

Table 6. Measurements of the 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 (in practice the SI second on the geoid), i.e. the fractional frequency deviation of TAI with the opposite sign: $d = -y_{\text{TAI}}$.

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) NIST-F1, NPL-CSF2, PTB-CS1, PTB-CS2, PTB-CSF1, PTB-CSF2, SYRTE-FO1 and SYRTE-FO2 for the year 2013.

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 7.

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 for the year 2013.

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,

$u_{\text{link/lab}}$ is the uncertainty in the link between the PFS and the clock participating to TAI, including the uncertainty due to dead-time,

$u_{\text{link/TAI}}$ 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_B).

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 over 2013 are indicated below. Reports of individual evaluations may be found at <http://www.bipm.org> in the subdirectory named 'data'. Ref(u_B) is a reference giving information on the value of u_B as stated in the 2013 reports, $u_B(\text{Ref})$ 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}	$u_B(\text{Ref})/10^{-15}$	Ref(u_B)	Comparison with	Number/typical duration of comp.
NIST-F1	Fountain	0.31	0.35	[1]	H maser	4 / 15 d to 45 d
NPL-CSF2	Fountain	0.23	0.23	[2]	H maser	12 / 15 d to 35 d
PTB-CS1	Beam /Mag.	8	8.	[3]	TAI	12 / 30 d
PTB-CS2	Beam /Mag.	12	12.	[4]	TAI	12 / 30 d
PTB-CSF1	Fountain	(0.70 to 0.72)	1.4	[5]	H maser	4 / 15 d to 30 d
PTB-CSF2	Fountain	(0.29 to 0.38)	0.41	[6]	H maser	9 / 15 d to 30 d
SYRTE-F01	Fountain	(0.35 to 0.41)	0.37	[7]	H maser	5 / 10 d to 30 d
SYRTE-F02	Fountain	(0.23 to 0.31)	0.23	[7]	H maser	13 / 10 d to 35 d

Secondary Standard	Type	Type B std. uncertainty/ 10^{-15}	$u_B(\text{Ref})/10^{-15}$	Ref(u_B)	Comparison with	Number/typical duration of comp.
SYRTE-FORb	Fountain	(0.28 to 0.34)	0.33	[7]	H maser	14 / 10 d to 35 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		$d/10^{-15}$	$u_A/10^{-15}$	$u_B/10^{-15}$	$u_{\text{link/lab}}/10^{-15}$	$u_{\text{link/TAI}}/10^{-15}$	$u/10^{-15}$	Notes
NIST-F1	56304	56329	0.59	0.27	0.31	0.15	0.23	0.49	
NIST-F1	56389	56414	-1.56	0.36	0.31	0.06	0.23	0.53	
NIST-F1	56489	56534	-0.82	0.24	0.31	0.14	0.14	0.44	
NIST-F1	56609	56624	-0.96	0.46	0.31	0.15	0.37	0.68	
NPL-CsF2	56289	56309	0.00	0.24	0.23	0.02	0.28	0.44	
NPL-CsF2	56319	56349	0.39	0.21	0.23	0.08	0.20	0.38	
NPL-CsF2	56349	56374	0.97	0.25	0.23	0.07	0.23	0.42	
NPL-CsF2	56389	56409	-0.13	0.26	0.23	0.03	0.28	0.45	
NPL-CsF2	56409	56439	-0.47	0.21	0.23	0.05	0.20	0.37	
NPL-CsF2	56439	56469	0.24	0.23	0.23	0.11	0.20	0.40	
NPL-CsF2	56469	56494	0.02	0.23	0.23	0.06	0.23	0.40	
NPL-CsF2	56519	56534	-0.61	0.32	0.23	0.11	0.37	0.55	
NPL-CsF2	56534	56564	0.72	0.22	0.23	0.07	0.20	0.38	
NPL-CsF2	56564	56594	-0.11	0.22	0.23	0.11	0.20	0.39	
NPL-CsF2	56594	56619	-0.08	0.25	0.23	0.10	0.23	0.42	
NPL-CsF2	56624	56654	-0.44	0.25	0.23	0.15	0.20	0.42	
PTB-CS1	56289	56319	-11.13	6.00	8.00	0.00	0.07	10.00	(1)
PTB-CS1	56319	56349	-8.58	6.00	8.00	0.00	0.07	10.00	
PTB-CS1	56349	56379	-14.56	6.00	8.00	0.00	0.07	10.00	
PTB-CS1	56379	56409	-8.04	6.00	8.00	0.00	0.07	10.00	
PTB-CS1	56409	56439	-16.18	6.00	8.00	0.00	0.07	10.00	
PTB-CS1	56439	56469	-16.88	6.00	8.00	0.00	0.07	10.00	
PTB-CS1	56469	56504	-17.14	6.00	8.00	0.00	0.06	10.00	
PTB-CS1	56504	56534	-10.43	6.00	8.00	0.00	0.07	10.00	
PTB-CS1	56534	56564	-9.66	6.00	8.00	0.00	0.07	10.00	
PTB-CS1	56564	56594	-12.55	6.00	8.00	0.00	0.07	10.00	
PTB-CS1	56594	56624	-9.66	6.00	8.00	0.00	0.07	10.00	
PTB-CS1	56624	56654	-7.77	6.00	8.00	0.00	0.07	10.00	
PTB-CS2	56289	56319	-13.75	3.00	12.00	0.00	0.07	12.37	(1)
PTB-CS2	56319	56349	-7.31	3.00	12.00	0.00	0.07	12.37	
PTB-CS2	56349	56379	-10.39	3.00	12.00	0.00	0.07	12.37	
PTB-CS2	56379	56409	-0.60	3.00	12.00	0.00	0.07	12.37	
PTB-CS2	56409	56439	4.73	3.00	12.00	0.00	0.07	12.37	
PTB-CS2	56439	56469	0.06	3.00	12.00	0.00	0.07	12.37	
PTB-CS2	56469	56504	5.68	3.00	12.00	0.00	0.06	12.37	
PTB-CS2	56504	56534	1.14	3.00	12.00	0.00	0.07	12.37	
PTB-CS2	56534	56564	-3.49	3.00	12.00	0.00	0.07	12.37	
PTB-CS2	56564	56594	-4.80	3.00	12.00	0.00	0.07	12.37	
PTB-CS2	56594	56624	-7.66	3.00	12.00	0.00	0.07	12.37	
PTB-CS2	56624	56654	-7.96	3.00	12.00	0.00	0.07	12.37	
PTB-CSF1	56409	56439	-0.06	0.11	0.72	0.02	0.07	0.73	
PTB-CSF1	56474	56499	0.17	0.12	0.70	0.02	0.08	0.71	
PTB-CSF1	56549	56564	1.05	0.14	0.70	0.02	0.12	0.72	
PTB-CSF1	56564	56594	1.55	0.10	0.72	0.03	0.07	0.73	
PTB-CSF2	56284	56304	-0.26	0.17	0.34	0.02	0.09	0.39	
PTB-CSF2	56304	56324	-0.21	0.17	0.34	0.02	0.09	0.39	
PTB-CSF2	56354	56369	0.83	0.20	0.37	0.02	0.12	0.44	
PTB-CSF2	56374	56394	-0.10	0.17	0.37	0.02	0.09	0.42	
PTB-CSF2	56414	56439	0.03	0.16	0.33	0.01	0.08	0.37	
PTB-CSF2	56484	56514	-1.07	0.15	0.29	0.01	0.07	0.33	
PTB-CSF2	56564	56584	0.40	0.15	0.38	0.02	0.09	0.42	
PTB-CSF2	56599	56614	0.85	0.18	0.31	0.02	0.12	0.38	
PTB-CSF2	56624	56639	-0.37	0.18	0.31	0.04	0.12	0.38	

Table 6A. (Cont.)

Standard	Period of estimation		$d/10^{-15}$	$u_A/10^{-15}$	$u_B/10^{-15}$	$u_{\text{link/lab}}/10^{-15}$	$u_{\text{link/TAI}}/10^{-15}$	$u/10^{-15}$
SYRTE-F01	56309	56319	-0.54	0.21	0.37	0.11	0.53	0.69
SYRTE-F01	56319	56344	-0.28	0.20	0.36	0.12	0.23	0.49
SYRTE-F01	56349	56364	0.07	0.40	0.37	0.11	0.37	0.67
SYRTE-F01	56544	56559	-0.46	0.30	0.41	0.11	0.37	0.64
SYRTE-F01	56564	56594	0.08	0.35	0.35	0.11	0.20	0.54
SYRTE-F02	56289	56304	-0.35	0.28	0.31	0.12	0.37	0.57
SYRTE-F02	56309	56319	0.29	0.21	0.31	0.11	0.53	0.66
SYRTE-F02	56319	56349	-0.05	0.25	0.24	0.12	0.20	0.42
SYRTE-F02	56349	56379	0.69	0.20	0.25	0.11	0.20	0.39
SYRTE-F02	56379	56409	0.08	0.20	0.23	0.11	0.20	0.38
SYRTE-F02	56409	56439	-0.47	0.20	0.23	0.10	0.20	0.38
SYRTE-F02	56439	56469	-0.13	0.20	0.25	0.10	0.20	0.39
SYRTE-F02	56469	56504	-0.51	0.25	0.25	0.10	0.17	0.41
SYRTE-F02	56504	56534	-0.21	0.40	0.25	0.10	0.20	0.52
SYRTE-F02	56544	56564	0.10	0.20	0.26	0.10	0.28	0.44
SYRTE-F02	56564	56594	0.44	0.35	0.26	0.10	0.20	0.49
SYRTE-F02	56594	56614	1.03	0.30	0.26	0.10	0.28	0.50
SYRTE-F02	56614	56624	1.21	0.30	0.26	0.11	0.53	0.67

Notes:

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

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

Standard	Period of estimation		$d/10^{-15}$	$u_A/10^{-15}$	$u_B/10^{-15}$	$u_{\text{link/lab}}/10^{-15}$	$u_{\text{link/TAI}}/10^{-15}$	$u/10^{-15}$	u_{SRep}	Ref(u_S)
SYRTE-FORb	56289	56304	-1.84	0.14	0.34	0.11	0.37	0.53	3.00	[8]
SYRTE-FORb	56309	56319	-1.16	0.30	0.34	0.11	0.53	0.70	3.00	[8]
SYRTE-FORb	56319	56349	-1.78	0.20	0.31	0.10	0.20	0.43	3.00	[8]
SYRTE-FORb	56349	56379	0.63	0.30	0.33	0.10	0.20	0.50	1.30	[9]
SYRTE-FORb	56379	56409	0.16	0.25	0.33	0.12	0.20	0.47	1.30	[9]
SYRTE-FORb	56409	56439	-0.15	0.27	0.33	0.11	0.20	0.48	1.30	[9]
SYRTE-FORb	56439	56469	-0.22	0.20	0.30	0.15	0.20	0.44	1.30	[9]
SYRTE-FORb	56469	56504	-0.59	0.40	0.30	0.11	0.17	0.54	1.30	[9]
SYRTE-FORb	56554	56564	0.19	0.40	0.34	0.12	0.53	0.75	1.30	[9]
SYRTE-FORb	56564	56594	0.40	0.30	0.34	0.10	0.20	0.50	1.30	[9]
SYRTE-FORb	56594	56614	0.89	0.40	0.31	0.10	0.28	0.59	1.30	[9]
SYRTE-FORb	56614	56624	1.42	0.20	0.31	0.10	0.53	0.65	1.30	[9]
SYRTE-FORb	56624	56639	-0.27	0.20	0.28	0.10	0.37	0.51	1.30	[9]
SYRTE-FORb	56639	56654	-0.79	0.30	0.28	0.11	0.37	0.56	1.30	[9]

References:

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