

## **That is the Year 2000 Bug?**

The Year 2000 (Y2K) bug is a problem that may exist in a computer program or embedded system whereby date comparisons do not take into account the century portion of the date.

## **What is the potential impact of the Year 2000 Bug?**

Airplanes may not be able to take off.

Automated defenses that protect our government, our people, and country may fail.

Checks from the government or various agencies could be late, might be a lot less (or more) than the intended amount.

Elevators that contain embedded systems to alert personnel of maintenance due could stop working thinking the elevator has not been maintained for 99 years.

Hospital equipment can fail endangering lives.

Lives of government intelligent agents may be put at risk due to Y2K failures as more and more governments rely on electronic measures and counter measures.

Money deposited in your bank account may be lost (not properly recorded) by the system.

Power plants could go down, bringing to a stop all systems dependent on ongoing power -- cash registers, computer systems, conveyer belts, elevators, subways, and more.

Radar control screens can go blank all across the United States and overseas.

Traffic lights may fail or intersection traffic lights will not be in sync.

## **Other problems occurring now due to the Y2K bug**

"Federal regulators have begun advising banks to toughen lending terms for customers that run too much Y2K risks. The lenders may even choose to avoid certain loans that they would otherwise make." -- By Jeffrey A. Tannerbaum, Staff Reporter of the *Wall Street Journal*

Credit cards with expiration dates beyond 1999 may not work at all retail locations.

## What is the cost of fixing the Year 2000 bug?

The cost for fixing the Y2K problem can vary from company to company and from country to country.

Here are some published figures:

- Australian companies plan to spend \$800 billion to fix the Y2K bugs in their systems.
- Aetna Inc. of Hartford, Conn., the country's biggest health insurer, plans to spend \$139 million.
- AT&T plans to spend \$375 million.
- Bank of New York will spend \$260 million.
- Bankers Trust Corp. will spend \$260 million.
- Bestfoods, the Englewood Cliffs maker of Skippy peanut butter and Thomas's English muffins, expects to spend \$20 million.
- Chase Manhattan Corp. will spend \$363 million.
- Citigroup will spend \$925 million.
- First Union will spend \$65 million.
- Illinois will spend \$114.4 million.
- Nabisco will spend \$31 million.
- Sprint plans to spend \$250 million.
- Union Pacific Railroad plans to spend \$46 million.
- Warner-Lambert Co. plans to spend \$250 million.
- Wells Fargo will spend \$141 million.

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On Sunday, November 29, 1998, *60 Minutes* did a short segment on the year 2000 problem.

In terms of banking, they talked about a bank that sent in over 110 programs to be fixed. One of the programs had over 100,000 lines of code. They found only 200 lines of code with the Y2K problem in that particular program. However, had the code involved not been fixed... any deposits made during after December 31, 1999 would be lost in the system.

In terms of airlines, they mentioned the potential black out of radar control panels. That the FAA was severely behind in their Y2K programming changes. They estimated that a worse case scenario would involve radar blackouts and doing a lot of the work manually. The impact is that as much as 30% of air travel traffic would have to be eliminated.

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According to the November 23, 1998 issue of *Federal Computer Week*, four agencies (DOD, HHS, Energy, and USAID) are critically behind the Y2K bug fix, and the Department of Defense just started testing their programs to see what will and will not fail.

Sample Agency Progress on Year 2000 Fixes

<b>Agency</b>	<b># of Mission Critical Systems yet to be fixed</b>	<b># of Compliant Systems (fixed)</b>
DOD	2,581	1,352
Education	14	9
Energy	420	210
Health and Human Services (HHS)	300	147
U.S. Agency for International Development (USAID)	7	1

\* Source: Agencies' November Reports to OBM

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*Computer World's* November 23, 1998 issue reported that major companies are setting up "year 2000 war rooms to monitor crisis management activities.

...In some cases, the war rooms, furnished with video conferencing equipment and computer generated maps will also help project teams monitor regional power outages and other localized operations affected during the millennium rollover."

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In a *PC Week* article published on November 23, 1998, *An Embedded Dilemma*, we are told of the good and bad news about the year 2000 problem and embedded systems.

"The paradox of embedded systems is that most of them are dumb and therefore pose minimal Y2K risks, but, by virtue of their simplicity, these systems are almost always hard-coded and therefore cannot be remedied if trouble occurs."

Device	Potential Problem
Traffic lights	Possibly: Worst case scenario: Intersections won't be in sync with each other.
Elevators	None, though they may connect to building control systems with their own Y2K glitches. Worst case scenario: Elevators may return to lobby and stay open.
Airplanes	Possibly. Boeing found Y2K problems in internal systems on 750 planes, 50 of which wouldn't be able to fly in 2000. All are being fixed by current owners.

\* Source WSJ Reports

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Auto makers battle Y2K bug in vast supplier network: GM's summer strike shows any breakdown in the chain can cause gridlock.

"The sheer scale of the auto industry's Y2K efforts is daunting. GM says its examination of potential Y2K problems has turned up about 1.7 million computer devices that control everything from the robots that weld car bodies together to the heart and lights of its plants. The total dwarfs the roughly 7,600 business computer systems GM's investigation found.... Big automakers have more than 150,000 suppliers world-wide. ...Costs above \$1.5 billion." -- November 30<sup>th</sup> issue of the *Wall Street Journal*.

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Millennium computer bug may cripple Canada's e-spies. Lives at risk, says federal report on shadowy agency

The millennium computer bug could cripple Canada's electronic spy agency, putting lives at risk and endangering national security, newly released documents warn.

A federal assessment says computer failure at the Communications Security Establishment could have "catastrophic implications" for peacekeepers and might leave the country unable to fulfil its NATO commitments.

"The impact can range from embarrassment to the government of Canada to exceptionally grave injury to the national interest and, ultimately, the loss of life," says the document, obtained by Southam News.

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In a survey of 283 professionals who work on the Y2K problem, 84 percent thought the situation would at least cause a drop of 20 percent or more in the stock market. Ed Yardeni, a stock-market strategist believes there's a "70-percent chance" the computer problem will trigger a worldwide recession." -- pg 44, December 1998 issue of *Reader's Digest*.

<b>Crisis</b>	<b>Cost</b>
World War II	\$3,100 billion
Vietnam	\$500 billion
Y2K challenge	\$600 billion?

\* Source: Gartner Group

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### **Good news**

As of November 2, 1998 the Pennsylvania State government has completed testing of over 98% of its computer systems.

As of October 26, 1998 the major retailers (The Gap Inc., The Home Depot Inc., Sears, J.C. Penny Co., and Goody's Family Clothing Inc.) have reported good progress in resolving their Y2K fixes as well as working with their vendors to ensure their vendors are Y2K compliant.

As of October 12, 1998 Utility companies have found few flaws in power plants. Washington Water Power, a Spokane, Washington based electric and gas utility tested 540,000 embedded components and found only 1,800 that contained year 2000 dependencies. Of those 1,800, only 234 needed to be fixed. The Bonneville Power Administration, which controls about 80% of generating capacity in the Pacific Northwest is finding the same thing.

## Bad News

"Most local governments are behind the curve- and behind the federal government," said Jack Brock, director, government-wide information systems at the U.S. General Accounting Office (GAO).

Big companies and government are not the only ones who need to prepare for the Year 2000 problem. The U.S. Small Business Administration figures that as many as 330,000 small businesses out of 23 million risk closing unless they fix the problem and an additional 370,000 could be temporarily or permanently crippled. That means shutdown of services, canceled shipments and job losses.

A Gallup Poll showed that 82 percent of businesses with revenue under \$50 million are at risk, and three-quarters of small-business owners have not taken any action to ensure that their computer systems can distinguish between the years 2000 and 1900.

According to an article on *How does chip fit into Year 2000?* in the November 19<sup>th</sup> issue of the *Wall Street Journal*, "Ground operations at airports are also teaming with electronic devices, from baggage-control systems to fire-fighting units, to the electronic sensors on runways. While most airports have begun to assess their systems, "some of them aren't stepping up to the problem, " says Tom Brown, who coordinates year 2000 efforts for the Air Transportation Association, the carrier trade group.

Of the 449 Fortune 1000 top level managers that participated in a Y2K survey:

- 30% do not conduct hardware and software inventory of their assets; meaning they don't know what they have in terms of computer equipment and software.
- 31% have not developed a list of non-compliant applications; 9% stated they don't plan to create such a list.
- 42% have not yet ranked the importance of non-compliant applications; 22% do not plan to rank them.
- 65% have not yet calculated the costs of correcting desktop Y2K problems.
- 30% have not yet secured the required labor to address their Y2K effort.
- 71% have not yet developed a compliance plan that defines what needs to be fixed and in what order.
- 75% have not developed a methodology to ensure problems are corrected on time and not reintroduced into the organization.

Vital hospital equipment has failed during testing for the millennium bug. A \$170,000 heart monitor at the Women's and Children's Hospital turned itself off when programmed to perform on the hypothetical date "00". And a \$400,000 obstetrics monitor also failed a millennium test, while a \$3 million CAT scan is still in doubt.

It was reported on November 30, 1998 that the US nuclear agency fails Y2K testing. The agency that manages the US Government's nuclear weapons stockpile is testing its most critical computers in the wake of Pentagon inspectors' discovery that no one had verified whether key systems could withstand year 2000 problems. -- Dow Jones Newswire.

**Local News**

Bell Atlantic plans to be year 2000 compliant by June 30, 1999.

Carpenter Technology has no news publicly posted.

Dana has no news publicly posted.

GPU's mission-critical items in Pennsylvania to have been upgraded or replaced, tested, and be in the monitoring phase by the end of March 1999.

GTE plans to be year 2000 compliant by mid 1999.

Lucent plans to be ready before the year 2000; no date published.

PP&L began working on Year 2000 compliance in 1996. They plan to be complaint by the year 2000. Editors note: they are cutting it very close as their compliance due date is the fourth quarter of 1999.

The Limerick nuclear power plant was scheduled to be audited by the NRC in November (report not yet published as of 12/8/98).

**Terminology**

Assembler	A computer language in the lowest level form -- machine language.
BASIC	Beginners All purpose Instruction Code. Variations of BASIC and Assembler are used often in embedded systems.
C/C++	Programming languages created by Bell Labs. Mainly used for operating systems and utility programs.
COBOL	Common Business Oriented Language -- a computer language developed in the mid 60's for creating business

	applications.
CPU	Central processing unit -- the heart of a computer.
Embedded System	A hardware component (board, chip, etc.) that contains a central processing unit (CPU / computer) and programming to make it work.
Hard coded	In embedded systems, code that cannot be changed without replacing the entire system / component.  In non-embedded systems, code that can only be changed by modifying the program.
Program	A set of instructions a computer is to follow when the program is executed / run.
Y2K / Year 2000 bug	One or more problems within a computer program whereby date comparisons do not take into account the century portion of the date.

### Web Sites of Interest

<http://www.year2000.com>

<http://www.itpolicy.gsa.gov/mks/yr2000/y201toc1.htm>

<http://www.nrc.gov/NRC/NEWS/year2000.html>

<http://www.y2k.com/>