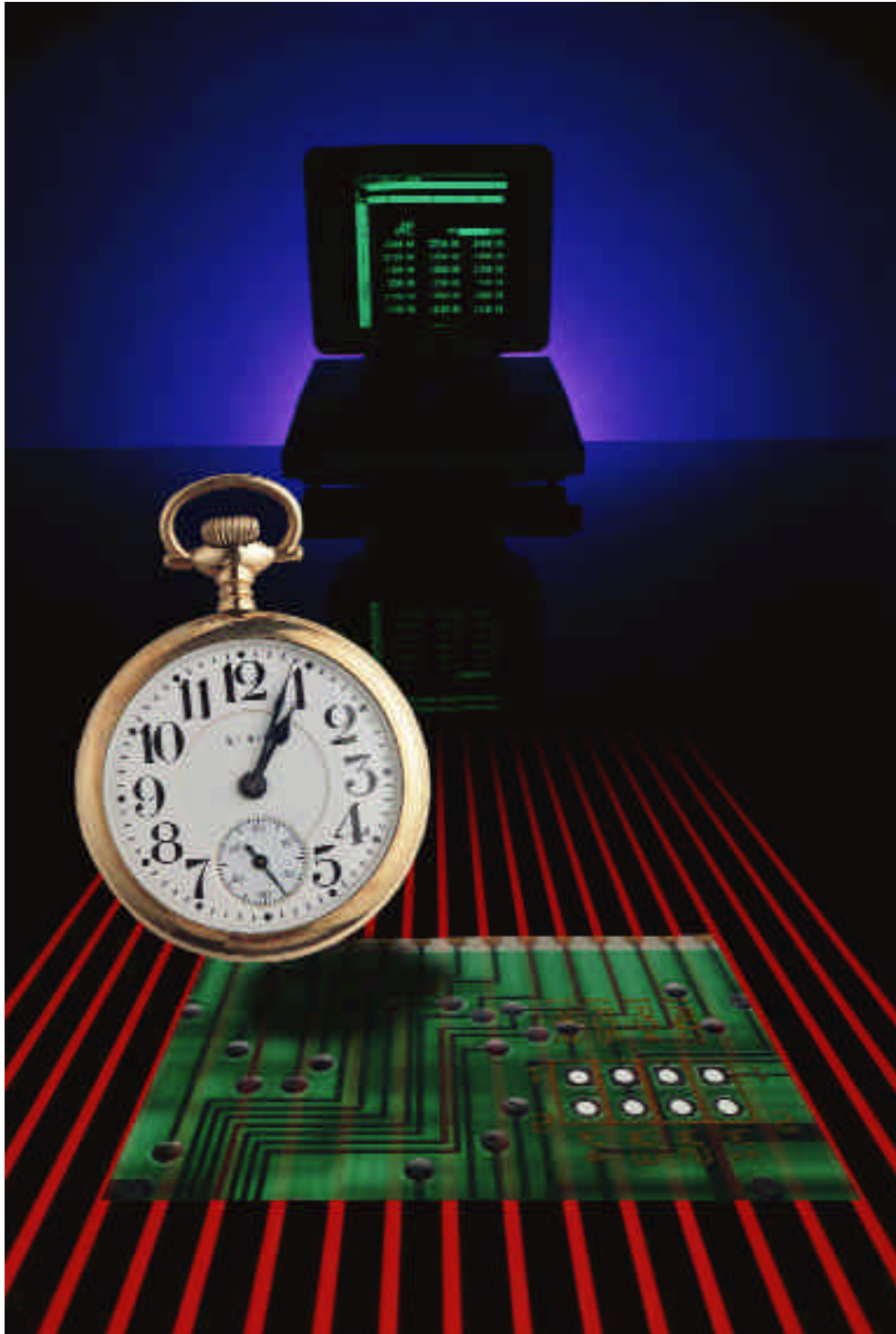


Year 2000 Embedded  Systems Tool Kit



A Theoretical Model



FORWARD

Dear Tool Kit User:

We know it as the Year 2000 problem, the millennium bug, or the millennium glitch that is projected to plague the operation of state services. Any business system or process that is date sensitive is a candidate for the Year 2000 problem.

The Year 2000 Embedded Systems Tool Kit is designed to address issues surrounding embedded computer chips. For example, lighting, security systems, elevators, parking, heating, ventilating, air conditioning, fax machines and medical devices are systems likely to contain embedded chips that are date sensitive.

The guidance provided in this tool kit shows you how to develop a Year 2000 — Embedded Systems Implementation Plan. It is designed to guide you step-by-step in conducting an inventory, assessing, tracking, fixing and testing your embedded systems.

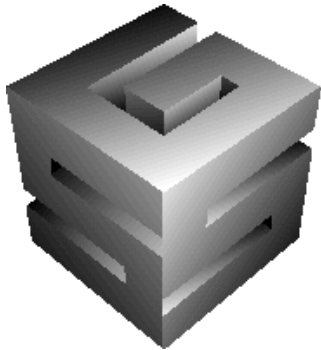
While we have developed as comprehensive a “tool” as we could conceptualize, this tool kit represents a theoretical model. Users are cautioned against using the tool kit as the definitive answer to all the problems you may encounter, and I strongly encourage you to independently research related concerns, not covered within the context of the tool kit. You are also advised to seek independent consultation with agency legal counsel regarding specific manufacturer/vendor — Year 2000 obligations, i.e., warranties or maintenance agreements (*See Appendix A*).

As I convey this message to you there are only 7 quarters remaining until the Year 2000. Time is running out! The sooner you start, the sooner potential problems can be identified and corrected.

As with other challenges facing state government executives, I believe that we can effectively meet the issues posed by the Year 2000 problem. I urge you to act now!

Sincerely,

André Pettigrew, Executive Director
General Support Services/Department of Personnel



ACKNOWLEDGEMENTS

The General Support Services wishes to extend appreciation to the following employees who gave of their time, energy and experiences and went beyond their regular duties to make this tool kit possible:

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Introduction:

Agencies who own or lease systems that contain embedded chips with date sensitive logic must objectively assess the impact of Year 2000 upon their business functions and associated risks therein.

What are embedded chips? Embedded chips are electronic systems that are used to control or supply a sub function of a more complicated machine or device, or are simple single function computers. Embedded reflects the fact that they are an integral part of the system. Typically, the user of the embedded system is a machine rather than a human operator. The general purpose of an embedded system is that it is a device to control, monitor, or assist in the operation of equipment or machinery. In many cases their embeddedness may be such that they are far from obvious to the casual observer, such as embedded systems in automobiles or airplanes.

What is the problem associated with Embedded Systems and the Year 2000? Simply stated, the risks associated with embedded chips are due to logic in microchips which record the year using only the last two digits (e.g., "97" rather than "1997"). This could cause the malfunction of elevator controls, heating, ventilation, air conditioning controls, energy management, control systems, alarms, security systems, etc. on January 1, 2000, because the computer would recognize the Year 2000 as the year 1900.

Correction of the problem and startup of systems could take days, even weeks, depending upon the complexity of the particular problem and the availability of technical assistance. It is imperative to the State of Colorado that we in state government ensure continuity of operations in our buildings and in the functions we perform. Accordingly, we must be steadfast in our efforts to identify and remedy potential Year 2000 problems with embedded systems.

What is the role of management in Year 2000 Embedded Systems? ~~The~~ ^{First} role of management in the effort for Y2K compliance is one that will require both leadership and vision - leadership in identifying methods to accurately assess the seriousness of the problem and the vision for determining how to best apply solutions that will be in the best interest of the organization. It will be up to management to sustain the momentum that will be required to implement successful solutions, while at the same time figuring out how to finance the efforts that go into the solutions. Management will also need to determine what effects the Y2K Embedded Systems expenditures will have on an organization's day-to-day operations and future projects.

Second, it is advisable that agencies contact their agency legal counsel to deal with aspects of any modifications, being ever mindful of the legal snares that await those who violate license, warranty, and service agreements.

Third, one of the key "best practices" recommendations made by most experts in the field of Y2K compliance is that at least one individual be appointed whose sole responsibility is that of overseeing an organization's efforts to become compliant. This is a bitter medicine to swallow, but if you try to make this someone's part-time responsibility, you decrease your chances of success. Remember, if this is not an individual's first priority, there will be too many other demands put on that person's time and the Y2K efforts will languish. *There is no penalty for finishing your Y2K efforts early, but the deadline for completion is immovable.*

Finally, involve people throughout your agency in the effort to become Y2K compliant as early in the process as possible. The Y2K effort could easily turn out to be Herculean before it's all done,

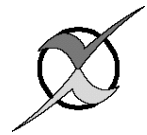


and more people actively seeking solutions to the problems will greatly increase the chances of success. Moreover, a successful effort will require a great deal of cooperation from people throughout the organization, and early involvement will give everyone in the organization a sense of project ownership.

What is General Support Services/ Department of Personnel's role in Year 2000 Embedded Systems?
To assist state agencies in this issue, General Support Services/Department of Personnel has developed a Year 2000 Embedded Systems Tool Kit. The tool kit is designed to assist agencies in implementation of an action oriented program. The tool kit consists of the following elements:

- ❖ ***Process for Conducting an Assessment of Embedded Systems*** Outlines the steps necessary to conduct a thorough and results-oriented assessment.
- ❖ ***Embedded Systems Inventory Checklist*** This checklist assists agencies in identifying systems that are date sensitive and support a function that is fatal or critical to the agency.
- ❖ ***Profile Sheet of Embedded Systems*** This form contains a detailed profiling of embedded systems and tracks program implementation from beginning to end.
- ❖ ***Testing Determination for Systems Which Have Been Validated Y2K Compliant*** This format provides a method to determine the extent of in-house testing necessary to validate vendor or manufacturer claims regarding Year 2000 compliance.
- ❖ ***Testing Determination for Systems Which Have Not Been Validated Y2K Compliant:*** This format provides a method to determine the extent of in-house testing for those systems that have not been validated Year 2000 compliant.
- ❖ ***Sample Test Plan***. Provides a sample format for agencies to follow when conducting in-house testing.
- ❖ ***Sample Letter Format***. Provides a sample format for contacting manufacturers/vendors where there is an existing warranty and where there is no existing warranty.
- ❖ ***Sample Warranty Language***. Provides a sample format for Year 2000 Warranty Language for construction and non-construction contracts.

Process for Implementation of an Agency Embedded Systems Program



Step One: Inventorying your Embedded Systems

Conducting a detailed inventory of your embedded systems is the first step in ensuring that your embedded systems are Year 2000 compliant. In general, “compliance” means that the system will continue to function properly and handle calculated dates properly after the turn of the century.

The purpose of conducting inventories is to understand your agency’s Year 2000 embedded system situation by identifying and documenting all of your assets being utilized in the agency’s business and how such functions may be affected by the century roll over.

Form 1.1 entitled “Embedded System Checklist Form”, is provided to assist you in your inventory. Agencies should take note that this list is not exhaustive and if a system is not listed on the checklist, additional spaces are provided for individual identification.

Agencies should identify all embedded systems that contain date related software such as logic controllers for scheduling equipment maintenance checks, etc. It is important to note that the inventory process is a tedious but essential information gathering task that requires patience and painstaking care. The accuracy and completeness of the inventory will help an agency estimate the time and costs for achieving Year 2000 compliance as well as being an important tool in prioritizing efforts and developing contacts with the vendors and contractors of your embedded systems.

Establishment of an Inventory Team:

As part of conducting an inventory, agencies may consider setting up an inventory team to search and survey all embedded systems in your agency. The make-up of the inventory team is crucial to the success of the inventory process and should be considered as the backbone of the Year 2000 Embedded System Project. Without comprehensive inventories, the project could falter.


The inventory team should consist of knowledgeable people in each category of the inventory (i.e. building systems). Additionally, the inventory team members need to be detail oriented, and willing and able to perform some of the tedious tasks associated with most aspects of the inventory process.





Proceed to filling out form 1.1


Embedded Systems Inventory Checklist- Form 1.1

INSTRUCTIONS : Complete the following information. Identify those systems which are: (1) date sensitive; (2) have a date/time digital readout; or (3) respond differently on the weekends vs. weekdays. Note: do not conduct an inventory on systems that do not use dates. For each item checked indicate whether the system supports a function which is:

 **FIRST PRIORITY LEVEL - FATAL:** Defines a business function that is essential to your operation. Failure of this system could result in death, injury, severe financial loss or legal liability to your agency. Working around this system is impossible or impracticable. Examples: defibrillators, imaging equipment, sterilizers, pacemakers, pagers for doctors, etc.

 **SECOND PRIORITY LEVEL - CRITICAL:** Defines a business function that is critical to your operation. Working around this system is very cumbersome and unlikely to be sustainable for more than a short period. Examples: security systems for badge readers; surveillance systems; elevators, programmable thermostats, etc.

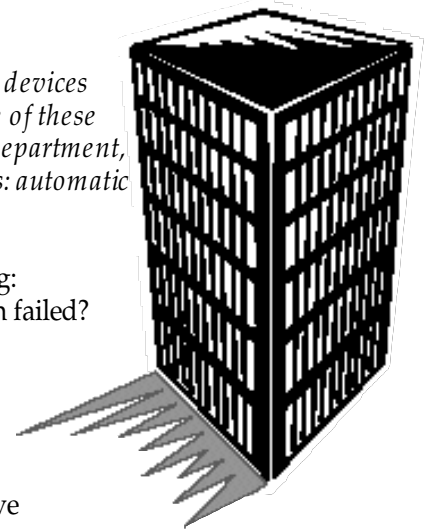
 **THIRD PRIORITY LEVEL - IMPORTANT:** Defines a business function that is important to your agency but not critical. These devices are needed, but do not play a critical role. Examples: copiers, fax machines (if not needed for legal documents), still and video cameras, pagers, etc.

 **FOURTH PRIORITY LEVEL - MARGINAL:** Defines those devices that are not important to your department. Failure of these devices would result in an inconvenience to the user, or department, but are not important to an established project. Examples: automatic coffee pots, VCR's, microwaves.

To determine the risk to the agency consider the following:

- (1) What agency functions would be affected if the system failed?
- (2) What would be the consequences of the failure?
- (3) Would there be a legal liability for the agency if the system failed?

Note: The checklist which follows is not exhaustive. If a system is not listed on the checklist, additional spaces have been provided at the end of each section.



Security & Police Protection Systems

System Identification	How Many	Fatal To Mission	Critical To Mission	Important To Mission	Marginal To Mission
Electronic Surveillance Equipment					
Night Vision, Thermal Imaging and Surveillance					
Anti Surveillance Equipment					
Spy Equipment					
Electronic Article Surveillance Equipment (EAS) Systems					
Clock Cameras					
Surveillance Cameras					
Closed Circuit Television (CCTV)					
Wireless Video Cameras					
Security Cameras					
Anti-bugging and Bugs Detector Systems					
Safes					
Vaults					
Building Access Systems					
Time Activated Locks					
Disabling "Inactive" Keys					
Door Locks					
Secured Gate					
Badge Readers					
Photo ID and Badge System					
Biometric Fingerprint Identification Systems					
Biometric Hand Identifiers					
DNA Fingerprinting Systems					
Fingerprint Sensors, Identification and Comparison Systems					
Fingerprinting Verification Equipment					
Bar Coding Reading Devices					
Bar Code Labels and Tag System					
ID Cameras					
Watchmen Clocks					
Mobile Satellite Terminals for Tracking Objects and People					
In-car Video systems and Tape Management Systems					
Bomb and Weapon Detection Systems					
Metal Detectors					
Blood Collection Kits					
Evidence Identification Labels					
Palm Readers					
Fence Shaker - Perimeter					
Microwave Perimeter Detection					
Security Electronic Programmable Logic Controllers					
Uninterruptible Power Supply					
Camera Switchers & Multiplexers					
Graphic Link - Software & LAN System for CCTV, Audio, Call & Door Control					
PAS - Personal Alarm Systems, including Sonic & Radio Frequency Detectors					
PLC Key Cabinet Locking System					
Walk - through Metal Detectors					

Security & Police Protection Systems cont'd.

System Identification	How Many	Fatal To Mission	Critical To Mission	Important To Mission	Marginal To Mission
PLC Based Ovens					
Detention Toilet Controller - LAN Based PLC					
Inmate Detention Cell Water Closet Controllers					
<i>List Other Systems Not Described Above:</i>					

Fixed Systems - Transportation

System Identification	How Many	Fatal To Mission	Critical To Mission	Important To Mission	Marginal To Mission
Vehicle Preventative Maintenance Chips					
Engine Management/Service Interval Prediction Systems					
Onboard Computers/Sensors					
Gate Systems					
Variable Message Signs					
Traffic Lights					
Ticketing Systems/ Machines					
Command and Control Systems					
Speed Cameras, Radar Speed detectors					
Photo Surveillance Systems					
Airplanes					
Automobiles					
Ambulances					
Helicopters					
Buses					
Fuel Services					
Automobiles					
Traffic Monitoring /Counting Devices					
Loop Detector					
Vehicle Detectors - Radio Frequency Systems Joined with Access Point Manager Systems					
<i>List Other Systems Not Described Above:</i>					

Fixed Systems - Parking

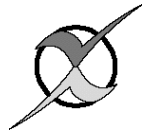
System Identification	How Many	Fatal To Mission	Critical To Mission	Important To Mission	Marginal To Mission
Parking Access Control					
Lighting					
Sprinklers					
Surveillance Cameras					
Car Parking and Other Meters					
<i>List Other Systems Not Described Above:</i>					

Fixed Systems - Communication

System Identification	How Many	Fatal To Mission	Critical To Mission	Important To Mission	Marginal To Mission
Phone/PBX					
Telephone Exchange					
Cable Systems					
Telephone switches					
Satellites (Global Position System GPS)					
Data Switching Equipment					
Radios					
Base Stations					
Mobile Units					
Trunk Radio Controller					
Mobile Data Terminals					
Microwaves					
Satellite Dishes					
Satellite TV Systems					
Intercoms					
Modems					
Paging Systems					
Communication Hardware					
<i>List Other Systems Not Described Above:</i>					

Moveable Systems - Medical & Research cont'd.

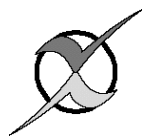
System Identification	How Many	Fatal To Mission	Critical To Mission	Important To Mission	Marginal To Mission
Ultrasonic Aspirator					
Ultrasonic Scanner					
Respiratory Ventilators					
Infusion Pumps					
Volumetric Infusion Pump					
Pump, Enteral					
Pump Infusion Syringe					
Balloon Pump					
Enteral Feeding Pump					
PCA Infusion Pump					
Blanket Warmer					
Blood Warmer					
Pulse Oximeter					
Electrocardiograph					
Electroencephalograph					
Electrocardiograph Recorder					
Electrocardiogram Recorder					
Electrosurgical Unit					
Electromyograph					
pH Meter					
Automatic Medication Dispensing Equipment					
Imaging (MRI) Systems					
Cardiac Monitoring Systems					
Tissue and Gas Analyzers					
Cardiac Defibrillators					
X-Ray Equipment					
X-Ray Cameras					
Dental X-Ray Machines					
Dialysis Machines					
Sterilizers					
ECG, EEG, EMG Machines					
Blood-Gas Analysis					
Pharmaceutical Control and Dispensing systems					
Rhynol Laryngeal Stroboscope					
Sequential Compression Device					
Doppler Vascular Flowmeter					
Light Source					
Fibre Optic Light Source/Video Processor					
Bedside Recorder					
Electronic Thermometer					
Paperless EEG System					
Stress ECG Testing Systems					
Stereotaxy Computer					
Ultrasound Systems					
Ultrasound Cardiac					
Ultrasonic Scanner					
Pace Makers					



Step Two: Locating an Embedded Chip

In the process of conducting an inventory of your “embedded systems”, you may come across equipment or systems, for which you are unsure as to the existence of an embedded chip. If you can quickly retrieve a schematic drawing of your equipment, we recommend that you review the drawing to determine whether or not your equipment contains an embedded chip (note: sometimes drawings will have this type of information). If you cannot quickly locate a schematic drawing for the equipment or if you’re still unsure, even after review of the schematics, we recommend that you immediately contact the manufacturer/vendor and ask if the equipment in question contains a date sensitive chip. The following information will be required by the manufacturer/vendor when posing this question:

- System Make
- System Model
- Serial Number
- Year Manufactured

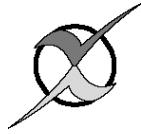


Step Three: Location of Warranties; Identification of Maintenance Agreements.

Once you have inventoried all of your embedded systems and identified the priority level of each system, i.e. fatal, critical, important, or marginal, you may elect at this point to locate and review all license agreements, warranty language, and long term maintenance agreements for those systems you have identified as fatal and critical.

If the license agreement is accompanied by a long term maintenance agreement surviving past January 1, 2000, the vendor/manufacturer may have an obligation to make its software/firmware Year 2000 compliant at the vendor/manufacturer’s expense. If there is no such long term maintenance agreement or other expressed or implied warranty, in all probability, the State will have to bear the costs associated with making such systems Year 2000 compliant.

Note: If you are unable to quickly locate the manufacturer warranty or maintenance, do not waste valuable time trying to find the documentation. Move on to Step 4. You can always come back to this step, if there is an issue of manufacturer/vendor Year 2000 compliance obligation.



Step Four: Contacting Vendors/Manufacturers.

The appropriate vendors or manufacturers should be contacted in order to request information as to whether the system in question is Year 2000 compliant. The following sample letters provide a recommended format to request this information.

Additionally, you may be able to get information regarding the compliance of your system by accessing the Manufactures/Vendor's web-site on the Internet. Much information exists on the Internet pertaining to compliance of various equipment, system, and software vendors and manufacturers. If you need assistance accessing the Internet, contact your agency Year 2000 Coordinator.

Note: If you do not receive an answer to your first communication within a reasonable period of time, resend the letter "certified/receipt requested".

“Sample” Year 2000 Embedded Systems Letter (If a warranty does not exist):

Dear: (Vendor/Manufacturer)

The State of Colorado (agency) is taking steps to ensure that our business systems supporting our operations will continue to function properly regardless of the approaching Year 2000. Information provided by your company is critical to ensuring that these systems operate smoothly into the Year 2000 and beyond.

In order to accomplish the assessment of our systems, we are asking your assistance in helping us determine if the following product(s) developed by or purchased from your company is/are Year 2000 compliant. When we in the State of Colorado use the term “Year 2000 Compliance” we mean fault free performance in the processing of date and date related data (including, but not limited to calculating, comparing, and sequencing) by all software products, firmware and supplies, individually and in combination as a system, when used in accordance with the product documentation provided by the vendor or manufacturer.

(Item, Model, description, etc.)

The enclosed questionnaire is designed to assist us in determining the Year 2000 status of the above system(s). Critical issues include: whether the product(s) is/are date sensitive, whether testing has been performed to verify Year 2000 compliance, what steps are recommended to fix the product(s) if Year 2000 is not verified, when retrofits or upgrades will be made available, and what cost is expected to be involved.

Please provide your written response by (date) to the following street address or e-mail address:

(Name)
(Name Of Agency)
(Address)

xxxx@state.co.us

If you have questions or wish to discuss this in further detail, please call (Name) at (phone)

Your assistance is greatly appreciated.

Sincerely,

Attachment to Sample Letter

Attachment - Questionnaire - Page 1 of 2

Please respond to the following questions concerning the Year 2000 status of products purchased from your company. (Place product name and model number here)

Product Name _____

Product Model Number _____

As noted in our letter, we would appreciate a response by _____ (date) .

Name of Individual Responding to this questionnaire: _____

Title _____ Name of Company _____

Phone Number _____ Fax Number _____ Web Site: _____

1. Is this product Year 2000 compliant?

Yes No Still being evaluated; response anticipated by _____ (date).

2. Will this product successfully rollover to the Year 2000?

Yes No Still being evaluated; response anticipated by _____ (date).

3. Will this product successfully and accurately compute given that Year 2000 is a leap year?

Yes No Still being evaluated; response anticipated by _____ (date).

4. Will this product successfully rollover to the Year 2001?

Yes No Still being evaluated; response anticipated by _____ (date).

5. Has a third party verified that the above system is Year 2000 compliant?

Yes No Being explored; response anticipated by _____ (date).

6. Contact information for the third party (if checked above):

Name: _____ Title _____

Company Name _____

Phone _____ Fax _____

7. Can the product referenced on this form interface with any other system - whether or not manufactured or installed by you or supplier?

Yes No Still being evaluated; response anticipated by _____ (date)

(Over)

8. If "yes" or "still being evaluated" to the question number 7, what systems is the product likely to interface with?

9. Is the product referenced on this form capable of being tested to determine if it is date sensitive?

Yes No Still being evaluated; response anticipated by _____ (date).

10. If the product referenced on this form is not Year 2000 compliant can the product be retrofitted or otherwise fixed?

Yes No Still being evaluated; response anticipated by _____ (date).

11. If "Yes" to Question Number. 10:

- You or Supplier able to retrofit
- Customer can retrofit with instructions from supplier
- Retrofit available from third party

12. Contact information for the third party (if checked in Number. 11 above)

Name _____ Title _____

Company Name _____

Phone _____ Fax _____ E-Mail _____

13. What type of "fix" is likely to ensure this product is unaffected by the century date change? (check all that apply)

- Chip Replacement
- Software Upgrade
- Hardware Upgrade
- User needs to reset date (no other product modification is required)
- No fix; existing model must be replaced with newer one
- Other (Please describe) _____

14. What is the estimated cost to implement action noted above? _____

15. How much time is required to implement action noted above? _____

16. Will you or the supplier cover part or all of the costs?

Yes No Possibly; response anticipated by _____ (date)

Will you or supplier warranty the Year 2000 compliance of the product referenced on this form? Describe response below:

Please add any other information pertinent to this issue and this product:

Your assistance is greatly appreciated!

“ Sample” Year 2000 Embedded Systems Warranty Letter

Dear (Vendor/Manufacturer)

The State of Colorado (agency) is taking steps to ensure that our systems supporting state operations will continue to function properly regardless of the approaching Year 2000. We use the following product(s) developed by or purchased from your company.

(Item, model, description, etc)

Attached is a product warranty. We believe it would be beneficial for (name of agency) and your company to have a common understanding of what Year 2000 compliance means. We ask that your company review the warranty and let us know within 30 days whether you can provide such a warranty to us with regard to your product(s). If your company is not already in compliance, we also ask that you provide us your plans and time table for the product(s) becoming Year 2000 compliant.

Please respond to us at the following street address or e-mail address:

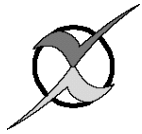
(Name)
(Name of Agency)
(Address)

xxxxx@state.co.us

If you have questions or wish to discuss this in further detail, call (name) at (phone)

Your assistance is greatly appreciated.

Sincerely,



Step Five: Program Efforts.

Early in the process of inventorying and assessing the scope of your Y2K problem it is important that methods of documenting Y2K compliance efforts be established and that those methods be followed religiously for the following reasons:

First, such documentation will hold the key to demonstrating that an organization, and the individuals in that organization, have done everything they can to pursue a solution with due diligence, and such documentation could prove to be invaluable in successfully defending against any potential negligence claims.

Second, during the time between now and the new millennium, it is not unreasonable to expect that an organization's Y2K Team or Project Manager find it necessary to routinely report on the status of that organization's efforts to attain Y2K compliance. Formal documentation of efforts and the progress that has been made, will serve to demonstrate an organization's pursuit of a solution.

Third, documentation will help to insure continuity of your compliance efforts in the event that key personnel in your organization leave the project before completion. This is a possibility that must be considered very seriously, particularly in the areas of Y2K compliance projects that deal with identifying and repairing date sensitive codes.

The following form entitled "Embedded Systems Profile Sheet " will assist you in identifying everything you need to document with regard to embedded systems, actions which you have taken with regard to the Year 2000 compliance efforts, and help you assess whether or not to replace, retire, or modify an embedded system.

Although this step is identified as "Step Five," we recommend that you start filling out the information on embedded systems as quickly as possible. As you gather and receive information relative to your embedded systems, transfer such information to the "Profile Sheet."

Profile Sheet of Embedded Systems - Form 1.2

Completed by: _____ Date: _____

System Information - Section 1	
System Name	
System Function	
System Location	
System Priority Level	<input type="checkbox"/> Fatal - 1st Level of Priority <input type="checkbox"/> Critical - 2nd Level of Priority <input type="checkbox"/> Important - 3rd Level of Priority <input type="checkbox"/> Marginal - 4th Level of Priority
Department/Division	
Agency Contact Name	
Street Address	
City	
State	
Postal Code	
Telephone	
Telephone Extension	
Fax Number	
E-Mail Address	
System Make	
System Model	
Serial Number	
Year Manufactured	
Year Purchased	
Purchase Price	
System Useful Life	
System Under Warranty	<input type="checkbox"/> Yes <input type="checkbox"/> No
Warranty Expiration Date	
Maintenance Agreement	<input type="checkbox"/> Yes <input type="checkbox"/> No
Maintenance Agreement Expiration Date	
Does System Interface with Other System(s)	<input type="checkbox"/> Yes <input type="checkbox"/> No
Interface Name	
Interface Type	
System Assessment-Section II	
Agency Contact Name	
Telephone Number	
Fax Number	
E-Mail Address	
Assessment Start Date	
Assessment Completion Date	
Vendor/Manufacturer	
Vendor/Manufacturer Contacted?	<input type="checkbox"/> Yes <input type="checkbox"/> No

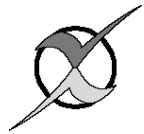
System Information - Section 1	
System Name	
System Function	
System Location	
System Priority Level	<input type="checkbox"/> Fatal - 1st Level of Priority <input type="checkbox"/> Critical - 2nd Level of Priority <input type="checkbox"/> Important - 3rd Level of Priority <input type="checkbox"/> Marginal - 4th Level of Priority
Department/Division	
Agency Contact Name	
Street Address	
City	
State	
Postal Code	
Telephone	
Telephone Extension	
Fax Number	
E-Mail Address	
System Make	
System Model	
Serial Number	
Year Manufactured	
Year Purchased	
Purchase Price	
System Useful Life	
System Under Warranty	<input type="checkbox"/> Yes <input type="checkbox"/> No
Warranty Expiration Date	
Maintenance Agreement	<input type="checkbox"/> Yes <input type="checkbox"/> No
Maintenance Agreement Expiration Date	
Does System Interface with Other System(s)	<input type="checkbox"/> Yes <input type="checkbox"/> No
Interface Name	
Interface Type	
System Assessment-Section II	
Agency Contact Name	
Telephone Number	
Fax Number	
E-Mail Address	
Assessment Start Date	
Assessment Completion Date	
Vendor/Manufacturer	
Vendor/Manufacturer Contacted?	<input type="checkbox"/> Yes <input type="checkbox"/> No

Vendor/Manufacturer 1st Contact Date	
Vendor/Manufacturer 2nd Contact Date	
Vendor/Manufacturer 3rd Contact Date	
Was written correspondence certified?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Vendor/Manufacturer Website address	
Vendor/Manufacturer Response Date	
Is system identified on the Vendor/Manufacturer website?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Vendor/Manufacturer Compliant	<input type="checkbox"/> Yes <input type="checkbox"/> No
Has Vendor/Manufacturer Provided Certification or Documentation of Y2K Compliance	<input type="checkbox"/> Yes <input type="checkbox"/> No
Has a third party verified that the system is Year 2000 compliant?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Contact information for third party	
Does Certification Adequately Demonstrate the System Capability to Handle Date	<input type="checkbox"/> Yes <input type="checkbox"/> No
Logic Operations With Year 2000 Dates	
If not Compliant is Y2K Correction Available	<input type="checkbox"/> Yes <input type="checkbox"/> No
Estimated Unit Cost to Correct	Cost \$
Actual Unit Cost to Correct	Cost \$
Y2K Replacement Available	<input type="checkbox"/> Yes <input type="checkbox"/> No
Estimated Unit Cost to Replace	Cost \$
Actual Unit Cost to Replace	Cost \$
Estimated time to correct	
Estimated time to replace system?	
System Testing - Section III	
Was System Tested	<input type="checkbox"/> Yes <input type="checkbox"/> No
Testing Organization	
Name of Test Team Contact	
Date Testing Started	
Date Testing Completed	
How was Year 2000 Compliance Tested?	<input type="checkbox"/> Certified by Vendor/Manufacturer <input type="checkbox"/> Tested in house <input type="checkbox"/> Inspected but not tested

Vendor/Manufacturer 1st Contact Date	
Vendor/Manufacturer 2nd Contact Date	
Vendor/Manufacturer 3rd Contact Date	
Was written correspondence certified?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Vendor/Manufacturer Website address	
Vendor/Manufacturer Response Date	
Is system identified on the Vendor/Manufacturer website?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Vendor/Manufacturer Compliant	<input type="checkbox"/> Yes <input type="checkbox"/> No
Has Vendor/Manufacturer Provided Certification or Documentation of Y2K Compliance	<input type="checkbox"/> Yes <input type="checkbox"/> No
Has a third party verified that the system is Year 2000 compliant?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Contact information for third party	
Does Certification Adequately Demonstrate the System Capability to Handle Date	<input type="checkbox"/> Yes <input type="checkbox"/> No
Logic Operations With Year 2000 Dates	
If not Compliant is Y2K Correction Available	<input type="checkbox"/> Yes <input type="checkbox"/> No
Estimated Unit Cost to Correct	Cost \$
Actual Unit Cost to Correct	Cost \$
Y2K Replacement Available	<input type="checkbox"/> Yes <input type="checkbox"/> No
Estimated Unit Cost to Replace	Cost \$
Actual Unit Cost to Replace	Cost \$
Estimated time to correct	
Estimated time to replace system?	
System Testing - Section III	
Was System Tested	<input type="checkbox"/> Yes <input type="checkbox"/> No
Testing Organization	
Name of Test Team Contact	
Date Testing Started	
Date Testing Completed	
How was Year 2000 Compliance Tested?	<input type="checkbox"/> Certified by Vendor/Manufacturer <input type="checkbox"/> Tested in house <input type="checkbox"/> Inspected but not tested

Testing Results - Section IV	
System Tested	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-Compliant
Did System Successfully Cross 1999 to 2000.	<input type="checkbox"/> Yes <input type="checkbox"/> No
Did System Successfully Cross from 28 February 2000 to 29 February 2000	<input type="checkbox"/> Yes <input type="checkbox"/> No
Did System successfully Cross from 2000 to 2001	<input type="checkbox"/> Yes <input type="checkbox"/> No
Was Manufacturer Contacted About any Problem Found	<input type="checkbox"/> Yes <input type="checkbox"/> No
Mitigation Type - Section V	
<input type="checkbox"/> Chip replace	
<input type="checkbox"/> Software Upgrade	
<input type="checkbox"/> Hardware Upgrade	
<input type="checkbox"/> User needs to reset date (no other modification is required)	
<input type="checkbox"/> No Fix: existing system must be replaced with newer one	
<input type="checkbox"/> No Action Required	
<input type="checkbox"/> Mitigation Type under review	
<input type="checkbox"/> Other (describe)	
Legal Concerns and Comments - Section VI	
General Concerns and Comments - Section VII	

Testing Results - Section IV	
System Tested	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-Compliant
Did System Successfully Cross 1999 to 2000.	<input type="checkbox"/> Yes <input type="checkbox"/> No
Did System Successfully Cross from 28 February 2000 to 29 February 2000	<input type="checkbox"/> Yes <input type="checkbox"/> No
Did System successfully Cross from 2000 to 2001	<input type="checkbox"/> Yes <input type="checkbox"/> No
Was Manufacturer Contacted About any Problem Found	<input type="checkbox"/> Yes <input type="checkbox"/> No
Mitigation Type - Section V	
<input type="checkbox"/> Chip replace	
<input type="checkbox"/> Software Upgrade	
<input type="checkbox"/> Hardware Upgrade	
<input type="checkbox"/> User needs to reset date (no other modification is required)	
<input type="checkbox"/> No Fix: existing system must be replaced with newer one	
<input type="checkbox"/> No Action Required	
<input type="checkbox"/> Mitigation Type under review	
<input type="checkbox"/> Other (describe)	
Legal Concerns and Comments - Section VI	
General Concerns and Comments - Section VII	



Step Six: Remediation.

Before beginning your remediation, you must make a decision about pursuing legal remedies. A failure to provide notice and a reasonable opportunity for the vendor to correct a defect, for example, may forfeit any rights under express warranties. Even where no express warranty exists, there may be rights under Uniform Commercial Code (UCC) implied warranties. But a failure to provide a notice of defect may also eliminate any right to later claim damages. CRS 4-2-607(3)(a).

The availability of warranty protection turns basically on the particulars of each individual purchase. It is impossible to reach general conclusions about whether legal rights exist in any transaction, and the legal steps necessary to protect those rights, without analysis of the documents and circumstances involved in each purchase.

Consequently, it is important that decisions about pursuing legal remedies be made before beginning remediation. Failure to provide requisite notice or retain adequate documentary evidence may prejudice an agency's rights to claim damages later.

The "Legal Issues" found in Appendix A of this tool kit contains generalized discussions of some common legal issues and theories of recovery where embedded systems are not Year 2000 compliant.

Based upon your legal assessment, the results of your review of "embedded systems," the mission criticality of each system, and, responses received from manufacturers/vendors, an agency must now decide on remediation approaches. The options are:

- Upgrade/Modify
- Replace
- Retire
- Continue to review type of remediation

In deciding upon an remediation option, you must compare the estimated cost of any upgrade or modification options against the replacement costs. If you decide to upgrade or modify your systems you must keep in mind that the nature of equipment with embedded chips is such that an upgrade will, in most cases, have to come from the vendor. The upgrade path, if available, will be in most cases, quite expensive, since it will involve physical replacement of the embedded chip. Most vendors will suggest a new model instead of an upgrade or modification. At any rate you should be heavily involved in working with vendors on upgrades, modifications or replacement options. Vendors will be your best source of information about upgrade options for equipment with embedded chips.



Step Seven: Testing.

As has been previously stated, many embedded systems that are date sensitive may not have been designed to recognize the change of the century. Because most systems view the year using the last two digits only, some devices will identify the "00" as being the Year 1900 thus corrupting subsequent calculations using the date. The potential result of these erroneous calculations vary

in magnitude. Some may cause nothing more than frustration, while others may wreak havoc. The only way to determine what the potential result is to test the device.

Testing can be easily accomplished for some systems, while testing of systems that contain multiple embedded systems, oftentimes acquired from multiple vendors, becomes more of a challenge. For example, a typical fax machine contains at least one embedded system to control date and time stamping of outbound and inbound faxes. There are hundreds of brands and models of fax machines on the market, and the task of testing each brand and model poses a challenge. Given the number of embedded chips used in all brands and models of airplanes, cars, elevators, lifts, medical equipment — all of which need to be tested — the challenge may seem like a daunting and time consuming task. However ignoring the potential malfunction in these automated devices could result in exponentially larger costs associated with damage control.

Cautionary Note: Due to the difficulty of testing equipment and devices with embedded chips, you may wish to contract an outside vendor to conduct all of your embedded equipment compliance checking. In general, the process of determining compliance involves opening up the equipment. This typically requires someone who knows what to look for and someone with expertise in the product or device (this is usually the vendor or manufacturer) to get at the system to test for and fix Year 2000 problems. Some users are reporting they have discovered that identical systems may be variously compliant because the embedded chips that are used in each system (although identical) come from different sources. Therefore, it is imperative that each embedded system be treated as if it were a different programming language that only a few people know. Without someone knowledgeable to assist you in testing, your system is at risk.

If the people within your agency are familiar enough with particular devices and are capable of testing equipment, the following guidelines are available for your use.....Proceed to Form 2.1.

Testing Determination for Systems which have been validated Y2K compliant-Form 2.1

Instructions : This format should be used to determine the extent of in-house testing necessary to validate manufacturer claims regarding Year 2000 compliance. The determination is based on the risk to the State of Colorado's operations if the equipment or item should fail despite vendor claims, and balanced against the cost and effort required to conduct testing. All items for which the impact of failure would pose a high risk should be tested. Though ideally everything should be tested, in cases where the risk is low and the cost would be high, the responsible manager may determine to accept the risk and not conduct in-house testing. Consideration of the questions below is required to support and document any decision not to test.

1. Does the vendor/manufacturer certify that the item is Year 2000 compliant?
 Yes No
2. Has information documenting this claim been provided to the State by the vendor/manufacturer?
 Yes No
3. What method could the agency use to conduct in-house testing?
4. Describe the cost and effort required to conduct this testing?
5. What would be the impact to the State of Colorado of the failure of this equipment/item/system?
6. What other functions, customers or other stakeholders would be affected?

Certification of the manager of the organization with primary responsibility for this equipment/item/system:

It is determined not to conduct in-house testing

Signature

Date

Testing will be conducted

Signature

Date

Testing Determination for Systems which have not been validated Y2K compliant-Form 2.2

Instructions : Even if you believe that your system is Year 2000 compliant, you cannot be sure until you do specific testing. This section can be used to assess whether or not to conduct testing.

1. Does this system support functions fatal or critical to the mission of the agency?
 Yes No
2. What method could the agency use to conduct in-house testing?
3. Describe the cost and effort required to conduct this testing?
4. What would be the impact to the State of Colorado of the failure of this equipment/item/system?
5. What other functions, customers or other stakeholders would be affected:

Certification of the manager of the organization with primary responsibility for this equipment/item/system:

It is determined not to conduct in-house testing

Signature

Date





Testing will be conducted

Signature

Date

"Sample" Test Plan

If you plan to conduct in-house testing yourself please do so with the following cautions:

-  Beware of simply changing the date on the equipment directly, if it allows you to do so. In some cases, this will prevent the device from working, or in other cases you may not be able to set it back.
-  Beware of any actions that might invalidate its warranty, such as opening the equipment up or altering any codes that are accessible.
-  Planning to replace old machines is one way to remediate Y2K problems. If your agency plans to replace the machine you may not need to test the system for compliancy. Before replacing be sure to check compliancy with vendor/manufacturer.
-  Establish a test site and time that will not be disruptive to the operations of your agency.

The following checklist will provide you with examples for checking devices and systems for Year 2000 compliance.

Rollover to year 2000 - Turn Power On:

This is the basic Y2K transition (occasionally called the "millennium transition") and the one that is most likely to cause a product to fail catastrophically. Set the time to 23:49 hours (11:49 p.m.) on 31 December 1999, and wait until the clock rolls over to year 2000 with system turned on. Check that the date has correctly rolled over.

Retention of Year 2000 on Power Down:

Power off the device after performing a live year 2000 rollover test. Wait a minute and switch back on. Many devices will incorrectly revert to a date of 1980 or 1990. Correct the date and repeat power down retention test. All devices should then retain the new date.

Rollover to Year 2000 - Power Off:

Set the date on the device to December 31, 1999. Set the time to 23:58 hours (11:58 p.m.) and then power off the device. Wait at least 3 minutes and then turn it back on. Check the date and time. It should be a minute or two past midnight, on the morning of Saturday, January 1, 2000. Many devices respond with January 4, 1980.

Ability to change Year 2000 Date:

This test involves changing the date and time within the year 2000 and can be observed as part of performing one or other of the following tests. For example some systems are known to lock up if a date (9/9/99) in the year 2000 is entered, after which the date and time cannot be changed.

Leap Year Tests - The Year 2000 is Also a Leap Year:

Some devices will not recognize that the Year 2000 is a leap year. This transition must be examined to determine that the product performs the leap year calculation correctly. Set the time to 23:58 (11:58 p.m.) hours on 28 February 2000, and wait 3 minutes until the clock rolls over to the next day. Check whether the next day is Tuesday, 29 February 2000. Some devices will roll over to March 2000.

Check day-of-week calculation:

Set a day after 29 February 2000, and confirm that it is the correct day of the week on the basis that the year 2000 is a leap year (29 February 2000, is a Tuesday). The day of the week may also be incorrectly computed by an application if it assumes that the year "00" is 1900 and not 2000. Another date commonly checked is 30 October 2000. It should be a Monday.

Rollover to year 2001:

This is the last of the minimum set of Year 2000 transitions and takes the system completely into the new century. It also completes the leap year evaluation by establishing that the product "knows" that the year 2000 has 366 days. Power-On: Set date and time at around 11:59 p.m. on 31 December 2000, and observe correct rollover to 2001. (01-01-2001 is a Monday).

Rollover to year 2001 - Power-Off:

Set the date on the device to December 31, 2000. Set the time to 23:58 hours (11:58 p.m.) and "power off" the device. Wait at least 3 minutes and then turn it back on. Check the date and time. It should be a minute or two past midnight on the morning of Monday, January 1, 2001.


NOTE: There are certain magical dates that products may be sensitive to because and may cause a problem:

 **1 January 1999 and 9 September 1999:**

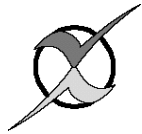
Many systems have used 1/1/99 or simply "99" and 9/9/99 - to signify 'no expiration date'. Erratic results are possible when these dates occur.

 **31 December 1999:**

This is commonly used as a 'die date', and will cause some systems to stop altogether.

 **31 December 2000 — The 366th day of the year:**

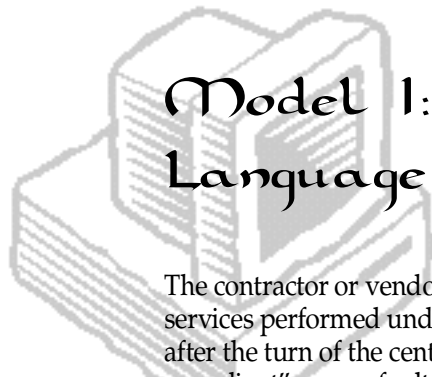
Some systems will be expecting only 365 days, and will produce erratic results when this date occurs.



Ongoing Steps:

The following model warranty clauses should be used in all state contracts and purchase orders for software, firmware, supplies, and services where date calculation, comparison, or sequencing is a part of the software, firmware, supply or service being delivered or performed. The purpose of the clause is to protect the state during the change from the 20th to the 21st century.

You are encouraged to seek legal advice and technical advice from information system specialists when vendors seek modification to the language.



Model 1: Year 2000 Warranty Language (Other than Construction)

The contractor or vendor warrants that the software, firmware, or supplies delivered, or services performed under this contract or purchase order to be used before, during and after the turn of the century (January 1, 2000) are "Year 2000 compliant." "Year 2000 compliant" means fault-free performance in the processing of date and date-related data (including, but not limited to calculating, comparing and sequencing) by all software products, firmware, and supplies, individually and in combination as a system, when used in accordance with the product documentation provided by the contractor or vendor. Fault free performance means:

- No invalid or incorrect results or abnormal termination prior to, during and after January 1, 2000 as a result of date or date-related data or data processing that represents or references different centuries or more than one century; and,
- Proper calculation and handling of leap years; and,
- Except for normal user interfaces (e.g. four digit date entry) identified in the contractor's or vendor's documentation, such date data processing shall be transparent to the user.

In the event this warranty is breached, the State may elect to (1) return the software or supply and receive a refund of the purchase price (in the case of delivered software or supplies) or (2) require the contractor or vendor to make all code revisions or repairs/replacements of firmware of supplies as well as revisions to associated documentation, at no cost to the State in order to ensure that the software, firmware or supplies are Year 2000 compliant so long as notice of such defect is provided no later than 90 days after discovery. This warranty shall survive acceptance of the software, firmware, or supplies and is not subject to any disclaimer or limitation of warranty or other limitation of the contractor's or vendor's liability which may be specified in this contract or purchase order, or any exhibits, appendices, or any other document attached or incorporated in this contract or purchase order by reference. The remedies specified herein shall not be exclusive remedies and shall not limit any other remedy at law or equity available to the State.

Model 2: Year 2000 Warranty Language (Construction)

The contractor warrants that the software, firmware, or supplies delivered under this contract to be used before, during and after the turn of the century (January 1, 2000) are "Year 2000 compliant". Year 2000 compliant means fault free performance in the processing of date and date-related data (including, but not limited to calculating, comparing and sequencing) by all software products, firmware, and supplies, individually and in combination as a system, when used in accordance with the product documentation provided by the contractor. Fault-free performance means:

- No invalid or incorrect results or abnormal termination prior to, during and after January 1, 2000 as a result of date or date-related data or data processing that represents or references different centuries or more than one century; and
- Proper calculation and handling of leap years; and,
- Except for normal user interfaces (e.g. four digit date entry) identified in the contractor's or vendor's documentation, such date data processing shall be transparent to the user.

In the event this warranty is breached, the contractor will make all code revisions or repairs/replacement (in the case of firmware or supplies), as well as revisions to associated drawings and documentation, at no cost to the State in order to ensure that the software, firmware or supplies are Year 2000 compliant so long as notice of such defect is provided no later than 90 days after discovery. This warranty shall survive acceptance of the work and is not subject to any disclaimer or limitation of warranty or other limitation of the contractor's liability which may be specified in this contract, or any exhibits, appendices, or any other document attached or incorporated in this contract by reference. The obligation to revise, repair, or replace stated herein, shall not be an exclusive remedy and shall not limit any other remedy at law or equity available to the state.



"Watching the clock roll over to a new millennium will be a unique experience in many ways! We can only hope it will be a time for great celebration, with business as usual and every state agency successfully meeting the Year 2000 challenge!"

Appendix A

Legal Issues

Because Year 2000 warranty coverage is so dependent on the circumstances of the particular transaction, agencies are strongly encouraged to seek legal advice about the availability of legal remedies. The following general discussion is intended to introduce agency personnel and legal counsel to common issues that will be encountered.

Express Warranties

Express warranties arise by operation of the Uniform Commercial Code (UCC) and by inclusion of specific warranty language and representations in the contract or purchase order. In a services or system integration contract involving delivery of embedded systems, there may be specific language in the seller's proposal or the contract itself that grants extended rights to the buyer to demand repair or replacement in the event that certain defined defects are discovered. The "Model" Year 2000 Warranty in this tool kit is an example of an express warranty. In those cases, you must comply with the specific conditions in the express warranty provisions.

Warranties can also arise by operation of CRS 4-2-313 of the (UCC). Note, however, that the UCC sales provisions only apply to "transactions in goods," a threshold determination that requires an analysis of whether the primary purpose of the contract is either the sale of goods or sale of labor or service. Factors to be considered include: 1) the contractual language; 2) whether an overall price is charged, or the goods and labor/service are separately billed; 3) the ratio of the cost of goods to the overall contract price; and 4) the nature and reasonableness of the purchaser's expectations of acquiring a property interest in the goods. *Bailey v. Montgomery Ward & Co., Inc.*, 1990 P.2d 1280 (Colo. App. 1984). With that caveat, note that express warranties can arise in transactions in goods where the affirmations of quality are contained in promotional sales materials outside of the actual contract or purchase order. *Colorado-Ute Electrical Association v. Envirotech Corp.*, 24 F. Supp. 1152 (D. Colo. 1981).

CRS 4-2-313. Express warranties by affirmation, promise, description, sample. (1) Express warranties by the seller are created as follows:

(a) Any affirmation of fact or promise made by the seller to the buyer which relates to the goods and becomes part of the basis of the bargain creates an express warranty that the goods shall conform to the affirmation or promise.

(b) Any description of the goods which is made part of the basis of the bargain creates an express warranty that the goods shall conform to the description.

(c) Any sample or model which is made part of the basis of the bargain creates an express warranty that the whole of the goods shall conform to the sample or model.

(2) It is not necessary to the creation of an express warranty that the seller use formal words such as "warranty" or "guarantee" or that he have a specific intention to make a warranty, but an affirmation merely of the value of the goods or a statement purporting to be merely the seller's opinion or commendation of the goods does not create a warranty.

This broader definition of “express warranty” in sales of goods governed by the UCC permits the buyer to look to extra-contractual seller representations as a basis for claiming breach of warranty. So for example, a seller representation as part of its proposal, promotional literature, or marketing presentation that the equipment would “take the agency into the 21st century” might support a claim of warranty under the UCC.

UCC Implied Warranties of Merchantability and Fitness For Particular Purpose

Unless effectively disclaimed by language consistent with CRS 4-2-316, sales of goods are also protected by the implied warranties of merchantability and fitness for a particular purpose.

CRS 4-2-314. Implied warranty - merchantability - usage of trade. (1) Unless excluded or modified (section 4-2-316), a warranty that the goods shall be merchantable is implied in a contract for their sale if the seller is a merchant with respect to goods of that kind. Under this section, the serving for value of food or drink to be consumed either on the premises or elsewhere is a sale.

(2) Goods to be merchantable must be at least such as:

(a) Pass without objection in the trade under the contract description; and

(b) In the case of fungible goods, are of fair average quality within the description; and

(c) Are fit for the ordinary purposes for which such goods are used; and

(d) Run, within the variations permitted by the agreement, of even kind, quality, and quantity within each unit and among all units involved; and

(e) Are adequately contained, packaged, and labeled as the agreement may require; and

(f) Conform to the promises or affirmations of fact made on the container or label if any.

(3) Unless excluded or modified (section 4-2-316), other implied warranties may arise from course of dealing or usage of trade.

CRS 4-2-315. Implied warranty - fitness for particular purpose. Where the seller at the time of contracting has reason to know any particular purpose for which the goods are required and that the buyer is relying on the seller’s skill or judgment to select or furnish suitable goods, there is, unless excluded or modified under section 4-2-316, an implied warranty that the goods shall be fit for such purpose.

Although these are viable legal theories for recovery, there is no case law yet that clearly applies the implied warranties in the Year 2000 context. At least with respect to merchantability, one can expect that expert testimony would be necessary to establish the existence of the implied warranty, and that the age/useful life of the product would be relevant factors. With respect to fitness, the content of negotiations at the time of sale between the agency and seller would be important; expectations that the product was intended to be used beyond the beginning of the next century would likely be relevant.

Services/Construction Contracts

As noted above, the UCC only applies to “transactions in goods.” Consequently, in services or construction contracts involving delivery of embedded systems, it is doubtful whether representations outside the written agreement could form the basis for an express or implied warranty against the contractor in “privity” of contract with the State. However, if an agency can prove an overt misrepresentation of material fact, e.g. Year 2000 compliance, that induced the agency to enter into a contract or purchase order, then there may be independent remedies based on fraud or misrepresentation causes of action.

Even in services/construction contracts, however, the agency may have a claim against the sub-tier supplier of the embedded system. A seller’s warranty whether express or implied extends to any person who may reasonably be expected to use or be affected by the goods and who is injured by breach of the warranty. (CRS 4-2-318) A seller may not exclude or limit the operation of this rule (that eliminates the requirement of “privity”), although warranties may still be “disclaimed” using language consistent with CRS 4-2-316. As a practical matter, commercially reasonable disclaimers in agreements between a contractor and supplier are common and may limit the agency’s ability to pursue legal remedies against the supplier. Further, the agency usually will not have access to those agreements without pursuing litigation.

Disclaimers of Warranties

The UCC permits disclaimers of warranties, although the disclaimers generally are not effective against warranties construed as “express.” Disclaimers are commonly used in commercial transactions and may limit any action based on “implied warranty” theories.

CRS 4-2-316. Exclusion or modification of warranties. (1) Words or conduct relevant to the creation of an express warranty and words or conduct tending to negate or limit warranty shall be construed wherever reasonable as consistent with each other; but subject to the provisions of this article on parol or extrinsic evidence (section 4-2-202), negation or limitation is inoperative to the extent that such construction is unreasonable.

(2) Subject to subsection (3) of this section, to exclude or modify the implied warranty of merchantability or any part of it, the language must mention merchantability and in case of a writing must be conspicuous, and to exclude or modify any implied warranty of fitness the exclusion must be by a writing and conspicuous. Language to exclude all implied warranties of fitness is sufficient if it states, for example, that “There are no warranties which extend beyond the description on the face hereof.”

(3) Notwithstanding subsection (2) of this section:

(a) Unless the circumstances indicate otherwise, all implied warranties are excluded by expressions like “as is”, “with all faults”, or other language which in common understanding calls the buyer’s attention to the exclusion of warranties and makes plain that there is no implied warranty; and

(b) When the buyer before entering into the contract has examined the goods or the sample or model as fully as he desired or has refused to examine the

- goods, there is no implied warranty with regard to defects which an examination ought in the circumstances to have revealed to him; and
- (c) An implied warranty can also be excluded or modified by course of dealing or course of performance or usage of trade.
 - (4) Remedies for breach of warranty can be limited in accordance with the provisions of this article on liquidation or limitation of damages and on contractual modification of remedy (sections 4-2-718 and 4-2-719).

Look for disclaimers in the purchase order or contract. An example of a disclaimer is:

BUYER HEREBY ACKNOWLEDGES THAT ANY AND ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE IMPLIED WARRANTY OF MERCHANTABILITY AND ANY WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, ARE EXCLUDED FROM THIS CONTRACT AND SHALL NOT APPLY TO THE GOODS SOLD. THERE ARE NO WARRANTIES THAT EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF.

Despite the language, these disclaimers are typically not held effective to disclaim express warranties.

Statutes Of Limitation

One limiting factor in any warranty claim will be the applicable statute of limitations. CRS 4-2-725 says that:

- (1) An action for breach of any contract for sale must be commenced within the time period prescribed by section 13-80-101, C.R.S. [3 years]. This period of limitation may not be varied by agreement.
- (2) A cause of action accrues when the breach occurs, regardless of the aggrieved party's lack of knowledge of the breach. A breach of warranty occurs when tender of delivery is made; except, that where a warranty explicitly extends to future performance of the goods and discovery of the breach must await the time of such performance, the cause of action accrues when the breach is or should have been discovered.

In transactions governed by the UCC, claims for breach of implied warranties will likely be barred if not asserted within three (3) years after delivery. Express warranties extending to discovery and corrections of defects in the future will likely be barred three (3) years after the buyer discovers that the seller will not correct the defect as warranted. *Smith v. Union Supply Co* 675 P.2d 333 (Colo. App. 1983).

In cases not involving transactions in goods, the general statute of limitations is also three (3) years, although the time likely will be measured from when the breach is discovered or should have been discovered by exercise of reasonable diligence. (CRS 13-80-101, 108) In construction cases, the statute of limitations is three (3) years after the claim for relief arises (generally upon discovery of the defect), but not longer than six (6) years after substantial completion of the project. (CRS 13-80-104)

With respect to misrepresentation or fraud causes of action in this context, the statute of limitations is three (3) years from the date when the fraud or misrepresentation is discovered or should have been discovered by exercise of reasonable diligence. (CRS 13-80-101, 108)

The likelihood of having a successful legal remedy will have to take into account the age of the claim and these statute of limitations provisions.

Revocation of Acceptance under the UCC

Pursuant to CRS 4-2-608 of the UCC, after acceptance of goods, the buyer has only a limited right to “revoke acceptance,” and then only where:

- 1) the nonconformity “substantially impairs” the value of the good to the buyer;
- 2) acceptance was reasonably induced either by the difficulty of discovery before acceptance or by seller’s assurances; and
- 3) revocation of acceptance occurs within a reasonable time after the buyer discovers or should have discovered the grounds for it and before any substantial change in condition of the goods which is not caused by their own defects.

As a practical matter, the third provision may limit the ability of agencies to revoke acceptance of goods suffering from Year 2000 problems, especially where they have been in service for a long time. However, where a warranty can be established, the buyer still may have a claim of damages for breach of the warranty. (CRS 4-2-714)

Notification of Vendor Concerning Defect

Most express warranties governing discovery of defects in the future will contain specific notice provisions that must be followed. The model Year 2000 Warranty in this tool kit, for example, requires notice within 90 days after discovery of the defect.

Even implied warranties under the UCC require buyer notice of breach. After acceptance, a buyer must within a reasonable time after it discovers or should have discovered any breach, notify the seller of breach or be barred from any remedy. (CRS 4-2-607(3)(a))

As a consequence, in any case in which an agency with the advice of counsel elects to exercise or reserve its legal rights, a written notice of the defect should be furnished, with a reasonable opportunity granted the seller to correct the defect. Of course, if the express warranty has other specific requirements, they must be followed.

Investigation and Obtaining Legal Advice

Because the availability of legal remedies turns on the facts of each purchase, the following steps are recommended:

1. Get a complete copy of the contract or purchase order.
2. Get a complete copy of the request for quotation, request for proposal, or invitation for bids prepared by the State and issued to the offerors/contractor.
3. Get copies of promotional literature or brochures furnished by the contractor to the State or otherwise published by the contractor.
4. Assemble any warranty information/documents. Sometimes warranty information exists that is separate from the contract or purchase order.
5. Assemble any other written correspondence that may contain seller affirmations of quality.
6. Get negotiation memoranda that may summarize oral discussions between the agency and the contractor.
7. Assemble testing or other technical evidence demonstrating the existence of a Year 2000 problem.
8. Assemble any other available information about particular requirements of the agency that were communicated to the seller, including the expected useful life of the product or system.
9. Assemble any later correspondence with the seller concerning Year 2000 compliance, such as the responses from and letters to the seller recommended by this tool kit.
10. Provide written information to agency counsel in advance. Schedule a follow-up meeting.
11. Have people at the meeting with counsel who know the product, participated in the negotiation or purchase, and may have been in contact with seller's marketing and sales personnel. Discuss with counsel the wisdom of employing outside testing experts. Assess the costs and likelihood of success in pursuing legal remedies.

A Plan for Notice/Evidence Retention Before Remediation

If legal remedies will be pursued, insure that the plan of action includes the following:

1. Proper notice to be furnished to the seller, including a reasonable time for the seller to correct the defect.
2. Reserve rights in writing before undertaking remediation by the agency.
3. Test the product to establish the existence of a defect. Consider wisdom of using outside testing experts.

