

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

(File available on <http://www.bipm.org> under the name UTAI06.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: $d = -\gamma_{TAI}$.

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-O1, NIST-F1, NMIJ-F1, PTB-CS1, PTB-CS2, PTB-CSF1, SYRTE-FO1, SYRTE-FO2, SYRTE-FOM and SYRTE-JPO for the year 2006.

Previous calibrations are available in the successive annual reports of the BIPM Time Section volumes 1 to 18.

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,

Ref(u_B) is a reference giving information on the stated value of u_B ,

$u_{link/lab}$ 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 (For evaluations published since September 2006, this value is computed using the standard uncertainty of [UTC-UTC(k)], following a recommendation of the CCTF Working Group on PFS),

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 2006 are indicated below.

Primary Standard	Type /selection	Type B std. Uncertainty	Operation	Comparison with	Number/typical duration of comp.
IT-CSF1	Fountain	$(0.5 \text{ to } 0.8) \times 10^{-15}$	Discontinuous	H maser	3 / 20 to 35 d
NICT-O1	Beam /Opt.	6×10^{-15}	Discontinuous	UTC(NICT)	2 / 20 to 30 d
NIST-F1	Fountain	0.3×10^{-15}	Discontinuous	H maser	3 / 30 to 40 d
NMIJ-F1	Fountain	4×10^{-15}	Discontinuous	H maser	3 / 10 to 15 d
PTB-CS1	Beam /Mag.	8×10^{-15}	Continuous	TAI	12 / 30 d
PTB-CS2	Beam /Mag.	12×10^{-15}	Continuous	TAI	12 / 30 d
PTB-CSF1	Fountain	1.1×10^{-15}	Discontinuous	H maser	2 / 10 to 15 d
SYRTE-FO1	Fountain	0.4×10^{-15}	Discontinuous	H maser	2 / 15 d
SYRTE-FO2	Fountain	0.4×10^{-15}	Discontinuous	H maser	3 / 5 to 15 d
SYRTE-FOM	Fountain	1.2×10^{-15}	Discontinuous	H maser	1 / 15 d
SYRTE-JPO	Beam /Opt.	6×10^{-15}	Discontinuous	H maser	11 / 20 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})	Ref(u_B)	$u_{\text{link/lab}}$ (10^{-15})	$u_{\text{link/TAI}}$ (10^{-15})	u (10^{-15})	Notes
IT-CSF1	53774 53794	4.7	0.8	0.5	[1]	0.2	1.5	1.8	
IT-CSF1	53914 53949	3.7	0.6	0.8		0.3	0.9	1.4	
IT-CSF1	54064 54084	-0.1	1.1	0.5		0.5	0.6	1.4	
NICT-01	53769 53789	10.8	3.7	5.5	[2]	0.8	1.5	6.8	
NICT-01	53839 53869	4.9	4.0	5.5		0.0	1.0	6.9	
NIST-F1	53724 53764	3.7	0.4	0.3	[3]	0.4	0.8	1.0	
NIST-F1	53784 53824	2.6	0.3	0.3		0.3	0.8	0.9	
NIST-F1	54009 54039	3.1	0.4	0.4		0.2	0.3	0.7	
NMIJ-F1	53974 53984	-0.4	1.1	3.9	[4]	0.6	1.9	4.5	
NMIJ-F1	53994 54009	1.7	0.9	3.9		0.5	0.9	4.1	
NMIJ-F1	54024 54034	1.0	1.1	3.9		0.5	1.2	4.3	
PTB-CS1	53734 53764	-5.3	5.0	8.0	[5]	0.0	1.0	9.5	(1)
PTB-CS1	53764 53794	1.8	5.0	8.0		0.0	1.0	9.5	
PTB-CS1	53794 53824	-1.4	5.0	8.0		0.0	1.0	9.5	
PTB-CS1	53824 53854	1.2	5.0	8.0		0.0	1.0	9.5	
PTB-CS1	53854 53884	-4.3	5.0	8.0		0.0	1.0	9.5	
PTB-CS1	53884 53914	2.3	5.0	8.0		0.0	1.0	9.5	
PTB-CS1	53914 53944	-8.8	5.0	8.0		0.0	1.0	9.5	
PTB-CS1	53944 53974	-1.8	5.0	8.0		0.0	1.0	9.5	
PTB-CS1	53974 54004	-5.8	5.0	8.0		0.0	0.3	9.4	
PTB-CS1	54004 54039	4.0	5.0	8.0		0.0	0.2	9.4	
PTB-CS1	54039 54069	-2.3	5.0	8.0		0.0	0.2	9.4	
PTB-CS1	54069 54099	-3.6	5.0	8.0		0.0	0.2	9.4	
PTB-CS2	53734 53764	4.2	3.0	12.0	[6]	0.0	1.0	12.4	(1)
PTB-CS2	53764 53794	3.3	3.0	12.0		0.0	1.0	12.4	
PTB-CS2	53794 53824	-2.6	3.0	12.0		0.0	1.0	12.4	
PTB-CS2	53824 53854	-0.8	3.0	12.0		0.0	1.0	12.4	
PTB-CS2	53854 53884	-3.5	3.0	12.0		0.0	1.0	12.4	
PTB-CS2	53884 53914	1.2	3.0	12.0		0.0	1.0	12.4	
PTB-CS2	53914 53944	4.3	3.0	12.0		0.0	1.0	12.4	
PTB-CS2	53944 53974	0.7	3.0	12.0		0.0	1.0	12.4	
PTB-CS2	53974 54004	5.8	3.0	12.0		0.0	0.3	12.4	
PTB-CS2	54004 54039	-0.6	3.0	12.0		0.0	0.2	12.4	
PTB-CS2	54039 54069	-5.4	3.0	12.0		0.0	0.2	12.4	
PTB-CS2	54069 54099	3.6	3.0	12.0		0.0	0.2	12.4	
PTB-CSF1	53914 53924	2.9	1.0	2.6	[7]	0.1	3.0	4.1	
PTB-CSF1	54079 54094	3.8	1.0	1.1		0.1	0.4	1.5	
SYRTE-F01	54054 54069	1.1	0.1	0.4	[8]	0.1	0.6	0.8	
SYRTE-F01	54084 54099	0.6	0.5	0.4		0.3	0.6	0.9	
SYRTE-F02	53764 53789	1.5	0.2	0.6	[8]	0.1	1.2	1.4	
SYRTE-F02	54054 54069	1.0	0.2	0.4		0.1	0.6	0.8	
SYRTE-F02	54069 54079	1.5	0.1	0.4		0.1	0.9	1.0	
SYRTE-F02	54089 54094	3.1	0.7	0.4		0.2	1.6	1.8	
SYRTE-F0M	54054 54069	-0.1	0.5	1.2	[9]	0.2	0.6	1.5	

Table 6. (Cont.)

Standard	Period of estimation	d (10^{-15})	u_A (10^{-15})	u_B (10^{-15})	Ref(u_B)	$u_{\text{link/lab}}$ (10^{-15})	$u_{\text{link/TAI}}$ (10^{-15})	u (10^{-15})	Notes
SYRTE-JPO	53739 53764	6.7	0.9	6.3	[10]	0.3	1.2	6.5	
SYRTE-JPO	53764 53794	4.5	0.7	6.3		0.3	1.0	6.4	
SYRTE-JPO	53794 53824	6.4	1.1	6.3		0.3	1.0	6.5	
SYRTE-JPO	53824 53854	5.5	0.7	6.3		0.3	1.0	6.4	
SYRTE-JPO	53859 53884	8.7	0.8	6.3		0.3	1.2	6.5	
SYRTE-JPO	53884 53914	8.0	0.6	6.3		0.3	1.0	6.4	
SYRTE-JPO	53914 53944	10.5	0.6	6.3		0.3	1.0	6.4	
SYRTE-JPO	53984 54004	11.1	0.8	6.3		0.3	0.6	6.4	
SYRTE-JPO	54009 54039	11.1	0.8	6.3		0.3	0.4	6.4	
SYRTE-JPO	54039 54069	10.0	0.7	6.3		0.3	0.3	6.4	
SYRTE-JPO	54069 54099	12.7	0.7	6.3		0.3	0.3	6.4	

Notes:

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

References:

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