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

(File available on ftp://62.161.69.5/pub/tai/scale/UTAI/utai15.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 Table 6A, *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-CsF2, NIM5, NIST-F1, NIST-F2, NPL-CSF2, NPLI-CsF1, PTB-CS1, PTB-CS2, PTB-CSF1, PTB-CSF2, SU-CsFO2, SYRTE-FO1 and SYRTE-FO2 reported on the year 2015.
In Table 6B, *d* is obtained on the given periods of estimation by comparison of the TAI frequency with that of the individual secondary frequency standard (SFS) SYRTE-FORb reported on the year 2015.
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 9 (web only since volume 4 for 2009).

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 addition, Table 6B includes the following information:
u_{SRep} is the recommended uncertainty of the secondary representation of the second, as specified in the CIPM Recommendation identified under Ref(u_S).

In these tables, 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 and secondary standards reported in 2015 are indicated below. Reports of individual 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 value of u_B as stated in the 2015 reports, 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/ 10^{-15}	u_B(Ref)/10^{-15}	Ref(u_B)	Comparison with	Number/typical duration of comp.
IT-CsF2	Fountain	(0.17 to 0.30)	0.18	[1]	H maser	7 / 15 d to 30 d
NIM5	Fountain	1.4	1.4	[2]	H maser	3 / 15 d to 20 d
NIST-F1	Fountain	0.31	0.35	[3]	H maser	2 / 15 d to 25 d
NIST-F2	Fountain	0.15	0.11	[4]	H maser	1 / 20 d
NPL-CSF2	Fountain	(0.22 to 0.37)	0.23	[5]	H maser	2 / 25 d
NPLI-CsF1	Fountain	2.82	2.5	[6]	H maser	1 / 10 d
PTB-CS1	Beam /Mag.	8	8.	[7]	TAI	10 / 30 d
PTB-CS2	Beam /Mag.	12	12.	[8]	TAI	12 / 30 d
PTB-CSF1	Fountain	(0.69 to 0.71)	1.4	[9]	H maser	8 / 20 d to 35 d
PTB-CSF2	Fountain	(0.30 to 0.33)	0.41	[10]	H maser	4 / 10 d to 30 d
SU-CsFO2	Fountain	0.25	0.50	[11]	H maser	11 / 25 d to 35 d
SYRTE-FO1	Fountain	(0.38 to 0.44)	0.37	[12]	H maser	2 / 30 d
SYRTE-FO2	Fountain	(0.25 to 0.30)	0.23	[12]	H maser	11 / 15 d to 35 d

Secondary Standard	Type	Type B std. uncertainty/ 10^{-15}	u_B(Ref)/10^{-15}	Ref(u_B)	Comparison with	Number/typical duration of comp.
SYRTE-FORb	Fountain	(0.28 to 0.32)	0.32	[13]	H maser	12 / 10 d to 30 d

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

Table 6A. Measurements of the duration of the TAI scale interval by Primary Frequency Standards

Standard	Period of estimation		$d/10^{-15}$	$u_A/10^{-15}$	$u_B/10^{-15}$	$u_{link/lab}/10^{-15}$	$u_{link/TAI}/10^{-15}$	$u/10^{-15}$	Note
IT-CsF2	57029	57054	-1.11	0.37	0.17	0.17	0.23	0.50	
IT-CsF2	57054	57074	-0.76	0.62	0.17	0.14	0.28	0.72	
IT-CsF2	57124	57139	-1.49	0.47	0.17	0.32	0.61	0.85	
IT-CsF2	57139	57169	0.08	0.34	0.17	0.11	0.27	0.48	
IT-CsF2	57169	57199	1.82	0.19	0.30	0.10	0.20	0.42	
IT-CsF2	57199	57229	0.09	0.29	0.30	0.12	0.20	0.48	
IT-CsF2	57269	57289	-0.02	0.30	0.30	0.10	0.28	0.52	
NIM5	57094	57109	-0.46	0.60	1.40	0.20	0.37	1.58	
NIM5	57119	57139	-1.32	0.60	1.40	0.20	0.28	1.56	
NIM5	57179	57199	-1.91	0.60	1.40	0.20	0.28	1.56	
NIST-F1	57264	57289	-0.01	0.37	0.31	0.16	0.23	0.56	
NIST-F1	57359	57374	0.23	0.46	0.31	0.11	0.37	0.67	
NIST-F2	57069	57089	-2.07	0.43	0.15	0.19	0.57	0.75	
NPL-CsF2	57259	57284	-0.28	0.34	0.22	0.14	0.23	0.49	
NPL-CsF2	57289	57314	-0.47	0.29	0.37	0.13	0.23	0.54	
NPLI-CsF1	57319	57329	-3.88	0.90	2.82	0.19	0.53	3.01	
PTB-CS1	57019	57049	-4.53	6.00	8.00	0.00	0.13	10.00	(1)
PTB-CS1	57049	57079	-4.72	6.00	8.00	0.00	0.10	10.00	
PTB-CS1	57079	57109	-8.31	6.00	8.00	0.00	0.07	10.00	
PTB-CS1	57109	57139	-9.78	6.00	8.00	0.00	0.07	10.00	
PTB-CS1	57139	57169	-5.69	6.00	8.00	0.00	0.07	10.00	
PTB-CS1	57169	57199	-12.01	6.00	8.00	0.00	0.07	10.00	
PTB-CS1	57199	57234	-9.80	6.00	8.00	0.00	0.06	10.00	
PTB-CS1	57234	57264	-5.96	6.00	8.00	0.00	0.07	10.00	
PTB-CS1	57264	57294	-6.23	6.00	8.00	0.00	0.07	10.00	
PTB-CS1	57294	57324	-7.89	6.00	8.00	0.00	0.07	10.00	
PTB-CS2	57019	57049	-6.46	3.00	12.00	0.00	0.13	12.37	(1)
PTB-CS2	57049	57079	0.49	3.00	12.00	0.00	0.10	12.37	
PTB-CS2	57079	57109	-0.75	3.00	12.00	0.00	0.07	12.37	
PTB-CS2	57109	57139	-4.57	3.00	12.00	0.00	0.07	12.37	
PTB-CS2	57139	57169	-3.87	3.00	12.00	0.00	0.07	12.37	
PTB-CS2	57169	57199	-2.37	3.00	12.00	0.00	0.07	12.37	
PTB-CS2	57199	57234	-1.60	3.00	12.00	0.00	0.06	12.37	
PTB-CS2	57234	57264	2.18	3.00	12.00	0.00	0.07	12.37	
PTB-CS2	57264	57294	-3.91	3.00	12.00	0.00	0.07	12.37	
PTB-CS2	57294	57324	-3.18	3.00	12.00	0.00	0.07	12.37	
PTB-CS2	57324	57354	0.91	3.00	12.00	0.00	0.07	12.37	
PTB-CS2	57354	57384	-3.99	3.00	12.00	0.00	0.07	12.37	
PTB-CSF1	57029	57049	0.40	0.12	0.70	0.04	0.19	0.74	
PTB-CSF1	57084	57104	0.37	0.12	0.69	0.02	0.09	0.71	
PTB-CSF1	57109	57139	0.36	0.10	0.70	0.01	0.07	0.71	
PTB-CSF1	57179	57199	1.08	0.10	0.71	0.02	0.09	0.72	
PTB-CSF1	57229	57264	0.50	0.08	0.70	0.01	0.06	0.71	
PTB-CSF1	57264	57294	0.48	0.08	0.69	0.02	0.07	0.70	
PTB-CSF1	57294	57324	0.37	0.09	0.69	0.03	0.07	0.70	
PTB-CSF1	57324	57344	-0.21	0.09	0.70	0.01	0.09	0.71	
PTB-CSF2	57094	57104	-0.23	0.23	0.31	0.03	0.18	0.43	
PTB-CSF2	57114	57129	-0.21	0.19	0.33	0.02	0.12	0.40	
PTB-CSF2	57149	57169	0.51	0.17	0.31	0.03	0.09	0.37	
PTB-CSF2	57169	57199	0.57	0.13	0.30	0.04	0.07	0.34	

Table 6A. (Cont.)

Standard	Period of estimation		$d/10^{-15}$	$u_A/10^{-15}$	$u_B/10^{-15}$	$u_{link/lab}/10^{-15}$	$u_{link/TAI}/10^{-15}$	$u/10^{-15}$
SU-CsFO2	57049	57079	−0.40	0.24	0.25	0.13	0.59	0.69
SU-CsFO2	57079	57104	−0.44	0.21	0.25	0.13	0.69	0.78
SU-CsFO2	57104	57139	−0.15	0.20	0.25	0.14	0.51	0.62
SU-CsFO2	57139	57169	0.68	0.17	0.25	0.13	0.59	0.67
SU-CsFO2	57169	57199	0.04	0.17	0.25	0.13	0.59	0.67
SU-CsFO2	57199	57234	0.78	0.19	0.25	0.13	0.51	0.61
SU-CsFO2	57234	57264	−0.27	0.28	0.25	0.12	0.59	0.71
SU-CsFO2	57264	57294	−0.30	0.21	0.25	0.10	0.59	0.68
SU-CsFO2	57299	57319	0.71	0.25	0.25	0.11	0.85	0.92
SU-CsFO2	57324	57354	0.17	0.24	0.25	0.11	0.59	0.69
SU-CsFO2	57354	57384	−0.40	0.25	0.25	0.11	0.59	0.69
SYRTE-FO1	57049	57079	−0.95	0.22	0.44	0.10	0.20	0.54
SYRTE-FO1	57169	57199	0.86	0.30	0.38	0.11	0.20	0.53
SYRTE-FO2	57019	57039	0.61	0.25	0.27	0.10	0.28	0.47
SYRTE-FO2	57054	57079	−0.04	0.29	0.27	0.11	0.23	0.47
SYRTE-FO2	57079	57109	−0.02	0.20	0.27	0.10	0.20	0.40
SYRTE-FO2	57109	57134	−0.03	0.40	0.27	0.11	0.23	0.55
SYRTE-FO2	57139	57169	0.41	0.30	0.28	0.11	0.20	0.47
SYRTE-FO2	57169	57199	0.99	0.30	0.27	0.10	0.20	0.46
SYRTE-FO2	57199	57234	0.86	0.35	0.27	0.11	0.17	0.49
SYRTE-FO2	57234	57259	0.56	0.20	0.27	0.11	0.23	0.42
SYRTE-FO2	57264	57289	0.39	0.20	0.28	0.10	0.23	0.43
SYRTE-FO2	57294	57324	0.55	0.20	0.25	0.10	0.20	0.39
SYRTE-FO2	57324	57339	−0.11	0.30	0.30	0.11	0.37	0.57

Note:
(1) Continuously operating as a clock participating in TAI.

Table 6B. Measurements of the duration of the TAI scale interval by Secondary Frequency Standards

Standard	Period of estimation		$d/10^{-15}$	$u_A/10^{-15}$	$u_B/10^{-15}$	$u_{link/lab}/10^{-15}$	$u_{link/TAI}/10^{-15}$	$u/10^{-15}$	u_{SRep}	Ref(u_S)
SYRTE-FORb	57019	57029	1.59	0.30	0.32	0.10	0.53	0.69	1.3	[14]
SYRTE-FORb	57049	57079	0.06	0.20	0.31	0.10	0.20	0.43	1.3	[14]
SYRTE-FORb	57079	57109	0.29	0.20	0.30	0.10	0.20	0.42	1.3	[14]
SYRTE-FORb	57109	57139	0.13	0.20	0.30	0.11	0.20	0.42	1.3	[14]
SYRTE-FORb	57139	57169	0.38	0.30	0.30	0.11	0.20	0.48	1.3	[14]
SYRTE-FORb	57169	57199	1.12	0.26	0.29	0.11	0.20	0.45	1.3	[14]
SYRTE-FORb	57204	57224	0.87	0.20	0.31	0.11	0.28	0.48	1.3	[14]
SYRTE-FORb	57234	57259	0.81	0.20	0.30	0.10	0.23	0.44	1.3	[14]
SYRTE-FORb	57264	57289	0.16	0.20	0.28	0.10	0.23	0.43	1.3	[14]
SYRTE-FORb	57294	57324	0.71	0.20	0.30	0.10	0.20	0.42	1.3	[14]
SYRTE-FORb	57324	57354	0.29	0.20	0.30	0.11	0.20	0.42	1.3	[14]
SYRTE-FORb	57354	57384	-0.01	0.30	0.32	0.11	0.20	0.49	1.3	[14]

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