

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

(File available on <http://www.bipm.org> under the name UTAI05.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:  $d = -y_{\text{TAI}}$ .

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) IEN-CSF1, NICT-O1, NIST-F1, NMIJ-F1, PTB-CS1, PTB-CS2, SYRTE-FO2, and SYRTE-JPO for the year 2005.

Previous calibrations are available in the successive annual reports of the BIPM Time Section volumes 1 to 17.

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  $u_B$ ,

$u_{\text{link/lab}}$  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,

$u$  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 2005 are indicated below.

Primary Standard	Type /selection	Type B std. Uncertainty	Operation	Comparison with	Number/typical duration of comp.
IEN-CSF1	Fountain	$(0.6 \text{ to } 1.1) \times 10^{-15}$	Discontinuous	H maser	4 / 10 to 40 d
NICT-O1	Beam /Opt.	$6 \times 10^{-15}$	Discontinuous	UTC(NICT)	2 / 10 d
NIST-F1	Fountain	$0.3 \times 10^{-15}$	Discontinuous	H maser	3 / 30 to 40 d
NMIJ-F1	Fountain	$4 \times 10^{-15}$	Discontinuous	H maser	3 / 10 d
PTB-CS1	Beam /Mag.	$8 \times 10^{-15}$	Continuous	TAI	12 / 30 d
PTB-CS2	Beam /Mag.	$12 \times 10^{-15}$	Continuous	TAI	12 / 30 d
SYRTE-F02	Fountain	$(0.6 \text{ to } 0.8) \times 10^{-15}$	Discontinuous	H maser	3 / 15 to 25 d
SYRTE-JPO	Beam /Opt.	$6 \times 10^{-15}$	Discontinuous	H maser	11 / 10 to 25 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( $u_B$ )	$u_{1\text{ink}/1\text{ab}}$ ( $10^{-15}$ )	$u_{1\text{ink}/\text{TAl}}$ ( $10^{-15}$ )	$u$ ( $10^{-15}$ )	Notes
IEN-CSF1	53404	53414	7.9	0.4	1.1	[1]	0.4	3.0	3.2	
IEN-CSF1	53559	53584	6.4	0.4	0.9		0.3	1.2	1.6	
IEN-CSF1	53584	53624	8.0	0.3	0.9		0.5	0.8	1.3	
IEN-CSF1	53639	53664	6.8	0.6	0.6		0.4	1.2	1.5	
NICT-01	53424	53434	10.4	5.7	5.5	[2]	0.0	3.0	8.5	
NICT-01	53469	53479	0.0	5.7	5.5		0.8	3.0	8.5	
NIST-F1	53359	53399	4.9	0.4	0.3	[3]	0.3	0.8	1.0	
NIST-F1	53529	53559	6.3	0.4	0.3		0.2	1.0	1.1	
NIST-F1	53629	53669	4.3	0.3	0.3	[4]	0.3	0.8	0.9	
NMIJ-F1	53549	53559	5.8	1.1	3.8	[5]	0.5	3.0	5.0	(1)
NMIJ-F1	53589	53599	-9.2	1.1	4.0		0.5	3.0	5.1	
NMIJ-F1	53629	53639	-7.2	1.1	4.2		0.5	3.0	5.3	
PTB-CS1	53369	53399	-2.6	5.0	8.0	[6]	0.0	1.0	9.5	(2)
PTB-CS1	53399	53429	-1.3	5.0	8.0		0.0	1.0	9.5	
PTB-CS1	53429	53459	3.6	5.0	8.0		0.0	1.0	9.5	
PTB-CS1	53459	53489	1.1	5.0	8.0		0.0	1.0	9.5	
PTB-CS1	53489	53519	-2.8	5.0	8.0		0.0	1.0	9.5	
PTB-CS1	53519	53549	2.8	5.0	8.0		0.0	1.0	9.5	
PTB-CS1	53549	53579	3.3	5.0	8.0		0.0	1.0	9.5	
PTB-CS1	53579	53609	-4.8	5.0	8.0		0.0	1.0	9.5	
PTB-CS1	53609	53639	-1.9	5.0	8.0		0.0	1.0	9.5	
PTB-CS1	53639	53674	7.1	5.0	8.0		0.0	1.0	9.5	
PTB-CS1	53674	53704	-9.9	5.0	8.0		0.0	1.0	9.5	
PTB-CS1	53704	53734	-1.6	5.0	8.0		0.0	1.0	9.5	
PTB-CS2	53369	53399	3.4	3.0	12.0	[7]	0.0	1.0	12.4	(2)
PTB-CS2	53399	53429	3.7	3.0	12.0		0.0	1.0	12.4	
PTB-CS2	53429	53459	3.2	3.0	12.0		0.0	1.0	12.4	
PTB-CS2	53459	53489	0.4	3.0	12.0		0.0	1.0	12.4	
PTB-CS2	53489	53519	2.1	3.0	12.0		0.0	1.0	12.4	
PTB-CS2	53519	53549	2.7	3.0	12.0		0.0	1.0	12.4	
PTB-CS2	53549	53579	5.9	3.0	12.0		0.0	1.0	12.4	
PTB-CS2	53579	53609	-3.0	3.0	12.0		0.0	1.0	12.4	
PTB-CS2	53609	53639	2.2	3.0	12.0		0.0	1.0	12.4	
PTB-CS2	53639	53674	2.7	3.0	12.0		0.0	1.0	12.4	
PTB-CS2	53674	53704	-0.7	3.0	12.0		0.0	1.0	12.4	
PTB-CS2	53704	53734	4.6	3.0	12.0		0.0	1.0	12.4	
SYRTE-F02	53379	53399	4.6	0.04	0.8	[8,9]	0.1	1.5	1.7	
SYRTE-F02	53489	53504	7.1	0.0	0.7		0.1	2.0	2.1	
SYRTE-F02	53639	53664	4.9	0.1	0.6		0.1	1.2	1.3	
SYRTE-JPO	53479	53489	9.7	0.6	6.3	[10]	0.3	3.0	7.0	
SYRTE-JPO	53489	53509	10.9	0.5	6.3		0.3	1.5	6.5	
SYRTE-JPO	53514	53534	7.6	0.5	6.3		0.3	1.5	6.5	
SYRTE-JPO	53554	53569	5.1	0.8	6.3		0.3	2.0	6.7	
SYRTE-JPO	53579	53589	0.8	1.0	6.3		0.3	3.0	7.1	
SYRTE-JPO	53594	53609	3.7	0.6	6.3		0.3	2.0	6.6	

**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 53614	53629	5.5	0.6	6.3		0.3	2.0	6.6	
SYRTE-JPO 53644	53654	9.2	0.6	6.3		0.3	3.0	7.0	
SYRTE-JPO 53659	53674	5.5	0.6	6.3		0.3	2.0	6.6	
SYRTE-JPO 53679	53704	11.4	0.9	6.3		0.3	1.2	6.5	
SYRTE-JPO 53709	53724	12.3	1.2	6.3		0.3	2.0	6.7	

**Table 6. (Cont.)****Notes:**

- (1) NMIJ Cs atomic fountain.  
(2) Continuously operating as a clock participating to TAI.

**References:**

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