

Nematron

Nematron Products in the Year 2000

The following is, we believe, factual and complete, but does not constitute an extension of any warranty for Nematron products. As additional information becomes available, it will be posted on our web site. Please check the Support pages at www.nematron.com for the latest information.

Background

Nematron has been designing, manufacturing, selling, and supporting industrial control equipment since 1983. Today we are a leading supplier of operator interfaces, of Intel Pentium-based computers, and of software for control and HMI applications. The Year 2000 is a significant event for computer hardware and software users because many older designs, especially those from the '80s and earlier, used a 2-digit year field in order to save memory. In these cases, applications simply appended the digits "19" to the 2-digit year and continued. Things get complicated when the year 2000 rolls around. While seeing the year "1900" will be annoying on screens and in reports, logic and arithmetic using these "bad" years could have serious consequences. Year 2000 compliance must be of concern to all users and suppliers. A system or component is compliant with the Year 2000 (Y2K), if it functions accurately in all date-related operations (representational, logical, and arithmetic) as 1-JAN-2000 approaches, occurs, and passes. Nematron is committed to supplying the highest quality control systems and components. As part of this commitment, we continue to help our customers understand the impact of the Year 2000 on their existing and future installations.

A unit that stores the year as a 2-digit value will roll from 31-DEC-99 to 1-JAN-00. After this rollover, current dates will be logically and arithmetically "less than" some prior dates. A problem would occur in the following machine maintenance scheduling algorithm. Assume that a machine is programmed to shut down if it ever goes more than 20 days without maintenance. In structured text, it might be:

```
Scenario 1:
  if (date_today minus date_of_last_maintenance) is greater than 20
    shutdown machine
    inform operator
  endif

or Scenario 2:
  if date_today is greater than (date_of_last_maintenance plus 20)
    shutdown machine
    inform operator
  endif
```

The results of the first scenario will depend on the way the arithmetic is handled by the non-compliant system. In this simple example, a negative result is clearly unexpected. When 1-JAN-2000 occurs, the negative result might generate an application error. If an error isn't generated, the application will either shut the machine down (if it ignores the sign) or continue to operate beyond its scheduled maintenance date. The second scenario will simply allow the machine to continue operation until the need for maintenance becomes obvious, either from damage to the machine or from production of out of spec parts. All of the outcomes are unintended by the designer of the application.

NEMATRON PRODUCT IDENTIFICATION

A product I.D. label located on the unit contains a model number that identifies all of Nematron's products. This is usually to the right of the address on the label. The user of this document will need this number to find the information that pertains to their equipment. In this document, we have used abbreviated model numbers and the character "x" in places where the digit in that location has no bearing on Y2K compliance. For example, the model number from a product ID label may be IC7076-BB34A100, however, it is represented by IC7xxx in this document.

NEMATRON PRODUCT CLASSIFICATION

Nematron's hardware products can be divided into two groups, Operator Interfaces and Industrial Control Computers. Because these are applied at different levels of a "typical" application, the impact of the Y2K must be considered for each group.

OPERATOR INTERFACES (Following information is summarized in Table 1 & 2)

Nematron was one of the first companies to introduce third-party OI products (i.e., products capable of communicating with several manufacturers' PLCs). The term Operator Interface is very descriptive of their application. An OI allows the operator to monitor and adjust parameters of control applications running in other devices, usually PLCs. Nematron's OI products range from a two-line by 20-character display with a 10-key membrane keypad (the IWS-30 and IWS-40) to devices capable of graphics on 14-inch color screens with up to 52 keys (the IWS-2624). In the vast majority of their applications, these devices are simply operator interfaces to PLCs. In these applications, the only data communicated to the PLC is data input by the operator. They do not execute control logic or respond to PLC messages on their own (other than to perhaps change their displayed information).

Operator Interface Products and the Roll-Over to 2000

With the exception of the IWS-3005 (which does not have time/date functionality) all Nematron OI products store the year internally as a 2-digit value. At midnight on 31-DEC-99, the unit will roll over to 1-JAN-00. This will cause no problems in the majority of applications, those in which the device is simply an operator interface to a PLC or a computer. Two things have to be considered. First, if the date is being displayed as a 4-digit value on the OI, the century digits will have to be modified after the rollover. Second, if the OI is writing the date to another device, users should answer the following questions:

1. Is the date being used in logical or arithmetic calculations in that device?
2. Is the date being displayed as a 4-digit value on that device or on one of its peripherals?
3. Is that device passing the date on to another device where it will be displayed or used in logical or arithmetic calculations?

Users who answer NO to all of the questions above should experience no problems with their Nematron Operator Interface products. Users who answered YES to any of the questions, must determine the impact of the OI 2-digit year field by looking at the other components in their system. In most systems that include an operator interface, the OI interfaces to a PLC, a DCS, or a PC-based host. Generally, these "hosts" are smarter than the OI and would use an internally generated date. If the system has been designed so that the OI provides the date to the host, the user will have to modify the host logic to adjust for the 2-digit year field. The fix depends on the design of the logic in the host. If that logic converts the 2-digit year to a 4-digit year prior to calculations and comparisons, then the user might be able to fix the logic by testing whether the value is less than 50 (for example)

```
if YEAR is less than 50 then
    add 2000
else
    add 1900
endif
```

If the logic performs calculations and comparisons without converting to a 4-digit year field, then the user might again be able to fix the logic by testing whether the value is less than 50:

```
if YEAR is less than 50 then
    add 100
endif
```

These examples are simplified, but suggest the approach users might use in repairing their systems.

Operator Interface Products and the Leap Year

For most users, 28-FEB-00 is also an important Y2K issue. Century years are leap years if, and only if, they are divisible by 400. The year 2000 is a leap year, whereas the year 1900 was not. With the exception of the IPT-10x and IWS-10x (last offered in 1991) and of products in the IWS-1x1x/2x1x series (last offered in 1995) all Nematron OI devices treat the year "00" as a leap year. The date in all of these units rolls from 28-FEB-00 to 29-FEB-00.

Devices in the IWS-1x1x & IWS-2x1x series, however, do not treat the year 2000 as a leap year. This means that the date on these units rolls from 28-FEB-00 to 1-MAR-00. Users will have to note this and will probably want to adjust the date (subtracting a day) on 2-MAR-00, or shortly thereafter.

Operator Interfaces*			
Product	Treats "00" as a Leap Year?	Digits in Year Field	Comments
IPT-10x, IWS-10x	NO	2	
IWS-30/40	YES	2	
IWS-11x/12x	YES	2	
IWS-200	YES	2	
IWS-1x0x	NO	2	does not accept Feb 29, regardless of year
IWS/ICS-1x1x/2x1x	NO	2	does not accept Feb 29, regardless of year
IWS-1x2x/2x2x	YES	2	
ICS-1620/2620	YES	2	
IWS-1103/1603	N/A	none	no date/time feature
IWS-1834/HWS-1834	N/A	none	no date/time feature
IWS-2834/HWS-2834	N/A	none	no date/time feature
IWS-3005	N/A	none	no date/time feature
IWS-3015/3025	YES	2	

Table 1 Operator Interfaces

In addition to our own product line, Nematron has produced the following products for GE.

GE Private Label Products*			
Product	Treats "00" as a Leap Year?	Digits in Year Field	Comments
IC600KD510	NO	2	does not accept Feb 29, regardless of year
IC600KD511A	N/A	none	No date/time feature
IC600KD512	NO	2	does not accept Feb 29, regardless of year
IC600KD513	NO	2	does not accept Feb 29, regardless of year
IC600KD514	NO	2	does not accept Feb 29, regardless of year
IC600KD515	N/A	none	no date/time feature
IC600KD516	N/A	none	no date/time feature
IC600KD530	NO	2	does not accept Feb 29, regardless of year
IC600KD532	NO	2	does not accept Feb 29, regardless of year
IC600KD533	NO	2	does not accept Feb 29, regardless of year
IC600KD534	NO	2	does not accept Feb 29, regardless of year
IC600KD542	YES	2	
			Does not roll over to Jan 1, 2000, manual and software fixes work. See the section on IWS-45/46/49xx.
IC642MWP980	YES	4	
IC642PCM270	N/A	none	No date/time feature

Table 2 GE Private Label Products

* Year 2000 behavior statements in these tables apply to the operator interface and any firmware included with the unit.

Operator Interface Products – Configuration Software and Utilities

All revisions of the configuration and programming software discussed in this section are completely Y2K compliant by virtue of there being no date-aware functionality in any of the packages. Our OI products must be configured before they can be used. We ship configuration software and utilities with these devices for that purpose. All of these programs and utilities execute on a PC/AT during the configuration or programming phase and then are put away until their next use. They communicate with the OI via an RS-232 connection only while it is being configured. They are not a functioning part of the up-and-running operator interface. For the IWS-30/40/110/120 family of products, the two configuration software packages are simply designated CP (for "Configuration Program," currently at revision 3.59) and BP (for "Basic Program," currently at revision 3.36). For all of the other operator interface devices discussed above, owners will have received IWS Utilities (currently at revision 2.32) and OptiTalk (currently at revision 1.32).

Operator Interface Products and OptiBASIC (ICS-2620, IWS-2xxx, & IWS-3025)

The OI products above include a programming language called OptiBASIC. In addition to operator interface uses discussed above, the OptiBASIC in these units allows users to write supervisory level control programs. Supervisory control is non-time critical, where response times are at "human speeds" rather than "machine speeds." (Since none of the OI products are directly networked with I/O, they are not properly applied in machine control of the kind in which PLCs are applied.) Examples of supervisory level control are recipe management, machine maintenance scheduling, report generation, etc. Users should always ask the three questions above. When Nematron's OI products are also executing OptiBASIC programs, the user must also examine these programs for date-based calculations and logic comparisons. If it's necessary to modify the OptiBASIC programs to allow for the Y2K, the same general guidelines suggested above for repairing "host" logic should be applicable.

INDUSTRIAL CONTROL COMPUTERS (See Tables 3 & 4)

In AT-compatible systems, the real time Clock (RTC) determines the behavior at the change to the year 2000. Many RTCs have a fault that prevents them from rolling the century over, resulting in 1-JAN-2000 actually registering as 1-JAN-1900. MS-DOS has a separate clock it uses (called the software clock) which is set during the boot process. When MS-DOS picks up the date from the RTC and recognizes it as old, MS-DOS uses its default date as its starting point for the software clock (usually Jan 4, 1980). Windows, in turn, gets its date from the BIOS at powerup. So the correction is to cause the century bit to be set on the RTC. The only Microsoft fully Y2K compliant Microsoft operating systems are Windows NT (version 3.51 with Service Pack 5, version 4.0, or later) and Windows'98 (Windows'95 is very well behaved and can be made fully compliant with downloadable files, free from Microsoft). For Microsoft's handling and views of Y2K issues, you can start at www.microsoft.com/year2000/. Our Industrial Control Computers fall into three categories from the Y2K point of view. These are discussed below.

Note: Users must be careful when conducting their own tests. An application with an expiration date might "expire" if the user artificially sets the OS date beyond that application's expiration date. Evaluation copies of s/w and certain licensed programs might behave in this way.

W47xx, H47xx, ICC-5/6/7000, ICi-5/6/700, & FlexBox

These computers are fully Y2K compliant. Their BIOS/RTC rolls from 31-DEC-1999 to 1-JAN-2000 and they treat 2000 as a leap year. This BIOS and RTC functionality was verified using "IBM Year 2000 BIOS Verification Tool V2.8 3/13/98," which is available for download at their site: www.pc.ibm.com/year2000/evaluation.html (the "sister" pages contain valuable background information).

IWS-45/46/49xx, W48/49xx, & ICC-3,4,5xx

The BIOS/RTC in these computers does not roll from 31-DEC-1999 to 1-JAN-2000. All of these computers treat 2000 as a leap year. **Nematron is not able to make changes to these units' BIOS. Nematron (and other vendors) are advising their users who are not able to replace non-compliant systems to deal with the turn of the century in one of the following two ways:**

Manual The simplest solution may be to manually enter the year 2000 (shortly after the beginning of that year) into the systems BIOS Setup utility. Once saved the BIOS will store this value and begin incrementing dates properly.

Software The second solution is to use a software fix such as Year2000 by the RightTime Company at www.righttime.com. This simple TSR program is run from the autoexec.bat upon boot up. The program checks the 2 digit BIOS date, if its below 50, it is assumed to be 20, otherwise the century is assumed to be 19. The resulting year range is 1980 through 2079. Once installed, this fix will be performed only when needed and is completely transparent to the user. This fix will not work with systems running NT.

IWS-48xx

The BIOS/RTC in this computer does not roll from 31-DEC-1999 to 1-JAN-2000. Also, it does NOT treat 2000 as a leap year. Nematron is not able to make changes to these units' BIOS. Nematron (and other vendors) are advising their users who are not able to replace non-compliant systems to deal with the turn of the century in one of the two ways discussed above. They will also have to adjust for the leap year in the year 2000 by changing the date (subtracting a day) sometime on or after 2-MAR-2000.

IWS-58x6

The BIOS/RTC in this computer does not roll from 31-DEC-1999 to 1-JAN-2000. This family was offered in '286, '386 and '486 models. The '286 models recognize 00 as a leap year, the '386 models do not. The '486 models recognize 2000 as a leap year.

Industrial Control Computers			
Product	Digits in Year Field	Leap Year in Y2K?	Comments
IWS 45xx (286)	2	Yes -- 29-FEB-00	Manual & s/w fixes work
IWS-46xx	4	Yes -- 29-FEB-2000	Manual & s/w fixes work
IWS 48xx (386)	2	No	Manual & s/w fixes work
IWS-49xx	2	Yes -- 29-FEB-2000	Manual & s/w fixes work
IWS 55xx (286)	2	Yes -- 29-FEB-00	Manual & s/w fixes work
IWS-57x6/20, /33 (386)	2	No	Manual & s/w fixes work
IWS-5826/16 (286)	2	Yes -- 29-FEB-2000	Manual & s/w fixes work
IWS-58x6/20, /33 (386)	2	No	Manual & s/w fixes work
IWS-5826/35, /66 (486)	4	Yes -- 29-FEB-2000	Manual & s/w fixes work
W42xx	4	Yes -- 29-FEB-2000	Manual & s/w fixes work
H47xx, W47xx	4	Yes -- 29-FEB-2000	This model is fully compliant
W48xx, W49xx	4	Yes -- 29-FEB-2000	Manual & s/w fixes work
ICC3,4,5xx	4	Yes -- 29-FEB-2000	Manual & s/w fixes work
PVS3,4,5xx	4	Yes -- 29-FEB-2000	Manual in PowerVIEW ver 2.20 & above
RPCII (RackPCI)	4	Yes -- 29-FEB-2000	These models are fully compliant
IC5,6,7xxx	4	Yes -- 29-FEB-2000	These models are fully compliant
PVS5,6,7xxx	4	Yes -- 29-FEB-2000	These models are fully compliant
ICI5,6,7xx ("i" Series)	4	Yes -- 29-FEB-2000	These models are fully compliant
Fxxx (FlexBox PC)	4	Yes -- 29-FEB-2000	These models are fully compliant

Table 3 Industrial Control Computers

RackPC , SlimRAC, Rack10, Rack14, ShoeBOX, and VU-PAC

Nematron also offered a number of models based on rack-mounted and bench top system units without integral displays. A variety of CPU boards were used in these systems. Users can identify the board used by noting the BIOS identifying messages displayed during power-up. These CPU boards were also used in the VU-PAC product line.

CPU boards used in RackPC, SlimRAC, Rack10, Rack14, ShoeBOX, and VU-PAC				
Product	BIOS Mfr.	Compliant	29-FEB-00	Comments
286	None available to test			
386SX	AMI 5/91	NO	NO	Manual fix for Y2000
386/20	Award v.2.0	NO	NO	Manual fix for Y2000
386 Plus	C & T v.1.3	NO	NO	Manual fix for Y2000
386/33	AMI 12/91	NO	NO	Manual fix for Y2000
486	Award 1.10	NO	YES	Manual fix
486	Phoenix 1.01	NO	YES	Manual fix
486DX	AMI 1992	NO	YES	Manual fix

Table 4 Early Rack Computers

SERIES 6000 & 7000 NEMAX INDUSTRIAL X-TERMINALS

The year 2000 will have no impact on the operation of Nematron X-terminal products, the IWS-6615 and IWS-7616.

MONITORS & KEYBOARDS

The year 2000 will have no impact on the operation of any monitors (MON-) or keyboards (KBD-) sold by Nematron.

SOFTWARE

Information on Nematron and NemaSoft software products is being compiled and posted on our web site, WWW.NEMATRON.COM, and FTP site, FTP.NEMATRON.COM, as it becomes available. Users of Nematron software, including Open Control, Paragon, PowerVIEW, FloPro, and Autonet are advised to contact our Technical Support group at support@nematron.com for further assistance.