BIPM

BUREAU INTERNATIONAL DES POIDS ET MESURES

Circular T 15 (1989 May 2)

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

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

Date 1989 (0h UTC)	MAR 4	MAR 14	MAR 24
MJD	47589	47599	47609
Laboratory k	UTC-UTC(k)	(Unit = 1 microsecond)	
AOS (Borowiec)	-5.92	-6.40	-5.48
APL (Laurel)	-	-	-
ASMW (Berlin)	-0.10	-0.03	-0.03
AUS (Canberra)	-1.07	-1.03	-1.01
BEV (Wien)	-8.03	-8.76	-9.43
CAO (Cagliari)	6.22	6.43	6.75
CH (Berne)	0.74	0.72	0.69
CRL (Tokyo)	-1.42	-1.42	-1.43
CSAO (Shaanxi)	0.69	0.57	0.56
FTZ (Darmstadt)	17.24	17.23	17.22
IEN (Torino)	-0.87	-0.96	-0.90
IFAG (Wettzell)	-0.29	-0.45	-0.42
INPL (Jerusalem)	103.76	105.17	106.63
JATC (Xian)	0.57	0.14	-0.20
KSRI (Taejon)	-22.76	-23.42	-24.03
NAOM (Mizusawa)	-35.21	-35.29	-35.24
NIM (Beijing)	6.34	6.21	6.15
NIST (Boulder)	-0.29	-0.32	-0.34
NPL (Teddington)	0.48	0.24	0.11
NPLI (New-Delhi)	-11.08	-11.20	-11.32
NRC (Ottawa)	-13.46	-13.45	-13.48
NRLM (Tsukuba)	-35.18	-35.63	-36.10
OMH (Budapest)	-9.29	-9.16	-9.12
OP (Paris)	-1.80	-1.80	-1.79
ORB (Bruxelles)	-14.15	-14.44	-14.69
PKNM (Warsaw)	5.99	5.89	5.86
PTB (Braunschweig)	4.23	4.28	4.28
ROA (San Fernando)	7.40	7.39	7.37
SO (Shanghai)	2.63	2.54	2.58
STA (Stockholm)	2.21	2.21	2.25
SU (Moscow) (1)	-	-	-
TAO (Tokyo)	-2.71	-2.75	-2.80
TL (Taiwan)	1.97	2.10	2.26
TP (Praha)	-0.25	-0.18	-0.19
TUG (Graz)	-2.71	-2.49	-2.26
USNO (Washington) (USNO MC)	-1.07	-1.03	-1.01
VSL (Delft)	0.97	1.00	1.00
YUZM (Beograd)	5.62	5.71	5.89
ZIPE (Potsdam)	0.04	0.13	0.16

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

Computed values of TAI-TA(k)

Date 1989 (Oh UTC)			MAR 4	MAR 14	MAR 24
MJD			47589	47599	47609
Laboratory k			TAI-TA(k)	(Unit = 1 microsecond)	
AOS	(Borowiec)		-	-	-
APL	(Laurel)		-	-	-
AUS	(Canberra)		-18.81	-18.97	-19.13
CH	(Berne)		-55.25	-55.46	-55.67
CRL	(Tokyo)		-2.97	-2.95	-2.94
CSAO	(Shaanxi)		39.67	39.55	39.54
DDR	(Berlin)		-28.59	-28.47	-28.41
F	(Paris)		66.91	67.26	67.58
JATC	(Xian)		0.26	0.13	0.16
NIM	(Beijing)		-10.50	-10.66	-10.74
NISA	(Boulder)	(2)	-45054.54	-45054.78	-45055.02
NIST	(Boulder)		-45122.04	-45122.47	-45122.90
NRC	(Ottawa)		17.60	17.62	17.59
PTB	(Braunschweig)		-359.17	-359.12	-359.12
SO	(Shanghai)		-44.37	-44.46	-44.41
SU	(Moscow)	(1)	-	-	-
USNO	(Washington)	(3)	-34574.84	-34575.43	-34576.06

3 - NOTES ON SECTIONS 1 AND 2

(1) SU .

MJD	UTC-UTC(SU)	TAI-TA(SU)
47529	16.66	2827266.66
47539	16.66	2827266.66
47549	16.48	2827266.48

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

(3) 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 19h42m	PRN 6 NAV 3 15h22m	PRN 9 NAV 6 16h22m	PRN11 NAV 8 10h10m	PRN12 NAV10 19h 2m	PRN13 NAV 9 18h46m
FEB 22	47579	-1281	-6	5	16	36	-4	-15
FEB 23	47580	-1265	-15	3	18	25	6	-25
FEB 24	47581	-1266	-2	9	-7	0	-8	-5
FEB 25	47582	-1264	-5	17	-6	24	-17	-7
FEB 26	47583	-1262	-2	0	-12	19	-6	1
FEB 27	47584	-1258	1	4	-2	9	-9	2
FEB 28	47585	-1255	-1	5	1	19	-18	-8
MAR 1	47586	-1258	2	8	0	0	-5	2
MAR 2	47587	-1255	-6	23	7	0	-10	-15
MAR 3	47588	-1258	-1	21	12	-1	-8	-10
MAR 4	47589	-1263	-4	10	14	1	-12	-10
MAR 5	47590	-1277	-6	7	-1	6	-1	-9
MAR 6	47591	-1288	-17	-1	-5	8	-19	-12
MAR 7	47592	-1289	-	6	11	5	-	-
MAR 8	47593	-1302	-7	1	-5	7	-11	4
MAR 9	47594	-1310	-10	1	-4	-5	2	12
MAR 10	47595	-1305	-	-1	-3	8	-	-7
MAR 11	47596	-1310	-6	5	-3	-6	-1	-8
MAR 12	47597	-1305	-5	8	-3	10	-1	-7
MAR 13	47598	-1292	-10	8	4	7	-3	7
MAR 14	47599	-1284	-3	13	2	-3	-9	-7
MAR 15	47600	-1276	0	6	0	4	4	-12
MAR 16	47601	-1265	-4	6	0	3	-3	-8
MAR 17	47602	-1254	2	7	5	-3	0	10
MAR 18	47603	-1244	-3	3	-3	-4	-7	3
MAR 19	47604	-1241	1	6	0	-2	-2	-6
MAR 20	47605	-1232	-5	14	-3	4	-8	-3
MAR 21	47606	-1226	-14	16	-2	0	1	-4
MAR 22	47607	-1216	-6	21	2	-6	2	-4
MAR 23	47608	-1208	-10	14	-5	9	-8	-7
MAR 24	47609	-1206						

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 maybe 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	47549-47609	+0.8	10.0
PTB-CS1	47549-47609	-2.9	3.0
PTB-CS2	47549-47609	+2.4	1.5
BIPM estimate	47549-47609	0	2

6 - INFORMATION

From Circular T 16 onwards, the data for the last date of the previous Circular T will be given again, with possible minor improvement.