

# Y2K

## YAY2K (Yeat Another Year 2000)

In less than 500 days the most computerized cataclysm will strike the world. Possibly, nothing happens and everything goes on as before. Although, credits cards expiring in 2000 or beyond caused some cash registers to crash. The devil is thus already among us. That computers will stop running, crash or will not reboot after the 1st January 2000 (enthusiasts like to call it Y2k nowadays) is likely. Worse would be that they simply run their calculations on the year 1900 and come up with nothing else than wrong answers, resulting in a massive data processing breakdown. Don't think about what would happen with air traffic control systems, medical networks, communication systems,...

No, do not get discouraged yet. Recent investigations in the 'year 2000 problem' area for the CD-i platform make the picture far less terrifying for the CD-i community.

### General conclusion

CD-i players are Year 2000 compliant or work correctly up-to the year 2027 with one exception:

- Those products which uses a disc drive (e.g floppy) formatted according PC standards.

There is however another aspect: the application on the CD (CD-i disc). They could show some Year 2000 symptoms. You have to inquire at the supplier of your application to get a confirmation.

As result of our investigations we have trusted to paper a detailed description of the Y2K problems issues in CD-i players produced by Philips in combination with the CD-i application. When there is no direct solution to the problem, workarounds are suggested. The details are split up per system module affected. Please note that also system modules which are Year 2000 compliant are described to give a complete view of the problem area.

### File Managers

The file managers use the current system date to timestamp files when they are created. The timestamp is the date/time entry in the file descriptor. The year entry size is unfortunately only a single byte long. For most file managers the problem lies in the method they use to reduce the system year to a single byte value. This means that the application have to do some adjustments when doing date arithmetic.

### CDFM

This file manager provides support the CD device class, and is used in all CDI players. According to the FFGB the CDFM file manager stores the file creation date in a 6 byte field all being unsigned chars. One byte is reserved for the year indication and contains the number of years elapsed since 1900. This file-manager is capable of storing the date correctly up to the year 2155 and is thus Year 2000 compliant.

### NRF

This file manager is used in all CD-i players produced and support the NV-RAM type devices (8k or 32k). System time is requested using the system call F\$Time. The year information is copied to the file descriptor after calculating a modulo 100 (year %= 100). This means, any files created after year 1999 - e.g. 2003 will get the value 03 as the creation year.

The playershell compensates for this by adding 100 to all year-values from the file descriptor when the year is less than 88. So sorting the list of files in NVRAM based on 'Date' will yield correct results. Applications should use the same algorithm when comparing file dates on NV-RAM files.



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**RBF**

This file manager is used in a limited number of CD-i player models:

- CDI-602 for interface to OS-9 formatted floppy disks.
- CDI-605 for interface to OS-9 formatted floppy disks and hard disks.
- CDI-615 for interface to OS-9 formatted floppy disks.

This file manager obtains the system date from the F\$Time system call, it then stores the year as system\_year % 100 (modulo 100). This means that a file created in the year 2003 gets the value 3 in the file descriptor year field. When comparing file dates on RBF files 100 should be added to the year-value if the year is less than 88 before making the comparison.

**PCF**

This file manager is used in the following CDI player models:

- CDI-602 for interface to PC formatted floppy disks.
- CDI-605 for interface to PC formatted floppy disks and hard disks.
- CDI-615 for interface to PC formatted floppy disks.
- CDI-670 for interface to externally mounted Zip-100 or Imation SD-120 disk drives using PC formatted removable disks and floppy disks (Imation only).

The older player models (CDI-602, CDI-605, CDI-615) use edition #77 and earlier of the PCF: The year is obtained as the System\_year % 100. The MS-DOS year number is expressed as 'years since 1980' in a seven bit field. This is correctly derived as 'OS-9 year - 80' by the PCF. When however 'OS-9 year' < 80, this generates a carry and an effective 7-bit result of 'OS-9 year' + 48. When this date field is read back, either by PCF or by MS-DOS, it gets converted to: 'OS-9 year' + 48 + 1980 = 2028 + 'OS-9 Year' (In practice, the bit is lost when shifting left, but the effect is the same: an advance of 128 years)

Example:

Suppose a system date of '11/05/2003'. When we create a file on a PC-formatted media, remove the media and place it in a PC, a 'dir' would reveal '05/11/31' as the file date!

The latest player model (CDI-670) uses edition #777 of the PCF: For this version of PCF the date processing is identical to what has just been described, but the initial year is obtained as 'System\_year - 1900'. In this case, no carry is generated when converting dates beyond 1999 to MS-DOS format, and the correct year value is retained. This edition of PCF is Year 2000 compliant until 2028.

A ROM upgrade, consisting of a new extension ROM containing edition #777 of PCF, is available for the CDI-615 player. Contact LoB Disc for more information on this.

**PIPE**

This file manager is used in all CDI players produced. It provides support for named and unnamed pipes. System time is requested using the system call F\$Time. The year information is copied to the pipe descriptor after performing a modulo 100 (year %= 100). This means, any files created after year 1999 - e.g. 2003 will get the value 03 as the creation year.

It is recommended that applications use the same algorithm for comparing pipe creation dates as for NRF and RBF files. That is, if the creation year is < 88 add 100 before comparing.

**Backup Clock**

All CDI players made by Philips contain a battery backup clock used to keep current system time, even if the player is switched off.

No problems are known with the following player model ranges:

- CDI-605, CDI-210/40 and higher,
- CDI-220/60 and higher,
- CDI-450, CDI-550, CDI-470, CDI-490,
- CDI-615, CDI-660, CDI-670.

One known problem with the following player model ranges:

- CDI-220/20, CDI-220/40
- CDI-210/20



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If the system time is allowed to run past 2000, there are no problems with the time-keeping, but in one special case, a problem may occur: If current system time indicates a pre-2000 date, setting the date to a post year 2000 date will cause the system date to be set to 1900 plus the year count after 2000. The battery backup clock will be set correctly in this case, so when setting the system date past year 2000, the system should be switched OFF then ON to get the system clock updated properly.

**Other documents:**

IE Volume 6, Number 4, December 1997

IE Volume 7, Number 1, August 1998

Microware documentation on OS-9. (CD-i's CD-RTOS is based on release 2.4 of OS-9)



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