BUREAU INTERNATIONAL DES POIDS ET MESURES

(B I P M)

Circular T 12 (1989 February 1)

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

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

Date 1988 (0h UTC)		DEC 4	DEC 14	DEC 24
MJD		47499	47509	47519
Laboratory k		UTC-UTC(k)	(Unit = 1 microsecond)	
AOS (Borowiec)		-	-	-
APL (Laurel)		-0.30	-0.33	-0.36
ASMW (Berlin)		0.34	0.44	0.43
AUS (Canberra)		-17.57	-17.69	-17.83
BEV (Wien)		-3.24	-3.66	-3.81
CAO (Cagliari)		4.58	4.57	4.59
CH (Berne)		0.71	0.69	0.71
CRL (Tokyo)		-1.80	-1.78	-1.73
CSAO (Shaanxi)		1.49	1.49	1.41
FTZ (Darmstadt)		17.74	17.71	17.65
IEN (Torino)		1.29	0.95	0.56
IFAG (Wettzell)		-0.43	-0.26	-0.07
INPL (Jerusalem)		90.44	91.87	93.31
JATC (Xian)	(1)	-	-	-
KSRI (Daejeon)	(2)	-17.92	-18.61	-19.06
NAOM (Mizusawa)		-34.64	-34.69	-34.76
NIM (Beijing)		7.88	7.84	7.87
NIST (Boulder)		-0.10	-0.11	-0.10
NPL (Teddington)		3.12	2.93	2.68
NPLI (New-Delhi)	(3)	-11.50	-11.50	-11.50
NRC (Ottawa)	(4)	-12.47	-12.65	-12.82
NRLM (Tsukuba)		-31.27	-31.72	-32.16
OMH (Budapest)		-	-	-
OP (Paris)		-1.81	-1.86	-1.90
ORB (Bruxelles)		-12.11	-12.35	-12.55
PKNM (Warsaw)		3.14	3.71	4.71
PTB (Braunschweig)		4.13	4.11	4.11
ROA (San Fernando)		7.33	7.44	7.43
SO (Shanghai)		2.18	2.33	2.40
STA (Stockholm)	(5)	-0.90	-0.94	-0.48
SU (Moscow)		-	-	-
TAO (Tokyo)		-2.49	-2.53	-2.54
TL (Taiwan)	(2)	-5.88	-5.92	-5.99
TP (Praha)		-1.79	-1.43	-1.05
TUG (Graz)	(6)	5.02	-4.76	-4.49
USNO (Washington)	(USNO MC)	-1.55	-1.48	-1.40
VSL (Delft)		3.70	3.76	3.77
YUZM (Beograd)		7.44	7.41	6.96
ZIPE (Potsdam)		-0.15	-0.07	0.00

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

Computed values of TAI-TA(k)

Date 1988 (Oh UTC)		DEC 4	DEC 14	DEC 24
MJD		47499	47509	47519
Laboratory k		TAI-TA(k)	(Unit = 1 microsecond)	
AOS (Borowiec)		-	-	-
APL (Laurel)		-0.48	-0.51	-0.54
CH (Berne)		-53.65	-53.84	-54.01
CRL (Tokyo)		-3.41	-3.38	-3.32
CSAO(Shaanxi)		40.47	40.47	40.39
DDR (Berlin)		-30.18	-29.95	-29.73
F (Paris)		63.61	63.99	64.36
JATC(Xian)	(1)	-	-	-
NIM (Beijing)		-10.09	-9.95	-9.69
NISA(Boulder)	(7)	-45052.47	-45052.70	-45052.92
NIST(Boulder)		-45118.30	-45118.71	-45119.11
NRC (Ottawa)	(4)	18.60	18.42	18.25
PTB (Braunschweig)		-359.27	-359.29	-359.29
SO (Shanghai)		-45.34	-45.05	-44.89
SU (Moscow)		-	-	-
USNO(Washington)	(8)	-34569.59	-34570.15	-34570.73

3 - NOTES ON SECTIONS 1 AND 2

(1) JATC.

MJD	UTC-UTC(JATC)	TAI-TA(JATC)
47469	3.76	1.69
47479	3.84	1.85
47489	3.65	1.71

(2) KSRI, TL. Interpolated value on MJD = 47499

(3) NPLI.

MJD	UTC-UTC(NPLI)
47489	-11.54

(4) NRC .

MJD	UTC-UTC(NRC)	TAI-TA(NRC)
47489	-12.12	18.95

(5) STA . The time step of UTC-UTC(STA) between MJD=47509 and MJD=47519 of 0.5 μs is an adjustment made by the BIPM, as a consequence of the reintroduction of the GPS time link for STA.

(6) TUG . Time step of UTC(TUG) of 10 μs on MJD = 47504.70

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

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

4 - UTC-GPS TIME and TAI-GPS TIME

UTC-GPS TIME = -5 seconds + C
TAI-GPS TIME = 19 seconds + C , C=Co+DC, as explained below

C, as measured at Paris Observatory, is obtainted from the following table by interpolating Co at the time of day T of the measurement at Paris Observatory and adding DC. 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...). The data are normally corrected for the measured ionospheric refraction.

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.

Date 1988	MJD	Co (ns) 0hUTC	DC(ns) PRN 3 NAV11 1h32m	PRN 6 NAV 3 21h20m	PRN 9 NAV 6 22h20m	PRN11 NAV 8 16h12m	PRN12 NAV10 0h40m	PRN13 NAV 9 0h56m
NOV 30	47495	-1631	10	-5	-6	23	3	5
DEC 1	47496	-1634	4	-5	-3	19	-10	-8
DEC 2	47497	-1632	14	-9	-4	18	-13	-16
DEC 3	47498	-1620	6	-4	0	-2	-3	1
DEC 4	47499	-1620	2	-9	-5	9	1	-6
DEC 5	47500	-1607	19	-3	-4	13	-9	-5
DEC 6	47501	-1597	6	-10	3	15	-13	-5
DEC 7	47502	-1577	9	-8	-6	9	-7	-7
DEC 8	47503	-1561	14	-3	-5	11	2	-7
DEC 9	47504	-1556	4	-8	-8	17	-3	-6
DEC 10	47505	-1549	6	-5	-6	21	-7	-5
DEC 11	47506	-1535	9	-8	-9	22	-14	-11
DEC 12	47507	-1518	15	-10	-6	14	-13	-3
DEC 13	47508	-1503	4	0	-9	27	8	2
DEC 14	47509	-1485	0	5	-4	18	-15	-18
DEC 15	47510	-1479	8	-14	-7	24	-8	-11
DEC 16	47511	-1469	10	-9	-4	25	-6	0
DEC 17	47512	-1452	-3	-11	-6	16	-3	-6
DEC 18	47513	-1434	11	-5	4	32	1	18
DEC 19	47514	-1434	-	-3	20	-	-18	4
		*	23h58m	19h38m	20h38m	14h26m	23h18m	23h 2m
DEC 20	47515	-1434	1	-3	2	24	-3	-17
DEC 21	47516	-1424	-8	-11	6	22	-8	4
DEC 22	47517	-1419	8	4	7	-3	-4	-6
DEC 23	47518	-1411	-2	1	13	6	-18	-8
DEC 24	47519	-1418						

* Change of tracking schedule

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

Date 1988	MJD	Time comparisons (Unit : 1 microsecond)	uncert.	source	meth. (1)
NOV 24	47489.29	UTC(SU) - UTC(TP) = -18.37	0.05	SU telex	CT

Final result of the clock transportation between SU and TP. The result published in Circular T 11 was provisional.
(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.

Note. In previous issues of Circular T, only the BIPM estimate of D was given, with a conservative estimate of its standard deviation.
Starting with Circular T 9, 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 of 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, NBS, NRC, PTB, SU), with the uncertainty based on those of individual measurements, as reported.

Standards	Interval(MJD)	D	s
PTB-CS1	47459 - 47519	+1.2	3.0
PTB-CS2	47459 - 47519	+3.6	1.5
BIPM estimate	47459 - 47519	+3	2