

BUREAU INTERNATIONAL DES POIDS ET MESURES

Circular T 24 (1990 February 1)

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

(From 1988 January 1, 0h UTC, to 1990 January 1, 0h UTC, TAI-UTC = 24s)

(From 1990 January 1, 0h UTC, until further notice, TAI-UTC = 25s)

Date 1989 (0h UTC)	NOV 29	DEC 9	DEC 19	DEC 29
MJD	47859	47869	47879	47889
Laboratory k	UTC-UTC(k)	(Unit = 1 microsecond)		
AOS (Borowiec)	-6.92	-5.51	-4.13	-2.98
APL (Laurel)	-0.03	-0.03	0.02	0.08
ASMW (Berlin)	0.25	0.44	0.47	0.25
AUS (Canberra)	-0.77	-0.87	-0.94	-1.01
BEV (Wien)	-	-	-	-
CAO (Cagliari)	12.25	12.46	12.52	12.75
CH (Berne)	-0.93	-0.96	-0.99	-1.04
CRL (Tokyo)	-0.89	-0.87	-0.84	-0.82
CSAO (Shaanxi)	-2.42	-2.65	-2.88	-3.15
DPT (Pretoria)	-16.75	-17.05	-17.35	-17.63
FTZ (Darmstadt)	16.47	16.42	16.38	16.42
IEN (Torino)	-0.11	-0.16	-0.23	-0.30
IFAG (Wetzell)	0.32	0.57	0.76	0.89
INPL (Jerusalem)	143.17	144.68	146.12	147.61
JATC (Xian)	-9.44	-9.76	-10.07	-10.33
KSRI (Taejon)	-8.69	-8.60	-8.48	-8.23
NAOM (Mizusawa)	-35.20	-35.09	-35.21	-35.47
NIM (Beijing)	-	9.40	9.35	9.31
NIST (Boulder)	0.05	0.10	0.16	0.19
NPL (Teddington)	-2.08	-2.10	-2.11	-2.11
NPLI (New-Delhi)	-18.47	-18.99	-19.43	-19.67
NRC (Ottawa)	-15.83	-15.83	-15.80	-15.79
NRLM (Tsukuba)	-40.71	-39.28	-37.89	-36.56
OMH (Budapest)	-10.09	-10.58	-10.01	-10.09
ONRJ (Rio de Janeiro)	11.26	11.17	11.28	11.32
OP (Paris)	-0.03	-0.06	-0.09	-0.14
ORB (Bruxelles)	3.71	4.05	4.13	4.82
PEL (Lower Hutt)	-	-	-	-
PKNM (Warsaw)	-0.35	-0.66	-1.32	-1.65
PTB (Braunschweig)	3.83	3.84	3.82	3.78
RC (Havana)	-2.57	-2.72	-2.72	-2.49
ROA (San Fernando)	9.52	9.66	9.78	9.86
SO (Shanghai)	3.53	3.61	3.74	3.76
STA (Stockholm)	0.39	0.38	0.35	0.33
SU (Moscow)	11.73	-	-	-
TAO (Tokyo)	-4.61	-4.67	-4.73	-4.81
TL (Taiwan)	1.41	1.35	1.26	1.22
TP (Praha)	1.86	1.82	1.68	1.48
TUG (Graz)	3.73	3.98	4.22	4.46
USNO (Washington) (USNO MC)	-0.77	-0.87	-0.94	-1.01
VSL (Delft)	2.07	2.17	2.17	2.20
YUZM (Beograd)	20.78	19.82	19.28	19.18
ZIPE (Potsdam)	-0.12	-0.01	0.19	0.19

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

Computed values of TAI-TA(k)

Date 1989 (0h UTC)	NOV 29	DEC 9	DEC 19	DEC 29
MJD	47859	47869	47879	47889
Laboratory k	TAI-TA(k) (Unit = 1 microsecond)			
APL (Laurel)	-1.37	-1.37	-1.32	-1.26
AUS (Canberra)	-25.00	-25.15	-25.32	-25.52
CH (Berne)	-61.78	-62.00	-62.21	-62.44
CRL (Tokyo)	-2.13	-2.10	-2.06	-2.04
CSAO (Shaanxi)	36.28	35.95	35.62	35.25
DDR (Berlin)	-28.48	-28.28	-28.01	-27.91
F (Paris)	75.60	75.94	76.25	76.56
JATC (Xian)	-1.49	-1.42	-1.35	-1.41
NIM (Beijing)	-	-10.36	-10.40	-10.47
NISA (Boulder) (1)	-45061.01	-45061.21	-45061.40	-45061.62
NIST (Boulder)	-45133.92	-45134.41	-45134.88	-45135.38
NRC (Ottawa)	15.24	15.24	15.27	15.28
PTB (Braunschweig)	-359.57	-359.56	-359.58	-359.62
RC (Havana)	-6000256.84	-6000257.78	-6000258.61	-6000259.20
SO (Shanghai)	-44.04	-43.96	-43.85	-43.84
SU (Moscow)	2827261.73	-	-	-
USNO (Washington) (2)	-34589.97	-34590.63	-34591.32	-34591.96

3 - NOTES ON SECTIONS 1 AND 2

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

(2) 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 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)						
			PRN11 NAV 8 14h 0m	PRN14 NAV14 16h24m	PRN 6 NAV 3 20h 8m	PRN 9 NAV 6 21h28m	PRN12 NAV10 0h28m	PRN13 NAV 9 1h32m	PRN 3 NAV11 2h52m
NOV 29	47859	-459	2	-	-5	-5	-9	0	8
NOV 30	47860	-441	7	-	-11	-7	0	0	8
DEC 1	47861	-427	3	-	-9	1	-2	-5	2
DEC 2	47862	-419	12	-	-	-27	8	-2	9
DEC 3	47863	-414	-4	-2	-14	-10	-42	-7	14
DEC 4	47864	-401	4	17	-1	1	-17	-5	4
DEC 5	47865	-381	4	7	-8	-2	-	11	7
DEC 6	47866	-367	5	2	-18	-10	-8	4	7
DEC 7	47867	-355	20	20	-6	-3	-5	0	-3
DEC 8	47868	-340	3	9	-10	-4	4	-2	4
DEC 9	47869	-325	12	9	-8	-6	-4	3	3
DEC 10	47870	-317	2	-	-8	-10	3	7	4
DEC 11	47871	-313	-2	-	-3	-3	15	-2	-1
DEC 12	47872	-311	3	-	-8	-1	7	5	3
DEC 13	47873	-312	5	-	-11	-3	10	2	6

Date 1989	MJD	Co (ns) 0hUTC	DC(ns)						
			PRN13 NAV 9 0h24m	PRN 3 NAV11 1h44m	PRN11 NAV 8 12h56m	PRN14 NAV14 15h20m	PRN 6 NAV 3 19h36m	PRN 9 NAV 6 22h32m	PRN12 NAV10 23h20m
DEC 14	47874	-323	-4	5	3	-	-6	-11	5
DEC 15	47875	-325	5	1	12	-	-7	-12	0
DEC 16	47876	-328	3	1	9	-	-9	-8	0
DEC 17	47877	-332	-5	4	-3	12	-13	-10	-6
DEC 18	47878	-334	4	10	11	8	-6	-11	2
DEC 19	47879	-336	-	4	1	12	-5	-3	-13
DEC 20	47880	-346	4	3	13	13	-2	-5	-12
DEC 21	47881	-362	1	7	8	-7	-8	-8	19
DEC 22	47882	-378	4	-6	12	-1	0	-7	-1
DEC 23	47883	-390	-3	-3	11	12	-11	-8	-1
DEC 24	47884	-405	-4	6	11	-2	-10	-4	-18
DEC 25	47885	-421	4	4	6	5	-5	-4	-1
DEC 26	47886	-438	2	3	1	4	2	-3	-7
DEC 27	47887	-453	2	-1	-4	20	-1	-6	-18
DEC 28	47888	-464	-7	4	10	-2	0	-9	4
DEC 29	47889	-472	0	-1	3	8	-2	-4	10

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

D and its standard deviation s are expressed in 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	47829-47889	+34.3	10.0
PTB-CS1	47829-47889	+1.0	3.0
PTB-CS2	47829-47889	+3.4	1.5
BIPM estimate	47829-47889	+3	2