

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: $d = -yTAI$.

In these tables, d is obtained on the given periods of estimation by comparison of the TAI frequency with that of the individual primary frequency standards (PFS) CRL-01, LPTF-JPO, LPTF-F01, NIST-7, NIST-F1, NRC CsVI A and C, NRLM-4, PTB CS1, PTB CS2, PTB CS3, PTB CSF1 and SU MCsR 102 for the period 1996-2000. Previous calibrations are available in the successive annual reports of the BIPM Time Section volumes 1 to 12.

The typical characteristics of the calibrations of the TAI frequency provided by the different primary standards are indicated below.

Primary Standard	Type B standard uncertainty	Operation	Comparison with	Duration of comparison
CRL-01	5 to 10×10^{-15}	Discontinuous	UTC(CRL)	10 d
LPTF-JPO	6×10^{-15}	Discontinuous	H maser	10 or 20 d
LPTF-F01	2×10^{-15}	Discontinuous	H maser	5 d to 30 d
NIST-7	5 to 10×10^{-15}	Discontinuous	H maser	5 d to 30 d
NIST-F1	1.5×10^{-15}	Discontinuous	H maser	20 d to 30 d
NRC CsVI A	$\approx 100 \times 10^{-15}$	Continuous	TAI	60 d or 30 d
NRC CsVI C	$\approx 100 \times 10^{-15}$	Continuous	TAI	60 d or 30 d
NRLM-4	29×10^{-15}	Discontinuous	TAI	5 d or 10 d
PTB CS1	8×10^{-15}	Continuous	TAI	60 or 30 d
PTB CS2	12×10^{-15}	Continuous	TAI	60 or 30 d
PTB CS3	14×10^{-15}	Continuous	TAI	30 d
PTB CSF1	1.4×10^{-15}	Discontinuous	H maser	15 d
SU MCsR 102	50×10^{-15}	Discontinuous	UTC(SU)	60 d

For the period 1996-1999 (Table 6A), no further information is available. Starting 2000 (Table 6B), each comparison is provided with the following information:

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_A is the uncertainty originating in the instability of the PFS

$u_{link/lab}$ is the uncertainty in the link between the PFS and the clock participating to TAI

$u_{link/TAI}$ is the uncertainty in the link to TAI

u is the quadratic sum of all four uncertainty values

For the data of Table 6B, a frequency over a time interval is defined as the ratio of the end-point phase difference to the duration of the interval.

TABLE 6A. PERIOD 1996-1999

Interval for transfer to TAI	Central date of the calibration	d in 10^{-14}						
		CRL CRL-01	LPTF JPO	NIST NIST-7	NRLM NRLM-4	SU MCSR 102	LPTF FO1	NIST NIST-F1
50094-50124	1996 Jan 27					+8.4		
50124-50154	1996 Feb 26					+2.4		
50144-50149	1996 Mar 4			+2.1				
50154-50184	1996 Mar 27					+1.9		
50199-50209	1996 May 1			+2.5				
50209-50214	1996 May 8						+1.8	
50214-50219	1996 May 13						+2.3	
50219-50224	1996 May 18						+2.2	
50439-50449	1996 Dec 27			+2.7				
50619-50629	1997 Jun 25			+1.7				
50739-50749	1997 Oct 23			-0.3				
50754-50784	1997 Nov 17						+0.99	
50869-50874	1998 Feb 27				-2.4			
50879-50889	1998 Mar 12			-0.9				
50889-50894	1998 Mar 19				-0.3			
50929-50964	1998 May 13			+1.2				
50934-50939	1998 May 3				-1.0			
50969-50979	1998 Jun 10				-0.7			
51014-51024	1998 Jul 25				-0.9			
51009-51039	1998 Jul 30			-1.1				
51019-51044	1998 Aug 6	-1.2						
51034-51044	1998 Aug 14				-1.9			
51099-51129	1998 Oct 28			-0.3				
51124-51134	1998 Nov 12				-3.9			
51149-51159	1998 Dec 7				-0.8			
51144-51174	1998 Dec 12			-0.1				
51174-51184	1999 Jan 1				-2.0			
51209-51239	1999 Feb 15			+0.1				
51219-51229	1999 Feb 15				-4.3			
51299-51329	1999 May 16			-0.7				
51339-51359	1999 Jun 20		+0.8					
51359-51369	1999 Jul 5				-1.7			
51359-51389	1999 Jul 15			-0.7				
51379-51389	1999 Jul 25		+1.0					
51399-51409	1999 Aug 14				-3.3			
51439-51449	1999 Sep 23				-0.6			
51439-51469	1999 Oct 3			+0.1				
51444-51464	1999 Oct 3		+0.7					
51499-51519	1999 Nov 27						+0.2	
51504-51514	1999 Nov 27				-4.2			
51519-51539	1999 Dec 17			+0.1				

TABLE 6A. (CONT.)

Interval for transfer to TAI	Central date of the calibration	d in 10^{-14}				
		NRC CsVIA	NRC CsVIC	PTB CS1	PTB CS2	PTB CS3
50079-50139	1996 Jan 27	-15.7	-8.2		+3.1	
50139-50199	1996 Mar 27	-17.6	-7.2		+2.8	
50199-50264	1996 May 28	-15.5	-5.9		+2.6	
50264-50324	1996 Jul 30	-15.6	-7.7		+2.9	+5.6
50324-50384	1996 Sep 28	-13.7	-2.5		+2.2	+2.6
50384-50444	1996 Nov 27	-12.5	-5.3		+2.9	+5.0
50444-50504	1997 Jan 26	-10.9	+1.7		+2.8	+5.6
50504-50564	1997 Mar 27	-11.0	+2.4		+2.8	+4.5
50564-50629	1997 May 28	-11.0	-0.5		+2.6	+4.9
50629-50689	1997 Jul 30	-11.2	+0.7		+0.4	+3.4
50689-50749	1997 Sep 28	-12.1	+0.7		+1.4	+3.8
50749-50809	1997 Nov 27	-12.3	+0.5		+0.5	+2.5
50809-50844	1998 Jan 13	-12.6	+0.6		+0.6	+1.6
50844-50869	1998 Feb 12	-13.6	-0.4		+0.6	+0.8
50869-50899	1998 Mar 12	-13.1	+0.2		+0.2	+3.3
50899-50929	1998 Apr 11	-13.5	-0.1		-0.1	+0.5
50929-50964	1998 May 13	-12.2	+0.3		+0.4	+0.1
50964-50994	1998 Jun 15	-13.4	-0.4		-0.3	+0.8
50994-51024	1998 Jul 15	-13.4	+0.1	-0.3	+0.2	+0.5
51024-51054	1998 Aug 14	-15.1	+0.2	-0.7	+0.5	+1.7
51054-51084	1998 Sep 13		+1.5	-0.8	+0.2	+2.4
51084-51114	1998 Oct 13		+0.4	-0.2	-0.6	+2.6
51114-51144	1998 Nov 12		+0.2	-1.0	-0.1	+4.0
51144-51174	1998 Dec 12		-0.1	-0.4	+0.1	+1.7
51174-51209	1999 Jan 14		+0.2	-1.5	-0.1	+3.9
51209-51234	1999 Feb 13	+2.8	+1.2	+0.2	+0.6	+3.4
51234-51264	1999 Mar 12	+1.5	+1.0	+0.1	+0.2	+3.9
51264-51294	1999 Apr 11	-0.7		-0.1	+0.5	+1.9
51294-51329	1999 May 14	-1.3		-0.3	-0.1	+2.7
51329-51359	1999 Jun 15	-0.4		-0.4	+0.5	+1.4
51359-51379	1999 Jul 10			+0.1		
51359-51389	1999 Jul 15				+0.3	+1.9
51389-51419	1999 Aug 14				+0.8	+2.2
51419-51449	1999 Sep 13	-0.7			+0.3	+2.2
51449-51479	1999 Oct 13	-0.8			+1.0	+2.7
51479-51509	1999 Nov 12	+0.3			+0.8	+3.5
51509-51539	1999 Dec 12	-1.8			+0.5	

TABLE 6B. YEAR 2000

Standard	Period of estimation	d (10-15)	uB (10-15)	Ref(uB)	uA (10-15)	uI/lab (10-15)	uI/TAI (10-15)	Notes	u (10-15)
CRL-01	51649-51659	+14.3	2.7	[5]	19.	0.8	3.	(2)	19.
CRL-01	51704-51714	4.7	4.7		14.9	0.8	3.		15.9
CRL-01	51754-51764	-7.0	5.4		22.4	0.8	3.		23.2
CRL-01	51834-51844	29.8	4.3		6.4	0.8	3.		8.3
NIST-7	51579-51609	+1.x	4.X	[5]	2.1	1.0	1.		X.X
NIST-7	51649-51674	+7.3	7.3		2.1	1.0	1.5		7.8
NIST 7	51764-51794	4.1	4.6		2.4	0.8	1.		5.3
NIST-F1	51579-51609	+5.	1.XX	[8]	0.8	0.2	1.		2.
NIST-F1	51764-51794	9.7	1.5		0.8	0.2	1.		2.0
NRLM 4	51584-51594	-10.	29.	[6]	4.	1.	15.	(3)	33.
NRLM 4	51619-51629	-29.0	29.		4.	1.	15.		33.
NRLM-4	51654-51664	-28.0	29.		4.	1.	3.		29.
NRLM-4	51684-51694	-19.7	29.		4.	1.	3.		29.
NRLM-4	51704-51714	-50.6	29.		4.	1.	3.		29.
NRLM-4	51724-51729	-54.5	29.		4.	1.	6.		30.
NRLM-4	51739-51744	-31.6	29.		4.	1.	6.		30.
NRLM-4	51769-51779	-50.9	29.		4.	1.	3.		29.
NRLM-4	51819-51824	-16.4	29.		4.	1.	6.		30.
PTB CS1	51644-51664	+7.2	8.	[1,4]	5.	0.	1.5	(1)	10.
PTB CS1	51664-51694	-3.6	8.		5.	0.	1.		9.
PTB CS1	51694-51724	1.7	8.		5.	0.	1.		9.
PTB CS1	51724-51754	3.2	8.		5.	0.	1.		9.
PTB CS1	51754-51784	4.5	8.		5.	0.	1.		9.
PTB CS1	51784-51814	-0.5	8.		5.	0.	1.		9.
PTB CS1	51814-51844	-7.1	8.		5.	0.	1.		9.
PTB CS1	51844-51874	-11.2	8.		5.	0.	1.		9.
PTB CS1	51874-51909	+1.2	8.		5.	0.	1.		9.
PTB CS2	51539-51574	+5.	15.	[2,4]	3.	0.	1.	(1)	15.
PTB CS2	51574-51599	+5.	15.		3.	0.	1.		15.
PTB CS2	51599-51634	-2.	12.		3.	0.	1.		12.
PTB CS2	51634-51664	+3.5	12.		3.	0.	1.		12.
PTB CS2	51664-51694	11.4	12.		3.	0.	1.		12.
PTB CS2	51694-51724	8.7	12.		3.	0.	1.		12.
PTB CS2	51724-51754	5.9	12.		3.	0.	1.		12.
PTB CS2	51754-51784	8.0	12.		3.	0.	1.		12.
PTB CS2	51784-51814	6.5	12.		3.	0.	1.		12.
PTB CS2	51814-51844	4.4	12.		3.	0.	1.		12.
PTB CS2	51844-51874	6.6	12.		3.	0.	1.		12.
PTB CS2	51874-51909	+7.4	12.		3.	0.	1.		12.

TABLE 6B. (CONT.)

Standard	Period of estimation	d (10-15)	uB (10-15)	Ref(uB)	uA (10-15)	u1/lab (10-15)	u1/TAI (10-15)	Notes	u (10-15)
PTB CS3	51604-51634	+30.	14.	[3,4]	7.	0.	1.	(1)	16.
PTB CS3	51634-51664	+38.9	14.		7.	0.	1.		16.
PTB CS3	51664-51694	41.3	14.		7.	0.	1.		16.
PTB CS3	51694-51724	40.9	14.		7.	0.	1.		16.
PTB CS3	51724-51754	28.5	14.		7.	0.	1.		16.
PTB CS3	51754-51784	28.7	14.		7.	0.	1.		16.
PTB CS3	51784-51814	19.1	14.		7.	0.	1.		16.
PTB CS3	51814-51844	30.5	14.		7.	0.	1.		16.
PTB CSF1	51764-51779	7.2	1.5	[7]	1.	0.	2.		2.7
PTB CSF1	51799-51814	5.4	1.4		1.	0.	2.		2.6
PTB CSF1	51824-51839	8.5	1.4		1.	0.	2.		2.6
PTB CSF1	51864-51879	+9.5	1.4		1.	0.	2.		2.6

Notes:

- (1) Continuously operating as a clock participating to TAI.
(2) CRL-01 has been reported earlier as CRL-01. The evaluation procedure of its type B uncertainty is based on that of NIST-7 [5].
(3) The value d is calculated by NRLM.

References:

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