8 | 1.9 |
| ORB (Bruxelles) | | -1.5 | -1.5 | -1.6 | -1.6 | -0.9 | -0.4 | 0.7 | 0.3 | 5.2 | 5.2 |
| | | | | | | | | | | | |
| PL (Warszawa) | | 14.5 | 8.6 | 12.4 | 14.5 | 10.5 | 11.3 | 5.9 | 0.3 | 5.1 | 5.1 |
| PTB (Braunschweig) | | -3.6 | -3.3 | -3.6 | -3.1 | -2.2 | -1.4 | -0.2 | 0.1 | 1.5 | 1.5 |
| ROA (San Fernando) | | -1.1 | -0.8 | 2.9 | 6.5 | 10.0 | 12.7 | 17.1 | 0.5 | 5.2 | 5.2 |
| SCL (Hong Kong) | | -2.2 | 0.7 | -12.4 | -11.0 | -10.7 | -17.3 | -7.8 | 2.5 | 10.0 | 10.3 |
| SG (Singapore) | | 3.0 | 4.0 | 6.2 | 7.1 | 5.9 | 3.5 | 1.9 | 0.4 | 5.2 | 5.2 |
| SIQ (Ljubljana) | | -641.3 | -625.2 | -633.5 | -600.2 | -607.3 | -629.2 | -632.4 | 4.0 | 20.0 | 20.4 |
| SMD (Bruxelles) | | 4.9 | 2.8 | 1.7 | 10.5 | -0.7 | 2.4 | 7.4 | 1.5 | 19.9 | 19.9 |
| SMU (Bratislava) | | 79.6 | 73.5 | 68.4 | 67.1 | 76.0 | 81.8 | 99.9 | 1.0 | 20.1 | 20.1 |
| SP (Boras) | | -12.0 | -12.0 | -13.9 | -15.4 | -12.5 | -9.4 | -7.2 | 0.3 | 1.8 | 1.8 |
| SU (Moskva) | | 3.0 | 4.0 | 3.6 | 5.0 | 5.4 | 4.9 | 7.2 | 1.0 | 5.2 | 5.3 |
| | | | | | | | | | | | |
| TCC (Concepcion) | | 896.5 | 911.3 | 935.8 | 964.7 | 982.8 | 989.7 | 1005.6 | 0.3 | 5.2 | 5.2 |
| TL (Chung-Li) | | 3.5 | 2.8 | -1.8 | -4.0 | -4.3 | -4.8 | -1.6 | 0.3 | 5.0 | 5.0 |
| TP (Praha) | | 1.5 | 8.3 | 12.9 | 8.7 | 10.2 | 9.9 | 9.6 | 0.3 | 5.2 | 5.2 |
| UA (Kharkov) | | -4.7 | -11.6 | -12.5 | -14.3 | -15.0 | -13.9 | -11.5 | 1.5 | 20.0 | 20.0 |
| UME (Gebze-Kocaeli) | | 115.0 | 111.5 | 114.2 | 124.4 | 125.1 | 118.6 | 118.4 | 1.0 | 7.0 | 7.1 |
| USNO (Washington DC) | | 0.1 | 0.4 | -0.2 | -0.7 | 0.1 | 0.2 | 1.1 | 0.3 | 3.8 | 3.8 |
| VMI (Ha Noi) | | 6.0 | 9.8 | 5.9 | 1.0 | 2.1 | 10.4 | 7.7 | 0.3 | 20.0 | 20.0 |
| VSL (Delft) | | -0.3 | 0.8 | -2.5 | 0.1 | 1.6 | 1.3 | 6.0 | 0.3 | 1.8 | 1.9 |
| ZA (Pretoria) | | 1992.8 | 1958.3 | 1925.6 | 1886.8 | 1836.9 | 1813.1 | 1763.8 | 1.5 | 19.8 | 19.9 |

- Notes on section 1:

- (1) BEV : Change of master clock on MJD 56014.53.
- (2) BIM : Apparent time step of about +70 ns on MJD 56016.
- (3) CNM : Change of master clock on MJD 56033.

2 - International Atomic Time TAI and Local atomic time scales TA(k). Computed values of $[TAI-TA(k)]$.

| Date 2012 | 0h UTC | MAR 28 | APR 2 | APR 7 | APR 12 | APR 17 | APR 22 | APR 27 |
|-----------------------|--------|------------------|-------------|-------------|-------------|-------------|-------------|----------------|
| MJD | | 56014 | 56019 | 56024 | 56029 | 56034 | 56039 | 56044 |
| Laboratory k | | $[TAI-TA(k)]/ns$ | | | | | | |
| CH (Bern) | | 37796.5 | 37725.8 | 37655.9 | 37587.6 | 37518.8 | 37450.3 | 37382.5 |
| F (Paris) | | 167648.0 | 167647.0 | 167646.8 | 167645.7 | 167643.4 | 167641.2 | 167641.1 |
| JATC (Lintong) | | -51348.5 | -51201.7 | -51229.6 | -51256.3 | -51283.9 | -51308.9 | -51334.4 |
| KRIS (Daejeon) | | 40253.1 | 40306.2 | 40359.6 | 40414.1 | 40469.4 | 40525.1 | 40581.0 |
| NICT (Tokyo) | | 99.4 | 106.4 | 114.2 | 120.2 | 127.1 | 136.9 | 145.3 |
| NIST (Boulder) | | -45374769.0 | -45374957.8 | -45375147.1 | -45375336.3 | -45375524.8 | -45375713.1 | -45375901.7 |
| NRC (Ottawa) | | 25297.0 | 25268.6 | 25246.4 | 25216.2 | 25194.3 | 25164.8 | 25131.5 |
| NTSC (Lintong) | | 13947.7 | 13976.5 | 14001.9 | 14027.2 | 14056.2 | 14088.4 | 14117.3 |
| ONRJ (Rio de Janeiro) | | -10853.2 | -10870.8 | -10892.2 | -10913.9 | -10936.5 | -10955.9 | -10975.5 |
| PL (Warszawa) | | -10065.2 | -10078.1 | -10092.3 | -10109.1 | -10131.2 | -10143.4 | -10157.8 |
| PTB (Braunschweig) | | -328341.7 | -328335.1 | -328315.6 | -328304.9 | -328294.0 | -328289.1 | -328284.1 |
| SG (Singapore) | | 9085.0 | 9118.0 | 9153.2 | 9186.1 | 9217.9 | 9247.5 | 9278.9 |
| SU (Moskva) | | 27282655.6 | 27282806.6 | 27282956.1 | 27283108.2 | 27283259.4 | 27283410.2 | 27283564.1 (1) |
| TL (Chung-Li) | | -533.1 | -535.1 | -535.6 | -539.4 | -540.7 | -544.6 | -546.4 |
| USNO (Washington DC) | | -35104899.5 | -35105189.6 | -35105480.7 | -35105771.7 | -35106061.9 | -35106352.2 | -35106642.8 |

- Note on section 2:

- (1) SU : Listed values are $TAI-TA(SU)$ - 2.80 seconds.

3 - Difference between the normalized frequencies of EAL (free atomic time scale) and TAI.

| | Interval of validity | $f(EAL)-f(TAI)$ |
|-------------------------|----------------------|---|
| Steering correction | 56014 - 56044 | 6.511×10^{-13} (2012 MAR 28 - 2012 APR 27) |
| New correction | 56044 - 56074 | 6.506×10^{-13} (2012 APR 27 - 2012 MAY 27) |
| New correction foreseen | 56074 - 56104 | 6.501×10^{-13} (2012 MAY 27 - 2012 JUN 26) |

4 - Duration of the TAI scale interval.

TAI is a realization of coordinate time TT. The following tables give the fractional deviation d of the scale interval of TAI from that of TT (the SI second on the geoid), i.e. the fractional frequency deviation of TAI with the opposite sign: $d = -y_{TAI}$. In this section, a frequency over a time interval is defined as the ratio of the end-point phase difference to the duration of the interval. Whenever needed, the instability of EAL should be expressed as the quadratic sum of three components with τ in days: (1) a white frequency noise of $2.0 \times 10^{-15} / \sqrt{\tau}$, (2) a flicker frequency noise of 0.4×10^{-15} and (3) a random walk frequency noise of $1.0 \times 10^{-16} \times \sqrt{\tau}$. The relation between EAL and TAI is given in *Circular T* and the *BIPM Annual Report on Time Activities*.

In the first table, d is obtained, on the given periods of estimation by comparison of the TAI frequency with that of the given individual Primary Frequency Standards (PFS). In this table: u_A is the uncertainty originating in the instability of the PFS, u_B is the combined uncertainty from systematic effects, $u_{1/Lab}$ is the uncertainty in the link between the PFS and the clock participating to TAI, including the uncertainty due to the dead-time, $u_{1/TAI}$ is the uncertainty in the link to TAI, u is the quadratic sum of all four uncertainty values. Ref(u_B) is a reference giving information on the values of u_B or is the *Circular T* where the reference was first given. $u_B(Ref)$ is the u_B value stated in this references. Note that all uncertainties may vary over time and that the current u_B values are generally not the same as the peer reviewed values given in Ref(u_B). See "<http://www.bipm.org/jsp/en/TimeFtp.jsp>" for previous issues of *Circular T* and individual Reports of Evaluation of Primary Frequency Standards that explain changes in uncertainties. All values are expressed in 10^{-15} and are valid only for the stated period of estimation.

| Standard | Period of Estimation | | d | u_A | u_B | $u_{1/Lab}$ | $u_{1/TAI}$ | u | Ref(u_B) | $u_B(Ref)$ | Note |
|-----------|----------------------|-------|-------|-------|-------|-------------|-------------|-------|--------------|------------|------|
| PTB-CS1 | 56014 | 56044 | -5.20 | 6.00 | 8.00 | 0.00 | 0.07 | 10.00 | T148 | 8. | (1) |
| PTB-CS2 | 56014 | 56044 | 1.74 | 3.00 | 12.00 | 0.00 | 0.07 | 12.37 | T148 | 12. | (1) |
| NIST-F1 | 56009 | 56039 | 2.37 | 0.34 | 0.31 | 0.18 | 0.20 | 0.53 | T214 | 0.35 | (2) |
| NPL-CsF2 | 56019 | 56044 | 2.90 | 0.20 | 0.23 | 0.01 | 0.23 | 0.38 | T284 | 0.23 | (3) |
| SYRTE-F01 | 56014 | 56029 | 2.46 | 0.20 | 0.44 | 0.23 | 0.37 | 0.65 | T227 | 0.72 | (4) |
| SYRTE-F02 | 56014 | 56044 | 2.53 | 0.25 | 0.26 | 0.14 | 0.20 | 0.43 | T227 | 0.65 | (4) |
| SYRTE-FOM | 56014 | 56044 | 2.22 | 0.25 | 0.60 | 0.16 | 0.20 | 0.70 | T184 | 0.80 | (4) |
| PTB-CSF1 | 56014 | 56044 | 3.07 | 0.17 | 0.74 | 0.02 | 0.07 | 0.76 | T162 | 1.40 | (5) |
| PTB-CSF2 | 56004 | 56019 | 3.42 | 0.20 | 0.34 | 0.10 | 0.12 | 0.42 | T287 | 0.41 | (5) |

Notes:

- (1) Continuously operating as a clock participating to TAI
- (2) Report 23 APR. 2012 by NIST
- (3) Report 01 MAY. 2012 by NPL
- (4) Report 04 MAY. 2012 by LNE-SYRTE
- (5) Report 04 MAY. 2012 by PTB

The second table gives the BIPM estimate of d , based on all available PFS measurements over the period MJD 55654-56044, taking into account their individual uncertainties and characterizing the instability of EAL as noted above. u is the computed standard uncertainty of d

| | | | |
|----------------------|-----------------------|-----------------------|-----------------------------|
| Period of estimation | d | u | |
| 56014-56044 | 2.6×10^{-15} | 0.2×10^{-15} | (2012 MAR 28 - 2012 APR 27) |

5 - Relations of UTC and TAI with predictions of UTC(k) disseminated by GNSS and their System Times.

$$\begin{aligned}
 [UTC-GPS \text{ time}] &= -15 \text{ s} + C_0, & [TAI-GPS \text{ time}] &= 19 \text{ s} + C_0, & \text{global uncertainty is of the order of 10 ns.} \\
 [UTC-UTC(USNO)_{GPS}] &= C_0', & [TAI-UTC(USNO)_{GPS}] &= 34 \text{ s} + C_0', & \text{global uncertainty is of the order of 10 ns.} \\
 [UTC-GLONASS \text{ time}] &= C_1, & [TAI-GLONASS \text{ time}] &= 34 \text{ s} + C_1, & \text{global uncertainty is of the order of hundreds ns.} \\
 [UTC-UTC(SU)_{GLONASS}] &= C_1', & [TAI-UTC(SU)_{GLONASS}] &= 34 \text{ s} + C_1', & \text{global uncertainty is of the order of hundreds ns.}
 \end{aligned}$$

[UTC(USNO)_{GPS}] and [UTC(SU)_{GLONASS}] are, respectively, UTC(USNO) and UTC(SU) as predicted by USNO and SU and disseminated by GPS and GLONASS. The C_0 and C_0' values provide realizations of GPS time and of the prediction of UTC(USNO) broadcast by GPS, as obtained using the values [UTC-UTC(OP)] and the GPS data taken at the Paris Observatory, corrected for IGS precise orbits, clocks and ionosphere maps. The C_1 and C_1' values provide realizations of GLONASS time and of the prediction of UTC(SU) broadcast by GLONASS, as obtained using the values [UTC-UTC(AOS)] and the GLONASS data taken at the Astrodynamical Observatory Borowiec (AOS). N_0 , N_0' , N_1 and N_1' are the numbers of measurements; when N_0 , N_0' , N_1 or N_1' is 0, the corresponding values in the table are interpolated. The standard deviations σ_0 , σ_0' , σ_1 and σ_1' characterize the dispersion of individual measurements. The actual uncertainty of users' access to GPS and GLONASS times may differ from these values. For this edition of circular, $\sigma_0 = 1.4 \text{ ns}$, $\sigma_0' = 1.4 \text{ ns}$, $\sigma_1 = 6.8 \text{ ns}$, $\sigma_1' = 6.8 \text{ ns}$

| 2012 | 0h UTC | MJD | C_0 /ns | N_0 | C_0' /ns | N_0' | C_1 /ns | N_1 | C_1' /ns | N_1' |
|------|--------|-------|-----------|-------|------------|--------|-----------|-------|------------|--------|
| | MAR 28 | 56014 | -3.5 | 90 | -1.3 | 90 | -154.9 | 87 | -320.6 | 86 |
| | MAR 29 | 56015 | -4.4 | 88 | -3.2 | 89 | -157.2 | 86 | -323.0 | 86 |
| | MAR 30 | 56016 | -3.5 | 89 | -3.4 | 89 | -154.6 | 88 | -320.4 | 88 |
| | MAR 31 | 56017 | -3.1 | 89 | -2.2 | 89 | -149.4 | 83 | -315.2 | 83 |
| | APR 1 | 56018 | -2.8 | 90 | -3.3 | 90 | -148.0 | 81 | -313.8 | 81 |
| | APR 2 | 56019 | -4.1 | 89 | -4.6 | 88 | -154.3 | 83 | -320.0 | 84 |
| | APR 3 | 56020 | -4.6 | 89 | -3.4 | 89 | -160.1 | 79 | -325.4 | 79 |
| | APR 4 | 56021 | -2.9 | 89 | -1.6 | 89 | -158.0 | 87 | -323.9 | 87 |
| | APR 5 | 56022 | -1.3 | 90 | -1.2 | 90 | -155.3 | 90 | -322.7 | 90 |
| | APR 6 | 56023 | -2.5 | 89 | -5.7 | 89 | -154.6 | 87 | -323.4 | 87 |
| | APR 7 | 56024 | -2.8 | 89 | -4.6 | 89 | -154.6 | 87 | -324.7 | 87 |
| | APR 8 | 56025 | -0.5 | 87 | -1.2 | 87 | -153.5 | 85 | -325.0 | 85 |
| | APR 9 | 56026 | -1.1 | 89 | -1.4 | 89 | -148.2 | 87 | -320.5 | 87 |
| | APR 10 | 56027 | -2.3 | 89 | -4.7 | 89 | -145.9 | 87 | -318.7 | 87 |
| | APR 11 | 56028 | -3.8 | 88 | -5.3 | 88 | -145.5 | 79 | -318.5 | 79 |
| | APR 12 | 56029 | -5.0 | 89 | -1.6 | 89 | -144.5 | 82 | -317.4 | 80 |
| | APR 13 | 56030 | -6.0 | 89 | -3.1 | 89 | -145.1 | 88 | -317.0 | 88 |
| | APR 14 | 56031 | -5.8 | 89 | -4.6 | 89 | -148.5 | 89 | -318.4 | 89 |
| | APR 15 | 56032 | -4.3 | 89 | -4.0 | 89 | -149.9 | 89 | -317.4 | 89 |
| | APR 16 | 56033 | -4.3 | 89 | -4.3 | 89 | -150.2 | 85 | -315.8 | 87 |
| | APR 17 | 56034 | -3.8 | 90 | -3.9 | 90 | -149.5 | 87 | -313.3 | 89 |
| | APR 18 | 56035 | -3.2 | 89 | -2.4 | 89 | -146.4 | 89 | -308.6 | 89 |
| | APR 19 | 56036 | -5.9 | 89 | -6.1 | 89 | -150.5 | 82 | -311.5 | 83 |
| | APR 20 | 56037 | -5.2 | 89 | -5.7 | 89 | -162.5 | 83 | -323.2 | 82 |
| | APR 21 | 56038 | -2.8 | 90 | -6.3 | 90 | -172.6 | 89 | -333.8 | 89 |
| | APR 22 | 56039 | -1.2 | 86 | -3.0 | 85 | -177.7 | 88 | -340.1 | 89 |
| | APR 23 | 56040 | -2.2 | 88 | -3.8 | 89 | -179.9 | 88 | -343.4 | 88 |
| | APR 24 | 56041 | -0.3 | 87 | -3.0 | 86 | -182.0 | 85 | -347.4 | 80 |
| | APR 25 | 56042 | 1.2 | 90 | 0.6 | 90 | -185.2 | 90 | -354.1 | 89 |
| | APR 26 | 56043 | -0.6 | 87 | 1.1 | 87 | -190.4 | 88 | -362.4 | 88 |
| | APR 27 | 56044 | -1.9 | 88 | -1.2 | 89 | -194.9 | 80 | -370.6 | 81 |

6 - Time links used for the computation of TAI and their uncertainties.

The time links used in the elaboration of this *Circular T* are listed in this section. The technique for the link is indicated as follows:

GPS SC for GPS all-in-view single-channel C/A data; GPS MC for GPS all-in-view multi-channel C/A data; GPS P3 for GPS all-in-view multi-channel dual-frequency P code data; GPS PPP for GPS Precise Point Positioning technique; GPS GT for 'GPS time' observations; GLN MC for GLONASS common-view multi-channel C/A data; GPSGLN for the combination of GPS MC and GLN MC links; TWGPPP/TWGPP3 for the combined smoothing of TWSTFT and GPS PPP/GPS P3; INT LK for internal cable link and TWSTFT for two-way satellite time and frequency transfer data.

For each link, the following uncertainties are provided: u_A is the standard uncertainty accounting for measurement noise and random effects with typical duration between 1 day and 30 days. u_B is the estimated uncertainty of the calibration.

The calibration type of the link is indicated as: GPS EC for GPS equipment calibration; TW EC for two-way equipment calibration; LC (technique) for a link calibrated using 'technique'; BC (technique) for a link calibrated using 'technique' to transfer a past equipment calibration through a discontinuity of link operation. DIC is used for direct internal calibration.

The calibration dates indicate: the most recent calibration results for the two laboratories in the case of EC and the most recent calibration of the link in the case of LC and BC.
NA stands for not available, in this case estimated values are provided.

| Link | Type | u_A /ns | u_B /ns | Calibration Type | Calibration Dates |
|----------|--------|-----------|-----------|------------------------|-------------------|
| AOS /PTB | TWGPPP | 0.3 | 5.0 | BC(GPS MC) | 2008 May |
| APL /PTB | GPS MC | 1.0 | 5.0 | GPS EC/GPS EC | 2003 Dec/2006 Sep |
| AUS /PTB | GPSPPP | 0.3 | 5.0 | GPS EC/GPS EC | 2010 Oct/2004 Aug |
| BEV /PTB | GPSPPP | 0.3 | 3.0 | BC(GPS MC) | 2012 Mar |
| BIM /PTB | GPS MC | 1.5 | 7.0 | GPS EC/GPS EC | 2007 Nov |
| BIRM/PTB | GPS MC | 1.5 | 20.0 | NA /GPS EC | NA /2006 Sep |
| BY /PTB | GPS MC | 1.5 | 7.0 | GPS EC/GPS EC | 2008 Jun/2006 Sep |
| CAO /PTB | GPSGLN | 1.6 | 7.0 | LC(GPS MC) | 2011 Oct |
| CH /PTB | TWGPPP | 0.3 | 1.0 | LC(TWSTFT)/BC(GPS PPP) | 2008 Sep/2009 Aug |
| CNM /PTB | GPSGLN | 2.0 | 5.0 | LC(GPS MC) | 2012 Mar |
| CNMP/PTB | GPS MC | 3.0 | 5.0 | GPS EC/GPS EC | 2004 May/2006 Sep |
| DLR /PTB | GPS P3 | 0.7 | 5.0 | GPS EC/GPS EC | 2007 Feb/2004 Aug |
| DMDM/PTB | GPS MC | 2.0 | 7.0 | GPS EC/GPS EC | 2007 Jan/2006 Sep |
| DTAG/PTB | GPSPPP | 0.3 | 10.0 | LC(GPS MC) | 2009 Jul |
| EIM /PTB | NA | | | | |
| HKO /PTB | GPS MC | 2.5 | 5.0 | GPS EC/GPS EC | 2004 Sep/2006 Sep |
| IFAG/PTB | GPSPPP | 0.3 | 5.0 | GPS EC/GPS EC | 2003 Jun/2004 Aug |
| IGNA/PTB | GPS MC | 1.5 | 5.0 | GPS EC/GPS EC | 2004 Aug/2006 Sep |
| INPL/PTB | GPS P3 | 0.7 | 20.0 | NA /GPS EC | NA /2004 Aug |
| INTI/PTB | GPS MC | 3.0 | 20.0 | NA /GPS EC | NA /2006 Sep |

| Link | Type | u_A /ns | u_B /ns | Calibration Type | Calibration Dates |
|-----------|--------|-----------|-----------|------------------------|-------------------|
| IPQ /PTB | GPSPPP | 0.4 | 7.0 | LC(GPS MC) | 2010 Aug |
| IT /PTB | TWGPPP | 0.3 | 1.2 | LC(TWSTFT)/BC(GPS PPP) | 2008 Sep/2009 Aug |
| JATC/NTSC | INT LK | 0.2 | 1.0 | DIC | /2006 Sep |
| JV /PTB | GPS GT | 5.0 | 20.0 | NA /GPS EC | NA /2003 Aug |
| KEBS/PTB | GPS MC | 1.5 | 20.0 | NA /GPS EC | NA /2006 Sep |
| KIM /PTB | GPS MC | 2.0 | 20.0 | NA /GPS EC | NA /2006 Sep |
| KRIS/PTB | GPSPPP | 0.3 | 5.0 | GPS EC/GPS EC | 2005 Aug/2004 Aug |
| KZ /PTB | GPSGLN | 1.5 | 20.0 | NA /GPS EC | NA /2006 Sep |
| LT /PTB | GPS MC | 2.0 | 5.0 | GPS EC/GPS EC | 2006 Oct/2006 Sep |
| MIKE/PTB | GPSPPP | 0.3 | 7.0 | NA /GPS EC | NA /2004 Aug |
| MKEH/PTB | GPS MC | 1.5 | 20.0 | NA /GPS EC | NA /2006 Sep |
| MSL /PTB | GPS P3 | 1.5 | 20.0 | NA /GPS EC | NA /2004 Aug |
| NAO /PTB | GPS MC | 2.0 | 20.0 | NA /GPS EC | NA /2006 Sep |
| NICT/PTB | TWGPPP | 0.3 | 5.0 | LC(GPS P3) | 2009 Jun |
| NIM /PTB | GPS P3 | 0.7 | 5.0 | GPS EC/GPS EC | 2009 Dec/2004 Aug |
| NIMB/PTB | GPSPPP | 0.3 | 20.0 | NA /GPS EC | NA /2006 Sep |
| NIMT/PTB | GPS P3 | 1.0 | 20.0 | NA /GPS EC | NA /2004 Aug |
| NIS /PTB | GPS P3 | 0.8 | 7.0 | LC(GPS MC) | 2010 Jun |
| NIST/PTB | TWGPPP | 0.3 | 5.0 | LC(TWSTFT)/BC(GPS PPP) | 2005 May/2009 Aug |
| NMIJ/PTB | GPSPPP | 0.4 | 5.0 | GPS EC/GPS EC | 2002 Apr/2004 Aug |
| NMLS/PTB | GPS MC | 1.5 | 20.0 | NA /GPS EC | NA /2006 Sep |
| NPL /PTB | TWGPPP | 0.3 | 5.0 | LC(GPS P3) | 2008 Sep/2009 Nov |
| NPLI/PTB | GPS MC | 2.0 | 7.0 | GPS EC/GPS EC | 2005 Jul/2006 Sep |
| NRC /PTB | GPSPPP | 0.3 | 5.0 | GPS EC/GPS EC | 2003 Nov/2004 Aug |
| NRL /PTB | GPSPPP | 0.3 | 5.0 | GPS EC/GPS EC | 2002 May/2004 Aug |
| NTSC/PTB | GPS MC | 1.5 | 5.0 | GPS EC/GPS EC | 2004 Sep/2006 Sep |
| ONBA/PTB | GPS MC | 4.0 | 5.0 | GPS EC/GPS EC | 2004 Jul/2006 Sep |
| ONRJ/PTB | GPS MC | 4.0 | 7.0 | GPS EC/GPS EC | 2011 Dec/2006 Sep |
| OP /PTB | TWGPPP | 0.3 | 1.1 | LC(TWSTFT)/BC(GPS PPP) | 2008 Sep/2009 Aug |
| ORB /PTB | GPSPPP | 0.3 | 5.0 | GPS EC/GPS EC | 2003 Jul/2004 Aug |
| PL /PTB | GPSPPP | 0.3 | 5.0 | LC(GPS MC) | 2012 Mar |
| ROA /PTB | TWSTFT | 0.5 | 5.0 | LC(TWSTFT)/BC(GPS PPP) | 2005 May/2009 Aug |
| SCL /PTB | GPS MC | 2.5 | 10.0 | LC(GPS SC) | 1993 May |
| SG /PTB | GPSPPP | 0.4 | 5.0 | GPS EC/GPS EC | 2010 Mar/2004 Aug |
| SIQ /PTB | GPS SC | 4.0 | 20.0 | NA /GPS EC | NA /2003 Aug |
| SMD /PTB | GPS MC | 1.5 | 20.0 | NA /GPS EC | NA /2006 Sep |
| SMU /PTB | GPSGLN | 1.0 | 20.0 | NA /GPS EC | NA /2006 Sep |
| SP /PTB | TWGPPP | 0.3 | 1.0 | LC(TWSTFT)/BC(GPS PPP) | 2006 Mar/2009 Aug |
| SU /PTB | GPSGLN | 1.0 | 5.0 | LC(GPS MC) | 2009 May |
| TCC /PTB | GPSPPP | 0.3 | 5.0 | GPS EC/GPS EC | 2011 Feb/2004 Aug |
| TL /PTB | TWGPPP | 0.3 | 5.0 | LC(GPS PPP) | 2011 Dec |
| TP /PTB | GPSPPP | 0.3 | 5.0 | GPS EC/GPS EC | 2009 Feb/2004 Aug |
| UA /PTB | GPS MC | 1.5 | 20.0 | NA /GPS EC | NA /2006 Sep |
| UME /PTB | GPSGLN | 1.0 | 7.0 | GPS EC/GPS EC | 2005 Dec/2006 Sep |
| USNO/PTB | GPSPPP | 0.3 | 5.0 | GPS EC/GPS EC | 2001 /2004 Aug |
| VMI /PTB | GPSPPP | 0.3 | 20.0 | NA /GPS EC | NA /2004 Aug |
| VSL /PTB | TWGPPP | 0.3 | 1.0 | LC(TWSTFT)/BC(GPS PPP) | 2006 Mar/2009 Aug |
| ZA /PTB | GPS P3 | 1.5 | 20.0 | NA /GPS EC | NA /2004 Aug |