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

(File available at ftp://62.161.69.5/pub/tai/scale/UTAI/utai10.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 2010. 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 volume 1 to 4.

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 2010 are indicated below. Reports of individual PFS evaluations may be found at ftp://62.161.69.5/pub/tai/data/PFS_reports. 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	(0.5 to 0.9)x10^{-15}	0.5	[1]	H maser	6 / 15 d to 35 d
NICT-CSF1	Fountain	(0.9 to 1.0)x10^{-15}	1.9	[2]	UTC(NICT)	2 / 15 d to 25 d
NIST-F1	Fountain	0.31x10^{-15}	0.35	[3]	H maser	7 / 15 d to 25 d
NMIJ-F1	Fountain	3.9x10^{-15}	3.9	[4]	H maser	5 / 15 d to 35 d
NPL-CSF2	Fountain	(0.40 to 0.59)x10^{-15}	0.41	[5]	H maser	18 (8 in 2009)/10 d to 40 d
PTB-CS1	Beam /Mag.	8x10^{-15}	8.	[6]	TAI	12 / 30 d
PTB-CS2	Beam /Mag.	12x10^{-15}	12.	[7]	TAI	8 / 30 d
PTB-CSF1	Fountain	(0.76 to 0.81)x10^{-15}	1.4	[8]	H maser	4 / 15 d to 30 d
PTB-CSF2	Fountain	0.60x10^{-15}	0.8	[9]	H maser	1 / 15 d
SYRTE-FO1	Fountain	(0.40 to 0.48)x10^{-15}	0.72	[10]	H maser	6 / 15 d to 30 d
SYRTE-FO2	Fountain	(0.38 to 0.41)x10^{-15}	0.65	[10]	H maser	9 / 15 d to 30 d
SYRTE-FOM	Fountain	(0.82 to 0.86)x10^{-15}	0.80	[11]	H maser	5 / 15 d to 35 d
SYRTE-JPO	Beam /Opt.	6.3x10^{-15}	6.3	[12]	H maser	9 / 5 d to 35 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	55194 55214	2.71	0.60	0.60	0.50	0.52	1.11	
IT-CsF1	55334 55349	4.66	0.40	0.50	0.40	0.73	1.05	
IT-CsF1	55349 55374	7.29	0.60	0.50	0.20	0.46	0.93	
IT-CsF1	55379 55399	4.40	0.40	0.50	0.20	0.56	0.88	
IT-CsF1	55399 55434	4.95	0.30	0.60	0.10	0.34	0.76	
IT-CsF1	55449 55464	8.34	0.40	0.90	0.20	0.73	1.24	
NICT-CsF1	55189 55214	4.09	1.00	0.90	0.30	0.23	1.40	
NICT-CsF1	55534 55549	6.44	1.00	1.10	0.30	0.37	1.56	
NIST-F1	55219 55244	5.20	0.31	0.31	0.21	0.46	0.67	
NIST-F1	55274 55299	6.38	0.37	0.31	0.19	0.46	0.69	
NIST-F1	55354 55374	8.04	0.30	0.31	0.16	0.56	0.73	
NIST-F1	55404 55419	5.62	0.47	0.31	0.21	0.73	0.95	
NIST-F1	55444 55469	7.10	0.35	0.31	0.19	0.38	0.63	
NIST-F1	55494 55509	6.37	0.46	0.31	0.31	0.43	0.77	
NIST-F1	55529 55549	4.55	0.43	0.31	0.21	0.28	0.64	
NMIJ-F1	55349 55364	3.54	0.90	3.90	0.40	0.49	4.05	
NMIJ-F1	55404 55439	4.14	0.60	3.90	0.10	0.20	3.95	
NMIJ-F1	55439 55469	6.73	0.60	3.90	0.10	0.26	3.96	
NMIJ-F1	55504 55529	5.30	0.70	3.90	0.30	0.23	3.98	
NMIJ-F1	55529 55559	4.99	0.70	3.90	0.30	0.20	3.98	
NPL-CsF2	54904 54934	5.36	0.41	0.41	0.07	0.33	0.67	
NPL-CsF2	54974 54984	3.22	0.66	0.45	0.05	0.88	1.19	
NPL-CsF2	55004 55014	4.84	1.08	0.59	0.43	0.88	1.57	
NPL-CsF2	55039 55049	3.11	0.74	0.43	0.28	1.39	1.65	
NPL-CsF2	55064 55074	5.38	0.76	0.51	0.15	1.75	1.98	
NPL-CsF2	55084 55114	3.30	0.38	0.41	0.07	0.65	0.86	
NPL-CsF2	55119 55144	3.51	0.42	0.41	0.08	0.77	0.97	
NPL-CsF2	55169 55194	4.70	0.19	0.40	0.01	0.46	0.64	
NPL-CsF2	55194 55224	4.86	0.18	0.40	0.10	0.39	0.60	
NPL-CsF2	55224 55254	2.79	0.35	0.43	0.19	0.39	0.70	
NPL-CsF2	55254 55284	3.91	0.37	0.41	0.06	0.39	0.68	
NPL-CsF2	55284 55294	3.10	0.69	0.40	0.11	1.05	1.33	
NPL-CsF2	55314 55329	6.08	0.45	0.40	0.23	0.73	0.97	
NPL-CsF2	55334 55349	3.94	0.32	0.41	0.35	0.73	0.96	
NPL-CsF2	55394 55404	6.43	0.31	0.42	0.09	1.05	1.18	
NPL-CsF2	55404 55444	5.32	0.17	0.40	0.20	0.26	0.54	
NPL-CsF2	55459 55479	7.21	0.20	0.40	0.03	2.67	2.71	
NPL-CsF2	55484 55509	5.01	0.41	0.49	0.05	2.18	2.27	
PTB-CS1	55194 55224	-2.86	5.00	8.00	0.00	0.13	9.43	(1)
PTB-CS1	55224 55254	-6.48	6.00	8.00	0.00	0.13	10.00	
PTB-CS1	55254 55284	-4.25	6.00	8.00	0.00	0.13	10.00	
PTB-CS1	55284 55314	-5.21	6.00	8.00	0.00	0.13	10.00	
PTB-CS1	55314 55344	-1.81	6.00	8.00	0.00	0.13	10.00	
PTB-CS1	55344 55374	5.69	6.00	8.00	0.00	0.13	10.00	
PTB-CS1	55374 55404	-3.55	6.00	8.00	0.00	0.13	10.00	
PTB-CS1	55404 55439	0.14	6.00	8.00	0.00	0.11	10.00	
PTB-CS1	55439 55469	-0.84	6.00	8.00	0.00	0.13	10.00	
PTB-CS1	55469 55499	-1.93	6.00	8.00	0.00	0.13	10.00	
PTB-CS1	55499 55529	3.05	6.00	8.00	0.00	0.13	10.00	
PTB-CS1	55529 55559	-4.41	6.00	8.00	0.00	0.13	10.00	

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-CS2	55194	55224	7.63	3.00	12.00	0.00	0.13	12.37	(1)
PTB-CS2	55224	55254	6.29	3.00	12.00	0.00	0.13	12.37	
PTB-CS2	55254	55284	1.89	3.00	12.00	0.00	0.13	12.37	
PTB-CS2	55284	55314	0.23	3.00	12.00	0.00	0.13	12.37	
PTB-CS2	55314	55344	5.09	3.00	12.00	0.00	0.13	12.37	
PTB-CS2	55344	55374	1.45	3.00	12.00	0.00	0.13	12.37	
PTB-CS2	55374	55404	-1.04	3.00	12.00	0.00	0.13	12.37	
PTB-CS2	55404	55439	5.37	3.00	12.00	0.00	0.11	12.37	
PTB-CSF1	55349	55364	7.23	0.24	0.81	0.05	0.24	0.88	
PTB-CSF1	55379	55409	6.34	0.22	0.76	0.02	0.13	0.80	
PTB-CSF1	55484	55499	7.36	0.24	0.76	0.02	0.24	0.83	
PTB-CSF1	55514	55529	8.20	0.24	0.76	0.03	0.24	0.83	
PTB-CSF2	55244	55259	7.39	0.70	0.60	0.02	0.24	0.95	
SYRTE-FO1	55199	55224	4.90	0.20	0.41	0.11	0.54	0.71	
SYRTE-FO1	55284	55314	4.84	0.30	0.40	0.11	0.46	0.69	
SYRTE-FO1	55329	55344	5.09	0.20	0.41	0.10	0.85	0.97	
SYRTE-FO1	55409	55434	5.59	0.20	0.44	0.14	0.54	0.74	
SYRTE-FO1	55469	55494	5.79	0.30	0.48	0.14	0.54	0.79	
SYRTE-FO1	55539	55559	5.77	0.70	0.42	0.12	0.66	1.06	
SYRTE-FO2	55194	55224	5.50	0.35	0.38	0.10	0.43	0.68	
SYRTE-FO2	55224	55254	4.56	0.30	0.39	0.10	0.46	0.68	
SYRTE-FO2	55254	55284	4.79	0.30	0.39	0.10	0.46	0.68	
SYRTE-FO2	55284	55309	5.58	0.30	0.39	0.11	0.54	0.74	
SYRTE-FO2	55329	55344	6.30	0.30	0.38	0.10	0.85	0.99	
SYRTE-FO2	55344	55364	6.41	0.30	0.40	0.14	0.66	0.84	
SYRTE-FO2	55409	55429	5.09	0.20	0.40	0.11	0.66	0.80	
SYRTE-FO2	55479	55494	6.88	0.30	0.41	0.12	0.85	1.00	
SYRTE-FO2	55539	55559	6.58	0.70	0.39	0.12	0.66	1.04	
SYRTE-FOM	55344	55359	5.96	0.20	0.86	2.00	0.85	2.35	(2)
SYRTE-FOM	55364	55399	4.52	0.20	0.86	1.00	0.40	1.39	(3)
SYRTE-FOM	55404	55434	4.76	0.20	0.86	2.00	0.46	2.23	(3)
SYRTE-FOM	55439	55469	5.82	0.20	0.86	1.00	0.46	1.41	(3)
SYRTE-FOM	55529	55544	6.53	1.00	0.82	0.12	0.85	1.55	
SYRTE-JPO	55194	55224	3.89	0.61	6.30	0.30	0.43	6.35	
SYRTE-JPO	55224	55254	3.37	0.68	6.30	0.30	0.46	6.36	
SYRTE-JPO	55254	55284	5.33	0.65	6.30	0.30	0.46	6.36	
SYRTE-JPO	55284	55314	7.38	0.61	6.30	0.30	0.46	6.35	
SYRTE-JPO	55324	55344	7.76	0.71	6.30	0.30	0.66	6.38	
SYRTE-JPO	55344	55374	4.04	0.94	6.30	0.30	0.46	6.39	
SYRTE-JPO	55374	55404	2.77	0.90	6.30	0.30	0.46	6.39	
SYRTE-JPO	55404	55439	-0.12	0.85	6.30	0.30	0.40	6.38	
SYRTE-JPO	55439	55444	7.91	2.83	6.30	0.30	2.29	7.28	

Notes:
(1) Continuously operating as a clock participating to TAI.
(2) Operated in MPQ, Garching (Germany)
(3) Operated in OCA (France)

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