Embedded Computer Year 2000 Compliance Survey

Study SD99-08
Draft Executive Summary

Prepared by
South Dakota Department of Transportation
700 East Broadway Ave.
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ACKNOWLEDGEMENTS

This work was performed under the supervision of the SD99-08 Technical Panel:

- Jon Becker OFFICE OF RESEARCH
- Tim Bjorneberg ROAD DESIGN
- Jeff Karst PIERRE REGION
- Roxanne Rice DIVISION OF FISCAL/PUBLIC ASSISTANCE
- Steve Ulvestad OPERATIONS SUPPORT
- Dennis Winters INFORMATION/TELECOMMUNICATIONS
The Year 2000, or “Y2K” problem affects electronic equipment containing computers that record the year using only the last two digits (e.g., “97” rather than “1997”). This problem can affect elevator controls, heating, ventilation, air conditioning, traffic signals, surveying equipment, test equipment, control systems, etc. Some of this equipment may continue to function after January 1st, 2000, some may behave erratically, and some may fail completely. The full effect of the problem may not be known until 2000.

The Bureau of Information and Telecommunications has been addressing Y2K problems in telephone systems, personal computers and related equipment. However, the Department owns many pieces of equipment, such as laboratory and surveying equipment and traffic signals, that have not yet been addressed. The equipment that is susceptible to this problem must be identified and repaired or replaced throughout the Department’s central offices, Region and Area offices, and 75 maintenance shops.

508 items were inventoried. 62 items were found to be not Y2K compliant. Many of these items will still functionally operate even though they are not technically Y2K compliant. The cost of the equipment upgrades/replacement was $25,418.

Although there may be some unexpected problems, SDDOT is ready for the year 2000. The recommendation is that SDDOT be prepared as though there will be a major blizzard on December 31, 1999 that will last for a week. SDDOT will need to be prepared for this blizzard with the expectation that they will not be able to get any outside assistance (i.e. not being able to get fuel delivered for the duration of the blizzard).
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Problem Description

The Year 2000, or “Y2K” problem affects electronic equipment containing computers that record the year using only the last two digits (e.g., “97” rather than “1997”). This problem can affect elevator controls, heating, ventilation, air conditioning, traffic signals, surveying equipment, test equipment, control systems, etc. Some of this equipment may continue to function after January 1st, 2000, some may behave erratically, and some may fail completely. The full effect of the problem may not be known until 2000.

The Bureau of Information and Telecommunications has been addressing Y2K problems in telephone systems, personal computers and related equipment. However, the Department owns many pieces of equipment, such as laboratory and surveying equipment and traffic signals, that have not yet been addressed. The equipment that is susceptible to this problem must be identified and repaired or replaced throughout the Department’s central offices, Region and Area offices, and 75 maintenance shops.

Research Objectives

The technical panel overseeing Research Project SD 99-08 “Embedded Computer Year 2000 Compliance Survey”, defined the following objectives for the study:

1. **To identify and characterize embedded computer equipment within the Department affected by the Y2K problem.**

   This objective was accomplished, by completing task 1-6. The product of this objective was a spreadsheet that listed all the equipment identified, where it was located, and whether it was Y2K compliant or not.

2. **To recommend corrective actions for bringing equipment owned by the Department into Y2K compliance, performing repairs when practical.**

   This objective was accomplished by completing task 7-9.

Research Tasks

The numbered tasks that follow were taken from the original problem statement developed by the project’s technical panel. Each task is listed below with an explanation of how the researcher addressed each task.

Task 1 **Perform a literature search regarding Y2K.**

A literature search was completed. The literature search focused mainly on Internet sites. The main Internet sites were:

- 1) [http://www.garynorth.com/y2k/detail_cfm/953 “Gary North’s Y2K Links and Forums”](http://www.garynorth.com/y2k/detail_cfm/953). This site list many different systems that might be affected by Y2K.
- 2) [http://www.datamation.com/PlugIn/issues/1998/september/09y2k.html “The world’s biggest Easter egg hunt”](http://www.datamation.com/PlugIn/issues/1998/september/09y2k.html). This article had a 14-step methodology on determining if a piece of equipment is a suspect for a Y2K problem.
• 3) http://www.state.co.us/Y2K/embedded/Year_2000_Toolkit.PDF “Year 2000 Embedded Systems Tool Kit”. This site was all encompassing. It had the steps that an agency should follow to become Y2K compliant. It addressed how to determine if a piece of equipment is vulnerable to Y2K. It suggested how to determine what priority level a piece of equipment should have.

This gave the researcher background information on how to identify equipment that might be affected by Y2K.

**Task 2 Meet with the technical panel to review the project scope and work plan.**

The researcher met with the technical panel to explain the work plan and to ensure that the panel agreed that the project scope and work plan were headed in the right direction.

**Task 3 Identify and list all non-PC based equipment using embedded chips within the Department.**

This was accomplished by having the Area Engineers, Region Engineers, and Region Operation Engineers inventory their equipment that might have some Y2K issues. Information identifying equipment that might have Y2K problems was provided to the engineers. The information obtained from the engineers was compiled into a single spreadsheet and returned to them. This was done so that the engineers would be able to verify that all equipment was included. Visits have been made to the following Regions: Mitchell, Pierre and Rapid City. Also, a review of the equipment has been completed with the following Areas: Belle Fourche, Huron, Mitchell, Mobridge, Pierre, Rapid City, and Sioux Falls. The maintenance units reviewed included: Belle Fourche, DeSmet, Highmore, Huron, Miller, Mitchell, Mobridge, Pierre, Presho, Rapid City, Salem, Selby, Sioux Falls, and Wall. The purpose of these visits was to ensure that no equipment was overlooked on the inventory list and to clear up any questions on the equipment.

**Task 4 Evaluate and categorize the list by importance. Eliminate from the list all equipment that has little importance or that has already been addressed.**

This task was accomplished simultaneously with task 3. This task dealt with determining how important to mission readiness each piece of equipment was. This information was added to the spreadsheet developed in task 3. The same group that prepared the inventory completed this task.

**Task 5 Meet with the panel to review the list.**

The researcher met with the panel to discuss how the project was progressing.

**Task 6 Determine Y2K compliance for each piece of equipment.**

508 items were inventoried. Most of the equipment is Y2K compliant or has no date related functions. The following is a list of the equipment that is not Y2K compliant. The number in parentheses is the number that was reported.

a) Data collector SDR24. (7)  
b) Data collector SDR33. (22)  
c) SI Scan Plus. (4)  
d) ASOMA Model 111. (1)  
e) GRS31 Controller. (16)
f) Gilbarco Tank Monitor TM-2 and TM-3.  (7)
g) Veeder-Root TLS-350 Fuel Leak Detector with software version 1.  (1)
h) Nu-Metrics NS-850R Range Tracking.  (1)
i) SR200 Computer Selectron Model AD500.  (1)
j) Perkin-Elmer Corp. FTIR Series 1600.  (1)
k) Barber Colman Network 8000 system.  (1)

Task 7  Recommend corrective actions, giving costs when possible.

The cost of the equipment upgrades/replacement was $25,418.

a) SDR24.  The reports are that these are used only when a survey crew needs to send in their SDR33 for repair.  The company no longer supports this equipment.  The recommendation is, if there is money available, to buy the SDR33 to replace the old SDR24.

b) SDR33.  In order to be Y2K compliant, the SDR33 needs to have software version 4.26, most of the SDR33 have version 4.11.  Even though they are technically not Y2K compliant, the SDR33 will still functionally work.  The problem will be in the reporting of the date.  The recommendation is to obtain the new software version 4.26 and its documentation, since there is no cost for this software.  The software has been obtained and loaded on many of the SDR33.

c) SSI Scan Plus.  Norm Humphrey reported that SDDOT has 4 of these.  They are not Y2K compliant.  The upgrade patch would cost $595.  Three have already been upgraded.  Steve Ulvestad will upgrade the other one before the first of the year.

d) ASOMA Model 111.  This has already been replaced with an ASOMA Model 200 at a cost of $22,813.

e) GRS31 Controller (these are the controller used on the Mag Chloride pre wetter system).  They will operate, but will not be able to give season totals unless the date is reset.  Norm Humphrey reported that there are only six maintenance supervisors who have these systems.  Six copies of the procedure on how to reset the date of this system were prepared and given to Norm for distribution.

f) Gilbarco Tank Monitor.  The problem with the tank monitor is that it will not automatically adjust for the year 2000 since it is a leap year.  The solution and recommendation for this problem is to manually change the date on February 29, 2000.

g) Veeder-Root TLS-350 Fuel Leak Detector with software version 1.  There is only a problem if data is being sent remotely, otherwise it will function correctly.  Data is collected at the panel and is not sent remotely with this unit.  No action needs to be taken.

h) Nu-Metrics NS-850R Range Tracking.  The date on this unit will need to be reset manually.

i) SR200 Computer Selectron Model AD500.  There was one of these reported.  Each time the system is powered up the operator enters the desired run-date. Therefore no special actions are required.

j) Perkin-Elmer Corp. FTIR Series 1600.  The upgrade cost is $1170.  The replacement cost for a Spectrum RX1 is between $16,000 to $26,000, depending on options.  The company representative did not know if the FTIR would functionally operate on January 1, 2000.  He thought it might, but he was not sure.  SDDOT does not use the FTIR very often.  The recommendation is to test the FTIR as soon as possible after the first of the year to determine if the FTIR functionally operates.  If it functionally operates no further action is necessary.  If it does not functionally operates, replacement is recommended, as this is a discontinued instrument.
k) Barber Colman Network 8000 system. This is the heating control system installed at the Rapid City Regional Office. This has been upgraded at a cost of $225, no further action required.

**Task 8** Work with each affected office to take corrective action to bring equipment into compliance when a simple software or hardware upgrade is necessary, testing critical components.

Corrective action was taken with the affected offices to ensure that the equipment that was not Y2K compliant will functionally operate in the year 2000.

**Task 9** Meet with the panel to discuss progress and the extent of equipment repairs or replacement.

The researcher met with the technical panel to give them a progress report. The panel received a list of the equipment that was not Y2K compliant, and a list of equipment that was replaced or upgraded.

**Task 10** Prepare a final report including methodology, findings, conclusions and recommendations.

This executive summary satisfies the requirements of the final report.

**Task 11** Make an executive presentation to the Research Review Board.

A summary of the project was presented at the Research Review Board on November 23, 1999.

**Conclusions and Recommendations**

Although there may be some unexpected problems, SDDOT is ready for the year 2000. The recommendation is that SDDOT be prepared as though there will be a major blizzard on December 31, 1999 that will last for a week. SDDOT will need to be prepared for this blizzard with the expectation that they will not be able to get any outside assistance (i.e. not being able to get fuel delivered for the duration of the blizzard).
Technical Panel Evaluation and Recommendations
Embedded Computer Year 2000 Compliance Survey
SD99-08
December 22, 1999

Researcher: Brian Hines       Study Duration: January 1999 - December 1999

Organization: South Dakota Department of Transportation       Study Cost: $8500
700 E Broadway
Pierre, SD  57501

Study Evaluation:

The embedded computer Y2K study was carried out on schedule, and achieved its objectives. The researcher performed all tasks as outlined in the initial problem statement. The technical panel was slightly surprised that there was such a small number of pieces of equipment were not compliant, and, for the most part, repairs or updates were not costly.

The study reveals that the Department is well prepared for the Y2K date change. Any equipment considered to be critical has been replaced or otherwise brought into compliance. The Department is capable of performing its normal duties throughout the 1999-2000 winter.

The researcher did a good job performing this research. It is also important to note that many other state agencies expended great effort to ensure that computer equipment other than that looked at in this study is Y2K compliant.

Research Objectives

1) To identify and characterize embedded computer equipment within the Department affected by the Y2K problem.

Panel Comments
The researcher achieved this objective. Equipment affected by Y2K was identified, listed, and categorized on a spreadsheet listing over 500 items throughout the Department.

2) To recommend corrective actions for bringing equipment owned by the Department into Y2K compliance, performing repairs when practical.

Panel Comments
The researcher made appropriate recommendations for bringing equipment into compliance, and worked with the appropriate personnel to repair or replace the equipment.

Research Tasks

1. Perform a literature search regarding Y2K.

Panel Comments
The researcher summarized pertinent literature in his executive summary.
2. Meet with the technical panel to review the project scope and work plan.

   This task was performed.

3. Identify and list all non-PC based equipment using embedded chips within the Department.

   This task was performed, and all embedded computer equipment was listed in a spreadsheet.

4. Evaluate and categorize the list by importance. Eliminate from the list all equipment that has little importance or that has already been addressed.

   This task was performed, and equipment was evaluated and categorized by the researcher with the aid of personnel who use the equipment.

5. Meet with the panel to review the list.

   This task was performed.

6. Determine Y2K compliance for each piece of equipment.

   This task was performed as the list was completed.

7. Recommend corrective actions, giving costs when possible.

   This task was performed.

8. Work with each affected office to take corrective action to bring equipment into compliance when a simple software or hardware upgrade is necessary, testing critical components.

   This task was performed. Follow up is needed on those pieces of equipment that cannot or won't be corrected until after the first of the new year. For example, some equipment requires a date to be manually set after January 1, 2000.

9. Meet with the panel to discuss progress and the extent of equipment repairs or replacement.

   This task was performed.

10. Prepare a final report including methodology, findings, conclusions and recommendations.

    Due to the briefness of the findings, the researcher has prepared an executive summary fulfilling these requirements.


    The researcher presented his findings to the Research Review Board on November 23, 1999.
Researchers' Recommendations

1) The recommendation is that SDDOT be prepared as though there will be a major blizzard on December 31, 1999 that will last for a week. SDDOT will need to be prepared for this blizzard with the expectation that they will not be able to get any outside assistance (i.e. not being able to get fuel delivered for the duration of the blizzard).

Panel Recommendations

The panel agrees with the researcher’s recommendation, and the Department is ready to contend with winter storms as always. The Department has an adequate supply of snow plow cutting edges, fuel, salt and sand.

Technical Panel

Jon Becker.................................Research Tim Bjorneberg..........................Road Design Jeff Karst.................................Pierre Region Roxanne Rice.......Division of Fiscal/Public Assist Steve Ulvestad ......................Operations Support Dennis Winters  Information/Telecommunications