Table 6. Measurements of the duration of the TAI scale interval

(File available at ftp://62.161.69.5/pub/tai/scale/utai11.ar)

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 (in practice the SI second on the geoid), i.e. the fractional frequency deviation of TAI with the opposite sign: $d = -y_{TAI}$.

In this table, *d* is obtained on the given periods of estimation by comparison of the TAI frequency with that of the individual primary frequency standards (PFS) IT-CSF1, NICT-CSF1, NIST-F1, NMIJ-F1, NPL-CSF2, PTB-CS1, PTB-CS2, PTB-CSF1, PTB-CSF2, SYRTE-FO1, SYRTE-FO2, SYRTE-FOM and SYRTE-JPO for the year 2011. Previous calibrations are available in the successive annual reports of the BIPM Time Section volumes 1 to 18 and in the BIPM annual report on time activities volumes 1 to 5.

Each comparison is provided with the following information:
u_A is the uncertainty originating in the instability of the PFS,
u_B is the combined uncertainty from systematic effects,
$u_{link/lab}$ is the uncertainty in the link between the PFS and the clock participating to TAI, including the uncertainty due to dead-time,
$u_{link/TAI}$ is the uncertainty in the link to TAI, computed using the standard uncertainty of [UTC-UTC(k)],
u is the quadratic sum of all four uncertainty values.

In this table, a frequency over a time interval is defined as the ratio of the end-point phase difference to the duration of the interval.

The typical characteristics of the calibrations of the TAI frequency provided by the different primary standards over 2011 are indicated below. Reports of individual PFS evaluations may be found at ftp://62.161.69.5/pub/tai/data/PFS_reports. Subdirectory named 'data'. Ref(u_B) is a reference giving information on the stated value of u_B, u_B(Ref) is the u_B value stated in this reference. Note that the current u_B values are generally not the same as the peer reviewed values given in Ref(u_B).

Primary Standard	Type /selection	Type B std. uncertainty	u_B(Ref)/10^{-15}	Ref(u_B)	Comparison with	Number/typical duration of comp.
IT-CSF1	Fountain	0.7×10^{-15}	0.5	[1]	H maser	1 / 25 d
NICT-CSF1	Fountain	$(1.0 \text{ to } 1.2)\times10^{-15}$	1.9	[2]	UTC(NICT)	2 / 10 d to 20 d
NIST-F1	Fountain	0.31×10^{-15}	0.35	[3]	H maser	5 / 15 d to 30 d
NMIJ-F1	Fountain	3.9×10^{-15}	3.9	[4]	H maser	2 / 30 d
NPL-CSF2	Fountain	$(0.40 \text{ or } 0.41)\times10^{-15}$	0.41	[5]	H maser	5 / 15 d to 25 d
		0.23×10^{-15}	0.23	[6]	H maser	2 / 15 d to 25 d
PTB-CS1	Beam /Mag.	8×10^{-15}	8.	[7]	TAI	12 / 30 d to 35 d
PTB-CS2	Beam /Mag.	12×10^{-15}	12.	[8]	TAI	7 / 30 d to 35 d
PTB-CSF1	Fountain	$(0.74 \text{ to } 0.79)\times10^{-15}$	1.4	[9]	H maser	10 / 15 d to 25 d
PTB-CSF2	Fountain	$(0.36 \text{ to } 0.54)\times10^{-15}$	0.8	[10]	H maser	5 / 15 d to 25 d
		0.56×10^{-15}	0.41	[11]		1 / 20 d
SYRTE-FO1	Fountain	$(0.42 \text{ to } 0.49)\times10^{-15}$	0.72	[12]	H maser	6 / 10 d to 25 d
SYRTE-FO2	Fountain	$(0.26 \text{ to } 0.39)\times10^{-15}$	0.65	[12]	H maser	12 / 15 d to 35 d
SYRTE-FOM	Fountain	$(0.82 \text{ to } 0.92)\times10^{-15}$	0.80	[13]	H maser	6 / 20 d to 30 d

More detailed information on the characteristics and operation of individual PFS may be found in the annexes supplied by the individual laboratories.

Table 6. (Cont.)

Standard	Period of estimation		$d/10^{-15}$	$u_A/10^{-15}$	$u_B/10^{-15}$	$u_{link/lab}/10^{-15}$	$u_{link/TAI}/10^{-15}$	$u/10^{-15}$	Notes
IT-CsF1	55564	55589	9.91	0.30	0.70	0.30	0.54	0.98	
NICT-CsF1	55554	55574	3.79	1.00	1.00	0.30	0.28	1.47	
NICT-CsF1	55864	55874	4.15	1.00	1.20	0.30	0.53	1.68	
NIST-F1	55574	55589	5.20	0.46	0.31	0.25	0.37	0.71	
NIST-F1	55634	55649	5.71	0.50	0.31	0.18	0.37	0.72	
NIST-F1	55744	55759	7.25	0.60	0.31	0.29	0.37	0.82	
NIST-F1	55794	55814	6.89	0.44	0.31	0.19	0.28	0.64	
NIST-F1	55894	55924	2.38	0.31	0.31	0.20	0.20	0.52	
NMIJ-F1	55559	55589	6.34	0.70	3.90	0.30	0.20	3.98	
NMIJ-F1	55589	55619	5.92	0.70	3.90	0.30	0.20	3.98	
NPL-CsF2	55554	55569	8.10	0.29	0.40	0.10	0.97	1.10	
NPL-CsF2	55579	55599	5.13	0.23	0.40	0.01	0.75	0.88	
NPL-CsF2	55669	55684	4.89	0.32	0.41	0.07	0.97	1.11	
NPL-CsF2	55709	55734	3.78	0.21	0.41	0.03	0.46	0.65	
NPL-CsF2	55744	55759	4.52	0.27	0.40	0.03	0.49	0.69	
NPL-CsF2	55789	55804	4.47	0.28	0.23	0.01	0.49	0.61	
NPL-CsF2	55864	55889	3.88	0.22	0.23	0.02	0.23	0.39	
PTB-CS1	55559	55589	-2.21	6.00	8.00	0.00	0.13	10.00	(1)
PTB-CS1	55589	55619	4.11	6.00	8.00	0.00	0.13	10.00	
PTB-CS1	55619	55649	-6.78	6.00	8.00	0.00	0.13	10.00	
PTB-CS1	55649	55679	-11.60	6.00	8.00	0.00	0.13	10.00	
PTB-CS1	55679	55709	-3.20	6.00	8.00	0.00	0.13	10.00	
PTB-CS1	55709	55739	-9.15	6.00	8.00	0.00	0.13	10.00	
PTB-CS1	55739	55769	-8.61	6.00	8.00	0.00	0.13	10.00	
PTB-CS1	55769	55804	-2.04	6.00	8.00	0.00	0.11	10.00	
PTB-CS1	55804	55834	-5.33	6.00	8.00	0.00	0.13	10.00	
PTB-CS1	55834	55864	-8.65	6.00	8.00	0.00	0.13	10.00	
PTB-CS1	55864	55894	-6.68	6.00	8.00	0.00	0.13	10.00	
PTB-CS1	55894	55924	-12.00	6.00	8.00	0.00	0.13	10.00	
PTB-CS2	55709	55739	1.31	3.00	12.00	0.00	0.13	12.37	(1)
PTB-CS2	55739	55769	9.06	3.00	12.00	0.00	0.13	12.37	
PTB-CS2	55769	55804	1.47	3.00	12.00	0.00	0.11	12.37	
PTB-CS2	55804	55834	1.31	3.00	12.00	0.00	0.13	12.37	
PTB-CS2	55834	55864	-0.97	3.00	12.00	0.00	0.13	12.37	
PTB-CS2	55864	55894	5.36	3.00	12.00	0.00	0.13	12.37	
PTB-CS2	55894	55924	5.90	3.00	12.00	0.00	0.13	12.37	
PTB-CSF1	55539	55564	7.03	0.23	0.76	0.02	0.15	0.81	
PTB-CSF1	55569	55589	6.48	0.32	0.76	0.03	0.19	0.85	
PTB-CSF1	55634	55654	5.68	0.11	0.76	0.02	0.19	0.79	
PTB-CSF1	55659	55674	7.04	0.14	0.76	0.02	0.24	0.81	
PTB-CSF1	55694	55709	6.92	0.24	0.76	0.02	0.24	0.83	
PTB-CSF1	55714	55729	6.64	0.17	0.79	0.02	0.24	0.84	
PTB-CSF1	55774	55794	5.79	0.12	0.77	0.01	0.19	0.80	
PTB-CSF1	55804	55824	4.67	0.12	0.74	0.01	0.19	0.77	
PTB-CSF1	55854	55869	4.75	0.15	0.74	0.01	0.24	0.79	
PTB-CSF1	55874	55894	4.49	0.15	0.74	0.01	0.19	0.78	

Table 6. (Cont.)

Standard	Period of estimation	$d/10^{-15}$	$u_A/10^{-15}$	$u_B/10^{-15}$	$u_{link/lab}$ $/10^{-15}$	$u_{link/TAI}$ $/10^{-15}$	$u/10^{-15}$	Notes
PTB-CSF2	55629 55644	6.81	0.21	0.54	0.02	0.24	0.63	
PTB-CSF2	55659 55679	7.31	0.16	0.46	0.02	0.19	0.52	
PTB-CSF2	55694 55709	6.83	0.20	0.42	0.03	0.24	0.53	
PTB-CSF2	55774 55799	5.69	0.20	0.43	0.04	0.15	0.50	
PTB-CSF2	55824 55839	4.33	0.28	0.36	0.04	0.24	0.52	
PTB-CSF2	55859 55879	4.24	0.17	0.56	0.06	0.19	0.62	
SYRTE-FO1	55639 55649	4.17	0.30	0.45	0.10	0.53	0.76	
SYRTE-FO1	55664 55679	5.17	0.20	0.49	0.14	0.37	0.66	
SYRTE-FO1	55684 55709	5.05	0.40	0.42	0.14	0.23	0.64	
SYRTE-FO1	55709 55729	6.36	0.30	0.43	0.13	0.28	0.61	
SYRTE-FO1	55869 55889	2.96	0.25	0.43	0.11	0.28	0.58	
SYRTE-FO1	55914 55924	1.98	0.20	0.46	0.18	0.53	0.75	
SYRTE-FO2	55619 55639	6.10	0.20	0.39	0.11	0.51	0.68	
SYRTE-FO2	55594 55619	6.66	0.25	0.39	0.11	0.54	0.72	
SYRTE-FO2	55654 55679	5.83	0.20	0.39	0.11	0.23	0.51	
SYRTE-FO2	55684 55709	5.68	0.30	0.26	0.13	0.23	0.48	
SYRTE-FO2	55709 55734	7.23	0.30	0.26	0.12	0.23	0.47	
SYRTE-FO2	55739 55769	6.25	0.40	0.26	0.11	0.20	0.53	
SYRTE-FO2	55769 55804	5.08	0.30	0.28	0.13	0.17	0.46	
SYRTE-FO2	55804 55819	6.18	0.20	0.27	0.17	0.37	0.52	
SYRTE-FO2	55819 55834	3.88	0.30	0.27	0.10	0.37	0.55	
SYRTE-FO2	55834 55864	4.79	0.30	0.28	0.14	0.20	0.48	
SYRTE-FO2	55864 55894	4.34	0.40	0.28	0.11	0.20	0.54	
SYRTE-FO2	55894 55924	3.22	0.20	0.26	0.11	0.20	0.40	
SYRTE-FOM	55594 55614	6.52	0.30	0.82	0.22	0.66	1.12	
SYRTE-FOM	55629 55649	4.66	0.20	0.92	0.22	0.28	1.01	
SYRTE-FOM	55649 55679	5.77	0.30	0.82	0.37	0.20	0.97	
SYRTE-FOM	55684 55709	5.79	0.20	0.82	0.12	0.23	0.88	
SYRTE-FOM	55869 55894	3.86	0.25	0.82	0.11	0.23	0.89	
SYRTE-FOM	55894 55924	2.94	0.20	0.82	0.12	0.20	0.87	

Notes:
(1) Continuously operating as a clock participating to TAI.

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