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BIPM

BUREAU INTERNATIONAL DES POIDS ET MESURES

Circular T 27 (1990 May 2)

1 - COORDINATED UNIVERSAL TIME UTC. Computed values of UTC-UTC(k)

(Since 1990 January 1, 0h UTC, TAI-UTC = 25s)

Date 1990 (0h UTC)			FEB 27	MAR 9	MAR 19	MAR 29
MJD			47949	47959	47969	47979
Laboratory k			UTC-UTC(k)	(Unit = 1 microsecond)		
AOS	(Borowiec)		1.07	0.46	-0.41	-0.94
APL	(Laurel)		0.55	0.68	0.80	0.95
ASMW	(Berlin)		-0.31	-0.27	-0.21	-0.10
AUS	(Canberra)		-1.34	-1.32	-1.28	-1.22
BEV	(Wien)	(1)	-10.10	-10.31	-10.65	8.60
CAO	(Cagliari)		11.93	12.15	10.59	9.63
CH	(Berne)		-0.97	-0.88	-0.79	-0.70
CRL	(Tokyo)		-0.58	-0.53	-0.51	-0.46
CSAO	(Shaanxi)		-4.76	-5.02	-5.36	-5.64
DPT	(Pretoria)		-19.46	-19.75	-19.98	-20.19
FTZ	(Darmstadt)		16.34	16.48	16.47	16.41
IEN	(Torino)		-0.96	-0.96	-0.93	-0.91
IFAG	(Wettzell)	(2)	0.33	-1.67	-1.68	-1.55
INPL	(Jerusalem)		157.35	159.09	161.04	163.09
JATC	(Xian)		-12.40	-12.85	-13.33	-13.79
KSRI	(Taejon)		-53.88	-54.79	-55.65	-56.51
NAOM	(Mizusawa)		-2.41	-2.59	-2.80	-3.02
NIM	(Beijing)		9.01	9.04	9.02	8.98
NIST	(Boulder)		0.37	0.40	0.44	0.46
NPL	(Teddington)		-2.29	-2.33	-2.29	-2.30
NPLI	(New-Delhi)		-22.79	-23.34	-23.95	-24.47
NRC	(Ottawa)		-0.60	-0.56	-0.47	-0.35
NRLM	(Tsukuba)		-31.99	-31.51	-30.96	-30.49
OMH	(Budapest)	(3)	-	1.13	1.21	1.19
ONRJ	(Rio de Janeiro)		11.95	12.01	11.95	11.85
OP	(Paris)		-0.47	-0.53	-0.58	-0.66
ORB	(Bruxelles)		5.33	5.45	5.60	5.74
PEL	(Lower Hutt)		-	-	-	-
PKNM	(Warsaw)		-3.51	-3.97	-4.66	-5.30
PTB	(Braunschweig)		3.75	3.74	3.73	3.71
RC	(Havana)		-2.17	-2.22	-2.31	-2.62
ROA	(San Fernando)		9.59	9.56	9.45	9.28
SO	(Shanghai)		3.85	3.86	3.90	3.83
STA	(Stockholm)		0.30	0.29	0.23	0.20
SU	(Moscow)		-	-	-	-
TAO	(Tokyo)		-5.06	-4.91	-4.74	-4.55
TL	(Taiwan)		1.53	1.73	1.90	2.10
TP	(Praha)		0.98	0.71	0.70	0.79
TUG	(Graz)		-3.14	-2.92	-2.67	-2.39
USNO	(Washington) (USNO MC)		-1.34	-1.32	-1.28	-1.22
VSL	(Delft)		2.49	2.52	2.60	2.67
YUZM	(Beograd)		17.16	17.11	16.91	17.07
ZIPE	(Potsdam)		-0.20	-0.37	-0.38	-0.24

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2 - INTERNATIONAL ATOMIC TIME TAI AND LOCAL ATOMIC TIME SCALES TA(k)

Computed values of TAI-TA(k)

Date 1990 (0h UTC)			FEB 27	MAR 9	MAR 19	MAR 29
MJD			47949	47959	47969	47979
Laboratory k			TAI-TA(k)	(Unit = 1 microsecond)		
AOS	(Borowiec)		1.07	0.46	-0.41	-0.94
APL	(Laurel)		-0.79	-0.66	-0.54	-0.38
AUS	(Canberra)		-26.40	-26.56	-26.74	-26.93
CH	(Berne)		-63.66	-63.84	-64.01	-64.17
CRL	(Tokyo)		-1.74	-1.69	-1.64	-1.60
CSAO	(Shaanxi)		33.05	32.68	32.24	31.86
DDR	(Berlin)		-26.84	-26.77	-26.65	-26.48
F	(Paris)		78.38	78.67	78.97	79.29
JATC	(Xian)		-1.59	-1.55	-1.50	-1.50
NIM	(Beijing)		-11.23	-11.23	-11.24	-11.24
NISA	(Boulder)	(4)	-45062.85	-45063.05	-45063.24	-45063.43
NIST	(Boulder)		-45138.41	-45138.91	-45139.42	-45139.94
NRC	(Ottawa)		15.47	15.51	15.60	15.72
PTB	(Braunschweig)		-359.65	-359.66	-359.67	-359.69
RC	(Havana)	(5)	-261.88	-261.95	-262.06	-262.40
SO	(Shanghai)		-43.77	-43.74	-43.68	-43.71
SU	(Moscow)		-	-	-	-
USNO	(Washington)	(6)	-34596.10	-34596.77	-34597.42	-34598.06

3 - NOTES ON SECTIONS 1 AND 2

(1) BEV . Time step of UTC(BEV) of -20 µs on MJD = 47972.59

(2) IFAG. Time step of UTC(IFAG) of + 2 µs on MJD = 47949.37

(3) OMH . Corrected values of UTC-UTC(OMH) : from MJD=47839 to MJD=47919 add +0.91 µs to the published values of UTC-UTC(OMH).

(4) TA(NISA) designates the scale AT1 of NIST.

(5) RC . Listed values are TAI-TA(RC) - 18 seconds.

(6) TA(USNO) designates the scale A1(MEAN) of USNO.

4 - UTC-GPS TIME and TAI-GPS TIME

UTC-GPS TIME = -6 seconds + Co ; TAI-GPS TIME = 19 seconds + Co.

Co is obtained from measurements made at Paris Observatory, usually corrected for the measured ionospheric delay, and from linear interpolation of UTC-UTC(OP).
DC is the synchronization offset between satellites, as measured at Paris Observatory at the instant T of the tracking. T is given for the middle of the tracking period of 13 minutes, for the first tabular date and must be decremented by 4 minutes per day (8 minutes when moving from 0h.. to 23h..).

For most of the applications it is sufficient to derive UTC from the observations of any of the listed satellites, at any time, by interpolating Co. However, in case of large values of DC, one might obtain better values of UTC by using, instead of Co, C=Co+DC.

Date 1990	MJD	Co (ns) 0hUTC	DC(ns) PRN13 NAV 9 19h20m	PRN 3 NAV11 20h40m	PRN11 NAV 8 7h56m	PRN14 NAV14 10h20m	PRN 6 NAV 3 14h36m	PRN 9 NAV 6 17h32m	PRN12 NAV10 18h20m
FEB 27	47949	-1338	-5	-8	6	22	-4	-11	-8
FEB 28	47950	-1370	2	2	11	20	-1	-6	-4
MAR 1	47951	-1398	-3	7	1	1	7	-16	26
MAR 2	47952	-1421	-2	-7	8	-6	7	-4	-21
MAR 3	47953	-1435	-6	1	2	16	5	1	0
MAR 4	47954	-1449	7	-6	-2	-	18	1	-7
MAR 5	47955	-1464	-6	-3	-3	-	15	3	-17
MAR 6	47956	-1478	-21	1	7	-	5	-11	3
MAR 7	47957	-1485	2	-9	2	-	19	-10	16
MAR 8	47958	-1486	-10	-1	-2	-	10	-13	3
MAR 9	47959	-1486	9	-7	-2	-	11	1	16
MAR 10	47960	-1485	-27	-4	3	-	11	-6	-25
MAR 11	47961	-1480	12	-3	3	-13	9	0	6
MAR 12	47962	-1471	-13	3	1	-15	22	5	20
MAR 13	47963	-1465	3	-5	-5	15	-15	-4	7
MAR 14	47964	-1462	13	3	-6	-13	8	-1	-14
MAR 15	47965	-1452	25	2	-	6	-19	12	1
MAR 16	47966	-1439	3	-1	-5	-5	-24	-8	19
MAR 17	47967	-1428	-5	2	0	10	-15	9	23
MAR 18	47968	-1421	0	7	-3	-	-12	2	8
MAR 19	47969	-1416	-4	-6	-2	-	-6	4	-22
MAR 20	47970	-1407	20	21	8	-	-4	7	-22
MAR 21	47971	-1397	-7	-3	1	-	-6	2	19
MAR 22	47972	-1394	0	-3	-6	-	-15	7	-26
MAR 23	47973	-1389	23	3	-4	-	-3	5	3
MAR 24	47974	-1380	11	-4	-6	-	0	7	1
MAR 25	47975	-1374	-5	10	-4	-	-10	7	-20
MAR 26	47976	-1368	5	2	17	-	-4	-6	0
MAR 27	47977	-1364	-1	16	-9	-	-7	-7	10
MAR 28	47978	-1362	17	3	2	-26	-26	-	-12
MAR 29	47979	-1360	-10	-2	7	-	6	-	0

5 - DURATION OF THE TAI SCALE INTERVAL : 1 second + D

D and its standard deviation s are expressed in 1*10**-14 second.

The following data are given :

- for continuously operating primary standards (primary clocks), the average of D for the two previous months, with the last available estimate of the inaccuracy of the standard;
- for occasional measurements, the value D for the measurement interval, as computed by BIPM (the BIPM uncertainty may be larger than the reported uncertainty on account of the time comparisons);
- the BIPM evaluation from all available measurements (from CRL, NIST, NRC, PTB, SU), with the uncertainty based on those of individual measurements, as reported.

Standards,	Interval(MJD)	D	s
NRC-CsV	47919-47979	+19.1	10.0
PTB-CS1	47919-47979	+1.1	3.0
PTB-CS2	47919-47979	+3.7	1.5
BIPM estimate	47919-47979	+3	2