BIPM

BUREAU INTERNATIONAL DES POIDS ET MESURES

Circular T 14 (1989 April 3)

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

(Since 1988 January 1, 0h UTC, TAI-UTC = 24s)

Date 1989 (0h UTC)			FEB 2	FEB 12	FEB 22
MJD			47559	47569	47579
Laboratory k			UTC-UTC(k)	(Unit = 1 microsecond)	
AOS	(Borowiec)		-	-	-
APL	(Laurel)		-	-	-
ASMW	(Berlin)		0.01	-0.10	-0.18
AUS	(Canberra)	(1)	-1.18	-1.16	-1.08
BEV	(Wien)		-6.32	-6.91	-7.48
CAO	(Cagliari)		5.45	5.72	5.96
CH	(Berne)		0.74	0.74	0.74
CRL	(Tokyo)		-1.55	-1.51	-1.46
CSAO	(Shaanxi)		1.12	0.87	0.73
FTZ	(Darmstadt)		17.44	17.32	17.26
IEN	(Torino)	(2)	-0.76	-0.79	-0.83
IFAG	(Wettzell)	(3)	-1.07	-0.79	-0.51
INPL	(Jerusalem)		98.99	100.53	102.14
JATC	(Xian)		2.02	1.49	0.98
KSRI	(Daejeon)		-20.53	-21.25	-21.92
NAOM	(Mizusawa)		-35.04	-35.09	-35.14
NIM	(Beijing)		7.19	6.82	6.47
NIST	(Boulder)		-0.16	-0.21	-0.27
NPL	(Teddington)		1.53	1.21	0.83
NPLI	(New-Delhi)		-11.04	-10.91	-10.86
NRC	(Ottawa)		-13.37	-13.42	-13.45
NRLM	(Tsukuba)		-33.89	-34.34	-34.76
OMH	(Budapest)		-9.28	-9.38	-9.33
OP	(Paris)		-1.83	-1.82	-1.81
ORB	(Bruxelles)		-13.21	-13.57	-13.88
PKNM	(Warsaw)		5.97	6.13	6.01
PTB	(Braunschweig)		4.14	4.16	4.19
ROA	(San Fernando)		7.46	7.46	7.40
SO	(Shanghai)		2.68	2.58	2.58
STA	(Stockholm)		0.91	1.37	1.85
SU	(Moscow)	(4)	-	-	-
TAO	(Tokyo)		-2.66	-2.71	-2.70
TL	(Taiwan)		1.52	1.64	1.80
TP	(Praha)		-0.26	-0.20	-0.16
TUG	(Graz)		-3.49	-3.24	-2.96
USNO	(Washington)	(USNO MC)	-1.19	-1.15	-1.11
VSL	(Delft)		0.97	1.03	1.04
YUZM	(Beograd)		5.76	5.56	5.51
ZIPE	(Potsdam)		-0.17	-0.22	-0.19

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

Computed values of TAI-TA(k)

Date 1989 (0h UTC)		FEB 2	FEB 12	FEB 22
MJD		47559	47569	47579
Laboratory k		TAI-TA(k)	(Unit = 1 microsecond)	
AOS (Borowiec)		-	-	-
APL (Laurel)		-	-	-
AUS (Canberra)		-18.38	-18.58	-18.65
CH (Berne)		-54.71	-54.89	-55.07
CRL (Tokyo)		-3.11	-3.07	-3.01
CSAO(Shaanxi)		40.10	39.85	39.71
DDR (Berlin)		-29.11	-28.98	-28.83
F (Paris)		65.85	66.23	66.58
JATC(Xian)		0.84	0.60	0.37
NIM (Beijing)		-9.89	-10.30	-10.45
NISA(Boulder)	(5)	-45053.82	-45054.07	-45054.32
NIST(Boulder)		-45120.74	-45121.16	-45121.60
NRC (Ottawa)		17.69	17.65	17.62
PTB (Braunschweig)		-359.26	-359.24	-359.20
SO (Shanghai)		-44.36	-44.43	-44.42
SU (Moscow)	(4)	-	-	-
USNO(Washington)	(6)	-34573.15	-34573.73	-34574.28

3 - NOTES ON SECTIONS 1 AND 2

(1) AUS . Time scale designated by TS(AUS) by AUS.

(2) IEN . Change of master clock on MJD = 47549.0

(3) IFAG. Time step of UTC(IFAG) of 2 µs on MJD = 47557.5

(4) SU .

MJD	UTC-UTC(SU)	TAI-TA(SU)
47489	17.36	2827267.36
47499	17.25	2827267.25
47509	17.03	2827267.03
47519	16.75	2827266.75

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

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

4 - UTC-GPS TIME and TAI-GPS TIME

UTC-GPS TIME = -5 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 a 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 1989	MJD	Co (ns) 0hUTC	DC(ns) PRN 3 NAV11 21h42m	PRN 6 NAV 3 17h22m	PRN 9 NAV 6 18h22m	PRN11 NAV 8 12h10m	PRN12 NAV10 21h 2m	PRN13 NAV 9 20h46m
JAN 23	47549	-1328	-2	14	4	11	-14	-12
JAN 24	47550	-1318	3	6	-3	5	-14	2
JAN 25	47551	-1309	1	4	4	11	-11	10
JAN 26	47552	-1303	4	-1	-10	1	-16	6
JAN 27	47553	-1307	7	6	-6	13	-5	-14
JAN 28	47554	-1303	2	1	-8	12	-4	0
JAN 29	47555	-1298	2	0	-11	12	-7	3
JAN 30	47556	-1298	1	-6	8	8	-1	-11
JAN 31	47557	-1296	2	4	10	6	-9	-4
FEB 1	47558	-1295	1	-5	1	8	-15	-2
FEB 2	47559	-1296	0	1	0	16	3	-4
FEB 3	47560	-1293	-1	-2	-6	12	-8	-15
FEB 4	47561	-1298	2	6	0	19	-19	4
FEB 5	47562	-1294	-4	-3	-1	9	5	-12
FEB 6	47563	-1294	3	-2	-1	13	-4	2
FEB 7	47564	-1288	2	0	-4	6	-1	3
FEB 8	47565	-1290	-2	0	12	-1	-3	-18
FEB 9	47566	-1292	-9	27	18	-5	-16	-14
FEB 10	47567	-1290	-2	10	-4	6	-6	2
FEB 11	47568	-1286	-4	12	-9	21	-1	-8
FEB 12	47569	-1292	0	-3	-7	13	-5	-19
FEB 13	47570	-1299	0	1	-2	20	-3	4
FEB 14	47571	-1295	-1	-2	-2	3	-1	-12
FEB 15	47572	-1298	-3	-1	-2	6	2	3
FEB 16	47573	-1293	3	16	-2	6	-7	-2
FEB 17	47574	-1296	-1	-5	-11	5	5	-6
FEB 18	47575	-1303	3	-2	-4	11	-14	-4
FEB 19	47576	-1301	-7	1	-9	11	-1	1
FEB 20	47577	-1293	-3	0	-6	26	3	-6
FEB 21	47578	-1288	-4	6	-7	2	-27	-2
FEB 22	47579	-1281						

5 - MEASUREMENT OF UTC(j)-UTC(k)

Date 1989	MJD	Time comparisons (Unit : 1 microsecond)	uncert.	source	meth. (1)
MAR 5	47590.58	UTC(SU) - UTC(NPL) = -15.56		SU telex	CT

(1) method : CT Clock transportation.

6 - 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 that 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	47519-47579	+12.3	10.0
PTB-CS1	47519-47579	-2.1	3.0
PTB-CS2	47519-47579	+1.3	1.5
BIPM estimate	47519-47579	+1	2