BUREAU INTERNATIONAL DES POIDS ET MESURES

Annual Report of the BIPM Time Section
Rapport annuel de la Section du temps du BIPM

Volume 5

1992

Pavillon de Breteuil
F-92312 SÈVRES Cedex, France

ISBN 92-822-2127-X
ISSN 1016-6114

Since the 1st of January 1988, the establishment of International Atomic Time, TAI, and of Coordinated Universal Time, UTC (with the exception of the determination ~~and the announcement of~~ leap seconds of UTC) has been the responsibility of the Bureau International des Poids et Mesures (BIPM) under the authority of the Comité International des Poids et Mesures (CIPM).

The determination and announcement of the dates of leap seconds of UTC are among the tasks of the International Earth Rotation Service (IERS), which is responsible for Earth rotation parameters determination and maintainance of the related celestial and terrestrial reference systems.

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PRACTICAL INFORMATION ABOUT THE BIPM TIME SECTION

The periodic publications on Time of the BIPM are the monthly Circulars T and the Annual Report of the BIPM Time Section. Some information on Time is also available by telephone line, either through the BIPM data service or through the General Electric Mark III system. The monthly Circulars T are now also sent via BITNET/INTERNET on request.

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Mr Eric Bleuzet (from May to September 1992), from the Institut Géographique National, Saint-Mandé, France.

Depuis le 1er janvier 1988, l'établissement du Temps atomique international, TAI, et du Temps universel coordonné, UTC, (à l'exception de l'annonce des secondes intercalaires de l'UTC) est placé sous la responsabilité du Bureau international des poids et mesures (BIPM) et du Comité international des poids et mesures (CIPM).

Le choix des dates et l'annonce des secondes intercalaires de l'UTC constituent quelques-unes des missions du Service international de la rotation terrestre (IERS), qui est responsable de la détermination des paramètres de la rotation terrestre et de la conservation des systèmes de référence terrestre et céleste associés.

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Renseignements pratiques sur la Section du temps du BIPM

Les publications périodiques du BIPM concernant le temps sont la Circulaire T, mensuelle, et le Rapport annuel de la Section du temps du BIPM. Certaines autres informations sur le temps sont aussi disponibles par ligne téléphonique, soit par le service de données propre à la Section du temps du BIPM, soit par le système informatique General Electric Mark III. La Circulaire T est aussi maintenant envoyée par BITNET/INTERNET sur simple demande.

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PART A

ATOMIC TIME SCALES ESTABLISHED

BY THE BIPM

PARTIE A

ECHELLES DE TEMPS ATOMIQUE ETABLIES

PAR LE BIPM

1 - Establishment of International Atomic Time and Coordinated Universal Time in 1992

International Atomic Time (TAI) and Coordinated Universal Time (UTC) are obtained from a combination of data from atomic clocks kept by about 60 laboratories spread worldwide. This data is regularly reported to the BIPM by 45 timing centres maintaining a local UTC (see Table 1, Part B), in the form of time differences UTC(k) - Clock.

An iterative algorithm produces a free atomic time scale, EAL (Echelle atomique libre) defined as a weighted average of clock readings. The processing is done in deferred-time and treats two-month blocks of data [1] [2]. The weighting procedure and clock frequency prediction are chosen so that EAL is optimized for long-term stability. No attempt is made to ensure the conformity of the EAL scale interval with the second of the International System of Units.

The duration of the scale interval of EAL is evaluated by comparison with the data of primary cesium standards, after conversion on the rotating geoid. TAI is then derived from EAL by adding a linear function of time with a convenient slope to ensure the accuracy of the TAI scale interval. The frequency offset between TAI and EAL is changed when necessary to maintain accuracy, the magnitude of the changes being of the same order as the frequency fluctuations resulting from the instability of EAL. This operation is referred to as "steering of TAI".

TAI and UTC are made available in the form of time differences with respect to the local time scales UTC(k), approximation to UTC, and TA(k), independent local atomic time.

These differences, UTC - UTC(k) and TAI - TA(k), are computed at 10-day intervals for Modified Julian Dates (MJD) ending in 9, at 0h UTC, and designated here as "standard dates".

The computation of TAI has a basic periodicity of two months. However a provisional computation is made every other month (January, March, etc.) with the data which is available. The following month, TAI is recomputed for the whole span of two months. The deviations between the provisional one-month and complete two-month solutions are usually smaller than 10 ns. This organization allows the monthly publication of results in the BIPM Circular T.

When preparing the Annual Report, the results of Circular T are revised taking into account some improvement in the data made known after the publication of Circular T. The computation is then strictly made for the six two-month intervals of the year.

2 - Time links used by the BIPM in 1992

The network of time links used by the BIPM in 1992 is non-redundant and mainly relies on the observation of GPS satellites.

2.1 GPS LINKS

Since mid-1992, 36 of the 45 centres keeping a local UTC have been equipped with GPS time receivers, have followed the international tracking schedule published by the BIPM and have regularly sent their GPS observations to the BIPM. This means that nearly all time links involved in the TAI computation are now obtained by one of the most accurate time transfer methods available and undergo a unified data treatment. Only two GPS time links are still computed outside the BIPM:

IGMA - USNO computed by IGMA
AUS - USNO computed by AUS.

The international GPS network is organized as shown in Figure 1: it features local stars on a continental scale and two long-distance links, OP-NAOT and OP-NIST, chosen because measured ionospheric delays are routinely available at the OP, the NAOT and the NIST.

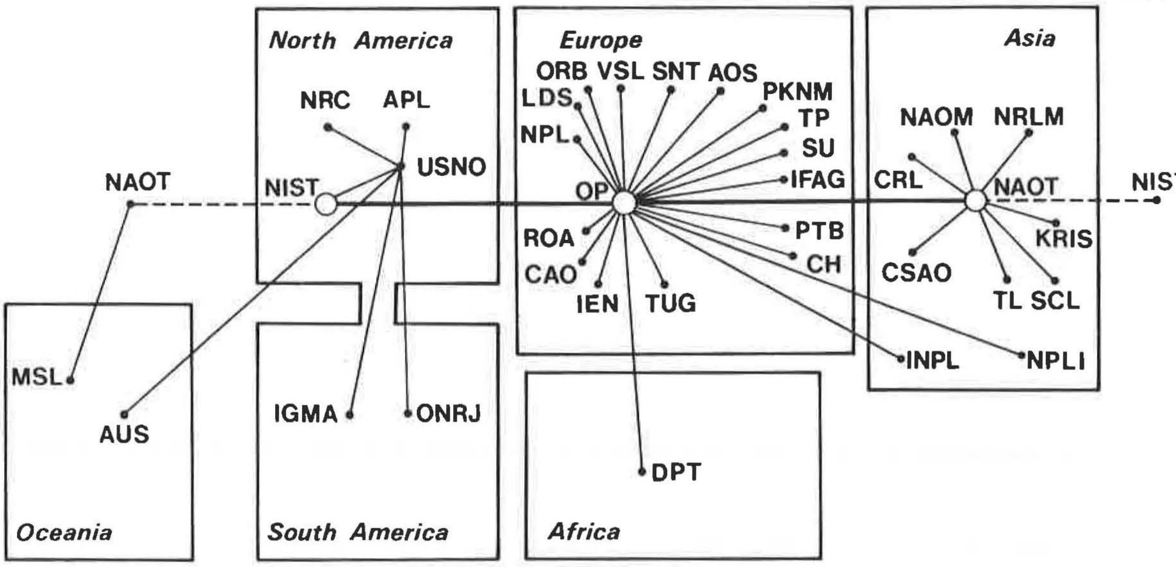

Figure 1. Organisation of the international GPS time links used for TAI computation. Network operational in July 1992.

The current computation of GPS time comparisons incorporates a number of refinements. For most links we now use strict common views (synchronization within 1s) in order to remove the clock-jitter noise brought about by the voluntary degradation (Selective Availability) of GPS signals. The degree of smoothing of rough GPS data is adjusted according to the length of the baseline between stations. It appears that the precision of one single measurement $UTC(k_1) - UTC(k_2)$ is now about 2ns for short distances and about 8ns for long distances.

Two GPS common view schedules were established and proposed by the BIPM in 1992: schedule n°19 (see Table B) implemented on 30 June 1992 (MJD 48803) and schedule n°20 (see Table C) implemented on 8 December 1992 (MJD 48964).

The quality of GPS time links is greatly improved by the use of accurate antenna coordinates. On 1990 June 12 at 0h00 UTC, the BIPM proposed the introduction of new coordinates into the GPS time receivers. There were obtained by a combination of two techniques: geodetic methods which give the relative position of the antenna with respect to the nearest IERS site, and the BIPM method of differential positioning [3] between GPS antennas. This action, which has ensured the worldwide homogeneity in the IERS Terrestrial Reference Frame (ITRF) of the coordinates of all national laboratories equipped with GPS receivers, is now continued for newly equipped laboratories and on special requests.

Since mid-1992 the BIPM has regularly retrieved precise GPS satellites ephemerides produced by the International Geodynamics Service, with a delay of a few days. The use of these precise satellite ephemerides greatly improve the precision and accuracy of GPS time links. Work has begun to prepare their implementation in current TAI computation in the course of 1993.

2.2 LORAN-C LINKS

The laboratories where only LORAN-C is received are preferably linked to laboratories where both LORAN-C and GPS are received. Simultaneous receptions of the LORAN-C signals have been organized.

The time differences of the UTC(k)'s of the laboratories are computed daily, then the values at the standard dates are evaluated by linear fit over 10 days (5 before and 5 after the standard date). Adequate corrections are applied when time or frequency steps of the UTC(k)'s are reported or found.

The following LORAN-C time comparisons were evaluated by the BIPM and were used in TAI computation in 1992:

NMC - OP
BEV - OP
FTZ - PTB
NIM - NAOT
SO - NAOT
RC - USNO.

2.3 GLONASS LINKS

From his current observations of both the GPS and GLONASS satellite systems Prof. P. Daly, University of Leeds, establishes and reports GPS time - GLONASS time. This data allows the regular publication by the BIPM of UTC - GLONASS time but was not used in TAI computation in 1992.

In 1991 and 1992, the BIPM initiated an experiment which allowed a direct comparison of GPS and GLONASS common-view time transfers [4]. This experiment has already demonstrated the feasibility of the GLONASS common-view time transfer, but also the need to establish schedules for satellite observation and unified procedures for data treatment. No regular GLONASS common-view time link was used in TAI computation in 1992.

2.4 Television links

The simultaneous reception of public television signals provides the links:

OMH - TP
ONBA - IGMA.

2.5 Two-way time transfer via geostationary satellites

For experimental purposes, two-way time transfers via geostationary satellites have been carried out in 1992, on the one hand between NIST, NRC and USNO, and on the other hand between TUG and USNO. These results were not used for TAI computation in 1992.

Note: the time link UTC(JATC) - UTC(CSAO) is obtained by internal connection.

3. Accuracy of the TAI scale interval

Table A gives the normalized frequency offsets between EAL and TAI. The relationship TAI-EAL was modified twice in 1992 by frequency offsets of 0.5×10^{-14}, in order to compensate a frequency drift of EAL with respect to the primary standards of the PTB.

4. Time scales established in retrospect

For the most demanding applications, such as millisecond pulsar timing, the BIPM issues atomic time scales in retrospect designated as TT(BIPMxx) where 1900 + xx is the year of computation [5]. The successive versions of TT(BIPMxx) are both updates, and revisions: they may differ for common dates. These time scales are available on request from the BIPM.

References

[1] B. Guinot and C. Thomas, 'Establishment of the International Atomic Time', Annual Report of the BIPM Time Section, 1988, pp. D3-D22.

[2] P. Tavella and C. Thomas, 'Comparative study of time scale algorithms', Metrologia 28, 1991, pp. 57-63.

[3] B. Guinot and W. Lewandowski, 'Improvement of the GPS time comparisons by simultaneous relative positioning of the antennas', Bull. Géod. 63, 1989, pp. 371-386.

[4] W. Lewandowski, P. Moussay, G.T. Cherenkov, N.B. Koshelyaevsky and S.B. Pushkin, 'GLONASS common-view time transfer', Proc. 7th EFTF, 1993, (accepted).

[5] B. Guinot, 'Atomic time scales for pulsar studies and other demanding applications', Astron. and Astrophys. 192, 1988, pp. 370-373.

TABLE A. DIFFERENCES BETWEEN THE NORMALIZED FREQUENCIES OF EAL AND TAI
(until January 1993)

Date	MJD	f(EAL) - f(TAI) in 10^{-13}
until 1977 Jan 1	until 43144	0
1977 Jan 1 - 1977 Apr 26	43144 - 43259	10.0
1977 Apr 26 - 1977 Jun 25	43259 - 43319	9.8
1977 Jun 25 - 1977 Aug 24	43319 - 43379	9.6
1977 Aug 24 - 1977 Oct 23	43379 - 43439	9.4
1977 Oct 23 - 1978 Oct 28	43439 - 43809	9.2
1978 Oct 28 - 1979 Jun 25	43809 - 44049	9.0
1979 Jun 25 - 1979 Aug 24	44049 - 44109	8.8
1979 Aug 24 - 1979 Oct 23	44109 - 44169	8.6
1979 Oct 23 - 1982 Apr 30	44169 - 45089	8.4
1982 Apr 30 - 1982 Jun 29	45089 - 45149	8.2
1982 Jun 29 - 1982 Aug 28	45149 - 45209	8.0
1982 Aug 28 - 1984 Feb 29	45209 - 45759	7.8
1984 Feb 29 - 1987 Apr 24	45759 - 46909	8.0
1987 Apr 24 - 1987 Dec 30	46909 - 47159	8.0125
1987 Dec 30 - 1989 Jun 22	47159 - 47699	8.0
1989 Jun 22 - 1989 Dec 29	47699 - 47889	7.95
1989 Dec 29 - 1990 Feb 27	47889 - 47949	7.90
1990 Feb 27 - 1990 Apr 28	47949 - 48009	7.85
1990 Apr 28 - 1990 Jun 27	48009 - 48069	7.80
1990 Jun 27 - 1990 Aug 26	48069 - 48129	7.75
1990 Aug 26 - 1991 Feb 22	48129 - 48309	7.70
1991 Feb 22 - 1991 Apr 23	48309 - 48369	7.625
1991 Apr 23 - 1991 Aug 31	48369 - 48499	7.55
1991 Aug 31 - 1991 Oct 30	48499 - 48559	7.50
1991 Oct 30 - 1992 Apr 27	48559 - 48739	7.45
1992 Apr 27 - 1992 Jun 26	48739 - 48799	7.40
1992 Jun 26 -	48799	7.35

As the time scales UTC and TAI differ by an integral number of seconds (see Tables 2 and 3 of Part B), UTC is necessarily subjected to the same intentional frequency adjustement as TAI.

TABLE B. INTERNATIONAL GPS TRACKING SCHEDULE N° 19 FOR MJD = 48803 (1992 JUNE 30) AT 0HUTC

This is a suggested tracking schedule for international time comparisons in common view of GPS satellites between ten areas of the globe.

Area		Participating laboratories
Europe	E	AOS, CAO, CH, IEN, IFAG, LDS, Mad*, NPL, OP, ORB, PKNM, PTB, ROA, SNT, SU, TP, TUG, VSL
East North America	ENA	AO*, APL, NRC, USNO
West North America	WNA	Gold*, NIST, WWV*
Hawaii	H	WWVH*
East Asia	EA	CRL, CSAO, KRIS, NAOM, NAOT, NRLM, SO, TL
Australia and New Zealand	A	Can*, ATC*, ORR*, MSL, NML*
India	I	NPLI
Middle East	ME	INPL
South Africa	SAF	DPT, RAO*, SAAO*
South America	SAM	IGMA, ONRJ, Kou*

* Mad, Gold, Can: JPL Deep Space Network, Madrid, Goldstone, Canberra
WWV, WWVH: NIST stations in Colorado and Hawaii
AO: Arecibo Observatory
ATC, ORR and NML: Australian laboratories (see AUS in Table 4)
RAO, SAAO: South African laboratories (see DPT in Table 4)

Other laboratories are designated by their usual acronyms.

The start times of the tracks are referenced to UTC. The suggested track duration is 15 minutes. Data taking is to start 2 minutes after the start of the track to allow time to lock on to the satellite signal. The data length is therefore 13 minutes; it has been chosen in order to ensure use of the ionospheric correction which is transmitted every 12,5 min. All the track time should be decremented 4 minutes each day, to account for the GPS sidereal orbits. The track times are chosen to maximize elevation angles between pairs of stations. The class bytes are such that in association with the satellite number they form a unique identifyer for each common view.

The European area has a heavy schedule, shared in several sub-schedules. European laboratories are contacted to ensure the coordination of sub-schedules.

TABLE B. SCHEDULE N° 19, 1992 JUNE 30 (CONT.)

*** Europe ***

Class	PRN	Start		Connects	Subschedules			
		h	m		E1	E2	E3	E4
08	24	00	00	WNA,ENA	*	*	*	*
08	3	01	36	WNA,ENA		*		
08	16	01	52	WNA,ENA	*	*	*	*
10	19	02	40	EA,ME,I	*	*	*	*
68	12	05	20	ENA,SAM		*		
10	2	05	36	EA,ME,I	*	*	*	*
00	23	06	24	ENA,WNA		*		
4C	13	06	40	SAF,ME,I				*
08	12	06	56	WNA,ENA,ME		*		
E4	12	08	00	E	*	*	*	*
48	13	08	32	ME,I,EA	*	*	*	*
19	20	08	48	ENA,WNA,ME,SAM	*	*	*	*
4C	12	09	52	SAF,ME,I				*
10	24	10	08	EA,ME,I			*	
4C	3	10	24	SAF,ME				*
00	25	10	40	ENA,WNA	*	*	*	*
00	3	11	44	ENA,ME	*	*	*	*
10	16	12	32	EA,ME,I			*	
A0	3	13	36	ME,I,EA			*	
18	28	13	52	ENA,WNA,SAM		*		
4C	23	14	24	SAF,ME,I			*	
10	17	15	12	EA,ME,I	*	*	*	*
4C	21	15	28	SAF,ME	*	*	*	*
00	11	16	16	ENA,WNA,ME	*	*	*	*
10	23	16	32	EA,ME,I	*	*	*	*
08	15	17	20	WNA,ENA,SAM	*	*	*	*
4C	28	17	36	SAF,ME,I	*	*	*	*
10	21	17	52	EA,ME,I			*	
18	2	18	08	ENA,WNA,H		*		
BC	11	19	28	ME,SAF,I			*	
00	14	20	16	ENA,WNA,SAM	*	*	*	*
10	25	21	04	EA,ME,I			*	
4C	15	21	20	SAF,ME,I				*
54	18	21	36	SAM,SAF,ME				*
08	13	22	08	WNA,ENA,SAM,ME		*		
10	14	22	56	EA,ME,I			*	
00	18	23	12	ENA,ME	*	*	*	*
4C	19	23	28	SAF,ME				*

TABLE B. SCHEDULE N° 19, 1992 JUNE 30 (CONT.)

*** E. North America ***					*** W. North America ***					*** East Asia ***				
Class	PRN	Start		Connects	Class	PRN	Start		Connects	Class	PRN	Start		Connects
		h	m				h	m				h	m	
08	24	00	00	E,WNA	08	24	00	00	E,ENA	98	28	00	16	A,I
18	16	00	16	WNA	18	16	00	16	ENA	20	3	00	32	ENA,WNA,H
20	3	00	32	EA,WNA,H	20	3	00	32	ENA,EA,H	98	25	01	04	A,H
28	17	01	20	WNA,EA,H	28	17	01	20	EA,H,ENA	28	17	01	20	WNA,H,ENA
08	3	01	36	E,WNA	08	3	01	36	E,ENA	10	19	02	40	E,ME,I
08	16	01	52	E,WNA	08	16	01	52	E,ENA	34	28	04	48	H,WNA,ENA
68	3	04	00	SAM,WNA	68	3	04	00	ENA,SAM	10	2	05	36	E,ME,I
34	28	04	48	H,WNA,EA	34	28	04	48	H,ENA,EA	28	11	05	52	WNA,ENA,H
18	17	05	04	WNA,SAM	18	17	05	04	ENA,SAM	98	14	06	40	A
68	12	05	20	SAM,E	18	21	05	36	ENA,H	20	15	08	00	ENA,WNA,H
18	21	05	36	WNA,H	28	11	05	52	EA,ENA,H	36	14	08	16	H
28	11	05	52	EA,WNA,H	00	23	06	24	E,ENA	48	13	08	32	E,ME,I
00	23	06	24	E,WNA	08	12	06	56	E,ENA,ME	98	2	08	48	A
08	12	06	56	E,WNA,ME	20	15	08	00	EA,ENA,H	28	14	09	36	WNA,ENA,H
20	15	08	00	EA,WNA,H	19	20	08	48	ENA,E,ME,SAM	10	24	10	08	E,ME,I
19	20	08	48	WNA,E,ME,SAM	28	14	09	36	EA,ENA,H	ED	13	10	40	EA
28	14	09	36	EA,WNA,H	00	25	10	40	E,ENA	98	13	12	00	A
00	25	10	40	E,WNA	28	18	12	16	EA,ENA,H	28	18	12	16	WNA,ENA,H
00	3	11	44	E,ME	18	28	13	52	ENA,E,SAM	10	16	12	32	E,ME,I
28	18	12	16	EA,WNA,H	18	18	14	08	ENA	A0	3	13	36	ME,I,E
18	28	13	52	WNA,E,SAM	18	19	14	24	ENA,H	10	17	15	12	E,ME,I
18	18	14	08	WNA	68	18	15	44	ENA,SAM	98	12	16	16	A
18	19	14	24	WNA,H	00	11	16	16	E,ENA,ME	10	23	16	32	E,ME,I
68	18	15	44	SAM,WNA	08	15	17	20	E,ENA,SAM	10	21	17	52	E,ME,I
00	11	16	16	E,WNA,ME	18	2	18	08	ENA,H,E	98	20	19	12	A
08	15	17	20	E,WNA,SAM	34	13	19	44	H,ENA	20	12	20	00	ENA,WNA,H
18	2	18	08	WNA,H,E	20	12	20	00	ENA,EA,H	10	25	21	04	E,ME,I
34	13	19	44	WNA,H	00	14	20	16	E,ENA,SAM	28	20	22	40	WNA,H,ENA
20	12	20	00	EA,WNA,H	18	24	21	20	ENA,H	10	14	22	56	E,ME,I
00	14	20	16	E,WNA,SAM	08	13	22	08	E,ENA,SAM,ME					
18	24	21	20	WNA,H	28	20	22	40	EA,H,ENA					
08	13	22	08	E,WNA,SAM,ME										
28	20	22	40	WNA,EA,H										
00	18	23	12	E,ME										

TABLE B. SCHEDULE N° 19, 1992 JUNE 30 (CONT.)

*** Hawaii ***					*** Australia ***					*** India ***				
Class	PRN	Start		Connects	Class	PRN	Start		Connects	Class	PRN	Start		Connects
		h	m				h	m				h	m	
20	3	00	32	ENA,EA,WNA	98	28	00	16	EA,I	98	28	00	16	EA,A
98	25	01	04	EA,A	98	25	01	04	EA,H	10	19	02	40	E,EA,ME
28	17	01	20	WNA,EA,ENA	98	14	06	40	EA	10	2	05	36	E,EA,ME
34	28	04	48	WNA,ENA,EA	F9	19	08	16	A	4C	13	06	40	E,SAF,ME
18	21	05	36	ENA,WNA	98	2	08	48	EA	48	13	08	32	E,ME,EA
28	11	05	52	EA,WNA,ENA	3C	19	10	40	H	4C	12	09	52	E,SAF,ME
20	15	08	00	EA,ENA,WNA	98	13	12	00	EA	10	24	10	08	E,EA,ME
36	14	08	16	EA	F9	13	13	20	A	10	16	12	32	E,EA,ME
28	14	09	36	EA,WNA,ENA	F9	12	15	12	A	A0	3	13	36	ME,E,EA
3C	19	10	40	A	98	12	16	16	EA	4C	23	14	24	E,SAF,ME
28	18	12	16	EA,WNA,ENA	98	20	19	12	EA	10	17	15	12	E,EA,ME
18	19	14	24	ENA,WNA	F9	3	20	16	A	10	23	16	32	E,EA,ME
18	2	18	08	ENA,WNA,E	F9	23	21	20	A	4C	28	17	36	E,SAF,ME
34	13	19	44	WNA,ENA	CC	11	22	56	SAF	10	21	17	52	E,EA,ME
20	12	20	00	ENA,EA,WNA						BC	11	19	28	ME,SAF,E
18	24	21	20	ENA,WNA						10	25	21	04	E,EA,ME
28	20	22	40	WNA,EA,ENA						4C	15	21	20	E,SAF,ME
										10	14	22	56	E,EA,ME

TABLE B. SCHEDULE N° 19, 1992 JUNE 30 (CONT.)

*** Middle East ***

Class	PRN	Start h m	Connects
BC	14	00 32	SAF
10	19	02 40	E,EA,I
10	2	05 36	E,EA,I
4C	13	06 40	E,SAF,I
08	12	06 56	E,WNA,ENA
48	13	08 32	E,I,EA
19	20	08 48	ENA,WNA,E,SAM
4C	12	09 52	E,SAF,I
10	24	10 08	E,EA,I
4C	3	10 24	E,SAF
00	3	11 44	E,ENA
10	16	12 32	E,EA,I
A0	3	13 36	I,E,EA
4C	23	14 24	E,SAF,I
10	17	15 12	E,EA,I
4C	21	15 28	E,SAF
00	11	16 16	E,ENA,WNA
10	23	16 32	E,EA,I
4C	28	17 36	E,SAF,I
10	21	17 52	E,EA,I
BC	11	19 28	SAF,E,I
10	25	21 04	E,EA,I
4C	15	21 20	E,SAF,I
54	18	21 36	E,SAM,SAF
08	13	22 08	E,WNA,ENA,SAM
10	14	22 56	E,EA,I
00	18	23 12	E,ENA
4C	19	23 28	E,SAF

*** South Africa ***

Class	PRN	Start h m	Connects
BC	14	00 32	ME
4C	13	06 40	E,ME,I
4C	12	09 52	E,ME,I
4C	3	10 24	E,ME
4C	23	14 24	E,ME,I
4C	21	15 28	E,ME
4C	28	17 36	E,ME,I
BC	11	19 28	ME,E,I
CA	19	20 32	SAM
4C	15	21 20	E,ME,I
54	18	21 36	E,SAM,ME
CC	11	22 56	A
4C	19	23 28	E,ME

*** South America ***

Class	PRN	Start h m	Connects
F8	13	00 32	SAM
68	3	04 00	ENA,WNA
F8	12	04 16	SAM
18	17	05 04	ENA,WNA
68	12	05 20	ENA,E
19	20	08 48	ENA,WNA,E,ME
F8	11	13 20	SAM
18	28	13 52	ENA,WNA,E
68	18	15 44	ENA,WNA
08	15	17 20	E,WNA,ENA
00	14	20 16	E,ENA,WNA
CA	19	20 32	SAF
54	18	21 36	E,SAF,ME
08	13	22 08	E,WNA,ENA,ME

TABLE C. INTERNATIONAL GPS TRACKING SCHEDULE N° 20, FOR MJD = 48964 (1992 DECEMBER 8) AT 0hUTC

This is a suggested tracking schedule for international time comparisons in common view of GPS satellites between ten areas of the globe.

Area		Participating laboratories
Europe	E	AOS, CAO, CH, IEN, IFAG, LDS, Mad*, NPL, OP, ORB, PKNM, PTB, ROA, RGO, SNT, SU, TP, TUG, VSL
East North America	ENA	AO*, APL, NRC, USNO
West North America	WNA	Gold*, NIST, WWV*
Hawaii	H	WWVH*
East Asia	EA	CRL, CSAO, KRIS, NAOM, NAOT, NRLM, SCL, SO, TL
Australia and New Zealand	A	Can*, ATC*, ORR*, MSL, NML*
India	I	NPLI
Middle East	ME	INPL
South Africa	SAF	DPT, RAO*, SAAO*
South America	SAM	IGMA, ONRJ,Kou*

* Mad, Gold, Can: JPL Deep Space Network, Madrid, Goldstone, Canberra
WWV, WWVH: NIST stations in Colorado and Hawaii
AO: Arecibo Observatory
Kou: CNES Kourou Center
ATC, ORR and NML: Australian laboratories (see AUS in Table 4)
RAO, SAAO: South African laboratories (see DPT in Table 4

Other laboratories are designated by their usual acronyms.

The start times of the tracks are referenced to UTC. The suggested track duration is 15 minutes. Data taking is to start 2 minutes after the start of the track to allow time to lock on to the satellite signal. The data length is therefore 13 minutes; it has been chosen in order to ensure use of the ionospheric correction which is transmitted every 12,5 min. All the track time should be decremented 4 minutes each day, to account for the GPS sidereal orbits. The track times are chosen to maximize elevation angles between pairs of stations. The class bytes are such that in association with the satellite number they form a unique identifyer for each common view.

The European area has a heavy schedule, shared in several sub-schedules. European laboratories are contacted to ensure the coordination of sub-schedules.

TABLE C. SCHEDULE N° 20, 1992 DECEMBER 8 (CONT.)

*** Europe ***

Class	PRN	Start h	Start m	Connects	E1	E2	E3	E4
00	25	00	00	ENA,WNA	*	*	*	*
00	3	00	48	ENA,ME	*	*	*	*
10	16	01	36	EA,ME,I			*	
A0	3	02	40	ME,I,EA			*	
18	28	02	56	ENA,WNA,SAM		*		
4C	23	03	12	SAF,ME,I			*	
10	17	04	00	EA,ME,I	*	*	*	*
4C	21	04	16	SAF,ME	*	*	*	*
10	23	05	20	EA,ME,I	*	*	*	*
00	11	05	36	ENA,WNA,ME	*	*	*	*
08	15	06	40	WNA,ENA,SAM	*	*	*	*
4C	28	06	56	SAF,ME,I	*	*	*	*
18	2	07	12	ENA,WNA,H		*		
10	21	07	28	EA,ME,I			*	
BC	11	08	32	ME,SAF,I				*
00	14	09	20	ENA,WNA,SAM	*	*	*	*
10	25	10	08	EA,ME,I			*	
4C	15	10	24	SAF,ME,I				*
54	18	10	40	SAM,SAF,ME				*
08	13	11	28	WNA,ENA,SAM,ME		*		
10	14	12	00	EA,ME,I			*	
00	18	12	16	ENA,ME	*	*	*	*
08	24	12	32	WNA,ENA	*	*	*	*
4C	19	12	48	SAF,ME				*
08	3	14	40	WNA,ENA		*		
08	16	14	56	WNA,ENA	*	*	*	*
10	19	15	44	EA,ME,I	*	*	*	*
08	26	16	32	WNA,ENA	*	*	*	*
10	27	16	48	EA,ME,I	*	*	*	*
68	12	18	24	ENA,SAM		*		
10	2	18	40	EA,ME,I	*	*	*	*
00	23	19	12	ENA,WNA		*		
4C	13	19	28	SAF,ME,I				*
08	12	20	00	WNA,ENA,ME		*		
E4	12	21	04	E	*	*	*	*
48	13	21	36	ME,I,EA	*	*	*	*
19	20	21	52	ENA,WNA,ME,SAM	*	*	*	*
10	24	22	40	EA,ME,I			*	
4C	12	22	56	SAF,ME,I				*
4C	3	23	12	SAF,ME				*

TABLE C. SCHEDULE N° 20, 1992 DECEMBER 8 (CONT.)

*** E. North America ***					*** W. North America ***					*** East Asia ***				
Class	PRN	Start		Connects	Class	PRN	Start		Connects	Class	PRN	Start		Connects
		h	m				h	m				h	m	
00	25	00	00	E,WNA	00	25	00	00	E,ENA	98	13	00	48	A
00	3	00	48	E,ME	28	18	01	04	EA,ENA,H	28	18	01	04	WNA,ENA,H
28	18	01	04	EA,WNA,H	18	18	02	40	ENA	10	16	01	36	E,ME,I
18	18	02	40	WNA	18	28	02	56	ENA,E,SAM	98	26	01	52	A,I
18	28	02	56	WNA,E,SAM	18	19	03	12	ENA,H	A0	3	02	40	ME,I,E
18	19	03	12	WNA,H	18	27	03	44	ENA,H,EA	18	27	03	44	ENA,WNA,H
18	27	03	44	WNA,H,EA	68	18	04	32	ENA,SAM	10	17	04	00	E,ME,I
68	18	04	32	SAM,WNA	00	11	05	36	E,ENA,ME	10	23	05	20	E,ME,I
00	11	05	36	E,WNA,ME	28	26	06	24	EA,H	98	12	05	36	A
08	15	06	40	E,WNA,SAM	08	15	06	40	E,ENA,SAM	28	26	06	24	WNA,H
18	2	07	12	WNA,H,E	18	2	07	12	ENA,H,E	10	21	07	28	E,ME,I
34	13	08	48	WNA,H	34	13	08	48	H,ENA	98	20	08	16	A
20	12	09	04	EA,WNA,H	20	12	09	04	ENA,EA,H	20	12	09	04	ENA,WNA,H
00	14	09	20	E,WNA,SAM	00	14	09	20	E,ENA,SAM	10	25	10	08	E,ME,I
18	24	10	24	WNA,H	18	24	10	24	ENA,H	28	20	11	44	WNA,H,ENA
08	13	11	28	E,WNA,SAM,ME	08	13	11	28	E,ENA,SAM,ME	10	14	12	00	E,ME,I
28	20	11	44	WNA,EA,H	28	20	11	44	EA,H,ENA	98	28	13	04	A,I
00	18	12	16	E,ME	08	24	12	32	E,ENA	20	3	13	36	ENA,WNA,H
08	24	12	32	E,WNA	18	16	13	20	ENA	98	25	14	08	A,H
18	16	13	20	WNA	20	3	13	36	ENA,EA,H	28	17	14	24	WNA,H,ENA
20	3	13	36	EA,WNA,H	28	17	14	24	EA,H,ENA	10	19	15	44	E,ME,I
28	17	14	24	WNA,EA,H	08	3	14	40	E,ENA	10	27	16	48	E,ME,I
08	3	14	40	E,WNA	08	16	14	56	E,ENA	34	28	17	36	H,WNA,ENA
08	16	14	56	E,WNA	08	26	16	32	E,ENA	10	2	18	40	E,ME,I
08	26	16	32	E,WNA	68	3	17	04	ENA,SAM	28	11	18	56	WNA,ENA,H
68	3	17	04	SAM,WNA	34	28	17	36	H,ENA,EA	98	14	19	28	A
34	28	17	36	H,WNA,EA	18	17	18	08	ENA,SAM	20	15	21	04	ENA,WNA,H
18	17	18	08	WNA,SAM	18	21	18	40	ENA,H	36	14	21	20	H
68	12	18	24	SAM,E	28	11	18	56	EA,ENA,H	48	13	21	36	E,ME,I
18	21	18	40	WNA,H	00	23	19	12	E,ENA	98	2	21	52	A
28	11	18	56	EA,WNA,H	08	12	20	00	E,ENA,ME	28	14	22	24	WNA,ENA,H
00	23	19	12	E,WNA	20	15	21	04	EA,ENA,H	10	24	22	40	E,ME,I
08	12	20	00	E,WNA,ME	19	20	21	52	ENA,E,ME,SAM	ED	13	23	28	EA
20	15	21	04	EA,WNA,H	28	14	22	24	EA,ENA,H					
19	20	21	52	WNA,E,ME,SAM										
28	14	22	24	EA,WNA,H										

TABLE C. SCHEDULE N° 20, 1992 DECEMBER 8 (CONT.)

*** Hawaii ***				*** Australia ***				*** India ***			
Class	PRN	Start	Connects	Class	PRN	Start	Connects	Class	PRN	Start	Connects
		h m				h m				h m	
28	18	01 04	EA,WNA,ENA	98	13	00 48	EA	10	16	01 36	E,EA,ME
18	19	03 12	ENA,WNA	98	26	01 52	EA,I	98	26	01 52	EA,A
18	27	03 44	ENA,WNA,EA	F9	13	02 24	A	A0	3	02 40	ME,E,EA
28	26	06 24	WNA,EA	F9	12	04 16	A	4C	23	03 12	E,SAF,ME
18	2	07 12	ENA,WNA,E	98	12	05 36	EA	10	17	04 00	E,EA,ME
34	13	08 48	WNA,ENA	98	20	08 16	EA	10	23	05 20	E,EA,ME
20	12	09 04	ENA,EA,WNA	F9	3	09 20	A	4C	28	06 56	E,SAF,ME
18	24	10 24	ENA,WNA	F9	23	10 24	A	10	21	07 28	E,EA,ME
28	20	11 44	WNA,EA,ENA	CC	11	12 00	SAF	BC	11	08 32	ME,SAF,E
20	3	13 36	ENA,EA,WNA	98	28	13 04	EA,I	10	25	10 08	E,EA,ME
98	25	14 08	EA,A	98	25	14 08	EA,H	4C	15	10 24	E,SAF,ME
28	17	14 24	WNA,EA,ENA	98	14	19 28	EA	10	14	12 00	E,EA,ME
34	28	17 36	WNA,ENA,EA	F9	19	21 04	A	98	28	13 04	EA,A
18	21	18 40	ENA,WNA	98	2	21 52	EA	10	19	15 44	E,EA,ME
28	11	18 56	EA,WNA,ENA	F9	27	22 56	A	10	27	16 48	E,EA,ME
20	15	21 04	EA,ENA,WNA	3C	19	23 44	H	10	2	18 40	E,EA,ME
36	14	21 20	EA					4C	13	19 28	E,SAF,ME
28	14	22 24	EA,WNA,ENA					48	13	21 36	E,ME,EA
3C	19	23 44	A					10	24	22 40	E,EA,ME
								4C	12	22 56	E,SAF,ME

TABLE C. SCHEDULE N° 20, 1992 DECEMBER 8 (CONT.)

*** Middle East ***

Class	PRN	Start h	Start m	Connects
00	3	00	48	E,ENA
10	16	01	36	E,EA,I
A0	3	02	40	I,E,EA
4C	23	03	12	E,SAF,I
10	17	04	00	E,EA,I
4C	21	04	16	E,SAF
10	23	05	20	E,EA,I
00	11	05	36	E,ENA,WNA
4C	28	06	56	E,SAF,I
10	21	07	28	E,EA,I
BC	11	08	32	SAF,E,I
10	25	10	08	E,EA,I
4C	15	10	24	E,SAF,I
54	18	10	40	E,SAM,SAF
08	13	11	28	E,WNA,ENA,SAM
10	14	12	00	E,EA,I
00	18	12	16	E,ENA
4C	19	12	48	E,SAF
BC	14	13	20	SAF
10	19	15	44	E,EA,I
10	27	16	48	E,EA,I
10	2	18	40	E,EA,I
4C	13	19	28	E,SAF,I
08	12	20	00	E,WNA,ENA
48	13	21	36	E,I,EA
19	20	21	52	ENA,WNA,E,SAM
10	24	22	40	E,EA,I
4C	12	22	56	E,SAF,I
4C	3	23	12	E,SAF

*** South Africa ***

Class	PRN	Start h	Start m	Connects
4C	23	03	12	E,ME,I
4C	21	04	16	E,ME
4C	28	06	56	E,ME,I
BC	11	08	32	ME,E,I
CA	19	09	36	SAM
4C	15	10	24	E,ME,I
54	18	10	40	E,SAM,ME
CC	11	12	00	A
4C	19	12	48	E,ME
BC	14	13	20	ME
4C	13	19	28	E,ME,I
4C	12	22	56	E,ME,I
4C	3	23	12	E,ME

*** South America ***

Class	PRN	Start h	Start m	Connects
F8	11	02	24	SAM
18	28	02	56	ENA,WNA,E
68	18	04	32	ENA,WNA
08	15	06	40	E,WNA,ENA
00	14	09	20	E,ENA,WNA
CA	19	09	36	SAF
54	18	10	40	E,SAF,ME
08	13	11	28	E,WNA,ENA,ME
F8	13	13	36	SAM
68	3	17	04	ENA,WNA
F8	12	17	20	SAM
18	17	18	08	ENA,WNA
68	12	18	24	ENA,E
19	20	21	52	ENA,WNA,E,ME

PARTIE A, VERSION FRANÇAISE

1. ETABLISSEMENT DU TEMPS ATOMIQUE INTERNATIONAL ET DU TEMPS UNIVERSEL COORDONNE EN 1992

Le Temps atomique international (TAI) et le Temps universel coordonné (UTC) sont obtenus par une combinaison de données d'horloges atomiques conservées par environ 60 laboratoires répartis dans le monde entier. Ces données sont fournies régulièrement au BIPM par 45 laboratoires de temps qui maintiennent un UTC local (voir le tableau 1 de la partie B), sous la forme de differences de temps UTC(k) - Horloge.

Un algorithme itératif qui traite en temps différé des blocs de 2 mois de données [1] [2], produit une "échelle atomique libre", EAL, définie comme étant une moyenne pondérée de lectures d'horloges. Le choix de la pondération et du mode de prédiction de fréquence optimise la stabilité de l'EAL à long terme. Il n'est pas tenté d'assurer la conformité de l'intervalle unitaire de l'EAL avec la seconde du Système international d'unités.

La durée de l'intervalle unitaire de l'EAL est évaluée par comparaison aux données d'étalons de fréquence à césium primaires, après conversion sur le géoïde en rotation. Ensuite le TAI se déduit de l'EAL par l'addition d'une fonction linéaire du temps dont la pente est convenablement choisie pour assurer l'exactitude de l'intervalle unitaire du TAI. Le décalage de fréquence entre le TAI et l'EAL est changé quand c'est nécessaire pour maintenir l'exactitude, les changements ayant le même ordre de grandeur que les fluctuations de fréquence qui résultent de l'instabilité de l'EAL. Cette opération est désignée par l'expression "pilotage du TAI".

Le TAI et l'UTC sont disponibles sous forme de différences de temps avec les échelles locales de temps UTC(k), approximation de UTC, et TA(k), temps atomique local indépendant.

Les différences UTC - UTC(k) et TAI - TA(k) sont calculées de 10 jours en 10 jours pour les dates juliennes modifiées (MJD) se terminant par 9, à 0hUTC, "dates normales".

Le calcul du TAI doit être fait, en principe, tous les deux mois. Mais un calcul provisoire est fait un mois sur deux (pour janvier, mars, etc.) avec les données disponibles. Le mois suivant, le calcul du TAI est repris pour une durée de deux mois. L'écart entre les résultats des calculs provisoire et complet est ordinairement inférieur à 10 ns. Cette organisation permet la publication mensuelle des résultats dans la Circulaire T du BIPM.

Quand le Rapport annuel est préparé, les résultats de la circulaire T sont révisés, compte-tenu des améliorations de données, connues après la publication de la Circulaire T. Les calculs sont alors strictement faits par période de deux mois.

2. LIAISONS HORAIRES UTILISEES PAR LE BIPM EN 1992

Le système des liaisons horaires utilisé par le BIPM en 1992 est non-redondant. Il repose principalement sur l'observation des satellites du GPS.

2.1 COMPARAISON DE TEMPS PAR LE SYSTEME DE SATELLITES DU GPS

Depuis le milieu de l'année 1992, 36 des 45 laboratoires qui maintiennent un UTC local, sont équipés de récepteurs du temps du GPS, suivent le programme de poursuite des satellites du GPS, produit par le BIPM, et envoient régulièrement leurs données au BIPM. Ceci signifie que presque toutes les comparaisons horaires utilisées pour le calcul du TAI sont obtenues par l'une des méthodes les plus exactes et résultent d'un traitement unifié des données. On ne dénombre que deux liaisons horaires, utilisant le GPS, qui ne soient pas calculées par le BIPM. Il s'agit de:

	IGMA - USNO	calculé par IGMA
et	AUS - USNO	calculé par AUS.

Le réseau international de comparaisons horaires utilisant le GPS est représenté sur la figure 1 (page A-4). Il s'organise en plusieurs étoiles, au niveau des continents, et en deux liaisons à longue distance, OP-NAOT et OP-NIST, choisies parce que des données de retards ionosphériques mesurés sont disponibles à l'OP, au NAOT et au NIST.

Les calculs courants des comparaisons horaires par le GPS comportent un certain nombre de raffinements. Pour la plupart des liaisons on utilise des observations en vues simultanées strictes, c'est-à-dire synchronisées à la seconde près, ceci afin de supprimer la dégradation des signaux des horloges embarquées, due à l'implantation de "l'accés sélectif". Le degré de lissage appliqué aux données brutes dépend de la longueur de la ligne de base entre les stations. Il s'avère que la précision de lecture de la différence temporelle $UTC(k_1) - UTC(k_2)$ est de l'ordre de 2ns pour les courtes distances et de l'ordre de 8ns pour les longues distances.

Deux programmes internationaux de vues simultanées du GPS ont été établis et proposés par le BIPM en 1992: le programme n°19 (voir le tableau B, page A-9), mis en oeuvre le 30 juin 1992, et le programme n°20 (voir le tableau C, page A-15) mis en oeuvre le 8 décembre 1992.

La qualité des comparaisons horaires par le GPS est largement améliorée si les coordonnées d'antennes sont connues avec précision. Le BIPM a suggéré de corriger les coordonnées d'antennes introduites dans les récepteurs GPS le 12 juin 1990, à 0h00 UTC. Ces coordonnées plus exactes avaient été obtenues grâce à deux techniques : des méthodes géodésiques qui donnent la position de l'antenne par rapport au site IERS le plus proche, et la méthode de positionnement différentiel développée par le BIPM [3]. On continue cette homogénéisation mondiale des coordonnées d'antennes, réalisée dans le système de référence terrestre de l'IERS, pour les laboratoires nouvellement équipés de récepteurs de temps du GPS et pour d'autres centres qui en font la demande.

Depuis le milieu de l'année 1992, le BIPM recupère régulièrement les éphémérides précises des satellites du GPS, produites par l'IGS. Leur delai d'accès est de quelques jours. L'utilisation de ces éphémérides précises permet d'améliorer considérablement la précision et l'exactitude des comparaisons horaires par le GPS. Leur introduction dans les calculs courants du TAI est en préparation et devrait intervenir dans le courant de l'année 1993.

2.2 Comparaison de temps par le LORAN-C

Les laboratoires qui n'effectuent que la réception des signaux du LORAN-C sont, de préférence, liés aux laboratoires capables de fournir des données du Loran-C et du GPS. Des réceptions simultanées des signaux du LORAN-C ont été organisées.

Les comparaisons horaires entre les UTC(k) des laboratoires sont calculées quotidiennement, puis l'on en fait une estimation aux dates normales, 0hUTC, par application d'une régression linéaire sur 10 valeurs, correspondant aux 10 jours entourant la date normale. On applique aussi les corrections adéquates quand des sauts de temps ou de fréquence des UTC(k) sont signalés ou découverts.

En 1992, le BIPM a calculé et utilisé dans les calculs courants du TAI, les comparaisons horaires par LORAN-C suivantes:

NMC - OP
BEV - OP
FTZ - PTB
NIM - NAOT
SO - NAOT
RC - USNO.

2.3 Comparaison de temps par le systeme de satellites du GLONASS

Le Professeur P. Daly, de l'Université de Leeds, déduit de ses observations habituelles des deux systèmes de satellites GPS et GLONASS, des valeurs de comparaisons horaires entre les temps du GPS et du GLONASS. Ces données permettent au BIPM de publier régulièrement des différences de temps entre l'UTC et le temps du GLONASS, mais ne furent pas utilisées dans les calculs courants du TAI durant l'année 1992.

En 1991 et 1992, le BIPM débuta une expérience visant à comparer les résultats obtenus par la méthode des vues simultanées appliquée au GPS et au GLONASS [4]. Cette expérience a déjà montré la faisabilité de la méthode des vues simultanées de satellites du GLONASS, mais aussi le besoin d'établir des programmes d'observation et des procédés unifiés de traitement de données. Aucune donnée d'observation du GLONASS en vues simultanées n'a été utilisée dans les calculs courants du TAI en 1992.

2.4 Comparaison de temps par television

La réception simultanée des impulsions de la télévision publique fournit des valeurs pour deux comparaisons horaires utilisées dans l'établissement du TAI:

OMH - TP
ONBA - IGMA.

2.5 Comparaison de temps a deux voies

Des comparaisons de temps par la méthode des deux voies utilisant un satellite géostationnaire ont été réalisées à titre expérimental, d'une part entre le NIST, le NRC et l'USNO, d'autre part entre le TUG et l'USNO. Les résultats de ces expériences n'ont pas été utilisés pour le calcul du TAI en 1992.

Note: la comparaison horaire UTC(JATC) - UTC(CSAO) est obtenue par connection interne.

3. Exactitude de l'intervalle unitaire du TAI

Le tableau A (texte anglais, page A-7) donne le décalage de fréquence entre le TAI et l'EAL. La relation entre le TAI et l'EAL a été modifiée deux fois en 1992, par des décalages de fréquence de $0,5 \times 10^{-14}$, afin de compenser une dérive de fréquence de l'EAL par rapport aux étalons primaires de la PTB.

4. Echelles de temps etablies retrospectivement

Pour les applications les plus exigeantes, comme le chronométrage des pulsars milliseconde, le BIPM produit des échelles de temps rétrospectivement, désignées par TT(BIPMxx), 1900 + xx étant l'année du calcul [5]. Les versions successives de TT(BIPMxx) ne sont pas seulement des mises à jour, mais aussi des révisions, de sorte qu'elles peuvent différer pour les dates communes. Ces échelles de temps sont disponibles sur demande faite au BIPM.

Les références sont données dans le texte anglais (page A-6).

PART B

TABLE OF RESULTS

PARTIE B

TABLEAUX DE RESULTATS

TABLE 1. ACRONYMS AND LOCATIONS OF THE TIMING CENTRES WHICH MAINTAIN A LOCAL APPROXIMATION OF UTC, UTC(k), OR/AND AN INDEPENDENT LOCAL TIME SCALE, TA(k), AND WHICH REPORTED TO THE BIPM REGULAR CLOCK COMPARISON DATA IN 1992.

AOS	Astronomiczne Obserwatorium Szerokościowe, Borowiec, Polska
APL	Applied Physics Laboratory, Laurel, MA, USA
AUS	Consortium of laboratories in Australia
BEV	Bundesamt für Eich - und Vermessungswesen, Wien, Oesterreich
CAO	Cagliari Astronomical Observatory , Cagliari, Italia
CH	Consortium of laboratories in Switzerland
CRL	Communications Research Laboratory, Tokyo, Japan
CSAO	Shaanxi Astronomical Observatory, Lintong, P.R. China
DPT	Division of Production Technology, CSIR, Pretoria, South Africa
F	Commission Nationale de l'Heure, Paris, France
FTZ	Fernmeldetechnisches Zentralamt, Darmstadt, Deutschland
IEN	Istituto Elettrotecnico Nazionale Galileo Ferraris, Torino, Italia
IFAG	Institut für Angewandte Geodäsie, Frankfurt am Main, Deutschland
IGMA	Instituto Geografico Militar, Buenos-Aires, Argentina
INPL	National Physical Laboratory, Jerusalem, Israel
JATC	Joint Atomic Time Commission, Lintong, P.R. China
KRIS	Korea Research Institute of Standards and Science, Taejon, Rep. of Korea
LDS	The University of Leeds, Leeds, United Kingdom
MSL (1)	Measurement Standards Laboratory, Lower Hutt, New Zealand
NAOM	National Astronomical Observatory, Misuzawa, Japan
NAOT(2)	National Astronomical Observatory, Tokyo, Japan
NIM	National Institute of Metrology, Beijing, P.R. China
NIST	National Institute of Standards and Technology, Boulder, CO, USA
NMC	National Metrological Center, Sofiya, Bulgaria
NPL	National Physical Laboratory, Teddington, United Kingdom
NPLI	National Physical Laboratory, New-Delhi, India
NRC	National Research Council of Canada, Ottawa, Canada
NRLM	National Research Laboratory of Metrology, Tsukuba, Japan
OMH	Orszagos Mérésügyi Hivatal, Budapest, Hungary
ONBA	Observatorio Naval, Buenos-Aires, Argentina
ONRJ	Observatorio Nacional, Rio de Janeiro, Brazil
OP	Observatoire de Paris, Paris, France
ORB	Observatoire Royal de Belgique, Bruxelles, Belgique

(1) Formerly PEL

(2) Formerly TAO

TABLE 1. ACRONYMS AND LOCATIONS OF THE TIMING CENTRES WHICH MAINTAIN A LOCAL APPROXIMATION OF UTC, UTC(k), OR/AND AN INDEPENDENT LOCAL TIME SCALE, TA(k), AND WHICH REPORTED TO THE BIPM REGULAR CLOCK COMPARISON DATA IN 1992. (CONT.)

PKNM	Polski Komitet Normalizacji Miar i Jakości, Warszawa, Polska
PTB	Physikalisch-Technische Bundesanstalt, Braunschweig, Deutschland
RC	Comité Estatal de Normalizacion, Habana, Cuba
ROA	Real Instituto y Observatorio de la Armada, San Fernando, Espana
SCL	Standards and Calibration Laboratory, Wan Chai, Hong Kong
SNT	Swedish National Time and Frequency Laboratory, Stockholm, Sweden
SO	Shanghai Observatory, Shanghai, P.R. China
SU	National Scientific and Research Institute for Physical and Radiotechnical Measurements, VNIIFTRI, Mendeleevo, Federation of Russia
TL	Telecommunication Laboratories, Chung-Li, Taiwan, China
TP	Ústav Radiotechniky a Elektroniky ČSAV, Praha, Czech Republic Astronomický ústav ČSAV, Praha, Czech Republic
TUG	Technische Universität, Graz, Oesterreich
USNO	U.S. Naval Observatory, Washington D.C., USA
VSL	Van Swinden Laboratorium, Delft, Nederland
YUZM	Bureau fédéral des Mesures et Métaux précieux, Beograd, Yougoslavia

TABLE 2. FREQUENCY OFFSETS AND STEP ADJUSTEMENTS OF UTC, UNTIL 1993 JUNE 30

DATE (AT 0hUTC)	OFFSETS	STEPS
1961 Jan. 1	-150×10^{-10}	
1961 Aug. 1	"	+0.050 s
1962 Jan. 1	-130×10^{-10}	
1963 Nov. 1	"	-0.100 s
1964 Jan. 1	-150×10^{-10}	
1964 Apr. 1	"	-0.100 s
1964 Sep. 1	"	-0.100 s
1965 Jan. 1	"	-0.100 s
1965 Mar. 1	"	-0.100 s
1965 Jul. 1	"	-0.100 s
1965 Sep. 1	"	-0.100 s
1966 Jan. 1	-300×10^{-10}	
1968 Feb. 1	"	+0.100 s
1972 Jan. 1	0	-0.107 7580 s

DATE (AT 0hUTC)	OFFSETS	STEPS
1972 Jul. 1	0	-1 s
1973 Jan. 1	"	-1 s
1974 Jan. 1	"	-1 s
1975 Jan. 1	"	-1 s
1976 Jan. 1	"	-1 s
1977 Jan. 1	"	-1 s
1978 Jan. 1	"	-1 s
1979 Jan. 1	"	-1 s
1980 Jan. 1	"	-1 s
1981 Jul. 1	"	-1 s
1982 Jul. 1	"	-1 s
1983 Jul. 1	"	-1 s
1985 Jul. 1	"	-1 s
1988 Jan. 1	"	-1 s
1990 Jan. 1	"	-1 s
1991 Jan. 1	"	-1 s
1992 Jul. 1	"	-1 s

TABLE 3. RELATIONSHIP BETWEEN TAI AND UTC, UNTIL 1993 JUNE 30

Limits of validity (at 0hUTC)	TAI - UTC (in seconds)
1961 Jan. 1 - 1961 Aug. 1	1.422 8180 + (MJD - 37300) x 0.001 296
1961 Aug. 1 - 1962 Jan. 1	1.372 8180 + " "
1962 Jan. 1 - 1963 Nov. 1	1.845 8580 + (MJD - 37665) x 0.001 1232
1963 Nov. 1 - 1964 Jan. 1	1.945 8580 + " "
1964 Jan. 1 - 1964 Apr. 1	3.240 1300 + (MJD - 38761) x 0.001 296
1964 Apr. 1 - 1964 Sep. 1	3.340 1300 + " "
1964 Sep. 1 - 1965 Jan. 1	3.440 1300 + " "
1965 Jan. 1 - 1965 Mar. 1	3.540 1300 + " "
1965 Mar. 1 - 1965 Jul. 1	3.640 1300 + " "
1965 Jul. 1 - 1965 Sep. 1	3.740 1300 + " "
1965 Sep. 1 - 1966 Jan. 1	3.840 1300 + " "
1966 Jan. 1 - 1968 Feb. 1	4.313 1700 + (MJD - 39126) x 0.002 592
1968 Feb. 1 - 1972 Jan. 1	4.213 1700 + " "
1972 Jan. 1 - 1972 Jul. 1	10 (integral number of seconds)
1972 Jul. 1 - 1973 Jan. 1	11
1973 Jan. 1 - 1974 Jan. 1	12
1974 Jan. 1 - 1975 Jan. 1	13
1975 Jan. 1 - 1976 Jan. 1	14
1976 Jan. 1 - 1977 Jan. 1	15
1977 Jan. 1 - 1978 Jan. 1	16
1978 Jan. 1 - 1979 Jan. 1	17
1979 Jan. 1 - 1980 Jan. 1	18
1980 Jan. 1 - 1981 Jul. 1	19
1981 Jul. 1 - 1982 Jul. 1	20
1982 Jul. 1 - 1983 Jul. 1	21
1983 Jul. 1 - 1985 Jul. 1	22
1985 Jul. 1 - 1988 Jan. 1	23
1988 Jan. 1 - 1990 Jan. 1	24
1990 Jan. 1 - 1991 Jan. 1	25
1991 Jan. 1 - 1992 Jul. 1	26
1992 Jul. 1 -	27

TABLE 4. LABORATORIES CONTRIBUTING TO TAI IN 1992 : EQUIPMENT, INDEPENDENT LOCAL TIME SCALE

(Ind. Cs : industrial Cs Standard, Lab. Cs : laboratory Cs standard,

		Information on TA(k) - UTC(k)	
Laboratory (k)	Equipment in atomic standards	Interval of validity (in MJD at 0hUTC)	TA(k) - UTC(k) in s
AOS	1 Ind. Cs		
APL	2 Ind. Cs 4 H-Masers	48622-48785 48785-48804 48804-48838 48838-48987	26.000 000 507 26.000 000 737 27.000 000 737 26.999 998 537
AUS	Ind. Cs H-Masers (3)	year 1992	TA(AUS)-UTC(AUS) is sent to the BIPM by ORR
BEV	1 Ind. Cs		
CAO	3 Ind. Cs		
CH	13 Ind. Cs (4)	year 1992	TA(CH)-UTC(CH) is sent to the BIPM by OFM
CRL	1 Lab. Cs 12 Ind. Cs 3 H-Masers	year 1992	TA(CRL)-UTC(CRL) is published in CRL Standards Frequency and Time Bulletin
CSAO	5 Ind. Cs 3 H-Masers	year 1992	TA(CSAO)-UTC(CSAO) is published in CSAO Time and Frequency Services Bulletin

TA(K), SOURCE OF UTC(K) AND RECEPTION OF TIME SIGNALS

H-Maser : Hydrogen Maser)

	Information on time links					
source of UTC(k) (1)	GPS recept.	Iono. meas. syst.	GLONASS recept.	LORAN-C recept. (2)	Television link with	Two-way satellite time transfer
1 Cs + microstepper	*			7970-W	PKNM	
1 H-Maser	*					in a planning stage
(3)	*					in a planning stage
1 Cs				7970-W	OMH, TUG, other labs in Slovak Republic	
1 Cs	*			7990-M 7990-X 7990-Z	IEN, other labs in Italy	
all the Cs	*			7970-W 7990-Z	PTT (4)	
7 Cs	*	*		9970-M	NRLM, NAOT	in an experimental stage (5) (6)
all the Cs	*			9970-Y	other labs in China	

TABLE 4. LABORATORIES CONTRIBUTING TO TAI IN 1992 : EQUIPMENT, INDEPENDENT LOCAL TIME SCALE

(Ind. Cs : industrial Cs Standard, Lab. Cs : laboratory Cs standard,

		Information on TA(k) - UTC(k)	
Laboratory (k)	Equipment in atomic standards	Interval of validity (in MJD at 0hUTC)	TA(k) - UTC(k) in s
DPT	1 Ind. Cs		
FTZ	5 Ind. Cs		
IEN	5 Ind. Cs		
IFAG	5 Ind. Cs 2 H-Masers		
IGMA	4 Ind. Cs		
INPL	5 Ind. Cs	year 1992	TA(INPL)-UTC(INPL) is sent to the BIPM
JATC	1 Lab. Cs 10 Ind. Cs 6 H-Masers (9)	year 1992	TA(JATC)-UTC(JATC) is sent to the BIPM
KRIS	5 Ind. Cs 1 H-Maser	year 1992	TA(KRIS)-UTC(KRIS) is sent to the BIPM
LDS	2 Ind. Cs		
MSL (11)	3 Ind. Cs		

TA(k), SOURCE OF UTC(k) AND RECEPTION OF TIME SIGNALS (CONT.)

H-Maser : Hydrogen Maser)

	Information on time links					
source of UTC(k) (1)	GPS recept.	Iono. meas. syst.	GLONASS recept.	LORAN-C recept. (2)	Television link with	Two-way satellite time transfer
1 Cs	*				other labs in South Africa (7)	
1 Cs	*			7970-W		in an experi-mental stage (8)
1 Cs + microstepper	*			7990-Z	CAO, other labs in Italy	in a planning stage
1 Cs + microstepper	*					
1 Cs + microstepper	*				ONBA, other labs in Argentina	
4 Cs	*	*				
1 Cs + microstepper				9970-Y		
all the Cs	*	*		9970-Y		in an experi-mental stage (5)
1 Cs	*		* (10)			
1 Cs	*				other labs in New Zealand	

TABLE 4. LABORATORIES CONTRIBUTING TO TAI IN 1992 : EQUIPMENT, INDEPENDENT LOCAL TIME SCALE

(Ind. Cs : industrial Cs Standard, Lab. Cs : laboratory Cs standard,

		Information on TA(k) - UTC(k)	
Laboratory (k)	Equipment in atomic standards	Interval of validity (in MJD at 0hUTC)	TA(k) - UTC(k) in s
NAOM	4 Ind. Cs		
NAOT (12)	6 Ind. Cs		
NIM	3 Ind. Cs	year 1992	TA(NIM)-UTC(NIM) is sent to the BIPM
NIST	1 Lab. Cs 20 Ind. Cs 2 H-Masers	year 1992	TA(NIST)-UTC(NIST) is published in the NIST Time and Frequency Bulletin (13)
NMC	1 Ind. Cs		
NPL	7 Ind. Cs 1 H-Maser		
NPLI	3 Ind. Cs		
NRC	3 Lab. Cs 1 Ind. Cs	48622-48804 48804-48987	25.999 983 931 26.999 983 931
NRLM	5 Ind. Cs 2 Lab. Cs		

TA(K), SOURCE OF UTC(K) AND RECEPTION OF TIME SIGNALS (CONT.)

H-Maser : Hydrogen Maser)

	Information on time links					
source of UTC(k) (1)	GPS recept.	Iono. meas. syst.	GLONASS recept.	LORAN-C recept. (2)	Television link with	Two-way satellite time transfer
1 Cs + microstepper	*			9970-M 9970-X		
1 Cs + microstepper	*			9970-M 9970-Y	CRL, NAOM NRLM	
1 Cs + microstepper				9970-Y	other labs in China	
10 Cs 1 Lab. Cs 1 H-Maser	*	*		9940-M 8970-M		in an exper- mental stage (14)
1 Cs + microstepper				7990-Y		
1 H-Maser + microstepper	*			7970-W	transmitting station at Rugby	in an experi- mental stage
1 Cs	*					
1 Lab. Cs (15)	*			9960-M		in an experi- mental stage (14)
1 Cs	*			9970-M 9970-X	CRL, NAOT	

TABLE 4. LABORATORIES CONTRIBUTING TO TAI IN 1992 : EQUIPMENT, INDEPENDENT LOCAL TIME SCALE

(Ind. Cs : industrial Cs Standard, Lab. Cs : laboratory Cs standard,

		Information on TA(k) - UTC(k)	
Laboratory (k)	Equipment in atomic standards	Interval of validity (in MJD at 0hUTC)	TA(k) - UTC(k) in s
OMH	1 Ind. Cs		
ONBA	2 Ind. Cs		
ONRJ	5 Ind. Cs		
OP	6 Ind. Cs	year 1992	TA(F)-UTC(OP) is published in Bulletin H by OP(LPTF) (16)
ORB	3 Ind. Cs		
PKNM	3 Ind. Cs		
PTB	4 Lab. Cs 8 Ind. Cs 2 H-Masers	48622-48804 48804-48987	26.000 363 400 27.000 363 400
RC	5 H-Masers	year 1992	TA(RC)-UTC(RC) is sent to the BIPM
ROA	7 Ind. Cs		
SCL (20)	2 Ind. Cs		

TA(K), SOURCE OF UTC(K) AND RECEPTION OF TIME SIGNALS (CONT.)

H-Maser : Hydrogen Maser)

	Information on time links					
source of UTC(k) (1)	GPS recept.	Iono. meas. syst.	GLONASS recept.	LORAN-C recept. (2)	Television link with	Two-way satellite time transfer
1 Cs					BEV, TP	
2 Cs					IGMA other labs in Argentina	
5 Cs	*				other labs in Brasil	
1 Cs	*	*		7970-W 7990-Z 8940-M	18 labs in France.	
3 Cs (17)	*			7970-W		
1 Cs + microstepper	*			7970-W (18)	AOS	
1 Lab. Cs (19)	*	*		7970-W	TP, and other labs	in an experi-mental stage (8)
3 H-Masers				7980-M 7980-Y		
all the Cs	*			7990-Z		
1 Cs	*			9970-Y		

TABLE 4. LABORATORIES CONTRIBUTING TO TAI IN 1992 : EQUIPMENT, INDEPENDENT LOCAL TIME SCALE

(Ind. Cs : industrial Cs Standard, Lab. Cs : laboratory Cs standard,

		Information on TA(k) - UTC(k)	
Laboratory (k)	Equipment in atomic standards	Interval of validity (in MJD at 0hUTC)	TA(k) - UTC(k) in s
SNT	3 Ind. Cs		
SO	1 Lab. Cs 2 Ind. Cs 3 H-Masers	year 1992	TA(SO)-UTC(SO) is published in SO Atomic Time Bulletin
SU	2 Lab. Cs 8 H-Masers	48622-48804 48804-48987	23.172 750 000 24.172 750 000
TL	5 Ind. Cs		
TP	2 Ind. Cs		
TUG	3 Ind. Cs		
USNO	55 Ind. Cs 10 H-Masers 3 Prototype Mercury Ion Freq. Std.	year 1992	A.1(MEAN)-UTC(USNO,MC) is sent to the BIPM (22) (23)
VSL	4 Ind. Cs		
YUZM	1 Ind. Cs		

TA(K), SOURCE OF UTC(K) AND RECEPTION OF TIME SIGNALS (CONT.)

H-Maser : Hydrogen Maser)

	Information on time links					
source of UTC(k) (1)	GPS recept.	Iono. meas. syst.	GLONASS recept.	LORAN-C recept. (2)	Television link with	Two-way satellite time transfer
1 Cs	*			7970-W	other labs in Sweden	
1 Cs + microstepper	*			9970-Y	other labs in China	
2 Lab. Cs 8 H-Masers	*		*	7990-Y 9970-X		
1 Cs + microstepper	*	*		9970-Y		(6) in an experimental stage
1 Cs + microstepper	*			7970-W	PTB, OMH	
1 Cs	*			7970-W 7990-M	BEV	in an experimental stage (21)
UTC(USNO,MC) is an H-Maser + Freq. synthesizer steered to UTC(USNO) (22)	* (24)			(24)	(24)	in an experimental stage (14) (21) (25)
1 Cs + microstepper	*			7970-M 7970-W 9980-X	15 Labs in Netherlands	in an experimental stage
1 Cs				7990-M		

NOTES

(1) When several clocks are indicated as "source of UTC(k)", laboratory k generally computes a software clock, steered to UTC. Often a physical realization of UTC(k) is obtained using a Cs clock and a microphase-stepper.

(2) LORAN-C stations :

7970-M	Norwegian Sea chain,	Ejde, Denmark
7970-W	" "	Sylt, Germany
7980-M	Southeast USA chain	Malone, Florida, USA
7980-Y	" "	Jupiter,Florida, USA
7990-M	Mediterranean chain,	Sellia Marina, Italy
7990-X	" "	Lampedusa, Italy
7990-Y	" "	Kargabarun, Turkey
7990-Z	" "	Estartit, Spain
8940-M	French chain,	Lessay, France
8970-M	Great Lakes chain,	Dana, Indiana, USA
9940-M	West Coast chain,	Fallon, Nevada, USA
9960-M	Northeast Coast chain,	Seneca, New York, USA
9970-M	Northwest Pacific chain,	Iwo Jima, Japan
9970-X	" "	Hokkaido, Japan
9970-Y	" "	Gesashi, Japan
9980-X	North Atlantic chain	Ejde, Denmark.

(3) Some of the standards are located as follows (at the end of 1992) :

* Australian Telecommunications Commission (Melbourne) (ATC) 7 Cs
* National Measurements Laboratory, CSIRO (Sydney) (NML) 3 Cs, 2 H-Masers
* Orroral Observatory (Belconnen) (ORR) 5 Cs.

Australian laboratories are intercompared by GPS and by the TV method.

UTC(AUS) is the output from a GPS receiver, located at NML, corrected by the time difference UTC(USNO,MC)-GPS time (as given in the GPS message) in order to get in real-time UTC(AUS) = UTC(USNO,MC).

(4) The standards are located as follows (at the end of 1992) :

* Office Fédéral de Métrologie (Bern)	(OFM)	8 Cs
* Observatoire de Neuchâtel (Neuchâtel)	(ON)	3 Cs
* Direction Générale des PTT (Bern)	(PTT)	2 Cs.

They are intercompared by LORAN-C (OFM-ON) and TV method (OFM-PTT) and linked to the foreign laboratories through the Swiss Federal Office of Metrology.

(5) For experimental purposes, two-way satellite time transfer operated between KRIS and CRL in April 1992.

NOTES (CONT.)

(6) For experimental purposes, two-way satellite time transfer operated between TL and CRL in December 1992.

(7) DPT is in particular linked to :

* Radio Astronomical Observatory (Johannesburg) (RAO) and
* South African Astronomical Observatory (Cape Town) (SAAO)

(8) Experimental two-way satellite time transfer operates between FTZ and PTB through Kopernikus 2.

(9) The standards are located at

* Shaanxi Astronomical Observatory (CSAO)
* Shanghai Astronomical Observatory (SO)
* Wuhan Time Observatory.
* Beijing Institute of Radio Metrology and Measurement.

(10) Reception of GPS and GLONASS signals on a common custom-built receiver, allowing the observation of GPS time - GLONASS time.

(11) Measurement Standards Laboratory, Lower Hutt (New Zealand), formerly PEL.

(12) National Astronomical Observatory, Tokyo (Japan), formerly TAO

(13) Another independent local time scale AT1 is computed at NIST. It appears in the BIPM publications as TA(NISA).

(14) For experimental purposes, two-way satellite time transfer operates between NIST and NRC, and between NIST and USNO.

(15) NRC Cs V was the source of UTC(NRC) until MJD = 48943 (1992-11-17) From then onwards, UTC(NRC) has been derived from NRC Cs VI C.

(16) TA(F) is the French atomic time scale computed by OP(LPTF) with data from 25 industrial cesium located as follows (at the end of 1992) :

* Centre Electronique de l'Armement (Rennes)	2 Cs
* Centre National d'Etudes Spatiales (CNES)	2 Cs
* Centre National d'Etudes des Télécommunications	3 Cs
* Observatoire de la Côte d'Azur (OCA)	3 Cs
* Electronique Serge Dassault (Trappes)	1 Cs
* Hewlett-Packard (Orsay)	2 Cs
* Observatoire de Paris : Laboratoire Primaire du Temps et des Fréquences (LPTF)	6 Cs
* Observatoire de Besançon (OB)	3 Cs
* Laboratoire de Physique et de Métrologie des Oscillateurs (Besançon) (LPMO)	1 Cs
* Ecole Nationale Supérieure de Mécanique et des Microtechniques (Besançon) (ENSMM)	1 Cs
* Société d'Etudes, Recherches et Constructions Electroniques (Carquefou) (SERCEL).	1 Cs

Links by GPS : OP-OB, OP-SERCEL, OP-OCA, OP-CNES.
Cable links : OB-LPMO, OB-ENSMM.
Other national links by the TV method.

NOTES (CONT.)

(17) The source of UTC(ORB) is a Rb clock kept in phase with a mathematical clock, this latter being the mean of 3 Cs corrected for their drift.

(18) Reception of Russian LORAN chain 8000.

(19) Two Laboratory Cs PTB CS1 and PTB CS2 are operated continuously as clocks. TA(PTB) and UTC(PTB) were derived directly from PTB CS2 in 1992. The uncertainty of PTB CS3 and PTB CS4 is currently evaluated. Data submission to the BIPM is scheduled for 1993.

(20) Standards and Calibration Laboratory, Wan Chai (Hong Kong).

(21) For experimental purposes two-way satellite time transfer operates between TUG and USNO.

(22) The time scales UTC(USNO) and A.1(MEAN) are computed by USNO. They rely on 25 Cs clocks and 6 H-Masers (used to improve short-term stability). UTC(USNO) is steered on UTC.

(23) The time scale A.1(MEAN) computed by USNO is designated as TA(USNO) in the BIPM publications.

(24) Daily time differences of UTC(USNO,MC) - transmitting station are published weekly (Series 4 of USNO) for :

* the LORAN-C chains,
* the Washington D.C. TV Station WTTG,
* the GPS satellite system.

This data is also available via the Automated Data Service(ADS) of USNO.

(25) For experimental purposes, two-way satellite time transfer operates between USNO Washington DC and USNO sub-station in Richmond, Florida.

TABLE 5. ABSOLUTE TIME COMPARISONS BETWEEN LABORATORIES

5A. CLOCK TRANSPORTATION

Date 1992	MJD	Time Comparison (1 microsecond)	Uncert.	Source of report
Oct 14	48909.05	UTC(CRL)-UTC(NAOT) = -2.254	0.005	CRL

5B. GPS TIME RECEIVER TRANSPORTATION

Date 1992	MJD	Time Comparison (1 microsecond)	Uncert.	Source of report
Jul 4	48807.00	UTC(OP)-UTC(TP) = 0.536	0.002	BIPM

TABLE 6. INDEPENDENT LOCAL ATOMIC TIME SCALES

The following table gives the values of TAI-TA(k), where TA(k) denotes the independent atomic time scale established by laboratory k. The values are rounded to 10 ns for the laboratories linked via LORAN-C or television.

Unit is one microsecond

DATE 1992 0hUTC	MJD	TAI - TA(k) APL	AUS	CH	CRL	CSAO
Jan 8	48629	-1.487	-38.804	-72.211	8.187	22.908
Jan 18	48639	-1.437	-38.864	-72.269	8.456	22.786
Jan 28	48649	-1.480	-39.019	-72.321	8.737	22.730
Feb 7	48659	-1.501	-39.094	-72.356	9.012	22.614
Feb 17	48669	-1.516	-39.251	-72.410	9.302	22.496
Feb 27	48679	-1.538	-39.386	-72.468	9.571	22.381
Mar 8	48689	-1.412	-39.533	-72.536	9.923	22.255
Mar 18	48699	-1.308	-39.557	-72.580	10.186	22.148
Mar 28	48709	-1.224	-39.712	-72.628	10.427	22.137
Apr 7	48719	-1.145	-39.831	-72.648	10.738	22.102
Apr 17	48729	-1.083	-39.971	-72.699	10.931	22.035
Apr 27	48739	-1.005	-40.105	-72.745	11.220	22.006
May 7	48749	-0.831	-40.168	-72.791	11.490	22.033
May 17	48759	-0.658	-40.322	-72.840	11.773	21.966
May 27	48769	-0.472	-40.490	-72.932	12.038	21.869
Jun 6	48779	-0.289	-40.626	-73.014	12.317	21.860
Jun 16	48789	-0.100	-40.875	-73.086	12.613	21.720
Jun 26	48799	0.126	-41.144	-73.200	12.890	21.632
Jul 6	48809	0.543	-41.244	-73.305	13.210	21.583
Jul 16	48819	0.998	-41.371	-73.423	13.527	21.502
Jul 26	48829	1.399	-41.488	-73.521	13.871	21.502
Aug 5	48839	1.438	-41.678	-73.615	14.178	21.540
Aug 15	48849	1.329	-41.849	-73.704	14.516	21.567
Aug 25	48859	1.304	-42.036	-73.784	14.850	21.535
Sep 4	48869	1.266	-42.230	-73.890	15.168	21.531
Sep 14	48879	1.249	-42.402	-73.972	15.507	21.421
Sep 24	48889	1.209	-42.557	-74.075	15.831	21.376
Oct 4	48899	1.165	-42.679	-74.159	16.174	21.304
Oct 14	48909	1.101	-42.872	-74.278	16.512	21.297
Oct 24	48919	1.101	-43.050	-74.372	16.846	21.231
Nov 3	48929	1.164	-43.203	-74.450	17.173	21.174
Nov 13	48939	1.104	-43.259	-74.569	17.492	21.133
Nov 23	48949	1.165	-43.407	-74.672	17.845	21.046
Dec 3	48959	1.180	-43.570	-74.796	18.182	20.951
Dec 13	48969	1.222	-43.695	-74.890	18.516	20.873
Dec 23	48979	1.251	-43.821	-75.002	18.856	20.755

TABLE 6. (CONT.)

Unit is one microsecond

DATE 1992 0hUTC	MJD	TAI - TA(k) F	INPL	JATC	KRIS	NIM
Jan 8	48629	98.704	-	-0.01	-25.160	-10.18
Jan 18	48639	99.010	-	0.10	-25.616	-10.16
Jan 28	48649	99.316	-	0.30	-26.107	-10.20
Feb 7	48659	99.607	-	0.27	-26.695	-10.23
Feb 17	48669	99.900	-	0.37	-27.193	-10.22
Feb 27	48679	100.210	-	0.49	-27.768	-10.27
Mar 8	48689	100.509	-	0.54	-28.344	-10.13
Mar 18	48699	100.811	-	0.77	-28.902	-10.05
Mar 28	48709	101.117	-	1.01	-29.498	-9.91
Apr 7	48719	101.446	-	1.13	-29.944	-9.91
Apr 17	48729	101.738	-	1.23	-30.448	-10.04
Apr 27	48739	102.039	-	1.34	-30.920	-10.29
May 7	48749	102.343	-	1.47	-31.411	-10.46
May 17	48759	102.639	-	1.58	-31.876	-10.45
May 27	48769	102.936	-	1.69	-32.321	-10.32
Jun 6	48779	103.244	-	1.80	-32.735	-10.34
Jun 16	48789	103.569	-	1.96	-33.155	-10.38
Jun 26	48799	103.855	-	2.12	-33.474	-10.08
Jul 6	48809	104.185	-	2.44	-33.526	-10.00
Jul 16	48819	104.514	-	2.71	-33.559	-10.09
Jul 26	48829	104.834	-	2.84	-33.587	-10.13
Aug 5	48839	105.161	-	3.21	-	-10.20
Aug 15	48849	105.495	-	3.35	-	-10.21
Aug 25	48859	105.834	-	3.56	-	-10.21
Sep 4	48869	106.177	-	3.67	-	-10.23
Sep 14	48879	106.536	-	3.55	-	-10.24
Sep 24	48889	106.873	-	3.72	-	-10.18
Oct 4	48899	107.231	-	3.84	-	-10.19
Oct 14	48909	107.591	-	4.07	-	-10.21
Oct 24	48919	107.957	-	4.06	-	-10.14
Nov 3	48929	108.331	-	4.19	-0.473	-9.52
Nov 13	48939	108.694	-106.510	4.31	-0.522	-
Nov 23	48949	109.090	-108.107	4.33	-0.523	-
Dec 3	48959	109.467	-109.715	4.44	-0.512	-9.92
Dec 13	48969	109.837	-111.347	4.50	-0.451	-10.05
Dec 23	48979	110.234	-113.012	4.39	-0.438	-9.75

TABLE 6. (CONT.)

Unit is one microsecond

DATE 1992 0hUTC	MJD	TAI - TA(k) NISA *	NIST	NRC	PTB
Jan 8	48629	-45081.599	-45181.120	17.399	-360.144
Jan 18	48639	-45081.957	-45181.795	17.351	-360.140
Jan 28	48649	-45082.310	-45182.464	17.304	-360.153
Feb 7	48659	-45082.662	-45183.132	17.203	-360.152
Feb 17	48669	-45083.026	-45183.798	17.083	-360.156
Feb 27	48679	-45083.373	-45184.436	16.963	-360.161
Mar 8	48689	-45083.720	-45185.076	16.832	-360.180
Mar 18	48699	-45084.076	-45185.732	16.690	-360.198
Mar 28	48709	-45084.438	-45186.404	16.572	-360.212
Apr 7	48719	-45084.767	-45187.039	16.463	-360.200
Apr 17	48729	-45085.115	-45187.686	16.359	-360.210
Apr 27	48739	-45085.452	-45188.329	16.279	-360.211
May 7	48749	-45085.795	-45188.979	16.177	-360.219
May 17	48759	-45086.145	-45189.610	16.095	-360.234
May 27	48769	-45086.477	-45190.241	15.986	-360.254
Jun 6	48779	-45086.805	-45190.880	15.880	-360.277
Jun 16	48789	-45087.157	-45191.518	15.775	-360.305
Jun 26	48799	-45087.562	-45192.198	15.638	-360.354
Jul 6	48809	-45087.932	-45192.844	15.564	-360.379
Jul 16	48819	-45088.315	-45193.501	15.489	-360.404
Jul 26	48829	-45088.703	-45194.166	15.408	-360.435
Aug 5	48839	-45089.067	-45194.797	15.353	-360.444
Aug 15	48849	-45089.442	-45195.450	15.298	-360.462
Aug 25	48859	-45089.818	-45196.100	15.250	-360.478
Sep 4	48869	-45090.183	-45196.735	15.194	-360.490
Sep 14	48879	-45090.545	-45197.360	15.152	-360.497
Sep 24	48889	-45090.915	-45197.999	15.130	-360.512
Oct 4	48899	-45091.289	-45198.637	15.257	-360.530
Oct 14	48909	-45091.664	-45199.275	15.388	-360.546
Oct 24	48919	-45092.034	-45199.916	15.528	-360.565
Nov 3	48929	-45092.405	-45200.548	15.694	-360.570
Nov 13	48939	-45092.784	-45201.182	15.844	-360.585
Nov 23	48949	-45093.142	-45201.801	16.004	-360.581
Dec 3	48959	-45093.514	-45202.438	16.200	-360.578
Dec 13	48969	-45093.887	-45203.077	16.358	-360.569
Dec 23	48979	-45094.260	-45203.715	16.585	-360.572

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

TABLE 6. (CONT.)

Unit is one microsecond

DATE 1992 0hUTC	MJD	TAI - TA(k) RC	SO	SU	USNO *
Jan 8	48629	17999701.97	-44.97	2827254.352	-34640.977
Jan 18	48639	17999701.55	-45.11	2827254.270	-34641.647
Jan 28	48649	17999701.25	-45.09	2827254.183	-34642.317
Feb 7	48659	17999700.98	-45.23	2827254.100	-34642.980
Feb 17	48669	17999700.72	-45.17	2827253.970	-34643.653
Feb 27	48679	17999700.53	-45.22	2827253.830	-34644.318
Mar 8	48689	17999700.26	-45.25	2827253.819	-34645.006
Mar 18	48699	17999699.65	-45.18	2827253.704	-34645.699
Mar 28	48709	17999699.32	-45.20	2827253.609	-34646.382
Apr 7	48719	17999698.90	-45.35	2827253.523	-34647.044
Apr 17	48729	17999698.56	-45.41	2827253.428	-34647.720
Apr 27	48739	17999698.17	-45.56	2827253.344	-34648.388
May 7	48749	17999697.83	-45.44	2827253.244	-34649.056
May 17	48759	17999697.33	-45.61	2827253.146	-34649.725
May 27	48769	17999696.73	-45.63	2827253.038	-34650.393
Jun 6	48779	17999696.20	-45.75	2827252.930	-34651.059
Jun 16	48789	17999695.65	-45.72	2827252.816	-34651.723
Jun 26	48799	17999695.04	-45.65	2827252.679	-34652.430
Jul 6	48809	17999694.58	-45.59	2827252.567	-34653.103
Jul 16	48819	17999693.90	-45.54	2827252.457	-34653.788
Jul 26	48829	17999693.37	-45.68	2827252.334	-34654.470
Aug 5	48839	17999692.64	-45.62	2827252.230	-34655.147
Aug 15	48849	17999691.97	-45.64	2827252.130	-34655.824
Aug 25	48859	17999691.43	-45.53	2827252.027	-34656.492
Sep 4	48869	17999690.83	-45.69	2827251.925	-34657.159
Sep 14	48879	17999690.58	-45.94	2827251.826	-34657.820
Sep 24	48889	17999689.94	-45.96	2827251.720	-34658.495
Oct 4	48899	17999689.04	-45.90	2827251.611	-34659.169
Oct 14	48909	17999688.41	-45.66	2827251.504	-34659.842
Oct 24	48919	17999687.47	-45.81	2827251.398	-34660.520
Nov 3	48929	17999686.85	-45.82	2827251.299	-34661.189
Nov 13	48939	17999685.88	-45.75	2827251.195	-34661.868
Nov 23	48949	17999685.27	-45.84	2827251.106	-34662.537
Dec 3	48959	17999684.02	-45.494	2827251.011	-34663.218
Dec 13	48969	17999683.64	-45.514	2827250.927	-34663.869
Dec 23	48979	17999683.33	-45.460	2827250.828	-34664.549

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

TABLE 7. PRIMARY FREQUENCY STANDARDS USED AS CLOCKS

Five primary frequency standards were used as clocks in 1992: NRC CsV, NRC CsVI A and C, and PTB CS1 and CS2. The following table gives the time differences in microseconds, between TAI and these laboratory standards.

TAI-LAB.STD.

DATE 1992 0hUTC	MJD	PTB (1)		NRC (2)		
		CS1	CS2	CsV	CsVI A	CsVI C
Jan 8	48629	3.352	-1.083	27.619	22.240	14.563
Jan 18	48639	3.377	-1.079	27.561	22.535	14.551
Jan 28	48649	3.397	-1.091	27.505	22.627	14.552
Feb 7	48659	3.414	-1.091	27.394	22.717	14.529
Feb 17	48669	3.427	-1.095	27.264	22.799	14.504
Feb 27	48679	3.449	-1.100	27.134	22.872	14.485
Mar 8	48689	3.453	-1.118	26.993	22.943	14.444
Mar 18	48699	3.450	-1.138	26.840	23.029	14.427
Mar 28	48709	3.442	-1.150	26.714	23.157	14.429
Apr 7	48719	3.468	-1.139	26.595	23.299	14.439
Apr 17	48729	3.480	-1.150	26.480	23.648	14.422
Apr 27	48739	3.494	-1.150	26.392	23.860	14.409
May 7	48749	3.497	-1.158	26.280	24.075	14.409
May 17	48759	3.496	-1.173	25.786	23.861	14.006
May 27	48769	3.492	-1.193	25.668	24.039	14.061
Jun 6	48779	3.503	-1.216	25.552	24.212	14.114
Jun 16	48789	3.513	-1.243	25.438	24.407	14.193
Jun 26	48799	3.508	-1.292	25.691	24.957	14.644
Jul 6	48809	3.512	-1.319	25.605	25.146	14.747
Jul 16	48819	3.510	-1.343	25.522	25.310	14.836
Jul 26	48829	3.514	-1.374	25.431	25.487	14.906
Aug 5	48839	3.538	-1.383	25.366	25.679	15.050
Aug 15	48849	3.569	-1.401	25.302	25.825	15.214
Aug 25	48859	3.582	-1.417	25.244	25.955	15.349
Sep 4	48869	3.594	-1.429	25.178	26.092	15.515
Sep 14	48879	3.596	-1.436	25.126	26.192	15.700
Sep 24	48889	3.606	-1.451	25.095	26.326	15.888
Oct 4	48899	3.638	-1.469	25.212	26.437	16.051
Oct 14	48909	3.636	-1.485	25.333	26.546	16.189
Oct 24	48919	3.613	-1.504	25.463	26.651	16.323
Nov 3	48929	3.574	-1.509	-	-	16.460
Nov 13	48939	3.560	-1.524	-	-	16.607
Nov 23	48949	3.557	-1.520	-	-	16.772
Dec 3	48959	3.542	-1.517	-	-	16.958
Dec 13	48969	3.550	-1.508	-	-	17.106
Dec 23	48979	3.552	-1.511	-	-	17.324

TABLE 7. (CONT.)

NOTES

(1) The time scales under the headings PTB CS1 and CS2 are coordinate time scales on the rotating geoid; they are derived from the scales of proper time produced by standards CS1 and CS2 of PTB through the application of the gravitational correction which is equal to -0.00066μs/d .

(2) The time scales under the headings NRC Cs V, Cs VI A, Cs VI C, are the scales of proper produced directly by primary frequency standards Cs V, Cs VI A and Cs VI C of NRC used as clocks. The gravitational correction to be applied to these time scales of proper time, in order to obtain coordinate times on the rotating geoid, is equal to -0.00097μs/d .

TABLE 8A. UTC - UTC(k)

The following table gives the values of UTC-UTC(k), where UTC(k) denotes the approximation to UTC kept by laboratory k. The values are rounded to 10 ns for laboratories linked via LORAN-C or television.

Unit is one microsecond.

DATE 1992 0hUTC	MJD	AOS	APL (1)	AUS	BEV (2)	CAO (3)	CH
Jan 8	48629	-1.493	-0.980	0.174	0.33	-2.093	1.223
Jan 18	48639	-1.349	-0.930	0.142	-0.58	-9.316	1.233
Jan 28	48649	-1.801	-0.973	0.112	-1.54	-10.362	1.250
Feb 7	48659	-1.693	-0.994	0.100	-2.63	-11.448	1.253
Feb 17	48669	-1.689	-1.009	0.076	-3.63	-12.658	1.218
Feb 27	48679	-1.755	-1.031	0.057	-4.70	-13.298	1.190
Mar 8	48689	-1.845	-0.905	0.019	-5.71	-13.935	1.151
Mar 18	48699	-1.903	-0.801	-0.014	13.25	-14.476	1.138
Mar 28	48709	-1.697	-0.717	-0.046	12.12	-15.111	1.119
Apr 7	48719	-1.526	-0.638	-0.048	11.08	-15.831	1.127
Apr 17	48729	-1.198	-0.576	-0.066	10.06	-16.390	1.103
Apr 27	48739	-1.346	-0.498	-0.081	9.06	-16.813	1.082
May 7	48749	-0.669	-0.324	-0.088	7.95	-17.173	1.063
May 17	48759	-1.200	-0.151	-0.077	6.90	-17.494	1.039
May 27	48769	-1.362	0.035	-0.069	5.87	-17.911	0.975
Jun 6	48779	-1.667	0.218	-0.058	4.89	-18.241	0.919
Jun 16	48789	-1.434	0.637	-0.049	3.90	-18.600	0.873
Jun 26	48799	-1.424	0.863	-0.077	2.89	-19.007	0.787
Jul 6	48809	-1.883	1.280	-0.084	2.00	-19.410	0.704
Jul 16	48819	-2.096	1.735	-0.115	0.97	-19.859	0.612
Jul 26	48829	-2.788	2.136	-0.135	-0.02	-20.340	0.541
Aug 5	48839	-3.131	-0.025	-0.141	-1.12	-20.834	0.470
Aug 15	48849	-3.010	-0.134	-0.153	-2.24	-21.354	0.404
Aug 25	48859	-2.351	-0.159	-0.164	-3.16	-21.867	0.346
Sep 4	48869	-1.422	-0.197	-0.173	-3.95	-22.284	0.263
Sep 14	48879	-0.328	-0.214	-0.157	-4.99	-22.633	0.202
Sep 24	48889	0.992	-0.254	-0.140	-6.13	-23.047	0.118
Oct 4	48899	1.684	-0.298	-0.103	-7.21	-23.457	0.054
Oct 14	48909	1.292	-0.362	-0.075	-8.35	-23.843	-0.049
Oct 24	48919	1.295	-0.362	-0.058	-9.48	-24.201	-0.080
Nov 3	48929	1.497	-0.299	-0.045	9.45	-24.596	-0.074
Nov 13	48939	1.362	-0.359	-0.040	8.26	-24.971	-0.106
Nov 23	48949	1.333	-0.298	-0.018	7.04	-25.280	-0.124
Dec 3	48959	1.241	-0.283	-0.016	5.84	-25.694	-0.165
Dec 13	48969	1.280	-0.241	-0.017	4.70	-26.084	-0.172
Dec 23	48979	0.883	-0.212	-0.022	3.82	-26.336	-0.202

TABLE 8A - (CONT.)

Unit is one microsecond.

DATE 1992 0hUTC	MJD	UTC - UTC(k) CRL	CSAO	DPT	FTZ	IEN (4)	IFAG
Jan 8	48629	2.507	-2.533	-24.492	23.41	-1.066	1.430
Jan 18	48639	2.499	-2.455	-24.399	23.49	-1.033	1.415
Jan 28	48649	2.498	-2.311	-24.298	23.68	-0.815	1.318
Feb 7	48659	2.488	-2.227	-24.203	23.77	-0.827	1.347
Feb 17	48669	2.502	-2.145	-24.074	23.90	-0.848	1.262
Feb 27	48679	2.485	-2.060	-23.975	24.00	-0.847	1.245
Mar 8	48689	2.566	-1.986	-23.867	24.05	-0.839	1.126
Mar 18	48699	2.550	-1.893	-23.718	24.09	-0.856	0.880
Mar 28	48709	2.512	-1.704	-23.620	24.19	-0.856	0.467
Apr 7	48719	2.549	-1.539	-23.479	24.30	-0.811	-0.021
Apr 17	48729	2.457	-1.406	-23.389	24.37	-0.795	-0.145
Apr 27	48739	2.434	-1.235	-23.412	24.52	-0.757	-0.206
May 7	48749	2.389	-1.008	-23.254	24.64	-0.757	-0.217
May 17	48759	2.362	-0.875	-23.046	24.74	-0.755	-0.201
May 27	48769	2.311	-0.772	-22.874	24.85	-0.738	-0.155
Jun 6	48779	2.278	-0.631	-22.712	24.94	-0.711	-0.045
Jun 16	48789	2.247	-0.671	-22.515	25.01	-0.687	0.083
Jun 26	48799	2.202	-0.659	-22.367	25.37	-0.689	0.244
Jul 6	48809	2.206	-0.636	-22.089	25.41	-0.639	0.478
Jul 16	48819	2.210	-0.674	-21.912	-	-0.546	0.714
Jul 26	48829	2.235	-0.631	-21.763	-	-0.483	1.033
Aug 5	48839	2.217	-0.549	-21.614	-	-0.399	1.432
Aug 15	48849	2.236	-0.479	-21.545	-	-0.312	1.905
Aug 25	48859	2.251	-0.467	-21.552	-	-0.254	2.292
Sep 4	48869	2.244	-0.428	-21.472	-	-0.203	2.685
Sep 14	48879	2.260	-0.495	-21.246	-	-0.156	2.880
Sep 24	48889	2.265	-0.497	-20.982	-	-0.126	3.078
Oct 4	48899	2.284	-0.526	-20.720	-	-0.070	3.290
Oct 14	48909	2.299	-0.490	-20.358	-	-0.046	3.523
Oct 24	48919	2.317	-0.513	-20.042	-	-0.023	3.614
Nov 3	48929	2.324	-0.518	-19.783	-	0.006	3.592
Nov 13	48939	2.324	-0.472	-19.512	-	0.013	3.578
Nov 23	48949	2.352	-0.473	-19.343	-	0.056	3.526
Dec 3	48959	2.366	-0.481	-19.235	-	0.066	3.475
Dec 13	48969	2.378	-0.472	-19.078	-	0.096	3.457
Dec 23	48979	2.400	-0.504	-19.058	-	0.123	3.389

TABLE 8A - (CONT.)

Unit is one microsecond.

DATE 1992 0hUTC	MJD	UTC - UTC(k) IGMA	INPL (5)	JATC (6)	KRIS	LDS (7)
Jan 8	48629	-1.431	-1.738	0.32	0.210	-
Jan 18	48639	-1.444	-1.882	0.22	0.064	-20.659
Jan 28	48649	-1.497	-2.036	0.19	-0.037	-21.619
Feb 7	48659	-1.501	-2.195	0.04	-0.175	-22.654
Feb 17	48669	-1.518	-2.283	-0.09	-0.263	-23.672
Feb 27	48679	-1.526	-2.270	-0.12	-0.348	-24.610
Mar 8	48689	-1.561	-2.381	-0.27	-0.334	-25.710
Mar 18	48699	-1.637	-2.916	-0.30	-0.312	-26.594
Mar 28	48709	-1.695	-2.928	-0.27	-0.348	-27.687
Apr 7	48719	-1.704	-2.944	-0.27	-0.154	-28.809
Apr 17	48729	-1.714	-2.978	-0.32	0.062	-29.682
Apr 27	48739	-1.737	-2.967	-0.20	0.320	-30.725
May 7	48749	-1.750	-2.925	0.15	0.459	-31.603
May 17	48759	-1.792	-2.859	0.41	0.484	-32.789
May 27	48769	-1.816	-2.801	0.60	0.469	-33.933
Jun 6	48779	-1.834	-2.685	0.63	0.465	-34.808
Jun 16	48789	-1.847	-2.519	0.43	0.455	-35.869
Jun 26	48799	-1.908	-2.405	0.41	0.466	-37.095
Jul 6	48809	-1.922	-2.236	0.36	0.564	-38.143
Jul 16	48819	-1.962	-2.046	0.20	0.691	-39.201
Jul 26	48829	-1.959	-1.849	0.21	0.823	-40.240
Aug 5	48839	-1.952	-1.661	0.35	0.948	-41.348
Aug 15	48849	-1.947	-1.466	0.29	1.037	-42.446
Aug 25	48859	-1.946	-1.258	0.26	-	-
Sep 4	48869	-1.940	-1.105	0.29	-	8.458
Sep 14	48879	-1.916	-0.982	0.10	-	7.503
Sep 24	48889	-1.872	-0.907	-0.03	-	6.543
Oct 4	48899	-1.764	-0.839	-0.24	-	5.640
Oct 14	48909	-1.678	-0.759	-0.32	-	4.625
Oct 24	48919	-1.614	-0.689	-0.52	-	3.735
Nov 3	48929	-1.588	-0.630	-0.65	-0.103	7.422
Nov 13	48939	-1.605	-0.598	-0.78	-0.132	5.972
Nov 23	48949	-1.557	-0.540	-0.97	-0.093	4.770
Dec 3	48959	-1.667	-0.478	-1.17	-0.102	3.381
Dec 13	48969	-1.609	-0.438	-1.41	-0.181	2.117
Dec 23	48979	-1.640	-0.433	-1.67	-0.288	0.800

TABLE 8A - (CONT.)

Unit is one microsecond.

DATE 1992 0hUTC	MJD	UTC - UTC(k) MSL (8)	NAOM	NAOT (9)	NIM	NIST	NMC
Jan 8	48629	-1.341	-7.569	1.202	7.94	-0.754	0.11
Jan 18	48639	-1.179	-7.395	1.194	7.93	-0.702	0.09
Jan 28	48649	-1.117	-7.193	1.180	7.87	-0.645	0.55
Feb 7	48659	-1.227	-7.030	1.170	7.82	-0.574	0.58
Feb 17	48669	-1.246	-6.861	1.134	7.81	-0.508	0.62
Feb 27	48679	-1.160	-6.711	1.093	7.75	-0.425	0.56
Mar 8	48689	-1.321	-6.543	1.054	7.86	-0.349	1.13
Mar 18	48699	-1.256	-6.371	1.013	7.93	-0.285	-0.35
Mar 28	48709	-1.336	-6.176	0.991	8.04	-0.227	-1.22
Apr 7	48719	-1.476	-5.961	0.994	8.04	-0.148	-1.56
Apr 17	48729	-1.502	-5.770	0.946	7.87	-0.096	0.14
Apr 27	48739	-1.596	-5.562	0.912	7.59	-0.033	0.92
May 7	48749	-1.773	-5.364	0.889	7.39	0.011	1.93
May 17	48759	-1.815	-5.150	0.854	7.38	0.041	2.63
May 27	48769	-2.064	-4.949	0.790	7.49	0.089	3.00
Jun 6	48779	-2.236	-4.710	0.729	7.45	0.131	3.49
Jun 16	48789	-2.423	-4.484	0.667	7.38	0.139	4.89
Jun 26	48799	-2.595	-4.266	0.597	7.66	0.094	5.59
Jul 6	48809	-2.692	-4.017	0.557	7.72	0.075	-
Jul 16	48819	-2.827	-3.791	0.497	7.60	0.032	-
Jul 26	48829	-2.741	-3.548	0.470	7.54	-0.016	-
Aug 5	48839	-2.822	-3.313	0.385	7.44	-0.044	-
Aug 15	48849	-2.841	-3.068	0.335	7.41	-0.089	1.27
Aug 25	48859	-2.994	-2.796	0.264	7.39	-0.135	1.88
Sep 4	48869	-3.198	-2.541	0.164	7.35	-0.167	2.59
Sep 14	48879	-3.256	-2.271	0.138	7.33	-0.189	3.31
Sep 24	48889	-3.326	-2.006	0.122	7.36	-0.219	1.84
Oct 4	48899	-3.446	-1.751	0.119	7.32	-0.250	-1.71
Oct 14	48909	-3.594	-1.501	0.125	7.29	-0.275	-2.83
Oct 24	48919	-3.720	-1.246	0.050	7.34	-0.295	-1.61
Nov 3	48929	-3.691	-1.006	-0.054	7.94	-0.313	-
Nov 13	48939	-3.823	-0.805	-0.178	-	-0.327	-
Nov 23	48949	-3.795	-0.555	-0.276	-	-0.320	1.81
Dec 3	48959	-3.772	-0.339	-0.405	7.48	-0.324	0.99
Dec 13	48969	-3.726	-0.127	-0.519	7.33	-0.317	0.10
Dec 23	48979	-3.829	0.060	-0.640	7.61	-0.310	-0.30

TABLE 8A - (CONT.)

Unit is one microsecond.

DATE 1992 0hUTC	MJD	UTC - UTC(k) NPL (10)	NPLI (11)	NRC (12)	NRLM (13)	OMH	ONBA (14)
Jan 8	48629	0.034	17.194	1.330	-126.541	-	-37.21
Jan 18	48639	0.075	18.033	1.282	-133.639	-	-38.24
Jan 28	48649	0.082	18.847	1.235	-140.917	-	-39.36
Feb 7	48659	0.082	20.602	1.134	-148.386	2.62	-40.55
Feb 17	48669	0.046	22.131	1.014	-156.225	2.41	-41.61
Feb 27	48679	0.007	23.312	0.894	-164.301	2.37	-42.90
Mar 8	48689	-0.026	24.335	0.763	-172.566	2.38	-43.99
Mar 18	48699	-0.045	25.587	0.621	-181.645	3.35	-43.57
Mar 28	48709	-0.063	26.436	0.503	-189.443	3.00	-44.38
Apr 7	48719	-0.052	27.297	0.394	-0.223	-	-47.52
Apr 17	48729	-0.047	28.760	0.290	-0.524	-	-48.95
Apr 27	48739	-0.002	29.410	0.210	-0.818	2.31	-50.10
May 7	48749	0.028	31.176	0.108	-1.132	-	-51.33
May 17	48759	0.056	32.693	-0.374	-1.467	-	-52.37
May 27	48769	0.046	34.214	-0.483	-1.541	-	-53.77
Jun 6	48779	0.025	-	-0.589	-1.586	-	-54.94
Jun 16	48789	0.013	-	-0.694	-1.685	-	-56.12
Jun 26	48799	-0.015	-	-0.431	-1.810	-	-57.23
Jul 6	48809	-0.024	-	-0.505	-2.280	-	-58.62
Jul 16	48819	-0.029	-	-0.580	-2.737	-	-59.73
Jul 26	48829	-0.047	-	-0.661	-3.176	0.88	-60.62
Aug 5	48839	-0.050	-	-0.716	-3.660	0.89	-61.25
Aug 15	48849	-0.059	-	-0.771	-4.153	-	-62.18
Aug 25	48859	-0.056	-	-0.819	-4.614	-	-63.10
Sep 4	48869	-0.051	-	-0.875	-5.126	-	-64.24
Sep 14	48879	-0.032	-	-0.917	-5.609	-	-65.15
Sep 24	48889	-0.029	40.603	-0.939	-6.146	-	-65.87
Oct 4	48899	-0.011	40.638	-0.812	-6.752	-	-66.80
Oct 14	48909	-0.003	41.571	-0.681	-7.338	-	-67.44
Oct 24	48919	0.006	-8.450	-0.541	-7.926	-	-66.31
Nov 3	48929	0.037	-8.325	-0.375	-8.499	-	-67.07
Nov 13	48939	0.054	-8.424	-0.225	-9.092	-	-68.21
Nov 23	48949	0.089	-8.522	-0.065	-9.651	-	-69.38
Dec 3	48959	0.117	-8.391	0.131	-10.227	-	-69.79
Dec 13	48969	0.151	-8.114	0.289	-10.957	-	-70.48
Dec 23	48979	0.185	-7.909	0.516	-11.662	-	-71.80

TABLE 8A - (CONT.)

Unit is one microsecond.

DATE 1992 0hUTC	MJD	UTC - UTC(k) ONRJ	OP	ORB	PKNM (15)	PTB	RC
Jan 8	48629	-	-0.707	1.485	0.727	3.256	-2.46
Jan 18	48639	-	-0.763	1.436	0.676	3.260	-2.54
Jan 28	48649	-	-0.767	1.507	0.652	3.247	-2.65
Feb 7	48659	6.132	-0.809	1.426	0.645	3.248	-2.62
Feb 17	48669	5.379	-0.853	1.265	0.717	3.244	-2.62
Feb 27	48679	4.588	-0.888	1.305	0.820	3.239	-2.55
Mar 8	48689	3.822	-0.929	1.114	0.868	3.220	-2.61
Mar 18	48699	3.069	-0.903	1.064	0.825	3.202	-3.00
Mar 28	48709	2.333	-0.900	1.097	0.798	3.188	-3.07
Apr 7	48719	1.761	-0.883	0.954	0.778	3.200	-3.14
Apr 17	48729	1.231	-0.852	0.903	0.779	3.190	-3.05
Apr 27	48739	0.615	-0.820	0.878	0.710	3.189	-3.05
May 7	48749	0.164	-0.800	0.861	0.745	3.181	-3.04
May 17	48759	-0.359	-0.832	0.775	0.733	3.166	-3.16
May 27	48769	-1.025	-0.860	0.668	0.698	3.146	-3.24
Jun 6	48779	-1.503	-0.878	0.456	0.671	3.123	-3.25
Jun 16	48789	-2.024	-0.880	0.516	0.779	3.095	-3.29
Jun 26	48799	-2.592	-0.911	0.562	0.813	3.046	-3.37
Jul 6	48809	-3.000	-0.833	0.327	0.922	3.021	-3.28
Jul 16	48819	-3.444	-0.799	0.352	1.039	2.996	-3.35
Jul 26	48829	-3.731	-0.800	0.447	1.155	2.965	-3.27
Aug 5	48839	-4.186	-0.784	0.469	1.279	2.956	-3.40
Aug 15	48849	-4.526	-0.749	0.079	1.425	2.938	-3.42
Aug 25	48859	-4.685	-0.699	-0.004	1.544	2.922	-3.31
Sep 4	48869	-4.042	-0.660	-0.048	1.470	2.910	-3.31
Sep 14	48879	-3.295	-0.609	0.022	1.431	2.903	-3.04
Sep 24	48889	-2.267	-0.589	-0.059	1.401	2.888	-3.08
Oct 4	48899	-1.530	-0.584	-0.023	1.345	2.870	-3.37
Oct 14	48909	-1.085	-0.619	0.023	1.290	2.854	-3.44
Oct 24	48919	-1.011	-0.679	0.154	1.119	2.835	-3.73
Nov 3	48929	-0.507	-0.705	0.117	0.909	2.830	-3.62
Nov 13	48939	-0.819	-0.776	0.036	0.699	2.815	-3.88
Nov 23	48949	-1.179	-0.792	0.031	0.489	2.819	-3.68
Dec 3	48959	-1.566	-0.843	0.001	0.335	2.822	-4.07
Dec 13	48969	-1.765	-0.918	0.037	0.189	2.831	-4.05
Dec 23	48979	-1.644	-0.839	0.031	0.128	2.828	-3.93

TABLE 8A - (CONT.)

Unit is one microsecond.

DATE 1992 0hUTC	MJD	UTC - UTC(k) ROA	SCL (16)	SNT	SO (17)	SU (18)	TL
Jan 8	48629	4.673	-	0.151	2.46	4.352	1.947
Jan 18	48639	4.591	-	0.175	2.33	4.270	1.799
Jan 28	48649	4.490	-	0.192	2.35	4.183	1.702
Feb 7	48659	4.396	-	0.182	2.23	4.100	1.586
Feb 17	48669	4.288	-	0.173	2.27	3.970	1.465
Feb 27	48679	4.158	-	0.196	2.20	3.830	1.352
Mar 8	48689	4.034	-	0.086	2.15	3.819	1.203
Mar 18	48699	3.932	-	0.125	2.25	3.704	1.046
Mar 28	48709	3.831	-	0.114	2.25	3.609	1.010
Apr 7	48719	3.770	-	0.055	2.10	3.523	1.015
Apr 17	48729	3.746	-	0.080	2.05	3.428	1.036
Apr 27	48739	3.686	-	0.127	1.88	3.344	1.098
May 7	48749	3.619	-	0.153	2.02	3.244	1.148
May 17	48759	3.515	-	0.166	1.86	3.146	1.189
May 27	48769	3.423	-	0.117	1.88	3.038	1.218
Jun 6	48779	3.376	-	0.124	1.77	2.930	1.262
Jun 16	48789	3.313	-	0.115	1.84	2.816	1.253
Jun 26	48799	3.285	-	0.070	1.89	2.679	1.237
Jul 6	48809	3.283	-0.716	0.047	1.96	2.567	1.252
Jul 16	48819	3.313	-2.160	0.027	2.04	2.457	1.261
Jul 26	48829	3.311	-3.559	0.052	1.89	2.334	1.316
Aug 5	48839	3.359	-5.011	0.077	1.94	2.230	1.233
Aug 15	48849	3.362	-6.465	0.096	1.93	2.130	1.216
Aug 25	48859	3.353	-7.967	0.076	2.03	2.027	1.219
Sep 4	48869	3.340	-9.439	0.095	1.86	1.925	1.175
Sep 14	48879	3.326	-10.894	0.073	1.59	1.826	1.144
Sep 24	48889	3.326	-12.274	0.020	1.55	1.720	1.113
Oct 4	48899	3.382	-13.660	-0.104	1.61	1.611	1.018
Oct 14	48909	3.382	-14.972	-0.208	1.86	1.504	0.916
Oct 24	48919	3.410	-16.348	-0.316	1.67	1.398	0.888
Nov 3	48929	3.444	-17.831	-0.418	1.64	1.299	0.902
Nov 13	48939	3.490	-19.329	-0.420	1.74	1.195	0.777
Nov 23	48949	3.544	-20.859	-0.322	1.65	1.106	0.701
Dec 3	48959	3.610	-22.394	-0.303	2.033	1.011	0.661
Dec 13	48969	3.568	-23.995	-0.279	2.028	0.927	0.575
Dec 23	48979	3.497	-25.610	-0.300	2.102	0.828	0.503

TABLE 8A - (CONT.)

Unit is one microsecond.

DATE 1992 0hUTC	MJD	UTC - UTC(k) TP	TUG (19)	USNO	VSL	YUZM
Jan 8	48629	-1.357	2.904	0.174	2.468	-
Jan 18	48639	-1.237	3.226	0.142	2.383	-
Jan 28	48649	-1.143	3.591	0.112	2.324	-
Feb 7	48659	-1.109	3.921	0.100	2.257	-
Feb 17	48669	-1.055	4.273	0.076	2.126	-
Feb 27	48679	-0.634	4.577	0.057	2.073	-
Mar 8	48689	-0.431	-4.086	0.019	1.972	-
Mar 18	48699	-0.637	-3.756	-0.014	1.863	-
Mar 28	48709	-0.804	-3.438	-0.046	1.726	-
Apr 7	48719	-0.749	-3.093	-0.048	1.616	-
Apr 17	48729	-0.688	-2.755	-0.066	1.499	-
Apr 27	48739	-0.655	-2.405	-0.081	1.453	-
May 7	48749	-0.563	-2.065	-0.088	1.391	-
May 17	48759	-0.459	-1.719	-0.077	1.312	-
May 27	48769	-0.341	-1.364	-0.069	1.246	-
Jun 6	48779	-0.259	-1.037	-0.058	1.142	-
Jun 16	48789	-0.302	-0.722	-0.049	1.067	-
Jun 26	48799	-0.327	-0.426	-0.077	0.952	-
Jul 6	48809	-0.324	-0.112	-0.084	0.865	-
Jul 16	48819	-0.333	0.229	-0.115	0.752	-
Jul 26	48829	-0.326	0.530	-0.135	0.702	-
Aug 5	48839	-0.322	0.886	-0.141	0.660	-
Aug 15	48849	-0.350	1.229	-0.153	0.669	-
Aug 25	48859	-0.401	1.549	-0.164	0.621	-
Sep 4	48869	-0.412	1.858	-0.173	0.539	-
Sep 14	48879	-0.418	2.193	-0.157	0.448	-
Sep 24	48889	-0.451	2.457	-0.140	0.391	-
Oct 4	48899	-0.514	2.744	-0.103	0.273	-
Oct 14	48909	-0.587	3.060	-0.075	0.170	-
Oct 24	48919	-0.623	3.349	-0.058	0.025	-
Nov 3	48929	-0.679	3.659	-0.045	-0.093	-
Nov 13	48939	-0.772	3.944	-0.040	-0.176	-
Nov 23	48949	-0.824	4.275	-0.018	-0.299	-
Dec 3	48959	-0.852	1.168	-0.016	-0.370	-
Dec 13	48969	-0.869	1.183	-0.017	-0.429	-
Dec 23	48979	-0.916	1.187	-0.022	-0.397	-

TABLE 8A - (CONT.)

NOTES

(1) APL . Time steps of UTC(APL) of -0.080 μs on MJD = 48784.8, of -0.150 μs on MJD = 48788.5 and of 2.200 μs on MJD = 48838

(2) BEV . Time steps of UTC(BEV) of - 20 μs on MJD = 48698 and MJD = 48921.5

(3) CAO . Time step of UTC-UTC(CAO) between MJD = 48629 and MJD = 48639 due to the introduction of GPS time link

(4) IEN . Time step of UTC(IEN) of -0.200 μs on MJD = 48643.5

(5) INPL. Time step of UTC(INPL) of 0.288 μs on MJD = 48697.0

(6) JATC. Time step of UTC(JATC) of -27 μs on MJD = 48622.0

(7) LDS . Momentary interruption of UTC(LDS) on MJD = 48924

(8) MSL . Measurement Standards Laboratory, Lower Hutt (New Zealand), formerly PEL

(9) NAOT. National Astronomical Observatory, Tokyo (Japan), formerly TAO

(10) NPL . Change of master clock on MJD = 48783

(11) NPLI. Time step of UTC(NPLI) of 50 μs on MJD = 48910.25

(12) NRC . Time steps of UTC(NRC) of 0.400 μs on MJD = 48749.8 and of -0.400 μs on MJD = 48789.5
Change of master clock on MJD = 48943.854

(13) NRLM. Change of master clock on MJD = 48718.9
Time step of UTC(NRLM) of - 0.270 μs on MJD = 48768.9

(14) ONBA. Apparent time step of - 100 μs of UTC(ONBA) between MJD = 48619 and MJD = 48629

(15) PKNM. Time step of UTC-UTC(PKNM) between MJD = 48619 and MJD = 48629 due to the introduction of GPS time link

(16) SCL . Hong Kong Government Standards and Calibration Laboratory, Wan Chai (Hong Kong)

(17) SO . Introduction of GPS time link on MJD = 48959

(18) SU . Introduction of GPS time link on MJD = 48629

(19) TUG . Time step of UTC(TUG) of 9 μs on MJD = 48683. Time step of UTC(TUG) of 3234 ns due to change of TUG master clock on MJD = 48953.542

TABLE 8B. TAI - GPS TIME AND UTC - GPS TIME

GPS satellites disseminate a common time scale designated as 'GPS time'. The relation between GPS time and TAI is :

TAI - GPS time = 19 s + C0,

where the time difference of 19 seconds is kept constant and C0 is a quantity of order a few hundreds of nanoseconds, varying with time.

The relation between GPS time and UTC involves a variable number of seconds as a consequence of the leap seconds of the UTC system and is as follows :

from 1991 January 1, 0hUTC, until 1992 July 1, 0hUTC :

UTC - GPS time = - 7 s + C0,

from 1992 July 1, 0hUTC, until 1993 July 1, 0hUTC :

UTC - GPS time = - 8 s + C0.

Here C0 is given at 0hUTC every day.

C0 is computed as follows: the GPS Block I satellites data taken at OP are first corrected for the measured ionospheric delays. Then they are smoothed to obtain daily values of UTC(OP) - GPS time at 0hUTC. UTC - GPS time is derived from them using linear interpolation of UTC - UTC(OP) from Table 8A. The r values, also reported here, are the residuals to the smoothed data for the middle of the 13-minute tracking periods. They show the quality of the synchronization.

UTC may be derived at any site from observation of any listed Block I satellite, by interpolating C0 to the tracking time. The quality of access to UTC mainly depends upon local conditions of observation.

Note:

The reference times reported in the following tables are given for the first date of the table only. They correspond to mid-points of 13-minute trackings.

* corresponds to data rejected in the smoothing.
\- corresponds to missing data.

TABLE 8B. (CONT.)

Date 1992 0hUTC	MJD	C0 (ns)	r(ns) PRN 3 NAV11 0h12m	PRN11 NAV 8 4h44m	PRN13 NAV 9 10h36m	PRN 6 NAV 3 16h12m	PRN12 NAV10 19h 8m
Jan 1	48622	233	-1	-14	2	7	-31*
Jan 2	48623	232	-7	1	4	-6	-25*
Jan 3	48624	230	-	4	-	-	-
Jan 4	48625	225	-	14	-16	-	-
Jan 5	48626	219	-8	11	-	-	-
Jan 6	48627	218	3	-4	0	3	10
Jan 7	48628	218	8	1	-1	-6	-13
Jan 8	48629	217	10	9	-13	3	-21*
Jan 9	48630	212	-3	-2	-12	-3	14
Jan 10	48631	207	1	-17	6	6	2
Jan 11	48632	199	2	10	9	-8	-12
Jan 12	48633	191	16	-5	-3	2	-42*
Jan 13	48634	186	3	-13	-16	7	-28*
Jan 14	48635	186	-10	3	-7	8	19
Jan 15	48636	187	1	-1	-7	-2	-7
Jan 16	48637	186	1	2	2	2	-22*
Jan 17	48638	183	3	4	11	-2	-9
Jan 18	48639	174	3	-7	-4	18	-12
Jan 19	48640	168	-8	7	3	-3	-48*
Jan 20	48641	164	0	-8	0	-3	-26*
Jan 21	48642	167	2	-6	0	-7	14
Jan 22	48643	170	8	2	-5	37*	11
Jan 23	48644	166	-6	1	-13	-8	-6
Jan 24	48645	160	2	-5	11	5	36*
Jan 25	48646	158	6	-6	1	0	-26*
Jan 26	48647	161	-3	-20*	-7	-7	18
Jan 27	48648	163	0	12	-5	-3	-41*
Jan 28	48649	158	-12	-2	11	-2	-3
Jan 29	48650	146	-7	-5	-8	5	12
Jan 30	48651	140	1	9	-9	5	13
Jan 31	48652	137	-3	-7	-8	-4	-44*

TABLE 8B. (CONT.)

r(ns)

Date 1992 0hUTC	MJD	C0 (ns)	PRN 3 NAV11 22h 4m	PRN11 NAV 8 2h40m	PRN13 NAV 9 8h32m	PRN 6 NAV 3 14h 8m	PRN12 NAV10 17h 4m
Feb 1	48653	138	12	6	-5	2	21*
Feb 2	48654	140	-9	5	-14	-13*	4
Feb 3	48655	143	-9	-12	-4	4	4
Feb 4	48656	145	1	3	1	15	19*
Feb 5	48657	141	-4	0	-13	-12*	-35*
Feb 6	48658	136	-2	2	-7	8	28*
Feb 7	48659	134	-5	0	3	-2	180*
Feb 8	48660	134	2	4	-8	8	-76*
Feb 9	48661	132	5	-39*	4	6	0
Feb 10	48662	129	1	-9	-12	11	-6
Feb 11	48663	124	7	-11	12*	16	-7
Feb 12	48664	122	-3	-3	-11	10	-7
Feb 13	48665	119	1	1	-4	20*	-3
Feb 14	48666	114	-2	-5	-12	22*	2
Feb 15	48667	109	-6	-5	1	12	-4
Feb 16	48668	107	1	-2	-8	5	-3
Feb 17	48669	109	-6	4	-3	8	-1
Feb 18	48670	109	2	12	-2	2	-1
Feb 19	48671	102	-3	-3	-4	7	0
Feb 20	48672	96	-2	12	-14	8	-4
Feb 21	48673	93	6	-11	-4	10	5
Feb 22	48674	94	-2	4	-6	33*	5
Feb 23	48675	91	-13	2	-5	3	-2
Feb 24	48676	89	9	1	-6	8	2
Feb 25	48677	87	3	5	-7	26*	1
Feb 26	48678	85	-9	-2	-13	4	-5
Feb 27	48679	82	7	6	-6	10	2
Feb 28	48680	77	-7	7	-9	2	-7
Feb 29	48681	68	6	12	0	31*	1

TABLE 8B. (CONT.)

r(ns)

Date 1992 0hUTC	MJD	C0 (ns)	PRN 3 NAV11 20h 8m	PRN11 NAV 8 0h44m	PRN13 NAV 9 6h36m	PRN 6 NAV 3 12h12m	PRN12 NAV10 15h 8m
Mar 1	48682	55	-4	-13	-8	13	3
Mar 2	48683	43	0	5	-12	10	-6
Mar 3	48684	32	-2	-5	-8	10	10
Mar 4	48685	21	-4	-4	-8	14	-2
Mar 5	48686	12	0	-2	-6	1	3
Mar 6	48687	3	1	4	-9	-2	3
Mar 7	48688	-2	-3	5	0	-4	4
Mar 8	48689	-4	8	-10	-17	8	6
Mar 9	48690	0	11	-1	-12	3	8
Mar 10	48691	0	-1	-1	-7	3	7
Mar 11	48692	-2	3	-	-21	0	1
Mar 12	48693	0	-6	-1	-5	9	4
Mar 13	48694	5	4	-3	-2	12	-8
Mar 14	48695	7	-1	5	-3	-1	1
Mar 15	48696	8	6	-7	-14	3	0
Mar 16	48697	12	13	-4	-16	5	5
Mar 17	48698	17	4	-4	-11	20*	4
Mar 18	48699	19	3	7	-2	3	-5
Mar 19	48700	13	-4	6	-15	-5	3
Mar 20	48701	8	3	1	-17	14	-3
Mar 21	48702	6	12	-3	-16	4	-3
Mar 22	48703	3	7	0	-1	2	-2
Mar 23	48704	-2	3	16*	-18	3	0
Mar 24	48705	-6	0	0	-26*	4	8
Mar 25	48706	-8	-5	4	-17	6	0
Mar 26	48707	-8	6	22*	-11	11	1
Mar 27	48708	-9	22*	-5	-5	4	6
Mar 28	48709	-13	-4	1	-15	4	3
Mar 29	48710	-15	8	-1	-11	4	2
Mar 30	48711	-18	4	0	-21	15	1
Mar 31	48712	-23	-2	-11	-7	-13*	2

TABLE 8B. (CONT.)

r(ns)

Date 1992 0hUTC	MJD	C0 (ns)	PRN 3 NAV11 18h 4m	PRN11 NAV 8 22h36m	PRN13 NAV 9 4h32m	PRN 6 NAV 3 10h 8m	PRN12 NAV10 13h 4m
Apr 1	48713	-30	9	-6	-12	11	3
Apr 2	48714	-38	8	-22*	-6	-2	2
Apr 3	48715	-45	15	-30*	-22	4	1
Apr 4	48716	-53	12	-	-8	-1	-5
Apr 5	48717	-64	-2	-92*	-7	-6	4
Apr 6	48718	-78	8	-61*	-9	1	10
Apr 7	48719	-90	4	29*	-13	0	-6
Apr 8	48720	-96	11	-24*	-11	-2	3
Apr 9	48721	-98	2	-59*	-8	1	11
Apr 10	48722	-103	1	-10	-7	-6	9
Apr 11	48723	-107	6	5	-2	-5	-7
Apr 12	48724	-106	11	-41*	-1	-12	-2
Apr 13	48725	-102	7	77*	-1	9	0
Apr 14	48726	-102	5	18*	-17	4	-2
Apr 15	48727	-105	2	4	-4	3	-
Apr 16	48728	-105	14	-16	-12	-11	3
Apr 17	48729	-96	4	19*	-11	-6	5
Apr 18	48730	-81	19	8	-7	10	-3
Apr 19	48731	-71	-7	-35*	-14	-	1
Apr 20	48732	-67	11	30*	-16	-	2
Apr 21	48733	-65	5	4	-9	-	2
Apr 22	48734	-63	7	37*	-3	-	0
Apr 23	48735	-59	-2	0	-14	-8	0
Apr 24	48736	-53	12	-	-15	12	9
Apr 25	48737	-49	-3	-2	-21	13	4
Apr 26	48738	-54	3	-11	-2	44*	5
Apr 27	48739	-61	3	-18*	-8	-20*	3
Apr 28	48740	-68	11	28*	-2	12	4
Apr 29	48741	-73	15	-14	-9	-104*	-1
Apr 30	48742	-78	7	25*	-10	28*	-5

TABLE 8B. (CONT.)

r(ns)

Date 1992 0hUTC	MJD	C0 (ns)	PRN 3 NAV11 16h 4m	PRN11 NAV 8 20h36m	PRN13 NAV 9 2h32m	PRN 6 NAV 3 8h 8m	PRN12 NAV10 11h 4m
May 1	48743	-82	7	1	-12	182*	3
May 2	48744	-83	13	-5	-4	278*	-11
May 3	48745	-84	4	48*	-2	-76*	-4
May 4	48746	-78	6	-23*	-8	270*	1
May 5	48747	-66	14	31*	-7	85*	-2
May 6	48748	-59	6	-14	-12	193*	3
May 7	48749	-52	5	-20*	0	105*	0
May 8	48750	-44	10	0	-4	82*	4
May 9	48751	-31	-4	17	-10	16	-3
May 10	48752	-24	3	-1	-12	-9	-7
May 11	48753	-21	14	-8	-8	40*	3
May 12	48754	-19	0	-3	-9	7	-1
May 13	48755	-20	6	10	-5	-32*	3
May 14	48756	-24	-5	5	1	-18	-1
May 15	48757	-33	-	-	-	-	-
May 16	48758	-36	-	-	-	-	-
May 17	48759	-34	-	-	-	-	-
May 18	48760	-32	-2	7	-2	82*	0
May 19	48761	-34	8	-14	-3	-	-3
May 20	48762	-36	5	9	-9	-	0
May 21	48763	-39	12	-13	-12	-	4
May 22	48764	-47	15	0	-11	-	1
May 23	48765	-56	-6	-55*	-1	-	0
May 24	48766	-63	3	11	-5	-	0
May 25	48767	-67	5	37*	-8	-	3
May 26	48768	-70	-2	-6	-5	-	2
May 27	48769	-75	6	-25*	-4	-	-3
May 28	48770	-78	5	-13	4	-	2
May 29	48771	-81	4	20*	-7	-	-6
May 30	48772	-82	-1	-11	-10	-	2
May 31	48773	-85	3	20*	1	-	5

TABLE 8B. (CONT.)

r(ns)

Date 1992 0hUTC	MJD	C0 (ns)	PRN 3 NAV11 14h 0m	PRN11 NAV 8 18h32m	PRN13 NAV 9 0h28m	PRN 6 NAV 3 6h 4m	PRN12 NAV10 9h 0m
Jun 1	48774	-85	2	4	-14	-	-1
Jun 2	48775	-83	4	25*	-12	-	3
Jun 3	48776	-78	2	35*	-1	-	2
Jun 4	48777	-71	4	-13	2	-	5
Jun 5	48778	-62	4	-4	-17	-	8
Jun 6	48779	-50	-1	5	-6	-	5
Jun 7	48780	-38	1	2	-	-	-2
Jun 8	48781	-33	1	9	-14	-	-5
Jun 9	48782	-34	7	5	-13	-	-12
Jun 10	48783	-38	-	-	-	-	-
Jun 11	48784	-41	-	-	-	-	-
Jun 12	48785	-39	2	25*	-1	-	1
Jun 13	48786	-35	9	-40*	-1	-	-4
Jun 14	48787	-36	5	-5	-8	-	-4
Jun 15	48788	-39	9	-38*	-10	-	5
Jun 16	48789	-45	1	-12	7	-	2
Jun 17	48790	-52	1	-5	-	-	7
Jun 18	48791	-53	1	-22*	-5	-	4
Jun 19	48792	-50	6	-30*	-8	-	-5
Jun 20	48793	-43	12	-36*	-4	-	3
Jun 21	48794	-41	6	-13	-11	-	0
Jun 22	48795	-42	4	-30*	-13	-	10
Jun 23	48796	-42	4	7	-9	-	1
Jun 24	48797	-43	3	-7	18*	-	-1
Jun 25	48798	-47	8	-32*	-8	-	7
Jun 26	48799	-56	-2	-9	13*	-	1
Jun 27	48800	-51	6	11*	0	-	-14*
Jun 28	48801	-45	2	-14	-15	-	-3
Jun 29	48802	-45	12	-	-	-	10

r(ns)

Date 1992 0hUTC	MJD	C0 (ns)	PRN12 NAV10 8h 8m	PRN 3 NAV11 11h52m	PRN11 NAV 8 16h24m	PRN13 NAV 9 22h16m
Jun 30	48803	-51	3	12	33*	-6

TABLE 8B. (CONT.)

Date 1992 0hUTC	MJD	C0 (ns)	r(ns) PRN12 NAV10 8h 4m	PRN 3 NAV11 11h48m	PRN11 NAV 8 16h20m	PRN13 NAV 9 22h12m
Jul 1	48804	-58	1	7	-3	1
Jul 2	48805	-64	6	3	-14	-4
Jul 3	48806	-68	1	7	12	-8
Jul 4	48807	-70	-17	2	9	-2
Jul 5	48808	-65	-4	14	14	-15
Jul 6	48809	-59	-4	5	33*	-14
Jul 7	48810	-58	6	1	17	0
Jul 8	48811	-61	13	6	-21	-13
Jul 9	48812	-70	5	18	32*	1
Jul 10	48813	-77	-8	0	-15	-4
Jul 11	48814	-82	2	3	16	-2
Jul 12	48815	-89	22	1	-5	-9
Jul 13	48816	-101	-26	13	-14	-1
Jul 14	48817	-111	11	6	-9	-6
Jul 15	48818	-113	-33*	1	16	-6
Jul 16	48819	-115	11	0	-1	-2
Jul 17	48820	-120	11	8	-23	-1
Jul 18	48821	-123	-20	2	-	3
Jul 19	48822	-119	-8	12	9	2
Jul 20	48823	-119	-5	7	33*	-6
Jul 21	48824	-125	-9	9	-24*	-1
Jul 22	48825	-127	15	13	11	33*
Jul 23	48826	-127	-13	12	-31*	-23
Jul 24	48827	-126	5	4	12	2
Jul 25	48828	-126	-10	5	-4	-18
Jul 26	48829	-126	7	7	24	-24
Jul 27	48830	-124	3	7	11	-14
Jul 28	48831	-124	5	14	-13	-16
Jul 29	48832	-123	0	8	15	36*
Jul 30	48833	-123	0	13	0	-14
Jul 31	48834	-122	-6	10	-9	-3

TABLE 8B. (CONT.)

Date 1992 0hUTC	MJD	C0 (ns)	r(ns) PRN12 NAV10 6h 0m	PRN 3 NAV11 9h44m	PRN11 NAV 8 14h16m	PRN13 NAV 9 20h 8m
Aug 1	48835	-117	-4	8	17	-15
Aug 2	48836	-110	-2	2	-15	15
Aug 3	48837	-104	-3	9	-12	-6
Aug 4	48838	-102	-8	0	33*	-2
Aug 5	48839	-96	-12	8	21	0
Aug 6	48840	-89	-16	6	2	-5
Aug 7	48841	-84	-6	-4	-6	13
Aug 8	48842	-83	-8	3	17	-12
Aug 9	48843	-87	-2	11	33*	-1
Aug 10	48844	-97	-3	4	0	-20
Aug 11	48845	-104	-6	11	7	19
Aug 12	48846	-107	-9	-11	11	14
Aug 13	48847	-108	-10	-6	-10	-29*
Aug 14	48848	-104	7	3	14	-15
Aug 15	48849	-94	0	0	5	15
Aug 16	48850	-86	-7	-6	4	-27*
Aug 17	48851	-82	-6	7	0	-13
Aug 18	48852	-80	-6	3	20	-40*
Aug 19	48853	-84	-4	7	-6	-7
Aug 20	48854	-96	0	6	-7	3
Aug 21	48855	-109	1	12	-4	-2
Aug 22	48856	-119	-10	-3	19	-9
Aug 23	48857	-125	-4	3	5	11
Aug 24	48858	-127	-15	-6	7	5
Aug 25	48859	-124	-10	0	8	-29*
Aug 26	48860	-121	-16	2	23	8
Aug 27	48861	-121	-9	-10	0	4
Aug 28	48862	-124	0	2	1	-29*
Aug 29	48863	-124	-14	3	9	-6
Aug 30	48864	-120	0	3	11	5
Aug 31	48865	-119	-	6	-2	-2

TABLE 8B. (CONT.)

Date 1992 0hUTC	MJD	C0 (ns)	r(ns) PRN12 NAV10 3h56m	PRN 3 NAV11 7h40m	PRN11 NAV 8 12h12m	PRN13 NAV 9 18h 4m
Sep 1	48866	-120	-5	1	-5	-3
Sep 2	48867	-122	-3	9	24*	11
Sep 3	48868	-123	-14	-5	-3	-3
Sep 4	48869	-123	-2	5	1	-5
Sep 5	48870	-122	-5	13	2	-9
Sep 6	48871	-124	-4	10	-11	12
Sep 7	48872	-127	-12	4	-7	-12
Sep 8	48873	-125	-4	-	11	7
Sep 9	48874	-122	-16	6	4	8
Sep 10	48875	-125	-8	11	0	-14
Sep 11	48876	-133	-5	6	-3	-17
Sep 12	48877	-136	2	13	10	24*
Sep 13	48878	-136	-10	-2	17	-14
Sep 14	48879	-135	3	8	-5	-15
Sep 15	48880	-133	6	4	10	-15
Sep 16	48881	-125	1	9	9	-13
Sep 17	48882	-117	-4	-2	36*	5
Sep 18	48883	-109	-2	1	-9	9
Sep 19	48884	-107	-3	8	-11	1
Sep 20	48885	-112	-1	3	0	7
Sep 21	48886	-118	-8	1	-3	-13
Sep 22	48887	-121	-5	-4	-22*	10
Sep 23	48888	-118	-2	15	0	-6
Sep 24	48889	-119	1	-6	4	-26*
Sep 25	48890	-122	-2	-4	25*	0
Sep 26	48891	-123	3	9	1	-1
Sep 27	48892	-127	-4	1	8	-6
Sep 28	48893	-128	-4	3	-10	-2
Sep 29	48894	-127	4	2	28*	9
Sep 30	48895	-123	-3	-3	-486*	-7

TABLE 8B. (CONT.)

r(ns)

Date 1992 0hUTC	MJD	C0 (ns)	PRN12 NAV10 1h56m	PRN 3 NAV11 5h40m	PRN11 NAV 8 10h12m	PRN13 NAV 9 16h 4m
Oct 1	48896	-119	-9	2	-229*	0
Oct 2	48897	-113	3	-5	172*	-29*
Oct 3	48898	-107	-7	9	5	-8
Oct 4	48899	-104	-13	2	13	10
Oct 5	48900	-112	-16	-5	15	-6
Oct 6	48901	-116	2	0	35*	-18
Oct 7	48902	-113	-3	-3	14	6
Oct 8	48903	-103	-5	8	11	-7
Oct 9	48904	-97	-5	-5	8	-14
Oct 10	48905	-89	-20	9	8	7
Oct 11	48906	-83	-11	-3	19	-9
Oct 12	48907	-78	-11	-3	3	-4
Oct 13	48908	-71	-7	1	13	8
Oct 14	48909	-63	-3	1	8	-15
Oct 15	48910	-59	0	23*	14	-5
Oct 16	48911	-54	-3	0	5	-19
Oct 17	48912	-47	0	1	6	-1
Oct 18	48913	-39	2	4	-1	23*
Oct 19	48914	-36	-8	11	0	-12
Oct 20	48915	-39	-4	2	9	12
Oct 21	48916	-47	-11	-3	5	-10
Oct 22	48917	-52	-3	4	5	-14
Oct 23	48918	-52	-1	14	13	-15
Oct 24	48919	-53	-3	9	11	-2
Oct 25	48920	-59	-3	-6	-1	2
Oct 26	48921	-65	-8	4	1	25*
Oct 27	48922	-68	-4	1	9	2
Oct 28	48923	-65	4	2	-10	-12
Oct 29	48924	-57	-	2	18	16*
Oct 30	48925	-47	-9	2	5	10
Oct 31	48926	-44	-2	9	-8	4

TABLE 8B. (CONT.)

Date 1992 0hUTC	MJD	C0 (ns)	r(ns) PRN12 NAV10 23h48m	PRN 3 NAV11 3h36m	PRN11 NAV 8 8h 8m	PRN13 NAV 9 14h 0m
Nov 1	48927	-45	5	0	4	-16
Nov 2	48928	-46	2	1	-1	23*
Nov 3	48929	-45	-4	10	10	-7
Nov 4	48930	-51	0	5	5	-18
Nov 5	48931	-53	1	4	7	11
Nov 6	48932	-49	-7	4	10	-7
Nov 7	48933	-41	-7	3	-	-18
Nov 8	48934	-31	-2	4	7	7
Nov 9	48935	-26	0	12	2	26*
Nov 10	48936	-35	-2	8	5	-19
Nov 11	48937	-48	-1	-8	-1	-4
Nov 12	48938	-51	2	4	0	5
Nov 13	48939	-47	-5	6	2	-11
Nov 14	48940	-39	-4	-25*	0	4
Nov 15	48941	-34	-9	3	0	-13
Nov 16	48942	-33	1	17	0	-38*
Nov 17	48943	-33	-1	1	0	-16
Nov 18	48944	-32	-2	-2	5	-4
Nov 19	48945	-27	-9	3	18	4
Nov 20	48946	-22	-2	-9	-6	18*
Nov 21	48947	-12	-10	11	8	-5
Nov 22	48948	-1	-8	3	1	-2
Nov 23	48949	8	-5	7	12	-20
Nov 24	48950	8	-2	8	-6	9
Nov 25	48951	1	-7	9	-4	1
Nov 26	48952	-10	1	1	-10	32*
Nov 27	48953	-16	0	1	1	-6
Nov 28	48954	-17	2	10	15	-4
Nov 29	48955	-19	3	-8	-6	-3
Nov 30	48956	-18	2	3	-7	25*

TABLE 8B. (CONT.)

Date 1992 0hUTC	MJD	C0 (ns)	r(ns) PRN12 NAV10 21h48m	PRN 3 NAV11 1h36m	PRN11 NAV 8 6h 8m	PRN13 NAV 9 12h 0m
Dec 1	48957	-16	4	3	0	3
Dec 2	48958	-16	-3	6	-3	-5
Dec 3	48959	-21	-2	1	-3	-21*
Dec 4	48960	-29	5	6	-2	24*
Dec 5	48961	-37	-8	12	-4	-25*
Dec 6	48962	-46	-2	-10	1	24*
Dec 7	48963	-47	-	2	7	-4

Date 1993 0hUTC	MJD	C0 (ns)	r(ns) PRN 3 NAV11 0h56m	PRN11 NAV 8 5h44m	PRN13 NAV 9 11h36m	PRN12 NAV10 20h 8m
Dec 8	48964	-50	-4	12	-4	-4
Dec 9	48965	-48	2	-5	16	0
Dec 10	48966	-48	6	2	-1	2
Dec 11	48967	-48	-7	2	-14	1
Dec 12	48968	-44	-5	14	11	0
Dec 13	48969	-35	1	-19	3	3
Dec 14	48970	-15	10	-3	-	5
Dec 15	48971	-5	5	-1	31*	-4
Dec 16	48972	-3	0	-1	-18	-3
Dec 17	48973	0	2	10	-3	-4
Dec 18	48974	4	5	-5	-2	-4
Dec 19	48975	3	12	-2	13	-2
Dec 20	48976	-5	-4	-9	0	4
Dec 21	48977	-16	-	5	-20	8
Dec 22	48978	-22	13	9	-18	-13
Dec 23	48979	-25	-5	5	16	-1
Dec 24	48980	-25	4	11	-5	1
Dec 25	48981	-24	-9	-15	44*	-14
Dec 26	48982	-10	8	15	6	0
Dec 27	48983	15	-4	-8	9	1
Dec 28	48984	37	20	-3	27*	2
Dec 29	48985	44	-1	2	-2	-5
Dec 30	48986	41	5	-6	-16	-10
Dec 31	48987	44	13	-17	14	-4

TABLE 8C. COMPLEMENT TO TABLE 8B

The following tables give the residuals r computed from the observation of Block II satellites, with respect to the smoothed data UTC - GPS time obtained from Block I satellites only. The C0 values reported here are already given in Table 8B.
The following tables give only the evidence of the turning on or off of Selective Availability on Block II satellites.
For deriving UTC use Table 8B.

r(ns)

Date 1992 0hUTC	MJD	C0 (ns)	PRN23 NAV23 2h52m	PRN17 NAV17 3h40m	PRN21 NAV21 3h56m	PRN15 NAV15 5h48m	PRN14 NAV14 8h44m	PRN18 NAV18 9h48m
Jan 1	48622	233	-1	-65	48	-29	66	-
Jan 2	48623	232	-17	73	65	19	35	-22
Jan 3	48624	230	-28	107	-5	54	-	-
Jan 4	48625	225	69	-38	98	-15	-4	20
Jan 5	48626	219	43	44	-8	66	-	-
Jan 6	48627	218	0	108	57	28	-114	-81
Jan 7	48628	218	-69	27	1	-77	22	45
Jan 8	48629	217	-58	-64	14	31	-16	17
Jan 9	48630	212	-8	-	67	39	39	18
Jan 10	48631	207	-50	-18	115	-11	44	20
Jan 11	48632	199	24	-21	-15	7	47	91
Jan 12	48633	191	46	-69	16	31	33	13
Jan 13	48634	186	44	49	-34	-71	9	27
Jan 14	48635	186	-38	-53	27	34	18	-23
Jan 15	48636	187	12	-49	46	44	96	-63
Jan 16	48637	186	-67	33	39	84	94	33
Jan 17	48638	183	-12	59	20	-32	-	36
Jan 18	48639	174	-50	4	12	30	-24	-36
Jan 19	48640	168	4	3	10	-15	-5	55
Jan 20	48641	164	13	-30	-31	28	-11	55
Jan 21	48642	167	73	-3	20	-38	-17	-34
Jan 22	48643	170	22	22	-	-	81	69
Jan 23	48644	166	-12	-38	-68	18	-71	-34
Jan 24	48645	160	-10	-16	-29	46	-92	-37
Jan 25	48646	158	4	-10	99	93	16	25
Jan 26	48647	161	99	-18	5	20	10	-17
Jan 27	48648	163	131	-32	-4	-90	20	92
Jan 28	48649	158	42	18	-60	-1	-57	-56
Jan 29	48650	146	-19	70	-125	-8	10	-117
Jan 30	48651	140	-31	39	40	110	28	-3
Jan 31	48652	137	-34	44	-25	-14	94	5

TABLE 8C. (CONT.)

Date 1992 0hUTC	MJD	C0 (ns)	r(ns) PRN24 NAV24 12h12m	PRN19 NAV19 12h28m	PRN16 NAV16 14h36m	PRN 2 NAV13 18h 4m	PRN20 NAV20 21h16m
Jan 1	48622	233	4	-16	-65	-55	-37
Jan 2	48623	232	-17	-8	23	-54	7
Jan 3	48624	230	-	-	-	-	-
Jan 4	48625	225	-39	6	-	-	-
Jan 5	48626	219	-	-	-	-	-
Jan 6	48627	218	-3	-23	-29	58	13
Jan 7	48628	218	39	38	-23	122	-48
Jan 8	48629	217	29	25	-54	-11	11
Jan 9	48630	212	7	4	32	-1	-63
Jan 10	48631	207	-105	48	90	-34	-89
Jan 11	48632	199	-28	-49	51	-36	79
Jan 12	48633	191	-96	-50	-49	-12	-61
Jan 13	48634	186	-86	-	26	40	-78
Jan 14	48635	186	39	-58	11	5	-16
Jan 15	48636	187	67	35	-26	124	48
Jan 16	48637	186	-9	-35	-	-52	-20
Jan 17	48638	183	74	-81	3	78	-46
Jan 18	48639	174	-80	-65	24	-15	-33
Jan 19	48640	168	119	4	-41	82	-25
Jan 20	48641	164	7	-34	9	-82	78
Jan 21	48642	167	-14	42	10	12	-78
Jan 22	48643	170	-71	-95	7	21	44
Jan 23	48644	166	11	16	-53	35	-8
Jan 24	48645	160	-32	23	52	30	-12
Jan 25	48646	158	-28	-40	20	66	3
Jan 26	48647	161	42	8	13	-7	44
Jan 27	48648	163	-33	-91	-25	46	34
Jan 28	48649	158	7	-65	13	50	28
Jan 29	48650	146	-	-35	50	-6	93
Jan 30	48651	140	-25	-7	2	-11	10
Jan 31	48652	137	71	-17	-25	-17	-29

TABLE 8C. (CONT.)

Date 1992 0hUTC	MJD	C0 (ns)	PRN23 NAV23 0h48m	PRN17 NAV17 1h36m	PRN21 NAV21 1h52m	PRN15 NAV15 3h44m	PRN14 NAV14 6h40m	PRN18 NAV18 7h44m
			r(ns)					
Feb 1	48653	138	11	75	-	-11	40	-
Feb 2	48654	140	18	-22	39	-47	25	88
Feb 3	48655	143	24	40	-70	-31	57	23
Feb 4	48656	145	-64	37	9	-16	-26	45
Feb 5	48657	141	31	26	19	11	4	1
Feb 6	48658	136	-24	5	40	-7	39	-15
Feb 7	48659	134	-4	-83	14	76	7	-
Feb 8	48660	134	128	-40	-33	59	20	37
Feb 9	48661	132	44	-29	-17	31	-101	77
Feb 10	48662	129	7	20	-43	102	26	-7
Feb 11	48663	124	56	82	21	-18	-38	-29
Feb 12	48664	122	-	2	62	-89	-22	30
Feb 13	48665	119	-17	-20	48	-17	33	41
Feb 14	48666	114	6	-47	8	34	-22	14
Feb 15	48667	109	26	-64	32	-3	-39	12
Feb 16	48668	107	-25	-58	-15	16	-23	-4
Feb 17	48669	109	9	49	18	-17	-4	-20
Feb 18	48670	109	62	-40	63	-4	25	-22
Feb 19	48671	102	-4	-33	58	5	78	-30
Feb 20	48672	96	39	-12	23	-51	29	40
Feb 21	48673	93	10	-79	40	103	-32	12
Feb 22	48674	94	18	-9	1	1	7	18
Feb 23	48675	91	3	-4	29	11	-6	0
Feb 24	48676	89	-30	-	-11	7	5	9
Feb 25	48677	87	51	12	-5	13	-36	-3
Feb 26	48678	85	-56	39	3	-33	78	9
Feb 27	48679	82	-44	79	-4	-34	2	11
Feb 28	48680	77	-3	-13	-	85	88	90
Feb 29	48681	68	14	-5	-	2	2	13

TABLE 8C. (CONT.)

Date 1992 0hUTC	MJD	C0 (ns)	r(ns) PRN24 NAV24 10h 8m	PRN19 NAV19 10h24m	PRN16 NAV16 12h32m	PRN 2 NAV13 16h 0m	PRN20 NAV20 19h12m
Feb 1	48653	138	5	31	0	-50	31
Feb 2	48654	140	-23	-78	-32	135	-87
Feb 3	48655	143	-12	-	97	23	47
Feb 4	48656	145	-14	-20	35	121	26
Feb 5	48657	141	-92	-86	12	27	-1
Feb 6	48658	136	5	68	-5	9	24
Feb 7	48659	134	25	59	-72	-11	15
Feb 8	48660	134	-16	-74	48	-41	-43
Feb 9	48661	132	18	-116	-5	45	-62
Feb 10	48662	129	-49	-78	74	-50	7
Feb 11	48663	124	-41	-13	19	14	-35
Feb 12	48664	122	-62	17	39	86	49
Feb 13	48665	119	-24	23	101	34	55
Feb 14	48666	114	16	2	-4	21	-27
Feb 15	48667	109	-14	-15	31	50	19
Feb 16	48668	107	-	-29	-58	52	-10
Feb 17	48669	109	-17	-6	108	45	35
Feb 18	48670	109	-19	-33	38	54	-9
Feb 19	48671	102	14	9	-17	97	6
Feb 20	48672	96	-88	58	-18	18	66
Feb 21	48673	93	-91	-101	-57	9	-5
Feb 22	48674	94	-6	-14	-2	2	-8
Feb 23	48675	91	-4	-12	-3	17	-6
Feb 24	48676	89	1	-14	-8	-	-11
Feb 25	48677	87	42	-39	38	3	33
Feb 26	48678	85	21	-77	48	-47	-49
Feb 27	48679	82	59	-11	-109	74	-79
Feb 28	48680	77	7	47	-	-3	4
Feb 29	48681	68	-3	-14	-23	-6	-7

TABLE 8C. (CONT.)

r(ns)

Date 1992 0hUTC	MJD	C0 (ns)	PRN23 NAV23 22h48m	PRN17 NAV17 23h36m	PRN21 NAV21 23h52m	PRN15 NAV15 1h48m	PRN14 NAV14 4h44m	PRN18 NAV18 5h48m
Mar 1	48682	55	-4	-20	3	1	-9	2
Mar 2	48683	43	-65	64	79	19	-2	7
Mar 3	48684	32	121	17	24	22	40	43
Mar 4	48685	21	-27	-9	8	80	-24	85
Mar 5	48686	12	3	-10	-58	56	-8	-9
Mar 6	48687	3	-4	-4	94	-57	21	39
Mar 7	48688	-2	-36	-56	-	-24	36	27
Mar 8	48689	-4	-31	46	65	2	122	111
Mar 9	48690	0	-86	-31	18	4	-7	-17
Mar 10	48691	0	44	38	39	112	47	6
Mar 11	48692	-2	85	-61	33	-49	-18	7
Mar 12	48693	0	8	8	-11	-19	-96	21
Mar 13	48694	5	96	3	71	-15	-77	97
Mar 14	48695	7	-15	-60	29	18	29	16
Mar 15	48696	8	78	-60	-8	57	-35	14
Mar 16	48697	12	30	19	5	40	5	-29
Mar 17	48698	17	23	56	16	21	68	-153
Mar 18	48699	19	81	-23	144	-49	36	-74
Mar 19	48700	13	8	31	14	98	31	7
Mar 20	48701	8	-14	45	-37	13	40	-1
Mar 21	48702	6	-24	0	-18	-59	13	-19
Mar 22	48703	3	-55	-20	-13	61	31	9
Mar 23	48704	-2	18	-42	52	-38	56	-33
Mar 24	48705	-6	-25	5	52	1	-23	74
Mar 25	48706	-8	85	-34	56	6	70	-31
Mar 26	48707	-8	6	-3	34	16	-9	4
Mar 27	48708	-9	-71	-36	12	-	24	-8
Mar 28	48709	-13	-20	-48	76	-	15	55
Mar 29	48710	-15	59	-10	84	-4	-16	-48
Mar 30	48711	-18	-39	-36	3	75	23	-35
Mar 31	48712	-23	26	-36	133	15	98	-

TABLE 8C. (CONT.)

Date 1992 0hUTC	MJD	C0 (ns)	PRN24 NAV24 8h12m	PRN19 NAV19 8h28m	PRN16 NAV16 10h36m	PRN 2 NAV13 14h 4m	PRN20 NAV20 17h16m
			r(ns)				
Mar 1	48682	55	1	-4	-20	5	3
Mar 2	48683	43	2	-15	20	5	-20
Mar 3	48684	32	-94	-75	-69	-45	-27
Mar 4	48685	21	37	31	-18	-50	45
Mar 5	48686	12	17	6	-65	3	-65
Mar 6	48687	3	-13	-103	37	54	32
Mar 7	48688	-2	-12	-10	109	16	-26
Mar 8	48689	-4	-28	61	67	52	-112
Mar 9	48690	0	19	-4	0	19	48
Mar 10	48691	0	-31	-14	93	20	4
Mar 11	48692	-2	38	-7	-37	-	-16
Mar 12	48693	0	40	30	6	0	8
Mar 13	48694	5	10	2	-34	64	-9
Mar 14	48695	7	-41	-15	41	-33	24
Mar 15	48696	8	36	52	-5	-13	7
Mar 16	48697	12	-124	-47	-29	-75	17
Mar 17	48698	17	24	-58	-	12	5
Mar 18	48699	19	61	5	-60	-18	35
Mar 19	48700	13	-48	-4	-63	-35	-87
Mar 20	48701	8	-13	-8	-10	0	-11
Mar 21	48702	6	33	-87	-35	43	-32
Mar 22	48703	3	16	-5	-78	-30	24
Mar 23	48704	-2	-10	-50	0	-26	-32
Mar 24	48705	-6	-60	67	-36	-24	-21
Mar 25	48706	-8	132	103	2	11	11
Mar 26	48707	-8	30	50	-33	12	-12
Mar 27	48708	-9	7	-26	21	41	-48
Mar 28	48709	-13	57	-19	-79	-27	-19
Mar 29	48710	-15	58	-	23	-54	51
Mar 30	48711	-18	-34	34	47	-81	-24
Mar 31	48712	-23	6	-71	47	23	-

TABLE 8C. (CONT.)

r(ns)

Date 1992 0hUTC	MJD	C0 (ns)	PRN23 NAV23 20h44m	PRN17 NAV17 21h32m	PRN21 NAV21 21h48m	PRN15 NAV15 23h40m	PRN14 NAV14 2h40m	PRN18 NAV18 3h44m
Apr 1	48713	-30	24	43	-34	-44	-31	12
Apr 2	48714	-38	94	-72	16	15	-59	-
Apr 3	48715	-45	-50	-3	74	94	-20	31
Apr 4	48716	-53	-5	-37	54	-38	-4	11
Apr 5	48717	-64	81	24	-42	-70	41	26
Apr 6	48718	-78	21	11	-2	4	33	0
Apr 7	48719	-90	-41	85	-39	22	-3	-8
Apr 8	48720	-96	47	4	77	3	2	6
Apr 9	48721	-98	40	6	-38	-4	-10	41
Apr 10	48722	-103	-88	-71	27	26	38	-72
Apr 11	48723	-107	21	-107	44	3	-65	-55
Apr 12	48724	-106	-21	98	-55	73	31	4
Apr 13	48725	-102	-62	1	-33	-6	-16	-130
Apr 14	48726	-102	11	48	-71	73	-59	1
Apr 15	48727	-105	44	-32	-42	-35	-7	-84
Apr 16	48728	-105	-	-45	-44	-10	43	24
Apr 17	48729	-96	-24	-39	130	-12	-	-10
Apr 18	48730	-81	-100	-6	7	-89	5	64
Apr 19	48731	-71	35	-5	-35	-18	-41	56
Apr 20	48732	-67	-1	8	4	-91	76	-55
Apr 21	48733	-65	-10	-85	-23	-43	49	-13
Apr 22	48734	-63	20	-38	-27	-13	-32	-22
Apr 23	48735	-59	-61	17	67	15	-	-4
Apr 24	48736	-53	10	20	-17	16	-34	-47
Apr 25	48737	-49	12	-73	-8	12	-156	-39
Apr 26	48738	-54	23	-17	49	-3	19	10
Apr 27	48739	-61	135	16	64	-10	-56	49
Apr 28	48740	-68	-10	83	35	66	-9	25
Apr 29	48741	-73	-	-75	94	53	-26	-37
Apr 30	48742	-78	68	-	32	-98	33	13

TABLE 8C. (CONT.)

Date 1992 0hUTC	MJD	C0 (ns)	r(ns) PRN24 NAV24 6h 8m	PRN19 NAV19 6h24m	PRN16 NAV16 8h32m	PRN 2 NAV13 12h 0m	PRN20 NAV20 15h12m
Apr 1	48713	-30	-16	36	-9	1	-6
Apr 2	48714	-38	-24	3	48	34	7
Apr 3	48715	-45	-2	51	-127	5	-9
Apr 4	48716	-53	-3	-91	-36	-7	3
Apr 5	48717	-64	-62	-115	20	-22	-1
Apr 6	48718	-78	1	-15	-49	-1	16
Apr 7	48719	-90	6	-12	-12	3	-17
Apr 8	48720	-96	10	-12	8	11	7
Apr 9	48721	-98	-38	-4	-66	-11	-13
Apr 10	48722	-103	-34	4	41	-40	-7
Apr 11	48723	-107	-64	35	-35	4	11
Apr 12	48724	-106	29	-8	32	4	-1
Apr 13	48725	-102	-60	45	-22	54	14
Apr 14	48726	-102	-18	6	42	15	-4
Apr 15	48727	-105	11	-3	-67	83	10
Apr 16	48728	-105	-90	64	-42	-66	-4
Apr 17	48729	-96	13	-101	-73	-	2
Apr 18	48730	-81	3	-29	11	-20	-4
Apr 19	48731	-71	-15	-5	-68	77	11
Apr 20	48732	-67	-32	-55	7	-36	11
Apr 21	48733	-65	74	8	-38	49	-18
Apr 22	48734	-63	28	44	26	10	3
Apr 23	48735	-59	-61	20	-44	7	-13
Apr 24	48736	-53	57	10	-100	47	5
Apr 25	48737	-49	10	15	-6	-	-8
Apr 26	48738	-54	16	-38	-51	12	7
Apr 27	48739	-61	12	-14	91	-52	11
Apr 28	48740	-68	39	-6	-22	43	-9
Apr 29	48741	-73	-18	-8	-49	-44	-4
Apr 30	48742	-78	42	-26	85	5	10

TABLE 8C. (CONT.)

Date 1992 0hUTC	MJD	C0 (ns)	PRN23 NAV23 18h44m	PRN17 NAV17 19h32m	PRN21 NAV21 19h48m	PRN15 NAV15 21h40m	PRN14 NAV14 0h40m	PRN18 NAV18 1h44m
			r(ns)					
May 1	48743	-82	-28	1	29	78	-13	-11
May 2	48744	-83	55	-	-11	89	7	-21
May 3	48745	-84	30	12	-20	-19	21	3
May 4	48746	-78	36	-18	21	43	43	62
May 5	48747	-66	-42	28	-94	22	0	19
May 6	48748	-59	20	9	-74	123	-18	12
May 7	48749	-52	-67	-16	23	101	-17	-66
May 8	48750	-44	-11	31	-14	44	-55	-105
May 9	48751	-31	-31	-18	28	-18	30	-1
May 10	48752	-24	-14	38	-73	-28	-	-35
May 11	48753	-21	-111	30	86	63	40	-45
May 12	48754	-19	-46	66	32	46	-28	97
May 13	48755	-20	6	-2	-13	28	-39	64
May 14	48756	-24	19	2	-6	-133	81	-80
May 15	48757	-33	-	-	-	-	-	-
May 16	48758	-36	-	-	-	-	-	-
May 17	48759	-34	-	-	-	1	23	-
May 18	48760	-32	0	5	-59	2	-76	40
May 19	48761	-34	35	-66	-31	102	20	84
May 20	48762	-36	-46	23	-115	0	-46	-
May 21	48763	-39	-14	-74	-	12	100	-
May 22	48764	-47	-9	86	-	-3	-4	22
May 23	48765	-56	-36	-53	-30	71	71	1
May 24	48766	-63	10	-28	-5	114	58	-46
May 25	48767	-67	7	5	-84	2	-8	16
May 26	48768	-70	34	68	49	-7	-	-
May 27	48769	-75	-56	101	53	14	4	30
May 28	48770	-78	6	61	61	-72	-9	-37
May 29	48771	-81	5	44	-	-8	-13	-49
May 30	48772	-82	87	62	-33	-13	83	11
May 31	48773	-85	43	-12	-17	-59	71	-42

TABLE 8C. (CONT.)

r(ns)

Date 1992 0hUTC	MJD	C0 (ns)	PRN24 NAV24 4h 8m	PRN19 NAV19 4h24m	PRN16 NAV16 6h32m	PRN 2 NAV13 10h 0m	PRN20 NAV20 13h12m
May 1	48743	-82	24	20	-37	6	1
May 2	48744	-83	34	8	-58	-59	-10
May 3	48745	-84	-31	113	-12	-47	6
May 4	48746	-78	-42	-3	-	82	-11
May 5	48747	-66	57	0	3	-23	-2
May 6	48748	-59	-8	39	-44	-47	-4
May 7	48749	-52	-69	-119	-54	36	-24
May 8	48750	-44	60	31	122	-39	0
May 9	48751	-31	-25	-9	69	79	15
May 10	48752	-24	-24	44	-17	66	-2
May 11	48753	-21	31	-70	-96	89	4
May 12	48754	-19	-27	36	-45	77	-1
May 13	48755	-20	12	15	-24	-19	-8
May 14	48756	-24	-19	-20	93	-25	-1
May 15	48757	-33	-	-	-	-	-
May 16	48758	-36	-	-	-	-	-
May 17	48759	-34	-	-	-	-	-
May 18	48760	-32	43	-28	-66	-16	-2
May 19	48761	-34	-24	-43	0	-44	4
May 20	48762	-36	88	-62	40	22	4
May 21	48763	-39	6	23	-16	34	9
May 22	48764	-47	78	-	-31	-46	7
May 23	48765	-56	-34	-72	93	-5	-13
May 24	48766	-63	-	-	-69	-17	3
May 25	48767	-67	-10	33	-14	-1	-14
May 26	48768	-70	34	-32	63	-	14
May 27	48769	-75	-15	-41	52	26	7
May 28	48770	-78	9	-7	78	-33	25
May 29	48771	-81	77	73	8	23	5
May 30	48772	-82	6	-47	-43	29	-5
May 31	48773	-85	40	25	36	-57	8

TABLE 8C. (CONT.)

Date 1992 0hUTC	MJD	C0 (ns)	r(ns) PRN23 NAV23 16h40m	PRN17 NAV17 17h28m	PRN21 NAV21 17h44m	PRN15 NAV15 19h36m	PRN14 NAV14 22h32m	PRN18 NAV18 23h36m
Jun 1	48774	-85	-5	5	23	-11	-140	-34
Jun 2	48775	-83	46	-47	-8	-27	-16	-17
Jun 3	48776	-78	-61	10	-25	-22	-37	-59
Jun 4	48777	-71	-8	5	25	1	-34	-27
Jun 5	48778	-62	14	-67	12	-35	27	-15
Jun 6	48779	-50	-9	-50	-69	-42	22	49
Jun 7	48780	-38	56	22	66	-47	44	-63
Jun 8	48781	-33	-46	44	54	-15	-	1
Jun 9	48782	-34	-6	32	96	120	78	65
Jun 10	48783	-38	-	-	-	-	-	-
Jun 11	48784	-41	-	-	-	-	-	-
Jun 12	48785	-39	-22	-13	48	-29	-32	3
Jun 13	48786	-35	-	58	27	59	-10	-62
Jun 14	48787	-36	20	72	73	-7	7	-15
Jun 15	48788	-39	71	25	54	-59	-27	0
Jun 16	48789	-45	-48	-35	5	-2	-	-77
Jun 17	48790	-52	-47	9	48	-28	-1	64
Jun 18	48791	-53	71	2	-72	22	38	-4
Jun 19	48792	-50	-8	0	-40	-52	11	-46
Jun 20	48793	-43	-	23	21	15	50	21
Jun 21	48794	-41	-52	-31	69	22	-49	-19
Jun 22	48795	-42	117	-34	-15	-23	-40	21
Jun 23	48796	-42	48	-54	15	9	-73	48
Jun 24	48797	-43	62	-20	66	16	-1	5
Jun 25	48798	-47	-61	-31	-20	0	-5	-2
Jun 26	48799	-56	-117	62	3	15	-36	59
Jun 27	48800	-51	34	63	43	11	-20	32
Jun 28	48801	-45	-23	-31	50	15	29	30
Jun 29	48802	-45	-	-	-	-	-	-35

Date 1992 0hUTC	MJD	C0 (ns)	r(ns) PRN24 NAV24 0h 8m	PRN16 NAV16 2h 0m	PRN19 NAV19 2h48m	PRN 2 NAV13 5h44m	PRN20 NAV20 8h56m	PRN25 NAV25 10h48m	PRN28 NAV28 14h 0m
Jun 30	48803	-51	-57	9	-19	-56	-9	-112	-23

TABLE 8C. (CONT.)

Date 1992 0hUTC	MJD	C0 (ns)	r(ns) PRN24 NAV24 2h 4m	PRN19 NAV19 2h20m	PRN16 NAV16 4h28m	PRN 2 NAV13 7h56m	PRN20 NAV20 11h 8m
Jun 1	48774	-85	62	-31	14	-53	-2
Jun 2	48775	-83	-7	-62	67	-48	-71
Jun 3	48776	-78	34	-2	-6	40	83
Jun 4	48777	-71	25	-66	-55	25	67
Jun 5	48778	-62	55	-9	-1	28	-
Jun 6	48779	-50	-11	-98	-59	50	-1
Jun 7	48780	-38	-47	65	-37	2	-68
Jun 8	48781	-33	-55	21	-40	-52	18
Jun 9	48782	-34	27	-32	38	-3	-2
Jun 10	48783	-38	-23	-69	-47	-	-
Jun 11	48784	-41	-	-	-	-	-
Jun 12	48785	-39	-	-	-	-	46
Jun 13	48786	-35	61	62	45	-86	-65
Jun 14	48787	-36	52	-29	-59	98	60
Jun 15	48788	-39	117	5	-25	-17	53
Jun 16	48789	-45	-6	-64	47	6	50
Jun 17	48790	-52	26	-101	-31	-28	17
Jun 18	48791	-53	12	-46	27	-36	63
Jun 19	48792	-50	-86	8	28	-20	24
Jun 20	48793	-43	-21	9	-9	51	-14
Jun 21	48794	-41	31	-80	-	29	24
Jun 22	48795	-42	28	9	4	-8	0
Jun 23	48796	-42	-	-15	-39	-74	45
Jun 24	48797	-43	28	84	38	35	-24
Jun 25	48798	-47	79	39	28	-25	7
Jun 26	48799	-56	25	-50	-14	-80	-70
Jun 27	48800	-51	-111	-39	17	28	-24
Jun 28	48801	-45	3	-12	10	46	-38
Jun 29	48802	-45	47	-23	-41	-77	35

Date 1992 0hUTC	MJD	C0 (ns)	r(ns) PRN23 NAV23 14h32m	PRN17 NAV17 15h20m	PRN21 NAV21 15h36m	PRN15 NAV15 17h28m	PRN14 NAV14 20h24m	PRN18 NAV18 23h20m
Jun 30	48803	-51	-22	46	82	36	-7	-80

TABLE 8C. (CONT.)

Date 1992 0hUTC	MJD	C0 (ns)	r(ns) PRN24 NAV24 0h 4m	PRN16 NAV16 1h56m	PRN19 NAV19 2h44m	PRN 2 NAV13 5h40m	PRN20 NAV20 8h52m	PRN25 NAV25 10h44m	PRN28 NAV28 13h56m
Jul 1	48804	-58	-	87	10	-33	26	17	-
Jul 2	48805	-64	-5	-51	-3	-12	-21	-33	38
Jul 3	48806	-68	81	-45	-2	-3	-29	-	15
Jul 4	48807	-70	58	-3	12	-52	72	-30	-10
Jul 5	48808	-65	-75	33	-93	-27	92	-58	2
Jul 6	48809	-59	0	-33	-87	-14	29	26	24
Jul 7	48810	-58	-22	14	-35	-72	-45	79	-1
Jul 8	48811	-61	-29	6	-108	-5	48	30	-63
Jul 9	48812	-70	-41	-16	-93	-23	-28	-46	-58
Jul 10	48813	-77	93	-17	-38	-104	-102	42	1
Jul 11	48814	-82	-42	-3	-93	-3	-4	6	-45
Jul 12	48815	-89	8	80	-8	22	45	40	17
Jul 13	48816	-101	-	-64	-47	23	-93	-5	-22
Jul 14	48817	-111	16	-15	-64	-7	-6	131	-45
Jul 15	48818	-113	52	30	23	41	52	-103	7
Jul 16	48819	-115	-	53	-63	-13	52	-11	19
Jul 17	48820	-120	-18	-116	-52	14	3	13	9
Jul 18	48821	-123	-23	-76	25	49	51	8	-22
Jul 19	48822	-119	1	-72	-40	-77	-2	-106	19
Jul 20	48823	-119	-11	-21	-57	70	67	41	-3
Jul 21	48824	-125	-48	3	21	-47	-51	34	21
Jul 22	48825	-127	-15	-11	-26	-4	36	-16	-68
Jul 23	48826	-127	14	-23	-75	32	-61	-56	65
Jul 24	48827	-126	41	-32	-110	-38	50	-42	-84
Jul 25	48828	-126	49	46	-36	1	48	21	-87
Jul 26	48829	-126	1	-1	-68	-107	20	28	64
Jul 27	48830	-124	-45	2	17	23	-17	7	-27
Jul 28	48831	-124	-2	-85	-3	-52	-58	32	94
Jul 29	48832	-123	-108	-	-58	-77	-58	-31	-58
Jul 30	48833	-123	-24	-14	-19	-91	5	-27	-65
Jul 31	48834	-122	-85	-91	-64	-40	-12	-27	-35

TABLE 8C. (CONT.)

Date 1992 0hUTC	MJD	C0 (ns)	r(ns) PRN23 NAV23 14h28m	PRN17 NAV17 15h16m	PRN21 NAV21 15h32m	PRN15 NAV15 17h24m	PRN14 NAV14 20h20m	PRN18 NAV18 23h16m
Jul 1	48804	-58	-19	-82	-39	-32	-29	-31
Jul 2	48805	-64	-12	-39	-3	-31	-50	-36
Jul 3	48806	-68	24	6	-16	6	-90	14
Jul 4	48807	-70	-39	42	2	-12	3	-8
Jul 5	48808	-65	6	17	68	4	-19	16
Jul 6	48809	-59	-4	-43	94	-16	7	-17
Jul 7	48810	-58	-11	53	41	-6	-76	-73
Jul 8	48811	-61	-28	1	-12	3	-55	-27
Jul 9	48812	-70	-5	-84	-51	-1	-35	-3
Jul 10	48813	-77	-3	18	31	2	59	-1
Jul 11	48814	-82	-24	85	66	-26	5	-44
Jul 12	48815	-89	51	6	35	-15	-36	125
Jul 13	48816	-101	12	-20	49	-27	0	-25
Jul 14	48817	-111	-21	-41	9	-9	-26	-21
Jul 15	48818	-113	-29	19	133	9	-27	53
Jul 16	48819	-115	52	56	-18	-13	52	39
Jul 17	48820	-120	102	0	30	9	65	-1
Jul 18	48821	-123	81	34	86	-7	0	-8
Jul 19	48822	-119	-44	-3	-9	-33	-5	30
Jul 20	48823	-119	4	15	-4	10	36	18
Jul 21	48824	-125	-64	-107	22	-18	-16	-6
Jul 22	48825	-127	9	3	-6	35	-26	38
Jul 23	48826	-127	51	81	-9	-2	8	57
Jul 24	48827	-126	-73	38	88	-36	-4	-52
Jul 25	48828	-126	-9	16	56	-46	-21	74
Jul 26	48829	-126	-77	-51	-108	55	-78	24
Jul 27	48830	-124	83	-64	44	-27	22	65
Jul 28	48831	-124	-50	60	47	-33	22	-17
Jul 29	48832	-123	40	-36	-8	5	11	29
Jul 30	48833	-123	-56	4	13	5	7	5
Jul 31	48834	-122	-4	-61	-21	-14	-109	7

TABLE 8C. (CONT.)

Date 1992 0hUTC	MJD	C0 (ns)	r(ns) PRN24 NAV24 21h56m	PRN16 NAV16 23h48m	PRN19 NAV19 0h40m	PRN 2 NAV13 3h36m	PRN20 NAV20 6h48m	PRN25 NAV25 8h40m	PRN28 NAV28 11h52m
Aug 1	48835	-117	58	33	-25	-70	33	-19	12
Aug 2	48836	-110	35	34	-26	4	25	5	65
Aug 3	48837	-104	-43	22	-10	-50	8	79	-67
Aug 4	48838	-102	-52	41	3	-13	0	-72	-23
Aug 5	48839	-96	-	35	92	-18	15	46	14
Aug 6	48840	-89	42	55	60	-25	10	21	60
Aug 7	48841	-84	-18	49	-46	-10	4	39	91
Aug 8	48842	-83	1	77	57	-58	14	43	-26
Aug 9	48843	-87	58	-83	-97	-44	-1	6	-25
Aug 10	48844	-97	-87	15	-	12	-3	65	-
Aug 11	48845	-104	-18	-185	-107	-69	-19	25	7
Aug 12	48846	-107	-24	-54	48	40	15	-80	-24
Aug 13	48847	-108	-26	78	11	9	5	-55	49
Aug 14	48848	-104	-32	91	-1	27	-4	-44	77
Aug 15	48849	-94	-46	-65	17	23	-6	61	25
Aug 16	48850	-86	68	15	-17	19	-4	-27	-30
Aug 17	48851	-82	58	0	-15	47	12	1	-4
Aug 18	48852	-80	-28	11	-150	-12	20	39	0
Aug 19	48853	-84	-41	47	-17	8	13	91	6
Aug 20	48854	-96	-10	66	-54	-11	3	-2	-47
Aug 21	48855	-109	83	29	15	-70	-10	3	29
Aug 22	48856	-119	-93	-28	-67	-39	5	135	34
Aug 23	48857	-125	-29	-91	12	25	13	-6	28
Aug 24	48858	-127	91	21	-44	-12	15	-1	64
Aug 25	48859	-124	-78	19	-34	19	16	12	-17
Aug 26	48860	-121	-3	2	-45	-75	17	73	5
Aug 27	48861	-121	-52	110	-7	-54	5	-44	-15
Aug 28	48862	-124	69	15	-45	-102	22	-22	43
Aug 29	48863	-124	46	-22	-32	4	-14	-93	13
Aug 30	48864	-120	58	11	-17	128	8	-30	111
Aug 31	48865	-119	90	-26	-39	-	13	69	-

TABLE 8C. (CONT.)

r(ns)

Date 1992 0hUTC	MJD	C0 (ns)	PRN23 NAV23 12h24m	PRN17 NAV17 13h12m	PRN21 NAV21 13h28m	PRN15 NAV15 15h20m	PRN14 NAV14 18h16m	PRN18 NAV18 21h12m
Aug 1	48835	-117	-13	26	13	0	-19	-10
Aug 2	48836	-110	6	-61	-99	-16	-47	-44
Aug 3	48837	-104	61	-53	-23	-3	22	-14
Aug 4	48838	-102	-55	19	-103	5	-98	-20
Aug 5	48839	-96	10	-68	-45	18	71	32
Aug 6	48840	-89	45	-71	2	-15	20	41
Aug 7	48841	-84	-27	-22	-3	-10	-38	55
Aug 8	48842	-83	17	53	-26	9	-46	35
Aug 9	48843	-87	-82	28	-64	-29	-17	-
Aug 10	48844	-97	-23	22	-44	-12	69	-35
Aug 11	48845	-104	-113	-27	118	-8	-44	-40
Aug 12	48846	-107	98	-87	36	-30	-5	52
Aug 13	48847	-108	-43	-7	88	0	37	11
Aug 14	48848	-104	-9	-4	51	-20	-37	80
Aug 15	48849	-94	-67	-75	4	-19	-46	39
Aug 16	48850	-86	80	-4	-13	4	34	-61
Aug 17	48851	-82	62	-30	-21	10	-22	-24
Aug 18	48852	-80	0	50	41	25	74	2
Aug 19	48853	-84	69	-19	4	9	-41	48
Aug 20	48854	-96	-23	11	30	-21	34	-90
Aug 21	48855	-109	23	-57	67	25	14	-60
Aug 22	48856	-119	11	47	-22	21	19	-124
Aug 23	48857	-125	-61	7	26	-3	-74	28
Aug 24	48858	-127	-12	-83	11	-3	-20	33
Aug 25	48859	-124	3	10	96	6	-4	109
Aug 26	48860	-121	20	-76	-42	1	-45	-24
Aug 27	48861	-121	-45	72	-23	2	-8	-45
Aug 28	48862	-124	2	34	3	-3	-23	-7
Aug 29	48863	-124	148	72	-15	0	58	-17
Aug 30	48864	-120	-75	23	-19	1	-	-12
Aug 31	48865	-119	-18	-45	117	-4	31	-31

TABLE 8C. (CONT.)

r(ns)

Date 1992 0hUTC	MJD	C0 (ns)	PRN24 NAV24 19h52m	PRN16 NAV16 21h44m	PRN19 NAV19 22h32m	PRN 2 NAV13 1h32m	PRN20 NAV20 4h44m	PRN25 NAV25 6h36m	PRN28 NAV28 9h48m
Sep 1	48866	-120	11	11	-15	-10	-7	2	0
Sep 2	48867	-122	9	-14	-22	6	-13	-3	2
Sep 3	48868	-123	-2	-5	-16	-20	12	-1	3
Sep 4	48869	-123	0	20	-35	-19	-7	0	-1
Sep 5	48870	-122	0	-17	-28	3	10	-1	-3
Sep 6	48871	-124	4	6	-16	1	7	6	6
Sep 7	48872	-127	-2	-14	-30	-	-5	-1	10
Sep 8	48873	-125	7	1	-20	2	13	2	-1
Sep 9	48874	-122	4	-9	-17	9	1	5	2
Sep 10	48875	-125	-1	10	-26	-2	-8	-1	2
Sep 11	48876	-133	15	-42	-17	-16	3	0	-2
Sep 12	48877	-136	7	37	-24	-4	14	3	1
Sep 13	48878	-136	-2	11	-26	6	9	0	4
Sep 14	48879	-135	5	14	-29	12	17	1	1
Sep 15	48880	-133	1	4	-28	-1	-20	-1	5
Sep 16	48881	-125	-3	-2	-14	-13	7	1	-2
Sep 17	48882	-117	-3	6	-6	8	12	-2	7
Sep 18	48883	-109	-12	6	-4	-1	4	5	-2
Sep 19	48884	-107	2	2	-25	10	17	7	5
Sep 20	48885	-112	1	15	-13	-2	6	6	7
Sep 21	48886	-118	-98	9	-40	-7	-6	4	4
Sep 22	48887	-121	-110	37	-74	-30	-11	-20	20
Sep 23	48888	-118	-4	23	-66	-	20	-76	28
Sep 24	48889	-119	57	-58	-88	40	-13	-69	37
Sep 25	48890	-122	-41	2	12	-30	11	93	47
Sep 26	48891	-123	-43	-52	-6	13	12	-41	13
Sep 27	48892	-127	136	-4	89	34	3	79	-43
Sep 28	48893	-128	79	40	-45	41	-1	39	-32
Sep 29	48894	-127	-44	9	-91	23	-4	-	82
Sep 30	48895	-123	11	79	-50	25	-2	11	56

TABLE 8C. (CONT.)

Date 1992 0hUTC	MJD	C0 (ns)	r(ns) PRN23 NAV23 10h20m	PRN17 NAV17 11h 8m	PRN21 NAV21 11h24m	PRN15 NAV15 13h16m	PRN14 NAV14 16h12m	PRN18 NAV18 19h 8m
Sep 1	48866	-120	4	7	-12	-24	-9	1
Sep 2	48867	-122	-11	-12	-11	-3	-9	3
Sep 3	48868	-123	2	10	17	-21	5	-4
Sep 4	48869	-123	-5	-10	2	-1	-5	-
Sep 5	48870	-122	4	-19	1	24	-3	-7
Sep 6	48871	-124	2	-9	21	9	-1	-7
Sep 7	48872	-127	3	18	-22	-32	-6	-15
Sep 8	48873	-125	7	-6	16	5	-5	2
Sep 9	48874	-122	15	7	8	-2	-4	4
Sep 10	48875	-125	19	-10	14	21	10	-3
Sep 11	48876	-133	-10	-1	-10	-34	-9	-6
Sep 12	48877	-136	-4	-10	9	-49	9	4
Sep 13	48878	-136	3	6	1	26	-5	8
Sep 14	48879	-135	2	-3	5	-30	-2	16
Sep 15	48880	-133	-5	9	-24	-34	6	-7
Sep 16	48881	-125	3	6	14	-11	-4	-6
Sep 17	48882	-117	-1	0	9	-10	4	16
Sep 18	48883	-109	2	-10	16	-3	-5	-10
Sep 19	48884	-107	9	-2	-11	-7	-5	12
Sep 20	48885	-112	3	-4	20	-13	3	-6
Sep 21	48886	-118	-7	-6	-5	7	13	9
Sep 22	48887	-121	8	-2	31	-13	-	32
Sep 23	48888	-118	-18	-51	-74	-2	23	-2
Sep 24	48889	-119	-62	-31	-16	-23	3	64
Sep 25	48890	-122	26	-	-37	-40	-8	-57
Sep 26	48891	-123	-6	21	13	25	23	71
Sep 27	48892	-127	139	-38	-39	-15	9	102
Sep 28	48893	-128	49	31	18	17	15	-5
Sep 29	48894	-127	-71	-11	-16	13	49	25
Sep 30	48895	-123	4	-9	30	-18	-56	-19

TABLE 8C. (CONT.)

r(ns)

Date 1992 0hUTC	MJD	C0 (ns)	PRN24 NAV24 17h52m	PRN16 NAV16 19h44m	PRN19 NAV19 20h32m	PRN 2 NAV13 23h28m	PRN20 NAV20 2h44m	PRN25 NAV25 4h36m	PRN28 NAV28 7h48m
Oct 1	48896	-119	-16	3	-62	-101	17	41	4
Oct 2	48897	-113	20	-46	-109	47	6	-88	-93
Oct 3	48898	-107	13	-28	68	72	1	29	5
Oct 4	48899	-104	4	120	-34	117	17	-34	47
Oct 5	48900	-112	2	132	-20	-80	18	78	-8
Oct 6	48901	-116	-4	6	-79	17	13	23	-135
Oct 7	48902	-113	8	31	-46	4	11	30	-8
Oct 8	48903	-103	18	-91	-40	49	7	-54	-13
Oct 9	48904	-97	12	37	-39	28	12	-7	94
Oct 10	48905	-89	-54	28	36	-29	26	-19	17
Oct 11	48906	-83	-6	-68	-15	-48	-2	83	-30
Oct 12	48907	-78	8	-12	25	75	20	-104	16
Oct 13	48908	-71	36	36	90	13	-24	2	58
Oct 14	48909	-63	-13	-38	-79	-79	7	46	12
Oct 15	48910	-59	-30	-58	-21	0	17	8	117
Oct 16	48911	-54	6	-55	72	64	4	3	-8
Oct 17	48912	-47	-120	27	-44	12	9	-18	-15
Oct 18	48913	-39	8	-28	-51	-56	20	18	-65
Oct 19	48914	-36	-14	-52	-11	43	-4	49	22
Oct 20	48915	-39	63	118	-82	53	11	79	54
Oct 21	48916	-47	3	3	-42	-9	20	-	-34
Oct 22	48917	-52	56	-29	-58	24	-6	-82	15
Oct 23	48918	-52	79	-79	-9	90	7	87	2
Oct 24	48919	-53	20	80	47	-10	-8	16	13
Oct 25	48920	-59	44	-7	43	16	8	25	-29
Oct 26	48921	-65	70	8	49	-8	-3	38	-10
Oct 27	48922	-68	-14	-14	-3	-21	4	51	-20
Oct 28	48923	-65	-7	21	-39	-10	3	-8	-101
Oct 29	48924	-57	-8	85	32	-40	-2	-12	-16
Oct 30	48925	-47	-28	57	-65	-48	8	-4	46
Oct 31	48926	-44	-5	19	51	-36	-2	27	32

TABLE 8C. (CONT.)

Date 1992 0hUTC	MJD	C0 (ns)	PRN23 NAV23 8h20m	PRN17 NAV17 9h 8m	PRN21 NAV21 9h24m	PRN15 NAV15 11h16m	PRN14 NAV14 14h12m	PRN18 NAV18 17h 8m
			r(ns)					
Oct 1	48896	-119	14	3	-4	-3	-19	45
Oct 2	48897	-113	-3	71	-52	-9	13	-81
Oct 3	48898	-107	65	20	-59	4	12	-47
Oct 4	48899	-104	-28	21	30	2	-43	9
Oct 5	48900	-112	-	39	23	37	-67	-10
Oct 6	48901	-116	-	-58	-31	-22	44	-13
Oct 7	48902	-113	-19	22	-44	-23	-18	10
Oct 8	48903	-103	14	-74	116	-19	-30	-
Oct 9	48904	-97	-100	-48	-108	15	-45	24
Oct 10	48905	-89	11	-4	59	-2	-20	39
Oct 11	48906	-83	48	-68	13	15	-2	-57
Oct 12	48907	-78	54	39	61	11	-73	-18
Oct 13	48908	-71	-45	-14	-61	18	6	-32
Oct 14	48909	-63	-48	70	-92	-10	98	48
Oct 15	48910	-59	-47	88	-50	-8	-5	69
Oct 16	48911	-54	-21	31	-24	7	-2	10
Oct 17	48912	-47	76	124	39	4	-83	-1
Oct 18	48913	-39	-15	52	17	27	83	13
Oct 19	48914	-36	54	52	1	20	-55	-29
Oct 20	48915	-39	-54	-34	15	2	-18	8
Oct 21	48916	-47	-58	4	34	-3	11	7
Oct 22	48917	-52	-26	38	-115	4	51	-22
Oct 23	48918	-52	-4	5	-2	12	-112	44
Oct 24	48919	-53	-39	28	31	-10	6	-14
Oct 25	48920	-59	55	76	-14	9	-25	-29
Oct 26	48921	-65	3	-136	129	-2	49	32
Oct 27	48922	-68	-28	59	69	-8	25	-11
Oct 28	48923	-65	61	-7	12	13	-73	-16
Oct 29	48924	-57	-25	-25	80	18	-43	29
Oct 30	48925	-47	-43	36	-29	20	-35	-72
Oct 31	48926	-44	24	21	30	41	3	37

TABLE 8C. (CONT.)

r(ns)

Date 1992 0hUTC	MJD	C0 (ns)	PRN24 NAV24 15h48m	PRN16 NAV16 17h40m	PRN19 NAV19 18h28m	PRN 2 NAV13 21h24m	PRN20 NAV20 0h40m	PRN25 NAV25 2h32m	PRN28 NAV28 5h44m
Nov 1	48927	-45	20	-29	3	-	27	47	-62
Nov 2	48928	-46	-8	58	-31	60	15	-19	-105
Nov 3	48929	-45	58	-43	3	-60	26	56	-
Nov 4	48930	-51	68	17	-41	11	-4	11	164
Nov 5	48931	-53	-42	65	-24	-4	14	27	-21
Nov 6	48932	-49	-35	59	50	-7	-2	4	-52
Nov 7	48933	-41	92	73	60	-8	7	25	-5
Nov 8	48934	-31	62	-35	5	-9	20	69	-22
Nov 9	48935	-26	-2	-9	35	15	1	22	41
Nov 10	48936	-35	-31	-27	5	-40	-	-68	59
Nov 11	48937	-48	15	48	18	-37	2	-119	76
Nov 12	48938	-51	24	-24	-8	46	8	38	-63
Nov 13	48939	-47	90	-113	-3	-30	9	-	14
Nov 14	48940	-39	-17	-2	24	-58	25	-1	-68
Nov 15	48941	-34	21	40	-	21	5	48	-
Nov 16	48942	-33	-34	-66	-41	-44	11	-14	67
Nov 17	48943	-33	85	17	34	33	11	68	37
Nov 18	48944	-32	-30	47	-7	-8	-1	27	-58
Nov 19	48945	-27	-5	13	-45	-83	24	21	-9
Nov 20	48946	-22	-25	1	3	-26	-9	113	-49
Nov 21	48947	-12	-55	6	-8	22	-2	22	81
Nov 22	48948	-1	-29	13	-25	-2	18	70	76
Nov 23	48949	8	-37	-54	-	1	-7	27	9
Nov 24	48950	8	31	12	-29	94	1	28	-32
Nov 25	48951	1	85	18	35	-38	5	32	-18
Nov 26	48952	-10	20	-58	-40	25	20	52	47
Nov 27	48953	-16	-77	48	-67	-31	5	38	40
Nov 28	48954	-17	-17	-43	-44	-	-5	17	13
Nov 29	48955	-19	8	-87	-8	-38	12	-22	-54
Nov 30	48956	-18	-37	12	0	43	12	50	71

TABLE 8C. (CONT.)

Date 1992 0hUTC	MJD	C0 (ns)	r(ns) PRN23 NAV23 6h16m	PRN17 NAV17 7h 4m	PRN21 NAV21 7h20m	PRN15 NAV15 9h12m	PRN14 NAV14 12h 8m	PRN18 NAV18 15h 4m
Nov 1	48927	-45	44	39	-3	12	39	-8
Nov 2	48928	-46	57	-26	-10	31	2	33
Nov 3	48929	-45	-32	18	-79	-11	-61	-21
Nov 4	48930	-51	28	66	-85	6	-	53
Nov 5	48931	-53	74	28	-71	38	-18	3
Nov 6	48932	-49	57	-38	14	25	-79	16
Nov 7	48933	-41	14	88	-	-	-14	36
Nov 8	48934	-31	46	-125	-19	29	22	-31
Nov 9	48935	-26	105	-28	13	7	-40	14
Nov 10	48936	-35	84	-27	7	-13	36	29
Nov 11	48937	-48	53	-49	-102	81	60	-1
Nov 12	48938	-51	-27	-20	-8	-41	30	-10
Nov 13	48939	-47	57	19	112	-60	-26	11
Nov 14	48940	-39	35	39	-	-26	72	31
Nov 15	48941	-34	-52	61	67	59	21	-31
Nov 16	48942	-33	-56	18	-72	37	-17	-8
Nov 17	48943	-33	47	37	-5	-67	29	-
Nov 18	48944	-32	43	71	61	-35	49	42
Nov 19	48945	-27	-	-9	10	-12	-42	-63
Nov 20	48946	-22	26	62	-7	4	-63	-10
Nov 21	48947	-12	25	41	-70	-96	17	93
Nov 22	48948	-1	-31	-33	32	44	-22	12
Nov 23	48949	8	15	-34	32	-26	19	65
Nov 24	48950	8	32	40	36	42	-8	-
Nov 25	48951	1	-26	-31	-36	-52	-20	-34
Nov 26	48952	-10	-68	-41	35	-6	-21	-19
Nov 27	48953	-16	73	-22	-83	-89	40	2
Nov 28	48954	-17	54	-67	-36	-10	-22	1
Nov 29	48955	-19	-32	-19	36	-42	-12	26
Nov 30	48956	-18	54	-41	-34	-15	-22	-9

TABLE 8C. (CONT.)

r(ns)

Date 1992 0hUTC	MJD	C0 (ns)	PRN24 NAV24 13h48m	PRN16 NAV16 15h40m	PRN19 NAV19 16h28m	PRN 2 NAV13 19h24m	PRN20 NAV20 22h36m	PRN25 NAV25 0h32m	PRN28 NAV28 3h44m
Dec 1	48957	-16	-19	10	7	80	20	-5	58
Dec 2	48958	-16	20	-18	-33	15	2	19	106
Dec 3	48959	-21	31	-41	-12	49	14	-26	24
Dec 4	48960	-29	-32	57	38	-	30	43	-54
Dec 5	48961	-37	-69	-19	-20	54	-18	6	36
Dec 6	48962	-46	15	-82	-47	45	9	11	18
Dec 7	48963	-47	55	-	-	-	-	37	-59

r(ns)

Date 1992 0hUTC	MJD	C0 (ns)	PRN25 NAV25 0h 8m	PRN28 NAV28 3h 4m	PRN17 NAV17 4h 8m	PRN21 NAV21 4h24m	PRN23 NAV23 5h28m	PRN15 NAV15 6h48m	PRN14 NAV14 9h28m
Dec 8	48964	-50	-66	22	30	-24	30	9	-7
Dec 9	48965	-48	-	-74	-12	86	44	7	32
Dec 10	48966	-48	75	38	72	-139	-38	-9	4
Dec 11	48967	-48	-57	40	-15	69	103	18	32
Dec 12	48968	-44	32	-1	24	17	-100	6	-5
Dec 13	48969	-35	-86	2	-90	-4	39	8	0
Dec 14	48970	-15	-53	25	12	13	-62	-4	67
Dec 15	48971	-5	15	-70	-29	57	20	2	-64
Dec 16	48972	-3	-3	45	-55	-65	37	2	2
Dec 17	48973	0	-62	-39	-39	-8	-23	-3	-35
Dec 18	48974	4	-2	-60	-25	-49	55	4	-69
Dec 19	48975	3	31	-54	4	62	-37	3	66
Dec 20	48976	-5	-31	-17	-31	-14	-20	2	73
Dec 21	48977	-16	12	47	26	-93	-10	-6	6
Dec 22	48978	-22	-5	-16	22	27	-30	1	-15
Dec 23	48979	-25	12	-10	76	21	35	-2	106
Dec 24	48980	-25	-4	29	14	-23	48	15	11
Dec 25	48981	-24	-69	18	6	-115	-59	-6	31
Dec 26	48982	-10	-63	-13	11	-65	-1	-10	74
Dec 27	48983	15	8	-39	-71	-46	-7	0	91
Dec 28	48984	37	62	-11	-6	-6	31	0	9
Dec 29	48985	44	-18	9	-58	-47	-4	5	-54
Dec 30	48986	41	49	93	-53	-84	-7	-6	-57
Dec 31	48987	44	-15	83	-24	8	91	9	95

TABLE 8C. (CONT.)

Date 1992 0hUTC	MJD	C0 (ns)	PRN23 NAV23 4h16m	PRN17 NAV17 5h 4m	PRN21 NAV21 5h20m	PRN15 NAV15 7h12m	PRN14 NAV14 10h 8m	PRN18 NAV18 13h 4m
			r(ns)					
Dec 1	48957	-16	-3	-41	-31	-24	-56	-25
Dec 2	48958	-16	-43	32	1	2	-31	-18
Dec 3	48959	-21	32	79	28	94	-68	-72
Dec 4	48960	-29	112	-27	1	21	112	52
Dec 5	48961	-37	33	-19	60	15	-37	44
Dec 6	48962	-46	39	61	-11	14	-12	18
Dec 7	48963	-47	59	-14	13	-9	-30	-20

Date 1992 0hUTC	MJD	C0 (ns)	PRN18 NAV18 12h24m	PRN24 NAV24 12h40m	PRN19 NAV19 12h56m	PRN16 NAV16 15h 4m	PRN26 NAV26 16h40m	PRN27 NAV27 16h56m	PRN 2 NAV13 18h48m	PRN20 NAV20 22h 0m
			r(ns)							
Dec 8	48964	-50	-29	28	-99	-85	24	23	24	10
Dec 9	48965	-48	-10	101	121	-100	12	-	-24	8
Dec 10	48966	-48	29	-36	-131	-30	-41	28	-91	-18
Dec 11	48967	-48	80	-91	-60	-26	10	-	25	-11
Dec 12	48968	-44	-33	75	-5	25	-34	71	14	13
Dec 13	48969	-35	-39	-72	-26	-67	-40	-32	-41	3
Dec 14	48970	-15	-	-	-	-	76	18	45	-13
Dec 15	48971	-5	-71	19	21	17	45	50	-25	-5
Dec 16	48972	-3	30	-	-15	24	-75	-18	-25	3
Dec 17	48973	0	-58	-6	-127	-61	-41	1	29	1
Dec 18	48974	4	-24	62	-62	3	-79	21	13	-7
Dec 19	48975	3	13	43	-153	47	11	12	-15	16
Dec 20	48976	-5	41	21	30	45	29	46	25	3
Dec 21	48977	-16	42	20	21	6	-42	9	9	-13
Dec 22	48978	-22	-8	-	-37	-94	-63	-44	-30	10
Dec 23	48979	-25	-25	43	-5	2	8	-56	3	-4
Dec 24	48980	-25	-69	-39	-20	-5	-37	19	-72	-12
Dec 25	48981	-24	-58	-7	-36	97	9	17	22	-23
Dec 26	48982	-10	-28	-41	-5	-14	67	-56	-17	13
Dec 27	48983	15	0	72	7	-37	-32	22	-4	-3
Dec 28	48984	37	2	31	14	58	55	44	80	5
Dec 29	48985	44	20	120	-23	-16	-31	-6	25	-4
Dec 30	48986	41	75	-4	7	64	-48	104	-12	7
Dec 31	48987	44	36	63	-	39	-47	-37	43	16

TABLE 8D. UTC - GLONASS TIME

The GLONASS satellites disseminate a common time scale designated as 'GLONASS time'. The relation between UTC and GLONASS time can be written as :

UTC - GLONASS time = C1 (modulo 1s).

From his current observation of both the GPS and GLONASS satellite systems Prof. P. Daly, University of Leeds, establishes and reports GPS time - GLONASS time at ten-day intervals, together with the standard deviation SD of his daily GLONASS data. C1 is then derived using UTC - GPS time of Table 8B.

Date 1992 0hUTC	MJD	C1 (μs)	SD (μs)
Jan 8	48629	-8.44	0.06
Jan 18	48639	-8.58	0.05
Jan 28	48649	-8.64	0.06
Feb 7	48659	-8.67	0.06
Feb 17	48669	-8.71	0.05
Feb 27	48679	-8.79	0.05
Mar 8	48689	-8.80	0.06
Mar 18	48699	-8.72	0.05
Mar 28	48709	-8.66	0.07
Apr 7	48719	-8.66	0.05
Apr 17	48729	-8.73	0.06
Apr 27	48739	-8.76	0.05
May 7	48749	-8.83	0.05
May 17	48759	-8.92	0.05
May 27	48769	-8.99	0.05
Jun 6	48779	-9.11	0.07
Jun 16	48789	-9.26	0.06
Jun 26	48799	-9.50	0.05
Jul 6	48809	-9.68	0.06
Jul 16	48819	-9.84	0.06
Jul 26	48829	-10.07	0.06
Aug 5	48839	-10.23	0.06
Aug 15	48849	-10.42	0.07
Aug 25	48859	-10.65	0.05
Sep 4	48869	-10.83	0.06
Sep 14	48879	-11.01	0.05
Sep 24	48889	-11.19	0.06
Oct 4	48899	-11.42	0.06
Oct 14	48909	-11.68	0.05
Oct 24	48919	-11.85	0.07
Nov 3	48929	-12.11	0.05
Nov 13	48939	-12.23	0.06
Nov 23	48949	-12.46	0.05
Dec 3	48959	-12.52	0.06
Dec 13	48969	-12.72	0.06
Dec 23	48979	-12.84	0.05

TABLE 9. COMPARISON BETWEEN ABSOLUTE TIME COMPARISONS AND THE BIPM RESULTS

The following tables give the differences between absolute time comparison values of Table 5 and the BIPM data deduced from Table 8A.

9A. CLOCK TRANSPORTATION

Date 1992	MJD	Time Comparison	Difference Clock Tr. - BIPM (1 microsecond)
Oct 14	48909.05	UTC(CRL) - UTC(NAOT)	-0.080

9B. GPS TIME RECEIVER TRANSPORTATION

Date 1992	MJD	Time Comparison	Difference GPS Comp. - BIPM (1 microsecond)
Jul 4	48807.00	UTC(OP) - UTC(TP)	0.012

TABLE 10A. RATES RELATIVE TO TAI OF CONTRIBUTING CLOCKS IN 1992

Mean clock rates relative to TAI are computed for two-month intervals ending at the dates given in the table.
When an intentional frequency adjustment has been applied to a clock, the data prior to this adjustment are corrected, so that Table 10A gives homogeneous rates for the whole year 1992. For studies including the clock rates of previous years, corrections must be brought to the data published in the Annual Reports for 1988, 1989, 1990 and 1991 and in the BIH Annual Reports for the previous years. These corrections are given in Table 10B.
Unit is ns/day, *** denotes that the clock was not used.

LAB.	CLOCK		48679	48739	48799	48859	48919	48979
AOS	19	7	1.92	10.35	-7.96	-21.67	65.63	-6.40
APL	14	793	-0.38	4.17	12.99	28.10	-3.82	-12.56
APL	31	571	-5.23	12.89	12.96	16.44	-10.37	-11.90
APL	40	3101	17.33	21.10	28.66	20.35	-3.66	2.29
APL	40	3102	11.32	17.75	31.61	20.88	-3.67	2.26
APL	40	3106	9.79	20.37	35.31	21.26	-3.95	1.98
AUS	12	1823	72.63	73.87	79.00	78.57	87.01	89.81
AUS	14	870	9.26	***	***	***	***	***
AUS	14	902	83.30	87.04	81.00	82.64	85.63	85.51
AUS	14	1270	1.52	16.77	11.91	18.96	10.64	***
AUS	14	1307	58.31	***	***	25.38	16.26	17.18
AUS	14	1363	***	***	4.05	1.67	***	***
AUS	14	1694	2.29	0.85	-2.25	-7.97	-3.14	***
AUS	14	1844	***	88.86	78.29	74.15	75.59	89.95
AUS	14	2010(1)	-107.34	-106.71	-108.67	-112.15	-114.54	-107.44
AUS	14	2020	***	***	-36.64	-49.00	-50.51	-49.62
AUS	21	258	***	***	***	***	***	55.99
AUS	40	5401	22.41	21.19	22.75	21.14	23.39	24.17
AUS	44	2	53.82	51.44	53.49	52.85	53.17	55.11
BEV	16	71	-99.07	-104.81	-102.18	-102.59	-106.98	-114.32
CAO	16	183	-85.79	-60.04	-36.36	-48.01	-39.09	-36.09
CAO	23	62	***	***	-11.44	-33.29	-40.91	-46.79
CAO	30	384	***	***	179.98	185.52	164.46	173.23
CH	12	285	45.77	59.75	13.80	22.04	-29.48	-24.95
CH	12	863	-16.65	-8.36	-22.09	***	***	***
CH	16	64	***	-19.35	-42.20	-77.28	-74.02	-73.23
CH	16	69	-143.31	-146.16	-148.67	-148.95	-148.36	-152.30
CH	16	77	***	-38.64	-46.31	-52.92	-60.73	-67.60
CH	16	140	47.95	51.20	38.45	***	***	32.80
CH	17	206	***	***	-61.59	-55.97	-52.47	-53.05
CH	21	179	11.11	20.12	19.69	19.17	20.95	18.20
CH	21	217	44.44	42.87	41.82	38.30	40.34	42.56
CH	21	243	7.99	10.03	-7.80	-25.56	-31.36	2.12
CH	21	265	-0.29	-11.19	***	***	***	***
CH	31	403	-16.58	-19.59	-21.59	-22.09	-19.35	-18.21

TABLE 10A. (CONT.)

LAB.	CLOCK		48679	48739	48799	48859	48919	48979
CRL	14	764	-7.15	-7.36	-2.48	1.37	0.06	0.03
CRL	14	865	-61.32	-62.05	-61.95	-59.42	-60.68	-63.12
CRL	14	932	-285.14	-287.72	-286.70	-283.86	-278.68	-275.26
CRL	14	1729	-40.19	-49.42	-49.56	-43.97	-44.31	-48.08
CRL	14	2456	13.52	13.20	13.28	17.43	19.94	22.36
CRL	31	305	***	***	4.07	17.64	30.71	44.33
CRL	34	131	***	***	***	***	***	-268.04
CSAO	12	1646	-51.00	-43.86	-48.97	-45.01	-60.08	-76.60
CSAO	12	1648	62.04	66.15	63.83	70.03	67.32	65.05
CSAO	12	2068	169.13	181.81	195.00	192.93	179.48	182.63
CSAO	30	151	236.49	187.53	149.72	***	***	***
CSAO	40	4902	-124.04	-95.32	-70.58	-96.39	-86.79	-84.60
F	12	206	-282.65	***	***	-247.27	-249.11	-253.29
F	12	439	-196.96	***	***	***	***	***
F	12	2405	-5.30	***	***	***	***	102.57
F	14	51	-124.24	-123.24	-123.60	-126.60	-127.40	-125.94
F	14	134	***	***	***	144.11	159.39	105.41
F	14	158	68.04	68.50	67.47	64.99	68.06	70.85
F	14	195	-131.29	-134.72	-138.30	-133.67	-136.01	-140.08
F	14	347	-78.92	-79.37	-94.70	-103.65	-99.36	-93.82
F	14	405	-38.81	-15.44	-11.07	4.83	25.59	***
F	14	475	***	-44.37	-45.19	-53.77	-49.19	-38.71
F	14	500	-10.67	-13.63	-16.60	-10.76	-12.52	-9.86
F	14	560	-87.35	-93.26	-88.59	-89.62	-86.78	-87.83
F	14	594	-67.09	-66.31	-71.03	-73.89	-70.46	-65.21
F	14	753	-37.18	-34.84	-37.96	-41.67	-38.07	-34.83
F	14	1120	-63.57	-58.77	-57.24	-55.96	-56.60	-55.09
F	14	1407	-63.40	-62.72	-57.44	-51.00	-48.42	-43.26
F	14	1645	25.26	27.39	24.39	22.30	28.32	28.86
F	14	1712	-98.36	-92.06	-83.72	-73.43	-77.30	-83.05
F	14	1842	-23.43	-26.44	-25.87	-17.55	-6.46	-7.10
F	16	106	-21.63	-13.93	-18.71	-18.60	-15.78	-12.59
F	16	178	58.94	61.43	***	***	-133.34	-124.90
F	16	187	-26.72	-27.36	-25.10	-18.26	-33.09	-24.19
F	17	489	***	3.71	1.44	-3.27	14.39	29.04
FTZ	14	1217	11.88	8.73	12.38	***	***	***
FTZ	14	1482	39.78	38.35	42.71	***	***	***
FTZ	14	1674	25.58	19.32	21.37	***	***	***
FTZ	16	130	20.36	15.73	23.43	***	***	***
IEN	14	469	-239.05	-238.80	-238.82	-232.64	-236.25	-237.61
IEN	14	893	-1.73	-3.66	-4.42	-7.88	4.31	2.58
IEN	31	659	-45.35	-47.48	-50.44	-53.64	-50.52	-52.17
IFAG	14	1105	***	***	-32.11	-4.93	-17.44	-43.23
IFAG	16	131	-8.28	-6.03	-13.71	-17.37	-15.49	-13.48
IFAG	16	138	103.08	102.59	83.27	49.76	71.64	115.87

TABLE 10A. (CONT.)

LAB.	CLOCK		48679	48739	48799	48859	48919	48979
IFAG	16	173	141.42	135.11	76.01	59.12	96.43	144.70
IFAG	16	274	210.90	***	***	***	***	***
IGMA	14	2407	-115.81	-117.21	-118.07	-116.48	-111.72	-117.11
IGMA	16	112	-9.96	-7.48	-7.95	-5.31	-14.39	-22.53
IGMA	17	127	56.83	51.35	55.36	64.95	72.50	41.36
INPL	14	2308	-23.76	-27.40	-23.75	-28.98	-33.26	***
INPL	14	2426	***	***	-7.27	-21.10	-34.20	-31.32
INPL	31	145	-153.82	-137.67	***	-15.79	-26.03	-21.07
INPL	31	619	-116.44	-120.86	-121.23	-122.02	-126.29	***
KRIS	12	1902	***	-139.02	-136.13	***	***	***
KRIS	12	1903	***	-15.20	-15.41	***	***	***
KRIS	14	1516	-56.10	-47.73	-21.16	***	***	***
LDS	12	202	***	99.85	101.46	***	***	***
LDS	14	868	***	-101.80	-105.92	***	***	***
MSL	12	381	-9.68	-26.29	-39.78	-25.31	-21.22	-17.66
MSL	12	933	2.85	-6.75	-16.84	-5.32	-11.29	-1.24
MSL	12	1770	-215.45	-187.25	-191.21	-184.47	-188.58	***
NAOM	14	614	235.78	170.32	131.91	***	***	***
NAOM	14	885	-36.91	-36.67	-40.91	-39.87	-37.42	-41.53
NAOM	14	1315	-56.08	-53.99	-51.87	-49.13	-47.62	-51.55
NAOM	34	2146	-65.30	-58.42	-57.02	-50.50	-55.07	***
NAOT	14	614	***	***	***	***	***	-205.48
NAOT	14	1498	-136.13	-137.15	-138.17	-140.08	-138.14	-138.70
NAOT	31	283	-99.90	-104.31	-106.27	-122.35	-129.20	-137.53
NAOT	31	284	-169.56	-170.38	-173.02	-173.17	-170.26	-179.15
NAOT	31	285	61.25	63.82	86.79	118.45	119.57	***
NAOT	31	286	-183.98	-203.75	-204.12	***	***	***
NAOT	34	1075	***	***	***	***	***	-1.29
NAOT	34	2494	***	***	13.67	8.79	4.95	6.58
NIM	12	1615	-484.19	-478.17	-471.62	-479.20	-474.19	***
NIM	12	1633	3.86	6.37	9.09	2.81	7.74	***
NIM	12	1640	-6.67	-4.11	-1.64	-8.32	-3.59	***
NIST	11	167	29.33	50.90	***	***	***	***
NIST	13	61	-116.56	-116.02	-113.13	-111.58	-103.35	-102.35
NIST	14	323	-74.51	-66.32	-58.66	***	***	***
NIST	14	324	-49.42	-41.84	-54.01	-45.76	-48.22	-51.28
NIST	14	601	14.62	14.46	11.89	10.24	8.47	8.67
NIST	14	1316	-54.16	-54.54	-52.78	-52.59	-51.29	-48.84
NIST	14	2165	-51.94	***	***	***	***	***
NIST	16	217	33.52	30.88	29.64	24.29	24.50	36.25
NIST	18	113	-322.73	***	***	***	***	***
NIST	18	1007	***	***	***	-97.72	-105.81	-110.15
NIST	31	569	-109.68	-112.91	-111.00	-110.72	-105.46	-106.89
NIST	34	493	***	***	-85.12	-85.51	-84.88	-84.38
NIST	35	54	***	2.83	***	***	***	***

TABLE 10A. (CONT.)

LAB.	CLOCK		48679	48739	48799	48859	48919	48979
NIST	35	132	***	***	***	***	-5.73	-7.38
NIST	40	201	***	***	***	***	1.78	3.04
NMC	30	2740	21.13	-7.52	74.20	***	-94.04	***
NPL	12	316	-89.37	-79.83	-80.81	-92.15	-99.69	-89.70
NPL	14	418	-7.45	-7.98	-8.93	-7.50	-12.93	-15.71
NPL	14	1334	-143.62	-145.75	-145.41	-143.92	-145.21	-145.62
NPL	14	1813	-20.73	-20.19	-9.12	-3.73	-4.52	-16.05
NPL	14	2064	-20.67	-20.79	-17.34	-11.31	-15.27	-21.65
NPL	31	328	-51.92	0.18	-26.65	-69.21	23.12	34.31
NPL	40	1701	11.26	8.05	4.44	1.97	0.33	0.33
NRC	14	267	-300.79	-287.15	-277.70	-271.37	-266.43	-283.71
NRC	90	5	-9.16	-12.48	-11.51	-7.51	3.76	***
NRC	90	61	12.54	16.59	18.23	16.87	11.57	***
NRC	90	63	-1.28	-0.92	4.21	11.66	16.50	16.59
NRLM	12	363	-744.94	-825.63	***	***	***	***
NRLM	14	1632	-18.53	***	***	-25.38	-23.90	-22.33
NRLM	31	310	-39.21	-25.43	-20.78	-46.71	-55.37	-61.64
NRLM	31	312	***	***	140.91	151.81	168.19	194.87
ONBA	12	227	***	-126.60	-119.78	-93.83	-63.08	-88.76
ONBA	12	540	***	120.94	185.55	182.85	201.28	259.90
ORB	12	205	-14.87	-15.00	-17.43	-18.47	-17.72	-19.00
ORB	12	804	19.77	12.89	-9.86	***	***	***
ORB	21	312	81.16	78.26	76.53	59.74	5.27	3.73
PKNM	14	1144	***	***	-45.58	-31.41	-21.83	-32.92
PKNM	30	652	-84.24	-87.66	-84.47	-73.96	-77.93	-80.99
PKNM	30	664	-173.35	-168.96	-161.10	-146.71	-167.86	-177.92
PTB	14	394	-43.83	-40.09	-35.97	-31.93	-34.99	-37.82
PTB	14	1103	-66.85	-67.56	-63.27	-57.65	-61.14	-67.05
PTB	14	2379	-56.19	-59.00	-50.34	-42.49	-43.91	-52.01
PTB	35	128	***	***	***	***	16.73	16.72
PTB	40	502	5.65	7.21	6.24	6.78	8.23	7.09
PTB	40	505	5.04	6.20	5.89	6.42	7.75	9.63
PTB	92	1	1.76	0.74	0.28	1.31	0.78	-0.89
PTB	92	2	-0.37	-0.76	-2.29	-2.06	-1.45	-0.05
RC	40	6477	-65.36	-76.45	-62.67	***	***	***
RC	40	6482	***	***	-48.57	-28.85	-21.56	-46.25
RC	40	6483	***	***	-71.62	-92.38	-101.58	-60.93
RC	40	6487	-73.40	***	***	***	-7.71	-16.19
ROA	14	896	-20.03	-17.12	-13.55	-10.47	-8.89	-5.17
ROA	14	1569	36.46	46.67	31.76	55.81	68.45	58.96
ROA	16	113	25.03	6.18	11.55	-2.43	10.08	19.18
ROA	16	121	116.93	106.63	104.94	102.50	102.81	113.81
ROA	16	177	-8.61	-3.95	-15.27	-17.82	-30.52	-27.95
ROA	31	422	-5.79	***	-7.39	-9.33	-7.48	-3.81
SNT	14	900	-36.42	-47.36	-47.85	-43.34	-52.36	-64.28

TABLE 10A. (CONT.)

LAB.	CLOCK	48679	48739	48799	48859	48919	48979
SNT	14 1376	-117.91	-118.05	-118.02	-116.38	-123.99	-127.28
SNT	16 137	-34.98	-37.45	-36.28	-31.12	-35.79	-29.50
SO	12 2067	-74.14	-73.42	-64.40	-59.87	-72.54	-58.65
SO	16 180	70.93	72.24	75.83	83.49	77.44	92.95
SU	40 3803	2.22	4.02	1.95	1.78	2.36	3.72
SU	40 3804	-21.25	-21.02	-23.35	-22.99	-21.85	-21.77
SU	40 3805	-28.56	-27.17	***	-28.80	-27.82	-28.11
SU	40 3806	0.11	0.96	-1.16	-0.97	0.23	1.64
TL	12 477	-112.87	-100.22	-83.10	***	***	***
TL	12 1145	137.48	259.25	***	***	***	***
TL	12 1455	***	***	***	***	***	-209.12
TL	12 2276	-64.84	-44.07	-50.59	-47.12	-50.30	-49.28
TL	16 283	-29.19	-112.48	-253.50	-37.03	***	***
TL	31 317	-29.64	-23.50	-23.42	-26.46	-31.72	-32.87
TP	12 335	-97.36	-86.41	-81.76	-82.67	-86.57	-87.10
TP	17 101	61.86	55.51	71.82	125.53	138.43	164.12
TUG	14 1654	34.17	33.50	33.24	33.09	29.84	29.20
TUG	18 108	805.76	826.10	***	536.98	556.47	568.43
TUG	35 107	***	***	***	***	2.01	0.91
USNO	14 334	***	***	***	***	50.67	***
USNO	14 339	***	***	***	***	320.02	***
USNO	14 444	55.05	73.91	***	93.82	86.61	65.43
USNO	14 532	-196.94	-201.76	-189.63	-184.91	-183.84	-196.90
USNO	14 651	***	***	-28.24	-26.08	-38.99	-38.29
USNO	14 653	***	***	***	***	-0.45	1.75
USNO	14 654	-110.67	-109.94	-103.70	-93.92	-90.03	-90.61
USNO	14 656	66.62	65.70	84.58	83.21	78.69	66.78
USNO	14 660	47.19	55.66	51.08	***	***	***
USNO	14 752	71.05	72.73	73.88	82.84	***	***
USNO	14 761	-29.28	-14.99	-29.39	-34.23	-30.83	***
USNO	14 783	***	87.99	92.31	93.68	89.42	85.20
USNO	14 862	***	***	***	***	***	-0.23
USNO	14 1035	-79.46	-80.17	-68.77	***	***	***
USNO	14 1094	***	***	-84.17	***	***	-79.03
USNO	14 1100	-103.46	-108.35	-107.11	-113.41	-119.65	-130.48
USNO	14 1104	***	***	***	***	-16.56	-15.20
USNO	14 1114	***	-122.16	-105.01	-106.92	-114.48	-116.48
USNO	14 1255	-52.28	-50.44	-51.12	-50.43	-48.00	-46.11
USNO	14 1264	47.91	42.56	37.57	37.56	44.72	47.18
USNO	14 1300	-170.76	-168.23	-167.21	***	***	-164.85
USNO	14 1301	***	***	***	***	-99.49	-101.82
USNO	14 1305	***	-564.42	-542.43	-550.69	-586.83	***
USNO	14 1423	***	-246.65	-242.95	***	-251.56	***
USNO	14 1605	55.26	54.81	***	***	***	***
USNO	14 1653	***	***	***	***	24.27	20.10

TABLE 10A. (CONT.)

LAB.	CLOCK	48679	48739	48799	48859	48919	48979
USNO	14 1809	-81.73	-79.72	-75.45	-74.31	-70.90	-91.40
USNO	14 1846	-50.04	-49.24	-52.07	-51.78	-50.73	-50.36
USNO	14 1946	***	-44.27	***	***	***	***
USNO	14 2098	-24.47	-27.11	-45.09	-41.81	-37.56	-30.58
USNO	14 2312	***	-276.64	-281.71	-243.08	-233.47	***
USNO	14 2313	***	20.56	19.60	***	25.48	32.84
USNO	14 2314	43.49	34.86	30.21	***	***	***
USNO	14 2481	15.80	***	***	-38.67	-35.88	-42.58
USNO	14 2483	***	31.40	36.06	***	40.25	41.18
USNO	14 2484	-28.63	-33.58	-36.46	-40.71	-47.13	-56.63
USNO	14 2485	***	15.38	10.53	19.74	33.44	40.03
USNO	14 2488	***	***	***	***	***	-6.41
USNO	31 116	-56.08	-47.61	-48.59	***	***	***
USNO	31 333	-58.94	-57.87	-61.29	***	***	-11.36
USNO	31 335	-228.54	***	***	***	47.40	58.83
USNO	31 336	-198.90	-204.13	-186.49	-184.05	-201.71	-197.90
USNO	31 337	***	34.28	37.61	37.78	44.53	51.59
USNO	31 338	***	38.33	40.21	46.73	56.04	39.24
USNO	31 340	-11.63	-5.74	-1.09	-12.82	-12.02	-20.78
USNO	31 426	***	***	***	***	-118.93	-124.86
USNO	31 527	***	***	-67.97	-56.74	***	***
USNO	35 101	***	***	7.32	***	-5.02	-5.08
USNO	35 104	***	***	24.68	23.57	22.14	20.71
USNO	35 106	***	***	9.85	12.69	13.97	16.86
USNO	35 108	***	***	34.20	20.00	16.09	14.31
USNO	35 114	***	***	***	18.64	17.68	16.60
USNO	40 704	-52.06	-52.86	-54.72	-55.67	-55.57	-54.56
USNO	40 705	-28.23	-29.48	-31.04	-31.20	-31.09	-30.65
USNO	40 708	***	***	***	***	-4.36	-6.03
USNO	40 722	***	32.47	***	***	13.54	10.88
USNO	40 723	-26.11	65.06	60.22	55.29	49.51	45.61
USNO	40 725	15.79	4.08	-6.61	-15.30	-23.36	-30.17
USNO	40 6201	12.28	11.33	9.07	***	***	***
VSL	12 349	***	44.09	42.45	42.01	75.04	77.05
VSL	12 1489	53.76	41.34	***	-55.83	-65.27	-56.98
VSL	14 1034	-61.37	-64.46	-61.84	-58.69	-63.22	-62.79
VSL	21 125	***	36.54	36.84	37.68	39.25	***
VSL	31 288	-69.80	-76.17	-86.65	-92.86	-46.31	-47.57

(1) Clock AUS 14 2010 was designated as AUS 14 2019 in the Annual Reports for 1990 and 1991.

The clocks are designated by their type (2 digits) and serial number in the type. The codes for the types are :

11 HEWLETT-PACKARD 5060A
12 HEWLETT-PACKARD 5061A
13 EBAUCHES, OSCILLATOM B5000
14 HEWLETT-PACKARD 5061A OPT. 4
16 OSCILLOQUARTZ 3200
17 OSCILLOQUARTZ 3000
18 FREQ. AND TIME SYSTEMS INC. 4000
19 RHODE AND SCHWARZ XSC
21 OSCILLOQUARTZ 3210
23 OSCILLOQUARTZ EUDICS 3020
30 HEWLETT-PACKARD 5061B
31 HEWLETT-PACKARD 5061B OPT. 4
34 H-P 5061A/B WITH 5071A TUBE
35 HEWLETT-PACKARD 5071A H. PERF.
4x HYDROGEN MASERS
9x PRIMARY CLOCKS AND PROTOTYPES

TABLE 10B. CORRECTIONS FOR AN HOMOGENEOUS USE OF THE CLOCK RATES PUBLISHED IN THE CURRENT AND PREVIOUS ANNUAL REPORTS.

Each line refers to the same clock working without interruption.

	1992	1991		1990		1989	
	clock n°	clock n°	corr. (ns/d)	clock n°	corr. (ns/d)	clock n°	corr. (ns/d)
APL	40 3101	40 3101	+18.00	40 3101	+7.00	40 3101	+7.00
	40 3102	40 3102	+12.00	40 3102	+8.00		
	40 3106	40 3106	+10.00	40 3106	+10.00	40 3106	+10.00
AUS	14 1694	14 1694		14 1694		14 1694	-43.20
CH	16 69	16 69	-28.00	16 69	-28.00	16 69	-28.00
CRL	14 764	14 764		14 764	+40.02	14 764	+40.02
	14 1729	14 1729		14 1729	+51.40	14 1729(1)	+51.40
CSAO	12 1646	12 1646	+31.60	12 1646	+31.60	12 1646(2)	+31.60
	12 1648	12 1648		12 1648		12 1648(3)	
	30 151	30 151		30 151	+104.96	30 151	+104.96
NIST	13 61	13 61	-25.32	13 61	-25.32	13 61	-25.32
	14 323	14 323		14 323	-29.20		
	14 324	14 324		14 324	+17.07		
	14 601	14 601	+17.28				
	14 1316	14 1316		14 1316	+10.70	14 1316(4)	+27.63
	14 2165	14 2165	+12.96				
	16 217	16 217		16 217	+58.63	16 217(5)	+52.50
NPL	40 1701	40 1701	+27.00				
ROA	14 1569	14 1569		14 1569		14 1569(6)	
	16 177	16 177		16 177		16 177(7)	
VSL	12 1489	12 1489		12 1489	+181.00		
	31 288	31 288	-30.00				

(1) A correction of +51.40 ns/d has to be applied in 1988 and for the last two-month interval of 1987.

(2) A correction of +31.60 ns/d has to be applied in 1988.
A correction of +73.20 ns/d has to be applied in 1987 and for the last three two-month intervals of 1986.

(3) A correction of +98.60 ns/d has to be applied in 1988, 1987, 1986 and 1985.

(4) A correction of +27.63 ns/d has to be applied in 1988, 1987, 1986, 1985 and for the last three two-month intervals of 1984.

(5) A correction of +52.50 ns/d has to be applied in 1988.

(6) A correction of -13.00 ns/d has to be applied in 1987 and 1986.

(7) A correction of +46.00 ns/d has to be applied in 1987, 1986, 1985 and for the last two-month interval of 1984.

TABLE 11A. WEIGHTS OF CONTRIBUTING CLOCKS IN 1992

Clock weights are computed for two-month intervals ending at the dates given in the table.
Since 1988 January 1st, the absolute weight of a given clock cannot exceed the value 100. For the year 1992, it corresponds to a maximum relative weight of about 1.4 %.

*** denotes that the clock was not used.

LAB.	CLOCK	48679	48739	48799	48859	48919	48979
AOS	19 7	1	1	2	2	0	1
APL	14 793	100	85	30	0	7	5
APL	31 571	38	0	8	8	6	6
APL	40 3101	20	22	22	64	0	6
APL	40 3102	88	59	0	19	7	6
APL	40 3106	100	0	0	11	6	5
AUS	12 1823	0	42	62	97	0	23
AUS	14 870	12	***	***	***	***	***
AUS	14 902	6	7	10	24	100	100
AUS	14 1270	6	6	8	18	18	***
AUS	14 1307	11	***	***	0	0	20
AUS	14 1363	***	***	0	0	***	***
AUS	14 1694	91	80	82	55	65	***
AUS	14 1844	***	0	0	8	13	14
AUS	14 2010 (1)	45	40	37	92	75	83
AUS	14 2020	***	***	0	0	8	14
AUS	21 258	***	***	***	***	***	0
AUS	40 5401	100	100	100	100	100	100
AUS	44 2	100	100	100	100	100	100
BEV	16 71	7	6	5	5	5	0
CAO	16 183	0	3	2	2	3	3
CAO	23 62	***	***	0	0	2	3
CAO	30 384	***	***	0	0	4	8
CH	12 285	100	0	0	3	0	1
CH	12 863	8	6	7	***	***	***
CH	16 64	***	0	0	1	1	1
CH	16 69	6	10	25	29	33	88
CH	16 77	***	0	0	9	7	6
CH	16 140	3	2	2	***	***	0
CH	17 206	***	***	0	0	27	42
CH	21 179	100	0	18	19	31	86
CH	21 217	26	36	36	56	98	100
CH	21 243	4	5	8	3	2	3
CH	21 265	3	8	***	***	***	***
CH	31 403	45	36	33	29	100	100

TABLE 11A. (CONT.)

LAB.	CLOCK		48679	48739	48799	48859	48919	48979
CRL	14	764	100	97	100	85	91	86
CRL	14	865	100	100	100	100	100	100
CRL	14	932	100	89	94	100	76	48
CRL	14	1729	9	7	6	6	6	70
CRL	14	2456	56	49	60	87	100	78
CRL	31	305	***	***	0	0	3	2
CRL	34	131	***	***	***	***	***	0
CSAO	12	1646	8	10	14	24	23	0
CSAO	12	1648	17	16	19	40	100	100
CSAO	12	2068	3	3	2	2	3	12
CSAO	30	151	0	0	0	***	***	***
CSAO	40	4902	2	2	1	1	3	3
F	12	206	11	***	***	0	0	53
F	12	439	20	***	***	***	***	***
F	12	2405	3	***	***	***	***	0
F	14	51	0	0	100	100	100	100
F	14	134	***	***	***	0	0	1
F	14	158	100	100	100	100	100	100
F	14	195	87	60	32	36	73	86
F	14	347	12	13	12	9	8	9
F	14	405	5	0	5	3	2	***
F	14	475	***	0	0	0	31	25
F	14	500	0	100	61	99	100	100
F	14	560	75	72	83	100	100	100
F	14	594	27	20	20	30	100	80
F	14	753	100	100	100	100	100	100
F	14	1120	100	100	100	100	100	100
F	14	1407	93	94	100	51	29	17
F	14	1645	100	100	100	100	100	100
F	14	1712	17	25	30	14	11	13
F	14	1842	0	9	7	9	11	13
F	16	106	0	17	33	54	72	94
F	16	178	3	3	***	***	0	0
F	16	187	40	65	96	54	40	44
F	17	489	***	0	0	31	12	5
FTZ	14	1217	73	61	64	***	***	***
FTZ	14	1482	16	42	100	***	***	***
FTZ	14	1674	66	68	67	***	***	***
FTZ	16	130	5	8	11	***	***	***
IEN	14	469	15	22	46	100	100	100
IEN	14	893	100	100	100	70	53	50
IEN	31	659	0	0	64	41	65	85
IFAG	14	1105	***	***	0	0	3	2
IFAG	16	131	10	8	9	14	38	44
IFAG	16	138	1	1	1	2	2	2

TABLE 11A. (CONT.)

LAB.	CLOCK		48679	48739	48799	48859	48919	48979
IFAG	16	173	0	0	0	0	1	1
IFAG	16	274	30	***	***	***	***	***
IGMA	14	2407	20	56	100	100	100	100
IGMA	16	112	12	28	100	100	79	0
IGMA	17	127	0	1	20	32	17	9
INPL	14	2308	41	43	66	53	50	***
INPL	14	2426	***	***	0	0	3	4
INPL	31	145	7	7	***	0	0	19
INPL	31	619	44	22	20	25	41	***
KRIS	12	1902	***	0	0	***	***	***
KRIS	12	1903	***	0	0	***	***	***
KRIS	14	1516	6	8	4	***	***	***
LDS	12	202	***	0	0	***	***	***
LDS	14	868	***	0	0	***	***	***
MSL	12	381	0	0	2	4	7	10
MSL	12	933	0	19	10	16	21	20
MSL	12	1770	0	0	2	3	5	***
NAOM	14	614	1	0	0	***	***	***
NAOM	14	885	100	100	100	84	100	100
NAOM	14	1315	100	100	100	100	100	100
NAOM	34	2146	0	0	27	20	33	***
NAOT	14	614	***	***	***	***	***	0
NAOT	14	1498	100	100	100	100	100	100
NAOT	31	283	23	25	32	0	6	4
NAOT	31	284	100	100	100	100	100	69
NAOT	31	285	1	1	1	1	1	***
NAOT	31	286	3	2	4	***	***	***
NAOT	34	1075	***	***	***	***	***	0
NAOT	34	2494	***	***	0	0	23	42
NIM	12	1615	100	100	56	60	51	***
NIM	12	1633	89	76	92	59	100	***
NIM	12	1640	95	84	100	59	82	***
NIST	11	167	21	0	***	***	***	***
NIST	13	61	25	25	36	97	0	29
NIST	14	323	0	8	5	***	***	***
NIST	14	324	29	42	45	50	50	52
NIST	14	601	25	29	46	66	63	100
NIST	14	1316	0	51	100	100	100	100
NIST	14	2165	5	***	***	***	***	***
NIST	16	217	0	27	27	26	39	40
NIST	18	113	6	***	***	***	***	***
NIST	18	1007	***	***	***	0	0	13
NIST	31	569	100	100	100	100	100	100
NIST	34	493	***	***	0	0	100	100
NIST	35	54	***	0	***	***	***	***

TABLE 11A. (CONT.)

LAB.	CLOCK		48679	48739	48799	48859	48919	48979
NIST	35	132	***	***	***	***	0	0
NIST	40	201	***	***	***	***	0	0
NMC	30	2740	0	1	1	***	0	***
NPL	12	316	0	9	7	9	13	17
NPL	14	418	100	100	100	100	100	72
NPL	14	1334	59	49	75	100	100	100
NPL	14	1813	24	23	23	21	19	19
NPL	14	2064	100	100	100	45	43	70
NPL	31	328	8	3	3	2	1	1
NPL	40	1701	74	50	34	29	30	42
NRC	14	267	0	0	0	6	4	7
NRC	90	5	15	17	32	96	0	***
NRC	90	61	30	32	51	48	90	***
NRC	90	63	39	100	100	0	20	16
NRLM	12	363	0	0	***	***	***	***
NRLM	14	1632	0	***	***	0	0	100
NRLM	31	310	4	6	8	9	6	4
NRLM	31	312	***	***	0	0	3	1
ONBA	12	227	***	0	0	0	1	1
ONBA	12	540	***	0	0	0	1	0
ORB	12	205	100	95	100	100	100	100
ORB	12	804	5	8	0	***	***	***
ORB	21	312	2	2	2	6	0	1
PKNM	14	1144	***	***	0	0	4	7
PKNM	30	652	17	20	20	17	39	47
PKNM	30	664	9	11	11	0	9	8
PTB	14	394	0	13	12	21	46	69
PTB	14	1103	79	59	59	73	90	72
PTB	14	2379	14	17	28	26	26	26
PTB	35	128	***	***	***	***	0	0
PTB	40	502	100	100	100	100	100	100
PTB	40	505	100	100	100	100	100	100
PTB	92	1	100	100	100	100	100	100
PTB	92	2	100	100	100	100	100	100
RC	40	6477	0	16	18	***	***	***
RC	40	6482	***	***	0	0	3	4
RC	40	6483	***	***	0	0	2	2
RC	40	6487	9	***	***	***	0	0
ROA	14	896	4	4	5	26	49	39
ROA	14	1569	0	10	14	8	5	5
ROA	16	113	8	10	13	9	11	10
ROA	16	121	2	1	2	3	30	26
ROA	16	177	27	21	21	23	10	9
ROA	31	422	0	***	0	0	100	100
SNT	14	900	38	17	21	20	15	11

TABLE 11A. (CONT.)

LAB.	CLOCK	48679	48739	48799	48859	48919	48979
SNT	14 1376	53	100	100	100	100	48
SNT	16 137	5	35	100	100	100	100
SO	12 2067	62	83	70	35	32	22
SO	16 180	82	94	67	0	55	0
SU	40 3803	100	100	100	100	100	100
SU	40 3804	100	100	100	100	100	100
SU	40 3805	0	100	***	0	0	100
SU	40 3806	0	100	100	100	100	100
TL	12 477	3	5	6	***	***	***
TL	12 1145	8	0	***	***	***	***
TL	12 1455	***	***	***	***	***	0
TL	12 2276	100	0	16	15	17	20
TL	16 283	0	0	0	0	***	***
TL	31 317	32	43	52	50	79	54
TP	12 335	11	14	17	19	26	35
TP	17 101	0	0	0	0	0	0
TUG	14 1654	100	100	100	100	100	100
TUG	18 108	1	1	***	0	0	2
TUG	35 107	***	***	***	***	0	0
USNO	14 334	***	***	***	***	0	***
USNO	14 339	***	***	***	***	0	***
USNO	14 444	1	1	***	0	0	2
USNO	14 532	2	2	4	6	14	20
USNO	14 651	***	***	0	0	0	14
USNO	14 653	***	***	***	***	0	0
USNO	14 654	100	100	100	0	14	12
USNO	14 656	0	61	0	11	16	13
USNO	14 660	3	6	8	***	***	***
USNO	14 752	4	3	4	6	***	***
USNO	14 761	0	0	7	9	14	***
USNO	14 783	***	0	0	77	100	73
USNO	14 862	***	***	***	***	***	0
USNO	14 1035	9	13	19	***	***	***
USNO	14 1094	***	***	0	***	***	0
USNO	14 1100	6	12	18	26	28	9
USNO	14 1104	***	***	***	***	0	0
USNO	14 1114	***	0	0	6	12	17
USNO	14 1255	100	100	100	100	100	100
USNO	14 1264	9	12	39	31	31	46
USNO	14 1300	0	6	8	***	***	0
USNO	14 1301	***	***	***	***	0	0
USNO	14 1305	***	0	0	4	2	***
USNO	14 1423	***	0	0	***	0	***
USNO	14 1605	24	24	***	***	***	***
USNO	14 1653	***	***	***	***	0	0

TABLE 11A. (CONT.)

LAB.	CLOCK	48679	48739	48799	48859	48919	48979
USNO	14 1809	0	100	100	100	82	0
USNO	14 1846	100	100	100	100	100	100
USNO	14 1946	***	0	***	***	***	***
USNO	14 2098	12	11	12	13	14	14
USNO	14 2312	***	0	0	0	1	***
USNO	14 2313	***	0	0	***	0	0
USNO	14 2314	0	0	10	***	***	***
USNO	14 2481	1	***	***	0	0	44
USNO	14 2483	***	0	0	***	0	0
USNO	14 2484	100	100	100	43	18	9
USNO	14 2485	***	0	0	26	7	6
USNO	14 2488	***	***	***	***	***	0
USNO	31 116	26	39	41	***	***	***
USNO	31 333	0	7	11	***	***	0
USNO	31 335	4	***	***	***	0	0
USNO	31 336	9	8	16	19	15	15
USNO	31 337	***	0	0	100	42	19
USNO	31 338	***	0	0	31	11	16
USNO	31 340	7	7	7	13	35	21
USNO	31 426	***	***	***	***	0	0
USNO	31 527	***	***	0	0	***	***
USNO	35 101	***	***	0	***	0	0
USNO	35 104	***	***	0	0	100	100
USNO	35 106	***	***	0	0	100	89
USNO	35 108	***	***	0	0	5	8
USNO	35 114	***	***	***	0	0	100
USNO	40 704	0	100	100	100	100	100
USNO	40 705	0	0	100	100	100	100
USNO	40 708	***	***	***	***	0	0
USNO	40 722	***	0	***	***	0	0
USNO	40 723	0	0	0	0	0	1
USNO	40 725	0	3	3	3	3	3
USNO	40 6201	100	100	100	***	***	***
VSL	12 349	***	0	0	100	0	3
VSL	12 1489	68	0	***	0	0	19
VSL	14 1034	100	100	100	100	100	100
VSL	21 125	***	0	0	100	100	***
VSL	31 288	100	92	0	9	4	3

(1) Clock AUS 14 2010 was designated as AUS 14 2019 in the Annual Reports for 1990 and 1991.

The clocks are designated by their type (2 digits) and serial number in the type. The codes for the types are :

11 HEWLETT-PACKARD 5060A
12 HEWLETT-PACKARD 5061A
13 EBAUCHES, OSCILLATOM B5000
14 HEWLETT-PACKARD 5061A OPT. 4
16 OSCILLOQUARTZ 3200
17 OSCILLOQUARTZ 3000
18 FREQ. AND TIME SYSTEMS INC. 4000
19 RHODE AND SCHWARZ XSC
21 OSCILLOQUARTZ 3210
23 OSCILLOQUARTZ EUDICS 3020
30 HEWLETT-PACKARD 5061B
31 HEWLETT-PACKARD 5061B OPT. 4
34 H-P 5061A/B WITH 5071A TUBE
35 HEWLETT-PACKARD 5071A H. PERF.
4x HYDROGEN MASERS
9x PRIMARY CLOCKS AND PROTOTYPES

TABLE 11B. STATISTICAL DATA ON THE WEIGHTS ATTRIBUTED TO THE CLOCKS IN 1992

Interval 1992	Total number of clocks	Number of clocks with a given weight							
		weights 0*	0**	weight 1-19	weight 20-39	weight 40-59	weight 60-79	weight 80-99	weight 100
Jan-Feb	184	27	13	64	20	8	7	7	38
Mar-Apr	197	35	16	61	19	13	7	10	36
May-Jun	205	45	13	56	24	8	10	5	44
Jul-Aug	186	32	14	48	23	15	6	8	40
Sep-Oct	203	33	11	64	21	11	9	6	48
Nov-Dec	194	29	7	69	13	15	8	9	44

* A priori null weight (test interval of new clocks).
** Null weight resulting from the statistics.
Clocks with missing data during a two-month interval of computation are excluded.

Table 12. Measurements of the EAL and TAI frequencies

The following table gives the differences of frequencies, measured in 1986-1992, between EAL, and TAI, and the laboratory cesium standards: CRL Cs1, NIST 6, NRC CsV, NRC CsVI A, B, C, PTB CS1, PTB CS2, SU MCsR 101, SU MCsR 102. The frequencies are expressed at sea level (gravitational corrections applied).

The standard CRL Cs1 (previously RRL Cs1) performs discontinuous calibrations of UTC(CRL) which are transferred to EAL by linear adjustment of EAL-UTC(CRL) over 60 days.

The standard NIST 6 (previously NBS 6) is operated in discontinuous mode. The calibration data, referred to UTC(NIST), are transferred to EAL and TAI by a linear adjustment of EAL-UTC(NIST) over 80 days.

The standard NRC CsVI C has been working as a clock since the end of 1979. The EAL and TAI calibrations result from a linear adjustment of EAL-standard over 60-day intervals.
The standards NRC CsV , CsVI A and CsVI B were used as clocks, from May 1975 until the end of 1992 for CsV, from the end of 1979 until the end of 1992 for CsVI A, and from the end of 1979 until the beginning of 1988 for CsVI B. The calibration data have been transferred to EAL as for NRC CsVI C.

The standard PTB CS1 was used as a frequency reference operating discontinuously until July 1978. Since then, it has been running as a clock, and the calibrations are obtained as for NRC CsV.
The standard PTB CS2 runs as a clock. The data, starting from August 1986, have been used in the same way as those of PTB CS1.

The standards SU MCsR 101 and 102 provide the frequency of TA(SU) and UTC(SU). The transfer to EAL is made by averaging the frequency difference of TA(SU) and EAL over several months.

TABLE 12. (CONT.)

Interval MJD	Central date	NRC CsV	NRC CsVIA	NRC CsVIB	NRC CsVIC	PTB CS1	PTB CS2
		f(EAL) - f(Standard) in 10^{-13}					
46429-46489	1986 Jan 29	8.70	8.93	9.69	8.21	8.58	
46489-46549	1986 Mar 30	8.62	8.68	9.62	8.16	8.36	
46549-46609	1986 May 29	8.81	8.39	8.78	8.63	8.05	
46609-46669	1986 Jul 28	8.11	9.25	9.02	8.80	7.85	
46669-46729	1986 Sep 26	8.05	9.77	9.35	9.17	8.02	7.61
46729-46789	1986 Nov 25	8.56	8.53	8.99	8.79	8.06	7.85
46789-46849	1987 Jan 24	7.99	8.01	9.18	8.90	8.18	7.98
46849-46909	1987 Mar 25	8.33	8.13	8.41	8.65	8.36	7.91
46909-46969	1987 May 24	7.03	7.46	8.70	8.26	7.99	7.69
46969-47029	1987 Jul 23	6.40	7.01	8.38	7.00	8.20	7.64
47029-47099	1987 Sep 26	6.50	7.79	7.55	6.43	7.82	7.68
47099-47159	1987 Nov 30	7.11	8.78	10.48	6.87	8.04	7.79
47159-47219	1988 Jan 29	9.71	10.70	-	8.18	7.97	7.85
47219-47279	1988 Mar 29	8.56	7.78	-	7.48	8.16	7.79
47279-47339	1988 May 28	8.16	7.16	-	7.59	8.11	7.76
47339-47399	1988 Jul 27	9.14	5.98	-	7.39	7.80	7.64
47399-47459	1988 Sep 25	4.47	4.91	-	7.22	7.82	7.62
47459-47519	1988 Nov 24	4.79	4.13	-	4.77	7.87	7.76
47519-47579	1989 Jan 23	6.77	5.17	-	5.93	8.21	7.87
47579-47639	1989 Mar 24	7.64	5.71	-	9.12	8.14	7.72
47639-47699	1989 May 23	6.93	5.48	-	6.24	7.80	7.59
47699-47769	1989 Jul 27	4.18	4.73	-	6.62	7.66	7.42
47769-47829	1989 Sep 30	4.78	4.46	-	5.68	7.64	7.54
47829-47889	1989 Nov 29	4.52	5.66	-	6.99	7.85	7.61
47889-47949	1990 Jan 28	5.06	6.89	-	8.06	7.82	7.55
47949-48009	1990 Mar 29	8.44	7.40	-	8.22	7.77	7.49
48009-48069	1990 May 28	9.62	7.95	-	-2.09	7.82	7.53
48069-48129	1990 Jul 27	7.95	7.50	-	5.74	7.83	7.62
48129-48189	1990 Sep 25	6.66	7.70	-	7.38	7.69	7.21
48189-48249	1990 Nov 24	7.65	8.49	-	7.09	7.51	7.60
48249-48309	1991 Jan 23	8.37	6.32	-	6.53	7.50	7.31
48309-48369	1991 Mar 24	8.69	9.63	-	5.92	7.40	7.10
48369-48429	1991 May 23	8.34	10.07	-	7.04	7.47	7.38
48429-48499	1991 Jul 27	7.78	8.77	-	7.34	7.54	7.28
48499-48559	1991 Sep 30	7.15	8.24	-	7.01	7.43	7.14
48559-48619	1991 Nov 29	6.39	8.70	-	7.51	7.42	7.28
48619-48679	1992 Jan 28	6.50	9.01	-	7.41	7.65	7.41
48679-48739	1992 Mar 28	6.11	9.48	-	7.45	7.54	7.36
48739-48799	1992 May 27	6.18	9.62	-	8.00	7.43	7.14
48799-48859	1992 Jul 26	6.59	9.41	-	8.81	7.50	7.11
48859-48919	1992 Sep 24	7.89	8.80	-	9.37	7.44	7.18
48919-48979	1992 Nov 23	-	-	-	9.38	7.25	7.34

TABLE 12. (CONT.)

Interval MJD	Central date	CRL Cs1	NIST NBS6	SU MCsR 101	SU MCsR 102
		f(EAL) - f(Standard) in 10^{-13}			
46502-46516	1986 Mar 20				5.87
46509-46569	1986 Apr 19	7.22			
46521-46543	1986 Apr 12				5.61
46563-46580	1986 May 22				5.76
46585-46600	1986 Jun 11				5.28
46684-46732	1986 Oct 5			5.99	
46737-46762	1986 Nov 16			5.58	
46773-46794	1986 Dec 19				5.35
46801-46816	1987 Jan 14				5.06
46859-46919	1987 Apr 5	8.73			
46886-46914	1987 Apr 14			5.37	
46919-46941	1987 May 15			5.67	
46947-46976	1987 Jun 15			6.11	
46959-47019	1987 Jul 13		9.65		
46977-46998	1987 Jul 11			6.09	
47061-47063	1987 Sep 24			5.59	
47083-47097	1987 Oct 21				5.76
47098-47124	1987 Nov 13				5.76
47130-47150	1987 Dec 11				5.36
47164-47173	1988 Jan 9				5.37
47215-47222	1988 Feb 28			5.45	
47256-47278	1988 Apr 16				5.87
47286-47288	1988 May 6				5.67
47354-47361	1988 Jul 16				5.77
47416-47433	1988 Sep 20				5.57
47437-47439	1988 Oct 4				5.64
47949-48009	1990 Apr 5	8.04			
48499-48559	1991 Sep 27	7.37			
48949-49009	1992 Dec 23	7.61			

TABLE 12. (CONT.)

Interval MJD	Central date	NRC CsV	NRC CsVIA	NRC CsVIB	NRC CsVIC	PTB CS1	PTB CS2
		f(TAI) - f(Standard) in 10^{-13}					
46429-46489	1986 Jan 29	0.70	0.93	1.69	0.21	0.58	
46489-46549	1986 Mar 30	0.62	0.68	1.62	0.16	0.36	
46549-46609	1986 May 29	0.81	0.39	0.78	0.63	0.05	
46609-46669	1986 Jul 28	0.11	1.25	1.02	0.80	-0.15	
46669-46729	1986 Sep 26	0.05	1.77	1.35	1.17	0.02	-0.39
46729-46789	1986 Nov 25	0.56	0.53	0.99	0.79	0.06	-0.15
46789-46849	1987 Jan 24	-0.02	0.00	1.17	0.89	0.17	-0.04
46849-46909	1987 Mar 25	0.32	0.12	0.40	0.64	0.35	-0.10
46909-46969	1987 May 24	-0.99	-0.55	0.69	0.25	-0.03	-0.32
46969-47029	1987 Jul 23	-1.61	-1.01	0.37	-1.01	0.19	-0.37
47029-47099	1987 Sep 26	-1.51	-0.22	-0.46	-1.58	-0.19	-0.34
47099-47159	1987 Nov 30	-0.91	0.77	2.46	-1.14	0.02	-0.23
47159-47219	1988 Jan 29	1.71	2.70	-	0.18	-0.03	-0.15
47219-47279	1988 Mar 29	0.56	-0.22	-	-0.52	0.16	-0.21
47279-47339	1988 May 28	0.16	-0.84	-	-0.41	0.11	-0.24
47339-47399	1988 Jul 27	1.14	-2.02	-	-0.61	-0.20	-0.36
47399-47459	1988 Sep 25	-3.53	-3.09	-	-0.78	-0.18	-0.38
47459-47519	1988 Nov 24	-3.21	-3.87	-	-3.23	-0.13	-0.24
47519-47579	1989 Jan 23	-1.23	-2.83	-	-2.07	0.21	-0.13
47579-47639	1989 Mar 24	-0.36	-2.29	-	1.12	0.14	-0.28
47639-47699	1989 May 23	-1.07	-2.52	-	-1.76	-0.20	-0.41
47699-47769	1989 Jul 27	-3.77	-3.22	-	-1.33	-0.29	-0.53
47769-47829	1989 Sep 30	-3.17	-3.49	-	-2.27	-0.31	-0.41
47829-47889	1989 Nov 29	-3.43	-2.29	-	-0.96	-0.10	-0.34
47889-47949	1990 Jan 28	-2.84	-1.01	-	0.16	-0.08	-0.35
47949-48009	1990 Mar 29	0.59	-0.45	-	0.37	-0.08	-0.36
48009-48069	1990 May 28	1.82	0.15	-	-9.89	0.02	-0.27
48069-48129	1990 Jul 27	0.20	-0.25	-	-2.01	0.08	-0.13
48129-48189	1990 Sep 25	-1.04	0.00	-	-0.32	-0.01	-0.49
48189-48249	1990 Nov 24	-0.05	0.79	-	-0.61	-0.19	-0.10
48249-48309	1991 Jan 23	0.67	-1.38	-	-1.17	-0.20	-0.39
48309-48369	1991 Mar 24	1.07	2.01	-	-1.70	-0.22	-0.53
48369-48429	1991 May 23	0.79	2.52	-	-0.51	-0.08	-0.17
48429-48499	1991 Jul 27	0.23	1.22	-	-0.21	-0.01	-0.27
48499-48559	1991 Sep 30	-0.35	0.74	-	-0.49	-0.07	-0.36
48559-48619	1991 Nov 29	-1.06	1.25	-	0.06	-0.03	-0.17
48619-48679	1992 Jan 28	-0.95	1.56	-	-0.04	0.20	-0.04
48679-48739	1992 Mar 28	-1.33	2.03	-	0.00	0.09	-0.09
48739-48799	1992 May 27	-1.22	2.22	-	0.60	0.03	-0.26
48799-48859	1992 Jul 26	-0.76	2.06	-	1.46	0.15	-0.24
48859-48919	1992 Sep 24	0.55	1.45	-	2.02	0.09	-0.17
48919-48979	1992 Nov 23	-	-	-	2.03	-0.10	-0.01

TABLE 12. (CONT.)

f(TAI) - f(Standard) in 10^{-13}

Interval MJD	Central date	CRL Cs1	NIST NBS6	SU MCsR 101	SU MCsR 102
46502-46516	1986 Mar 20				-2.13
46509-46569	1986 Apr 19	-0.78			
46521-46543	1986 Apr 12				-2.39
46563-46580	1986 May 22				-2.24
46585-46600	1986 Jun 11				-2.72
46684-46732	1986 Oct 5			-2.01	
46737-46762	1986 Nov 16			-2.42	
46773-46794	1986 Dec 19				-2.65
46801-46816	1987 Jan 14				-2.94
46859-46919	1987 Apr 5	0.73			
46886-46914	1987 Apr 14			-2.64	
46919-46941	1987 May 15			-2.34	
46947-46976	1987 Jun 15			-1.09	
46959-47019	1987 Jul 13		1.64		
46977-46998	1987 Jul 11			-1.92	
47061-47063	1987 Sep 24			-2.42	
47083-47097	1987 Oct 21				-2.26
47098-47124	1987 Nov 13				-2.26
47130-47150	1987 Dec 11				-2.66
47164-47173	1988 Jan 9				-2.63
47215-47222	1988 Feb 28			-2.55	
47256-47278	1988 Apr 16				-2.13
47286-47288	1988 May 6				-2.33
47354-47361	1988 Jul 16				-2.23
47416-47433	1988 Sep 20				-2.43
47437-47439	1988 Oct 4				-2.36
47949-48009	1990 Apr 5	0.19			
48499-48559	1991 Sep 27	-0.13			
48949-49009	1992 Dec 23	0.26			

TABLE 13. MEAN DURATION OF THE TAI SCALE INTERVAL IN SI SECOND ON THE ROTATING GEOID

The estimate of the mean duration of the TAI scale interval in SI second on the rotating geoid, is computed by the BIPM according to the method described in ' Azoubib J., Granveaud M., Guinot B., Metrologia 13, 1977, pp. 87-93 ' and is based on the calibrations of Table 12.

In the BIH Annual Reports from 1984 to 1987, the uncertainty was conservatively estimated to 5×10^{-14} since 1979. In the above table, the uncertainty is strictly the output of the computation and is based on the uncertainties reported by the laboratories.

For the months	Mean duration	Uncertainty
1986 Jan - Feb	$1 - 2.9\times10^{-14}$	2.0×10^{-14}
1986 Mar - Apr	- 2.2	2.0
1986 May - Jun	- 0.9	1.9
1986 Jul - Aug	+ 0.4	1.9
1986 Sep - Oct	+ 2.1	1.3
1986 Nov - Dec	+ 0.6	1.3
1987 Jan - Feb	$1 - 0.4\times10^{-14}$	1.3×10^{-14}
1987 Mar - Apr	- 0.1	1.3
1987 May - Jun	+ 2.1	1.3
1987 Jul - Aug	+ 2.6	1.3
1987 Sep - Oct	+ 2.7	1.3
1987 Nov - Dec	+ 1.5	1.3
1988 Jan - Feb	$1 + 0.9\times10^{-14}$	1.3×10^{-14}
1988 Mar - Apr	+ 1.0	1.3
1988 May - Jun	+ 1.5	1.3
1988 Jul - Aug	+ 2.6	1.3
1988 Sep - Oct	+ 3.0	1.3
1988 Nov - Dec	+ 2.7	1.3
1989 Jan - Feb	$1 + 0.8\times10^{-14}$	1.3×10^{-14}
1989 Mar - Apr	+ 1.9	1.3
1989 May - Jun	+ 3.5	1.3
1989 Jul - Aug	+ 4.5	1.3
1989 Sep - Oct	+ 3.8	1.3
1989 Nov - Dec	+ 3.0	1.3
1990 Jan - Feb	$1 + 2.9\times10^{-14}$	1.3×10^{-14}
1990 Mar - Apr	+ 2.8	1.3
1990 May - Jun	+ 2.0	1.3
1990 Jul - Aug	+ 1.1	1.3
1990 Sep - Oct	+ 3.3	1.3
1990 Nov - Dec	+ 1.2	1.3
1991 Jan - Feb	$1 + 3.2\times10^{-14}$	1.3×10^{-14}
1991 Mar - Apr	+ 4.0	1.3
1991 May - Jun	+ 1.5	1.3
1991 Jul - Aug	+ 2.0	1.4
1991 Sep - Oct	+ 2.8	1.3
1991 Nov - Dec	+ 0.8	1.3
1992 Jan - Feb	$1 + 0.0\times10^{-14}$	1.3×10^{-14}
1992 Mar - Apr	+ 0.5	1.3
1992 May - Jun	+ 1.8	1.3
1992 Jul - Aug	+ 1.5	1.3
1992 Sep - Oct	+ 1.0	1.3
1992 Nov - Dec	+ 0.0	1.3

PART C

TIME SIGNALS

PARTIE C

SIGNAUX HORAIRES

The time signal emissions reported here follow the UTC system, in accordance with the Recommendation 460-4 of the International Radio Consultative Committee (CCIR), unless otherwise stated.

Their maximum departure from the Universal Time UT1 is thus 0.9 second.

The following tables are based on information received at the BIPM in January and February 1993.

AUTHORITIES RESPONSIBLE FOR THE TIME SIGNAL EMISSIONS

Signal	Authority
ATA	National Physical Laboratory Dr. K.S. Krishnan Road New Delhi - 110012, India
BPM	Shaanxi Astronomical Observatory Chinese Academy of Sciences P.O. Box 18 - Lintong Shaanxi, China
BSF	Telecommunication Laboratories Ministry of Communications P.O. Box 71 - Chung-Li 320 Taiwan, Rep. of China
CHU	National Research Council of Canada Institute for National Measurement Standards - Time Standards Ottawa, Ontario, K1A OR6, Canada
DCF77	Physikalisch-Technische Bundesanstalt, Lab. Zeiteinheit Bundesallee 100 W - 3300 Braunschweig Germany
EBC	Real Instituto y Observatorio de la Armada - San Fernando Cadiz, Spain
HBG	Service horaire HBG Observatoire Cantonal CH - 2000 Neuchâtel, Suisse
HLA	Time and Frequency Laboratory Korea Research Institute of Standards and Science P. O. Box 3, Taedok Science Town Taejon 305-606, Republic of Korea

Signal	Authority
IAM	Istituto Superiore delle Poste e delle Telecomunicazioni Ufficio 8°, Rep.2° - Viale Europa 190 00144 - Roma, Italy
JG2AS, JJY	Standards and Measurements Division Communications Research Laboratory 2-1, Nukui-kitamachi 4-chome Koganei-shi, Tokyo 184 Japan
LOL	Servicio de Hidrográfica Naval Observatorio Naval Av. España 2099 1107 - Buenos-Aires, Argentina
MSF	National Physical Laboratory Division of Electrical Science Teddington, Middlesex TW11 OLW United Kingdom
OMA	Standard time and frequency information Ústav radiotechniky a elektroniky ČSAV Chaberská 57 182 51 Praha 8, Czech Republic in cooperation with Astronomický ústav. ČSAV Budecská 6 120 23 Praha 2, Czech Republic
PPE, PPR	Departemento Serviço da hora Observatorio Nacional (CNPq) Rua General Bruce, 586, Sao Cristovao 20921-030 - Rio de Janeiro, Brasil

Signal	Authority
RBU, RCH, RID, RTZ, RWM,UNW3, UPD8,UQC3, USB2,UTR3	National Scientific and Research Institute for Physical, Technical and Radiotechnical Measurements VNIIFTRI Mendeleevo, Moscow Region 141570 Russia
TDF	Centre National d'Etudes des Télécommunications - PAB - STC Etalons de fréquence et de temps 196 avenue Henri Ravera 92220 - Bagneux, France
VNG	National Standards Commission 12 Lyonpark Road P.O. Box 282 North Ryde NSW 2113 Australia
WWV,WWVH WWVB	Time and Frequency Division, 847.00 National Institute of Standards and Technology - 325 Broadway Boulder, Colorado 80303, U.S.A.
YVTO	Direccion de Hidrografia y Navegacion Observatorio Cagigal Apartado Postal No 6745 Caracas, Venezuela

Note

The emission of time signals by RTA, Novosibirsk, Russia, ceased on 1992, February 6.

TIME SIGNALS EMITTED IN THE UTC SYSTEM

Station	Location Latitude Longitude	Frequency (kHz)	Schedule (UTC)	Form of the signal
ATA	Greater Kailash New Delhi India 28° 34'N 77° 19'E	5 000 10 000 15 000	12 h 30 m to 3 h 30 m continuous 3 h 30 m to 12 h 30 m	Second pulses of 5 cycles of a 1 kHz modulation. Minute pulses of 100 ms duration. (The time signals are advanced by 50 ms on UTC).
BPM	Pucheng China 35° 0'N 109° 31'E	2 500 5 000 10 000 15 000	7 h 30 m to 1 h continuous continuous 1 h to 9 h	Signals emitted in advance on UTC by 20 ms. Second pulses of 10 ms of 1 kHz modulation. Minute pulses of 300 ms of 1 kHz modulation. UTC time signals are emitted from minutes 0 to 10, 15 to 25, 30 to 40, 45 to 55. UT1 time signals are emitted from minutes 25 to 29, 55 to 59.
BSF	Chung-Li Taiwan Rep. of China 24° 57'N 121° 9'E	5 000 15 000	continuous except interruption between minutes 35 and 40	From min. 5 to 10, 15 to 20, 25 to 30, 45 to 50, 55 to 60, second pulses of 5 ms duration without 1 kHz modulation. From min. 0 to 5, 10 to 15, ..., 50 to 55, second pulses of 5 ms duration with 1 kHz modulation. The 1 kHz modulation is interrupted 40 ms before and after the pulses. Minute pulses are extended to 300 ms. DUT1: CCIR code by pulse lengthening.
CHU	Ottawa Canada 45° 18'N 75° 45'W	3 330 7 335 14 670	continuous	Second pulses of 300 cycles of a 1 kHz modulation, with 29th and 51st to 59th pulses of each minute omitted. Minute pulses are 0.5 s long. Hour pulses are 1.0 s long, with the following 1st to 10th pulses omitted. A bilingual (Fr. Eng.) announcement of time (UTC) is made each minute following the 50th second pulse. FSK time code after 10 cycles of 1 kHz on the 31st to 39th seconds. Broadcast is single sideband; upper sideband with carrier reinsert. DUT1 : CCIR code by double pulse.
DCF77	Mainflingen Germany 50° 1'N 9° 0'E	77.5	continuous	At the beginning of each second (except the 59th second) the carrier amplitude is reduced to about 25 % for a duration of 0.1 s or 0.2 s. Coded transmission of year, month, day, hour, minute and day of the week in a BCD code from second marker No 21 to No 58(The second marker durations of 0.1 s or 0.2 s correspond to a binary 0 or a binary 1 respectively). The coded time information is related to legal time of FRG and second markers 17 and 18 indicate if the transmitted time refers to UTC(PTB) + 2 h (summer time) or UTC(PTB) + 1 h. Second marker No 15 is prolonged to 0.2 s, if the reserve antenna is in use. To achieve a more accurate time transfer and better use of the frequency spectrum available, an additional pseudo random phase - shift keying of the carrier is superimposed to the AM second markers. No transmission of DUT1.

TIME SIGNALS EMITTED IN THE UTC SYSTEM

Station	Location Latitude Longitude	Frequency (kHz)	Schedule (UTC)	Form of the signal
EBC	San Fernando Spain 36° 28'N 6° 12'W	12 008 6 840	10 h 00 m to 10 h 25 m 10 h 30 m to 10 h 55 m	Second pulses of 0.1 s duration of a 1 kHz modulation. Minute pulses of 0.5 s duration of 1 250 Hz modulation. DUT1: CCIR code by double pulse.
HBG	Prangins Switzerland 46° 24'N 6° 15'E	75	continuous	Interruption of the carrier at the beginning of each second, during 100 ms. The minutes are identified by a double pulse, the hours by a triple pulse. No transmission of DUT1. Time code and other coded information.
HLA	Taedok Science Town Republic of Korea 36° 23'N 127° 22'E	5 000	Continuous	Pulses of 9 cycles of 1800 Hz modulation. 29th and 59th second pulses omitted. Hour identified by 0.8 second long 1500 Hz tone. Beginning of each minute identified by 0.8 second long 1800 Hz tone. Voice announcement of hours and minutes each minute following 52nd second pulse. BCD time code given on 100 Hz subcarrier. DUT1 : CCIR code by double pulse.
IAM	Rome Italy 41° 47'N 12° 27'E	5 000	7 h 30 m to 8 h 30 m 10 h 30 m to 11 h 30 m except sunday and national holidays. Advance by 1 hour in summer.	Second pulses of 5 cycles of 1 kHz modulation. Minute pulses of 20 cycles. Voice announcements every 15 m beginning at 0 h 0 m. DUT1 : CCIR code by double pulse.
JG2AS	Sanwa Ibaraki Japan 36° 11'N 139° 51'E	40	continuous, except interruptions during communications.	During experimental coded transmission of the total day, hour, minute and DUT1, second pulses are 0.2 s, 0.5 s and 0.8 s duration. In case of no coded transmission, A1A type second pulses of 0.5 s duration.
JJY	Sanwa Ibaraki Japan 36° 11'N 139° 51'E	2 500 5 000 8 000 10 000 15 000	continuous, except interruption between minutes 35 and 39.	Second pulses of 8 cycles of 1 600 Hz modulation. Minute pulses are preceded by a 600 Hz modulation. DUT1 : CCIR code by lengthening.
LOL1	Buenos-Aires Argentina 34° 37'S 58° 21'W	5 000 10 000 15 000	11 h to 12 h, 17 h to 18 h, 23 h to 24 h	Second pulses of 5 cycles of 1 000 Hz modulation. Second 59 is omitted. Announcement of hours and minutes every 5 minutes, followed by 3 m of 1 000 Hz or 440 Hz modulation. DUT1 : CCIR code by lengthening.

TIME SIGNALS EMITTED IN THE UTC SYSTEM

Station	Location Latitude Longitude	Frequency (kHz)	Schedule (UTC)	Form of the signal
LOL2 LOL3	Buenos-Aires Argentina 34° 37'S 58° 21'W	4 856 8 030 17 180	1 h, 13 h, 21 h	A1 second pulses during the 5 minutes preceding the indicated times. Second 29 is omitted. Minute pulses are prolonged. DUT1 : CCIR code by double pulse.
MSF	Rugby United Kingdom 52° 22'N 1° 11'W	60	continuous except for an interruption for maintenance from 10 h 0 m to 14 h 0 m on the first Tuesday of each month.	Interruptions of the carrier of 100 ms for the second pulses, of 500 ms for the minute pulses. The signal is given by the beginning of the interruption. BCD NRZ code, 100 bits/s (month, day of month, hour, minute), during minute interruption. BCD PWM code, 1 bit/s (year, month, day of month, day of week, hour, minute) from seconds 17 to 59 in each minute. DUT1 : CCIR code by double pulse.
OMA (1)	Liblice Czechoslovakia 50° 4'N 14° 53'E	50	continuous (from 6 h to 12 h on the first Wednesday of each month, emitted from Podebrady with reduced power)	Interruption of the carrier of 100 ms at the beginning of every second, of 500 ms at the beginning of every minute. The precise time is given by the beginning of the interruption. Phase coded announcement of date, UT and local civil time, leap second and civil time change, and identification of the transmitter in operation. No DUT1 code.
PPE	Rio-de-Janeiro Brazil 22° 54'S 43° 13'W	8 721		Transmission interrupted.
PPR	Rio-de-Janeiro Brazil 22° 59'S 43° 11'W	435 4 244 8 634 13 105 17 194.4	1 h 30 m, 14 h 30 m, 21 h 30 m	Second ticks, of A1 type, during the five minutes preceding the indicated times. The minute ticks are longer.
RBU (2)	Moscow Russia 55° 48'N 38° 18'E	66.66	continuous	DXXXW type signals. The time of day in hours, minutes and seconds is transmitted in BCD code. From 9 h to 11 h, 19 h to 23 h, NON type signals.
RCH (2)	Tashkent Uzbekistan 41° 19'N 69° 15'E		between minutes 0 and 10, 30 and 40	A1X type second pulses. The pulses at the beginning of the minute are prolonged to 0.5 s.
		2 500	0 h to 4 h 40 m 6 h to 23 h 40 m	
		5 000	0 h to 4 h 40 m 15 h to 23 h 40 m	
		10 000	6 h to 14 h 10 m	

Notes : see p. C-14

TIME SIGNALS EMITTED IN THE UTC SYSTEM

Station	Location Latitude Longitude	Frequency (kHz)	Schedule (UTC)	Form of the signal
RID (2)	Irkutsk Russia 52° 26'N 104° 2'E	5 004 10 004 15 004	The station simultaneously operates on three frequencies between minutes 20 and 30, 50 and 60	A1X type second pulses. The pulses at the beginning of the minute are prolonged to 0.5 s.
RTZ (2)	Irkutsk Russia 52° 26'N 104° 2'E	50	between minutes 0 and 5 0 h to 21 h 05 m 23 h to 23 h 05 m	A1X type second pulses. The pulses at the beginning of the minute are prolonged to 0.5 s.
RWM (2)	Moscow Russia 55° 48'N 38° 18'E	4 996 9 996 14 996	The station simultaneously operates on three frequencies between minutes 10 and 20, 40 and 50	A1X type second pulses. The pulses at the beginning of the minute are prolonged to 0.5 s.
TDF	Allouis France 47° 10'N 2° 12'E	162	continuous except every Tuesday from 1 h to 5 h	Phase modulation of the carrier by + and - 1 radian in 0.1 s every second except the 59th second of each minute. This modulation is doubled to indicate binary 1. The numbers of the minute, hour, day of the month, day of the week, month and year are transmitted each minute from the 21st to the 58th second, in accordance with the French legal time scale. In addition a binary 1 at the 17th second indicates that the local time is 2 hours ahead of UTC(summer time); a binary 1 at the 18th second indicates that the local time is one hour ahead of UTC(winter time); a binary 1 at the 14th second indicates that the current day is a public holiday (Christmas, 14 July, etc...); a binary 1 at the 13th second indicates that the current day is a day before a public holiday.
UNW3	Molodechno Belarus 54° 26'N 26° 48'E	25	Winter schedule : 8 h 13 m to 8 h 22 m 14 h 13 m to 14 h 22 m Summer schedule : 7 h 13 m to 7 h 22 m 13 h 13 m to 13 h 22 m	A1N type 0.1 second pulses of 0.025 s duration. Second pulses are prolonged to 0.1 s. 10 second pulses are prolonged to 1 s and minute pulses are prolonged to 10 s. No transmission of DUT1 code.
UPD8	Arkhangelsk Russia 64° 24'N 41° 32'E	25	Winter schedule : 12 h 13 m to 12 h 22 m 22 h 13 m to 22 h 22 m Summer schedule : 3 h 13 m to 3 h 22 m 9 h 13 m to 9 h 22 m	A1N type 0.1 second pulses of 0.025 s duration. Second pulses are prolonged to 0.1 s. 10 second pulses are prolonged to 1 s and minute pulses are prolonged to 10 s. No transmission of DUT1 code.

Notes : see p. C-14

TIME SIGNALS EMITTED IN THE UTC SYSTEM

Station	Location Latitude Longitude	Frequency (kHz)	Schedule (UTC)	Form of the signal
UQC3	Chabarovsk Russia 48° 30'N 134° 51'E	25	Winter schedule : 3 h 13 m to 3 h 22 m 9 h 13 m to 9 h 22 m 15 h 13 m to 15 h 22 m Summer schedule : 2 h 13 m to 2 h 22 m 8 h 13 m to 8 h 22 m 14 h 13 m to 14 h 22 m	A1N type 0.1 second pulses of 0.025 s duration. Second pulses are prolonged to 0.1 s. 10 second pulses are prolonged to 1 s and minute pulses are prolonged to 10 s. No transmission of DUT1 code.
USB2	Bishkek Kirgiztan 43° 04'N 73° 39'E	25	Winter schedule : 5 h 13 m to 5 h 22 m 11 h 13 m to 11 h 22 m 17 h 13 m to 17 h 22 m Summer schedule : 4 h 13 m to 4 h 22 m 10 h 13 m to 10 h 22 m 20 h 13 m to 20 h 22 m	A1N type 0.1 second pulses of 0.025 s duration. Second pulses are prolonged to 0.1 s. 10 second pulses are prolonged to 1 s and minute pulses are prolonged to 10 s. No transmission of DUT1 code.
UTR3	Nizhni Novgorod Russia 56° 11'N 43° 58'E	25	Winter schedule : 6 h 13 m to 6 h 22 m 20 h 13 m to 20 h 22 m Summer schedule : 5 h 13 m to 5 h 22 m 19 h 13 m to 19 h 22 m	A1N type 0.1 second pulses of 0.025 s duration. Second pulses are prolonged to 0.1 s. 10 second pulses are prolonged to 1 s and minute pulses are prolonged to 10 s. No transmission of DUT1 code.
VNG	Llandilo New South Wales Australia 33° 43'S 150° 48'E	5 000 8 638 12 984 16 000	continuous continuous continuous 22 h to 10 h	Second pulses of 50 ms of 1 kHz modulation. Second pulses 55 to 58 of 5 ms of 1 kHz. Second pulse 59 omitted. Minute pulses of 0.5 seconds of 1 kHz modulation. During minutes 5, 10, 15,... second pulses 50 to 58 are 5 ms of 1 kHz. BCD time code giving day of year, hour and minute at the next minute is given between seconds 20 and 46. Voice announcement on 5 000 and 16 000 kHz during minutes 15, 30 ,45 and 60. Morse station identification on 8 638 and 12 984 kHz during minutes 15, 30, 45 and 60. DUT1 : CCIR code by double.
WWV	Fort-Collins, CO USA 40° 41'N 105° 2'W	2 500 5 000 10 000 15 000 20 000	continuous	Pulses of 5 cycles of 1 kHz modulation. 29th and 59th second pulses omitted. Hour is identified by 0.8 second long 1 500 Hz tone. Beginning of each minute identified by 0.8 second long 1 000 Hz tone. DUT1 : CCIR code by double pulse. BCD time code given on 100 Hz subcarrier, includes DUT1 correction.
WWVB	Fort-Collins, CO USA 40° 40'N 105° 3'W	60	continuous	Second pulses given by reduction of the amplitude of the carrier. Coded announcement of the date, time, DUT1 correction, daylight savings time in effect, leap year and leap second.

TIME SIGNALS EMITTED IN THE UTC SYSTEM

Station	Location Latitude Longitude	Frequency (kHz)	Schedule (UTC)	Form of the signal
WWVH	Kauai, HI USA 21° 59'N 159° 46'W	2 500 5 000 10 000 15 000	continuous	Pulses of 6 cycles of 1 200 Hz modulation. 29th and 59th second pulses omitted. Hour identified by 0.8 second long 1 500 Hz tone. Beginning of each minute identified by 0.8 second long 1 200 Hz tone. DUT1 : CCIR code by double pulse. BCD time code given on 100 Hz subcarrier, includes DUT1 correction.
YVTO	Caracas Venezuela 10° 30'N 66° 56'W	5 000	continuous	Second pulses of 1 kHz modulation with 0.1 s duration. The minute is identified by a 800 Hz tone and a 0.5 s duration. Second 30 is omitted. Between seconds 40 and 50 of each minute, voice announcement of the identification of the station. Between seconds 52 and 57 of each minute, voice announcement of hour, minute and second.

NOTES ON THE CHARACTERISTICS OF THE SIGNALS

(1) OMA, 50 kHz
The main transmitter in Liblice radiates approximately 7 kW and the stand-by transmitter in Podebrady (50° 9'N, 15° 9'E) approximately 50 W. The details of the time code were published in ' Nomenclature des stations de radiorepérage et des stations effectuant des services spéciaux'. Liste VI, Volume I, édition 7 de U.I.T. in Geneva in July 1980.

(2) CIS radiostation emitting DUT1 information in accordance with the CCIR code and also giving an additional information, dUT1, which specifies more precisely the difference UT1-UTC down to multiples of 0,02 s, the total value of the correction being DUT1 + dUT1. Positive values of dUT1 are transmitted by the marking of p second markers within the range between the 21th and 24th second so that dUT1 = +p.0,02 s. Negative values of dUT1 are transmitted by the marking of q second markers within the range between the 31th and the 34th second, so that dUT1 = -q.0,02 s.

ACCURACY OF THE CARRIER FREQUENCY

Station	Relative uncertainty of the carrier frequency in 10^{-10}
ATA	0.1
BPM	0.1
BSF	0.1
CHU	0.05
DCF77	0.005 (10d-mean)
EBC	0.1
HBG	0.005
HLA	0.1
IAM	0.5
JG2AS, JJY	0.1
LOL	0.1
MSF	0.02
OMA	0.5
RBU, RTZ	0.05
RCH, RID, RWM	0.5
TDF	0.02
UNW3, UPD8, UQC3,	0.05
USB2, UTR3	0.05
WWV	0.1
WWVB	0.1
WWVH	0.1

Imprimerie Durand
B.P. n° 69 - 28600 Luisant - Tél. : 37 24 48 00
Dépôt légal imprimeur n° 8210
2e trimestre 1993