

BUREAU INTERNATIONAL DES POIDS ET MESURES  
ORGANISATION INTERGOUVERNEMENTALE DE LA CONVENTION DU METRE  
PAVILLON DE BRETEUIL F-92312 SEVRES CEDEX TEL. +33 1 45 07 70 70 FAX. +33 1 45 34 20 21 tai@bipm.org

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.

Date 2009	0h UTC	OCT 30	NOV 4	NOV 9	NOV 14	NOV 19	NOV 24	NOV 29	Uncertainty/ns			Notes
MJD		55134	55139	55144	55149	55154	55159	55164	$u_A$	$u_B$	$u$	
Laboratory $k$		$[UTC-UTC(k)]/ns$										
AOS (Borowiec)		9.3	6.1	5.3	5.4	1.7	0.4	-1.6	1.5	5.1	5.3	
APL (Laurel)		-0.7	-7.1	-22.3	-16.6	0.2	6.0	-10.8	1.5	5.1	5.3	
AUS (Sydney)		838.0	811.7	788.3	774.2	758.3	733.6	711.3	0.3	5.1	5.1	
BEV (Wien)		49.0	48.7	51.9	51.2	49.9	47.5	41.6	1.5	3.2	3.5	
BIM (Sofiya)		-6983.0	-6975.5	-6974.4	-6962.3	-6959.1	-6949.7	-6948.3	2.0	7.1	7.4	
BIRM (Beijing)		-9049.3	-9086.1	-9112.4	-9151.3	-9187.1	-9215.9	-9261.7	2.0	20.0	20.1	
BY (Minsk)		54.7	-51.4	-55.8	-43.1	-17.4	-18.1	-14.1	2.0	7.1	7.4	(1)
CAO (Cagliari)		-3609.4	-3640.1	-3652.5	-3672.3	-3690.4	-3702.0	-3726.7	1.5	7.1	7.2	
CH (Bern)		10.0	8.8	6.2	6.8	-0.2	-3.1	-3.7	0.5	1.5	1.6	
CNM (Queretaro)		8.5	2.5	10.8	13.7	3.1	-0.3	-7.3	2.5	5.1	5.7	
CNMP (Panama)		43.7	47.2	50.4	45.9	58.4	54.4	54.3	3.0	5.1	5.9	
DLR (Oberpfaffenhofen)		72.9	71.8	66.4	61.5	63.3	51.9	41.2	0.3	5.1	5.1	
DMDM (Belgrade)		6207.6	6243.8	6274.2	6293.2	6331.9	6366.7	6395.4	2.0	7.1	7.3	
DTAG (Frankfurt/M)		-381.3	-387.5	-401.2	-401.0	-414.7	-422.7	-429.7	1.5	10.0	10.1	
EIM (Thessaloniki)		-	2.5	2.1	7.8	2.4	6.7	0.6	3.5	5.1	6.2	
HKO (Hong Kong)		23.4	20.6	33.4	45.3	44.2	46.8	53.0	2.5	5.1	5.7	
IFAG (Wetzell)		-153.1	-150.9	-143.6	-145.0	-138.9	-127.3	-118.3	0.3	5.1	5.1	
IGNA (Buenos Aires)		-	-	-	-	-	-	-	-	-	-	
INPL (Jerusalem)		-	-	-	-	-	-	-	-	-	-	
INTI (Buenos Aires)		-3.5	13.1	25.7	21.0	18.7	30.0	36.2	4.0	20.0	20.4	
IPQ (Caparica)		-	116.2	114.9	123.6	130.2	136.1	133.3	1.5	7.1	7.3	(2)
IT (Torino)		-1.7	-1.1	0.5	2.4	1.7	-0.6	1.2	0.5	1.6	1.7	(3)
JATC (Lintong)		6.6	3.8	-4.1	-0.2	3.5	-4.6	0.6	0.5	4.9	4.9	
JV (Kjeller)		5522.6	5809.7	6074.7	6328.4	6595.1	6865.4	7105.8	5.0	20.0	20.6	
KIM (Serpong-Tangerang)		-154.4	-151.9	-156.9	-158.5	-160.1	-151.6	-141.1	3.0	20.0	20.2	
KRIS (Daejeon)		-3.7	-2.6	-0.6	-6.4	-1.0	0.1	-2.8	0.3	5.0	5.0	
KZ (Astana)		-1774.6	-1818.2	-1859.5	-1899.2	-1946.8	-1987.8	-2037.3	2.0	20.0	20.1	
LT (Vilnius)		820.5	787.7	814.2	821.5	817.0	818.7	804.4	2.0	5.1	5.5	
LV (Riga)		-	-	-	-	-	3794.5	3808.3	1.5	7.1	7.3	
MIKE (Espoo)		-2.4	5.5	7.5	9.1	10.6	9.8	8.9	1.0	7.1	7.2	

Date 2009	0h UTC	OCT 30	NOV 4	NOV 9	NOV 14	NOV 19	NOV 24	NOV 29	Uncertainty/ns			Notes
MJD		55134	55139	55144	55149	55154	55159	55164	$u_A$	$u_B$	$u$	
Laboratory $k$		[UTC-UTC(k)]/ns										
MKEH (Budapest)		-27303.6	-27508.8	-27708.2	-27898.2	-28103.8	-28300.1	-28499.3	2.5	20.0	20.2	
MSL (Lower Hutt)		-126.3	-132.6	-148.5	-145.7	-136.4	-151.6	-153.8	1.0	20.0	20.1	
NAO (Mizusawa)		113.3	114.9	107.3	107.8	103.1	106.1	116.4	3.0	19.7	20.0	
NICT (Tokyo)		-2.8	-2.6	0.8	0.2	1.1	-0.5	-4.6	0.3	4.6	4.7	
NIM (Beijing)		-20.5	-20.8	-18.2	-14.9	-12.0	-10.5	-8.6	1.0	20.0	20.0	
NIMB (Bucharest)		-307.6	-311.9	-318.1	-320.1	-332.1	-356.3	-351.5	2.0	20.0	20.1	
NIMT (Bangkok)		-664.3	-681.1	-690.9	-706.3	-718.4	-738.1	-753.6	1.0	20.0	20.1	
NIS (Cairo)		11.6	10.1	14.4	21.7	23.3	24.6	17.3	1.5	7.1	7.2	
NIST (Boulder)		5.2	7.8	11.1	14.1	15.9	15.6	19.6	0.5	4.9	5.0	
NMIJ (Tsukuba)		7.2	4.0	1.8	2.8	4.9	6.7	8.2	0.3	5.1	5.1	
NMLS (Sepang)		-423.6	-450.0	-478.7	-514.2	-553.0	-581.9	-613.5	2.0	20.0	20.1	
NPL (Teddington)		47.3	49.9	53.3	36.5	26.9	5.7	19.9	1.0	5.1	5.2	
NPLI (New-Delhi)		-40.4	-36.4	-34.8	-31.9	-36.8	-34.1	-31.3	2.5	7.1	7.5	
NRC (Ottawa)		-60.4	-59.7	-63.9	-57.5	-54.5	-57.6	-54.8	0.3	5.1	5.1	
NRL (Washington DC)		7.5	6.3	3.7	5.2	4.5	5.0	6.4	0.3	5.1	5.1	
NTSC (Lintong)		9.1	19.2	14.1	6.8	9.8	8.9	12.0	0.5	4.8	4.8	
ONBA (Buenos Aires)		-2532.5	-2554.7	-2573.4	-2581.7	-2597.4	-2609.2	-2624.1	2.5	5.1	5.7	
ONRJ (Rio de Janeiro)		-13.7	-20.0	-14.0	1.4	-0.6	5.7	5.9	3.9	19.7	20.1	
OP (Paris)		-3.3	2.7	8.0	14.3	12.9	15.8	15.5	0.5	1.5	1.6	
ORB (Bruxelles)		31.5	31.7	31.8	31.3	30.7	28.5	25.9	0.3	5.1	5.1	
PL (Warszawa)		9.8	13.2	13.9	5.7	2.4	4.8	-6.4	1.5	4.9	5.2	
PTB (Braunschweig)		-0.2	-3.0	-4.9	-2.9	0.8	0.7	-1.2	0.2	1.1	1.1	
ROA (San Fernando)		16.6	14.3	14.8	14.6	12.7	9.7	5.1	0.7	5.1	5.1	
SCL (Hong Kong)		-12.5	-25.3	-46.8	-34.9	-32.2	-43.1	-45.8	3.0	10.0	10.4	
SG (Singapore)		2.8	5.2	4.4	6.2	7.5	5.5	6.0	0.3	5.1	5.1	
SIQ (Ljubljana)		-523.0	-513.8	-503.1	-532.9	-510.6	-503.0	-469.1	5.0	20.0	20.6	
SMD (Bruxelles)		13.7	8.1	2.9	5.9	5.6	12.9	22.5	1.5	19.6	19.7	
SMU (Bratislava)		16.7	18.7	17.9	19.3	10.6	11.7	6.3	1.5	20.0	20.1	
SP (Boras)		6.1	7.9	9.1	10.8	8.0	5.5	7.5	0.5	1.5	1.6	
SU (Moskva)		9.1	7.5	7.6	7.0	5.0	3.5	-0.6	1.5	5.1	5.3	(4)
TCC (Concepcion)		205.4	219.4	213.6	224.5	229.5	236.5	249.7	0.3	19.8	19.8	
TL (Chung-Li)		2.1	1.4	0.8	-1.0	-2.1	-3.4	-5.6	0.3	4.8	4.8	
TP (Praha)		4.4	-0.7	3.7	3.8	7.0	0.1	4.8	0.3	5.1	5.1	
UA (Kharkov)		-0.2	0.1	5.1	8.6	5.2	-2.9	-10.1	2.5	6.1	6.6	
UME (Gebze-Kocaeli)		154.5	141.0	136.8	149.8	145.9	152.1	152.2	1.5	7.1	7.3	
USNO (Washington DC)		4.4	3.6	3.6	3.1	3.1	4.2	3.2	0.3	1.7	1.7	
VMI (Ha Noi)		-4.5	-5.4	-9.6	-9.9	-14.9	-22.7	-22.8	1.0	20.0	20.0	
VSL (Delft)		-3.7	-1.2	12.9	16.7	7.4	-6.9	-6.5	0.7	1.5	1.7	
ZA (Pretoria)		-	-	-	-	-	-	-	-	-	-	

- Notes on section 1:

- (1) BY : Time step of UTC(BY) of +100 ns on MJD 55139.00.
- (2) IPQ : Instituto Portugues da Qualidade, Caparica, Portugal.
- (3) IT : Change of master clock on MJD 55161.
- (4) SU : Link with PTB by GLONASS common-view.

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

Date 2009	0h UTC	OCT 30	NOV 4	NOV 9	NOV 14	NOV 19	NOV 24	NOV 29
MJD		55134	55139	55144	55149	55154	55159	55164
Laboratory k		[TAI-TA(k)]/ns						
CH (Bern)		48297.9	48254.3	48208.2	48165.1	48115.4	48069.1	48025.6
F (Paris)		168022.0	168020.2	168016.7	168018.0	168016.4	168014.6	168011.2
IT (Torino)		87085.1	87229.1	87369.6	87512.4	87657.2	87802.3	87949.3
JATC (Lintong)		-46972.9	-46836.2	-46858.2	-46882.3	-46907.6	-46931.7	-46955.2
KRIS (Daejeon)		29892.0	29959.8	30028.6	30090.4	30162.4	30230.6	30295.0
NICT (Tokyo)		91.3	90.2	90.3	87.6	87.1	84.3	79.9
NIST (Boulder)		-45341018.7	-45341210.1	-45341400.8	-45341591.8	-45341784.0	-45341976.7	-45342164.7
NRC (Ottawa)		29887.9	29854.4	29816.4	29788.6	29757.8	29720.6	29689.4
NTSC (Lintong)		9355.4	9384.2	9413.0	9438.5	9464.2	9489.5	9516.2
ONRJ (Rio de Janeiro)		-5882.2	-5921.5	-5960.9	-5997.0	-6035.9	-6068.3	-6102.3
PL (Warszawa)		-5964.8	-5988.5	-5997.8	-6016.2	-6035.4	-6049.1	-6068.9
PTB (Braunschweig)		-356613.5	-356611.2	-356608.2	-356601.2	-356592.5	-356587.6	-356584.4
SG (Singapore)		6726.7	6729.1	6728.5	6730.2	6731.6	6729.2	6726.8
SU (Moskva)		27257710.4	27257831.0	27257953.4	27258076.3	27258197.9	27258320.8	27258441.1 (1)
TL (Chung-Li)		-274.7	-285.1	-298.4	-311.1	-323.5	-337.9	-349.0
USNO (Washington DC)		-35052859.3	-35053158.1	-35053456.4	-35053755.0	-35054053.0	-35054350.5	-35054649.6

- 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	55134 - 55164	$6.681 \times 10^{-13}$ (2009 OCT 30 - 2009 NOV 29)
New correction	55164 - 55194	$6.676 \times 10^{-13}$ (2009 NOV 29 - 2009 DEC 29)
New correction foreseen	55194 - 55224	$6.671 \times 10^{-13}$ (2009 DEC 29 - 2010 JAN 28)

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  $\tau$  in days: (1) a white frequency noise of  $2.0 \times 10^{-15} / \sqrt{\tau}$ , (2) a flicker frequency noise of  $0.4 \times 10^{-15}$  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	55134 55164	-12.08	5.00	8.00	0.00	0.13	9.43	T148	8.	(1)
PTB-CS2	55134 55164	5.74	3.00	12.00	0.00	0.13	12.37	T148	12.	(1)
IT-CsF1	55139 55159	3.99	0.40	0.70	0.22	0.47	0.96	T233	0.50	(2)
NICT-CsF1	55134 55144	1.73	1.00	1.30	0.30	0.53	1.75	T236	1.9	(3)
NIST-F1	55134 55149	4.20	0.33	0.37	0.28	0.61	0.83	T214	0.35	(4)
SYRTE-F01	55134 55164	2.79	0.20	0.41	0.11	0.33	0.57	T227	0.72	(5)
SYRTE-F02	55139 55164	3.97	0.20	0.48	0.11	0.38	0.66	T227	0.65	(5)
SYRTE-JP0	55134 55164	1.57	0.53	6.30	0.30	0.33	6.34	T160	6.30	(6)
PTB-CSF2	54819 54829	4.21	0.70	1.06	0.11	0.53	1.38	[1]	0.80	(7)
PTB-CSF2	54839 54854	4.29	0.70	0.67	0.06	0.37	1.04	[1]	0.80	(7)
PTB-CSF2	54884 54899	5.35	0.70	0.82	0.30	0.24	1.15	[1]	0.80	(7)
PTB-CSF2	55029 55049	5.83	0.70	1.07	0.03	0.19	1.29	[1]	0.80	(7)
PTB-CSF2	55064 55084	6.03	0.70	1.02	0.03	0.19	1.25	[1]	0.80	(7)
PTB-CSF2	55099 55109	4.24	0.70	1.35	0.03	0.35	1.56	[1]	0.80	(7)

Notes:

- (1) Continuously operating as a clock participating to TAI
- (2) Report 03 DEC. 2009 by INRIM
- (3) Report 03 DEC. 2009 by NICT
- (4) Report 24 NOV. 2009 by NIST
- (5) Report 02 DEC. 2009 by LNE-SYRTE
- (6) Report 03 DEC. 2009 by LNE-SYRTE
- (7) Report 25 NOV. 2009 by PTB
- [1] V. Gerginov, N. Nemitz, S. Weyers, R. Schröder, D. Griebisch, R. Wynands, accepted for publication in *Metrologia*.

The second table gives the BIPM estimate of  $d$ , based on all available PFS measurements over the period MJD 54774-55164, 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	$d$	$u$	
55134-55164	$3.5 \times 10^{-15}$	$0.3 \times 10^{-15}$	(2009 OCT 30 - 2009 NOV 29)

5 - Relations of UTC and TAI with GPS time and GLONASS time.

$$\begin{aligned}
 [UTC-GPS \text{ time}] &= -15 \text{ s} + C_0, & [TAI-GPS \text{ time}] &= 19 \text{ s} + C_0, & \text{global uncertainty is of order 10 ns.} \\
 [UTC-GLONASS \text{ time}] &= 0 \text{ s} + C_1, & [TAI-GLONASS \text{ time}] &= 34 \text{ s} + C_1, & \text{global uncertainty is of order hundreds ns.}
 \end{aligned}$$

The  $C_0$  values provide a realization of GPS time, 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  $C_1$  values provide a realization of GLONASS time, as obtained using the values  $[UTC-UTC(AOS)]$  and the GLONASS data taken at the Astrodynamical Observatory Borowiec (AOS).  $N_0$  and  $N_1$  are the numbers of measurements, when  $N_0$  or  $N_1$  is 0, the corresponding values of  $C_0$  or  $C_1$  are interpolated. The standard deviations  $\sigma_0$  and  $\sigma_1$  characterize the dispersion of individual measurements. The actual uncertainty of user's access to GPS and GLONASS times may differ from these values. For this circular,  $\sigma_0 = 2.8 \text{ ns}$ ,  $\sigma_1 = 11.4 \text{ ns}$

Date 2009	0h UTC	MJD	$C_0/\text{ns}$	$N_0$	$C_1/\text{ns}$	$N_1$
	OCT 30	55134	-1.7	43	-219.5	73
	OCT 31	55135	-1.6	41	-222.5	74
	NOV 1	55136	-1.0	43	-219.7	71
	NOV 2	55137	0.3	41	-213.4	74
	NOV 3	55138	0.0	45	-212.7	77
	NOV 4	55139	-0.2	46	-220.3	82
	NOV 5	55140	1.6	48	-222.1	75
	NOV 6	55141	2.6	46	-223.1	78
	NOV 7	55142	2.3	46	-225.9	81
	NOV 8	55143	1.2	45	-227.6	74
	NOV 9	55144	-0.9	48	-224.7	72
	NOV 10	55145	-3.6	46	-221.5	76
	NOV 11	55146	-3.6	46	-224.8	74
	NOV 12	55147	-4.3	47	-227.5	85
	NOV 13	55148	-3.0	47	-228.9	67
	NOV 14	55149	1.6	45	-229.8	70
	NOV 15	55150	3.9	47	-233.2	80
	NOV 16	55151	4.1	48	-233.3	70
	NOV 17	55152	0.5	47	-229.9	72
	NOV 18	55153	-0.9	46	-231.7	73
	NOV 19	55154	-0.9	45	-233.8	82
	NOV 20	55155	3.0	48	-235.1	77
	NOV 21	55156	2.5	47	-231.9	78
	NOV 22	55157	3.1	44	-232.4	80
	NOV 23	55158	3.7	46	-234.5	74
	NOV 24	55159	1.8	46	-235.9	73
	NOV 25	55160	-2.4	47	-234.9	61
	NOV 26	55161	-2.8	49	-236.7	58
	NOV 27	55162	2.4	48	-237.9	57
	NOV 28	55163	2.0	45	-235.2	76
	NOV 29	55164	3.2	48	-229.2	72

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; 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 statistical uncertainty evaluated by taking into account the level of phase noise in the raw data, the interpolation interval between data points and the effects with typical duration between 5 and 30 days.  $u_B$  is the estimated uncertainty on 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	GPS MC	1.5	5.0	GPS EC/GPS EC	2007 Jan/2006 Sep
APL /PTB	GPS MC	1.5	5.0	GPS EC/GPS EC	2003 Dec/2006 Sep
AUS /PTB	GPSPPP	0.3	5.0	LC(GPS MC)	2009 Nov
BEV /PTB	GPS MC	1.5	3.0	BC(TWSTFT)	2008 Jan
BIM /PTB	GPS MC	2.0	7.0	GPS EC/GPS EC	2007 Nov
BIRM/PTB	GPS MC	2.0	20.0	NA /GPS EC	NA /2006 Sep
BY /PTB	GPS MC	2.0	7.0	GPS EC/GPS EC	2008 Jun/2006 Sep
CAO /PTB	GPS MC	1.5	7.0	GPS EC/GPS EC	2004 Nov/2006 Sep
CH /PTB	TWSTFT	0.5	1.0	LC(TWSTFT)/BC(GPS PPP)	2008 Sep/2009 Aug
CNM /PTB	GPS MC	2.5	5.0	BC(GPS SC)	2008 May
CNMP/PTB	GPS MC	3.0	5.0	GPS EC/GPS EC	2004 May/2006 Sep
DLR /PTB	GPSPPP	0.3	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	GPS P3	1.5	10.0	BC(GPS MC)	2009 Jul
EIM /PTB	GPS MC	3.5	5.0	GPS EC/GPS EC	2007 May/2003 Aug
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	NA				
INPL/PTB	NA				
INTI/PTB	GPS MC	4.0	20.0	NA /GPS EC	NA /2006 Sep

Link	Type	$u_A/ns$	$u_B/ns$	Calibration Type	Calibration Dates
IPQ /PTB	GPS MC	1.5	7.0	GPS EC/GPS EC	2009 Feb/2006 Sep
IT /PTB	TWSTFT	0.5	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
KIM /PTB	GPS MC	3.0	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	GPS MC	2.0	20.0	NA /GPS EC	NA /2006 Sep
LT /PTB	GPS MC	2.0	5.0	GPS EC/GPS EC	2006 Oct/2006 Sep
LV /PTB	GPS MC	1.5	7.0	GPS EC/GPS EC	2006 Feb/2006 Sep
MIKE/PTB	GPS P3	1.0	7.0	NA /GPS EC	NA /2004 Aug
MKEH/PTB	GPS SC	2.5	20.0	NA /GPS EC	NA /2006 Sep
MSL /PTB	GPS P3	1.0	20.0	NA /GPS EC	NA /2004 Aug
NAO /PTB	GPS MC	3.0	20.0	NA /GPS EC	NA /2006 Sep
NICT/PTB	GPSPPP	0.3	5.0	GPS EC/GPS EC	2005 Jun/2004 Aug
NIM /PTB	GPS P3	1.0	20.0	NA /GPS EC	NA /2004 Aug
NIMB/PTB	GPS MC	2.0	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 MC	1.5	7.0	GPS EC/GPS EC	2005 May/2006 Sep
NIST/PTB	TWSTFT	0.5	5.0	LC(TWSTFT)/BC(GPS PPP)	2005 May/2009 Aug
NMIJ/PTB	GPSPPP	0.3	5.0	GPS EC/GPS EC	2002 Apr/2004 Aug
NMLS/PTB	GPS MC	2.0	20.0	NA /GPS EC	NA /2006 Sep
NPL /PTB	GPS P3	1.0	5.0	NA/GPS EC	NA /2004 Aug
NPLI/PTB	GPS MC	2.5	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	TWSTFT	0.5	5.0	BC(GPS MC)	2009 May
ONBA/PTB	GPS MC	2.5	5.0	GPS EC/GPS EC	2004 Jul/2006 Sep
ONRJ/PTB	GPS MC	4.0	20.0	NA /GPS EC	NA /2006 Sep
OP /PTB	TWSTFT	0.5	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	GPS MC	1.5	5.0	GPS EC/GPS EC	2006 Oct/2006 Sep
ROA /PTB	TWSTFT	0.7	5.0	LC(TWSTFT)/BC(GPS PPP)	2005 May/2009 Aug
SCL /PTB	GPS MC	3.0	10.0	LC(GPS SC)	1993 May
SG /PTB	GPSPPP	0.3	5.0	LC(GPS MC)	2009 Jun
SIQ /PTB	GPS SC	5.0	20.0	NA /GPS EC	NA /2003 Aug
SMD /PTB	GPS MC	1.5	20.0	NA /GPS EC	NA /2006 Sep
SMU /PTB	GPS MC	1.5	20.0	NA /GPS EC	NA /2006 Sep
SP /PTB	TWSTFT	0.5	1.0	LC(TWSTFT)/BC(GPS PPP)	2006 Mar/2009 Aug
SU /PTB	GLN MC	1.5	5.0	LC(GPS MC)	2009 May
TCC /PTB	GPSPPP	0.3	20.0	NA /GPS EC	NA /2004 Aug
TL /PTB	GPSPPP	0.3	5.0	GPS EC/GPS EC	2005 May/2004 Aug
TP /PTB	GPSPPP	0.3	5.0	GPS EC/GPS EC	2009 Feb/2004 Aug
UA /PTB	GPS MC	2.5	6.0	GPS EC/GPS EC	2006 Jun/2006 Sep
UME /PTB	GPS MC	1.5	7.0	GPS EC/GPS EC	2005 Dec/2006 Sep
USNO/PTB	TWSTFT	0.3	2.0	BC(TW X-Band)	2005 May
VMI /PTB	GPS P3	1.0	20.0	NA /GPS EC	NA /2004 Aug
VSL /PTB	TWSTFT	0.7	1.0	LC(TWSTFT)/BC(GPS PPP)	2006 Mar/2009 Aug
ZA /PTB	NA				

- Note on section 6:

(1) SU /PTB : Link between SU and PTB by GLONASS common-view.