BUREAU INTERNATIONAL DES POIDS ET MESURES

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Rapport annuel de la Section du temps du BIPM

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Practical information about the BIPM Time Section

The Time Section of the BIPM issues two periodic publications. These are the monthly *Circular T* and the *Annual Report of the BIPM Time Section*. The complete text of *Circular T* and most tables of the present Annual Report are available through the INTERNET network (see Annex I, just before the yellow pages of this volume, for the log-on procedure).

La Section du temps du BIPM produit deux publications périodiques: la Circulaire T, mensuelle, et le Rapport annuel de la Section du temps du BIPM. Les circulaires T et la plupart des tableaux de ce rapport annuel sont disponibles par utilisation du réseau INTERNET (voir l'annexe I, juste avant les pages jaunes de ce volume, pour la mise en oeuvre de la communication).

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Leap seconds

Secondes intercalaires

Since 1 January 1988, the maintenance of International Atomic Time, TAI, and of Coordinated Universal Time, UTC (with the exception of decisions and announcements concerning 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 dates of leap seconds of UTC are decided and announced by the International Earth Rotation Service (IERS), which is responsible for the determination of Earth rotation parameters and for maintenance of the related celestial and terrestrial reference systems. The adjustments of UTC and the relationship between TAI and UTC are given in Tables 1 and 2 of this volume.

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. Les ajustements de l'UTC et la relation entre le TAI et l'UTC sont donnés dans les tableaux 1 et 2 de ce volume.

Information on IERS can be obtained from:

Des renseignements sur l'IERS peuvent être obtenus à l'adresse suivante:

Central Bureau of IERS
Dr. Martine FEISSEL
Observatoire de Paris
61, avenue de l'Observatoire
75014 Paris, France

Telephone: + 33 1 40 51 22 26
Telefax: + 33 1 40 51 22 91
Electronic mail: services@obspm.fr
Anonymous ftp on 145.238.2.21 (subdirectory IERS)

Establishment of the International Atomic Time and of the Coordinated Universal Time

1. Data and computation

The International Atomic Time, TAI, and the Coordinated Universal Time, UTC, are obtained from a combination of data from about 230 atomic clocks kept by 60 laboratories spread worldwide and regularly reported to the BIPM by 47 timing centres maintaining a local UTC, UTC(k) (list in Table 3). This data is in the form of time differences [UTC(k) - Clock] taken at 10 day intervals for Modified Julian Dates (MJD) ending in 9, at 0h UTC, dates designated here as 'standard dates'. The equipment maintained by these 47 timing centres is detailed in Table 4.

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 as a whole 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.

2. Accuracy

The duration of the scale interval of EAL is evaluated by comparison with the data of primary caesium standards, after conversion on the rotating geoid. The 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 the 'steering of TAI'. Table 5 gives the normalized frequency offsets between EAL and TAI. Measurements of the duration of the TAI scale interval and estimates of its mean duration are reported in Tables 6 and 7.

3. Availability

The TAI and UTC are made available in the form of time differences with respect to the local time scales UTC(k), which approximate UTC, and TA(k), which are independent local atomic time scales. These differences, [UTC - UTC(k)] and [TAI - TA(k)], reported in Tables 8 and 9, are computed for the standard dates.

The computation of TAI is carried out every two months. A provisional computation, however, is made every odd-numbered month (January, March, etc.) with the data which is available. In 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 4 ns. This arrangement allows the monthly publication of results in Circular T. When preparing the Annual Report, the results shown in Circular T are revised taking into account any improvement in the data made known after its publication. The computation is then strictly made for the six two-month intervals of the year.

4. Time links

The network of time links used by the BIPM is non-redundant and mainly relies on the observation of GPS satellites. In 1995 nearly all national centres keeping a local UTC were equipped with GPS time receivers and followed the international tracking schedules published by the BIPM:

- Schedule No 25, reported in Table 10, implemented on 28 June 1995 (MJD 49896), and
- Schedule No 26, reported in Table 11, implemented on 4 January 1996 (MJD 50086).

Laboratories regularly send their GPS observations to the BIPM where they are processed following a unified procedure. Strict common views, synchronized to within 1 s, are used to remove the clock-dither noise brought about by the voluntary degradation, Selective Availability, of GPS signals.

The BIPM organizes the international GPS network which takes the form of local stars within a continent joined by two long-distance links, OP-CRL and OP-NIST, chosen because measured ionospheric delays are routinely available for these three sites. Precise GPS satellites ephemerides, produced by the International Geodynamics Service with a delay of a few days, are also routinely used for these long-distance links. The ultimate precision of one single measurement of [UTC(k_1) - UTC(k_2)], obtained at the BIPM with these procedures, is about 2 ns for short distances and 8 ns for long distances. The BIPM also publishes an evaluation of [UTC - GPS time] which is reported in Table 12 of this volume.

In December 1995 the BIPM issued the first GLONASS international common-view schedule to be implemented on 4 January 1996 (MJD 50086). This is reported in Table 13. The BIPM regularly publishes an evaluation of [UTC - GLONASS time], given here in Table 14, using current observations of both the GPS and GLONASS satellite systems provided by Prof. P. Daly, University of Leeds.

5. Time scales established in retrospect

For the most demanding applications, such as millisecond pulsar timing, the BIPM issues atomic time scales in retrospect. These are designated TT(BIPMxx) where 1900 + xx is the year of computation [3]. 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 or via the INTERNET network.

Notes

Tables 15 and 16 of this report give the rates relative to TAI and the weights of the contributing clocks to TAI in 1995.

The yellow pages, at the end of this volume, give indications about time signal emissions.

The report to the CCDS of the BIPM Time Section, for the three years March 1993 - March 1996, is reproduced after the yellow pages. All the publications mentioned in this report 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*, 1991, **28**, 57-63.

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

Etablissement du Temps atomique international et du Temps universel coordonné

1. Données et mode de calcul

Le Temps atomique international (TAI) et le Temps universel coordonné (UTC) sont obtenus par une combinaison de données provenant d'environ 230 horloges atomiques conservées par 60 laboratoires répartis dans le monde entier, et fournies régulièrement au BIPM par 47 laboratoires de temps qui maintiennent un UTC local, UTC(k) (liste donnée dans le tableau 3). Ces données prennent la forme de differences de temps [UTC(k) - Horloge] enregistrées de 10 jours en 10 jours pour les dates juliennes modifiées (MJD) se terminant par 9, à 0hUTC, 'dates normales'. L'équipement maintenu par ces 47 laboratoires de temps est décrit dans le tableau 4.

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.

2. Exactitude

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 tableau 5 donne les différences de fréquences normalisées entre l'EAL et le TAI. Des mesures de la durée de l'intervalle unitaire du TAI et des estimations de sa durée moyenne sont données dans les tableaux 6 et 7.

3. Disponibilité

Le TAI et l'UTC sont disponibles sous forme de différences de temps avec les échelles locales de temps UTC(k), approximation de l'UTC, et TA(k), temps atomique local indépendant, reportées dans les tableaux 8 et 9.

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 4 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.

4. Liaisons horaires

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

En 1995, pratiquement tous les laboratoires de temps qui maintiennent un UTC local, étaient équipés de récepteurs du temps du GPS et suivaient les programmes de poursuite des satellites du GPS, produits par le BIPM:

- *le programme No 25, reproduit dans le tableau 10, mis en oeuvre le 28 juin 1995 (MJD 49896), et*
- *le programme No 26, reproduit dans le tableau 11, mis en oeuvre le 4 janvier 1996 (MJD 50086).*

Les laboratoires envoient régulièrement leurs données au BIPM où les calculs sont effectués d'une manière unifiée. 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 BIPM organise le réseau international de comparaisons horaires utilisant le GPS selon un schéma en étoile au niveau des continents, et en deux liaisons à longue distance, OP-CRL et OP-NIST, choisies parce que des données de retards ionosphériques mesurés sont disponibles pour ces trois sites. Des éphémérides précises des satellites du GPS, produites par l'IGS et accessibles en quelques jours, sont aussi utilisées de manière courante pour ces deux liaisons. La précision ultime d'une mesure unique [UTC(k_1) - UTC(k_2)] est alors d'environ 2 ns pour les liaisons à courte distance et d'environ 8 ns pour les liaisons à longue distance. Le BIPM publie aussi une évaluation de [UTC - temps du GPS], donnée dans le tableau 12 de ce volume.

En décembre 1995, le BIPM a produit le premier programme de poursuite en vues simultanées des satellites du GLONASS. Il a été mis en oeuvre le 4 janvier 1996 (MJD 50086) et est reproduit ici dans le tableau 13. Le BIPM publie régulièrement une évaluation de [UTC - temps du GLONASS], donnée dans le tableau 14 du présent volume et déduite des observations habituelles des deux systèmes GPS et GLONASS, réalisées par le Professeur P. Daly de l'Université de Leeds.

5. Echelles de temps établies rétrospectivement

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 [3]. 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 ou par utilisation du réseau INTERNET.

Notes

Les tableaux 15 et 16 de ce rapport donnent les fréquences relatives au TAI et les poids des horloges qui ont contribué au calcul en 1995.

Les pages jaunes, à la fin de ce volume, concernent les émissions de signaux horaires.

Le rapport à trois ans (mars 1993 - mars 1996) de la section du temps du BIPM au CCDS est reproduit après les pages jaunes. Toutes les publications qui y sont mentionnées sont disponibles sur demande au BIPM.

Les références sont données dans le texte anglais, page 9.

List of the Tables included in the Annual Report of the BIPM Time Section for 1995

Tables indicated with * are available through the INTERNET network (see Annex I, just before the yellow pages of this volume) under the file names given in this list.

TABLE 1. FREQUENCY OFFSETS AND STEP ADJUSTMENTS OF UTC, UNTIL 31 DECEMBER 1996

DATE (AT 0h UTC)	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
1972 Jul. 1	"	-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
1993 Jul. 1	"	-1 s
1994 Jul. 1	"	-1 s
1996 Jan. 1	"	-1 s

TABLE 2. RELATIONSHIP BETWEEN TAI AND UTC, UNTIL 31 DECEMBER 1996

LIMITS OF VALIDITY (AT 0h UTC)	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 - 1993 Jul. 1	27
1993 Jul. 1 - 1994 Jul. 1	28
1994 Jul. 1 - 1996 Jan. 1	29
1996 Jan. 1 -	30

TABLE 3. 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)

AOS	Astronomiczne Obserwatorium Szerokosciowe, Borowiec, Polska
APL	Applied Physics Laboratory, Laurel, MA, USA
AUS	Consortium of laboratories in Australia
BEV	Bundesamt für Eich - und Vermessungswesen, Wien, Oesterreich
BIRM	Beijing Institute of Radio Metrology and Measurement, Beijing, P. R. China
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
CSIR	Council for Scientific and Industrial Research, Pretoria, South Africa
F	Commission Nationale de l'Heure, Paris, France
FTZ	Forschungs - und Technologiezentrum Darmstadt, Deutschland
GUM	Glówny Urzad Miar, Central Office of Measures, Warszawa, Polska
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
IPQ	Institute Português da Qualidade (Portuguese Institute for Quality), Monte de Caparica, Portugal.
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	Measurement Standards Laboratory, Lower Hutt, New Zealand
NAOM	National Astronomical Observatory, Misuzawa, Japan
NAOT	National Astronomical Observatory, Tokyo, Japan
NIM	National Institute of Metrology, Beijing, P.R. China
NIST	National Institute of Standards and Technology, Boulder, CO, USA
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

TABLE 3. 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) (CONT.)

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, Hong Kong
SNT (1)	Swedish National Time and Frequency Laboratory, Stockholm, Sweden
SO	Shanghai Observatory, Shanghai, P.R. China
SU	Institute of Metrology for Time and Space (IMVP), NPO "VNIIFTRI" Mendeleevo, Moscow Region, Russia
TL	Telecommunication Laboratories, Chung-Li, Taiwan
TP	Institute of Radio Engineering and Electronics, Academy of Sciences of Czech Republic - Czech Republic
TUG	Technische Universität, Graz, Oesterreich
UME	Ulusai Metroloji Enstitüsü, Marmara Research Centre, National Metrology Institute, Gebze-Kocaeli, Turkey
USNO	U.S. Naval Observatory, Washington D.C., USA
VSL	Van Swinden Laboratorium, Delft, Nederland

(1) SNT ceased its time activities in May 1995.

Table 4. Equipment and source of UTC(k) of the laboratories contributing to TAI in 1995.

Ind. Cs : Industrial Cs standard

Lab. Cs : Laboratory Cs standard

H-maser : Hydrogen maser

* means 'yes'

Lab k	Equipment	Source of UTC(k) (1)	TA(k)	Time links		
				GPS	GLONASS	Two-Way
AOS	2 Ind. Cs	1 Cs + micro-phase-stepper		*		
APL	2 Ind. Cs 4 H-masers	1 H-maser	* (2)	*		*
AUS	Ind. Cs H-masers (3)	1 Cs + micro-phase-stepper	*	*		
BEV	1 Ind. Cs	1 Cs		* (4)		
BIRM (5)	3 Ind. Cs	1 Cs		*		
CAO	3 Ind. Cs	1 Cs		*		
CH	12 Ind. Cs (6)	all the Cs	*	*		
CRL	14 Ind. Cs 1 Lab. Cs 4 H-masers	11 Cs	*	*		*
CSAO	5 Ind. Cs 2 H-masers	all the Cs	*	*		
CSIR	2 Ind. Cs	1 Cs		*		
FTZ	4 Ind. Cs	1 Cs		*		*

Table 4. Equipment and source of UTC(k)... (Cont.)

Ind. Cs : Industrial Cs standard

Lab. Cs : Laboratory Cs standard

H-maser : Hydrogen maser

* means 'yes'

Lab k	Equipment	Source of UTC(k) (1)	TA(k)	Time links GPS	GLONASS	Two-Way
GUM	3 Ind. Cs	1 Cs		*		
IEN	6 Ind. Cs	1 Cs + micro-phase-stepper	*	*		
IFAG	5 Ind. Cs 3 H-masers	1 Cs + micro-phase-stepper		*		
IGMA	4 Ind. Cs	1 Cs + micro-phase-stepper		* (7)		
INPL	5 Ind. Cs	4 Cs	*	*		
IPQ (8)	3 Ind. Cs	1 Cs		*		
JATC (9)	(10) 7 Ind. Cs 1 Lab. Cs 3 H-masers	1 Cs + micro-phase-stepper				
KRIS	5 Ind. Cs 1 H-maser	1 Cs + micro-phase-stepper	*	*		
LDS	2 Ind. Cs	1 Cs		*	* (11)	
MSL	3 Ind. Cs	1 Cs		*		
NAOM	3 Ind. Cs 1 H-maser	1 Cs + micro-phase-stepper		*		

Table 4. Equipment and source of UTC(k)... (Cont.)

Ind. Cs : Industrial Cs standard

Lab. Cs : Laboratory Cs standard

H-maser : Hydrogen maser

* means 'yes'

Lab k	Equipment	Source of UTC(k) (1)	TA(k)	Time links		
				GPS	GLONASS	Two-Way
NAOT	4 Ind. Cs	1 Cs + micro-phase-stepper		*		
NIM	3 Ind. Cs	1 Cs + micro-phase-stepper	*	* (7)		
NIST	20 Ind. Cs 3 Lab. Cs 3 H-masers	11 Cs 1 H-maser	*	*		*
NPL	5 Ind. Cs 1 H-maser	1 H-maser + micro-phase-stepper		*		*
NPLI	3 Ind. Cs	1 Cs		*		
NRC (9)	1 Ind. Cs 3 Lab. Cs	1 Lab. Cs (12)	*	*		*
NRLM	5 Ind. Cs 2 Lab. Cs	1 Cs		*		
OMH	1 Ind. Cs	1 Cs		*		
ONBA (13)	2 Ind. Cs	2 Cs				
ONRJ	5 Ind. Cs	5 Cs		*		
OP (14)	4 Ind. Cs 2 Lab. Cs 1 H-maser	1 Cs + micro-phase-stepper	*	*		
ORB	4 Ind. Cs 1 H-maser	3 Cs		*		

Table 4. Equipment and source of UTC(k)... (Cont.)

Ind. Cs : Industrial Cs standard

Lab. Cs : Laboratory Cs standard

H-maser : Hydrogen maser

* means 'yes'

Lab k	Equipment	Source of UTC(k) (1)	TA(k)	Time links		
				GPS	GLONASS	Two-Way
PTB	(15) 6 Ind. Cs 3 Lab. Cs 3 H-masers	1 Lab. Cs	* (16)	*		*
RC (9) (17)	5 H-masers	3 H-masers	*			
ROA	7 Ind. Cs	all the Cs		*		
SCL	2 Ind. Cs	1 Cs + micro-phase-stepper		*		
SO	2 Ind. Cs 1 Lab. Cs 3 H-masers	1 Cs + micro-phase-stepper	*	* (7)		
SU	2 Lab. Cs 10 H-masers	6 H-masers	* (18)	*	*	
TL	5 Ind. Cs	1 Cs + micro-phase-stepper		*		*
TP	4 Ind. Cs	1 Cs + output frequency steering		*		
TUG	4 Ind. Cs	1 Cs		*		*
UME	2 Ind. Cs	1 Cs		*		
USNO	78 Ind. Cs 12 H-masers 1 prototype Mercury Ion Frequency Standard 1 Linear Ion Trap Standard (LITS III)	UTC(USNO,MC) is an H-maser + frequency synthesizer steered to UTC(USNO) (19)	* (19)	*	*	*
VSL	4 Ind. Cs	1 Cs + micro-phase-stepper		*	*	*

NOTES

(1) When several clocks are indicated as source of UTC(k), laboratory k 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) APL . TA(APL)-UTC(APL) = 28.999 998 537 s from 49717 to 50083.

(3) AUS . Some of the standards are located as follows (at the end of 1995) :

* 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.

(4) BEV . GPS reception starting 11 July 1995.

(5) BIRM. Beijing Institute of Radio Metrology and Measurement, Beijing, P.R. China.

(6) CH . The standards are located as follows (at the end of 1995) :

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

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

(7) GPS link via local restitution of GPS time.

(8) IPQ . Instituto Português da Qualidade (Portuguese Institute for Quality), Monte De Caparica, Portugal.

(9) Information based on the Annual Report for 1994, not confirmed by the laboratory.

(10) JATC. The standards are located as follows :

* Shaanxi Astronomical Observatory (CSAO),
* Shanghai Astronomical Observatory (SO),
* Wuhan Time Observatory,

The link between UTC(JATC) and UTC(CSAO) is obtained by internal connection.

(11) LDS . Reception of GPS and GLONASS signals on a common custom-built receiver allowing observation of the difference between GPS time and GLONASS time.

(12) NRC . In 1995, UTC(NRC) was derived from NRC Cs VI C.

(13) ONBA. Linked by TV to IGMA.

NOTES (CONT.)

(14) OP . The French atomic time scale TA(F) is computed by the LPTF with data from 19 industrial caesium clocks located as follows (at the end of 1995) :

* Centre Electronique de l'Armement (CELAR, Rennes)	2 Cs
* Centre National d'Etudes Spatiales (CNES, Toulouse)	2 Cs
* Centre National d'Etudes des Télécommunications (CNET, Bagneux)	2 Cs
* Observatoire de la Côte d'Azur (OCA, Grasse)	1 Cs
* Electronique Serge Dassault (ESD, Trappes)	1 Cs
* Hewlett-Packard (HP, Orsay)	3 Cs
* Observatoire de Paris : Laboratoire Primaire du Temps et des Fréquences (LPTF)	4 Cs
* Observatoire de Besançon (OB, Besançon)	2 Cs
* Laboratoire de Physique et de Métrologie des Oscillateurs (LPMO, Besançon)	1 Cs
* Société d'Etudes, Recherches et Constructions Electroniques (SERCEL, Carquefou)	1 Cs.

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

(15) PTB . The laboratory Cs PTB CS1 which had been working continuously as a clock since 1978, was stopped on MJD = 49929 (31 July 1995). The laboratory Cs PTB CS2 is operated continuously as a clock. The laboratory Cs PTB CS3 has been operating continuously as a clock since MJD = 49939 (10 August 1995). TA(PTB) and UTC(PTB) were derived directly from PTB CS2 in 1995.

(16) PTB . TA(PTB)-UTC(PTB) = 29. 000 363 400 s from 49717 to 50083.

(17) RC . Linked via LORAN-C to USNO.

(18) SU . TA(SU)-UTC(SU) = 26. 172 750 000 s from 49717 to 50083.

(19) USNO. The time scales A.1(MEAN) and UTC(USNO) are computed by USNO. They rely on a number of Cs clocks and H-masers. A.1(MEAN) is a free time scale while UTC(USNO) is closely steered on UTC.

TABLE 5. DIFFERENCES BETWEEN THE NORMALIZED FREQUENCIES OF EAL AND TAI, UNTIL JANUARY 1996

(File available via INTERNET under the name EALTAI95.AR)

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 - 1993 Apr 22	48799 - 49099	7,35
1993 Apr 22 - 1995 Feb 21	49099 - 49769	7,40
1995 Feb 21 - 1995 Apr 22	49769 - 49829	7,39
1995 Apr 22 - 1995 Jun 21	49829 - 49889	7,38
1995 Jun 21 - 1995 Aug 30	49889 - 49959	7,37
1995 Aug 30 - 1995 Oct 29	49959 - 50019	7,36
1995 Oct 29 - 1995 Dec 28	50019 - 50079	7,35

As the time scales UTC and TAI differ by an integral number of seconds (see Tables 1 and 2), UTC is necessarily subjected to the same intentional frequency adjustments as TAI.

TABLE 6. MEASUREMENTS OF THE DURATION OF THE TAI SCALE INTERVAL

(File available via INTERNET under the name UTAI95.AR)

The following table gives the difference d between the duration of the TAI scale interval and the SI second as produced by the primary standards CRL Cs1, LPTF JPO, NIST-7, NRC CsV, NRC CsVI A and C, PTB CS1, PTB CS2, PTB CS3 and SU MCsR 102 for the period 1990-1995. Previous calibrations are available in the successive annual reports of the BIPM Time Section volumes 1 to 7.

The frequencies of these primary frequency standards are corrected for the gravitational shift (of about 1×10^{-13} for an altitude of 1000 m),and for the black body radiation shift (of 2×10^{-14} for a temperature of 40 °C) when available (standards taged with a *).

The characteristics of the calibrations of the TAI frequency provided by the different primary standards are as follows:

Standard	Unc. (1 σ)	Operation	Comparison with	Tranfer to TAI
CRL Cs1*	1.1×10^{-13}	discontinuous	UTC(CRL)	60 d
LPTF JPO*	1.1×10^{-13}	discontinuous	UTC(OP)	10 d
NIST NIST-7*	1×10^{-14}	discontinuous	H maser No 201	10 d
NRC CsV	$\simeq1\times10^{-13}$	continuous	TAI	60 d
NRC CsVI A	$\simeq1\times10^{-13}$	continuous	TAI	60 d
NRC CsVI C	$\simeq1\times10^{-13}$	continuous	TAI	60 d
PTB CS1*	3×10^{-14}	continuous	TAI	60 d
PTB CS2*	1.5×10^{-14}	continuous	TAI	60 d
PTB CS3*	1.4×10^{-14}	continuous	TAI	60 d
SU MCsR 102*	5×10^{-14}	discontinuous	UTC(SU)	60 d

TABLE 6. (CONT.)

Interval for transfer to TAI	Central date of the calibration	d in 10^{-14} s CRL Cs1*	LPTF JPO*	NIST NIST-7*	SU MCsR 102*
47949-48009	1990 Apr 5	-1.9			
48499-48559	1991 Sep 27	+1.3			
48859-48919	1992 Sep 30				+0.1
48919-48979	1992 Nov 30				-0.9
48949-49009	1992 Dec 23	-2.6			
48979-49039	1993 Jan 30				+4.0
49039-49099	1993 Mar 31				-2.0
49119-49129	1993 May 17		+11.6		
49099-49159	1993 May 30				-1.9
49159-49229	1993 Jul 30				-1.3
49229-49289	1993 Sep 30				+0.6
49289-49349	1993 Nov 30				+5.2
49469-49529	1994 May 30				+0.6
49509-49519	1994 Jun 11			-1.5	
49529-49589	1994 Jul 31				-0.5
49589-49599	1994 Aug 30			-2.0	
49599-49609	1994 Sep 9			-0.3	
49589-49649	1994 Sep 30				-3.5
49629-49639	1994 Oct 9			+0.6	
49649-49709	1994 Nov 30				+0.3
49689-49699	1994 Dec 4			+2.0	
49699-49709	1994 Dec 17			+2.5	
49789-49799	1995 Mar 16			+2.0	
49809-49819	1995 Apr 5			+3.0	
49819-49829	1995 Apr 15			+2.9	
49829-49839	1995 Apr 25			+2.0	
49839-49849	1995 May 8			+2.2	
49899-49909	1995 Jul 7			+2.2	
49959-49969	1995 Sep 3			+3.3	
49959-50019	1995 Sep 30				+3.5
50019-50029	1995 Nov 7			+2.2	
50019-50079	1995 Nov 30				+4.3

TABLE 6. (CONT.)

d in 10^{-14} s

Interval for transfer to TAI	Central date of the calibration	NRC CsV	NRC CsVIA	NRC CsVIC	PTB CS1*	PTB CS2*	PTB CS3*
47889-47949	1990 Jan 28	+28.4	+10.1	-1.6	+2.4	+5.2	-
47949-48009	1990 Mar 29	-5.9	+4.5	-3.7	+2.4	+5.3	-
48009-48069	1990 May 28	-18.2	-1.5	+98.9	+1.4	+4.4	-
48069-48129	1990 Jul 27	-2.0	+2.5	+20.1	+0.8	+3.0	-
48129-48189	1990 Sep 25	+10.4	0.0	+3.2	+1.7	+6.6	-
48189-48249	1990 Nov 24	+0.5	-7.9	+6.1	+3.5	+2.7	-
48249-48309	1991 Jan 23	-6.7	+13.8	+11.7	+3.6	+5.6	-
48309-48369	1991 Mar 24	-10.7	-20.1	+17.0	+3.8	+7.0	-
48369-48429	1991 May 23	-7.9	-25.2	+5.1	+2.4	+3.4	-
48429-48499	1991 Jul 27	-2.3	-12.2	+2.1	+1.7	+4.4	-
48499-48559	1991 Sep 30	+3.5	-7.4	+4.9	+2.3	+5.3	-
48559-48619	1991 Nov 29	+10.6	-12.5	-0.6	+1.9	+3.4	-
48619-48679	1992 Jan 28	+9.5	-15.6	+0.4	-0.4	+2.1	-
48679-48739	1992 Mar 28	+13.3	-20.3	0.0	+0.7	+2.6	-
48739-48799	1992 May 27	+12.2	-22.2	-6.0	+1.3	+4.3	-
48799-48859	1992 Jul 26	+7.6	-20.6	-14.6	+0.1	+4.1	-
48859-48919	1992 Sep 24	-5.5	-14.5	-20.2	+0.7	+3.4	-
48919-48979	1992 Nov 23	-	-	-20.3	+2.6	+1.8	-
48979-49039	1993 Jan 22	-	-	-19.0	+2.0	+1.4	-
49039-49099	1993 Mar 23	-	-	-11.8	+2.8	+0.6	-
49099-49159	1993 May 22	-	-	-13.1	+0.8	+2.4	-
49159-49229	1993 Jul 26	-	-	-9.0	+1.3	+2.1	-
49229-49289	1993 Sep 29	-	-	-9.4	+2.3	+2.9	-
49289-49349	1993 Nov 28	-	-	-12.6	-0.7	+2.3	-
49349-49409	1994 Jan 27	-	-	-10.2	+0.6	+1.4	-
49409-49469	1994 Mar 28	-	-	-11.6	+1.4	+1.3	-
49469-49529	1994 May 27	-	-	-11.4	+1.2	+2.9	-
49529-49589	1994 Jul 26	-	-	-10.8	+2.1	+3.3	-
49589-49649	1994 Sep 24	-	-	-10.8	+1.0	+2.4	-
49649-49709	1994 Nov 23	-	-	-10.4	+0.6	+1.9	-
49709-49769	1995 Jan 22	-	-	-	+2.5	+2.7	-
49769-49829	1995 Mar 23	-	-7.5	-1.7	-0.1	+3.0	-
49829-49889	1995 May 22	-	-10.7	-6.1	+3.5	+2.0	-
49889-49959	1995 Jul 26	-	-11.6	-5.0	-	+3.5	-
49959-50019	1995 Sep 29	-	-11.1	-5.8	-	+2.7	+4.9
50019-50059	1995 Nov 28	-	-9.2	-6.3	-	+2.5	+4.3

TABLE 7. MEAN DURATION OF THE TAI SCALE INTERVAL IN SI SECOND ON THE ROTATING GEOID

(File available via INTERNET under the name SITAI95.AR)

The estimate of the mean duration of the TAI scale interval in SI second on the rotating geoid, and its relative uncertainty are computed by the BIPM according to the method described in ' Azoubib J., Granveaud M., Guinot B., Metrologia 13, 1977, pp. 87-93 ', using all available measurements from the five most accurate primary frequency standards NIST-7, PTB CS1, PTB CS2, PTB CS3 and SU MCsR 102, consistently corrected for the black body radiation shift.

For the months	Mean duration in s	Relative uncertainty
1990 Jan - Feb	$1 + 4.6\times10^{-14}$	1.5×10^{-14}
1990 Mar - Apr	+ 4.6	1.5
1990 May - Jun	+ 3.7	1.5
1990 Jul - Aug	+ 3.3	1.5
1990 Sep - Oct	+ 4.8	1.4
1990 Nov - Dec	+ 3.2	1.4
1991 Jan - Feb	$1 + 5.0\times10^{-14}$	1.4×10^{-14}
1991 Mar - Apr	+ 6.3	1.3
1991 May - Jun	+ 3.8	1.3
1991 Jul - Aug	+ 3.2	1.3
1991 Sep - Oct	+ 4.4	1.3
1991 Nov - Dec	+ 2.7	1.2
1992 Jan - Feb	$1 + 1.1\times10^{-14}$	1.2×10^{-14}
1992 Mar - Apr	+ 1.8	1.2
1992 May - Jun	+ 2.8	1.1
1992 Jul - Aug	+ 1.7	1.1
1992 Sep - Oct	+ 0.8	1.0
1992 Nov - Dec	+ 0.7	0.9
1993 Jan - Feb	$1 + 0.1\times10^{-14}$	0.7×10^{-14}
1993 Mar - Apr	+ 0.4	0.7
1993 May - Jun	+ 0.8	0.7
1993 Jul - Aug	+ 0.9	0.6
1993 Sep - Oct	+ 1.4	0.6
1993 Nov - Dec	+ 0.6	0.6
1994 Jan - Feb	$1 + 0.3\times10^{-14}$	0.6×10^{-14}
1994 Mar - Apr	+ 0.8	0.6
1994 May - Jun	+ 1.2	0.6
1994 Jul - Aug	+ 1.7	0.6
1994 Sep - Oct	+ 0.8	0.5
1994 Nov - Dec	+ 1.3	0.5
1995 Jan - Feb	$1 + 1.9\times10^{-14}$	0.6×10^{-14}
1995 Mar - Apr	+ 1.8	0.5
1995 May - Jun	+ 2.3	0.5
1995 Jul - Aug	+ 3.1	0.6
1995 Sep - Oct	+ 3.0	0.6
1995 Nov - Dec	+ 2.8	0.7

TABLE 8 - INDEPENDENT LOCAL ATOMIC TIME SCALES

(File available via Internet under the name TAI95.AR)

The following table gives the values of [TAI - TA(k)], where TA(k) denotes the independent atomic time scale established by laboratory k.
Corresponding stability graphs are shown on the following pages when data is available for the years 1994 and 1995.

Unit is one nanosecond.

Date 1995 0h UTC	MJD	TAI - TA(k) APL	AUS	CH	CRL	CSAO
Jan 2	49719	2285	-56980	-71258	48576	11366
Jan 12	49729	2296	-57223	-71103	48998	11178
Jan 22	49739	2207	-57453	-70949	49411	11023
Feb 1	49749	2246	-57741	-70813	49825	10999
Feb 11	49759	2312	-58023	-70649	50251	10875
Feb 21	49769	2381	-58273	-70487	50670	10689
Mar 3	49779	2444	-58513	-70304	51087	10509
Mar 13	49789	2487	-58773	-70125	51500	10417
Mar 23	49799	2533	-59021	-69948	51932	10289
Apr 2	49809	2595	-59249	-69744	52353	10150
Apr 12	49819	2643	-59452	-69555	52771	10088
Apr 22	49829	2696	-59746	-69345	53190	9928
May 2	49839	2784	-60030	-69143	53612	9735
May 12	49849	2882	-60256	-68949	54030	9623
May 22	49859	3039	-60481	-68754	54440	9504
Jun 1	49869	3147	-60664	-68560	54857	9377
Jun 11	49879	3244	-60930	-68354	55280	9211
Jun 21	49889	3337	-61192	-68151	55695	9094
Jul 1	49899	3417	-61426	-67952	56112	9065
Jul 11	49909	3499	-61678	-67748	56531	8930
Jul 21	49919	3567	-61980	-67535	56956	8803
Jul 31	49929	3598	-62231	-67319	57369	8668
Aug 10	49939	3584	-62485	-67104	57780	8543
Aug 20	49949	3583	-62766	-66880	58197	8381
Aug 30	49959	3574	-62978	-66673	58605	8233
Sep 9	49969	3555	-63277	-66452	59017	8221
Sep 19	49979	3536	-63552	-66227	59433	8095
Sep 29	49989	3522	-63816	-66019	59847	7936
Oct 9	49999	-	-64103	-65805	60260	7775
Oct 19	50009	3395	-64394	-65588	60672	7573
Oct 29	50019	3388	-64677	-65365	61088	7539
Nov 8	50029	3375	-64998	-65141	61503	7368
Nov 18	50039	3369	-65225	-64912	61910	7252
Nov 28	50049	3376	-65492	-64675	62326	7132
Dec 8	50059	-	-65776	-64432	62742	6969
Dec 18	50069	3409	-66057	-64179	63154	6912
Dec 28	50079	3430	-66277	-63930	63571	6736

TABLE 8. (CONT.)

Unit is one nanosecond.

Date 1995 0h UTC	MJD	TAI - TA(k) F	IEN	INPL	JATC	KRIS
Jan 2	49719	137994	-	-251878	14055	877
Jan 12	49729	138362	-	-254105	13968	1053
Jan 22	49739	138729	-	-256384	13852	1239
Feb 1	49749	139092	-	-258666	14547	1328
Feb 11	49759	139467	-	-260916	14499	1362
Feb 21	49769	139836	-	-263200	14337	1341
Mar 3	49779	140196	-	-265489	14189	1338
Mar 13	49789	140568	-	-267788	14117	1347
Mar 23	49799	140937	-	-270078	13998	1365
Apr 2	49809	141302	-	-272385	13871	1349
Apr 12	49819	141666	-	-274694	13868	1326
Apr 22	49829	142008	-	-276988	13718	1307
May 2	49839	142360	-201	-279276	13661	1310
May 12	49849	142696	-206	-281598	13615	1305
May 22	49859	143045	-212	-283936	13560	1299
Jun 1	49869	143388	-242	-286218	13502	1291
Jun 11	49879	143730	-251	-288587	13450	1273
Jun 21	49889	144074	-280	-290876	13369	1246
Jul 1	49899	144422	-299	-293189	13386	1233
Jul 11	49909	144775	-323	-295650	13333	1244
Jul 21	49919	145144	-345	-298124	13250	1259
Jul 31	49929	145489	-382	-300025	13156	1203
Aug 10	49939	145825	-412	-301152	13096	1226
Aug 20	49949	146161	-428	-302290	12949	1264
Aug 30	49959	146484	-452	-303424	12839	1322
Sep 9	49969	146820	-476	-304520	13267	1364
Sep 19	49979	147160	-490	-305633	13243	1414
Sep 29	49989	147506	-505	-306775	13124	1462
Oct 9	49999	147837	-533	-307929	13021	1512
Oct 19	50009	148170	-542	-309058	12887	1588
Oct 29	50019	148505	-549	-310231	12922	1650
Nov 8	50029	148836	-542	-311430	-	1734
Nov 18	50039	149166	-547	-312723	-	1819
Nov 28	50049	149499	-543	-314001	-	1908
Dec 8	50059	149827	-539	-315316	12659	1992
Dec 18	50069	150156	-526	-316597	12689	2062
Dec 28	50079	150472	-500	-317888	12632	2160

TABLE 8. (CONT.)

Unit is one nanosecond.

Date 1995 0h UTC	MJD	TAI - TA(k) NIM	NISA (1)	NRC	PTB
Jan 2	49719	-8462	-45122874	-	-360843
Jan 12	49729	-8345	-45123315	23798	-360849
Jan 22	49739	-8294	-45123748	23862	-360858
Feb 1	49749	-8500	-45124175	23912	-360876
Feb 11	49759	-8521	-45124600	23943	-360873
Feb 21	49769	-8531	-45125032	23977	-360876
Mar 3	49779	-8545	-45125460	23993	-360883
Mar 13	49789	-8496	-45125900	24011	-360889
Mar 23	49799	-8475	-45126335	24028	-360903
Apr 2	49809	-8453	-45126767	24041	-360917
Apr 12	49819	-8426	-45127199	24053	-360928
Apr 22	49829	-8389	-45127638	24062	-360942
May 2	49839	-8351	-45128066	24086	-360945
May 12	49849	-8322	-45128500	24089	-360948
May 22	49859	-8297	-45128927	24164	-360941
Jun 1	49869	-8265	-45129361	24217	-360946
Jun 11	49879	-8225	-45129794	24281	-360951
Jun 21	49889	-8191	-45130229	24379	-360966
Jul 1	49899	-8137	-45130656	24441	-360976
Jul 11	49909	-8110	-45131092	24489	-360998
Jul 21	49919	-8064	-45131529	24506	-361023
Jul 31	49929	-8023	-45131967	24551	-361036
Aug 10	49939	-7994	-45132405	24604	-361041
Aug 20	49949	-8009	-45132837	24649	-361058
Aug 30	49959	-7909	-45133270	24694	-361079
Sep 9	49969	-7791	-45133712	24732	-361087
Sep 19	49979	-7714	-45134147	24779	-361087
Sep 29	49989	-7637	-45134579	24815	-361091
Oct 9	49999	-7560	-45135016	24868	-361114
Oct 19	50009	-7494	-45135451	24928	-361117
Oct 29	50019	-7379	-45135884	25001	-361134
Nov 8	50029	-7329	-45136317	25045	-361143
Nov 18	50039	-7209	-45136756	25108	-361157
Nov 28	50049	-7125	-45137188	25149	-361166
Dec 8	50059	-7094	-45137622	25208	-361170
Dec 18	50069	-7061	-45138060	25262	-361176
Dec 28	50079	-6948	-45138497	25333	-361179

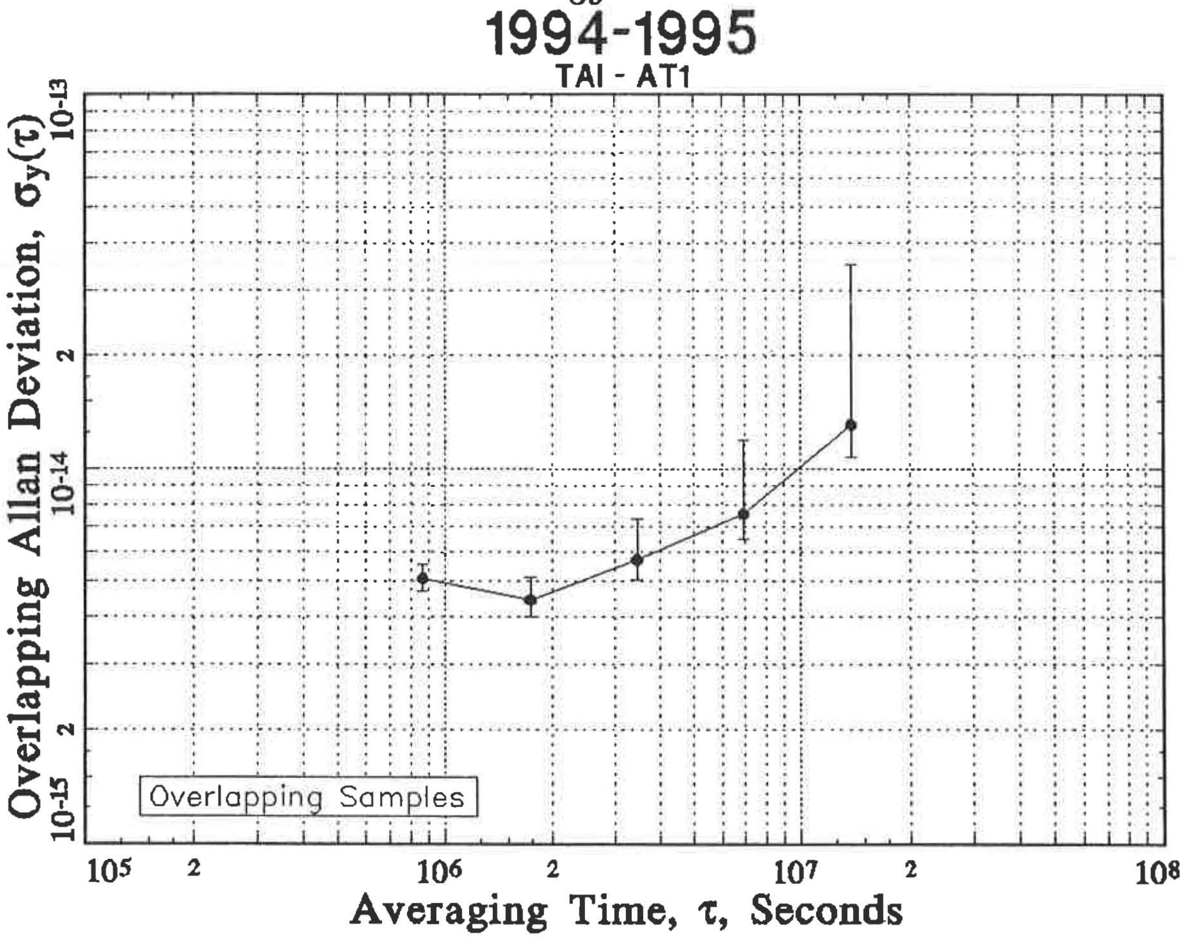
(1) TA(NISA) designates the scale AT1 of NIST.

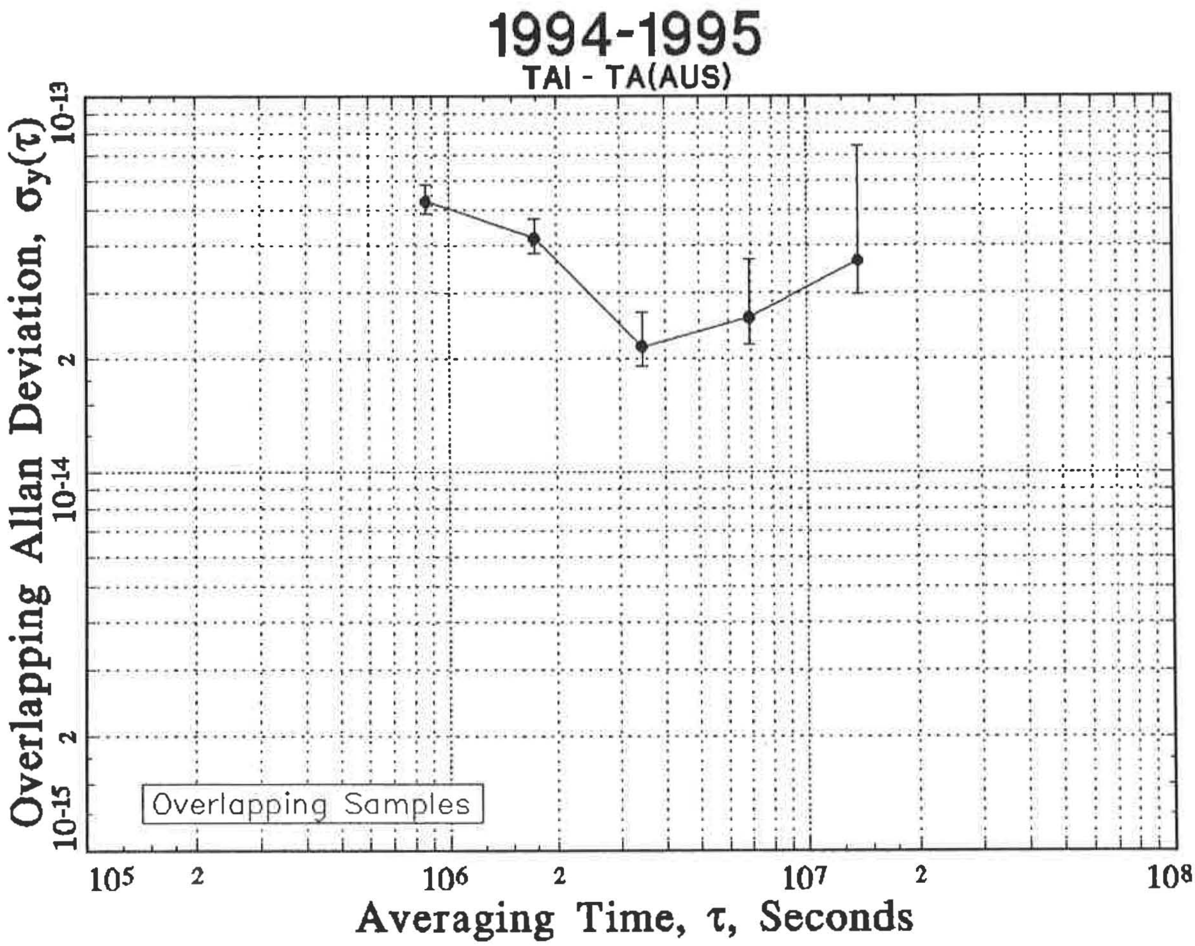
TABLE 8. (CONT.)

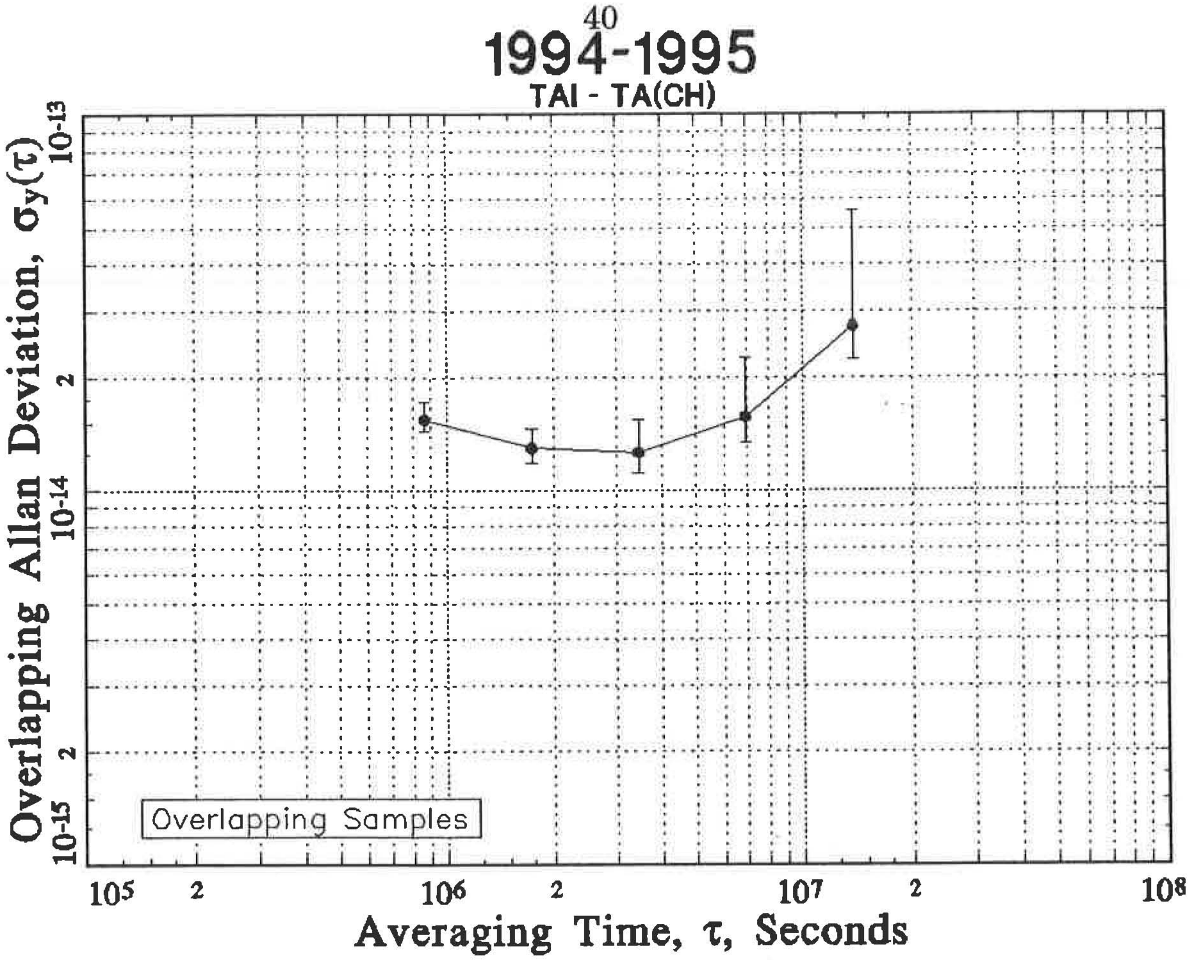
Unit is one nanosecond.

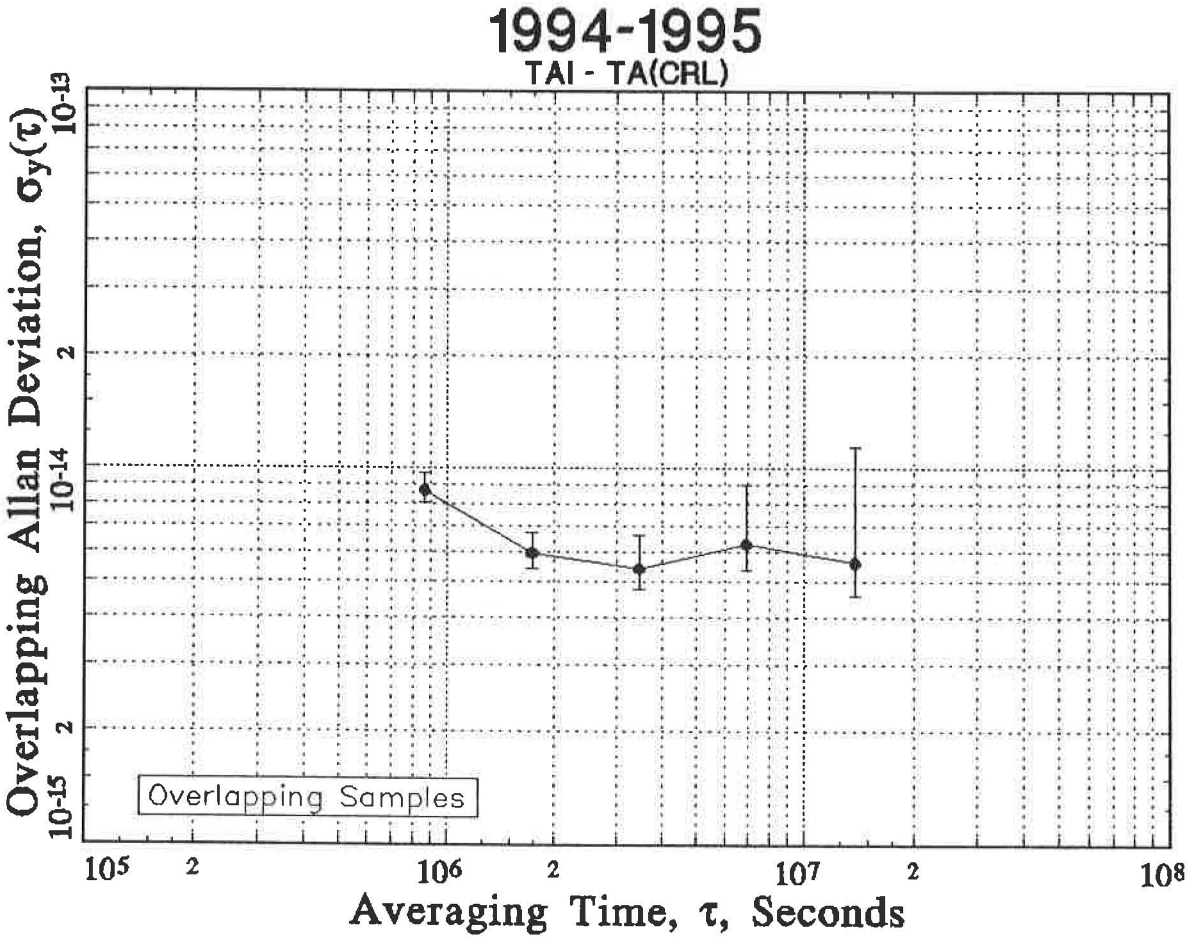
Date 1995 0h UTC	MJD	TAI - TA(k) RC (2)	SO	SU (3)	USNO (4)
Jan 2	49719	-	-45409	27244094	-34714675
Jan 12	49729	-	-45429	27243989	-34715347
Jan 22	49739	-	-45430	27243891	-34716014
Feb 1	49749	-	-45514	27243795	-34716677
Feb 11	49759	-	-45591	27243708	-34717341
Feb 21	49769	-	-45632	27243612	-34718007
Mar 3	49779	-	-45631	27243510	-34718676
Mar 13	49789	-	-45630	27243413	-34719342
Mar 23	49799	-	-45619	27243313	-34720011
Apr 2	49809	-	-45607	27243299	-34720678
Apr 12	49819	-	-45566	27243279	-34721344
Apr 22	49829	-	-45592	27243266	-34722011
May 2	49839	-	-45517	27243257	-34722674
May 12	49849	-	-45543	27243244	-34723340
May 22	49859	-	-45585	27243227	-34724005
Jun 1	49869	-	-45589	27243197	-34724668
Jun 11	49879	-	-45615	27243181	-34725334
Jun 21	49889	-	-45633	27243161	-34725998
Jul 1	49899	-324988	-45635	27243148	-34726662
Jul 11	49909	-324021	-45697	27243126	-34727328
Jul 21	49919	-322884	-45692	27243108	-34727992
Jul 31	49929	-322004	-45640	27243084	-34728654
Aug 10	49939	-320938	-45634	27243065	-34729318
Aug 20	49949	-320322	-45619	27243044	-34729980
Aug 30	49959	-319750	-45592	27243010	-34730641
Sep 9	49969	-318993	-45577	27242982	-34731312
Sep 19	49979	-318059	-45625	27242966	-34731977
Sep 29	49989	-317178	-45612	27242948	-34732640
Oct 9	49999	-	-45628	27242921	-34733299
Oct 19	50009	-	-45713	27242902	-34733962
Oct 29	50019	-	-45724	27242875	-34734622
Nov 8	50029	-	-45739	27242853	-34735275
Nov 18	50039	-	-45776	27242819	-34735938
Nov 28	50049	-	-45787	27242798	-34736600
Dec 8	50059	-	-45799	27242776	-34737262
Dec 18	50069	-	-45809	27242754	-34737925
Dec 28	50079	-	-45790	27242732	-34738589

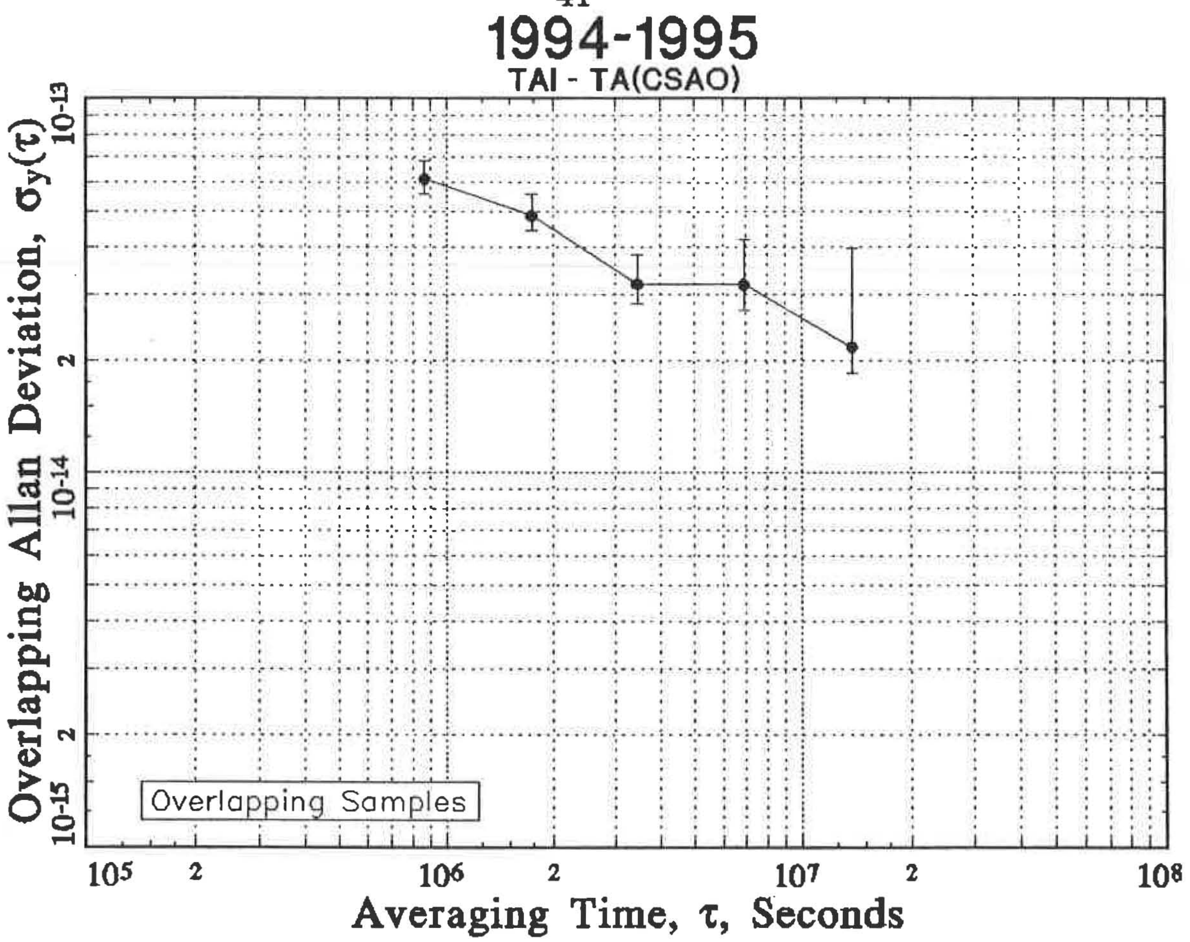
(2) Listed values are TAI-TA(RC) - 18 seconds.
(3) Listed values are TAI-TA(SU) - 2.80 seconds. Frequency step of TA(SU) of -8.64 ns/d on MJD = 49799.
(4) TA(USNO) designates the scale A1(MEAN) of USNO.

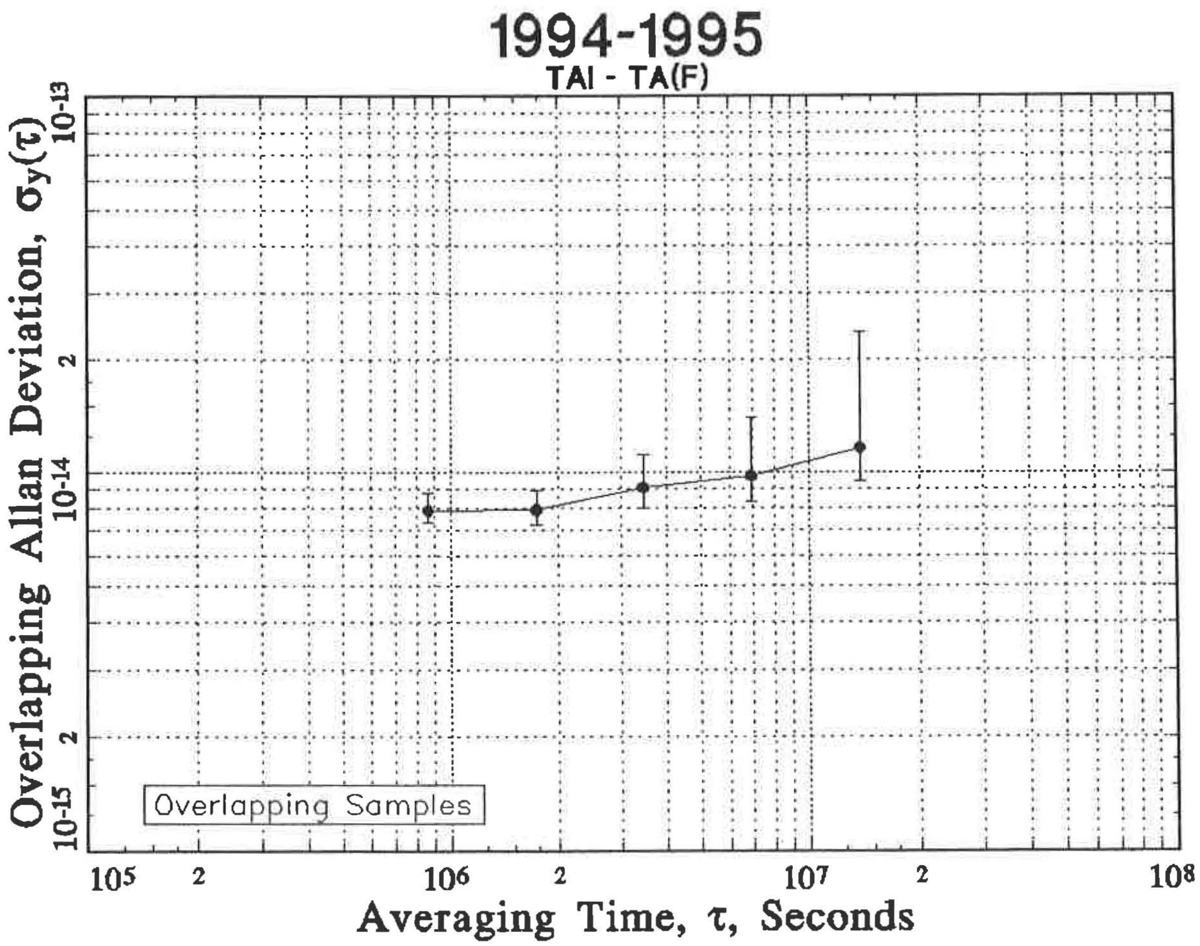

1994-1995
TAI - AT1
Overlapping Allan Deviation, σy(τ)
10-13
2
10-14
2
10-15
Overlapping Samples
105
2
106
2
107
2
108
Averaging Time, τ, Seconds

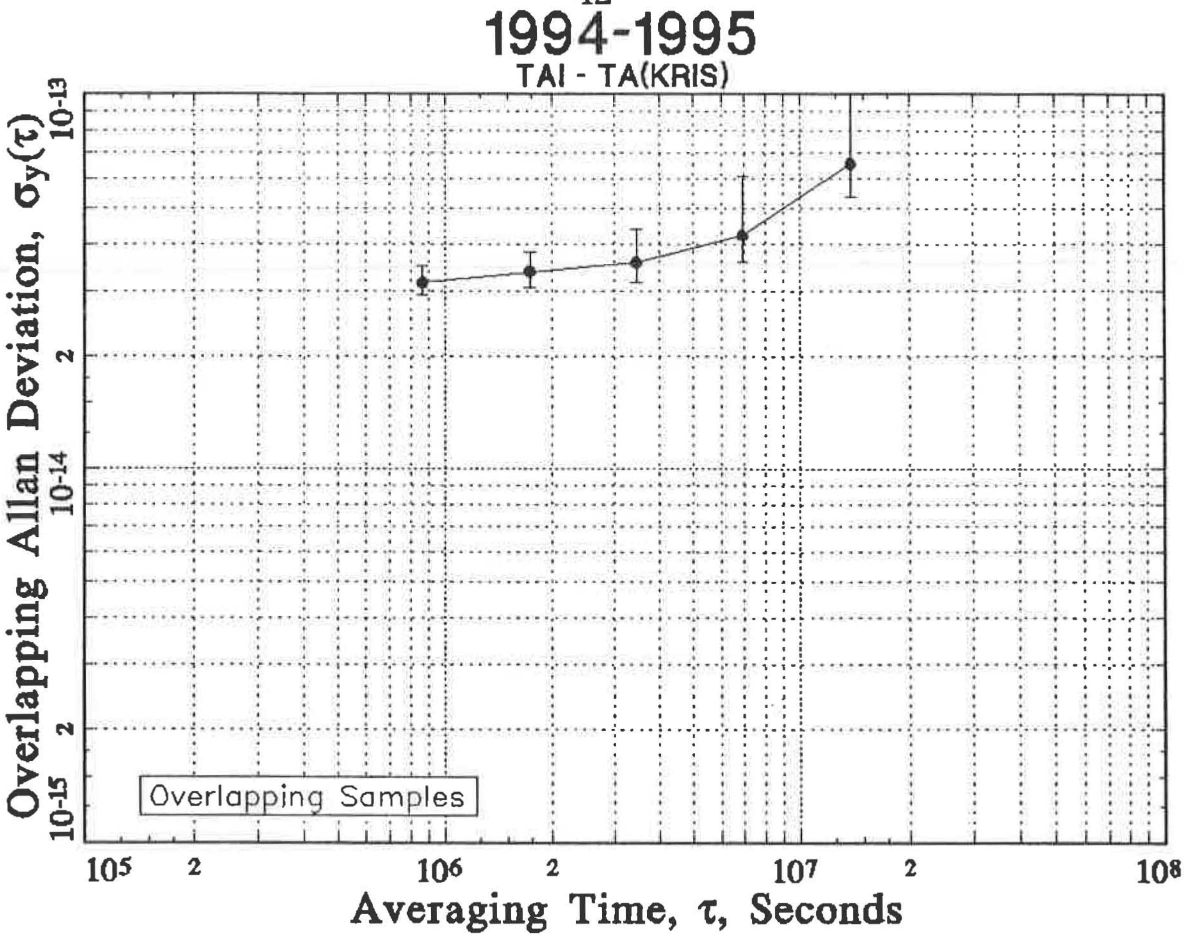

1994-1995
TAI - TA(AUS)
Overlapping Allan Deviation, σy(τ)
10-13
2
10-14
2
10-15
Overlapping Samples
105
2
106
2
107
2
108
Averaging Time, τ, Seconds


1994-1995
TAI - TA(CH)
Overlapping Allan Deviation, $\sigma_y(\tau)$
10^{-13}
2
10^{-14}
2
10^{-15}
Overlapping Samples
10^5
2
10^6
2
10^7
2
10^8
Averaging Time, τ, Seconds

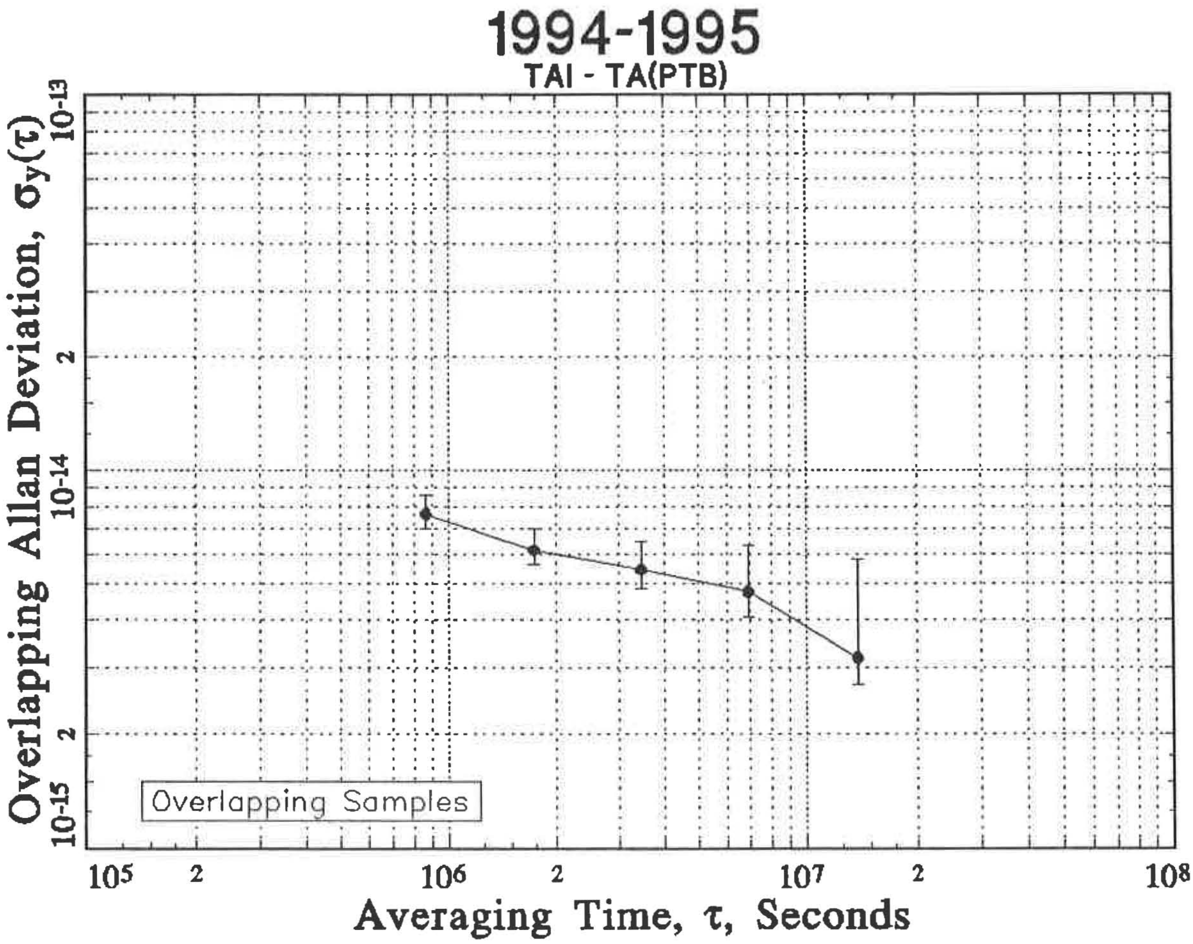

1994-1995
TAI - TA(CRL)
Overlapping Allan Deviation, $\sigma_y(\tau)$
10^{-13}
2
10^{-14}
2
10^{-15}
Overlapping Samples
10^5
2
10^6
2
10^7
2
10^8
Averaging Time, τ, Seconds


1994-1995
TAI - TA(CSAO)
Overlapping Allan Deviation, $\sigma_y(\tau)$
10^{-13}
2
10^{-14}
2
10^{-15}
Overlapping Samples
10^5
2
10^6
2
10^7
2
10^8
Averaging Time, τ, Seconds

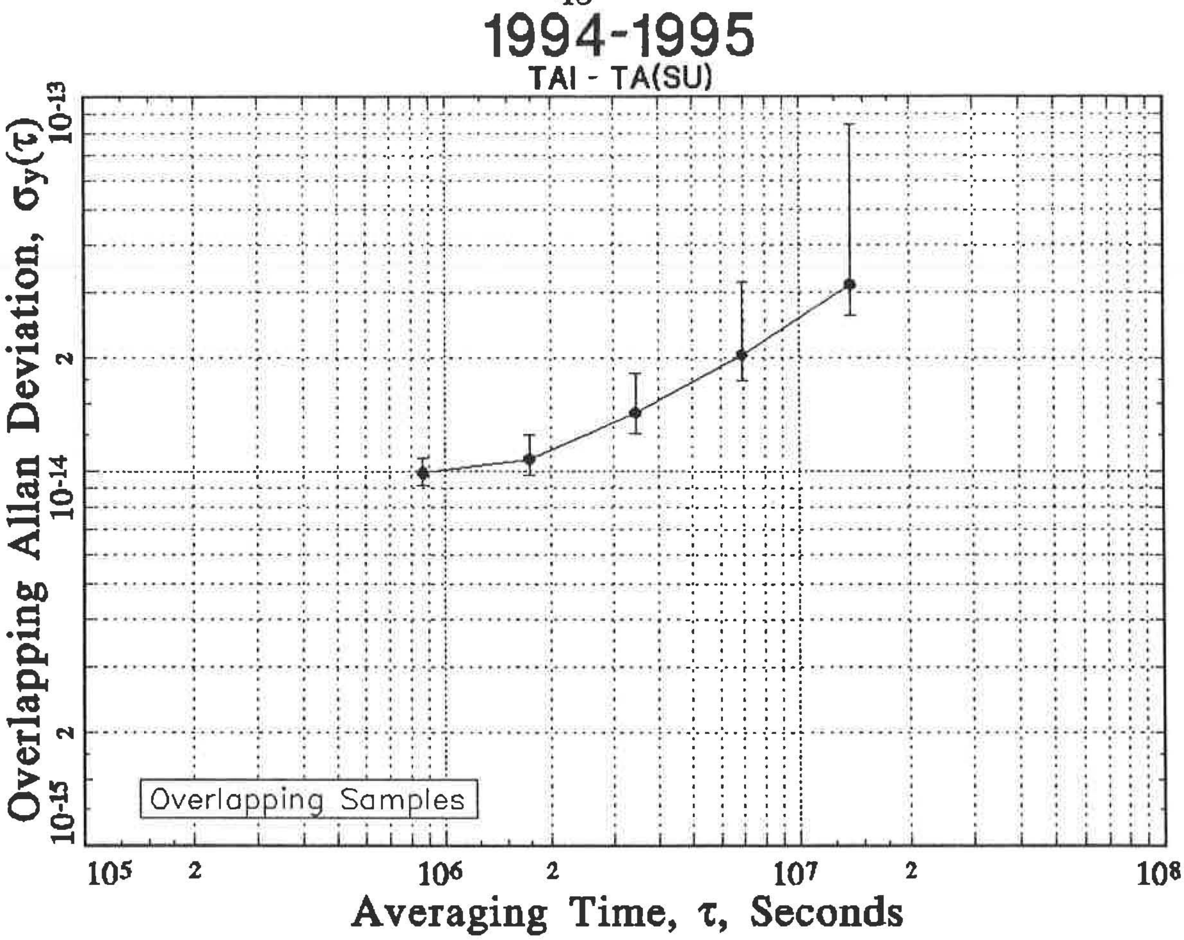

1994-1995
TAI - TA(F)
Overlapping Allan Deviation, $\sigma_y(\tau)$
10^{-13}
2
10^{-14}
2
10^{-15}
Overlapping Samples
10^5
2
10^6
2
10^7
2
10^8
Averaging Time, τ, Seconds



1994-1995
TAI - TA(KRIS)
Overlapping Allan Deviation, $\sigma_y(\tau)$
10^{-13}
2
10^{-14}
2
10^{-15}
Overlapping Samples
10^5
2
10^6
2
10^7
2
10^8
Averaging Time, τ, Seconds



1994-1995
TAI - TA(PTB)
Overlapping Allan Deviation, $\sigma_y(\tau)$
10^{-13}
2
10^{-14}
2
10^{-15}
Overlapping Samples
10^5
2
10^6
2
10^7
2
10^8
Averaging Time, τ, Seconds


1994-1995
TAI - TA(SU)
Overlapping Allan Deviation, σy(τ)
10-13
2
10-14
2
10-15
Overlapping Samples
105
2
106
2
107
2
108
Averaging Time, τ, Seconds

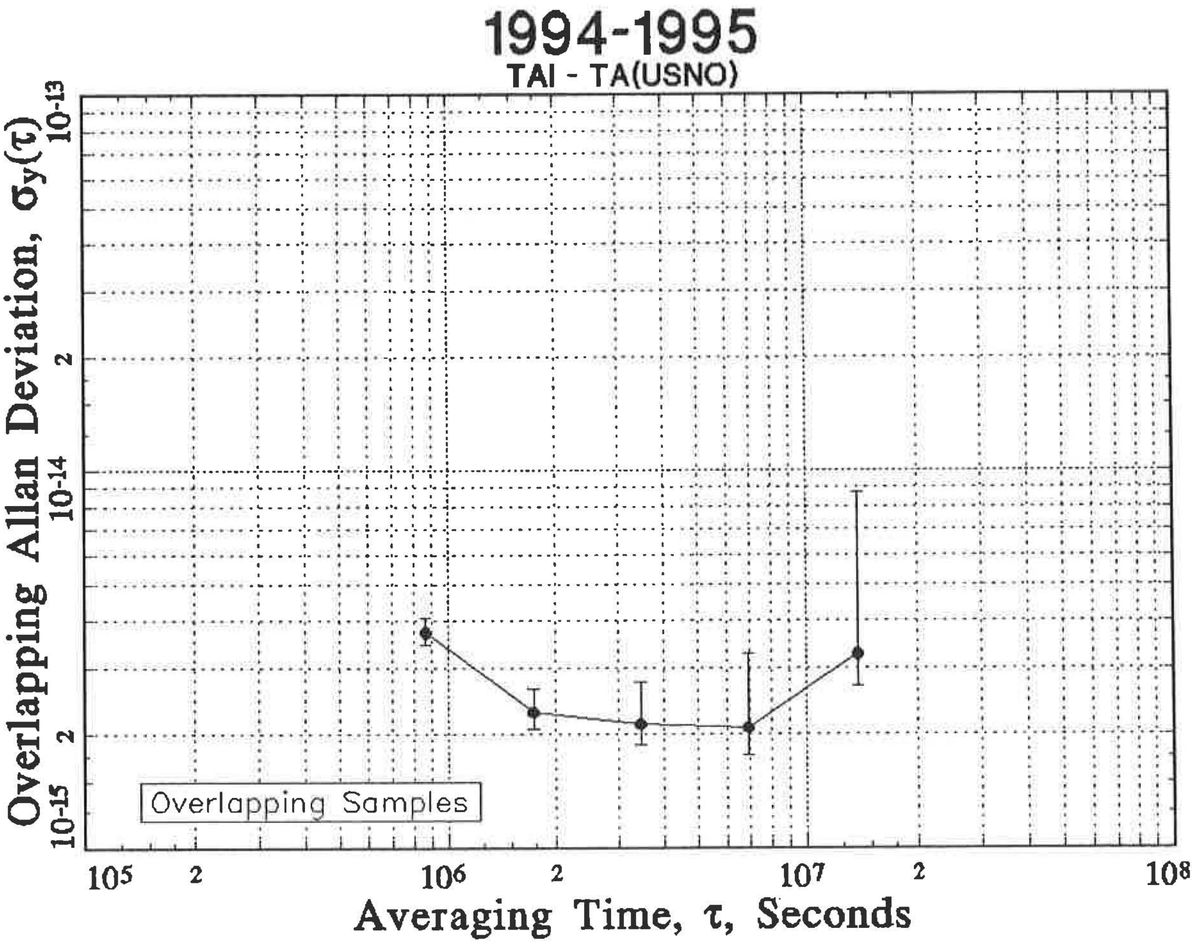

1994-1995
TAI - TA(USNO)
Overlapping Allan Deviation, σy(τ)
10-13
2
10-14
2
10-15
Overlapping Samples
105
2
106
2
107
2
108
Averaging Time, τ, Seconds

TABLE 9. LOCAL REPRESENTATIONS OF UTC : VALUES OF [UTC - UTC(k)]

(File available via Internet under the name UTC95.AR)

The following table gives the values of [UTC - UTC(k)], where UTC(k) denotes the approximation to UTC kept by laboratory k.

Unit is one nanosecond.

Date 1995 0h UTC	MJD	UTC - UTC(k) AOS	APL (1)	AUS	BEV (2)	BIRM (3)	CAO
Jan 2	49719	-921	822	-346	-	-	-5043
Jan 12	49729	-635	833	-331	-	-	-5206
Jan 22	49739	-622	744	-304	-	-	-5415
Feb 1	49749	-922	783	-379	-	-	-5740
Feb 11	49759	-1071	849	-483	-	-	-6126
Feb 21	49769	-1196	918	-557	-	-	-6416
Mar 3	49779	-1276	981	-510	-	-	-6622
Mar 13	49789	-1262	1024	-466	-	-	-6601
Mar 23	49799	-994	1070	-488	-	-	-6872
Apr 2	49809	-1200	1132	-478	-	-	-6941
Apr 12	49819	-1255	1180	-437	-	-	-6990
Apr 22	49829	-1341	1233	-378	-	-	-7416
May 2	49839	-1344	1321	-423	-	-	-7639
May 12	49849	-1390	1419	-433	-	-	-7919
May 22	49859	-2080	1576	-455	-	-	-8176
Jun 1	49869	-2146	1684	-381	-	-	-8446
Jun 11	49879	-2107	1781	-379	-	-	-8717
Jun 21	49889	-1938	1874	-394	-	-	-9019
Jul 1	49899	-1760	1954	-433	-	-	-9211
Jul 11	49909	-1809	2036	-450	-31289	-	-9497
Jul 21	49919	-1669	2104	-483	-31930	-	-9795
Jul 31	49929	-1767	2135	-460	-32538	-	-
Aug 10	49939	-1800	2121	-500	-33180	-	-
Aug 20	49949	-1909	2120	-547	-33757	-	-
Aug 30	49959	-1916	2111	-543	-34323	-	-
Sep 9	49969	-1589	2092	-506	-34829	-	-
Sep 19	49979	-1547	2073	-497	-35315	-	-
Sep 29	49989	-1846	2059	-490	-35884	-	-
Oct 9	49999	-2005	-	-458	-36463	-	-
Oct 19	50009	-1764	1932	-462	-37038	-	-
Oct 29	50019	-1948	1925	-471	12500	-	-
Nov 8	50029	-2054	1912	-471	12015	-	-
Nov 18	50039	-1692	1906	-412	11575	-	-
Nov 28	50049	-1094	1913	-401	11085	393	-
Dec 8	50059	-435	-	-451	10604	264	-
Dec 18	50069	-259	1946	-439	10236	114	-
Dec 28	50079	-172	1967	-401	9885	-14	-

TABLE 9. (CONT.)

Unit is one nanosecond.

Date 1995 0h UTC	MJD	UTC - UTC(k) CH (4)	CRL	CSAO	CSIR (5)	FTZ	GUM (6)
Jan 2	49719	52	1333	-209	-2082	40	-919
Jan 12	49729	97	1311	-267	-1884	47	-1206
Jan 22	49739	141	1286	-293	-1775	44	-1130
Feb 1	49749	113	1258	-187	-1566	42	-1023
Feb 11	49759	77	1246	-225	-1313	33	-972
Feb 21	49769	39	1226	-324	-1232	14	-1395
Mar 3	49779	22	1201	-409	-1082	-14	-1427
Mar 13	49789	2	1170	-371	-992	-16	-1277
Mar 23	49799	-21	1167	-370	-1018	-14	-1103
Apr 2	49809	-17	1140	-379	-1116	-37	-798
Apr 12	49819	32	1114	-311	-1093	-68	-534
Apr 22	49829	141	1085	-342	-1060	-92	-94
May 2	49839	243	1061	-405	-1007	-107	-99
May 12	49849	291	1039	-387	-977	-121	-108
May 22	49859	309	1009	-377	-879	-142	-117
Jun 1	49869	326	971	-374	-695	-135	-131
Jun 11	49879	316	944	-410	-442	-142	-130
Jun 21	49889	276	915	-398	-193	-154	-154
Jul 1	49899	232	882	-297	141	-158	-157
Jul 11	49909	209	854	-302	450	-	-168
Jul 21	49919	207	836	-300	743	-	-185
Jul 31	49929	207	803	-305	1081	-	-205
Aug 10	49939	203	769	-300	1528	-169	-228
Aug 20	49949	205	739	-333	1725	-198	-246
Aug 30	49959	191	701	-351	1898	-230	-282
Sep 9	49969	185	668	-233	2056	-225	-293
Sep 19	49979	180	638	-230	2290	-225	-302
Sep 29	49989	158	606	-259	2421	-233	-307
Oct 9	49999	141	572	-290	2694	-231	-310
Oct 19	50009	126	543	-363	3298	-231	-313
Oct 29	50019	118	510	-267	3803	-222	-316
Nov 8	50029	111	479	-308	4159	-252	-317
Nov 18	50039	109	440	-295	4763	-234	-327
Nov 28	50049	116	412	-285	4718	-239	-331
Dec 8	50059	130	381	-318	4741	-228	-337
Dec 18	50069	155	343	-246	4796	-247	-341
Dec 28	50079	177	311	-292	4855	-256	-343

TABLE 9. (CONT.)

Unit is one nanosecond.

Date 1995 0h UTC	MJD	UTC - UTC(k) IEN (7)	IFAG (8)	IGMA (9)	INPL	IPQ (10)	JATC
Jan 2	49719	564	-5386	-2612	-917	-	604
Jan 12	49729	561	-6115	-2455	-1120	-	646
Jan 22	49739	563	-6834	-2458	-1340	-	731
Feb 1	49749	574	-7543	-2452	-1535	-	1271
Feb 11	49759	590	-1187	-2522	-1680	-	1127
Feb 21	49769	594	-1560	-2584	-1843	-	899
Mar 3	49779	591	-1633	-2551	-1993	-	687
Mar 13	49789	592	-1703	-2637	-2135	-	598
Mar 23	49799	595	-1667	-2686	-2250	-	468
Apr 2	49809	597	-1700	-2503	-2357	-	331
Apr 12	49819	620	-1725	-2459	-2442	-	332
Apr 22	49829	640	-1809	-2287	-2475	-	225
May 2	49839	675	-1834	-2167	-2459	-	274
May 12	49849	87	-1880	-2121	-2437	-	323
May 22	49859	94	-1974	-1981	-2389	-	414
Jun 1	49869	81	-2050	-2069	-2242	-	146
Jun 11	49879	77	-2180	-2130	-2151	-	-60
Jun 21	49889	39	-2321	-2217	-1959	-	28
Jul 1	49899	34	-2450	16	-1777	-	248
Jul 11	49909	24	-2590	-41	-1734	-	484
Jul 21	49919	26	-2705	-160	-1695	-	748
Jul 31	49929	7	-2849	-269	-1566	-	777
Aug 10	49939	-7	-2946	-347	-1728	-	762
Aug 20	49949	-2	-3095	-372	-1948	-	787
Aug 30	49959	0	-3283	-336	-2121	-	820
Sep 9	49969	-7	-3443	-206	-2212	-	982
Sep 19	49979	-10	-3687	-47	-2278	-	1033
Sep 29	49989	-12	-3825	123	-2352	-	1019
Oct 9	49999	-29	-3962	293	-2428	-	1055
Oct 19	50009	-27	-4128	420	-2402	-	1055
Oct 29	50019	-31	-4257	430	-2417	-	1226
Nov 8	50029	-25	-4361	416	-2442	-7581	1251
Nov 18	50039	-47	-4428	397	-2546	-7682	1362
Nov 28	50049	-40	-4485	394	-2621	-7782	1482
Dec 8	50059	-36	-4556	386	-2723	-7885	1419
Dec 18	50069	-22	-4659	391	-2782	-8003	1493
Dec 28	50079	8	-4668	373	-2823	-8116	1442

TABLE 9. (CONT.)

Unit is one nanosecond.

Date 1995 0h UTC	MJD	UTC - UTC(k) KRIS	LDS (11)	MSL	NAOM (12)	NAOT (13)	NIM
Jan 2	49719	-73	-565	-2728	-1855	-1366	7495
Jan 12	49729	-47	-540	-2742	-1920	-1322	7585
Jan 22	49739	-21	-556	-2906	-1990	-1311	7617
Feb 1	49749	18	-672	-3053	-2031	-1289	7391
Feb 11	49759	82	-818	-3180	-2047	-1245	7345
Feb 21	49769	101	-892	-3296	-2084	-1249	7318
Mar 3	49779	118	-872	-3270	-2136	-1259	7284
Mar 13	49789	137	-900	-3373	-2199	-1324	7307
Mar 23	49799	175	-933	-3414	-2279	-1415	7312
Apr 2	49809	187	-915	-3444	-2361	-1551	7312
Apr 12	49819	180	-82	-3450	-2438	-1602	7322
Apr 22	49829	190	-53	-3478	-2519	-1601	7334
May 2	49839	204	-35	-3443	-2605	-1676	7352
May 12	49849	194	-34	-3453	-2687	-1689	7352
May 22	49859	187	-43	-3448	-2757	-1765	7353
Jun 1	49869	179	449	-3372	-2830	-1924	7364
Jun 11	49879	184	468	-3347	-2891	-2126	7378
Jun 21	49889	174	453	-3338	-2965	-2318	7392
Jul 1	49899	181	-	-3381	-3038	-2554	7422
Jul 11	49909	193	281	-3439	-3116	-2800	7432
Jul 21	49919	220	283	-3532	-3182	-3075	7451
Jul 31	49929	195	605	-3682	-3253	-3341	7473
Aug 10	49939	190	589	-3771	-3312	-3573	7473
Aug 20	49949	182	560	-4002	-3367	-3800	7431
Aug 30	49959	195	580	-4091	-3429	-4069	7502
Sep 9	49969	192	561	-4222	-3401	-4346	7579
Sep 19	49979	193	387	-4421	-3375	-4581	7603
Sep 29	49989	194	371	-4550	-3353	-4540	7645
Oct 9	49999	201	401	-4679	-3342	-4417	7686
Oct 19	50009	230	299	-4832	-3299	-4241	7708
Oct 29	50019	247	309	-4977	-3268	-4070	7783
Nov 8	50029	258	272	-5288	-3225	-3847	7806
Nov 18	50039	267	306	-5277	-3194	-3617	7891
Nov 28	50049	281	270	-5326	-3171	-3492	7927
Dec 8	50059	281	205	-5447	-3148	-3341	7930
Dec 18	50069	281	199	-5330	-3133	-3233	7928
Dec 28	50079	284	206	-5326	-3135	-3168	8006

TABLE 9. (CONT.)

Unit is one nanosecond.

Date 1995 0h UTC	MJD	UTC - UTC(k) NIST	NPL (14)	NPLI	NRC (15)	NRLM
Jan 2	49719	-95	-10	-	-	-10580
Jan 12	49729	-96	0	-	-203	-10425
Jan 22	49739	-89	8	-	-122	-10276
Feb 1	49749	-76	17	-	-55	-10126
Feb 11	49759	-51	38	-	-6	-9950
Feb 21	49769	-33	47	-	45	-9807
Mar 3	49779	-11	61	-	78	-9668
Mar 13	49789	-1	64	-	115	-9520
Mar 23	49799	14	73	-	148	-9351
Apr 2	49809	31	84	-	178	-9200
Apr 12	49819	39	94	-	208	-9053
Apr 22	49829	40	105	-	234	-8899
May 2	49839	51	112	-	275	-8753
May 12	49849	47	115	-	297	-8603
May 22	49859	50	117	-	345	-8459
Jun 1	49869	46	109	-	371	-8329
Jun 11	49879	43	116	-	410	-8174
Jun 21	49889	38	115	-	482	-8034
Jul 1	49899	41	110	-	517	-7885
Jul 11	49909	35	104	-	452	-7744
Jul 21	49919	28	98	-	359	-7606
Jul 31	49929	20	93	-	291	-7456
Aug 10	49939	12	85	-	232	-7314
Aug 20	49949	10	77	-	165	-7175
Aug 30	49959	7	66	-	98	-7036
Sep 9	49969	-5	61	-	23	-6907
Sep 19	49979	-10	53	-	-42	-6767
Sep 29	49989	-12	52	-	-84	-6620
Oct 9	49999	-15	42	-	-74	-6476
Oct 19	50009	-15	36	-	-58	-6331
Oct 29	50019	-13	33	-	-27	-6180
Nov 8	50029	-7	33	-	-27	-6036
Nov 18	50039	-6	29	-	-7	-5907
Nov 28	50049	2	27	-	-10	-5768
Dec 8	50059	8	33	-	6	-5627
Dec 18	50069	10	38	-	17	-5487
Dec 28	50079	13	39	-	44	-5342

TABLE 9. (CONT.)

Unit is one nanosecond.

Date 1995 0h UTC	MJD	UTC - UTC(k) OMH	ONBA	ONRJ	OP (16)	ORB	PTB *
Jan 2	49719	8357	-	-19222	-113	-246	2557
Jan 12	49729	8670	-	-19283	-122	-220	2551
Jan 22	49739	8983	-	-18539	-130	-199	2542
Feb 1	49749	9082	-	-17857	-127	-176	2524
Feb 11	49759	9180	-	-17099	-124	-178	2527
Feb 21	49769	9205	-	-17242	-123	-141	2524
Mar 3	49779	9293	-	-17551	-130	-96	2517
Mar 13	49789	9397	-	-17744	-124	-15	2511
Mar 23	49799	9455	-	-17992	-128	-13	2497
Apr 2	49809	9558	-	-17921	-125	-23	2483
Apr 12	49819	9660	-	-18052	-123	-5	2472
Apr 22	49829	9701	-	-18468	-123	-11	2458
May 2	49839	9856	-	-18784	-115	-45	2455
May 12	49849	9924	-	-19035	-109	-6	2452
May 22	49859	9967	-	-19279	-103	-12	2459
Jun 1	49869	10097	-	-19631	-106	52	2454
Jun 11	49879	10258	-	-19441	-102	40	2449
Jun 21	49889	10474	-	-18393	-93	41	2434
Jul 1	49899	10666	-	-17298	-72	92	2424
Jul 11	49909	10680	-	-16207	-65	100	2402
Jul 21	49919	10684	-	-15200	-54	134	2377
Jul 31	49929	10784	-	-14174	-41	145	2364
Aug 10	49939	10839	-3883	-13551	-31	195	2359
Aug 20	49949	10856	-4983	-12703	-12	232	2342
Aug 30	49959	10902	-6021	-11755	-7	245	2321
Sep 9	49969	11169	-6455	-10384	3	262	2313
Sep 19	49979	11385	-7297	-8530	6	243	2313
Sep 29	49989	11524	-7991	-7658	14	276	2309
Oct 9	49999	11649	-8693	-6616	24	311	2286
Oct 19	50009	11697	-9348	-5777	35	318	2283
Oct 29	50019	11865	-9410	-4992	50	322	2266
Nov 8	50029	12054	-9401	-4198	58	327	2257
Nov 18	50039	12237	-9393	-2876	58	316	2243
Nov 28	50049	12523	-9309	-1940	69	318	2234
Dec 8	50059	12801	-9233	-1109	58	323	2230
Dec 18	50069	13004	-9095	-234	61	339	2224
Dec 28	50079	13262	-8803	655	53	305	2221

TABLE 9. (CONT.)

Unit is one nanosecond.

Date 1995 0h UTC	MJD	UTC - UTC(k) RC	ROA (17)	SCL (18)	SNT	SO	SU (19)
Jan 2	49719	-	2175	-36	167	2143	-5906
Jan 12	49729	-	2184	-95	323	2159	-6011
Jan 22	49739	-	2175	-183	442	2155	-6109
Feb 1	49749	-	2165	-	338	2098	-6205
Feb 11	49759	-	2167	-99	113	2038	-6292
Feb 21	49769	-	2131	-50	36	2003	-6388
Mar 3	49779	-	2085	-11	-24	1991	-6490
Mar 13	49789	-	2037	18	-68	1982	-6587
Mar 23	49799	-	2038	11	-52	1986	-6687
Apr 2	49809	-	2038	-9	-76	1980	-6701
Apr 12	49819	-	2090	-60	-113	1994	-6721
Apr 22	49829	-	2203	-110	-81	1964	-6734
May 2	49839	-	2290	-184	-122	1998	-6743
May 12	49849	-	2288	-247	-106	1983	-6756
May 22	49859	-	2248	-342	-	1965	-6773
Jun 1	49869	-	2234	-479	-	1993	-6803
Jun 11	49879	-	2229	-574	-	1983	-6819
Jun 21	49889	-	2202	-667	-	1982	-6839
Jul 1	49899	-388	2186	-813	-	2017	-6852
Jul 11	49909	-541	2204	-894	-	1994	-6874
Jul 21	49919	-524	2168	-940	-	1969	-6892
Jul 31	49929	-764	2185	-1006	-	1985	-6916
Aug 10	49939	-618	2137	-1093	-	1964	-6935
Aug 20	49949	-792	2073	-1044	-	1944	-6956
Aug 30	49959	-1010	2040	-942	-	1970	-6990
Sep 9	49969	-1043	2055	-792	-	1974	-7018
Sep 19	49979	-899	2037	-639	-	1946	-7034
Sep 29	49989	-808	171	-580	-	1941	-7052
Oct 9	49999	-	248	-429	-	1946	-7079
Oct 19	50009	-	262	-	-	1906	-7098
Oct 29	50019	-	176	-138	-	1877	-7125
Nov 8	50029	-	151	-25	-	1829	-7147
Nov 18	50039	-	116	118	-	1819	-7181
Nov 28	50049	-	100	240	-	1791	-7202
Dec 8	50059	-	112	404	-	1770	-7224
Dec 18	50069	-	119	442	-	1758	-7246
Dec 28	50079	-	122	388	-	1733	-7268

TABLE 9. (CONT.)

Unit is one nanosecond.

Date 1995 0h UTC	MJD	UTC - UTC(k) TL (20)	TP	TUG (21)	UME (22)	USNO	VSL (23)
Jan 2	49719	-1165	-777	-1834	-2617	19	927
Jan 12	49729	-1109	-753	-1711	-2691	12	664
Jan 22	49739	-1040	-726	-1583	-2766	16	397
Feb 1	49749	-959	-699	-1489	-2831	22	274
Feb 11	49759	-888	-663	-1379	-2885	26	218
Feb 21	49769	-829	-654	-1246	-2937	27	88
Mar 3	49779	-782	-657	-1151	-3012	26	-37
Mar 13	49789	-732	-634	-669	-3089	25	-63
Mar 23	49799	-663	-618	-665	-3162	22	-80
Apr 2	49809	-603	-599	-650	-3231	20	-108
Apr 12	49819	-545	-606	-636	-3289	17	-118
Apr 22	49829	-488	-614	-617	-3366	12	-138
May 2	49839	-430	-590	-611	-3471	13	-161
May 12	49849	-376	-566	-590	-3508	7	-173
May 22	49859	-306	-555	-591	-3486	2	-166
Jun 1	49869	-224	-563	-565	-3466	1	-181
Jun 11	49879	-185	-555	-559	-3443	6	-182
Jun 21	49889	-184	-557	-540	-3430	5	-198
Jul 1	49899	-181	-538	-522	-3410	7	-200
Jul 11	49909	-201	-530	-508	-3398	4	-212
Jul 21	49919	-248	-504	-498	-3372	2	-213
Jul 31	49929	-189	-468	-493	-3365	4	-201
Aug 10	49939	-197	-464	-479	-3346	4	-188
Aug 20	49949	-185	-447	-466	-3326	6	-174
Aug 30	49959	-225	-431	-457	-3317	10	-168
Sep 9	49969	-94	-423	-435	-3300	4	-179
Sep 19	49979	-95	-407	-412	-3281	4	-194
Sep 29	49989	-124	-406	-380	-3253	5	-202
Oct 9	49999	-103	-400	-361	-3237	1	-205
Oct 19	50009	-118	-372	-347	-3225	1	-217
Oct 29	50019	-80	-350	-322	-3212	2	-230
Nov 8	50029	-95	-341	-312	-3196	7	-234
Nov 18	50039	-53	-331	-298	-3176	10	-233
Nov 28	50049	-45	-310	-279	-3163	10	-236
Dec 8	50059	-62	-294	-254	-3148	11	-244
Dec 18	50069	-59	-284	-234	-3128	11	-234
Dec 28	50079	-23	-296	-217	-3115	11	-231

TABLE 9. (CONT.)

NOTES

(1) APL . Interruption of the GPS time link between MJD = 49989 and MJD = 50009, and between MJD = 50049 and MJD = 50069.

(2) BEV . Time step of UTC(BEV) of - 50000 ns on MJD = 50014.4

(3) BIRM. Beijing Institute of Radio Metrology and Measurement, Beijing, Popular Republic of China.

(4) CH . Frequency steps of UTC(CH) in ns/d :

MJD	Freq. step
49743	+9.0
49813	-9.9
49843	+7.6
49873	+6.6
49903	-2.7
49933	+0.54
49993	+0.14
50023	-0.11
50053	-0.27

(5) CSIR. Frequency step of UTC(CSIR) between MJD = 50039 and MJD = 50049.

(6) GUM . Change of master clock on MJD = 49825.708

(7) IEN . Time step of UTC(IEN) of + 600 ns and frequency step of + 2.188 ns/d on MJD = 49840.4

(8) IFAG. Time step of UTC(IFAG) of - 7000 nanoseconds on MJD = 49749.6
Change of master clock on MJD = 49751.

(9) IGMA. Changes of master clock on MJD = 49786, MJD = 49842 and MJD = 49961. Time step of UTC(IGMA) of - 2300 ns on MJD = 49898.5 and frequency adjustment of UTC(IGMA) on MJD = 50002.

(10) IPQ . Instituto Português da Qualidade (Portuguese Institute for Quality), Monte de Caparica, Portugal.

(11) LDS . Resynchronization of UTC(LDS) on MJD = 49812 after a power failure.
Time step of UTC(LDS) of - 430 ns on MJD = 49868.35
UTC(LDS) clock reset on MJD = 49925.
Power failure from MJD = 49969.29 to MJD = 49971.38
Power interruption on MJD = 50007.

(12) NAOM. Change of frequency of UTC(NAOM) between MJD = 49959 and MJD = 49969.

(13) NAOT. Change of master clock on MJD = 49979.29

(14) NPL . Frequency steps of UTC(NPL) in ns/d :

MJD	Freq. step	MJD	Freq. step
49834.43	+1.0	50051.37	-0.7
49905.43	+1.0	50071.68	+0.4

(15) NRC . Time step of UTC(NRC) of 5000 ns on MJD = 49718.00

Frequency steps of UTC(NRC) in ns/d :

MJD	Freq. step
49849.00	+4.30
49899.00	+8.70
49984.00	-6.95

(16) OP . Frequency steps of UTC(OP) in ns/d :

MJD	Freq. step	MJD	Freq. step
49749.56	-0.691	49961.56	+0.864
49807.56	-0.432	50021.56	+0.432
49869.56	-0.864	50052.56	+0.432

(17) ROA . Time step of UTC(ROA) of + 1930 ns on MJD = 49980.51

(18) SCL . Frequency steps of UTC(SCL) in ns/d :

MJD	Freq. step
49904.069	-5.000
49939.213	-15.000
50059.253	+15.000

(19) SU . Frequency step of UTC(SU) of - 8.64 ns/d on MJD = 49799.

(20) TL . Apparent time step of UTC(TL) due to a change of GPS receiver between MJD = 49959 and MJD = 49969.
Frequency step of UTC(TL) of + 6.05 ns/d on MJD = 49873.25

(21) TUG . Time step of UTC(TUG) of - 438 ns on MJD = 49783.354 due to a change of master clock.

(22) UME . Frequency steps of UTC(UME) in ns/d :

MJD	Freq. step
49832.55	+6.048
49841.29	-14.774

(23) VSL . Change of master clock on MJD = 49716.49

Frequency steps of UTC(VSL) in ns/d :

MJD	Freq. step	MJD	Freq. step
49743.42	-25.92	49839.66	-1.728
49754.46	+11.23	49912.37	-1.728
49777.71	-11.23		

TABLE 10. INTERNATIONAL GPS TRACKING SCHEDULE NO 25 FOR MJD = 49896 (1995 JUNE 28) AT 0 H UTC

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, FTZ, GUM, IEN, IFAG, IPQ, LDS, Mad*, NPL, OMH, OP, ORB, PTB, ROA, SNT, SU, TP, TUG, UME, VSL
East North America	ENA	AO*, APL, NRC, USNO
West North America	WNA	Gold*, NIST, WWV*
Hawaii	H	WWVH*
East Asia	EA	BIRM, CRL, CSAO, KRIS, NAOM, NAOT, NIM, NRLM, SCL, SO, TL
Australia and New Zealand	A	Can*, ATC*, ORR*, MSL, NML*
India	I	NPLI
Middle East	ME	INPL
South Africa	SAF	CSIR
South America	SAM	IGMA, ONBA, 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 Consortium of laboratories.

Other laboratories are designated by their usual acronyms

The start times of the tracks are referenced to UTC. 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 most current 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 were 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 having numerous possible connections has a heavy schedule. The establishment of sub-schedules permits the sharing of the work. European laboratories are contacted to ensure the coordination of sub-schedules.

TABLE 10. SCHEDULE NO 25, 1995 JUNE 28 (CONT.)

*** Europe ***

Class	PRN	Start h	Start m	Connects	E1	E2	E3	E4
10	19	00	32	EA,ME,I	*	*	*	*
08	26	01	04	WNA,ENA	*	*	*	*
10	27	01	36	EA,ME,I	*	*	*	*
68	12	01	52	ENA,SAM		*		
19	9	02	40	ENA,WNA,SAM		*		
10	2	02	56	EA,ME,I	*	*	*	*
00	23	03	12	ENA,WNA		*		
10	7	04	00	EA,ME,I			*	
08	21	04	16	WNA,ENA		*		
00	5	04	48	ENA,ME,SAM	*	*	*	*
E4	12	05	04	E	*	*	*	*
19	20	05	52	ENA,WNA,ME,SAM	*	*	*	*
4C	12	06	08	SAF,ME,I				*
7C	1	06	24	WNA,SAM,ENA	*	*	*	*
BC	9	06	40	ME,SAF	*	*	*	*
10	4	06	56	EA,I,ME			*	
10	24	07	12	EA,ME,I			*	
10	5	07	44	EA,ME,I			*	
00	6	08	00	ENA,ME	*	*	*	*
00	25	08	32	ENA,WNA	*	*	*	*
10	16	09	52	EA,ME,I			*	
18	28	10	24	ENA,WNA,SAM	*	*	*	*
00	22	10	40	ENA,WNA,ME	*	*	*	*
10	6	10	56	EA,ME,I			*	
4C	23	11	44	SAF,ME,I				*
10	17	12	16	EA,ME,I	*	*	*	*
4C	21	12	32	SAF,ME	*	*	*	*
4C	22	13	20	SAF				*
00	31	13	52	ENA,WNA,ME	*	*	*	*
10	23	14	08	EA,ME,I	*	*	*	*
08	15	14	40	WNA,ENA,SAM	*	*	*	*
10	21	15	28	EA,ME,I			*	
18	2	15	44	ENA,WNA,H		*		
10	1	16	00	EA,ME,I			*	
4C	31	16	32	SAF				*
00	14	16	48	ENA,SAM,ME	*	*	*	*
00	7	18	08	ENA,WNA,SAM	*	*	*	*
4C	15	18	24	SAF,ME,I				*
10	25	18	40	EA,ME,I			*	
54	18	18	56	SAM,SAF,ME				*
10	14	19	44	EA,ME,I			*	
00	4	20	16	ENA,WNA,ME	*	*	*	*
00	18	20	32	ENA,ME	*	*	*	*
08	24	20	48	WNA,ENA	*	*	*	*
4C	19	21	04	SAF,ME				*
10	29	21	36	EA,ME,I	*	*	*	*
08	16	22	56	WNA,ENA	*	*	*	*
10	18	23	12	EA			*	

TABLE 10. SCHEDULE NO 25, 1995 JUNE 28 (CONT.)

*** E. North America ***					*** W. North America ***					*** East Asia ***				
Class	PRN	Start h	m	Connects	Class	PRN	Start h	m	Connects	Class	PRN	Start h	m	Connects
08	26	01	04	E,WNA	80	22	00	48	A,EA,H	98	29	00	16	A,I
68	12	01	52	SAM,E	08	26	01	04	E,ENA	10	19	00	32	E,ME,I
34	28	02	08	H,WNA,EA	34	28	02	08	H,ENA,EA	80	22	00	48	WNA,A,H
18	17	02	24	WNA,SAM	18	17	02	24	ENA,SAM	10	27	01	36	E,ME,I
19	9	02	40	WNA,E,SAM	19	9	02	40	ENA,E,SAM	34	28	02	08	H,WNA,ENA
18	21	02	56	WNA,H	18	21	02	56	ENA,H	10	2	02	56	E,ME,I
00	23	03	12	E,WNA	00	23	03	12	E,ENA	98	14	03	28	A
08	21	04	16	E,WNA	08	21	04	16	E,ENA	10	7	04	00	E,ME,I
00	5	04	48	E,ME,SAM	98	31	04	32	EA,A,H	98	31	04	32	A,H,WNA
20	15	05	04	EA,WNA,H	20	15	05	04	EA,ENA,H	20	15	05	04	ENA,WNA,H
19	20	05	52	WNA,E,ME,SAM	19	20	05	52	ENA,E,ME,SAM	36	14	05	20	H
7C	1	06	24	WNA,SAM,E	7C	1	06	24	SAM,E,ENA	98	2	06	08	A
28	14	06	40	EA,WNA,H	28	14	06	40	EA,ENA,H	28	14	06	40	WNA,ENA,H
00	6	08	00	E,ME	00	25	08	32	E,ENA	10	4	06	56	E,I,ME
00	25	08	32	E,WNA	28	18	09	04	EA,ENA,H	10	24	07	12	E,ME,I
28	18	09	04	EA,WNA,H	18	28	10	24	ENA,E,SAM	10	5	07	44	E,ME,I
18	28	10	24	WNA,E,SAM	00	22	10	40	E,ENA,ME	28	18	09	04	WNA,ENA,H
00	22	10	40	E,WNA,ME	68	31	10	56	ENA,SAM	10	16	09	52	E,ME,I
68	31	10	56	SAM,WNA	18	29	11	12	ENA,SAM	98	26	10	08	A,I
18	29	11	12	WNA,SAM	18	18	11	28	ENA	10	6	10	56	E,ME,I
18	18	11	28	WNA	18	19	11	44	ENA,H	18	27	12	00	ENA,WNA,H
18	19	11	44	WNA,H	18	27	12	00	ENA,H,EA	10	17	12	16	E,ME,I
18	27	12	00	WNA,H,EA	68	18	12	32	ENA,SAM	98	12	12	48	A
68	18	12	32	SAM,WNA	00	31	13	52	E,ENA,ME	98	9	13	04	A
00	31	13	52	E,WNA,ME	08	15	14	40	E,ENA,SAM	10	23	14	08	E,ME,I
08	15	14	40	E,WNA,SAM	28	26	14	56	EA,H	28	26	14	56	WNA,H
20	12	15	12	EA,WNA,H	20	12	15	12	ENA,EA,H	20	12	15	12	ENA,WNA,H
18	2	15	44	WNA,H,E	18	2	15	44	ENA,H,E	10	21	15	28	E,ME,I
00	14	16	48	E,SAM,ME	20	9	17	04	ENA,EA,H	10	1	16	00	E,ME,I
20	9	17	04	EA,WNA,H	00	7	18	08	E,ENA,SAM	98	20	16	16	A
00	7	18	08	E,WNA,SAM	20	5	18	24	ENA,EA,H	20	9	17	04	ENA,WNA,H
20	5	18	24	EA,WNA,H	18	24	18	40	ENA,H	20	5	18	24	ENA,WNA,H
18	24	18	40	WNA,H	28	20	20	00	EA,H,ENA	10	25	18	40	E,ME,I
28	20	20	00	WNA,EA,H	00	4	20	16	E,ENA,ME	98	22	19	12	A
00	4	20	16	E,WNA,ME	28	6	20	32	EA,H	10	14	19	44	E,ME,I
00	18	20	32	E,ME	08	24	20	48	E,ENA	28	20	20	00	WNA,H,ENA
08	24	20	48	E,WNA	80	17	21	04	A,H	98	1	20	16	A
18	16	21	20	WNA	18	16	21	20	ENA	28	6	20	32	WNA,H
28	17	22	40	WNA,EA,H	28	17	22	40	EA,H,ENA	98	28	21	20	A,I
08	16	22	56	E,WNA	08	16	22	56	E,ENA	10	29	21	36	E,ME,I
										98	25	22	24	A,H
										28	17	22	40	WNA,H,ENA
										10	18	23	12	E

TABLE 10. SCHEDULE NO 25, 1995 JUNE 28 (CONT.)

*** Hawaii ***				*** Australia ***				*** India ***			
Class	PRN	Start h m	Connects	Class	PRN	Start h m	Connects	Class	PRN	Start h m	Connects
80	22	00 48	WNA,A,EA	98	29	00 16	EA,I	98	29	00 16	EA,A
34	28	02 08	WNA,ENA,EA	80	22	00 48	WNA,EA,H	10	19	00 32	E,EA,ME
18	21	02 56	ENA,WNA	98	14	03 28	EA	10	27	01 36	E,EA,ME
98	31	04 32	EA,A,WNA	98	31	04 32	EA,H,WNA	10	2	02 56	E,EA,ME
20	15	05 04	EA,ENA,WNA	F9	19	05 36	A	10	7	04 00	E,EA,ME
36	14	05 20	EA	98	2	06 08	EA	4C	12	06 08	E,SAF,ME
28	14	06 40	EA,WNA,ENA	F9	27	07 28	A	10	4	06 56	E,EA,ME
3C	19	08 16	A	3C	19	08 16	H	10	24	07 12	E,EA,ME
28	18	09 04	EA,WNA,ENA	98	26	10 08	EA,I	10	5	07 44	E,EA,ME
18	19	11 44	ENA,WNA	F9	12	11 12	A	10	16	09 52	E,EA,ME
18	27	12 00	ENA,WNA,EA	98	12	12 48	EA	98	26	10 08	EA,A
28	26	14 56	WNA,EA	98	9	13 04	EA	10	6	10 56	E,EA,ME
20	12	15 12	ENA,EA,WNA	98	20	16 16	EA	4C	23	11 44	E,SAF,ME
18	2	15 44	ENA,WNA,E	F9	23	18 24	A	10	17	12 16	E,EA,ME
20	9	17 04	ENA,EA,WNA	98	22	19 12	EA	10	23	14 08	E,EA,ME
20	5	18 24	ENA,EA,WNA	98	1	20 16	EA	BC	1	14 24	ME,SAF
18	24	18 40	ENA,WNA	80	17	21 04	WNA,H	10	21	15 28	E,EA,ME
28	20	20 00	WNA,EA,ENA	98	28	21 20	EA,I	10	1	16 00	E,EA,ME
28	6	20 32	EA,WNA	98	25	22 24	EA,H	4C	15	18 24	E,SAF,ME
80	17	21 04	WNA,A					10	25	18 40	E,EA,ME
98	25	22 24	EA,A					10	14	19 44	E,EA,ME
28	17	22 40	WNA,EA,ENA					98	28	21 20	EA,A
								10	29	21 36	E,EA,ME

TABLE 10. SCHEDULE NO 25, 1995 JUNE 28 (CONT.)

*** Middle East ***

Class	PRN	Start h	Start m	Connects
10	19	00	32	E,EA,I
10	27	01	36	E,EA,I
BC	7	02	08	SAF
10	2	02	56	E,EA,I
10	7	04	00	E,EA,I
00	5	04	48	E,ENA,SAM
19	20	05	52	ENA,WNA,E,SAM
4C	12	06	08	E,SAF,I
BC	9	06	40	SAF,E
10	4	06	56	E,EA,I
10	24	07	12	E,EA,I
10	5	07	44	E,EA,I
00	6	08	00	E,ENA
10	16	09	52	E,EA,I
00	22	10	40	E,ENA,WNA
10	6	10	56	E,EA,I
4C	23	11	44	E,SAF,I
10	17	12	16	E,EA,I
4C	21	12	32	E,SAF
00	31	13	52	E,ENA,WNA
10	23	14	08	E,EA,I
BC	1	14	24	SAF,I
10	21	15	28	E,EA,I
10	1	16	00	E,EA,I
00	14	16	48	E,ENA,SAM
4C	15	18	24	E,SAF,I
10	25	18	40	E,EA,I
54	18	18	56	E,SAM,SAF
10	14	19	44	E,EA,I
00	4	20	16	E,ENA,WNA
00	18	20	32	E,ENA
4C	19	21	04	E,SAF
BC	14	21	20	SAF
10	29	21	36	E,EA,I
BC	4	22	24	SAF

*** South Africa ***

Class	PRN	Start h	Start m	Connects
BC	7	02	08	ME
4C	12	06	08	E,ME,I
BC	9	06	40	ME,E
4C	23	11	44	E,ME,I
4C	21	12	32	E,ME
4C	22	13	20	E
BC	1	14	24	ME,I
4C	31	16	32	E
CA	19	17	52	SAM
4C	15	18	24	E,ME,I
54	18	18	56	E,SAM,ME
4C	19	21	04	E,ME
BC	14	21	20	ME
BC	4	22	24	ME

*** South America ***

Class	PRN	Start h	Start m	Connects
F8	12	00	16	SAM
68	12	01	52	ENA,E
18	17	02	24	ENA,WNA
19	9	02	40	ENA,WNA,E
00	5	04	48	E,ENA,ME
19	20	05	52	ENA,WNA,E,ME
7C	1	06	24	WNA,E,ENA
18	28	10	24	ENA,WNA,E
68	31	10	56	ENA,WNA
18	29	11	12	ENA,WNA
68	18	12	32	ENA,WNA
08	15	14	40	E,WNA,ENA
00	14	16	48	E,ENA,ME
CA	19	17	52	SAF
00	7	18	08	E,ENA,WNA
54	18	18	56	E,SAF,ME

TABLE 11. INTERNATIONAL GPS TRACKING SCHEDULE NO 26 FOR MJD = 50086 (1996 JANUARY 4) AT 0 H UTC

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, FTZ, GUM, IEN, IFAG, IPQ, LDS, Mad*, NPL, OMH, OP, ORB, PTB, ROA, SNT, SU, TP, TUG, UME, VSL
East North America	ENA	AO*, APL, NRC, USNO
West North America	WNA	Gold*, NIST, WWV*
Hawaii	H	WWVH*
East Asia	EA	BIRM, CRL, CSAO, KRIS, NAOM, NAOT, NIM, NRLM, SCL, SO, TL
Australia and New Zealand	A	Can*, ATC*, ORR*, MSL, NML*
India	I	NPLI
Middle East	ME	INPL
South Africa	SAF	CSIR
South America	SAM	IGMA, ONBA, 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 Consortium of laboratories.

Other laboratories are designated by their usual acronyms

The start times of the tracks are referenced to UTC. The start time of a track is the date of the first observation. It may be necessary to advance this time by 2 minutes if you operate 'NBS-type' receivers, in order to allow the lock-on procedure onto the satellite signal. The track length is 780 s. All the track times should be decremented 4 minutes each day, to account for the GPS sidereal orbits. The track times were 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 having numerous possible connections has a heavy schedule. The establishment of sub-schedules permits the sharing of the work. European laboratories are contacted to ensure the coordination of sub-schedules.

TABLE 11. SCHEDULE NO 26, 1996 JANUARY 4 (CONT.)

*** Europe ***

Class	PRN	Start h	Start m	Connects	E1	E2	E3	E4
4C	22	00	34	SAF				*
00	31	01	06	ENA,WNA,ME	*	*	*	*
10	23	01	22	EA,ME,I	*	*	*	*
08	15	01	54	WNA,ENA,SAM	*	*	*	*
10	21	02	42	EA,ME,I			*	
18	2	02	58	ENA,WNA,H		*		
10	1	03	14	EA,ME,I			*	
4C	31	03	46	SAF				*
00	14	04	02	ENA,SAM,ME	*	*	*	*
00	7	05	22	ENA,WNA,SAM	*	*	*	*
4C	15	05	38	SAF,ME,I				*
10	25	05	54	EA,ME,I			*	
54	18	06	10	SAM,SAF,ME				*
10	14	06	58	EA,ME,I			*	
00	4	07	30	ENA,WNA,ME	*	*	*	*
00	18	07	46	ENA,ME	*	*	*	*
08	24	08	02	WNA,ENA	*	*	*	*
4C	19	08	18	SAF,ME				*
10	29	08	50	EA,ME,I	*	*	*	*
08	16	10	10	WNA,ENA	*	*	*	*
10	18	10	26	EA			*	
10	19	11	46	EA,ME,I	*	*	*	*
08	26	12	18	WNA,ENA	*	*	*	*
10	27	12	50	EA,ME,I	*	*	*	*
68	9	13	06	ENA,SAM		*		
19	9	13	54	ENA,WNA,SAM		*		
10	2	14	10	EA,ME,I	*	*	*	*
00	23	14	26	ENA,WNA		*		
10	7	15	14	EA,ME,I			*	
08	21	15	30	WNA,ENA		*		
00	5	16	02	ENA,ME,SAM	*	*	*	*
19	20	17	06	ENA,WNA,ME,SAM	*	*	*	*
4C	6	17	22	SAF,ME,SAM				*
7C	1	17	38	WNA,SAM,ENA	*	*	*	*
8C	9	17	54	ME,SAF	*	*	*	*
10	4	18	10	EA,I,ME			*	
10	24	18	26	EA,ME,I			*	
10	5	18	58	EA,ME,I			*	
00	6	19	14	ENA,ME	*	*	*	*
00	25	19	46	ENA,WNA	*	*	*	*
10	16	21	06	EA,ME,I			*	
18	28	21	38	ENA,WNA,SAM	*	*	*	*
00	22	21	54	ENA,WNA,ME	*	*	*	*
10	6	22	10	EA,ME,I			*	
4C	23	22	58	SAF,ME,I				*
10	17	23	30	EA,ME,I	*	*	*	*
4C	21	23	46	SAF,ME	*	*	*	*

TABLE 11. SCHEDULE NO 26, 1996 JANUARY 4 (CONT.)

*** E. North America ***				*** W. North America ***				*** East Asia ***			
Class	PRN	Start h m	Connects	Class	PRN	Start h m	Connects	Class	PRN	Start h m	Connects
00	31	01 06	E,WNA,ME	00	31	01 06	E,ENA,ME	98	9	00 18	A
08	15	01 54	E,WNA,SAM	08	15	01 54	E,ENA,SAM	10	23	01 22	E,ME,I
20	12	02 26	EA,WNA,H	28	26	02 10	EA,H	28	26	02 10	WNA,H
18	2	02 58	WNA,H,E	20	12	02 26	ENA,EA,H	20	12	02 26	ENA,WNA,H
00	14	04 02	E,SAM,ME	18	2	02 58	ENA,H,E	10	21	02 42	E,ME,I
20	9	04 18	EA,WNA,H	20	9	04 18	ENA,EA,H	10	1	03 14	E,ME,I
00	7	05 22	E,WNA,SAM	00	7	05 22	E,ENA,SAM	98	20	03 30	A
20	5	05 38	EA,WNA,H	20	5	05 38	ENA,EA,H	20	9	04 18	ENA,WNA,H
18	24	05 54	WNA,H	18	24	05 54	ENA,H	20	5	05 38	ENA,WNA,H
28	20	07 14	WNA,EA,H	28	20	07 14	EA,H,ENA	10	25	05 54	E,ME,I
00	4	07 30	E,WNA,ME	00	4	07 30	E,ENA,ME	98	22	06 26	A
00	18	07 46	E,ME	28	6	07 46	EA,H	10	14	06 58	E,ME,I
08	24	08 02	E,WNA	08	24	08 02	E,ENA	28	20	07 14	WNA,H,ENA
18	16	08 34	WNA	80	17	08 18	A,H	98	1	07 30	A
28	17	09 54	WNA,EA,H	18	16	08 34	ENA	28	6	07 46	WNA,H
08	16	10 10	E,WNA	28	17	09 54	EA,H,ENA	98	28	08 34	A,I
08	26	12 18	E,WNA	08	16	10 10	E,ENA	10	29	08 50	E,ME,I
68	9	13 06	SAM,E	80	22	12 02	A,EA,H	98	25	09 38	A,H
34	28	13 22	H,WNA,EA	08	26	12 18	E,ENA	28	17	09 54	WNA,H,ENA
18	17	13 38	WNA,SAM	34	28	13 22	H,ENA,EA	10	18	10 26	E
19	9	13 54	WNA,E,SAM	18	17	13 38	ENA,SAM	98	29	11 30	A,I
18	21	14 10	WNA,H	19	9	13 54	ENA,E,SAM	10	19	11 46	E,ME,I
00	23	14 26	E,WNA	18	21	14 10	ENA,H	80	22	12 02	WNA,A,H
08	21	15 30	E,WNA	00	23	14 26	E,ENA	10	27	12 50	E,ME,I
00	5	16 02	E,ME,SAM	08	21	15 30	E,ENA	34	28	13 22	H,WNA,ENA
20	15	16 18	EA,WNA,H	98	31	15 46	EA,A,H	10	2	14 10	E,ME,I
19	20	17 06	WNA,E,ME,SAM	20	15	16 18	EA,ENA,H	98	14	14 42	A
7C	1	17 38	WNA,SAM,E	19	20	17 06	ENA,E,ME,SAM	10	7	15 14	E,ME,I
28	14	17 54	EA,WNA,H	7C	1	17 38	SAM,E,ENA	98	31	15 46	A,H,WNA
00	6	19 14	E,ME	28	14	17 54	EA,ENA,H	20	15	16 18	ENA,WNA,H
00	25	19 46	E,WNA	00	25	19 46	E,ENA	36	14	16 34	H
28	18	20 18	EA,WNA,H	28	18	20 18	EA,ENA,H	98	2	17 22	A
18	28	21 38	WNA,E,SAM	18	28	21 38	ENA,E,SAM	28	14	17 54	WNA,ENA,H
00	22	21 54	E,WNA,ME	00	22	21 54	E,ENA,ME	10	4	18 10	E,I,ME
68	31	22 10	SAM,WNA	68	31	22 10	ENA,SAM	10	24	18 26	E,ME,I
18	29	22 26	WNA,SAM	18	29	22 26	ENA,SAM	10	5	18 58	E,ME,I
18	18	22 42	WNA	18	18	22 42	ENA	28	18	20 18	WNA,ENA,H
18	19	22 58	WNA,H	18	19	22 58	ENA,H	10	16	21 06	E,ME,I
18	27	23 14	WNA,H,EA	18	27	23 14	ENA,H,EA	98	26	21 22	A,I
68	18	23 46	SAM,WNA	68	18	23 46	ENA,SAM	10	6	22 10	E,ME,I
18	27	23 14	ENA,WNA,H								
10	17	23 30	E,ME,I								

TABLE 11. SCHEDULE NO 26, 1996 JANUARY 4 (CONT.)

*** Hawaii ***

Class	PRN	Start		Connects
		h	m	
3C	16	01	22	A
28	26	02	10	WNA,EA
20	12	02	26	ENA,EA,WNA
3C	5	02	42	A
18	2	02	58	ENA,WNA,E
20	9	04	18	ENA,EA,WNA
3C	26	04	34	A
3C	6	05	22	A
20	5	05	38	ENA,EA,WNA
18	24	05	54	ENA,WNA
3C	1	06	42	A
28	20	07	14	WNA,EA,ENA
28	6	07	46	EA,WNA
80	17	08	18	WNA,A
3C	23	09	06	A
98	25	09	38	EA,A
28	17	09	54	WNA,EA,ENA
3C	21	10	26	A
80	22	12	02	WNA,A,EA
34	28	13	22	WNA,ENA,EA
18	21	14	10	ENA,WNA
98	31	15	46	EA,A,WNA
3C	28	16	02	A
20	15	16	18	EA,ENA,WNA
36	14	16	34	EA
3C	29	17	06	A
3C	18	17	38	A
28	14	17	54	EA,WNA,ENA
3C	7	18	26	A
3C	19	19	30	A
28	18	20	18	EA,WNA,ENA
3C	27	20	34	A
3C	4	21	06	A
3C	2	21	54	A
3C	24	22	10	A
18	19	22	58	ENA,WNA
18	27	23	14	ENA,WNA,EA

*** Australia ***

Class	PRN	Start		Connects
		h	m	
98	9	00	18	EA
CC	6	00	50	SAF
3C	16	01	22	H
3C	5	02	42	H
98	20	03	30	EA
3C	26	04	34	H
3C	6	05	22	H
F9	23	05	38	A
CC	28	05	54	SAF
98	22	06	26	EA
3C	1	06	42	H
98	1	07	30	EA
CC	31	08	02	SAF
80	17	08	18	WNA,H
98	28	08	34	EA,I
3C	23	09	06	H
98	25	09	38	EA,H
3C	21	10	26	H
CC	14	10	42	SAF
98	29	11	30	EA,I
80	22	12	02	WNA,EA,H
CC	18	13	06	SAF
98	14	14	42	EA
98	31	15	46	EA,H,WNA
3C	28	16	02	H
F9	19	16	50	A
3C	29	17	06	H
98	2	17	22	EA
3C	18	17	38	H
CC	16	18	10	SAF
3C	7	18	26	H
F9	27	18	42	A
3C	19	19	30	H
CC	26	19	46	SAF
3C	27	20	34	H
3C	4	21	06	H
98	26	21	22	EA,I
CC	9	21	38	SAF
3C	2	21	54	H
3C	24	22	10	H
F9	4	22	26	A
CC	5	22	42	SAF

*** India ***

Class	PRN	Start		Connects
		h	m	
10	23	01	22	E,EA,ME
BC	1	01	38	ME,SAF
10	21	02	42	E,EA,ME
10	1	03	14	E,EA,ME
4C	15	05	38	E,SAF,ME
10	25	05	54	E,EA,ME
10	14	06	58	E,EA,ME
98	28	08	34	EA,A
10	29	08	50	E,EA,ME
98	29	11	30	EA,A
10	19	11	46	E,EA,ME
10	27	12	50	E,EA,ME
10	2	14	10	E,EA,ME
10	7	15	14	E,EA,ME
10	4	18	10	E,EA,ME
10	24	18	26	E,EA,ME
10	5	18	58	E,EA,ME
10	16	21	06	E,EA,ME
98	26	21	22	EA,A
10	6	22	10	E,EA,ME
4C	23	22	58	E,SAF,ME
10	17	23	30	E,EA,ME

TABLE 11. SCHEDULE NO 26, 1996 JANUARY 4 (CONT.)

*** Middle East ***

Class	PRN	Start h	Start m	Connects
00	31	01	06	E,ENA,WNA
10	23	01	22	E,EA,I
BC	1	01	38	SAF,I
10	21	02	42	E,EA,I
10	1	03	14	E,EA,I
00	14	04	02	E,ENA,SAM
4C	15	05	38	E,SAF,I
10	25	05	54	E,EA,I
54	18	06	10	E,SAM,SAF
10	14	06	58	E,EA,I
00	4	07	30	E,ENA,WNA
00	18	07	46	E,ENA
4C	19	08	18	E,SAF
BC	14	08	34	SAF
10	29	08	50	E,EA,I
BC	4	09	38	SAF
10	19	11	46	E,EA,I
10	27	12	50	E,EA,I
BC	7	13	22	SAF
10	2	14	10	E,EA,I
10	7	15	14	E,EA,I
00	5	16	02	E,ENA,SAM
19	20	17	06	ENA,WNA,E,SA
4C	6	17	22	E,SAF,SAM
BC	9	17	54	SAF,E
10	4	18	10	E,EA,I
10	24	18	26	E,EA,I
10	5	18	58	E,EA,I
00	6	19	14	E,ENA
10	16	21	06	E,EA,I
00	22	21	54	E,ENA,WNA
10	6	22	10	E,EA,I
4C	23	22	58	E,SAF,I
10	17	23	30	E,EA,I
4C	21	23	46	E,SAF

*** South Africa ***

Class	PRN	Start h	Start m	Connects
4C	22	00	34	E
CC	6	00	50	A
BC	1	01	38	ME,I
4C	31	03	46	E
CA	19	05	06	SAM
4C	15	05	38	E,ME,I
CC	28	05	54	A
54	18	06	10	E,SAM,ME
CC	31	08	02	A
4C	19	08	18	E,ME
BC	14	08	34	ME
BC	4	09	38	ME
CC	14	10	42	A
CC	18	13	06	A
BC	7	13	22	ME
4C	6	17	22	E,ME,SAM
BC	9	17	54	ME,E
CC	16	18	10	A
CC	26	19	46	A
CC	9	21	38	A
CC	5	22	42	A
4C	23	22	58	E,ME,I
4C	21	23	46	E,ME

*** South America ***

Class	PRN	Start h	Start m	Connects
08	15	01	54	E,WNA,ENA
00	14	04	02	E,ENA,ME
CA	19	05	06	SAF
00	7	05	22	E,ENA,WNA
54	18	06	10	E,SAF,ME
68	9	13	06	ENA,E
18	17	13	38	ENA,WNA
19	9	13	54	ENA,WNA,E
00	5	16	02	E,ENA,ME
19	20	17	06	ENA,WNA,E,ME
4C	6	17	22	E,SAF,ME
7C	1	17	38	WNA,E,ENA
18	28	21	38	ENA,WNA,E
68	31	22	10	ENA,WNA
18	29	22	26	ENA,WNA
68	18	23	46	ENA,WNA

TABLE 12. [TAI - GPS time] AND [UTC - GPS time]

(File available via INTERNET under the name UTCGPS95.AR)

The 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 the order of 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 1993 July 1, 0h UTC, until 1994 July 1, 0h UTC :

$$[UTC - GPS\ time] = -9\ s + C0$$

from 1994 July 1, 0h UTC, until 1996 January 1, 0h UTC :

$$[UTC - GPS\ time] = -10\ s + C0.$$

Here C0 is given at 0h UTC every day.

C0 is computed as follows: the GPS data taken at the Paris Observatory, from satellites with highest elevations, are first corrected for precise satellite ephemerides and for measured ionospheric delays, and then smoothed to obtain daily values of [UTC(OP) - GPS time] at 0h UTC. Daily values of C0 are derived from them using linear interpolation of [UTC - UTC(OP)] from Table 9.
For a given day, where N measurements are used for estimation of C0 :
- the dispersion of individual measurements is characterized by a standard deviation σ,
- the daily C0 value is characterized by the standard deviation of the mean $\sigma/\sqrt{N}$.

TABLE 12. (CONT.)

Date 1995 0h UTC	MJD	C0 (ns)	σ (ns)	σ/√N (ns)
Jan 1	49718	193	50	11
Jan 2	49719	204	38	9
Jan 3	49720	214	38	8
Jan 4	49721	223	43	9
Jan 5	49722	230	32	7
Jan 6	49723	236	44	11
Jan 7	49724	249	45	10
Jan 8	49725	264	32	7
Jan 9	49726	273	42	9
Jan 10	49727	274	57	12
Jan 11	49728	272	39	8
Jan 12	49729	272	30	6
Jan 13	49730	274	44	9
Jan 14	49731	277	45	10
Jan 15	49732	283	44	10
Jan 16	49733	288	46	10
Jan 17	49734	289	38	8
Jan 18	49735	291	32	7
Jan 19	49736	291	36	8
Jan 20	49737	289	46	12
Jan 21	49738	286	36	8
Jan 22	49739	286	50	11
Jan 23	49740	289	42	9
Jan 24	49741	285	38	8
Jan 25	49742	275	43	9
Jan 26	49743	265	47	10
Jan 27	49744	261	37	8
Jan 28	49745	256	40	9
Jan 29	49746	246	44	10
Jan 30	49747	227	35	8
Jan 31	49748	214	39	8

TABLE 12. (CONT.)

Date 1995 0h UTC	MJD	C0 (ns)	σ (ns)	σ/√N (ns)
Feb 1	49749	207	37	8
Feb 2	49750	198	46	10
Feb 3	49751	187	53	12
Feb 4	49752	175	39	8
Feb 5	49753	161	30	6
Feb 6	49754	147	39	9
Feb 7	49755	135	45	10
Feb 8	49756	127	49	11
Feb 9	49757	115	40	9
Feb 10	49758	100	43	9
Feb 11	49759	87	45	10
Feb 12	49760	78	52	11
Feb 13	49761	73	42	9
Feb 14	49762	66	58	12
Feb 15	49763	55	44	10
Feb 16	49764	45	40	9
Feb 17	49765	37	39	8
Feb 18	49766	30	32	7
Feb 19	49767	25	30	7
Feb 20	49768	20	36	8
Feb 21	49769	11	40	9
Feb 22	49770	1	45	10
Feb 23	49771	1	40	9
Feb 24	49772	6	37	8
Feb 25	49773	7	35	8
Feb 26	49774	8	39	8
Feb 27	49775	10	43	9
Feb 28	49776	13	31	7

TABLE 12. (CONT.)

Date 1995 0h UTC	MJD	C0 (ns)	σ (ns)	$\sigma/\sqrt{N}$ (ns)
Mar 1	49777	18	49	11
Mar 2	49778	24	39	8
Mar 3	49779	24	44	10
Mar 4	49780	25	43	9
Mar 5	49781	30	51	11
Mar 6	49782	38	44	9
Mar 7	49783	47	46	11
Mar 8	49784	52	47	10
Mar 9	49785	54	38	8
Mar 10	49786	52	41	9
Mar 11	49787	52	32	7
Mar 12	49788	53	47	10
Mar 13	49789	55	40	9
Mar 14	49790	54	24	5
Mar 15	49791	51	36	8
Mar 16	49792	53	39	9
Mar 17	49793	57	42	9
Mar 18	49794	59	42	9
Mar 19	49795	54	46	10
Mar 20	49796	45	36	8
Mar 21	49797	40	45	10
Mar 22	49798	37	45	10
Mar 23	49799	35	51	12
Mar 24	49800	31	39	9
Mar 25	49801	26	35	7
Mar 26	49802	23	30	7
Mar 27	49803	20	47	10
Mar 28	49804	16	40	9
Mar 29	49805	16	39	9
Mar 30	49806	25	38	9
Mar 31	49807	32	44	10

TABLE 12. (CONT.)

Date 1995 0h UTC	MJD	C0 (ns)	σ (ns)	σ/√N (ns)
Apr 1	49808	32	40	9
Apr 2	49809	27	38	10
Apr 3	49810	25	52	12
Apr 4	49811	30	51	11
Apr 5	49812	39	70	16
Apr 6	49813	37	42	9
Apr 7	49814	31	39	9
Apr 8	49815	30	42	10
Apr 9	49816	30	37	8
Apr 10	49817	29	41	9
Apr 11	49818	27	47	10
Apr 12	49819	24	41	9
Apr 13	49820	24	44	10
Apr 14	49821	28	54	12
Apr 15	49822	30	48	11
Apr 16	49823	31	45	10
Apr 17	49824	33	45	10
Apr 18	49825	33	31	7
Apr 19	49826	31	35	8
Apr 20	49827	31	42	9
Apr 21	49828	31	50	11
Apr 22	49829	32	45	10
Apr 23	49830	32	45	11
Apr 24	49831	34	28	6
Apr 25	49832	32	26	6
Apr 26	49833	34	45	10
Apr 27	49834	39	46	11
Apr 28	49835	41	39	8
Apr 29	49836	37	28	6
Apr 30	49837	32	50	11

TABLE 12. (CONT.)

Date 1995 0h UTC	MJD	C0 (ns)	σ (ns)	$\sigma/\sqrt{N}$ (ns)
May 1	49838	33	56	12
May 2	49839	38	40	9
May 3	49840	39	38	9
May 4	49841	37	35	8
May 5	49842	36	52	11
May 6	49843	35	39	9
May 7	49844	33	49	11
May 8	49845	30	45	10
May 9	49846	27	41	9
May 10	49847	26	40	9
May 11	49848	21	47	10
May 12	49849	16	28	6
May 13	49850	16	50	11
May 14	49851	18	37	8
May 15	49852	20	39	8
May 16	49853	15	32	7
May 17	49854	11	28	6
May 18	49855	12	44	10
May 19	49856	12	53	12
May 20	49857	13	37	8
May 21	49858	12	36	8
May 22	49859	15	20	5
May 23	49860	19	60	13
May 24	49861	24	34	7
May 25	49862	30	39	9
May 26	49863	30	41	11
May 27	49864	25	54	13
May 28	49865	25	54	12
May 29	49866	30	46	10
May 30	49867	31	40	10
May 31	49868	26	32	7

TABLE 12. (CONT.)

Date 1995 0h UTC	MJD	C0 (ns)	σ (ns)	σ/√N (ns)
Jun 1	49869	17	46	10
Jun 2	49870	7	35	8
Jun 3	49871	1	41	10
Jun 4	49872	0	57	13
Jun 5	49873	7	57	13
Jun 6	49874	12	43	10
Jun 7	49875	10	42	9
Jun 8	49876	11	32	7
Jun 9	49877	15	37	8
Jun 10	49878	16	48	11
Jun 11	49879	11	44	10
Jun 12	49880	6	46	10
Jun 13	49881	4	24	5
Jun 14	49882	6	48	11
Jun 15	49883	11	39	9
Jun 16	49884	16	46	10
Jun 17	49885	16	43	10
Jun 18	49886	13	43	10
Jun 19	49887	10	30	7
Jun 20	49888	10	50	12
Jun 21	49889	22	38	9
Jun 22	49890	26	42	10
Jun 23	49891	29	56	13
Jun 24	49892	31	42	10
Jun 25	49893	22	37	9
Jun 26	49894	29	30	7
Jun 27	49895	28	57	19
Jun 28	49896	25	58	17
Jun 29	49897	26	45	12
Jun 30	49898	31	41	10

TABLE 12. (CONT.)

Date 1995 0h UTC	MJD	C0 (ns)	σ (ns)	σ/√N (ns)
Jul 1	49899	32	47	11
Jul 2	49900	29	43	11
Jul 3	49901	28	50	12
Jul 4	49902	28	49	11
Jul 5	49903	26	37	8
Jul 6	49904	29	46	10
Jul 7	49905	34	41	10
Jul 8	49906	36	41	9
Jul 9	49907	33	33	7
Jul 10	49908	30	45	10
Jul 11	49909	29	42	9
Jul 12	49910	26	39	9
Jul 13	49911	26	41	9
Jul 14	49912	28	62	15
Jul 15	49913	29	52	13
Jul 16	49914	28	37	9
Jul 17	49915	27	34	8
Jul 18	49916	27	52	12
Jul 19	49917	29	42	9
Jul 20	49918	34	41	9
Jul 21	49919	38	35	7
Jul 22	49920	43	44	12
Jul 23	49921	45	37	8
Jul 24	49922	43	41	8
Jul 25	49923	38	43	9
Jul 26	49924	38	33	8
Jul 27	49925	44	40	9
Jul 28	49926	47	45	10
Jul 29	49927	45	47	11
Jul 30	49928	43	37	9
Jul 31	49929	43	28	6

TABLE 12. (CONT.)

Date 1995 0h UTC	MJD	C0 (ns)	σ (ns)	σ/√N (ns)
Aug 1	49930	42	42	9
Aug 2	49931	42	58	15
Aug 3	49932	45	41	9
Aug 4	49933	45	49	11
Aug 5	49934	39	51	11
Aug 6	49935	34	52	11
Aug 7	49936	34	47	10
Aug 8	49937	35	32	7
Aug 9	49938	29	34	7
Aug 10	49939	21	30	7
Aug 11	49940	17	37	9
Aug 12	49941	11	45	10
Aug 13	49942	7	44	9
Aug 14	49943	7	50	11
Aug 15	49944	7	43	9
Aug 16	49945	1	49	11
Aug 17	49946	-4	38	9
Aug 18	49947	-6	50	11
Aug 19	49948	-9	49	14
Aug 20	49949	-8	52	14
Aug 21	49950	-2	44	11
Aug 22	49951	6	43	10
Aug 23	49952	9	33	8
Aug 24	49953	9	39	10
Aug 25	49954	11	48	12
Aug 26	49955	12	46	11
Aug 27	49956	16	49	12
Aug 28	49957	20	36	8
Aug 29	49958	19	32	7
Aug 30	49959	12	52	12
Aug 31	49960	7	50	13

TABLE 12. (CONT.)

Date 1995 0h UTC	MJD	C0 (ns)	σ (ns)	σ/√N (ns)
Sep 1	49961	8	34	8
Sep 2	49962	16	53	11
Sep 3	49963	27	51	12
Sep 4	49964	36	46	10
Sep 5	49965	40	37	8
Sep 6	49966	41	39	8
Sep 7	49967	41	45	10
Sep 8	49968	44	42	11
Sep 9	49969	48	45	10
Sep 10	49970	51	40	9
Sep 11	49971	52	43	10
Sep 12	49972	46	64	15
Sep 13	49973	40	51	11
Sep 14	49974	37	50	10
Sep 15	49975	37	46	12
Sep 16	49976	39	43	11
Sep 17	49977	39	50	12
Sep 18	49978	39	46	11
Sep 19	49979	36	38	10
Sep 20	49980	33	33	9
Sep 21	49981	34	30	8
Sep 22	49982	37	39	11
Sep 23	49983	40	33	8
Sep 24	49984	36	30	9
Sep 25	49985	34	51	13
Sep 26	49986	36	54	14
Sep 27	49987	37	35	8
Sep 28	49988	37	36	8
Sep 29	49989	35	32	9
Sep 30	49990	33	54	14

TABLE 12. (CONT.)

Date 1995 0h UTC	MJD	C0 (ns)	σ (ns)	σ/√N (ns)
Oct 1	49991	36	38	12
Oct 2	49992	43	50	11
Oct 3	49993	44	38	11
Oct 4	49994	41	53	13
Oct 5	49995	33	51	11
Oct 6	49996	23	49	11
Oct 7	49997	21	29	7
Oct 8	49998	27	42	11
Oct 9	49999	33	65	17
Oct 10	50000	33	41	11
Oct 11	50001	25	43	12
Oct 12	50002	21	37	9
Oct 13	50003	20	48	12
Oct 14	50004	19	38	8
Oct 15	50005	16	41	9
Oct 16	50006	14	49	10
Oct 17	50007	13	41	9
Oct 18	50008	13	49	11
Oct 19	50009	12	49	10
Oct 20	50010	13	30	6
Oct 21	50011	14	55	12
Oct 22	50012	16	47	10
Oct 23	50013	18	44	9
Oct 24	50014	26	49	10
Oct 25	50015	31	47	10
Oct 26	50016	28	38	8
Oct 27	50017	22	47	10
Oct 28	50018	25	57	12
Oct 29	50019	30	50	10
Oct 30	50020	31	42	9
Oct 31	50021	27	47	10

TABLE 12. (CONT.)

Date 1995 0h UTC	MJD	CO (ns)	σ (ns)	σ/√N (ns)
Nov 1	50022	21	44	9
Nov 2	50023	17	50	10
Nov 3	50024	13	44	10
Nov 4	50025	15	50	11
Nov 5	50026	21	50	11
Nov 6	50027	22	45	9
Nov 7	50028	20	49	10
Nov 8	50029	21	46	10
Nov 9	50030	18	39	8
Nov 10	50031	15	53	11
Nov 11	50032	22	52	11
Nov 12	50033	34	50	10
Nov 13	50034	41	48	10
Nov 14	50035	42	51	10
Nov 15	50036	43	49	10
Nov 16	50037	47	41	8
Nov 17	50038	57	32	7
Nov 18	50039	66	37	8
Nov 19	50040	66	37	8
Nov 20	50041	69	40	9
Nov 21	50042	81	52	11
Nov 22	50043	85	42	9
Nov 23	50044	80	43	9
Nov 24	50045	72	44	9
Nov 25	50046	70	33	7
Nov 26	50047	73	44	9
Nov 27	50048	78	37	8
Nov 28	50049	81	43	9
Nov 29	50050	78	33	7
Nov 30	50051	71	44	9

TABLE 12. (CONT.)

Date 1995 0h UTC	MJD	C0 (ns)	σ (ns)	σ/√N (ns)
Dec 1	50052	66	46	11
Dec 2	50053	60	41	9
Dec 3	50054	56	34	7
Dec 4	50055	55	51	11
Dec 5	50056	52	49	11
Dec 6	50057	44	41	9
Dec 7	50058	37	37	8
Dec 8	50059	37	40	8
Dec 9	50060	38	31	7
Dec 10	50061	31	57	12
Dec 11	50062	22	34	7
Dec 12	50063	19	44	9
Dec 13	50064	17	49	10
Dec 14	50065	14	35	8
Dec 15	50066	14	36	8
Dec 16	50067	20	50	10
Dec 17	50068	27	36	8
Dec 18	50069	25	50	10
Dec 19	50070	22	49	10
Dec 20	50071	26	51	11
Dec 21	50072	30	29	6
Dec 22	50073	29	34	7
Dec 23	50074	33	35	7
Dec 24	50075	37	40	8
Dec 25	50076	39	37	8
Dec 26	50077	44	43	9
Dec 27	50078	48	51	10
Dec 28	50079	51	40	8
Dec 29	50080	53	38	8
Dec 30	50081	53	46	10
Dec 31	50082	55	50	10

TABLE 13. INTERNATIONAL GLONASS TRACKING SCHEDULE NO 1 FOR MJD = 50086 (1996 JANUARY 4) AT 0 H UTC

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

Area		Participating laboratories
Europe	E	BIPM, LDS, RIRT*, SU, VSL
East North America	ENA	USNO
West North America	WNA	3S Navigation*
Hawaii	H	
East Asia	EA	
Australia and New Zealand	A	
India	I	
Middle East	ME	
South Africa	SAF	
South America	SAM	

* RIRT : Russian Institute of Radionavigation and Time, St Petersbourg, Russia.
3S Navigation, Laguna Hills, California.

Other laboratories are designated by their usual acronyms.

The start times of the tracks are referenced to UTC. The start time of a track is the date of the first observation. The receiver shall be required to lock-on to the signal in advance of this time so that the first observation is made at the indicated time. The track length is 780 s. All the track times should be decremented by 4 minutes each day. Slot numbers should be increased by 1 each day, within each of 3 orbital planes. This is due to the motion of GLONASS satellites within the orbital planes. Each of these planes contains 8 almanac slots (plane 1: slots 1 to 8, plane 2: slots 9 to 16, plane 3: slots 17 to 24).

TABLE 13. SCHEDULE NO 1, 1996 JANUARY 4 (CONT.)

*** Europe ***

Start	Channel 1			Channel 2		
h m	Class	Slot	Connects	Class	Slot	Connects
00 02	09	17	WNA,ENA	11	8	EA,I,ME
00 18	48	1	ENA,I,ME	54	2	ENA,ME,SAM
00 34	31	8	EA,H,I	00	17	WNA,ENA,ME
00 50	40	24	I,ME,SAF	48	2	ME,SAM
01 06	49	1	EA,I,ME	09	18	WNA,ENA,H
01 22	00	3	ENA,SAM	49	17	ENA,I,ME
01 38	08	18	WNA,ENA,H	10	1	EA,I,ME
01 54	01	18	WNA,ENA,ME	11	1	EA,I,ME
02 10	12	1	EA,I,ME	00	18	WNA,ENA,ME
02 26	48	17	ME,SAF,SAM	4A	1	EA,I,ME
02 42	48	11	EA,I,ME	48	3	ME,SAM
02 58	10	11	EA,I,ME	4D	12	SAF
03 14	30	19	WNA,ENA,H	40	2	EA,I,ME
03 30	4C	17	ME,SAF,SAM	08	19	WNA,ENA,H
03 46	10	2	EA,I,ME	00	19	WNA,ENA
04 02	11	2	EA,I,ME	08	4	WNA,ENA,SAM
04 18	00	4	WNA,ENA,SAM	10	12	EA,I,ME
04 34	4C	18	ME,SAF,SAM	40	12	EA,I,ME
04 50	30	20	WNA,ENA,H	11	12	EA,I,ME
05 06	01	20	WNA,ENA,H	48	4	ME
05 22	00	20	WNA,ENA	10	3	EA,I,ME
05 38	08	20	WNA,ENA,SAM	40	3	EA,I,ME
05 54	40	13	EA,I,ME	54	5	WNA,ENA,SAM
06 10	10	13	EA,I,ME	08	5	WNA,ENA
06 26	48	13	EA,I,ME	00	5	WNA,ENA
06 42	00	21	WNA,ENA	48	15	ME
06 58	08	21	WNA,ENA,H	11	13	EA,I
07 14	30	21	WNA,ENA,H	48	5	I,ME
07 30	30	6	WNA,ENA,H	40	14	EA,I,ME
07 46	08	22	WNA,ENA,EA	4C	16	ME,SAF,SAM
08 02	10	14	EA,I,ME	08	6	WNA,ENA
08 18	48	14	EA,I,ME	01	6	WNA,ENA,ME
08 34	11	14	EA,H,I	00	6	WNA,ENA,ME
08 50	40	5	I,ME	54	16	ME,SAM
09 06	40	15	EA,I,ME	01	7	WNA,ENA,H
09 22	30	7	WNA,ENA,H	48	6	ENA,ME
09 38	10	15	EA,I,ME	08	7	WNA,ENA,H
09 54	10	24	EA,I	11	15	EA,I,ME
10 10	00	7	WNA,ENA,ME	41	15	EA,I,ME
10 26	40	17	EA,I,ME	00	16	ENA,I,ME
10 42	10	17	EA,I,ME	02	8	WNA,ENA,H
10 58	30	8	WNA,ENA,H	4C	6	ME,SAF,SAM
11 14	09	8	WNA,ENA,H	40	16	EA,I,ME
11 30	48	16	EA,I,ME	08	8	WNA,ENA
11 46	10	16	EA,I,ME	01	8	WNA,ENA

TABLE 13. SCHEDULE NO 1, 1996 JANUARY 4 (CONT.)

*** Europe ***

Start		Channel 1			Channel 2		
		Class	Slot	Connects	Class	Slot	Connects
h	m						
12	02	10	18	EA,I,ME	08	10	WNA,ENA,SAM
12	18	00	10	WNA,ENA,SAM	40	18	EA,I,ME
12	34	00	8	ENA,ME,SAM	40	19	I,ME,SAF
12	50	48	18	EA,I,ME	30	1	WNA,ENA,H
13	06	01	1	WNA,ENA,H	40	9	EA,I,ME
13	22	00	1	WNA,ENA,H	10	9	EA,I,ME
13	38	08	1	WNA,ENA,SAM	44	11	WNA,ENA,SAM
13	54	10	19	EA,I,ME	54	11	WNA,ENA,SAM
14	10	08	11	WNA,ENA	48	19	EA,I,ME
14	26	00	11	WNA,ENA	11	19	EA,I,ME
14	42	4C	21	ME,SAF	00	2	WNA,ENA,H
14	58	08	2	WNA,ENA,H	48	20	EA,I,ME
15	14	40	10	I,ME	30	2	WNA,ENA,H
15	30	30	12	WNA,ENA,H	40	20	EA,I,ME
15	46	08	3	WNA,ENA,H	09	12	WNA,ENA,H
16	02	10	20	EA,I,ME	08	12	WNA,ENA
16	18	11	20	EA,I,ME	00	22	ENA,ME
16	34	00	12	WNA,ENA,ME	31	20	EA,H,I
16	50	48	22	ME,SAM	40	11	I,ME,SAF
17	06	09	13	WNA,ENA,H	48	21	EA,I,ME
17	22	01	12	ENA,ME	40	21	EA,I,ME
17	38	10	21	EA,I,ME	30	13	WNA,ENA,H
17	54	10	5	EA,H,I	08	13	WNA,ENA
18	10	01	13	WNA,ENA,ME	11	21	EA,I,ME
18	26	40	22	I,ME	48	12	ME,SAF,SAM
18	42	00	13	WNA,ENA,ME	40	6	EA,I
18	58	10	6	EA,I,ME	30	14	WNA,ENA,H
19	14	10	22	EA,I,ME	01	14	WNA,ENA,H
19	30	08	14	WNA,ENA,H	4C	12	ME,SAF,SAM
19	46	40	7	EA,I,ME	00	14	WNA,ENA
20	02	08	24	WNA,ENA,SAM	10	7	EA,I,ME
20	18	48	7	EA,I,ME	00	24	WNA,ENA,ME,SAM
20	34	40	8	I,ME	11	22	EA,I,ME
20	50	11	7	EA,I,ME	30	15	WNA,ENA,H
21	06	01	24	ENA,ME	40	23	EA,I,ME
21	22	10	23	EA,I,ME	00	15	WNA,ENA
21	38	08	15	WNA,ENA,SAM	42	1	I,ME
21	54	10	8	EA,I,ME	54	17	WNA,ENA,SAM
22	10	08	17	WNA,ENA	48	8	EA,I,ME
22	26	41	8	EA,I,ME	01	17	WNA,ENA,ME
22	42	49	2	ME	08	16	WNA,ENA
22	58	41	1	EA,I,ME	30	16	WNA,ENA,H
23	14	41	17	ENA,I,ME	48	24	ME,SAF
23	30	40	1	EA,I,ME	30	18	WNA,ENA,H

TABLE 13. SCHEDULE NO 1, 1996 JANUARY 4 (CONT.)

*** E. North America ***

Start	Channel 1			Channel 2		
	Class	Slot	Connects	Class	Slot	Connects
h m						
00 02	09	17	WNA,E	18	15	WNA,SAM
00 18	48	1	E,I,ME	54	2	E,ME,SAM
00 34	58	1	I,ME	00	17	WNA,E,ME
00 50	18	16	WNA,H	20	9	WNA,EA,H
01 06	60	2	ME,SAM	09	18	WNA,E,H
01 22	00	3	E,SAM	49	17	E,I,ME
01 38	08	18	WNA,E,H	69	16	SAM
01 54	01	18	WNA,E,ME	E7	2	ENA
02 10	68	17	SAF,SAM	00	18	WNA,E,ME
02 26	32	16	WNA,H,SAM	18	9	WNA
02 42	20	10	WNA,EA,H	18	19	WNA,H
02 58	18	20	WNA,H	18	10	WNA,EA,H
03 14	30	19	WNA,E,H	68	4	SAM
03 30	68	18	SAM	08	19	WNA,E,H
03 46	60	3	ME	00	19	WNA,E
04 02	32	20	H	08	4	WNA,E,SAM
04 18	00	4	WNA,E,SAM	60	18	ME,SAF,SAM
04 34	68	19	WNA,SAM	E7	5	ENA
04 50	30	20	WNA,E,H	60	19	ME,SAM
05 06	01	20	WNA,E,H	18	5	WNA,SAM
05 22	00	20	WNA,E	32	21	H
05 38	08	20	WNA,E,SAM	20	21	EA,H
05 54	32	6	H,SAM	54	5	WNA,E,SAM
06 10	69	20	SAM	08	5	WNA,E
06 26	69	19	SAM	00	5	WNA,E
06 42	00	21	WNA,E	18	6	WNA,H,SAM
06 58	08	21	WNA,E,H	68	20	SAM
07 14	30	21	WNA,E,H	20	22	WNA,EA,H
07 30	30	6	WNA,E,H	58	5	I,ME
07 46	08	22	WNA,E,EA	18	21	WNA,H,SAM
08 02	32	7	WNA,H	08	6	WNA,E
08 18	6A	16	SAF,SAM	01	6	WNA,E,ME
08 34	58	15	I,ME	00	6	WNA,E,ME
08 50	18	22	WNA	18	7	WNA,H
09 06	60	16	ME,SAM	01	7	WNA,E,H
09 22	30	7	WNA,E,H	48	6	E,ME
09 38	E7	8	ENA	08	7	WNA,E,H
09 54	18	23	WNA	32	22	WNA,H,SAM
10 10	00	7	WNA,E,ME	68	6	SAF,SAM
10 26	20	24	WNA,EA,H	00	16	E,I,ME
10 42	5C	9	ME,SAM	02	8	WNA,E,H
10 58	30	8	WNA,E,H	60	9	WNA,ME,SAM
11 14	09	8	WNA,E,H	68	10	SAM
11 30	18	1	WNA,EA,H	08	8	WNA,E
11 46	58	9	I,ME	01	8	WNA,E

TABLE 13. SCHEDULE NO 1, 1996 JANUARY 4 (CONT.)

*** E. North America ***

Start		Channel 1			Channel 2		
h	m	Class	Slot	Connects	Class	Slot	Connects
12	02	18	24	WNA,H	08	10	WNA,E,SAM
12	18	00	10	WNA,E,SAM	60	7	ME,SAF
12	34	00	8	E,ME,SAM	E7	1	ENA
12	50	68	11	SAM	30	1	WNA,E,H
13	06	01	1	WNA,E,H	68	12	WNA,SAM
13	22	00	1	WNA,E,H	20	2	WNA,EA,H
13	38	08	1	WNA,E,SAM	44	11	WNA,E,SAM
13	54	6B	1	SAM	54	11	WNA,E,SAM
14	10	08	11	WNA,E	32	12	WNA,H,SAM
14	26	00	11	WNA,E	69	1	SAM
14	42	18	12	WNA,H,SAM	00	2	WNA,E,H
14	58	08	2	WNA,E,H	68	1	SAM
15	14	20	3	WNA,EA	30	2	WNA,E,H
15	30	30	12	WNA,E,H	6A	1	SAM
15	46	08	3	WNA,E,H	09	12	WNA,E,H
16	02	6B	1	SAM	08	12	WNA,E
16	18	18	2	WNA	00	22	E,ME
16	34	00	12	WNA,E,ME	58	21	I,ME
16	50	18	3	WNA,H	18	13	WNA,H
17	06	09	13	WNA,E,H	60	22	ME,SAM
17	22	01	12	E,ME	32	3	WNA,H,SAM
17	38	E7	14	ENA	30	13	WNA,E,H
17	54	18	4	WNA,H	08	13	WNA,E
18	10	01	13	WNA,E,ME	69	12	SAF,SAM
18	26	68	3	WNA,H,SAM	5C	5	WNA,EA
18	42	00	13	WNA,E,ME	68	23	SAM
18	58	20	15	WNA,EA,H	30	14	WNA,E,H
19	14	68	24	SAM	01	14	WNA,E,H
19	30	08	14	WNA,E,H	20	5	EA
19	46	68	13	SAM	00	14	WNA,E
20	02	08	24	WNA,E,SAM	32	15	H
20	18	58	23	I	00	24	WNA,E,ME,SAM
20	34	E7	13	ENA	18	14	WNA,SAM
20	50	69	18	SAM	30	15	WNA,E,H
21	06	01	24	E,ME	18	17	WNA,SAM
21	22	20	16	WNA,EA,H	00	15	WNA,E
21	38	08	15	WNA,E,SAM	E7	18	ENA
21	54	58	24	I,ME	54	17	WNA,E,SAM
22	10	08	17	WNA,E	69	15	SAM
22	26	68	14	SAM	01	17	WNA,E,ME
22	42	18	18	WNA,H,SAM	08	16	WNA,E
22	58	32	9	WNA,EA,H	30	16	WNA,E,H
23	14	41	17	E,I,ME	32	19	WNA,H
23	30	68	15	SAM	30	18	WNA,E,H

TABLE 13. SCHEDULE NO 1, 1996 JANUARY 4 (CONT.)

*** W. North America ***

Start	Channel 1			Channel 2		
	Class	Slot	Connects	Class	Slot	Connects
h m						
00 02	09	17	ENA,E	18	15	ENA,SAM
00 18	34	18	H	EA	16	WNA
00 34	29	9	EA,H	00	17	ENA,E,ME
00 50	18	16	ENA,H	20	9	ENA,EA,H
01 06	28	9	EA,H	09	18	ENA,E,H
01 22	34	19	H	80	20	H,A
01 38	08	18	ENA,E,H	34	9	EA,H
01 54	01	18	ENA,E,ME	34	20	H,A
02 10	34	10	EA,H,I	00	18	ENA,E,ME
02 26	32	16	ENA,H,SAM	18	9	ENA
02 42	20	10	ENA,EA,H	18	19	ENA,H
02 58	18	20	ENA,H	18	10	ENA,EA,H
03 14	30	19	ENA,E,H	28	10	EA,H
03 30	28	21	EA,H,A	08	19	ENA,E,H
03 46	28	20	EA,H	00	19	ENA,E
04 02	70	11	EA,H	08	4	ENA,E,SAM
04 18	00	4	ENA,E,SAM	29	11	EA,H
04 34	68	19	ENA,SAM	34	21	H
04 50	30	20	ENA,E,H	28	11	EA,H
05 06	01	20	ENA,E,H	18	5	ENA,SAM
05 22	00	20	ENA,E	34	11	EA,H
05 38	08	20	ENA,E,SAM	80	10	H,A
05 54	35	11	EA,H	54	5	ENA,E,SAM
06 10	28	12	EA,H	08	5	ENA,E
06 26	34	12	EA,H	00	5	ENA,E
06 42	00	21	ENA,E	18	6	ENA,H,SAM
06 58	08	21	ENA,E,H	28	22	EA,H
07 14	30	21	ENA,E,H	20	22	ENA,EA,H
07 30	30	6	ENA,E,H	34	22	EA,H
07 46	08	22	ENA,E,EA	18	21	ENA,H,SAM
08 02	32	7	ENA,H	08	6	ENA,E
08 18	6C	23	EA,H,I	01	6	ENA,E,ME
08 34	28	23	EA,H	00	6	ENA,E,ME
08 50	18	22	ENA	18	7	ENA,H
09 06	34	23	EA,H	01	7	ENA,E,H
09 22	30	7	ENA,E,H	70	1	A
09 38	80	1	H,A	08	7	ENA,E,H
09 54	18	23	ENA	32	22	ENA,H,SAM
10 10	00	7	ENA,E,ME	34	24	EA,H,I
10 26	20	24	ENA,EA,H	35	1	H
10 42	28	24	EA,H	02	8	ENA,E,H
10 58	30	8	ENA,E,H	60	9	ENA,ME,SAM
11 14	09	8	ENA,E,H	28	1	EA,H
11 30	18	1	ENA,EA,H	08	8	ENA,E
11 46	34	1	EA,H	01	8	ENA,E

TABLE 13. SCHEDULE NO 1, 1996 JANUARY 4 (CONT.)

*** W. North America ***

Start	Channel 1			Channel 2		
	Class	Slot	Connects	Class	Slot	Connects
h m						
12 02	18	24	ENA,H	08	10	ENA,E,SAM
12 18	00	10	ENA,E,SAM	29	17	EA,H
12 34	34	17	EA,H	28	2	EA,H
12 50	28	17	EA,H	30	1	ENA,E,H
13 06	01	1	ENA,E,H	68	12	ENA,SAM
13 22	00	1	ENA,E,H	20	2	ENA,EA,H
13 38	08	1	ENA,E,SAM	44	11	ENA,E,SAM
13 54	28	18	EA,H	54	11	ENA,E,SAM
14 10	08	11	ENA,E	32	12	ENA,H,SAM
14 26	00	11	ENA,E	29	3	EA,H
14 42	18	12	ENA,H,SAM	00	2	ENA,E,H
14 58	08	2	ENA,E,H	28	3	EA,H
15 14	20	3	ENA,EA	30	2	ENA,E,H
15 30	30	12	ENA,E,H	34	3	EA,H
15 46	08	3	ENA,E,H	09	12	ENA,E,H
16 02	34	13	H	08	12	ENA,E
16 18	18	2	ENA	6C	4	EA,H,I
16 34	00	12	ENA,E,ME	28	4	EA,H
16 50	18	3	ENA,H	18	13	ENA,H
17 06	09	13	ENA,E,H	34	4	EA,H
17 22	EA	14	WNA	32	3	ENA,H,SAM
17 38	80	15	H,A	30	13	ENA,E,H
17 54	18	4	ENA,H	08	13	ENA,E
18 10	01	13	ENA,E,ME	6C	5	EA,H,I
18 26	68	3	ENA,H,SAM	5C	5	ENA,EA
18 42	00	13	ENA,E,ME	28	5	EA,H
18 58	20	15	ENA,EA,H	30	14	ENA,E,H
19 14	28	15	EA,H	01	14	ENA,E,H
19 30	08	14	ENA,E,H	34	16	EA,H,A
19 46	34	15	EA,H	00	14	ENA,E
20 02	08	24	ENA,E,SAM	28	16	EA,H
20 18	29	6	EA,H	00	24	ENA,E,ME,SAM
20 34	34	5	H	18	14	ENA,SAM
20 50	28	6	EA,H	30	15	ENA,E,H
21 06	34	6	EA,H	18	17	ENA,SAM
21 22	20	16	ENA,EA,H	00	15	ENA,E
21 38	08	15	ENA,E,SAM	80	5	H,A
21 54	35	6	EA,H	54	17	ENA,E,SAM
22 10	08	17	ENA,E	28	7	EA,H
22 26	34	7	EA,H	01	17	ENA,E,ME
22 42	18	18	ENA,H,SAM	08	16	ENA,E
22 58	32	9	ENA,EA,H	30	16	ENA,E,H
23 14	7C	15	SAM	32	19	ENA,H
23 30	35	9	EA,H	30	18	ENA,E,H

TABLE 13. SCHEDULE NO 1, 1996 JANUARY 4 (CONT.)

*** East Asia ***

Start	Channel 1			Channel 2		
	Class	Slot	Connects	Class	Slot	Connects
h m						
00 02	36	6	H,A	11	8	E,I,ME
00 18	85	11	I	98	6	H,A
00 34	31	8	E,H,I	29	9	WNA,H
00 50	98	7	A	20	9	WNA,ENA,H
01 06	49	1	E,I,ME	28	9	WNA,H
01 22	ED	10	EA	8C	1	I,ME
01 38	34	9	WNA,H	10	1	E,I,ME
01 54	84	11	I	11	1	E,I,ME
02 10	12	1	E,I,ME	34	10	WNA,H,I
02 26	84	8	A,I	4A	1	E,I,ME
02 42	48	11	E,I,ME	20	10	WNA,ENA,H
02 58	10	11	E,I,ME	18	10	WNA,ENA,H
03 14	28	10	WNA,H	40	2	E,I,ME
03 30	28	21	WNA,H,A	84	1	I,ME
03 46	10	2	E,I,ME	28	20	WNA,H
04 02	11	2	E,I,ME	70	11	WNA,H
04 18	29	11	WNA,H	10	12	E,I,ME
04 34	98	22	H,A	40	12	E,I,ME
04 50	28	11	WNA,H	11	12	E,I,ME
05 06	36	22	H,A	98	23	A
05 22	34	11	WNA,H	10	3	E,I,ME
05 38	20	21	ENA,H	40	3	E,I,ME
05 54	40	13	E,I,ME	35	11	WNA,H
06 10	10	13	E,I,ME	28	12	WNA,H
06 26	48	13	E,I,ME	34	12	WNA,H
06 42	85	24	I	84	23	I
06 58	28	22	WNA,H	11	13	E,I
07 14	84	24	A,I	20	22	WNA,ENA,H
07 30	34	22	WNA,H	40	14	E,I,ME
07 46	08	22	WNA,ENA,E	36	12	H,A
08 02	10	14	E,I,ME	98	12	H,A
08 18	48	14	E,I,ME	6C	23	WNA,H,I
08 34	11	14	E,H,I	28	23	WNA,H
08 50	85	17	I	36	13	H,A
09 06	40	15	E,I,ME	34	23	WNA,H
09 22	98	13	H,A	84	14	I
09 38	10	15	E,I,ME	84	17	I,ME
09 54	10	24	E,I	11	15	E,I,ME
10 10	34	24	WNA,H,I	41	15	E,I,ME
10 26	40	17	E,I,ME	20	24	WNA,ENA,H
10 42	10	17	E,I,ME	28	24	WNA,H
10 58	84	15	I	84	18	I
11 14	28	1	WNA,H	40	16	E,I,ME
11 30	48	16	E,I,ME	18	1	WNA,ENA,H
11 46	10	16	E,I,ME	34	1	WNA,H

TABLE 13. SCHEDULE NO 1, 1996 JANUARY 4 (CONT.)

*** East Asia ***

Start		Channel 1			Channel 2		
h	m	Class	Slot	Connects	Class	Slot	Connects
12	02	10	18	E,I,ME	98	3	H,A
12	18	29	17	WNA,H	40	18	E,I,ME
12	34	34	17	WNA,H	28	2	WNA,H
12	50	48	18	E,I,ME	28	17	WNA,H
13	06	36	3	H,A	40	9	E,I,ME
13	22	20	2	WNA,ENA,H	10	9	E,I,ME
13	38	98	4	A	84	16	I,ME,SAF
13	54	10	19	E,I,ME	28	18	WNA,H
14	10	8C	9	ME	48	19	E,I,ME
14	26	29	3	WNA,H	11	19	E,I,ME
14	42	84	4	A,I	ED	18	EA
14	58	28	3	WNA,H	48	20	E,I,ME
15	14	20	3	WNA,ENA	84	19	I
15	30	34	3	WNA,H	40	20	E,I,ME
15	46	98	5	A,I	98	18	A
16	02	10	20	E,I,ME	36	19	H,I
16	18	11	20	E,I,ME	6C	4	WNA,H,I
16	34	28	4	WNA,H	31	20	E,H,I
16	50	84	5	I	98	19	A
17	06	34	4	WNA,H	48	21	E,I,ME
17	22	84	20	I	40	21	E,I,ME
17	38	10	21	E,I,ME	84	6	I,ME
17	54	10	5	E,H,I	99	19	A
18	10	6C	5	WNA,H,I	11	21	E,I,ME
18	26	98	20	A,I	5C	5	WNA,ENA
18	42	28	5	WNA,H	40	6	E,I
18	58	10	6	E,I,ME	20	15	WNA,ENA,H
19	14	10	22	E,I,ME	28	15	WNA,H
19	30	34	16	WNA,H,A	20	5	ENA
19	46	40	7	E,I,ME	34	15	WNA,H
20	02	28	16	WNA,H	10	7	E,I,ME
20	18	48	7	E,I,ME	29	6	WNA,H
20	34	36	9	H,A	11	22	E,I,ME
20	50	11	7	E,I,ME	28	6	WNA,H
21	06	34	6	WNA,H	40	23	E,I,ME
21	22	10	23	E,I,ME	20	16	WNA,ENA,H
21	38	98	10	A	84	22	I,ME
21	54	10	8	E,I,ME	35	6	WNA,H
22	10	28	7	WNA,H	48	8	E,I,ME
22	26	41	8	E,I,ME	34	7	WNA,H
22	42	86	11	I	84	10	I
22	58	41	1	E,I,ME	32	9	WNA,ENA,H
23	14	98	11	A,I	ED	1	EA
23	30	40	1	E,I,ME	35	9	WNA,H

TABLE 13. SCHEDULE NO 1, 1996 JANUARY 4 (CONT.)

*** Hawaii ***

Start	Channel 1			Channel 2		
	Class	Slot	Connects	Class	Slot	Connects
h m						
00 02	36	6	EA,A	F0	18	H
00 18	34	18	WNA	98	6	EA,A
00 34	31	8	E,EA,I	29	9	WNA,EA
00 50	18	16	WNA,ENA	20	9	WNA,ENA,EA
01 06	28	9	WNA,EA	09	18	WNA,ENA,E
01 22	34	19	WNA	80	20	WNA,A
01 38	08	18	WNA,ENA,E	34	9	WNA,EA
01 54	3C	8	A	34	20	WNA,A
02 10	34	10	WNA,EA,I	F0	9	H
02 26	32	16	WNA,ENA,SAM	3C	21	A
02 42	20	10	WNA,ENA,EA	18	19	WNA,ENA
02 58	18	20	WNA,ENA	18	10	WNA,ENA,EA
03 14	30	19	WNA,ENA,E	28	10	WNA,EA
03 30	28	21	WNA,EA,A	08	19	WNA,ENA,E
03 46	28	20	WNA,EA	F0	9	H
04 02	32	20	ENA	70	11	WNA,EA
04 18	F0	10	H	29	11	WNA,EA
04 34	98	22	EA,A	34	21	WNA
04 50	30	20	WNA,ENA,E	28	11	WNA,EA
05 06	01	20	WNA,ENA,E	36	22	EA,A
05 22	34	11	WNA,EA	32	21	ENA
05 38	80	10	WNA,A	20	21	ENA,EA
05 54	32	6	ENA,SAM	35	11	WNA,EA
06 10	28	12	WNA,EA	F0	23	H
06 26	34	12	WNA,EA	38	23	A,I
06 42	3C	11	A	18	6	WNA,ENA,SAM
06 58	08	21	WNA,ENA,E	28	22	WNA,EA
07 14	30	21	WNA,ENA,E	20	22	WNA,ENA,EA
07 30	30	6	WNA,ENA,E	34	22	WNA,EA
07 46	36	12	EA,A	18	21	WNA,ENA,SAM
08 02	32	7	WNA,ENA	98	12	EA,A
08 18	6C	23	WNA,EA,I	F0	22	H
08 34	11	14	E,EA,I	28	23	WNA,EA
08 50	36	13	EA,A	18	7	WNA,ENA
09 06	34	23	WNA,EA	01	7	WNA,ENA,E
09 22	30	7	WNA,ENA,E	98	13	EA,A
09 38	80	1	WNA,A	08	7	WNA,ENA,E
09 54	3C	1	A	32	22	WNA,ENA,SAM
10 10	F0	1	H	34	24	WNA,EA,I
10 26	20	24	WNA,ENA,EA	35	1	WNA
10 42	28	24	WNA,EA	02	8	WNA,ENA,E
10 58	30	8	WNA,ENA,E	3C	2	A
11 14	09	8	WNA,ENA,E	28	1	WNA,EA
11 30	18	1	WNA,ENA,EA	3D	2	A
11 46	34	1	WNA,EA	F0	24	H

TABLE 13. SCHEDULE NO 1, 1996 JANUARY 4 (CONT.)

*** Hawaii ***

Start	Channel 1			Channel 2		
	Class	Slot	Connects	Class	Slot	Connects
h m						
12 02	18	24	WNA,ENA	98	3	EA,A
12 18	F0	23	H	29	17	WNA,EA
12 34	34	17	WNA,EA	28	2	WNA,EA
12 50	28	17	WNA,EA	30	1	WNA,ENA,E
13 06	01	1	WNA,ENA,E	36	3	EA,A
13 22	00	1	WNA,ENA,E	20	2	WNA,ENA,EA
13 38	F0	24	H	F0	17	H
13 54	28	18	WNA,EA	F0	12	H
14 10	3D	17	A	32	12	WNA,ENA,SAM
14 26	38	4	A,I	29	3	WNA,EA
14 42	18	12	WNA,ENA,SAM	00	2	WNA,ENA,E
14 58	08	2	WNA,ENA,E	28	3	WNA,EA
15 14	3C	17	A	30	2	WNA,ENA,E
15 30	30	12	WNA,ENA,E	34	3	WNA,EA
15 46	08	3	WNA,ENA,E	09	12	WNA,ENA,E
16 02	34	13	WNA	36	19	EA,I
16 18	3C	18	A	6C	4	WNA,EA,I
16 34	28	4	WNA,EA	31	20	E,EA,I
16 50	18	3	WNA,ENA	18	13	WNA,ENA
17 06	09	13	WNA,ENA,E	34	4	WNA,EA
17 22	3C	15	A	32	3	WNA,ENA,SAM
17 38	80	15	WNA,A	30	13	WNA,ENA,E
17 54	10	5	E,EA,I	18	4	WNA,ENA
18 10	F0	14	H	6C	5	WNA,EA,I
18 26	68	3	WNA,ENA,SAM	3C	16	A
18 42	F0	4	H	28	5	WNA,EA
18 58	20	15	WNA,ENA,EA	30	14	WNA,ENA,E
19 14	28	15	WNA,EA	01	14	WNA,ENA,E
19 30	08	14	WNA,ENA,E	34	16	WNA,EA,A
19 46	34	15	WNA,EA	F0	5	H
20 02	28	16	WNA,EA	32	15	ENA
20 18	29	6	WNA,EA	F0	5	H
20 34	34	5	WNA	36	9	EA,A
20 50	28	6	WNA,EA	30	15	WNA,ENA,E
21 06	34	6	WNA,EA	3C	9	A
21 22	20	16	WNA,ENA,EA	F0	7	H
21 38	F0	6	H	80	5	WNA,A
21 54	35	6	WNA,EA	3B	18	SAM
22 10	3D	6	A	28	7	WNA,EA
22 26	34	7	WNA,EA	F0	10	H
22 42	18	18	WNA,ENA,SAM	3C	6	A
22 58	32	9	WNA,ENA,EA	30	16	WNA,ENA,E
23 14	F0	8	H	32	19	WNA,ENA
23 30	35	9	WNA,EA	30	18	WNA,ENA,E

TABLE 13. SCHEDULE NO 1, 1996 JANUARY 4 (CONT.)

*** Australia ***

Start h m	Channel 1 Class	Slot	Connects	Channel 2 Class	Slot	Connects
00 02	36	6	EA,H	CD	11	SAF
00 18	CD	12	SAF	98	6	EA,H
00 34	FA	11	A	CD	22	SAF
00 50	98	7	EA	FA	6	A
01 06	CD	12	SAF	F9	6	A
01 22	CD	22	SAF	80	20	WNA,H
01 38	F9	21	A	FA	7	A
01 54	3C	8	H	34	20	WNA,H
02 10	FA	21	A	FA	7	A
02 26	84	8	EA,I	3C	21	H
02 42	CC	23	SAF	F9	7	A
02 58	FA	22	A	FA	8	A
03 14	FA	7	A	F9	22	A
03 30	28	21	WNA,EA,H	CD	23	SAF
03 46	FA	22	A	AF	1	I
04 02	F9	8	A	AE	1	I
04 18	FA	8	A	AC	1	I
04 34	98	22	EA,H	CC	24	SAF
04 50	F9	23	A	AD	1	I
05 06	36	22	EA,H	98	23	EA
05 22	FA	1	A	CD	24	SAF
05 38	CC	1	SAF	80	10	WNA,H
05 54	FA	1	A	FA	23	A
06 10	AC	2	I,SAF	FA	1	A
06 26	F9	1	A	38	23	H,I
06 42	3C	11	H	CC	17	SAF
06 58	CC	2	SAF	FA	1	A
07 14	84	24	EA,I	FA	1	A
07 30	FA	1	A	FA	12	A
07 46	AC	17	I,SAF	36	12	EA,H
08 02	FA	1	A	98	12	EA,H
08 18	CD	17	SAF	FA	1	A
08 34	FA	1	A	CC	18	SAF
08 50	CC	3	SAF	36	13	EA,H
09 06	FA	1	A	AC	18	I,SAF
09 22	98	13	EA,H	70	1	WNA
09 38	80	1	WNA,H	CD	3	SAF
09 54	3C	1	H	FA	14	A
10 10	FA	13	A	F9	2	A
10 26	FA	14	A	F9	13	A
10 42	F9	12	A	FA	13	A
10 58	CC	4	SAF	3C	2	H
11 14	FA	12	A	AC	14	I
11 30	F9	3	A	3D	2	H
11 46	FA	3	A	FA	15	A

TABLE 13. SCHEDULE NO 1, 1996 JANUARY 4 (CONT.)

*** Australia ***

Start	Channel 1			Channel 2		
h m	Class	Slot	Connects	Class	Slot	Connects
12 02	F9	14	A	98	3	EA,H
12 18	AC	15	I	CD	5	SAF
12 34	FA	4	A	FA	14	A
12 50	AD	15	I	F9	4	A
13 06	36	3	EA,H	CC	5	SAF
13 22	F9	24	A	FA	4	A
13 38	98	4	EA	CC	15	SAF
13 54	F9	5	A	FA	15	A
14 10	3D	17	H	AC	16	I,SAF
14 26	38	4	H,I	CD	6	SAF
14 42	84	4	EA,I	AC	5	I
14 58	F9	15	A	FA	18	A
15 14	3C	17	H	CC	16	SAF
15 30	CC	6	SAF	FA	14	A
15 46	98	5	EA,I	98	18	EA
16 02	CD	6	SAF	FA	15	A
16 18	3C	18	H	CC	7	SAF
16 34	CD	9	SAF	FA	6	A
16 50	FA	18	A	98	19	EA
17 06	F9	18	A	AC	7	I,SAF
17 22	3C	15	H	CC	9	SAF
17 38	80	15	WNA,H	FA	19	A
17 54	AC	20	I	99	19	EA
18 10	FA	16	A	FA	19	A
18 26	98	20	EA,I	3C	16	H
18 42	CC	10	SAF	F9	19	A
18 58	FA	9	A	AD	20	I
19 14	FA	19	A	F9	9	A
19 30	CD	10	SAF	34	16	WNA,EA,H
19 46	AD	21	I	FA	9	A
20 02	FA	9	A	F9	20	A
20 18	FA	20	A	FA	21	A
20 34	36	9	EA,H	CC	11	SAF
20 50	F9	10	A	AC	21	I
21 06	FA	10	A	3C	9	H
21 22	CD	11	SAF	FA	10	A
21 38	98	10	EA	80	5	WNA,H
21 54	CD	22	SAF	F9	11	A
22 10	3D	6	H	FA	10	A
22 26	FA	21	A	CD	22	SAF
22 42	CC	12	SAF	3C	6	H
22 58	FA	7	A	FA	21	A
23 14	98	11	EA,I	CC	22	SAF
23 30	FA	20	A	FA	6	A

TABLE 13. SCHEDULE NO 1, 1996 JANUARY 4 (CONT.)

*** India ***

Start	Channel 1			Channel 2		
	Class	Slot	Connects	Class	Slot	Connects
h m						
00 02	A2	1	ME	11	8	E,EA,ME
00 18	48	1	ENA,E,ME	85	11	EA
00 34	31	8	E,EA,H	58	1	ENA,ME
00 50	40	24	E,ME,SAF	F2	1	I
01 06	49	1	E,EA,ME	F1	10	I
01 22	8C	1	EA,ME	49	17	ENA,E,ME
01 38	A0	12	ME,SAF	10	1	E,EA,ME
01 54	84	11	EA	11	1	E,EA,ME
02 10	12	1	E,EA,ME	34	10	WNA,EA,H
02 26	84	8	EA,A	4A	1	E,EA,ME
02 42	48	11	E,EA,ME	F1	1	I
02 58	10	11	E,EA,ME	A3	1	ME
03 14	A3	1	ME	40	2	E,EA,ME
03 30	F1	12	I	84	1	EA,ME
03 46	10	2	E,EA,ME	AF	1	A
04 02	11	2	E,EA,ME	AE	1	A
04 18	AC	1	A	10	12	E,EA,ME
04 34	F2	1	I	40	12	E,EA,ME
04 50	AD	1	A	11	12	E,EA,ME
05 06	A0	13	ME	F2	1	I
05 22	F2	12	I	10	3	E,EA,ME
05 38	A0	2	ME	40	3	E,EA,ME
05 54	40	13	E,EA,ME	F2	12	I
06 10	10	13	E,EA,ME	AC	2	A,SAF
06 26	48	13	E,EA,ME	38	23	H,A
06 42	85	24	EA	84	23	EA
06 58	A4	15	ME,SAF,SAM	11	13	E,EA
07 14	84	24	EA,A	48	5	E,ME
07 30	58	5	ENA,ME	40	14	E,EA,ME
07 46	AC	17	A,SAF	A0	4	ME
08 02	10	14	E,EA,ME	A0	15	ME
08 18	48	14	E,EA,ME	6C	23	WNA,EA,H
08 34	11	14	E,EA,H	58	15	ENA,ME
08 50	40	5	E,ME	85	17	EA
09 06	40	15	E,EA,ME	AC	18	A,SAF
09 22	A0	17	ME	84	14	EA
09 38	10	15	E,EA,ME	84	17	EA,ME
09 54	10	24	E,EA	11	15	E,EA,ME
10 10	34	24	WNA,EA,H	41	15	E,EA,ME
10 26	40	17	E,EA,ME	00	16	ENA,E,ME
10 42	10	17	E,EA,ME	A4	18	SAF
10 58	84	15	EA	84	18	EA
11 14	AC	14	A	40	16	E,EA,ME
11 30	48	16	E,EA,ME	F1	17	I
11 46	10	16	E,EA,ME	58	9	ENA,ME

TABLE 13. SCHEDULE NO 1, 1996 JANUARY 4 (CONT.)

*** India ***

Start h m	Channel 1 Class	Slot	Connects	Channel 2 Class	Slot	Connects
12 02	10	18	E,EA,ME	A0	19	ME,SAF
12 18	AC	15	A	40	18	E,EA,ME
12 34	F1	16	I	40	19	E,ME,SAF
12 50	48	18	E,EA,ME	AD	15	A
13 06	A1	20	ME	40	9	E,EA,ME
13 22	A0	16	ME,SAF	10	9	E,EA,ME
13 38	F1	18	I	84	16	EA,ME,SAF
13 54	10	19	E,EA,ME	A0	20	ME,SAF
14 10	AC	16	A,SAF	48	19	E,EA,ME
14 26	38	4	H,A	11	19	E,EA,ME
14 42	84	4	EA,A	AC	5	A
14 58	A4	21	ME,SAF,SAM	48	20	E,EA,ME
15 14	40	10	E,ME	84	19	EA
15 30	A0	11	ME	40	20	E,EA,ME
15 46	98	5	EA,A	A0	21	ME
16 02	10	20	E,EA,ME	36	19	EA,H
16 18	11	20	E,EA,ME	6C	4	WNA,EA,H
16 34	58	21	ENA,ME	31	20	E,EA,H
16 50	84	5	EA	40	11	E,ME,SAF
17 06	AC	7	A,SAF	48	21	E,EA,ME
17 22	84	20	EA	40	21	E,EA,ME
17 38	10	21	E,EA,ME	84	6	EA,ME
17 54	10	5	E,EA,H	AC	20	A
18 10	6C	5	WNA,EA,H	11	21	E,EA,ME
18 26	40	22	E,ME	98	20	EA,A
18 42	F1	7	I	40	6	E,EA
18 58	10	6	E,EA,ME	AD	20	A
19 14	10	22	E,EA,ME	F1	21	I
19 30	A0	8	ME	F1	6	I
19 46	40	7	E,EA,ME	AD	21	A
20 02	F1	23	I	10	7	E,EA,ME
20 18	48	7	E,EA,ME	58	23	ENA
20 34	40	8	E,ME	11	22	E,EA,ME
20 50	11	7	E,EA,ME	AC	21	A
21 06	A4	1	SAF	40	23	E,EA,ME
21 22	10	23	E,EA,ME	A1	1	ME
21 38	84	22	EA,ME	42	1	E,ME
21 54	10	8	E,EA,ME	58	24	ENA,ME
22 10	A0	1	ME,SAF	48	8	E,EA,ME
22 26	41	8	E,EA,ME	F2	1	I
22 42	86	11	EA	84	10	EA
22 58	41	1	E,EA,ME	A4	2	ME,SAF,SAM
23 14	41	17	ENA,E,ME	98	11	EA,A
23 30	40	1	E,EA,ME	A0	24	ME,SAF

Table 13. Schedule no 1, 1996 January 4 (Cont.)

*** Middle East ***

Start	Channel 1			Channel 2		
	Class	Slot	Connects	Class	Slot	Connects
h m						
00 02	A2	1	I	11	8	E,EA,I
00 18	48	1	ENA,E,I	54	2	ENA,E,SAM
00 34	58	1	ENA,I	00	17	WNA,ENA,E
00 50	40	24	E,I,SAF	48	2	E,SAM
01 06	49	1	E,EA,I	60	2	ENA,SAM
01 22	8C	1	EA,I	49	17	ENA,E,I
01 38	A0	12	I,SAF	10	1	E,EA,I
01 54	01	18	WNA,ENA,E	11	1	E,EA,I
02 10	12	1	E,EA,I	00	18	WNA,ENA,E
02 26	48	17	E,SAF,SAM	4A	1	E,EA,I
02 42	48	11	E,EA,I	48	3	E,SAM
02 58	10	11	E,EA,I	A3	1	I
03 14	A3	1	I	40	2	E,EA,I
03 30	4C	17	E,SAF,SAM	84	1	EA,I
03 46	10	2	E,EA,I	60	3	ENA
04 02	11	2	E,EA,I	C2	18	SAF,SAM
04 18	60	18	ENA,SAF,SAM	10	12	E,EA,I
04 34	4C	18	E,SAF,SAM	40	12	E,EA,I
04 50	60	19	ENA,SAM	11	12	E,EA,I
05 06	A0	13	I	48	4	E
05 22	BC	2	SAF	10	3	E,EA,I
05 38	A0	2	I	40	3	E,EA,I
05 54	40	13	E,EA,I	BC	14	SAF
06 10	10	13	E,EA,I	BC	15	SAF,SAM
06 26	48	13	E,EA,I	BC	3	SAF
06 42	F4	5	ME	48	15	E
06 58	A4	15	I,SAF,SAM	F4	4	ME
07 14	F4	3	ME	48	5	E,I
07 30	58	5	ENA,I	40	14	E,EA,I
07 46	A0	4	I	4C	16	E,SAF,SAM
08 02	10	14	E,EA,I	A0	15	I
08 18	48	14	E,EA,I	01	6	WNA,ENA,E
08 34	58	15	ENA,I	00	6	WNA,ENA,E
08 50	40	5	E,I	54	16	E,SAM
09 06	40	15	E,EA,I	60	16	ENA,SAM
09 22	A0	17	I	48	6	ENA,E
09 38	10	15	E,EA,I	84	17	EA,I
09 54	BC	18	SAF	11	15	E,EA,I
10 10	00	7	WNA,ENA,E	41	15	E,EA,I
10 26	40	17	E,EA,I	00	16	ENA,E,I
10 42	10	17	E,EA,I	5C	9	ENA,SAM
10 58	60	9	WNA,ENA,SAM	4C	6	E,SAF,SAM
11 14	C2	7	SAM	40	16	E,EA,I
11 30	48	16	E,EA,I	F4	19	ME
11 46	10	16	E,EA,I	58	9	ENA,I

TABLE 13. SCHEDULE NO 1, 1996 JANUARY 4 (CONT.)

*** Middle East ***

Start	Channel 1			Channel 2		
	Class	Slot	Connects	Class	Slot	Connects
h m						
12 02	10	18	E,EA,I	A0	19	I,SAF
12 18	60	7	ENA,SAF	40	18	E,EA,I
12 34	00	8	ENA,E,SAM	40	19	E,I,SAF
12 50	48	18	E,EA,I	F4	20	ME
13 06	A1	20	I	40	9	E,EA,I
13 22	A0	16	I,SAF	10	9	E,EA,I
13 38	F4	10	ME	84	16	EA,I,SAF
13 54	10	19	E,EA,I	A0	20	I,SAF
14 10	8C	9	EA	48	19	E,EA,I
14 26	BC	21	SAF,SAM	11	19	E,EA,I
14 42	4C	21	E,SAF	BC	9	SAF
14 58	A4	21	I,SAF,SAM	48	20	E,EA,I
15 14	40	10	E,I	F4	11	ME
15 30	A0	11	I	40	20	E,EA,I
15 46	BC	22	SAF,SAM	A0	21	I
16 02	10	20	E,EA,I	BC	10	SAF
16 18	11	20	E,EA,I	00	22	ENA,E
16 34	00	12	WNA,ENA,E	58	21	ENA,I
16 50	48	22	E,SAM	40	11	E,I,SAF
17 06	60	22	ENA,SAM	48	21	E,EA,I
17 22	01	12	ENA,E	40	21	E,EA,I
17 38	10	21	E,EA,I	84	6	EA,I
17 54	C3	12	SAM	BC	11	SAF
18 10	01	13	WNA,ENA,E	11	21	E,EA,I
18 26	40	22	E,I	48	12	E,SAF,SAM
18 42	00	13	WNA,ENA,E	C2	12	SAF,SAM
18 58	10	6	E,EA,I	C2	13	SAM
19 14	10	22	E,EA,I	BC	12	SAF,SAM
19 30	A0	8	I	4C	12	E,SAF,SAM
19 46	40	7	E,EA,I	BD	12	SAF,SAM
20 02	BD	1	SAF	10	7	E,EA,I
20 18	48	7	E,EA,I	00	24	WNA,ENA,E,SAM
20 34	40	8	E,I	11	22	E,EA,I
20 50	11	7	E,EA,I	BC	1	SAF
21 06	01	24	ENA,E	40	23	E,EA,I
21 22	10	23	E,EA,I	A1	1	I
21 38	84	22	EA,I	42	1	E,I
21 54	10	8	E,EA,I	58	24	ENA,I
22 10	A0	1	I,SAF	48	8	E,EA,I
22 26	41	8	E,EA,I	01	17	WNA,ENA,E
22 42	49	2	E	F4	23	ME
22 58	41	1	E,EA,I	A4	2	I,SAF,SAM
23 14	41	17	ENA,E,I	48	24	E,SAF
23 30	40	1	E,EA,I	A0	24	I,SAF

TABLE 13. SCHEDULE NO 1, 1996 JANUARY 4 (CONT.)

*** South Africa ***

Start	Channel 1			Channel 2		
	Class	Slot	Connects	Class	Slot	Connects
h m						
00 02	CA	2	SAM	CD	11	A
00 18	CD	12	A	CB	3	SAM
00 34	CB	13	SAM	CD	22	A
00 50	40	24	E,I,ME	CB	3	SAM
01 06	CD	12	A	F5	23	SAF
01 22	CD	22	A	F5	24	SAF
01 38	A0	12	I,ME	CA	14	SAM
01 54	F5	24	SAF	F5	23	SAF
02 10	68	17	ENA,SAM	F5	12	SAF
02 26	48	17	E,ME,SAM	F5	12	SAF
02 42	CC	23	A	F5	12	SAF
02 58	F5	13	SAF	4D	12	E
03 14	F5	13	SAF	F5	24	SAF
03 30	4C	17	E,ME,SAM	CD	23	A
03 46	F5	13	SAF	CA	15	SAM
04 02	F5	14	SAF	C2	18	ME,SAM
04 18	F5	17	SAF	60	18	ENA,ME,SAM
04 34	4C	18	E,ME,SAM	CC	24	A
04 50	F5	14	SAF	F5	13	SAF
05 06	CB	15	SAM	F5	17	SAF
05 22	BC	2	ME	CD	24	A
05 38	CC	1	A	CA	18	SAM
05 54	F5	15	SAF	BC	14	ME
06 10	AC	2	A,I	BC	15	ME,SAM
06 26	F5	18	SAF	BC	3	ME
06 42	CA	16	SAM	CC	17	A
06 58	CC	2	A	A4	15	I,ME,SAM
07 14	CB	19	SAM	CB	9	SAM
07 30	F5	4	SAF	F5	3	SAF
07 46	AC	17	A,I	4C	16	E,ME,SAM
08 02	CA	19	SAM	CA	9	SAM
08 18	6A	16	ENA,SAM	CD	17	A
08 34	CB	16	SAM	CC	18	A
08 50	CC	3	A	CB	9	SAM
09 06	F5	5	SAF	AC	18	A,I
09 22	F5	19	SAF	F5	4	SAF
09 38	F5	5	SAF	CD	3	A
09 54	BC	18	ME	CA	20	SAM
10 10	F5	5	SAF	68	6	ENA,SAM
10 26	F5	18	SAF	F5	5	SAF
10 42	F5	19	SAF	A4	18	I
10 58	CC	4	A	4C	6	E,ME,SAM
11 14	F5	19	SAF	F5	5	SAF
11 30	F5	20	SAF	CA	21	SAM
11 46	F5	20	SAF	F5	19	SAF

TABLE 13. SCHEDULE NO 1, 1996 JANUARY 4 (CONT.)

*** South Africa ***

Start	Channel 1			Channel 2		
h m	Class	Slot	Connects	Class	Slot	Connects
12 02	CA	6	SAM	A0	19	I,ME
12 18	CD	5	A	60	7	ENA,ME
12 34	F5	20	SAF	40	19	E,I,ME
12 50	F5	21	SAF	F5	6	SAF
13 06	CB	7	SAM	CC	5	A
13 22	A0	16	I,ME	CB	22	SAM
13 38	CC	15	A	84	16	EA,I,ME
13 54	F5	21	SAF	A0	20	I,ME
14 10	CA	7	SAM	AC	16	A,I
14 26	BC	21	ME,SAM	CD	6	A
14 42	4C	21	E,ME	BC	9	ME
14 58	A4	21	I,ME,SAM	F5	8	SAF
15 14	CA	22	SAM	CC	16	A
15 30	CC	6	A	F5	10	SAF
15 46	BC	22	ME,SAM	F5	9	SAF
16 02	CD	6	A	BC	10	ME
16 18	CA	23	SAM	CC	7	A
16 34	CD	9	A	CB	22	SAM
16 50	F5	10	SAF	40	11	E,I,ME
17 06	F5	23	SAF	AC	7	A,I
17 22	F5	11	SAF	CC	9	A
17 38	CB	1	SAM	F5	7	SAF
17 54	CA	1	SAM	BC	11	ME
18 10	CB	1	SAM	69	12	ENA,SAM
18 26	F5	1	SAF	48	12	E,ME,SAM
18 42	CC	10	A	C2	12	ME,SAM
18 58	F5	8	SAF	F5	11	SAF
19 14	F5	1	SAF	BC	12	ME,SAM
19 30	CD	10	A	4C	12	E,ME,SAM
19 46	F5	1	SAF	BD	12	ME,SAM
20 02	BD	1	ME	CA	12	SAM
20 18	F5	1	SAF	CB	12	SAM
20 34	CB	12	SAM	CC	11	A
20 50	CB	12	SAM	BC	1	ME
21 06	A4	1	I	CB	12	SAM
21 22	CD	11	A	F5	12	SAF
21 38	F5	12	SAF	CA	13	SAM
21 54	CD	22	A	F5	12	SAF
22 10	A0	1	I,ME	CB	2	SAM
22 26	F5	23	SAF	CD	22	A
22 42	CC	12	A	CA	3	SAM
22 58	F5	12	SAF	A4	2	I,ME,SAM
23 14	CC	22	A	48	24	E,ME
23 30	F5	12	SAF	A0	24	I,ME

TABLE 13. SCHEDULE NO 1, 1996 JANUARY 4 (CONT.)

*** South America ***

Start h m	Channel 1 Class	Slot	Connects	Channel 2 Class	Slot	Connects
00 02	CA	2	SAF	18	15	WNA,ENA
00 18	CB	3	SAF	54	2	ENA,E,ME
00 34	CB	13	SAF	F8	15	SAM
00 50	CB	3	SAF	48	2	E,ME
01 06	60	2	ENA,ME	F8	15	SAM
01 22	00	3	ENA,E	F8	4	SAM
01 38	CA	14	SAF	69	16	ENA
01 54	F8	17	SAM	F8	3	SAM
02 10	68	17	ENA,SAF	F8	4	SAM
02 26	48	17	E,ME,SAF	32	16	WNA,ENA,H
02 42	F8	4	SAM	48	3	E,ME
02 58	F8	4	SAM	F8	18	SAM
03 14	F8	16	SAM	68	4	ENA
03 30	4C	17	E,ME,SAF	68	18	ENA
03 46	F8	5	SAM	CA	15	SAF
04 02	C2	18	ME,SAF	08	4	WNA,ENA,E
04 18	00	4	WNA,ENA,E	60	18	ENA,ME,SAF
04 34	4C	18	E,ME,SAF	68	19	WNA,ENA
04 50	F8	6	SAM	60	19	ENA,ME
05 06	CB	15	SAF	18	5	WNA,ENA
05 22	F8	6	SAM	F8	19	SAM
05 38	08	20	WNA,ENA,E	CA	18	SAF
05 54	32	6	ENA,H	54	5	WNA,ENA,E
06 10	69	20	ENA	BC	15	ME,SAF
06 26	69	19	ENA	F8	7	SAM
06 42	CA	16	SAF	18	6	WNA,ENA,H
06 58	A4	15	I,ME,SAF	68	20	ENA
07 14	CB	19	SAF	CB	9	SAF
07 30	F8	19	SAM	F8	20	SAM
07 46	18	21	WNA,ENA,H	4C	16	E,ME,SAF
08 02	CA	19	SAF	CA	9	SAF
08 18	6A	16	ENA,SAF	F8	21	SAM
08 34	CB	16	SAF	F8	9	SAM
08 50	CB	9	SAF	54	16	E,ME
09 06	60	16	ENA,ME	F8	21	SAM
09 22	F8	9	SAM	F8	10	SAM
09 38	F8	9	SAM	F8	10	SAM
09 54	CA	20	SAF	32	22	WNA,ENA,H
10 10	F8	9	SAM	68	6	ENA,SAF
10 26	F8	22	SAM	F8	10	SAM
10 42	5C	9	ENA,ME	F8	10	SAM
10 58	60	9	WNA,ENA,ME	4C	6	E,ME,SAF
11 14	C2	7	ME	68	10	ENA
11 30	F8	11	SAM	CA	21	SAF
11 46	F8	7	SAM	F8	12	SAM

TABLE 13. SCHEDULE NO 1, 1996 JANUARY 4 (CONT.)

*** South America ***

Start	Channel 1			Channel 2		
	Class	Slot	Connects	Class	Slot	Connects
h m						
12 02	CA	6	SAF	08	10	WNA,ENA,E
12 18	00	10	WNA,ENA,E	F8	12	SAM
12 34	00	8	ENA,E,ME	F8	11	SAM
12 50	68	11	ENA	F8	12	SAM
13 06	CB	7	SAF	68	12	WNA,ENA
13 22	F8	8	SAM	CB	22	SAF
13 38	08	1	WNA,ENA,E	44	11	WNA,ENA,E
13 54	6B	1	ENA	54	11	WNA,ENA,E
14 10	CA	7	SAF	32	12	WNA,ENA,H
14 26	BC	21	ME,SAF	69	1	ENA
14 42	18	12	WNA,ENA,H	F8	1	SAM
14 58	A4	21	I,ME,SAF	68	1	ENA
15 14	CA	22	SAF	F8	1	SAM
15 30	F8	2	SAM	6A	1	ENA
15 46	BC	22	ME,SAF	F8	1	SAM
16 02	6B	1	ENA	F8	2	SAM
16 18	CA	23	SAF	F8	1	SAM
16 34	F8	1	SAM	CB	22	SAF
16 50	48	22	E,ME	F8	1	SAM
17 06	F8	1	SAM	60	22	ENA,ME
17 22	F8	1	SAM	32	3	WNA,ENA,H
17 38	CB	1	SAF	F8	23	SAM
17 54	C3	12	ME	CA	1	SAF
18 10	CB	1	SAF	69	12	ENA,SAF
18 26	68	3	WNA,ENA,H	48	12	E,ME,SAF
18 42	C2	12	ME,SAF	68	23	ENA
18 58	F8	24	SAM	C2	13	ME
19 14	68	24	ENA	BC	12	ME,SAF
19 30	F8	17	SAM	4C	12	E,ME,SAF
19 46	68	13	ENA	BD	12	ME,SAF
20 02	08	24	WNA,ENA,E	CA	12	SAF
20 18	CB	12	SAF	00	24	WNA,ENA,E,ME
20 34	CB	12	SAF	18	14	WNA,ENA
20 50	69	18	ENA	CB	12	SAF
21 06	CB	12	SAF	18	17	WNA,ENA
21 22	F8	14	SAM	F8	18	SAM
21 38	08	15	WNA,ENA,E	CA	13	SAF
21 54	3B	18	H	54	17	WNA,ENA,E
22 10	CB	2	SAF	69	15	ENA
22 26	68	14	ENA	F8	19	SAM
22 42	18	18	WNA,ENA,H	CA	3	SAF
22 58	F8	15	SAM	A4	2	I,ME,SAF
23 14	7C	15	WNA	F8	14	SAM
23 30	68	15	ENA	F8	4	SAM

TABLE 14. [UTC - GLONASS time]

(File available via INTERNET under the name UTCGLO95.AR)

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 1 s).

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 σ of the daily measurements. C1 is then derived using [UTC - GPS time] of Table 12.

Date 1995 0h UTC	MJD	C1 (ns)	σ (ns)
Jan 2	49719	-15457	80
Jan 12	49729	-15489	84
Jan 22	49739	-15531	95
Feb 1	49749	-15510	82
Feb 11	49759	-15570	83
Feb 21	49769	-15634	87
Mar 3	49779	-15692	89
Mar 13	49789	-15764	87
Mar 23	49799	-15896	86
Apr 2	49809	-16049	87
Apr 12	49819	-16190	98
Apr 22	49829	-16376	83
May 2	49839	-16560	85
May 12	49849	-16772	92
May 22	49859	-16982	89
Jun 1	49869	-17267	87
Jun 11	49879	-17598	85
Jun 21	49889	-17967	91
Jul 1	49899	-18339	87
Jul 11	49909	-18691	87
Jul 21	49919	-19088	88
Jul 31	49929	-19435	88
Aug 10	49939	-19812	86
Aug 20	49949	-20188	85
Aug 30	49959	-20549	92
Sep 9	49969	-	-
Sep 19	49979	-21324	90
Sep 29	49989	-21698	93
Oct 9	49999	-22141	92
Oct 19	50009	-22487	85
Oct 29	50019	-22795	92
Nov 8	50029	-23107	92
Nov 18	50039	-23399	86
Nov 28	50049	-23670	97
Dec 8	50059	-23961	93
Dec 18	50069	-24249	94
Dec 28	50079	-24569	103

TABLE 15A. RATES RELATIVE TO TAI OF CONTRIBUTING CLOCKS IN 1995

(File available via INTERNET under the name RTAI95.AR)

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 15A gives homogeneous rates for the whole year 1995. 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, 1991, 1992, 1993 and 1994, and in the BIH Annual Reports for the previous years. These corrections are given in Table 15B.
Unit is ns/day, *** denotes that the clock was not used.

LAB.	CLOCK		49769	49829	49889	49959	50019	50079
AOS	23	67	-3.49	-1.19	-14.54	-0.79	-3.24	36.37
APL	14	793	-13.47	***	***	***	***	***
APL	31	571	3.58	***	***	***	***	***
APL	40	3101	-6.55	-2.60	3.33	-0.66	***	***
APL	40	3102	1.20	***	***	***	***	***
APL	40	3106	2.78	***	***	***	***	***
AUS	36	207	-2.10	2.39	0.33	-2.08	1.22	0.87
AUS	36	249	***	-5.99	-3.81	-8.35	-8.19	-6.86
AUS	36	340	8.90	7.72	9.09	8.36	8.08	9.44
AUS	36	379	17.31	19.11	18.04	15.60	17.97	19.54
AUS	36	424	-3.12	1.59	0.26	-1.02	0.41	0.25
AUS	36	654	***	***	***	***	-45.67	-44.80
AUS	40	5401	36.17	***	41.46	40.97	40.66	43.11
AUS	44	2	59.49	59.35	62.77	63.44	61.35	61.85
BEV	16	71	***	***	***	***	-53.92	-44.17
CAO	16	183	-24.96	-14.56	-26.75	***	***	***
CAO	23	62	-131.56	-112.55	-111.70	***	***	***
CAO	30	384	49.08	***	***	***	***	***
CH	12	285	138.35	141.59	154.46	158.46	***	***
CH	16	69	-161.15	-150.90	-163.85	-158.37	-157.38	-147.23
CH	16	77	-69.81	-80.80	-100.42	-97.55	-97.70	-92.59
CH	16	140	87.94	100.95	100.98	108.34	109.63	110.81
CH	17	206	27.82	34.73	10.96	2.15	8.21	12.14
CH	21	179	79.43	88.97	85.84	79.03	72.49	90.18
CH	21	194	-60.26	-54.60	-47.82	-40.11	-35.32	-34.31
CH	21	217	76.17	75.96	73.42	75.16	72.62	80.02
CH	21	265	***	***	***	***	-0.69	5.57
CH	31	403	-50.69	-43.43	-40.37	-40.81	-44.04	-44.08
CH	35	413	-3.98	-5.52	-5.15	-3.97	-1.54	0.63
CH	36	354	41.24	41.25	40.89	42.01	42.69	42.24
CRL	14	764	7.00	8.88	***	***	***	***
CRL	14	932	***	***	***	***	-181.25	-180.38
CRL	14	1729	15.42	17.37	23.64	***	***	***
CRL	14	2456	41.66	***	***	***	-11.06	-9.63
CRL	34	131	-278.91	***	***	***	***	***

TABLE 15A. (CONT.)

LAB.	CLOCK		49769	49829	49889	49959	50019	50079
CRL	35	112	-6.55	-7.23	-7.70	-8.24	-9.00	-9.67
CRL	35	144	3.21	3.26	2.96	3.29	2.92	3.21
CRL	35	332	24.50	24.70	24.42	24.40	24.66	24.99
CRL	35	342	13.88	13.70	13.35	12.98	13.35	13.10
CRL	35	343	7.44	7.21	7.56	7.69	8.73	8.02
CSAO	12	1646	***	598.83	583.01	573.65	563.61	477.45
CSAO	12	1648	64.09	56.94	56.09	51.42	51.73	71.39
CSAO	12	2068	84.64	99.91	105.92	107.79	83.06	87.67
CSAO	30	152	560.12	566.43	585.26	***	666.70	693.30
CSAO	40	4902	***	***	***	***	***	768.60
F	14	51	-134.19	-127.71	-132.27	-123.71	-117.26	-122.20
F	14	134	25.42	25.95	37.28	36.34	***	***
F	14	195	-132.70	-139.43	-140.69	-131.22	***	***
F	14	475	-34.90	-35.46	-40.05	-52.05	-57.91	-54.21
F	14	500	0.01	-0.50	1.44	3.81	2.82	0.72
F	14	753	-40.79	-36.72	-39.26	-46.66	***	***
F	14	1120	-57.98	-57.26	-56.03	-52.71	-47.66	-52.24
F	14	1407	***	***	-66.44	***	***	***
F	14	1645	53.89	56.56	56.88	65.05	65.53	63.80
F	14	1842	20.42	***	***	***	***	***
F	16	106	-11.47	-15.38	-15.82	-14.63	-18.79	-17.39
F	16	178	***	-13.17	***	***	***	***
F	16	187	-35.88	-45.89	-64.75	-79.82	-79.79	-76.87
F	17	489	63.94	70.71	59.27	46.99	30.35	29.37
F	35	122	-21.95	-22.05	-21.87	-22.86	-21.67	-21.98
F	35	124	-4.83	-5.12	-5.24	-5.10	-4.57	-4.76
F	35	131	15.61	14.81	14.41	13.65	13.58	13.00
F	35	158	10.40	10.02	9.77	10.07	10.54	10.28
F	35	172	-1.36	-0.80	0.01	-0.46	0.41	-0.72
F	35	198	0.57	0.30	-0.04	0.02	0.06	0.39
F	35	385	***	-6.26	-5.37	-4.82	-0.85	-2.11
F	35	396	5.49	5.41	5.80	5.69	5.66	5.75
F	35	536	***	***	-6.71	-7.15	-6.22	***
F	40	816	-17.77	-19.60	-21.90	-24.24	-25.13	-25.58
FTZ	14	1217	***	28.74	28.84	***	4.76	3.09
FTZ	14	1674	***	16.35	6.01	***	25.53	-3.04
FTZ	36	136	***	***	***	***	9.09	6.11
FTZ	36	345	***	-1.59	-0.95	***	-0.02	-0.23
GUM	14	1144	-16.01	-30.33	-13.55	-3.06	-1.18	-0.47
GUM	30	652	-39.15	-42.08	***	***	***	***
GUM	30	664	-196.72	-182.90	-168.71	-113.24	***	***
GUM	35	441	-2.55	-1.15	-0.94	-1.84	-0.54	-0.47
IEN	31	659	-53.40	-52.26	-55.45	-54.61	-55.59	-59.89
IEN	35	219	-1.81	-1.58	-0.24	-0.66	-0.54	0.44
IEN	35	505	***	-0.79	-1.03	-2.24	-0.56	3.19

TABLE 15A. (CONT.)

LAB.	CLOCK		49769	49829	49889	49959	50019	50079
IFAG	14	1105	-51.47	-38.19	***	0.02	-21.74	-50.04
IFAG	16	131	-10.15	-38.21	-26.58	0.01	-21.72	-50.06
IFAG	16	138	159.50	157.10	105.63	71.29	89.81	168.53
IFAG	16	173	188.61	172.46	104.71	66.24	102.93	176.91
IFAG	16	274	***	***	***	***	54.23	37.68
IFAG	40	4401	***	***	***	***	-9.59	-2.38
IFAG	40	4413	***	***	***	***	9.13	-45.43
IGMA	14	2403	***	***	33.58	31.09	***	17.91
IGMA	14	2407	-89.99	***	***	***	***	***
IGMA	16	112	25.79	19.87	31.22	36.99	63.98	48.49
IGMA	17	127	91.07	24.05	62.12	21.55	-11.48	41.29
IGMA	35	647	***	***	***	***	***	17.37
INPL	14	2308	-13.30	-15.19	-22.04	***	***	***
INPL	14	2426	21.98	19.50	29.08	45.71	48.80	30.12
INPL	31	145	-32.76	-40.77	***	***	28.10	29.91
INPL	31	619	-51.66	-54.97	***	-14.93	-19.10	-33.30
KRIS	12	1406	-0.17	0.21	0.94	2.68	8.00	15.15
KRIS	12	1902	***	***	***	***	78.06	80.61
KRIS	12	1903	11.69	9.21	15.56	14.70	14.39	16.26
KRIS	36	321	4.79	4.61	4.03	4.50	5.15	6.56
KRIS	40	5623	-11.70	-13.41	-13.91	***	***	***
LDS	35	289	-4.06	***	10.74	***	***	-1.96
MSL	12	933	-9.42	-3.49	2.48	-11.34	-14.78	-4.62
MSL	12	1770	-16.46	-16.60	2.22	2.48	-3.60	-1.99
MSL	36	274	6.03	4.89	5.73	4.41	5.09	22.74
NAOM	14	885	-12.49	-12.57	-10.52	-5.57	2.62	0.34
NAOM	14	1315	-54.97	-57.49	-57.41	-56.71	-47.63	-47.87
NAOM	34	2146	-74.41	-72.93	-71.94	-70.93	-74.75	-76.02
NAOT	31	284	-208.69	-218.70	-223.41	-240.30	-243.35	-250.73
NAOT	34	1075	-17.51	-19.61	-19.43	-19.78	-21.02	-19.93
NAOT	34	1498	-28.16	-25.74	-49.47	-63.97	-72.68	-70.70
NAOT	34	2494	-39.59	-42.46	-43.29	-47.19	-55.06	-53.22
NIM	12	1633	6.47	9.53	10.75	11.75	13.32	11.45
NIM	12	1640	-4.27	-1.31	-1.55	-1.44	0.21	-2.14
NIST	13	61	-87.58	-83.73	***	***	***	***
NIST	14	1316	-35.99	-35.17	-33.86	-29.50	-27.47	-25.96
NIST	16	217	26.46	20.54	23.87	17.32	***	26.32
NIST	18	1007	-206.81	-221.71	-228.08	-192.36	-172.92	-150.28
NIST	31	569	-124.49	-124.31	-118.42	-124.95	-126.22	-129.03
NIST	34	493	-88.04	-82.91	-84.06	-85.21	-86.22	-87.13
NIST	35	132	-7.15	-7.58	-7.96	-7.79	-8.10	-8.33
NIST	35	182	-6.49	-6.78	-6.48	-7.00	-6.54	-6.47
NIST	35	408	-9.77	-9.80	-9.53	-9.47	-9.58	-9.81
NIST	40	201	5.39	5.62	6.38	7.07	7.53	8.21
NIST	40	222	***	***	***	***	***	-737.07

TABLE 15A. (CONT.)

LAB.	CLOCK		49769	49829	49889	49959	50019	50079
NPL	14	418	14.76	13.91	10.17	8.69	7.31	-1.33
NPL	14	1334	-156.86	-155.34	-145.82	-149.17	-143.87	-147.12
NPL	14	1813	-62.33	-64.40	-64.94	-36.99	-25.12	-35.57
NPL	14	2064	-19.26	-18.35	-16.48	***	***	***
NPL	35	123	2.90	2.86	1.80	1.74	3.56	3.17
NPL	35	404	15.13	13.20	13.59	15.06	13.09	12.74
NPL	40	1701	-5.06	-5.08	-4.95	-4.84	-4.58	-4.15
NRC	35	234	***	2.20	3.37	2.23	2.68	2.59
NRC	35	372	***	14.25	14.47	14.37	13.26	13.30
NRC	40	303	***	25.00	26.56	26.26	28.12	31.02
NRC	40	304	***	10.72	9.72	8.19	10.37	11.58
NRC	90	61	***	5.52	8.33	9.09	8.60	7.00
NRC	90	63	***	0.48	4.28	3.36	4.03	4.51
NRLM	14	1632	-24.12	-24.29	-24.47	-25.53	-25.46	-26.19
NRLM	31	312	312.91	324.94	***	***	***	***
NRLM	35	224	15.31	15.26	14.39	14.25	14.32	13.93
NRLM	35	523	***	***	***	-3.65	-3.28	-2.94
OMH	12	1067	20.15	8.51	11.78	5.38	15.03	23.80
ORB	21	312	15.31	17.37	18.70	39.41	45.40	***
ORB	35	201	-3.00	-2.63	-2.45	-3.27	-2.01	-0.67
ORB	35	202	4.18	4.60	3.98	5.38	4.37	4.41
ORB	35	593	***	***	***	***	31.27	30.82
ORB	40	2601	-84.93	-99.41	-109.19	-118.47	-128.89	-139.13
PTB	14	2379	-62.77	-59.48	-54.10	-49.29	-53.03	-60.78
PTB	35	128	***	10.72	11.36	11.04	11.03	15.97
PTB	35	271	***	***	***	3.94	3.55	3.96
PTB	35	415	-1.01	***	***	-1.10	-1.16	-1.33
PTB	40	502	-9.15	-15.95	-19.87	***	-27.55	-26.42
PTB	40	505	19.80	20.16	***	***	***	***
PTB	40	537	9.30	14.14	18.03	22.33	24.93	20.15
PTB	92	1	-0.77	1.49	-1.66	***	***	***
PTB	92	2	-0.84	-1.14	-0.29	-1.60	-0.91	-0.74
PTB	92	3	***	***	***	***	-2.68	-2.12
ROA	12	1223	64.98	76.64	97.69	87.00	110.97	-57.07
ROA	14	896	-33.17	-22.89	-2.06	-1.59	5.21	3.26
ROA	14	1569	-34.28	-28.02	-13.60	-9.99	5.91	2.43
ROA	16	113	62.48	58.59	48.46	63.58	58.63	78.97
ROA	16	121	14.99	***	***	***	***	***
ROA	31	422	-6.03	-7.38	-1.31	-2.52	-1.42	-2.12
ROA	35	583	***	***	***	-0.04	0.55	0.67
ROA	35	718	***	***	***	***	***	2.12
SCL	14	2127	***	91.06	88.43	83.45	***	81.88
SCL	31	838	***	-141.10	-149.58	-152.04	***	-145.77
SNT	16	137	-10.91	-10.21	***	***	***	***
SO	12	2067	-69.41	-71.71	-68.82	-71.06	-74.06	-79.07

TABLE 15A. (CONT.)

LAB.	CLOCK	49769	49829	49889	49959	50019	50079
SO	40 5101	-78.17	-79.33	-72.96	-73.85	-70.76	-72.64
SU	40 3802	***	***	***	***	***	-0.30
SU	40 3805	-28.97	-29.20	-29.36	-29.17	-28.81	-28.92
SU	40 3806	-5.64	-5.28	-5.17	-4.48	-3.49	-3.00
SU	40 3807	-7.57	-7.35	-7.18	-6.27	-6.29	-6.22
SU	40 3808	-17.84	-20.46	-23.23	-24.56	-26.40	-28.50
SU	40 3810	***	***	-11.61	-10.91	***	***
SU	40 3811	***	***	-19.39	-19.69	-19.26	-19.47
SU	40 3812	***	***	1.99	-1.77	-5.27	-7.62
TL	12 2276	-289.59	-283.91	***	***	***	***
TL	16 283	4.52	36.19	27.43	31.74	51.01	57.05
TL	31 317	***	***	***	24.08	13.00	-10.91
TL	35 160	***	6.90	6.67	5.81	***	***
TL	35 300	10.80	10.15	11.16	10.08	10.00	11.22
TL	35 474	***	***	***	-9.94	***	-6.16
TP	12 335	-83.33	-90.20	-98.86	-103.28	-95.56	-89.32
TP	36 154	9.95	10.84	9.74	10.25	9.54	9.51
TP	36 163	10.01	10.17	11.73	11.50	9.81	7.71
TP	36 326	12.76	11.29	11.28	12.27	11.63	11.55
TUG	14 1654	27.55	28.29	26.82	27.99	27.13	29.12
TUG	18 108	784.57	***	***	-7.24	8.40	18.63
TUG	35 107	0.75	0.81	1.29	1.13	2.25	1.87
TUG	35 247	11.24	10.85	11.75	11.99	***	***
UME	35 251	11.77	13.41	15.46	15.77	16.33	15.78
UME	35 252	1.91	1.63	1.63	1.63	1.81	1.65
USNO	14 654	-74.24	-72.67	-73.38	-73.27	-71.79	-71.57
USNO	14 862	-20.92	***	-34.34	-47.43	-40.36	-18.81
USNO	14 1423	-43.13	***	-37.48	-37.56	-43.35	-34.24
USNO	14 2314	21.64	***	4.83	3.32	0.41	-6.49
USNO	14 2481	10.85	***	***	***	***	***
USNO	31 333	-65.55	***	-40.80	***	***	***
USNO	31 337	***	***	49.39	***	***	***
USNO	31 341	-19.80	-16.11	-22.51	***	***	***
USNO	34 651	***	***	***	***	***	-98.13
USNO	34 1094	***	***	***	***	***	-101.70
USNO	34 1452	-435.88	***	-411.05	-421.37	-422.90	-432.78
USNO	34 1710	***	***	***	***	***	-37.32
USNO	34 2081	-31.57	***	-53.52	-39.64	-59.37	-41.56
USNO	34 2313	38.66	40.28	46.57	***	***	***
USNO	34 2487	-32.00	-31.78	-35.02	***	***	***
USNO	35 101	16.75	17.00	17.62	17.65	17.60	17.44
USNO	35 104	16.84	***	16.34	15.30	16.76	13.78
USNO	35 106	9.77	10.07	10.62	10.77	10.89	11.17
USNO	35 108	13.61	12.96	14.22	14.51	14.85	15.26
USNO	35 114	18.09	18.54	19.20	19.46	19.34	20.72

TABLE 15A. (CONT.)

LAB.	CLOCK		49769	49829	49889	49959	50019	50079
USNO	35	142	5.20	5.06	4.64	4.91	5.83	5.86
USNO	35	145	3.15	3.20	***	***	***	***
USNO	35	146	3.58	3.93	4.50	4.34	4.78	4.33
USNO	35	148	-18.27	-17.94	-18.11	-17.46	-18.38	-19.13
USNO	35	150	20.62	21.00	***	***	21.84	21.89
USNO	35	152	1.47	***	1.20	2.23	1.87	1.01
USNO	35	153	***	***	18.90	19.04	19.79	19.98
USNO	35	156	6.07	5.92	5.75	6.10	6.32	5.87
USNO	35	161	3.00	2.64	3.66	3.63	3.78	3.05
USNO	35	164	7.40	7.21	6.94	6.74	6.94	6.85
USNO	35	165	20.40	20.55	20.61	20.03	20.58	20.29
USNO	35	166	-3.02	-2.65	***	***	2.75	2.73
USNO	35	167	12.12	11.40	11.08	11.29	11.19	10.89
USNO	35	169	-7.37	-8.00	-8.34	-8.34	-8.67	-7.68
USNO	35	171	21.33	21.41	22.25	23.59	23.84	23.65
USNO	35	213	-12.89	-12.36	-11.67	-10.53	-10.81	-10.77
USNO	35	217	-5.12	-6.12	-5.85	-5.72	-6.22	-6.03
USNO	35	225	7.13	7.47	8.06	7.24	8.04	7.92
USNO	35	226	0.51	0.10	0.83	0.86	0.75	1.47
USNO	35	227	11.11	11.55	11.57	11.61	12.21	11.92
USNO	35	229	15.34	14.43	14.26	14.14	14.29	12.64
USNO	35	231	-27.43	-26.41	-24.51	-22.32	***	***
USNO	35	233	-0.49	-0.56	-0.54	-0.56	-0.26	0.48
USNO	35	242	18.01	18.32	18.23	18.41	17.59	17.49
USNO	35	244	14.46	13.88	14.15	14.56	13.36	13.63
USNO	35	246	***	***	***	***	1.50	1.25
USNO	35	249	-4.53	-4.93	-4.02	-4.66	-4.33	-4.84
USNO	35	253	-8.93	-9.70	-9.45	-9.60	-9.94	-9.31
USNO	35	254	-3.87	-3.76	-3.58	-3.79	-3.54	-3.88
USNO	35	255	-13.13	-13.15	***	-13.21	-13.58	***
USNO	35	256	-18.51	-20.59	***	***	-14.70	-14.53
USNO	35	260	2.60	2.81	2.63	3.01	3.15	3.01
USNO	35	266	1.47	1.75	1.61	3.42	***	***
USNO	35	268	2.13	0.62	0.03	2.54	***	***
USNO	35	270	5.59	5.12	5.56	5.35	5.11	5.16
USNO	35	279	-14.99	-14.98	-13.93	-14.16	-13.58	-13.63
USNO	35	292	***	***	10.29	9.97	10.83	10.71
USNO	35	299	***	***	9.25	10.04	10.13	10.01
USNO	35	392	-1.40	-2.13	-2.28	-1.59	-2.14	-2.28
USNO	35	394	13.67	13.47	12.76	12.41	11.11	11.24
USNO	35	416	2.28	***	-0.19	0.21	0.44	-0.60
USNO	35	417	***	***	10.67	9.54	9.93	10.40
USNO	35	496	***	***	-16.73	-16.75	-16.09	-16.13
USNO	40	702	-3.50	-4.16	-4.31	-4.47	-4.96	-5.17
USNO	40	703	-0.96	-1.52	***	***	-6.92	-5.61

TABLE 15A. (CONT.)

LAB.	CLOCK		49769	49829	49889	49959	50019	50079
USNO	40	704	-55.41	-55.48	-55.27	-55.05	-54.95	-54.74
USNO	40	705	-31.84	-32.02	-32.06	-32.08	-32.37	-31.96
USNO	40	708	-32.11	-33.53	-34.19	-34.84	-35.35	-34.71
USNO	40	709	-51.57	-51.48	-51.39	-50.88	-51.16	-51.07
USNO	40	710	-25.60	-24.63	***	***	-22.09	-18.97
USNO	40	711	6.56	7.63	9.00	10.40	11.78	***
USNO	40	712	-20.49	***	-26.13	***	***	-1.16
USNO	40	718	***	***	***	***	-12.79	-17.05
USNO	40	719	-146.75	***	***	***	-149.44	***
USNO	40	723	***	***	***	-36.45	-41.36	-43.98
USNO	40	6201	***	***	***	-13.42	-15.19	-15.93
VSL	14	1034	-49.80	-43.67	***	***	***	***
VSL	21	125	***	71.63	71.47	***	***	***
VSL	31	288	78.02	***	***	***	***	***
VSL	35	179	22.30	21.18	20.98	20.86	18.89	19.84
VSL	35	456	9.94	9.70	10.10	10.22	10.03	9.31
VSL	35	548	***	***	2.33	2.65	2.66	3.96

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

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
4x HYDROGEN MASERS
9x PRIMARY CLOCKS AND PROTOTYPES
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 High perf.
36 HEWLETT-PACKARD 5071A Low. perf.

TABLE 15B. 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.

	1995	1994		1993		1992	
	clock n°	clock n°	corr. (ns/d)	clock n°	corr. (ns/d)	clock n°	corr. (ns/d)
APL	40 3101	40 3101	-7.78	40 3101	-7.78	40 3101(1)	-7.78
	40 3102	40 3102		40 3102		40 3102(2)	
	40 3106	40 3106		40 3106		40 3106(3)	
CH	16 69	16 69		16 69		16 69(4)	
	17 206	17 206	+78.00	17 206	+78.00	17 206	+78.00
CRL	14 764	14 764		14 764		14 764(5)	
	14 1729	14 1729		14 1729		14 1729(6)	
CSAO	12 1648	12 1648		12 1648		12 1648(7)	
	30 152	30 152	-1.76				
IEN	35 219	35 219	-2.19	35 219	-2.19		
IFAG	14 1105	14 1105		14 1105		14 1105	+27.00
NIST	13 61	13 61		13 61		13 61(8)	
	14 1316	14 1316		14 1316		14 1316(9)	
	16 217	16 217		16 217		16 217(10)	
NPL	14 418	14 418	+22.00	14 418	+22.00	14 418(11)	+22.00
	14 1813	14 1813		14 1813	-40.00	14 1813(12)	-40.00
	40 1701	40 1701		40 1701		40 1701(13)	
ROA	12 1223	12 1223	+124.00				
	14 896	14 896	-31.00				
	14 1569	14 1569	-6.00				
	16 121	16 121		16 121	-113.00	16 121(14)	-113.00
SU	40 3806	40 3806	-1.00	40 3806	-1.00	40 3806(15)	-14.00
UME	35 252	35 252	+8.72				
VSL	31 288	31 288		31 288		31 288(16)	

(1) A correction of + 10.22 ns/d has to be applied in 1991. A correction of -0.78 ns/d has to be applied in 1990 and for the last two-month interval of 1989.
(2) A correction of + 12.00 ns/d has to be applied in 1991. A correction of +8.0 ns/d has to be applied in 1990.
(3) A correction of + 10.00 ns/d has to be applied in 1991 and 1990 and for the last two-month interval of 1989.
(4) A correction of -28.00 ns/d has to be applied in 1991, 1990 and in 1989.
(5) A correction of +40.02 ns/d has to be applied in 1990 and for the last five two-month intervals of 1989.
(6) A correction of +51.40 ns/d has to be applied in 1990, 1989, 1988 and

for the last two-month interval of 1987.

(7) A correction of +98.60 ns/d has to be applied in 1990, 1989, 1988, 1987, 1986 and 1985.

(8) A correction of -25.32 ns/d has to be applied in 1991, 1990 and 1989.

(9) A correction of +10.70 ns/d has to be applied in 1990. A correction of +27.63 ns/d has to be applied in 1989, 1988, 1987, 1986, 1985 and for the last three two-month intervals of 1984.

(10) A correction of +58.63 ns/d has to be applied in 1990. A correction of +52.50 ns/d has to be applied in 1989 and 1988.

(11) A correction of +22.00 ns/d has to be applied in 1991.

(12) A correction of -40.00 ns/d has to be applied in 1991 and 1990 and for the last four two-month intervals of 1989.

(13) A correction of +27.00 ns/d has to be applied in 1991.

(14) A correction of -113.00 ns/d has to be applied in 1991, 1990, 1989, 1988, 1987, and 1986.

(15) A correction of -14.00 ns/d has to be applied in 1991.

(16) A correction of -30.00 ns/d has to be applied in 1991.

TABLE 16A. WEIGHTS OF CONTRIBUTING CLOCKS IN 1995

(File available via INTERNET under the name WTAI95.AR)

Clock weights are computed for two-month intervals ending at the dates given in the table.
From 1 January 1988 up to 2 May 1995, the absolute weight of a given clock could not exceed the value 1000. Since 2 May 1995, the upper limit of weight has been multiplied by 2.5 and thus appears in the following table as 2500.

*** denotes that the clock was not used.

LAB.	CLOCK		49769	49829	49889	49959	50019	50079
AOS	23	67	82	170	172	172	184	0
APL	14	793	94	****	****	****	****	****
APL	31	571	575	****	****	****	****	****
APL	40	3101	689	682	327	349	****	****
APL	40	3102	0	****	****	****	****	****
APL	40	3106	1000	****	****	****	****	****
AUS	36	207	1000	1000	1047	1153	1639	2500
AUS	36	249	****	0	0	933	1352	2236
AUS	36	340	1000	1000	2500	2500	2500	2500
AUS	36	379	0	0	2500	2500	2500	2500
AUS	36	424	1000	1000	2500	2500	2500	2500
AUS	36	654	****	****	****	****	0	0
AUS	40	5401	1000	****	0	0	2500	2500
AUS	44	2	1000	1000	1394	1037	1429	2500
BEV	16	71	****	****	****	****	0	0
CAO	16	183	1000	0	513	****	****	****
CAO	23	62	252	140	102	****	****	****
CAO	30	384	90	****	****	****	****	****
CH	12	285	154	143	138	134	****	****
CH	16	69	268	442	412	414	507	260
CH	16	77	1000	599	0	56	51	68
CH	16	140	30	29	52	38	61	141
CH	17	206	15	45	0	57	56	63
CH	21	179	355	0	196	232	240	214
CH	21	194	118	164	173	103	87	91
CH	21	217	1000	1000	1303	1317	2500	1516
CH	21	265	****	****	****	****	0	0
CH	31	403	30	84	607	604	604	760
CH	35	413	1000	1000	2500	2500	2500	2014
CH	36	354	1000	1000	2500	2500	2500	2500
CRL	14	764	1000	1000	****	****	****	****
CRL	14	932	****	****	****	****	0	0
CRL	14	1729	9	8	8	****	****	****
CRL	14	2456	1000	****	****	****	0	0
CRL	34	131	396	****	****	****	****	****

TABLE 16A. (CONT.)

LAB.	CLOCK		49769	49829	49889	49959	50019	50079
CRL	35	112	1000	1000	2500	2500	2500	2500
CRL	35	144	1000	1000	2500	2500	2500	2500
CRL	35	332	1000	1000	2500	2500	2500	2500
CRL	35	342	1000	1000	2500	2500	2500	2500
CRL	35	343	1000	1000	2500	2500	2500	2500
CSAO	12	1646	****	0	0	30	29	0
CSAO	12	1648	205	131	139	156	212	167
CSAO	12	2068	31	45	106	75	78	82
CSAO	30	152	7	7	6	****	0	0
CSAO	40	4902	****	****	****	****	****	0
F	14	51	751	725	1205	454	215	254
F	14	134	23	39	312	251	****	****
F	14	195	940	551	455	495	****	****
F	14	475	674	633	629	0	100	94
F	14	500	0	1000	2500	2500	2500	2500
F	14	753	1000	637	578	596	****	****
F	14	1120	1000	1000	1789	2371	0	710
F	14	1407	****	****	0	****	****	****
F	14	1645	225	321	2500	0	339	411
F	14	1842	114	****	****	****	****	****
F	16	106	0	1000	1597	2500	1643	1429
F	16	178	****	0	****	****	****	****
F	16	187	0	192	0	25	26	28
F	17	489	212	130	210	150	49	32
F	35	122	1000	1000	2500	2500	2500	2500
F	35	124	1000	1000	2500	2500	2500	2500
F	35	131	1000	1000	2500	2500	2500	2500
F	35	158	1000	1000	2500	2500	2500	2500
F	35	172	1000	1000	2500	2500	2500	2500
F	35	198	1000	1000	2500	2500	2500	2500
F	35	385	****	0	0	2500	1282	1760
F	35	396	1000	1000	2500	2500	2500	2500
F	35	536	****	****	0	0	2500	****
F	40	816	1000	1000	1090	789	775	899
FTZ	14	1217	****	0	0	****	0	0
FTZ	14	1674	****	0	0	****	0	0
FTZ	36	136	****	****	****	****	0	0
FTZ	36	345	****	0	0	****	0	0
GUM	14	1144	32	66	105	115	92	76
GUM	30	652	14	16	****	****	****	****
GUM	30	664	36	34	34	0	****	****
GUM	35	441	0	0	2500	2500	2500	2500
IEN	31	659	1000	1000	1743	1760	2016	1309
IEN	35	219	1000	1000	2500	2500	2500	2500
IEN	35	505	****	0	0	2500	2500	2168

TABLE 16A. (CONT.)

LAB.	CLOCK		49769	49829	49889	49959	50019	50079
IFAG	14	1105	18	18	****	0	0	8
IFAG	16	131	909	0	78	57	56	30
IFAG	16	138	6	5	5	7	8	6
IFAG	16	173	7	6	6	5	4	4
IFAG	16	274	****	****	****	****	0	0
IFAG	40	4401	****	****	****	****	0	0
IFAG	40	4413	****	****	****	****	0	0
IGMA	14	2403	****	****	0	0	****	0
IGMA	14	2407	0	****	****	****	****	****
IGMA	16	112	0	0	0	0	0	32
IGMA	17	127	0	0	0	0	4	7
IGMA	35	647	****	****	****	****	****	0
INPL	14	2308	0	0	0	****	****	****
INPL	14	2426	0	116	190	113	70	69
INPL	31	145	68	66	****	****	0	0
INPL	31	619	101	92	****	0	0	0
KRIS	12	1406	37	31	39	79	371	0
KRIS	12	1902	****	****	****	****	0	0
KRIS	12	1903	55	72	73	110	590	1538
KRIS	36	321	1000	1000	2500	2500	2500	2500
KRIS	40	5623	992	876	1527	****	****	****
LDS	35	289	1000	****	0	****	****	0
MSL	12	933	224	468	230	247	262	256
MSL	12	1770	62	66	56	93	119	134
MSL	36	274	906	909	2500	2500	2500	0
NAOM	14	885	240	681	2500	1326	0	238
NAOM	14	1315	1000	1000	908	1232	0	481
NAOM	34	2146	1000	1000	2500	2500	2500	2500
NAOT	31	284	402	195	110	53	36	37
NAOT	34	1075	1000	1000	2500	2500	2500	2500
NAOT	34	1498	0	0	0	20	19	23
NAOT	34	2494	985	842	707	406	203	247
NIM	12	1633	0	0	1117	1401	1397	2039
NIM	12	1640	0	0	2026	2500	2500	2500
NIST	13	61	1000	1000	****	****	****	****
NIST	14	1316	983	753	751	1026	974	600
NIST	16	217	521	429	623	459	****	0
NIST	18	1007	5	6	11	59	22	11
NIST	31	569	362	447	322	323	471	784
NIST	34	493	1000	1000	2500	2500	2500	2500
NIST	35	132	1000	1000	2500	2500	2500	2500
NIST	35	182	1000	1000	2500	2500	2500	2500
NIST	35	408	1000	1000	2500	2500	2500	2500
NIST	40	201	1000	1000	2500	2500	2500	2500
NIST	40	222	****	****	****	****	****	0

TABLE 16A. (CONT.)

LAB.	CLOCK		49769	49829	49889	49959	50019	50079
NPL	14	418	622	653	784	649	495	0
NPL	14	1334	66	79	87	93	395	378
NPL	14	1813	930	938	1094	0	35	33
NPL	14	2064	384	660	1453	****	****	****
NPL	35	123	1000	1000	2500	2500	2500	2500
NPL	35	404	1000	1000	2500	2500	2500	2500
NPL	40	1701	1000	1000	2500	2500	2500	2500
NRC	35	234	****	0	0	2500	2500	2500
NRC	35	372	****	0	0	2500	2500	2500
NRC	40	303	****	0	0	2500	2500	1747
NRC	40	304	****	0	0	2500	2500	2500
NRC	90	61	****	0	0	1545	2500	2500
NRC	90	63	****	0	0	1358	2401	2500
NRLM	14	1632	829	1000	2288	2500	2500	2500
NRLM	31	312	4	6	****	****	****	****
NRLM	35	224	1000	1000	2500	2500	2500	2500
NRLM	35	523	****	****	****	0	0	2500
OMH	12	1067	114	132	184	235	311	207
ORB	21	312	753	1000	1157	0	61	****
ORB	35	201	1000	1000	2500	2500	2500	2500
ORB	35	202	1000	1000	2500	2500	2500	2500
ORB	35	593	****	****	****	****	0	0
ORB	40	2601	31	25	22	25	25	25
PTB	14	2379	333	335	326	460	419	375
PTB	35	128	****	0	0	2500	2500	1857
PTB	35	271	****	****	****	0	0	2500
PTB	35	415	1000	****	****	0	0	2500
PTB	40	502	0	0	165	****	0	0
PTB	40	505	0	0	****	****	****	****
PTB	40	537	148	242	296	244	211	324
PTB	92	1	1000	1000	2500	****	****	****
PTB	92	2	1000	1000	2500	2500	2500	2500
PTB	92	3	****	****	****	****	0	0
ROA	12	1223	14	17	31	46	39	0
ROA	14	896	0	174	0	36	36	41
ROA	14	1569	0	417	210	127	49	40
ROA	16	113	0	112	128	114	183	0
ROA	16	121	19	****	****	****	****	****
ROA	31	422	1000	1000	825	1292	1422	1644
ROA	35	583	****	****	****	0	0	2500
ROA	35	718	****	****	****	****	****	0
SCL	14	2127	****	0	0	321	****	0
SCL	31	838	****	0	0	148	****	0
SNT	16	137	1000	893	****	****	****	****
SO	12	2067	802	882	961	865	2500	0

TABLE 16A. (CONT.)

LAB.	CLOCK		49769	49829	49889	49959	50019	50079
SO	40	5101	115	122	204	201	653	952
SU	40	3802	****	****	****	****	****	0
SU	40	3805	1000	1000	2500	2500	2500	2500
SU	40	3806	1000	1000	2500	2500	2500	2500
SU	40	3807	1000	1000	2500	2500	2500	2500
SU	40	3808	1000	799	610	560	562	607
SU	40	3810	****	****	0	0	****	****
SU	40	3811	****	****	0	0	2500	2500
SU	40	3812	****	****	0	0	360	360
TL	12	2276	4	7	****	****	****	****
TL	16	283	76	37	56	72	42	29
TL	31	317	****	****	****	0	0	15
TL	35	160	****	0	0	2500	****	****
TL	35	300	1000	1000	2500	2500	2500	2500
TL	35	474	****	****	****	0	****	0
TP	12	335	163	227	310	193	191	189
TP	36	154	1000	1000	2500	2500	2500	2500
TP	36	163	1000	1000	2500	2500	2500	2500
TP	36	326	1000	1000	2500	2500	2500	2500
TUG	14	1654	1000	1000	2500	2500	2500	2500
TUG	18	108	11	****	****	0	0	30
TUG	35	107	1000	1000	2500	2500	2500	2500
TUG	35	247	1000	1000	2500	2500	****	****
UME	35	251	0	1000	1469	1662	1906	2500
UME	35	252	0	1000	2500	2500	2500	2500
USNO	14	654	1000	1000	2500	2500	2500	2500
USNO	14	862	50	****	0	0	115	45
USNO	14	1423	0	****	0	0	419	467
USNO	14	2314	14	****	0	0	910	254
USNO	14	2481	196	****	****	****	****	****
USNO	31	333	427	****	0	****	****	****
USNO	31	337	****	****	0	****	****	****
USNO	31	341	623	510	748	****	****	****
USNO	34	651	****	****	****	****	****	0
USNO	34	1094	****	****	****	****	****	0
USNO	34	1452	136	****	0	0	117	82
USNO	34	1710	****	****	****	****	****	0
USNO	34	2081	0	****	0	0	48	74
USNO	34	2313	0	423	464	****	****	****
USNO	34	2487	1000	1000	1536	****	****	****
USNO	35	101	1000	1000	2500	2500	2500	2500
USNO	35	104	0	****	0	0	2500	2500
USNO	35	106	1000	1000	2500	2500	2500	2500
USNO	35	108	1000	1000	2500	2500	2500	2500
USNO	35	114	1000	1000	2500	2500	2500	2500

TABLE 16A. (CONT.)

LAB.	CLOCK		49769	49829	49889	49959	50019	50079
USNO	35	142	1000	1000	2500	2500	2500	2500
USNO	35	145	1000	1000	****	****	****	****
USNO	35	146	1000	1000	2500	2500	2500	2500
USNO	35	148	1000	1000	2500	2500	2500	2500
USNO	35	150	1000	1000	****	****	0	0
USNO	35	152	1000	****	0	0	2500	2500
USNO	35	153	****	****	0	0	2500	2500
USNO	35	156	1000	1000	2500	2500	2500	2500
USNO	35	161	1000	1000	2500	2500	2500	2500
USNO	35	164	1000	1000	2500	2500	2500	2500
USNO	35	165	1000	1000	2500	2500	2500	2500
USNO	35	166	1000	1000	****	****	0	0
USNO	35	167	1000	1000	2500	2500	2500	2500
USNO	35	169	1000	1000	2500	2500	2500	2500
USNO	35	171	1000	1000	2500	2500	2500	2500
USNO	35	213	1000	1000	2500	2500	2500	2500
USNO	35	217	1000	1000	2500	2500	2500	2500
USNO	35	225	1000	1000	2500	2500	2500	2500
USNO	35	226	1000	1000	2500	2500	2500	2500
USNO	35	227	1000	1000	2500	2500	2500	2500
USNO	35	229	1000	1000	2500	2500	2500	2500
USNO	35	231	1000	1000	2500	1782	****	****
USNO	35	233	1000	1000	2500	2500	2500	2500
USNO	35	242	1000	1000	2500	2500	2500	2500
USNO	35	244	1000	1000	2500	2500	2500	2500
USNO	35	246	****	****	****	****	0	0
USNO	35	249	1000	1000	2500	2500	2500	2500
USNO	35	253	1000	1000	2500	2500	2500	2500
USNO	35	254	1000	1000	2500	2500	2500	2500
USNO	35	255	1000	1000	****	0	0	****
USNO	35	256	1000	1000	****	****	0	0
USNO	35	260	1000	1000	2500	2500	2500	2500
USNO	35	266	1000	1000	2500	2500	****	****
USNO	35	268	1000	1000	2500	2500	****	****
USNO	35	270	1000	1000	2500	2500	2500	2500
USNO	35	279	1000	1000	2500	2500	2500	2500
USNO	35	292	****	****	0	0	2500	2500
USNO	35	299	****	****	0	0	2500	2500
USNO	35	392	1000	1000	2500	2500	2500	2500
USNO	35	394	1000	1000	2500	2500	2500	2500
USNO	35	416	0	****	0	0	2500	2500
USNO	35	417	****	****	0	0	2500	2500
USNO	35	496	****	****	0	0	2500	2500
USNO	40	702	1000	1000	2500	2500	2500	2500
USNO	40	703	1000	1000	****	****	0	0

TABLE 16A. (CONT.)

LAB.	CLOCK		49769	49829	49889	49959	50019	50079
USNO	40	704	1000	1000	2500	2500	2500	2500
USNO	40	705	1000	1000	2500	2500	2500	2500
USNO	40	708	1000	1000	2500	2500	2500	2500
USNO	40	709	1000	1000	2500	2500	2500	2500
USNO	40	710	1000	1000	****	****	0	0
USNO	40	711	1000	1000	2500	2152	1972	****
USNO	40	712	529	****	0	****	****	0
USNO	40	718	****	****	****	****	0	0
USNO	40	719	0	****	****	****	0	****
USNO	40	723	****	****	****	0	0	327
USNO	40	6201	****	****	****	0	0	2500
VSL	14	1034	1000	1000	****	****	****	****
VSL	21	125	****	0	0	****	****	****
VSL	31	288	15	****	****	****	****	****
VSL	35	179	1000	1000	2500	2500	2500	2500
VSL	35	456	0	1000	2500	2500	2500	2500
VSL	35	548	****	****	0	0	2500	2500

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

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
4x HYDROGEN MASERS
9x PRIMARY CLOCKS AND PROTOTYPES
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 High perf.
36 HEWLETT-PACKARD 5071A Low. perf.

TABLE 16B. STATISTICAL DATA ON THE WEIGHTS ATTRIBUTED TO THE CLOCKS IN 1995

Interval	Number of clocks			Number of clock with a given weight								
				0* weight			0** weight			maximum weight		
1995	HM	5071A	total	HM	5071A	total	HM	5071A	total	HM	5071A	total
Jan-Feb	28	74	217	4	6	21	0	0	7	18	68	115
Mar-Apr	25	75	209	4	7	27	0	0	5	15	68	111
May-Jun	27	81	215	7	17	45	0	0	6	11	63	93
Jul-Aug	26	86	206	6	16	34	0	0	5	12	68	99
Sep-Oct	31	85	215	9	10	37	0	0	4	14	73	108
Nov-Dec	33	87	225	10	9	40	0	0	9	15	74	109

* A priori null weight (test interval of new clocks).

** Null weight resulting from the statistics.

HM designates hydrogen masers.

5071A designates Hewlett-Packard 5071A units with high performance tubes.

Clocks with missing data during a two-month interval of computation are excluded.

Access to the BIPM Time Section data via anonymous FTP

The BIPM Time section is making available several publications and data files via anonymous ftp. To access it, one should use the following procedure (precise syntax may depend on the machine one is running):

```
ftp 145.238.2.2         ! to connect
user anonymous          ! system requests that you enter your identity as a
                          password
cd [anonymous.tai]      ! to access the [.tai] subdirectory
get read.me             ! the read.me file is listed below
cd [.subdirectory]      ! to go to one of the subdirectories
```

Of course, when logged on, one can go directly to the proper subdirectory by issuing the command:
cd [anonymous.tai.subdirectory]
or just,
cd [.tai.subdirectory]
and get the files needed.

Listing of the READ.ME file:

```
last update : 26 February 1996

                    BUREAU INTERNATIONAL DES POIDS ET MESURES
                                  TIME SECTION


The [.tai] subdirectory offers via ANONYMOUS FTP (node 145.238.2.2)
informations of interest for the time & frequency community. This service
is under development. It presently contains 3 subdirectories:

 [.tai.gps]              A selection of recent GPS time data
                         (presently upon request)

 [.tai.publication]      Latest issue of Time Section publications
     Circular T#xx in file cirt.xx
     GPS schedule #xx in file schgps.xx
     GLONASS schedule #xx in file schglo.xx

 [.tai.scale]            Time scales data (most recent year or update)
                         (previous years upon request)
     TT(BIPMxx) in file TTBIPM.xx
     For year xx until 92:
         UTC-UTC(labs) in file UTC.xx
         TAI-TA(labs) in file TA.xx
     For year xx starting with 93:
     Files issued from tables of the Annual Report
       Frequency difference of EAL and TAI in file EALTAIxx.AR
       TAI frequency in file FTAIxx.AR (for 1993 and 1994)
       Measurements of TAI scale interval in file UTAI**.AR (starting 1995)
       Mean duration of TAI scale interval in file SITAIxx.AR
       TAI-TA(labs) in file TAIxx.AR
       UTC-UTC(labs) in file UTCxx.AR
       UTC-GPS time in file UTCGPSxx.AR
       UTC-GLONASS time in file UTCGLOxx.AR
       Rates of clocks in file RTAIxx.AR
       Weights of clocks in file WTAIxx.AR


For any comment or query send a message to: bipm@mesiob.obspm.fr
                                                  or tai@bipm.fr
```

TIME SIGNALS

The time signal emissions reported here follow the UTC system, in accordance with the Recommendation 460-4 of the Radiocommunication Bureau (RB) of the International Telecommunication Union (ITU) 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 1996.

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 Transportation and Communications P.O. Box 71 - Chung-Li 320 Taiwan, 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 D-38116 Braunschweig Germany
EBC	Real Instituto y Observatorio de la Armada - 11100 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 Yusong P.O. Box 102, Taejon 305-600 Republic of Korea

Signal	Authority
IAM	Istituto Superiore delle Poste e delle Telecomunicazioni Viale Europa 190 00144 - Roma, Italia
JG2AS, JJY	Standards and Measurements Division Communications Research Laboratory 2-1, Nukui-kitamachi 4-chome Koganei-shi, Tokyo 184 Japan
LOL	Servicio de Hidrografia Naval Observatorio Naval Av. España 2099 1107 - Buenos-Aires, Argentina
MSF	National Physical Laboratory Centre for Electromagnetic and Time Metrology Teddington, Middlesex TW11 0LW United Kingdom
OMA	Institute of Radio Engineering and Electronics - Academy of Sciences of Czech Republic - Chaberská 57 182 51 Praha 8 - Kobylisy, Czech Republic
PPE, PPR	Departemento Serviço da hora Observatorio Nacional (CNPq) Rua General Bruce, 586, Sao Cristovao 20921-030 - Rio de Janeiro, Brasil
RAB-99, RBU, RCH, RID, RJH-63, RJH-69, RJH-77, RJH-86, RJH-90, RTZ, RWM	Institute of Metrology for Time and Space (IMVP), GP "VNIIFTRI" Mendeleevo, Moscow Region 141570 Russia

Signal	Authority
TDF	France Telecom 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 P.O. Box 282 North Ryde NSW 2113 Australia
WWV, WWVB, WWVH	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

Station	Location Latitude Longitude	Frequency (kHz)	Schedule (UTC)	Form of the signal
ATA	Greater Kailash New Delhi India 28° 34'N 77° 19'E	10 000	continuous	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: ITU-R 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 code (300 bps, Bell 103) after 10 cycles of 1 kHz on seconds 31 to 39. Year, DUT1, leap second information, TAI-UTC and Canadian summer time format on 31, and time code on 32-39. Broadcast is single sideband; upper sideband with carrier reinsert. DUT1 : ITU-R 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 Germany 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(1)	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: ITU-R 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 : ITU-R 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 : ITU-R 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(2)	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 : ITU-R code by lengthening.
LOL1(3)	Buenos-Aires Argentina 34° 37'S 58° 21'W	5 000 10 000 15 000	11 h to 12 h 14 h to 15 h 17 h to 18 h 20 h to 21 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 : ITU-R code by lengthening.

(1) EBC . Probable change of transmitting frequencies in 1996 : 15006 kHz instead of 12008 kHz and 4998 kHz instead of 6840 kHz.

(2) JJY . Stop of emission on 2500 and 15000 kHz starting 1st April 1996.

(3) LOL3. Definitive stop of emission.

Station	Location Latitude Longitude	Frequency (kHz)	Schedule (UTC)	Form of the signal
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. A longer period of maintenance during summer is announced annually.	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, 1 bit/s (year, month, day of month, day of week, hour, minute) from seconds 17 to 59 in each minute, following the seconds interruption. The 100 bit/s BCD NRZ code during the minutes interruption may cease after 1996. DUT1 : ITU-R code by double pulse.
OMA(1)	Liblice Czech Republic 50° 4'N 14° 53'E	50	continuous, interrupted on the first Tuesday of each month.	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, UTC and local civil time, leap second and civil time change. No DUT1 code.
PPR(2)	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.
RAB-99	Khabarovsk Russia 48° 30'N 134° 50'E	25	Winter 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 Summer schedule : 1 h 13 m to 1 h 22 m 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.
RBU	Moscow Russia 55° 48'N 38° 18'E	200/3	continuous	DXXXW type signals. The numbers of the minute, hour, day of the month, day of the week, month, year of the century, difference between the universal time and the local time, TJD and DUT1+dUT1 are transmitted each minute from the 1st to the 59th second. From 9 h to 11 h, 19 h to 23 h are NON type signals.
RCH(3)	Tashkent Uzbekistan 41° 19'N 69° 15'E	2 500 5 000 10 000	0 h to 3 h 50 m 5 h to 23 h 50 m 0 h to 3 h 50 m 14 h to 23 h 50 m 5 h to 14 h 20 m	A1X type second pulses are transmitted between minutes 0 and 10, 30 and 40. The pulses at the beginning of the minute are prolonged to 0.5 s. A1N type 0.1 seconds pulses of 0.02 s duration are transmitted between minutes 10 and 20, 40 and 50. The pulses at the beginning of the second are prolonged to 0.04 s and of the minute to 0.5 s. DUT1+dUT1: by double pulses.

(1) OMA. Stop of emission starting 31 December 1995.

(2) PPE. Momentary stop of emission

(3) RCH. CIS radiostation emitting DUT1 information in accordance with the ITU-R 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.

TIME SIGNALS EMITTED IN THE UTC SYSTEM

Station	Location Latitude Longitude	Frequency (kHz)	Schedule (UTC)	Form of the signal
RID(1)	**Irkutsk** **Russia** **52° 26'N** **104° 2'E**	5 004 10 004 15 004	The station simultaneously operates on three frequencies.	A1X type second pulses are transmitted between minutes 20 and 30, 50 and 60. The pulses at the beginning of the minute are prolonged to 0.5 s. A1N type 0.1 second pulses of 0.02 s duration are transmitted between minutes 0 and 10, 30 and 40. The pulses at the beginning of the second are prolonged to 0.04 s, and of the minute to 0.5 s. DUT1+dUT1 : by double pulses.
RJH-63	**Krasnodar** **Russia** **44° 46'N** **39° 34'E**	25	Winter schedule : 9 h 13 m to 9 h 22 m 17 h 13 m to 17 h 22 m Summer schedule : 8 h 13 m to 8 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.
RJH-69	**Molodechno** **Belarus** **54° 28'N** **26° 47'E**	25	Winter schedule : 7 h 13 m to 7 h 22 m 13 h 13 m to 13 h 22 m Summer schedule : 6 h 13 m to 6 h 22 m 12 h 13 m to 12 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.
RJH-77	**Arkhangelsk** **Russia** **64° 22'N** **41° 35'E**	25	Winter schedule : 11 h 13 m to 11 h 22 m 21 h 13 m to 21 h 22 m Summer schedule : 2 h 13 m to 2 h 22 m 10 h 13 m to 10 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.
RJH-86	**Bishkek** **Kirgizstan** **43° 03'N** **73° 37'E**	25	Winter schedule : 4 h 13 m to 4 h 22 m 10 h 13 m to 10 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.
RJH-90	**Nizhni Novgorod** **Russia** **56° 11'N** **43° 57'E**	25	Winter schedule : 5 h 13 m to 5 h 22 m 19 h 13 m to 19 h 22 m Summer schedule : 4 h 13 m to 4 h 22 m 18 h 13 m to 18 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.
RTZ(1)	**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.

(1) RID, RTZ. CIS radiostation emitting DUT1 information in accordance with the ITU-R 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.

TIME SIGNALS EMITTED IN THE UTC SYSTEM

Station	Location Latitude Longitude	Frequency (kHz)	Schedule (UTC)	Form of the signal
RWM(1)	Moscow Russia 55° 48'N 38° 18'E	4 996 9 996 14 996	The station simultaneously operates on three frequencies.	A1X type second pulses are transmitted between minutes 10 and 20, 40 and 50. The pulses at the beginning of the minute are prolonged to 0.5 s. A1N type 0.1 seconds pulses of 0.02 s duration are transmitted between minutes 20 and 30, 50 and 60. The pulses at the beginning of the second are prolonged to 0.04 s and of the minute to 0.5 s. DUT1+dUT1 : by double pulses.
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.
VNG	Llandilo New South Wales Australia 33° 43'S 150° 48'E	2 500 5 000 8 638 12 984 16 000	continuous 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 2 500, 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 : ITU-R code by double.

(1) RMW. CIS radiostation emitting DUT1 information in accordance with the ITU-R 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.

TIME SIGNALS EMITTED IN THE UTC SYSTEM

Station	Location Latitude Longitude	Frequency (kHz)	Schedule (UTC)	Form of the signal
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 : ITU-R 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.
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 : ITU-R 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.

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
RAB-99, RBU	0.05
RCH, RID, RWM	0.5
RJH-63, RTZ	0.05
RJH-69, RJH-77	0.05
RJH-86, RJH-90	0.05
TDF	0.02
VNG	0.1
WWV	0.1
WWVB	0.1
WWVH	0.1

January 1996

CCDS 1996

REPORT OF THE BIPM TIME SECTION 1993-1995

Claudine Thomas

Over the three years covered by this report, the work of the BIPM Time section was largely guided by rapid evolution in the quality of the timing data used for the computation of International Atomic Time, TAI. Four major changes have occurred since the beginning of 1993:

* older designs of commercial clocks have been extensively replaced by the new HP 5071A clocks which present outstanding stability, characterized by a flicker floor level of about 6×10^{-15}, in terms of $\sigma_y(\tau)$, for averaging times τ between 20 d and 40 d,
* the entry into operation, in timing laboratories, of active auto-tuned hydrogen-masers showing frequency drifts of order 10^{-17}/d,
* the widespread use of GPS time transfer, with makes it possible to compare the clocks of nearly all laboratories contributing to TAI with an accuracy of a few nanoseconds,
* evaluations of new primary frequency standards showing type B uncertainties of some parts in 10^{14} ($1\ \sigma$), and even better for the caesium fountain developed at the LPTF.

A direct consequence is a natural improvement in the stability and accuracy of TAI, but to take full advantage of this improvement in timing data a number of studies were required: these included time scale algorithms, time transfer techniques and the application of general relativity to time metrology. They are detailed in the following. Some of the results obtained were presented at the meeting of the CCDS Working Group on TAI, held at the BIPM on 13-14 March 1995. Appropriate decisions were then taken and put in operation soon after.

1. International Atomic Time (TAI) and Coordinated Universal Time (UTC)

Reference time scales TAI and UTC have been regularly computed and published in the monthly *Circular T* and successive volumes of the *Annual Report of the BIPM Time Section* (Volume 7 for 1994). The definitive results for 1993 and 1994 have also been made available in the form of computer-readable files in the BIPM Time section Internet anonymous FTP. The definitive results for 1995 will be available in March 1996.

2. Algorithm for time scales

Research concerning time-scale algorithms includes studies which aim to improve the long-term stability of EAL and define a safe strategy for frequency steering.

2.1. Stability algorithm

Since the end of 1992, the stability of the free atomic time scale EAL has improved significantly due to the extensive replacement of older designs of commercial clocks by the new HP 5071A clocks and without significant change in the algorithm. Values for the stability can be estimated by application of the N-cornered hat technique to data obtained from January 1993 to April 1995 in comparisons between EAL and the best independent time scales of the world (maintained at the NIST, the VNIIFTRI, the USNO, the PTB and the LPTF). They lead to the values for the Allan standard deviation $\sigma_y(\tau)$ given in the third line of Table 1.

	$\sigma_y(\tau)$				
	$\tau = 10$ d	$\tau = 20$ d	$\tau = 40$ d	$\tau = 80$ d	$\tau = 160$ d
EAL[1] N-cornered hat	$4{,}0\text{x}10^{-15}$	$3{,}4\text{x}10^{-15}$	$3{,}1\text{x}10^{-15}$	$3{,}7\text{x}10^{-15}$	$4{,}6\text{x}10^{-15}$
E2500[2] N-cornered hat	$3{,}7\text{x}10^{-15}$	$2{,}8\text{x}10^{-15}$	$2{,}5\text{x}10^{-15}$	$3{,}1\text{x}10^{-15}$	$3{,}9\text{x}10^{-15}$
E5000[2] N-cornered hat	$3{,}7\text{x}10^{-15}$	$2{,}7\text{x}10^{-15}$	$2{,}3\text{x}10^{-15}$	$3{,}1\text{x}10^{-15}$	$4{,}4\text{x}10^{-15}$
E10000[2] N-cornered hat	$3{,}4\text{x}10^{-15}$	$2{,}5\text{x}10^{-15}$	$2{,}1\text{x}10^{-15}$	$3{,}1\text{x}10^{-15}$	$4{,}8\text{x}10^{-15}$
ER[3] N-cornered hat	$2{,}8\text{x}10^{-15}$	$2{,}0\text{x}10^{-15}$	$2{,}0\text{x}10^{-15}$	$2{,}6\text{x}10^{-15}$	
E[1] N-cornered hat	$2{,}7\text{x}10^{-15}$	$2{,}2\text{x}10^{-15}$	$2{,}6\text{x}10^{-15}$	$3{,}9\text{x}10^{-15}$	

Table 1. Values of the Allan standard deviation $\sigma_y(\tau)$ computed for the time scales EAL, E2500, E5000, E10000, ER and E by application of the N-cornered hat technique, using data covering the periods: [1] January 1993 - April 1995, [2] January 1993 - June 1995, [3] July 1993 - June 1995.

The time scales E2500, E5000 and E10000 correspond respectively to an absolute upper individual of weight of 2500, 5000 and 10000. The time scale ER corresponds to a relative upper individual contribution of 1,37%. The time scale E corresponds to a computation time reduced to 30 d, an absolute upper individual of weight of 2500 and the introduction of a predicted frequency drift for hydrogen masers.

For further improvement, the stability algorithm which produces EAL may need to be revised and several possible changes have been the subject of experiments on real clock data collected at the BIPM. These possibilities mainly concern changes in the upper limit of weights, the use of hydrogen-masers and shortening of the computation time of TAI.

The HP 5071A clocks kept in national laboratories show outstanding long-term stability and generally contribute the maximum weight as soon as their data is used in the TAI computation. Consequently, to take full advantage of the most stable of these clocks calls for an increase in the upper limit of weight. Tests have been conducted with limits chosen equal to 2500, 5000 and 10000 and have shown an improvement of the stability (lines 4, 5 and 6 of Table 1) [63]. However, the time scales E5000 and E10000 were judged not reliable enough [6, 8] and, following decisions of the CCDS Working Group on TAI, the maximum allowable weight of a clock in EAL was changed from 1000 to 2500 starting from the computation over the two-month interval May-June 1995.

Studies are in hand to assess the advantages of using an upper limit of relative weights, rather than one of absolute weights. Tests show that an upper contribution of 1,37 % for any individual clock would have helped to improve the stability of EAL for all averaging times during the period January 1993-June 1995 (line 7 of Table 1) [8]. This criterion is severely discriminatory even among HP 5071A clocks and primary standards, some of these not being stable enough to reach the upper limit. It also deweights laboratories for which GPS data are not of the first quality.

It has been shown that the introduction of hydrogen maser data in the EAL computation did not degrade its stability for the period 1988-1994, though frequency drifts were not taken into account [4]. For averaging times close to the EAL computation time (60 days), the variation of the maser frequencies relative to EAL was dominated by an important drift in only one maser, which consequently received a small weight. However, EAL stability is improving and the frequency drift of some hydrogen masers may become significant when compared with the intrinsic EAL noise. If this proves to be the case, it will be necessary to use a specific weighting procedure and mode of frequency prediction for hydrogen masers, based on estimates of their frequency drifts. The CCDS Working Group on TAI did not take any decision on this point and tests are being carried out. It is already recognized that long periods of observation, at least one year, are necessary to make good estimates of frequency drifts.

Reduction of the noise involved in time transfers and the stability characteristics of HP 5071A clocks may make it possible to shorten the computation time of EAL. Tests show that data averaging over 30 day periods rather than 60 day periods improves the middle-term stability of EAL, but does not improve its long-term stability even if it is associated with an increase of the upper limit of weight (line 8 of Table 1) [62, 64]. Nevertheless, the idea of reducing the computation time has not been abandoned: this would reduce the delay of access to UTC and improve its predictability, two features which are important for national timing centres which keep a local representation of UTC [5].

Other decisions of the Working Group were put into operation immediately after the meeting:

- All time differences published in *Circular T* are given within ± 1 ns.
- Frequency steering corrections are published in advance, so as to facilitate the steering of local time scales.
- Clock data for month *n* are requested, in a file arranged according to a specified format, on the 5th of month (*n*+1). This had the effect that *Circular T 88* was published on 18 May 1995, whereas publication had been expected on 29 May.

- All contributing laboratories must provide the BIPM with data taken every 5 days (MJDs ending in 9 and 4) rather than every 10 days (MJDs ending in 9). January - February 1996 will thus be the first two-month interval for which TAI will be defined every 5 days.

2.2. Steering strategy

The question of new steering corrections was also discussed at the meeting of the CCDS Working Group on TAI [61]. The purpose of such corrections is to keep the duration of the TAI scale unit as close as possible to the SI second on the rotating geoid. For many years TAI accuracy has been based on results from the primary frequency standards PTB CS1 and CS2, but the situation has now radically changed:

- Since July 1994, the BIPM has regularly received data from evaluations of the optically pumped primary frequency standard NIST-7 developed at the NIST. These evaluations lead to a level of accuracy, characterized by a type B relative uncertainty of 1×10^{-14} (1 σ), never reached before. These results are corrected for the black-body radiation shift, which is estimated to be about -1,7 parts in 10^{14} for a caesium atom at a temperature of 300 K. In the past, laboratories reporting data from primary frequency standards have not applied this correction in a uniform way: in particular, the results provided by PTB CS1 and CS2 have never been corrected.
- Since July 1995, PTB CS1 has ceased operation and the BIPM has received an estimate of the black-body correction for PTB CS2. Recall that the type B relative uncertainty of PTB CS 2 is $1{,}5 \times 10^{-14}$ (1 σ).
- Since October 1995, the BIPM has received regular data from PTB CS3, which presents a type B relative uncertainty of $1{,}4 \times 10^{-14}$ (1 σ), and an estimate of the black-body correction for PTB CS3.

It follows that, starting October 1995, we have applied a black-body correction to results from PTB CS2 and CS3, and have evaluated the duration of the TAI scale unit from the three primary frequency standards PTB CS2, PTB CS3 and NIST-7, corrected in a consistent manner. This procedure is in accord with the decisions of the CCDS Working Group on TAI which recommended to the CCDS that black-body corrections should be applied.

This new procedure led to a departure of the TAI scale unit from the SI second on the geoid estimated as $1{,}9 \times 10^{-14}$ s, with a relative uncertainty of 1×10^{-14}, for the two-month interval November-December 1995. Compensation for this discrepancy has already been initiated: it takes the form of cumulative frequency steering corrections, each of relative amplitude 1×10^{-15}, on dates separated by 60 day intervals, a procedure which should not degrade the stability of the time scale.

3. Time links

Since the beginning of 1995, the GPS common-view technique has been the sole means of time transfer used for TAI computation. Nevertheless, the BIPM Time section is interested in any other time comparison method which has the potential for nanosecond accuracy, in particular GLONASS common views and two-way time transfer via geostationary satellites.

3.1. Global Positioning System (GPS)

Twice a year, the BIPM issues GPS international common-view schedules. The collection and treatment of rough GPS data are effected regularly according to well-known procedures. The international network of GPS time links used by the BIPM is organized to follow a pattern of local stars within a continent, together with two long-distance links, NIST-OP and CRL-OP, for which data is corrected to take account of on-site ionospheric measurements and post-processed precise satellite ephemerides. Only strict common-views are used in order to overcome effects due to the implementation of Selective Availability on satellite signals.

The BIPM also publishes an evaluation of the daily time differences [*UTC* - *GPS time*] in its monthly *Circular T*. These differences are obtained by smoothing data taken from a selection of satellites observed with an angle of elevation greater than 30°. The standard deviation of the daily results is about 12 ns, as Selective Availability is not completely eliminated in this procedure.

An important part of our current work is to check the differential delays between GPS receivers which operate on a regular basis in collaborating timing centres or, on special request, in other laboratories. The results are published in BIPM Reports [Refs 47 to 57 for the years 1993, 1994 and 1995]. A differential delay between a pair of laboratories which is measured with an uncertainty much smaller than its value and which remains stable over a period of years is applied by the Time section to the regular TAI computation. Differential corrections in use from 1st January 1996 are given in Table 2.

$UTC(k_1)$ - $UTC(k_2)$	Δt / ns
UTC(IEN) - *UTC*(OP)	-18
UTC(TP) - *UTC*(OP)	-12
UTC(IFAG) - *UTC*(OP)	+11
UTC(AOS) - *UTC*(OP)	+370
UTC(CH) - *UTC*(OP)	+14
UTC(TUG) - *UTC*(OP) [1]	+12
UTC(NRC) - *UTC*(USNO) [1, 2]	+17
UTC(USNO) - *UTC*(NIST) [1]	+15

Table 2: Differential corrections Δt to be applied to GPS time transfer for TAI computation starting January 1996. For all other links Δt is set to zero.

[1] Probable seasonal variations in GPS equipment at the TUG and the USNO.

[2] A physical change of the internal delay of the GPS equipment at the USNO would change the value of Δt to be applied to [*UTC* (NRC) - *UTC*(USNO)].

Work continues on testing the closure condition through a combination of three links, OP-NIST, NIST-CRL and CRL-OP, using precise GPS satellite ephemerides and ionospheric delays measured at the three sites. The closure condition still shows a residual error of a few nanoseconds on daily averages, which can now be determined with a precision of less than 1 ns [10]. With the passage of time the IGS precise satellite ephemerides continue to improve, which results in a corresponding improvement in the determination of the deviation from closure. The residual bias now probably originates from errors in station coordinates and errors in ionospheric measurements. Work is under way to evaluate these errors.

It may now be possible to carry out GPS time transfers at sub-nanosecond accuracy using dual-frequency phase measurements. Such data are obtained from the Allen Osborne Associates TTR-4P receiver in operation at the BIPM and we are now contacting outside laboratories equipped with similar receivers to initiate experimental work on this subject [20].

The implementation of technical directives for the standardization of GPS time receiver software and of the new data format [14, 58], designed in 1993, began in September 1995 [18]. In January 1996, nine of the laboratories keeping a local representation of UTC were equipped with the new software, but the BIPM has not yet been able to compute long-distance time links with the new software installed on both sites. Within the CCDS Group on GPS Time Transfer Standards, CGGTTS, the BIPM is now studying the possibility of using standardized hardware, with the aim of reducing the variation with outside temperature of some types of receivers currently in operation.

Another issue is the estimation of the tropospheric delay which is usually computed using a general empirical model. We are testing a semi-empirical model based on weather measurements taken on site. Time transfers through GPS common views over a short baseline of about 700 km, and over three baselines of 6400 km, 9000 km and 9600 km have been studied using both models. These show that the results of time comparisons within a region where the climate is similar are shifted by no more than a few hundreds of picoseconds when applying the semi-empirical model. In contrast, for long distance links, differences can reach several nanoseconds [16, 19].

3.2. Global Navigation Satellite System (GLONASS)

Values of [*UTC - GLONASS time*], provided from observations of GLONASS satellites by Prof. P. Daly, University of Leeds, are currently published in the *BIPM Circular T*.

In 1993, a GLONASS common-view time transfer experiment was organized jointly by the BIPM and the VNIFTRII, Moscow, Russia, using prototypes of GLONASS time receivers whose observations could not be scheduled. Despite the difficulty of such an experiment, it appears that GLONASS common-view time transfer had a performance close to that given by GPS common-view time transfer [21].

During the second half of 1995, a GLONASS common-view time transfer between California, the East Coast of the United States and the BIPM was carried out. The BIPM was equipped with a receiver which was on loan from the 3S Navigation Company. The software in this new receiver, which is designed specifically for fully automatic GLONASS common-view observations, is the first of its kind and was developed with the help of the BIPM: in particular, the results are provided in the new standard format defined by the GGTTS for GPS measurements. Results show a precision similar to that obtained with the GPS [22, 23].

Since January 1996, this experiment has continued with an expected improved accuracy using a GLONASS double-frequency receiver purchased by the BIPM, and the first official GLONASS international common-view schedule published by the BIPM in December 1995 for implementation on 4 January 1996. Some other laboratories, in particular in Europe and Asia, are now purchasing similar GLONASS time transfer receivers. This could lead to the implementation of an operational GLONASS network for time transfer and to the development of research studies concerning, for example, a GLONASS closure around the world.

It should be emphasized that, in comparison with GPS time transfer, GLONASS time transfer is not subjected to intentional degradation of satellite signals. It does, however, present two other difficulties:

* GLONASS time differs by about 25 μs from UTC while GPS time remains within ±100 ns of UTC,
* the reference system used with GLONASS is not the ITRF, although ITRF coordinates have been established and are currently used in national timing centres.

3.3. Two-way time transfer

The BIPM Time section has taken an active role in the work of the CCDS Working Group on Two-Way Satellite Time Transfer, first by ensuring the group secretariat and second by comparing time transfer results obtained with the two-way and the GPS common-view techniques [24].

Some of these studies were carried out in the framework of the field-trial. The field-trial is an international two-way time transfer experiment through the INTELSAT V-A(F13) satellite at 307°E, involving both European and North-American laboratories. It began in January 1994 and remained free of charge until the end of 1995. Regular time transfer sessions occurred three times per week, on Mondays, Wednesdays and Fridays. The field-trial was a major success in terms of putting into permanent operation an international network of eight stations. The precision of one single two-way point is about 200 ps, but sub-nanosecond time transfer has not yet been obtained [25, 26, 27].

3.4. Laser Synchronization from Satellite Orbit (LASSO)

The BIPM has been involved in an experiment to compare time transfer by laser synchronization from satellite orbits (LASSO) with GPS common-view time transfer between Texas and France [28]. As expected, the precision of individual LASSO points is better than 100 ps, unfortunately it was not possible to estimate the accuracy of the LASSO technique by this experiment.

3.5. Hydrogen masers in space

For several years now the BIPM Time section has been interested in the application to time metrology of experiments using hydrogen masers on board satellites. Indeed the excellent short-term stability of active and auto-tuned hydrogen masers should make it possible to solve a number of scientific and applied problems in the fields of time, navigation, geodesy, geodynamics and Earth-atmosphere physics. In this framework we have studied the potential use of the Experiment on Timing Ranging and Atmospheric Soundings (ExTRAS). In this the communication between on-board clocks and ground stations is effected by means of a microwave link using the PRARE technique (Precise Range and Range-Rate Equipment), and an optical link operating according to the T2L2 method (Time Transfer by Laser Link). The PRARE and T2L2 techniques are upgraded versions of the usual two-way and LASSO methods. The impact of ExTRAS, in the time domain, has been studied [29] in terms of anticipated uncertainty budgets: the potential accuracy of this experiment is characterized by uncertainties of order 500 ps (1 σ) for time dissemination and ground clock synchronization.

Unfortunately, in 1995, the ExTRAS project was not approved for funding by the European Space Agency. Another candidate is the NASA/RSA project Hydrogen Maser Clock, HMC, scheduled for launch in 1997. The equipment will consist of a hydrogen maser on board the Russian space station MIR, linked to ground clocks via a laser link of the T2L2 type. We follow the progress of this experiment in view of its possible application to time transfer.

4. Application of general relativity to time metrology

Investigations of the application of the theory of relativity to time transfer in the vicinity of the Earth at the picosecond level of accuracy [30, 31, 32] and to the development of a relativistic theory for the syntonization of clocks, also in the vicinity of the Earth, have been completed [33, 34, 35, 36]. Analytical expressions for the syntonization of a clock with respect to Geocentric Coordinate Time (TCG) were obtained at a relative uncertainty of about $2x10^{-17}$ for clocks on the Earth's surface and to about $1x10^{-18}$ for clocks on board terrestrial satellites. It was found that syntonization with respect to Terrestrial Time (TT) is limited at a relative uncertainty of about $2x10^{-17}$ by uncertainties in the determination of the potential at the location of the clock and on the geoid. When comparing the stability of two clocks, only time varying effects are of interest: expressions for calculation of the corresponding corrections at a level of 10^{-18} were obtained, even for clocks located on the Earth's surface.

Members of the Time section contributed to a report of the CCDS Working Group on the Application of General Relativity to Metrology chaired by Prof. B. Guinot, and are currently continuing research on some of the topics addressed by this report.

A satellite test of special relativity [37, 38] has also been proposed within the framework of the ExTRAS project (see Section 3.5) now abandoned. Research continues with the goal of eventually carrying out such a test.

5. Pulsars

Millisecond pulsars can be used as stable clocks to realize a time scale by means of a stability algorithm. Work has been carried out with a view to understanding how such a pulsar time scale could be realized and what implications it would have for atomic time [40, 41, 42]. An important feature of this work is that a pulsar time scale could allow the transfer of the accuracy of the atomic second from one epoch to another, thus overcoming some of the consequences of failures in atomic standards.

Collaboration is under way with radio-astronomy groups observing pulsars in order to obtain real pulsar data. The Time section provided these groups with successive versions of its post-processed realization of Terrestrial Time TT(BIPM93) in March 1993, TT(BIPM94) in May 1994 and TT(BIPM95) in April 1995, and has given other occasional support. This collaboration will continue through the Working Group on Pulsar Timing of the IAU commission 31 (Time), which is chaired by G. Petit.

Studies of a new technique which could be used at radio observatories to obtain more pulsar data are being carried out in collaboration with the Centre National d'Études Spatiales, CNES, Toulouse, France, and with the Paris Observatory, Meudon, France [39, 46]. The possibility of using this technique to discover new pulsars is also under study.

6. Very Long Baseline Interferometry

Very Long Baseline Interferometry (VLBI) is one of the most precise techniques for the realisation of reference frames in geodesy and astrometry. It is also an application which demands the highest stability of atomic clocks when operating with averaging times of 1 minute to 1 day. We maintain contact with this technique by collaborating with the Paris Observatory and the CNES, particularly through VLBI observations on millisecond pulsars [43, 44, 45, 46].

7. Time laboratory

Since the beginning of 1995 the time laboratory of the BIPM has been installed in a large room where the temperature is controlled to (22,0 ± 0,2)°C and the relative humidity to (55 ± 5)%. The BIPM has at disposal two caesium beam frequency standards set up in a small room particularly well protected against any environmental changes. One is a HP 5061A unit on loan from the USNO and the other one a HP 5071A unit on loan from Hewlett Packard in 1994 and 1995 and purchased by the BIPM in January 1996.

A number of one-channel single-frequency GPS time receivers of different types are in continuous operation at the BIPM where they are regularly compared. The time laboratory is located close to the antenna platform so cables are shorter than 30 m, a precaution which avoids distortion of the signal. Other units are used as portable receivers and serve for purposes of differential calibration. Ionospheric delays along the line of sight of GPS satellites are also measured on a regular basis by a number of dual-frequency systems on loan from Japan and USA. Among the equipment available at the BIPM is an Allen-Osborne TTR-4P GPS time receiver. This dual-frequency multi-channel receiver interprets the P-code and relies on the best available technology, however the quality of its data is disappointing: the TTR-4P unit is no more stable than a conventional single-frequency receiver operated in conjunction with an ionospheric measurement system. In addition, there is some suspicion that the software realizes an incorrect computation of the range between the satellite and the station. This receiver is thus still under test. As already noted in Section 3.2, we also have at our disposal a one-channel single-frequency GLONASS time receiver on loan from 3S Navigation and a dual-channel dual-frequency GLONASS time receiver which belongs to the BIPM. The BIPM Time section is grateful to private companies and national timing laboratories which actively support its work by the loan of equipment without which a deep understanding of the nature of timing data would not be possible.

A geodetic network has been established at the BIPM by the Institut Géographique National. This has an internal precision of a few millimetres and makes it possible to determine the coordinates of the phase centres of the GPS antennas with centimetric accuracy in a geocentric reference system [59].

8. Publications

8.1 External publications on time scales

1. THOMAS C., ALLAN D.W., A real-time prediction of UTC, *Proc. 25th PTTI*, 1993, 217-230.

2. THOMAS C., Time Activities at the BIPM, *Proc. 26th PTTI,* 1994, 111-122.

3. THOMAS C., WOLF P., TAVELLA P., Time scales, *Monographie BIPM-94/1*, 1994, 52 pages.

4. AZOUBIB J., THOMAS C., The Use of Hydrogen Masers in TAI Computation, *Proc. 9th EFTF,* 1995, 283-287.

5. QUINN T.J., THOMAS C., Role of the BIPM in UTC Dissemination to the Real Time User, *Proc. 27th PTTI,* 1995, in press.

6. THOMAS C., AZOUBIB J., Upper Limit of Weights in TAI computation, *Proc. 27th PTTI,* 1995, in press.

7. THOMAS C., Time Scales, *Selection and Use of Precise Frequency and Time Systems,* ITU Handbook, Chapter VI, 1996, in press.

8. THOMAS C., AZOUBIB J., TAI computation: study of an alternative choice for implementing an upper limit of clock weights, *Metrologia,* 1996, in press.

9. THOMAS C., Stability and Accuracy of the International Atomic Time, *Proc. 10th EFTF,* 1996, accepted.

8.2. External publications on GPS time transfer

10. LEWANDOWSKI W., PETIT G., THOMAS C., Precision and Accuracy of GPS Time Transfer, *IEEE Trans. Instrum. Meas.*, 1993, **42**, 474-479.

11. THOMAS C., The use of the AOA TTR-4P GPS receiver in operation at the BIPM for real-time restitution of GPS time, *Proc. 25th PTTI*, 1993, 183-195.

12. LEWANDOWSKI W., GPS Common-View Time Transfer, *Proc. 25th PTTI*, 1993, 133-148.

13. WEISS M.A., PETIT G., SHATTIL S., A comparison of GPS broadcast and DMA precise ephemerides, *Proc. 25th PTTI*, 1993, 293-306.

14. ALLAN D.W., THOMAS C,. Technical Directives for Standardization of GPS Time Receiver Software, *Metrologia*, 1994, **31**, 69-79.

15. THOMAS C., PETIT G., MOUSSAY P., Comparison between different dual-frequency GPS receivers measuring ionospheric delay for time and frequency applications, *Proc. 8th EFTF*, 1994, 1012-1028.

16. LEWANDOWSKI W., GRUDLER P., BAUMONT F., Study of tropospheric correction for GPS common-view time transfer between the BIPM and the OCA, *Proc. 8th EFTF*, 1994, 981-997.

17. PETIT G., THOMAS C., Current achievements in time transfer, *Highlights of Astronomy*, Kluwer Acad. Pub., I. Appenzeller (ed.), 1995, **10**, 286-287.

18. WEISS M.A., THOMAS C., Implementation of a Standard Format for GPS Common View Data, *Proc. 26th PTTI*, 1994, 75-88.

19. LEWANDOWSKI W., KLEPCZYNSKI W.J., MIRANIAN M., GRUDLER P., BAUMONT F., IMAE M., Study of Tropospheric Correction for Intercontinental GPS Common View Time Transfer, *Proc. 26th PTTI*, 1994, 319-332.

20. PETIT G., MOUSSAY P., THOMAS C., GPS Time Transfer Using Carrier Phase and P-Code Measurements, *Proc. 10th EFTF*, 1996, accepted.

8.3. External publications on GLONASS time transfer

21. DALY P., KOSHELYAEVSKY N.B., LEWANDOWSKI W., PETIT G., THOMAS C., Comparison of GLONASS and GPS Time Transfers, *Metrologia*, 1993, **30**, 89-94.

22. KLEPCZYNSKI W.J., DANAHER J., KIM S., LEWANDOWSKI W., An Experiment of GLONASS Common-View Time Transfer Between North America and Europe, *Proc. 27th PTTI*, 1995, in press.

23. KLEPCZYNSKI W.J., LEWANDOWSKI W., DANAHER J., GLONASS Common-View Time Transfer Between North America and Europe and its Comparison with GPS, *Proc. 10th EFTF*, 1996, accepted.

8.4. External publications on two-way satellite time transfer

24. KIRCHNER D., RESSLER H., GRUDLER P., BAUMONT F., LEWANDOWSKI W., HANSON W., KLEPCZYNSKI W., UHRICH P., Comparison of GPS and Two-Way Satellite Time Transfer Over A Baseline of 800 km, *Metrologia*, 1993, **30**, 183-192.

25. KLEPCZYNSKI W.J., DAVIS J.A., KIRCHNER D., RESSLER H., DE JONG G., BAUMONT F., HETZEL P., SOERING A., HACKMAN C., GRANVEAUD M., LEWANDOWSKI W., Some Preliminary Results of the FAST Calibration Trip During the INTELSAT Field-Trial, *Proc. 26th PTTI*, 1994, 89-94.

26. DAVIS J.A., LEWANDOWSKI W., DEYOUNG J.A., KIRCHNER D., HETZEL P., DE JONG G., SOERING A., BAUMONT F., KLEPCZYNSKI W.J., PARKER T., BARTLE K.A., RESSLER H., ROBNIK R., VEENSTRA L., Preliminary Comparison of Two-Way Satellite Time and Frequency Transfer and GPS Common-View Time Transfer During the INTELSAT Field-Trial, *Proc. 27th PTTI*, 1995, in press.

27. DAVIS J.A., LEWANDOWSKI W., DEYOUNG J.A., KIRCHNER D., HETZEL P., DE JONG G., SOERING A., BAUMONT F., KLEPCZYNSKI W.J., PARKER T., BARTLE K.A., RESSLER H., ROBNIK R., VEENSTRA L., Comparison of Two-Way Time

Transfer and GPS Common-View Time Transfer During the INTELSAT Field-Trial, *Proc. 10th EFTF,* 1996, accepted.

8.5. External publications on LASSO experiment

28. LEWANDOWSKI W., PETIT G., BAUMONT F., FRIDELANCE P., GAIGNEBET J., GRUDLER P., VEILLET C., WIANT J., KLEPCZYNSKI W.J, Comparison of LASSO and GPS time transfers, *Proc. 25th PTTI*, 1993, 357-366.

8.6. External publications on ExTRAS

29. THOMAS C., WOLF P., UHRICH P., SCHAEFER W., NAU H., VEILLET C., Anticipated Uncertainty budgets of Praretime and T2L2 Techniques as applied to ExTRAS, *Proc. 26th PTTI,* 1994, 127-140.

8.7. External publications on General Relativity

30. PETIT G., WOLF P., Relativistic theory for picosecond time transfer in the vicinity of the Earth, *Proc. 25th PTTI*, 1993, 205-215.

31. PETIT G., WOLF P., Relativistic theory for picosecond time transfer in the vicinity of the Earth, *Astron. Astrophys.*, 1994, **286**, 971-977.

32. PETIT G., WOLF P., Relativistic theory for picosecond time transfer in the vicinity of the Earth, *Proc. 8th EFTF,* 1994, 407-416.

33. WOLF P., PETIT G., Realization of TCG, TT and TCB, using hyperstable clocks: limits from geophysical and astronomical constants, *Journées 1994 Systèmes de Référence Spatio-Temporels*, 1994, 41-46.

34. WOLF P., PETIT G., Relativistic Theory for Syntonization of Clocks in the Vicinity of the Earth, *Proc. 26th PTTI*, 1994, 381-392.

35. WOLF P., PETIT G., Relativistic Theory for the Realization of Coordinate Time Scales and the Syntonization of Clocks in the Vicinity of the Earth, *Proc. 9th EFTF*, 1995, 323-326.

36. WOLF P., PETIT G., Relativistic Theory for Clock Syntonization and the Realization of Geocentric Coordinate Times, *Astron. Astrophys.*, 1995, **304**, 653-661.

37. WOLF P., Satellite Test of the Isotropy of the One-Way Speed of Light Using ExTRAS, *Proc. 26th PTTI,* 1994, 455-464.

38. WOLF P., Proposed Satellite Test of Special Relativity, *Phys. Rev. A.,* 1995, **51**, 6, 5016-5018.

8.8. External publications on millisecond pulsars

39. PETIT G., FAYARD T., LESTRADE J-F., High precision timing of the millisecond pulsar 1937+21 by autocorrelation of VLBI data, *Astron. Astrophys.*, 1995, **303**, L17-L20.

40. PETIT G., BIPM analysis of millisecond pulsar data, *Highlights of Astronomy*, I. Appenzeller (ed), 1995, **10**, 278-279.

41. PETIT G., TAVELLA P., Pulsars and time scales, *Astron. Astrophys.*, 1996, in press.

42. PETIT G., Limits to the stability of pulsar time, *Proc. 27th PTTI*, 1995, in press.

8.9. External publications on VLBI

43. PETIT G., FAYARD T., Validation of the CNES VLBI correlator and its use for millisecond pulsar astrometry, *Proc. 9th meeting on European VLBI for geodesy and astrometry,* 1993, 129-132.

44. FAYARD T., PETIT G., The CNES VLBI soft-correlator, *Proc. 9th meeting on European VLBI for geodesy and astrometry,* 1993, 123-128.

45. PETIT G., FAYARD T., A Programmable VLBI Correlator Using Parallel Computing, *VLBI Technology, Progress and Future Observational Possibilities,* Sasao T., Manabe S., Kemeya O., Inoue M. (eds), Terra Scientific Pub., 1993, 332-337.

46. PETIT G., Observations VLBI des pulsars millisecondes pour le raccordement des systèmes de référence célestes et la stabilité des échelles de temps, *Thèse de Doctorat,* Observatoire de Paris, 1994.

8.10. BIPM reports on GPS differential calibration

47. LEWANDOWSKI W., THOMAS C., IMAE M., Determination of differential time correction between GPS time receivers located at the Observatoire de Paris and the Communications Research Laboratory of Tokyo, *Rapport BIPM-93/4*, 1993, 12 pages.

48. THOMAS C., MOUSSAY P., Determination of differential time correction between GPS time receivers located at the Observatoire de Paris and the Standards and Calibration Laboratory of Hong Kong, *Rapport BIPM-93/5*, 1993, 12 pages.

49. THOMAS C., MOUSSAY P., Determination of differential time correction between GPS time receivers located at the Observatoire de Paris, Paris, France, and the National Physical Laboratory, Teddington, United Kingdom, *Rapport BIPM-94/2*, 1994, 12 pages.

50. THOMAS C., MOUSSAY P., Determination of differential time correction between GPS time receivers located at the Observatoire de Paris, Paris, France, and the National Institute of Standards and Technology, Boulder, Colorado, USA, *Rapport BIPM-94/3*, 1994, 12 pages.

51. LEWANDOWSKI W., Determination of differential time correction between GPS time equipment located at the Observatoire de Paris, Paris, France, and the United States Naval Observatory, Washington DC, USA, *BIPM Report 94/11,* 1994, 14 pages.

52. LEWANDOWSKI W., BAUMONT F., Determination of differential time corrections between GPS time equipment located at the Observatoire de Paris, Paris, France, the Observatoire de la Côte d'Azur, Grasse, France, the National Physical Laboratory, Teddington, United

Kingdom, the Van Swinden Laboratorium, Delft, the Netherlands, the Physikalisch-Technische Bundesanstalt, Braunschweig, Germany, the Forschungs-und Technologiezentrum, Darmstadt, Germany and the Technical University, Graz, Austria, *BIPM Report 94/12,* 1995, 12 pages.

53. LEWANDOWSKI W., MOUSSAY P., Determination of differential time correction between GPS time equipment located at the Observatoire de Paris, Paris, France, and the Istituto Elettrotecnico Nazionale Galileo Ferraris, Torino, Italy , *BIPM Report 95/07,* 1995, 10 pages.

54. LEWANDOWSKI W., Determination of differential time correction between GPS time equipment located at the Observatoire de Paris, Paris, France, and the Van Swinden Laboratorium, Delft, the Netherlands, *BIPM Report 95/08,* 1995, 10 pages.

55. LEWANDOWSKI W., Determination of differential time correction between GPS time equipment located at the Observatoire de Paris, Paris, France, and the United States Naval Observatory, Washington DC, USA, *BIPM Report 95/10,* 1995, 12 pages.

56. LEWANDOWSKI W., Determination of differential time correction between GPS time equipment located at the Observatoire de Paris, Paris, France, and the Central Office of Measures, Warsaw, Poland, *BIPM Report 95/11,* 1995, 12 pages.

57. LEWANDOWSKI W., Determination of differential time correction between GPS time equipment located at the Observatoire de Paris, Paris, France, and the Astronomical Latitude Observatory, Borowiec, Poland, *BIPM Report 95/12,* 1995, 12 pages.

8.11. Other BIPM Reports and Reports to the CCDS Working Group on TAI

58. THE GROUP ON GPS TIME TRANSFER STANDARDS, Technical Directives for Standardization of GPS Time Receiver Software, *Rapport BIPM-93/6,* 1993, 32 pages.

59. PETIT G., Détermination d'un réseau géodésique au BIPM, liaison avec le système de référence ITRF, *Rapport BIPM-94/8,* 1994, 5 pages.

60 THOMAS C., Pre-filtering of timing data, *Report to the CCDS Working Group on TAI,* GT-TAI/95-4, 1995, 2 pages.

61. PETIT G., Test of different strategies in the steering of EAL, *Report to the CCDS Working Group on TAI,* GT-TAI/95-6, 1995, 9 pages.

62. AZOUBIB J., THOMAS C., Shortening of the definitive computation time of TAI, *Report to the CCDS Working Group on TAI,* GT-TAI/95-7, 1995, 28 pages.

63. AZOUBIB J., THOMAS C., The upper limit of weight for clocks contributing to TAI, *Report to the CCDS Working Group on TAI,* GT-TAI/95-8, 1995, 26 pages.

64. THOMAS C., AZOUBIB J., A modified version of the TAI algorithm under test, *Report to the CCDS Working Group on TAI,* GT-TAI/95-9, 1995, 15 pages.

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