

Discuss and take appropriate action on special recognition of employee in County Clerk's office.

County Clerk Nancy Rister read resolution to the court.

Moved: Commissioner Boatright

Seconded: Commissioner Hays

Motion: To recognize Deputy Clerk Gina Mabry for outstanding service to the citizens of Williamson County.

Vote: Motion carried 3 - 0 with Commissioner Mehevec absent from the dais.  
< Clerk copy here >

*State of Texas*  
*County of Williamson*  
*Know all men by these presents:*

THAT ON THIS, the 20<sup>th</sup> day of October, 1998, the Commissioners Court of Williamson County, met in duly called session at the Courthouse in Georgetown, Texas, with the following members present:

John C. Doerfler, County Judge  
Mike Heiligenstein, Commissioner, Pct. #1  
Greg Boatright, Commissioner, Pct. #2  
David Hays, Commissioner, Pct. #3  
Jerry Mehevec, Commissioner Pct. #4  
Nancy E. Rister, County Clerk

And at said meeting, among other business, the Court considered the following

**RESOLUTION**

WHEREAS, County Government is a service industry endeavoring to provide specific services to it's citizens; and

WHEREAS, Governmental service is only as good as the employees delivering service to the citizens on a one on one basis; and

WHEREAS, all employees of the County Clerk's office have demonstrated exemplary service to the customers of the office, Gina Mabry has had an outstanding attitude and been most helpful to the public during the last three months; and

WHEREAS, she has upheld the highest standards of service as a Williamson County Clerk employee; Now

THEREFORE, BE IT RESOLVED that the Williamson County Commissioner's Court, on behalf of all the citizens of Williamson County, do publicly PRAISE and COMMEND

GENA MABRY

for her unselfish efforts in serving the citizens of Williamson County.

*John C. Doerfler*  
John C. Doerfler, County Judge

ATTEST:

*Nancy E. Rister*  
Nancy E. Rister, County Clerk



Discuss and take appropriate action on hiring professional services for Year 2000 hardware/software inventory.

Moved: Commissioner Boatright

Seconded: Commissioner Heiligenstein

Motion: To approve hiring John Donna, computer consultant professional services for Year 2000 Readiness Assessment for Williamson County's Personal Computer Equipment and Software.

Vote: Motion carried 3 - 0 with Commissioner Mehevec absent from the dais.

< Clerk copy here >

10/19/98 MON 12:45 FAX 5124747577

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**PROPOSAL FOR YEAR 2000 READINESS ASSESSMENT FOR WILLIAMSON  
COUNTY'S PERSONAL COMPUTER EQUIPMENT AND SOFTWARE  
10/16/98**

**SCOPE**

The following work is proposed to help Williamson County prepare its plan to address year 2000 computer equipment issues:

1. Collect inventory data on all Williamson County's PC workstations--and file servers, as necessary--to include CPU, BIOS, operating system and application software information. (Inventory of peripherals, such as monitors, printers, modems, UPS's, backup tape and disk drives are not included in this proposal.)
2. Obtain and run commercial software designed to test year 2000 compliancy on each PC.
3. Interpret results of software inventory and year 2000 tests. Provide each department head with a Personal Computer Year 2000 Readiness Assessment to include:
  - a) List of computers
  - b) List of software on each computer
  - c) Compliancy classification for each component: Compliant, Not Compliant, "Unknown" (compliancy data unavailable)
  - d) Recommendations.

*The objective of this project is not to make systems year 2000 compliant, but to provide Williamson County and its department heads with knowledge they can use to make informed decisions regarding their year 2000 preparedness.*

**COST**

Based on Williamson County's estimate that it has 300+ PC's, I propose to do the work outlined above at the following rate:

\$30 per inventoried PC for license of commercial software to test year 2000 compliancy.  
\$40 per inventoried PC for site visit and data collection.  
\$10 per PC for analysis and production of reports.

The total for 300 PC's therefore would be \$24,000.

Williamson County's Information System's group has expressed an interest in helping with the software inventory to reduce expense to the County and expedite the project. For each PC on which IS does the data collection per my instructions, I will charge a total of 45\$ instead of 80\$, for a savings of \$35 to the County.

The project will be progressively invoiced weekly, or as groups of approximately 50 PC's are completed. Payment will be expected within 15 days of receipt of the invoice. Work in addition to that outlined above will be billed to Williamson County at \$80 / hour + materials.

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P I N P O I N T

## Testing PC Hardware for Year 2000 Compliance

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**PC Hardware Testing  
for Year 2000 Compliance**

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# Testing PC Hardware for Year 2000 Compliance

## Testing PC Hardware

A network manager starting to investigate hardware testing is presented with several different testing scenarios. These scenarios are often backed up with conflicting opinions on the scope, viability, and complexity of the tests being performed. This paper will help sort out the various test scenarios and provide a good foundation for decision making when selecting a Y2k hardware test tool.

## Background

The Y2k problem as it relates to PC hardware can be traced back to the introduction of the IBM PC-AT. With the AT class machines, a real-time clock (RTC) was added to the architecture allowing users to boot the machine without entering the current time and date, as was necessary with the XT. The RTC selected was the Motorola MC146818 Real-time clock chip, which was bundled with a small amount (up to 128 bytes) of CMOS memory. Memory addressing cannot directly access the CMOS memory associated with the RTC. Instead this memory is accessed through IN and OUT assembly language instructions accessing ports 70h and 71h.

## The Real-Time Clock

The RTC is battery powered so the clock continues to run while the machine is turned off. The RTC stores the current year and time in a reserved area of the CMOS memory. Another byte was later designated as the century byte, but this byte is generally not changed by the RTC. This is the root of the PC's Y2k problem. When the century changes from 19 to 20 the year will correctly change from 99 to 00, but the century byte will generally not be modified, leaving the RTC to report the current year as 1900.

by Timothy Huth, Sr. Software Engineer  
PinPoint Software Corporation

## Abstract

Understanding how to test PC hardware for Y2k compliance can be problematic. There are several defined methods to read and write the system clock, but each can fall in different ways. This leads to confusion regarding what might be an adequate set of compliance tests. Additionally, Y2k managers are looking for highly accurate tests that do not require a great deal of manual effort collecting the results.

This paper presents background information to help Y2k managers evaluate various testing methodologies. Also presented is a way of viewing the testing process that is similar to testing in the medical field. This model can help with the planning and testing phases of a Y2k audit. Finally, PinPoint Software Corporation's testing methodology is explained.

## Introduction

Over the past two years, there has been a dramatic increase in the awareness of the Y2k problem. Many different scenarios have been presented, ranging from minor inconvenience to Armageddon. Almost everyone agrees, however, that it is judicious for companies to perform some sort of risk evaluation. Estimating the scope of the testing is itself a big task because mainframes, business software, personal computers, individual productivity software, and embedded systems all need testing.

## Testing PC Hardware for Year 2000 Compliance

### BIOS

BIOS stands for Basic Input Output System, and is the program held in nonvolatile memory to handle the interface to the PC's hardware. Without this standardized layer, each card, drive, and video manufacturer would have a different interface that would need to be programmed to. The inclusion of this layer greatly simplified the task of developers for the PC, and helped ensure the success of the machine. The BIOS is a set of well-defined functions accessed through interrupts available from assembly and higher-level languages. These functions address various aspects of the machine's operation including controlling video, disk drives, printers, and the RTC.

Currently there are a handful of major BIOS vendors. Each vendor develops a base library of code, which is then licensed to motherboard manufacturers. These motherboard manufacturers may (and commonly do) modify the BIOS source code delivered to them, especially if the motherboard is in a portable computer, or takes advantage of newer peripheral technologies such as power-save features. The BIOS in 486 class or older machines is generally encoded in a specific hardware chip that would need to be replaced if an upgrade is necessary. In Pentium class machines, the BIOS is generally what is known as a flash BIOS, which means that it can be reprogrammed through a software utility.

### Operating System

The Operating System is the software layer that passes instructions between application programs and the BIOS. Examples of PC operating systems are DOS, Windows NT, UNIX, and OS/2. The operating system code handles program launching, resource management, etc. The operating system generally has interrupts that build upon the BIOS interrupts to perform more complex, or OS-specific, functions such as file system routines. DOS also has interrupts to read and write to the system clock via BIOS routines. It is generally recommended that software developers write to the operating system layer rather than writing code that either bypasses or takes advantage of specific BIOS routines.

### The PC Architecture Boot Process

It is important to understand the basics of how the PC loads the operating system, because there are several opportunities for the RTC to change during this process. The first thing that happens after the machine is powered on is basic hardware initialization. Next, the BIOS loads from nonvolatile memory and code execution begins. A significant part of the BIOS initialization routines is the Power On Self Test (POST).

These are the routines that make sure that all hardware is initialized correctly, that the CMOS memory is valid, and that the RTC contains a valid date and time. After the POST routines execute successfully, the BIOS then calls BIOS INT 19h to load the operating system. INT 19h reads the boot sector into memory from the floppy disk, hard disk, or CD, depending upon BIOS configuration settings.

This boot sector is actually a small piece of code that loads the rest of the operating system. True IBM machines will start BASIC at this point if no boot device is available. Note that it is also possible to have a network card that inserts code into the boot process to start machines from a network resource. This is what enables diskless workstations to initialize. The boot sector program initializes floppy drives and hard drives, loads the OS loader from disk, and then passes execution to that program. This program is MSDOS.SYS for DOS and Windows, and NTLDR for Windows NT.

### What Happens at the Century Transition

The RTC will increment and change to the year 1/1/00 at midnight December 31, 1999. In most instances the century byte will not increment, so that the date will appear to be 1/1/1900. In some newer PC models, the RTC has been re-architected to increment the century byte as well. In this case the machine will behave correctly.

The BIOS, assuming machine is powered on, will not do anything special at midnight. The next time the date is requested through the BIOS routines, however, some BIOS code will detect an invalid century byte and correctly set it to 20h (instead of 19h) if the machine is powered off at the turn of the century, the RTC will increment as before. But the next

## Testing PC Hardware for Year 2000 Compliance

time that the machine is booted some BIOS code will check for the invalid date of 1900 during the POST routines. In some cases the BIOS will then correct the century byte. In some other cases, the BIOS will reset the date to the BIOS creation date (something like 4/1/95).

This is done because the BIOS believes the date and time are outside the valid date window. If the machine contained a dead CMOS battery, the RTC CMOS would contain random data and this would reflect an incorrect date and time. The POST routines check for this condition and initialize the date to some sensible value. It is important to note that this all happens before any operating system has been bootstrapped.

When DOS starts, if it sees a system date prior to 1980, it will set the system date to 1/1/1980. If NT sees an invalid date such as 1900, it will correct the century byte in the CMOS. Applications will most likely get the system date by requesting the date from the OS. There are some applications that will access the BIOS directly, and an even smaller amount (very few) will directly query the RTC for the current date.

As you see, there are quite a few checks that happen during the boot process and normal PC operation that attempt to correct the initial flaw, which is the RTC not incrementing the century byte. It is important to remember this when evaluating what can go wrong.

### Points of failure

The RTC can (and most likely will) fail to update the century byte on a rollover to the year 2000. The POST routines run only on a reboot. They usually check the validity of the RTC clock and adjust the RTC values if they are invalid. There are two failure modes here. The first way that the POST routines can fail is if they fail to adjust the century byte. The second way that there could be a failure is if the POST routines detect any year greater than 1999 as an invalid year and readjust the values at startup. During normal operation of the computer, the OS and applications may ask the BIOS to read and write RTC values. When the BIOS reads the RTC values, it can determine if the RTC values are invalid, and correct the values if necessary. Additionally, if the BIOS is asked to write an invalid date, this can be detected and corrected.

### Leap Year

Another factor to consider during this discussion is that the year 2000 is a leap year. This year is noteworthy because it is a special case of a special case. The rules for determining a leap year are:

- 1) If the year is evenly divisible by four, then it is a leap year.
- 2) If the year ends in 00, then the first rule does not apply and it is not a leap year.
- 3) If the year is evenly divisible by 1000, then the second rule does not apply, and it is a leap year.
- 4) If the year is 3600, then it is not a leap year.

Keep in mind Year 2000's status as a leap year when examining the various failure behaviors of the RTC, BIOS, and OS.

## Testing Methodology

There are two fundamental ways to test the system behavior. The first is testing with the operating system loaded. This is valid given that the operating system or some other application running does not change the system time during the test. This is not always a valid assumption. A case in point is Windows NT version 4.0 and later which camps on the RTC and adjusts the century byte when it sees an invalid date transition.

This effectively hides any failure of the hardware. Of course if you make the assumption that the particular machine will never have another OS installed, then you can assume the machine will behave correctly during and after the century transition. Another problem with testing within the context of a loaded operating system is that OS startup code can modify the BIOS/RTC values, making it impossible to test particular interfaces. Finally, it is imperative that a reboot test is included to fully test the machine's behavior during the century transition. Even a machine that passes the RTC rollover can fail compliance due to faulty BIOS POST routines.

A good alternative to consider when testing machines for Y2k compliance is a test suite that runs without the operating system. This solution involves creating a special boot disk that loads its own operating system, whose job is to test only for the Y2k problem. Such a test suite can fully



Consider waiving penalty and interest on certain tax accounts.

Moved: Commissioner Boatright

Seconded: Commissioner Hays

Motion: To approve waiving penalty and interest on certain tax accounts.

Vote: Motion carried 4 - 0

< Clerk copy here >

## Memorandum

To: Members of the Commissioners Court

From: Deborah M. Hunt, CTA *DMH*

Date: October 9, 1998

Re: Waiver of Penalty & Interest

In accordance with Section 33.011 of the Texas Property Tax Code, "The Governing Body of a taxing unit shall waive penalties and may provide for the waiver of interest if interest on a delinquent tax is an act or omission of an officer, employee, or agent of the taxing unit or the appraisal district in which the taxing unit participates caused or resulted in the taxpayer's failure to pay the tax before delinquency and if the tax is paid within 21 days after the taxpayer knows or should know of the delinquency."

| Account # | Name           | 1997 P&I + Attorney | Description  |
|-----------|----------------|---------------------|--|
| R082955   | Cora Jensen    | \$23.46 + \$0.00    | Tax office's bank returned check in error.                       |
| R347418   | James McKenzie | \$48.96 + \$29.59   | Rollback tax amount was not timely entered onto computer system. |

Approved *Mike Herlihy* 10-20-98