U. S. NAVAL OBSERVATORY
WASHINGTON, D.C. 20390

8 October 1971

TIME SERVICE ANNOUNCEMENT, SERIES 14 NO. 8

NEW UTC SYSTEM

References: (a) Time Service Announcement Series 14, No. 7
(b) CCIR Rec. VII/460 (New Delhi, 1970)
(c) IAU Rec. 1 of Comm 31 (Brighton, 1970)
(d) CCIR Report VII/517 (Geneva, 1971)
(e) "International Coordinated Clock Time and the Coming Improvements in the System UTC," by G. M. R. Winkler, 25th Annual Frequency Control Symposium, Atlantic City, N. J., April 1971
(f) Time Service Announcement Series 14, No. 2

1. In accordance with References (b), (c), and (d), the following improvements in the system of coordinated clock time used by USNO for all external measurements will be implemented on 31 December 1971 at 24 hours UTC.

a) Frequency Change:

The frequency of UTC (USNO) will be increased by 300×10^{-10}. This is equivalent to permanently making the "Offset" zero. (Clocks will operate on standard frequency as based on the S.I. second.)

b) Time Step:

At the end of this calendar year a unique fraction of a second step will also be introduced in UTC(USNO) to coordinate it closely with the International Time Scales kept by the BIH. UTC (USNO) will be delayed (retarded) by 107 600 μs. In other words, the standard moment of change may be expressed in either of the following dates which will mean the same instant.

1971 December 31, $23^h\ 59^m\ 60^s.107\ 600$ old UTC

1972 January 1, $0^h\ 0^m\ 00^s$ (exactly) new UTC.

2. Difference: UTC (USNO, new) - UTC (USNO, old)

a) Tables.

In order to facilitate comparisons between clocks set to the old and new UTC scales at times different from the standard moment, the attached tables are provided giving the difference

$$\underline{\text{UTC (USNO, new) - UTC (USNO, old)}}$$

for any moment of measurement between 1 September 1971 and 29 February 1972. (For the "algebraic" notation see reference (f).) Table I gives the clock difference for the beginning of the day (0^h UT) using the formula,

$$\text{UTC (USNO, new) - UTC (USNO, old)} = 2\,592\ (\text{MJD} - 41317) - 107\,600\ \mu\text{s}.$$

Due to the frequency difference between the old and the new systems of UTC, the instant of measurement has to be taken into account by adding Table II values to the value of Table I.

Example:

Time of measurement: 1972 January 14, $15^h\ 45^m\ 53^s$ UTC (old or new)

from Table I	- 73 904.00	(0^h, January 14)
	+ 1 620.00	(15^h)
	+ 81.00	(45^m)
	+ 1.59	(53^s)

UTC (USNO, new) - UTC (USNO, old) = - 72 201.41 μs

b) Formula.

The difference for the instant of measurement may be computed directly from the formula (given above) by converting the desired instant to a decimal of a day.

Example:

Time of measurement:

1971 October 15, $8^h\ 15^m\ 26^s$ UTC (old or new) = MJD 41239.344 051

The formula gives

UTC (USNO, new) - UTC(USNO, old) = - 308 884.22 μs.

3. Further details of the coming changes in the coordinated clock time system can be found in References (a) and (e). Details concerning the Delta UT Code (giving $\Delta UT = UT1 - UTC$) can be found in References (d) and (e). (Reference (a) is superseded by Reference (d) in regard to the code.)

4. In view of the coming improvements, no further steps will be announced in the old UTC. Consequently, users requiring UT1 or UT2 with greater precision than 0.7s are advised to request Time Service Announcement Series No. 7, issued weekly. It gives predicted differences for UT2 - UTC two weeks in advance with an estimated accuracy of 5 ms.

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