From: Gareth Hunt <ghunt@NRAO.EDU>
To: abridle@NRAO.EDU
Subject: Fyi: whine 2000 (forwarded from Ken Sowinski)
Date: Tue, 14 Oct 1997 18:31:15 -0400 (EDT)

------- start of forwarded message (RFC 934 encapsulation) -------
From: Ken Sowinski <ksowinsk@aoc.nrao.edu>
To: tbeasley@aoc.nrao.edu
Cc: bsahr@aoc.nrao.edu, gmartin@aoc.nrao.edu, pdooley@aoc.nrao.edu,
ghunt@aoc.nrao.edu
Subject: whine 2000
Date: Thu, 9 Oct 1997 16:38:58 -0600 (MDT)

Year 2000 problems at the VLA

The problem arises because the IAT clock which drives the VLA only provides the two least significant digits of the year to the computer system. Internally and on the front panel the clock uses a four digit year, but not all digits are communicated to the computer system.

This is a concern in three situations; one of them is trivial. The trivial situation is that at boot time, the date and time are read from the clock and used to initialize the operating system clock. This is referred to by various programs to produce readable ASCII time stamps, usually, for annotation purposes. The more serious uses of the clock concern astronomy. When the system initializes itself the time and date read from the clock are used to calculate MJAD and IAT for internal astronomical timekeeping. This will fail at the transition from 1999 to 2000 because the clock only provides the low order digits. Finally, the clock is read periodically and the result compared with the time kept in core; if the two disagree we claim that something has broke. Again, this will break at the transition from 1999 to 2000.

Except in the cases outlined in the previous paragraph everything else in the online system is derived from MJAD. Since MJAD counts independently of centuries it is suggested that nothing else will break.

How to address the problems

I have modified the layer of the software that communicates with the clock to apply a heuristic to determine the century and return a four digit year rather than a two digit year. The only place that this layer is invoked has been modified to assume a four digit year. I have also verified by inspection that the year 2000 will be considered to be a leap year. The heuristic used will break down in the year 2090, long after any of us should need to care about it. Similarly, the leap year detection algorithm will fail for the year 2100. With these changes we will be able to observe beyond 1999 and through the foreseeable life of the VLA online system.

The operating system keeps the year internally as four digits if it is provided in that form. I propose modifying the initialization code to do so in the near future.

Any other problems will be cosmetic. In various situations dates are produced for human consumption or for generating names of files.

These will appear as either "00" or "1900" in the year 2000. These uses of dates can be changed on an ad hoc basis anytime before or after December 31, 1999. I would argue that we not even think about this until the year 2000. We have enough work to do already that is not merely cosmetic.

Testing

With the changes described above in place I performed two tests. First, I set the clock to shortly before midnight the night of December 31, 1999 and observed that the system and the clock continued to function as normally as one might expect as the artificial time passed through midnight. I could not observe real fringes because it was not possible to set the sky as easily as the clock.

The second test was to set the clock to the correct time and day but three years ahead. Again the sky does not cooperate very well, but did so sufficiently well to be able to observe fringes at L band from where 3C84 would be on October 7, 2000.

Conclusion

I believe that we are now prepared to continue observing at the VLA beyond December 31, 1999. Any remaining issues are only cosmetic and may be safely addressed in the year 2000.
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