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NATIONAL
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JUNE 30 WILL BE ONE SECOND LONGER

The first leap second in history will occur June 30, 1972. At the recommendation of the International Bureau of Time, an extra second will be inserted into the day of June 30, beginning at 23 hours 59 minutes 60 seconds UTC (Universal Coordinated Time.) That will be 7 p.m. Eastern Standard Time. The UTC clock at the National Bureau of Standards (NBS) in Boulder, Colorado will be set back one second. NBS is part of the U.S. Department of Commerce.

The leap second will be incorporated into the broadcasts of standard frequency and time stations WWV, WWVB, and WWVH, operated by the NBS Boulder Laboratories.

The term "leap second" comes from the analogy to "leap year," when an extra day is added to the calendar to compensate for the fact that there aren't a whole number of days in a year. Because the number of seconds in a year varies with the earth's spin, it is necessary to add or subtract the leap second. If this adjustment were not made, clocks would be out of step with the sun and stars' positions in the sky.

In the past, clocks were adjusted to our position in space by adjusting the speeds of the clocks and by making step adjustments of a fraction of a second. That method caused confusion and was difficult to implement.

The new method, under international agreement, has been in effect since the first of 1972. It requires no rate adjustments - only occasional leap second adjustments - making it much simpler, according to NBS scientists.

The UTC scale and the time scale based on the earth's rotation are kept synchronous to within about seven-tenths of a second. The

earth has slowed down since the year 1900 so that a positive leap second is needed approximately once a year. At other times it may be necessary to subtract a second.

The causes of variations in the earth's rate of spin are not known with certainty. Geophysicists think perhaps global wind patterns, ocean tides and currents, and even shifting currents within the molten core of the earth may be causes. Whatever the reasons, the effects are easily measured by modern atomic-clock systems. The NBS atomic clock is about 100,000 times better than the earth-rotation clock.

The procedure that NBS scientists will use to make the leap second adjustment on June 30 is simply to stop their clocks for exactly one second at the specified time. Thus, June 30 will be one second longer this year.

For most people, the leap second will come and go without notice. Most clocks in use are not accurate to a second anyway. But many scientific and technical laboratories will have to adjust their atomic clocks if they want to stay in step with official time.

ADDITIONAL INFORMATION:

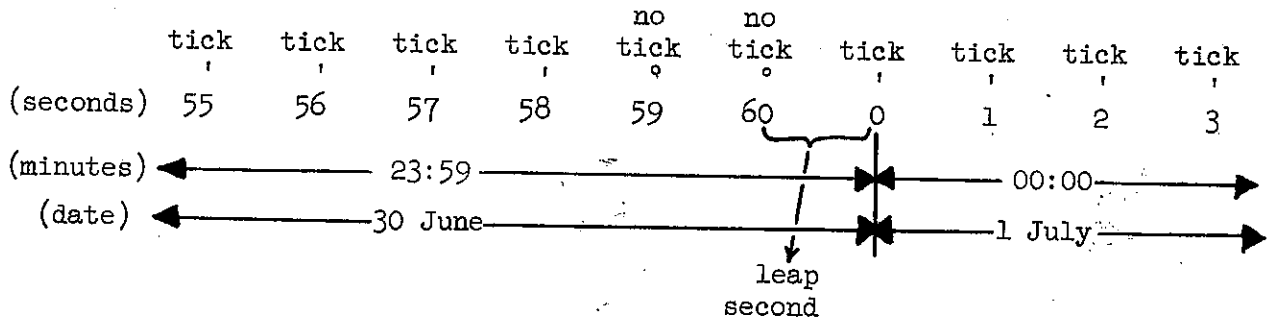
A time scale is a means of assembling a series of time intervals into a continuous record of dates, where "dates" refer to specific instants of time, not just calendar days. The scale must define the length of the unit intervals, and the beginning date. For the UTC time scale, the unit interval is the second, which is defined as the length of time needed for 9,192,631,770 oscillations of the radiation associated with the cesium atom under specified conditions. These "atomic" seconds are added together to yield minutes, hours, days, years, etc. UTC is different from other atomic time scales because leap seconds are used to adjust UTC to keep it nearly synchronous with the earth. For instance, International Atomic Time (IAT) is the major internationally adopted time scale, but it has no leap second adjustments, and on 1 January 1972 UTC was set

exactly 10 seconds late compared to IAT. The various scales are used for different scientific or navigational purposes, each one designed to have certain characteristics useful to its users.

NBS RADIO STATION LEAP SECOND PROCEDURE

The National Bureau of Standards (NBS) operates four standard frequency and time radio stations, three of which are affected by the leap second. (The fourth, WWVL, is experimental in nature, and only transmits frequency information, not time of day.) WWV, WWVH, and WWVB provide time-of-day information by means of pre-recorded messages cued by time code generators. Each of the stations uses three generators for reliability (two are standby units). One of these standby time code generators at each station will be set up to include the leap second. Then, at the proper moment (23:59:60 UTC, June 30), control of the station will be shifted from the primary time code generator to the altered one (which then becomes the primary unit). Later, the other two generators at each station can be corrected to include the extra second and they can be put back into the system as backup units.

WWV and WWVH normally transmit "ticks" at the beginning of each second except the 29th and 59th of each minute. However, the beginning of the leap second (the 60th second of minute 23:59) will also lack a tick. Schematically, the situation will appear thus:



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