TIME TO START WATCHING TIME

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Additional Note on Sep 02 2003:

Drift rate analysis of the independent time standard that has been developed now shows a departure of 1.5 seconds over a period of 57 days since the monitoring of time standards began. This indicates the detection of another 0.5 second additional departure since Aug 17 2003. A projection of the current time departure rate is estimated at 9.5 seconds per year; a departure of this magnitude is phenomenal in magnitude if these observations bear out in the future. A one second departure (approximately) over a year period is expected based upon the historical record. A careful monitoring of geophysical events and changes is recommended based upon this preliminary report, as unusual changes in time will likely correlate with significant geophysical energy releases. The likelihood of random errors has diminished since all UCT time differences being measured are of the same sign. No errors in the processing of the data have been discovered. All five clocks in the independent time standard are now modeled with least squares linear drift rates, and these have been revised accordingly in the table below. Readers are referred to the paper entitled Time, Energy and Earth Changes to assess the potential geophysical impact of small time differences that have been observed and reported. The number of clocks being used in the independent time standard will increase in the future. The estimated RMS error in the independent time standard drift rates is approximately 0.1 to 0.2 seconds / month. This monitoring project commenced at 2320 MDT on 070803.

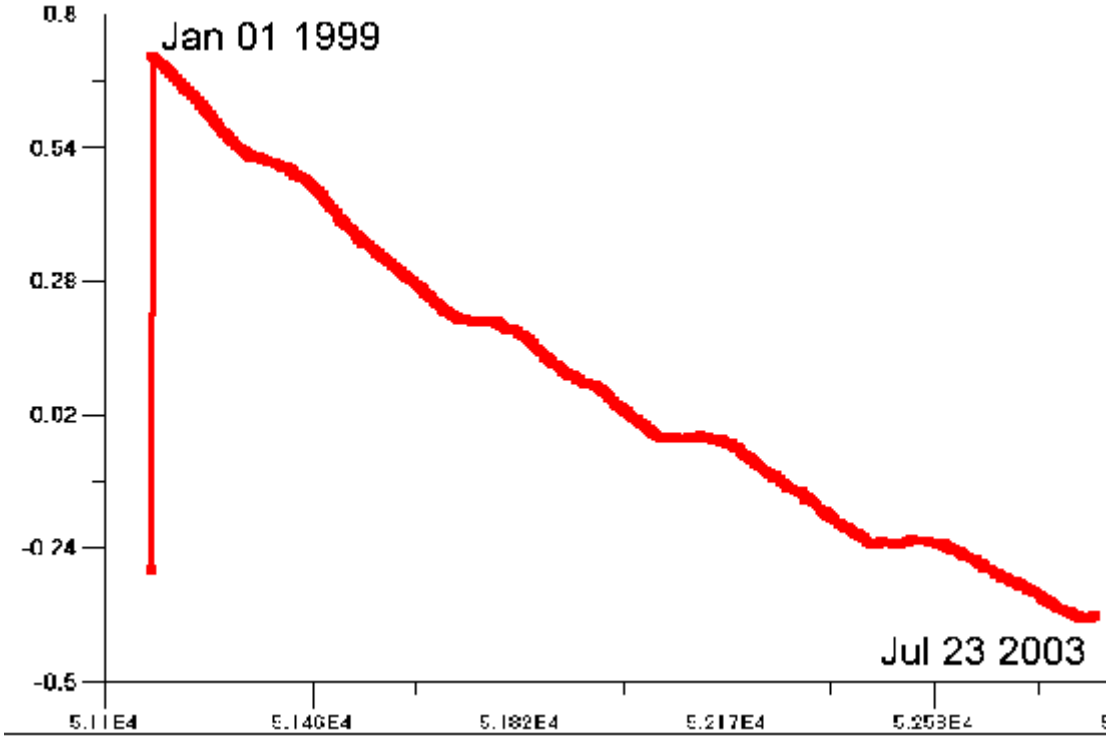
Additional Note on Aug 17 2003:

All indications are that another 0.5 seconds has been added to UTC between 0930 MDT on 081603 and 1200 MDT on 081703. This reaffirms the need for independent time standards to be established by researchers that wish to monitor this investigation. No errors in processing of the data have been discovered.

There appears to be the possibility that undocumented revisions to Universal Coordinated Time (UTC) may be occurring. This report is preliminary, and continued efforts are being made to determine if any errors of process have occurred. Additional observers are called for to monitor and establish independent time references from the national and international sources that are available to the public. This finding, if verified, leads to geophysical questions of planetary significance, since UTC is based upon the rotation rate of the earth. Undocumented revisions to this time standard, if they are

occurring, are of great importance. This study is investigative and final conclusions are not appropriate at this time.

It has already been determined that the variations between the atomic time standard (TA1) and UTC since the beginning of 1999 are statistically extraordinary. Readers are referred to an earlier paper on the issue of time and various hypotheses that are under consideration. Attention has also been called to a most unusual "stair-step" pattern in the post 1999 data which is visible in the graph below. Any unusual variations in the difference between atomic time (TA1) and UTC can be interpreted as anomalies in the rotational rate of the earth.



"Stair Step" Pattern Visible in Post 1999 Series
Y Axis is the Difference in Time Between TA1 and UTC
TA1 is based upon atomic time. UTC is based upon the rotational speed of the earth.
X Axis is the Julian Day Number. Data begins on Jan 01 1999 and ends on Jul 23 2003
Source of Data : U.S. Naval Observatory

The data and observations indicate that an undocumented 0.5 second addition to UTC may have been made between 1000 MDT on 081203 and 2300 MDT on 081303. If the observation is correct, it may be interpreted as a "partial" leap second, and the frequency of such an event would be of great importance. The observation does appear as an anomaly, either in the UTC time standard or within the clocks that are being used as an independent time standard. If any errors in the processing are discovered, they will be promptly reported; none have been discovered at this time. It is unlikely that revisions of this nature can be documented unless careful monitoring begins at a broader level, since this would not qualify as a leap second addition (which is normally reported). It is unusual that no documented full leap seconds have been added since Jan 01 1999, and this absence is out of character with the historical record.

A method of recording time has been developed which demonstrates accuracy on

the order of .003 – .005 seconds day, or approximately 0.1 seconds per month of elapsed time. This independent standard has been and remains under comparison with UTC, and appears to be able to easily detect any discrete aberrations on the order of 0.5 seconds or more.

The general procedure being used is as follows:

1. Five new digital clocks reading to the second have been acquired. Each clock is carefully synchronized to UTC via WWV at an arbitrary point in time.

2. An automatically updating so-called "atomic" clock has been acquired to serve as an additional time standard. This particular digital clock remains within 1-2 seconds of the WWV time signal regardless of elapsed time due to the updating of the time by radio signal from WWV. This clock is optional but serves as an additional time standard for direct observation. This clock is not used in any of the numerical analysis that has taken place.

3. WWV radio signals will need to be available on a regular basis. These signals can be heard on the shortwave frequencies of 5, 10 and 15 MHz.

4. Drift rates for each clock are regularly determined as the ratio of the error in any one clock as compared to the WWV signal to the elapsed interval in days, assuming that no discrete revisions to UTC have been made during the interval of measurement. Drift rate determinations have been made approximately once per day for a 60+ day period. Errors in the drift rate have been carefully and continually analyzed. All five clocks now use a linear modeling of the drift rate to achieve the same level of accuracy estimated at .002 – .004 seconds per day.

5. Numerous error analysis procedures have been applied to the observational data sets, and all analyses are in accordance with the measured data sets.

6. The drift rates for each clock have been determined over a 57 day period with an estimated RMS error of .002 – .004 seconds /day as follows:

Clock Number	Drift Rate seconds / day
1	(– 9.1E-4 * elapsed days) + .177
2	(2.08E-3 * elapsed days) + 1.494
3	(– 1.2E-4 * elapsed days) + 1.949
4	(1.97E-3 * elapsed days) + 0.489
5	(– 2.59E-4 * elapsed days) + 1.159

The error budget on this independent time standard has stabilized at approximately 25 days into the recording process, and has remained so until the period specified of 1000 MDT on 081203 to 2300 MDT on 081303, when a

dramatic departure from the established drift rates was observed with an RMS error escalation to approximately .015 seconds.

7. Analysis indicates that the increased error on 081203 to 081303 will result with the introduction of a 0.5 second offset into either the UTC or the five clock independent digital time standard. The latter appears unlikely at this point in time, since all clocks measure relatively equal departures. A projection of the data which includes a 0.5 second offset maintains the drift rates and error budget reported in the table above.

8. Astronomic occultation observations may also be helpful in analyzing any variations in UTC.

9. Work will continue to establish or refute the validity of the observation that has been recorded on this page. Additional researchers will be helpful in this process. The particulars of the observation and calculation methods will be described in greater detail as circumstances require.

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