

Printers

This chapter presents the PC 99 requirements and recommendations for printers. Printers and other devices attached to parallel ports should be capable of high-speed, bi-directional data transfers. The design criteria for parallel devices follows the design criteria for parallel ports as described in “Parallel Port Requirements” in Chapter 13, “I/O Ports and Devices.”

The goal of the PC 99 requirements for printers and parallel ports is to ensure the following:

- Maximum speed for transfer of parallel data between the system and the peripheral
- A true Plug and Play experience for users

Contents

Basic Printer Features	383
PC 99 Printer Design	385
Plug and Play for Printers.....	385
Device Drivers and Installation for Printers.....	386
Printer References.....	389
Checklist for Printers	390

Basic Printer Features

This section summarizes the basic PC 99 hardware requirements for printers.

21.1. IEEE 1394 printer meets PC 99 requirements for IEEE 1394

Required

The IEEE 1394 bus is recommended for support of fast, high-density data transfer. For information about implementing IEEE 1394 for PC 99, see Chapter 8, “IEEE 1394.”

21.2. USB printer meets PC 99 requirements for USB devices

Required

The USB bus is a requirement for PC 99 systems. USB printers must conform to the *Universal Serial Bus Device Class Definition for Printing Devices, Version 1.0* or later. For information about implementing USB for PC 99, see Chapter 7, “USB.”

PC 99A clarification: The USB bus is a requirement for PC 99 systems. USB printers must conform to the *Universal Serial Bus Device Class Definition for Printing Devices, Version 1.1* or later.

21.3. IEEE 1284 printer supports compatibility mode, nibble mode, and ECP, compliant with IEEE 1284-I

Required

Parallel peripherals must implement nibble mode and compatibility mode. Nibble mode provides a means of transferring the identification string from the peripheral to the system. Compatibility mode provides backward compatibility with non-Plug and Play systems that do not support more advanced modes.

A parallel device complies with IEEE 1284 if it meets the required criteria documented in the IEEE 1284 specification, *Standard Signaling Method for a Bi-directional Parallel Peripheral Interface for Personal Computers*. For a parallel device that connects to a PC 99 system, the minimum requirement is IEEE 1284 Level I compliance, which implements the compatibility and nibble modes as specified in IEEE 1284 and defines the mechanical and electrical specifications of the peripheral.

An IEEE 1284-I-compliant peripheral uses the standard IEEE 1284-B connector. In all cases, ensure that there is enough space between the connectors and the surrounding enclosure to allow for a mating connector, a connector shell, and a latch assembly.

For more information about the electrical specifications for IEEE 1284-I-compliant peripherals, refer to the IEEE 1284 specification.

For more information, see “Parallel Port Requirements” in Chapter 13, “I/O Ports and Devices,” which defines the following related parallel port requirements:

- Support for compatibility, nibble mode, and extended capabilities port (ECP) protocols compliant with IEEE 1284-1994
- Port connectors compliant with IEEE 1284-I, at a minimum
- Support for ECP mode compliant with IEEE 1284

Recommended: ECP mode enabled by default.

21.4. IEEE 1284 printer meets IEEE 1284-II requirements*Recommended*

Peripheral devices capable of handling a high-speed data rate should comply with the mechanical, electrical, and protocol specification of IEEE 1284-II. In particular, such devices should support the protocols of the IEEE 1284-II ECP mode and should use the IEEE 1284-C connector.

21.5. ECP printer works correctly when ECP mode is turned off*Required*

This ensures that the user has correct printing support when ECP mode is not in use.

21.6. IEEE 1284 hardware supports error notification*Required*

The following minimum errors must be reported individually by the hardware:

- Out of paper
- Paper jam
- Load other paper size

21.7. Daisy-chained parallel port device is Plug and Play capable*Required*

The daisy-chained parallel port device must be capable of answering Plug and Play requests from the host. Because of end-of-chain issues with IEEE 1284 and IEEE 1284.3, it is also required that all pass-through devices comply with IEEE 1284.3.

21.8. Network printer supports standard port monitor*Required*

Network-connected printers must support TCP/IP standards such as Line Printer Remote (LPR) and Line Printer Daemon (LPD) (RFC 1179), Port 9100 printing (raw mode printing), or both types.

PC 99 Printer Design

This section summarizes requirements related to the PC 99 design initiatives in Part 1 of this guide.

Plug and Play for Printers

The items in this section are requirements for Plug and Play capabilities. For Plug and Play requirements related to the printer port on the PC, see Chapter 13, "I/O Ports and Devices," or the related bus port requirements in Part 3 of this guide.

21.9. Plug and Play support implemented for all supported buses

Required

Complete Plug and Play support must be implemented for all buses that the device supports. Each print device must have a unique Plug and Play ID. For information about the Plug and Play requirements, see the related bus-class definitions in Part 3 of this guide.

21.10. Peripheral device meets IEEE 1284 requirements

Required

Recommended: Support CompatibleID key in the device identification string.

These requirements include a Plug and Play device ID as described in the IEEE 1284 specification. For more information, see “Parallel Port Requirements” in Chapter 13, “I/O Ports and Devices.”

Device Drivers and Installation for Printers

This section summarizes device driver requirements for printers. The items in this section are requirements for all PC 99 systems.

21.11. Printer INF file and installation meet PC 99 requirements

Required

Each device requires a printer INF file for both Windows 98 and Windows 2000 Professional operating systems. The manufacturer does not need to supply a printer INF file if a standard printer INF file provided with the operating system can be used.

If the manufacturer provides an INF file, it must be complete and free of errors. This INF file must comply with the printer-specific extensions listed in the Windows 95 DDK and Windows 2000 DDK.

PC 99A clarification: For information about printer INF format for Windows 2000, see “Chapter 10: Installing and Configuring Printer Drivers” in “Part 3: Printer Drivers and Spooler Components” in the “Graphics Drivers Design Guide” in the Windows 2000 DDK (online at http://www.microsoft.com/ddk/ddkdocs/Win2kRC1/prtinst_02lj.htm).

For information about the INF format for Windows 98, see “Printer INF File Extension” and “Printer-Specific INF File Extensions Reference” in “Windows 95 Documentation” in the Windows 98 DDK (online at http://www.microsoft.com/ddk/ddkdocs/win98ddk/devinst_19f7.htm).

If the manufacturer supplies an INF file or another file, it must comply with requirement 3.16, “Device driver and installation meet PC 99 requirements.”

21.12. Driver correctly reports device capabilities

Required

The driver must correctly support the DEVMODE structure as defined in the Windows 95 DDK and Windows 2000 DDK.

PC 99A clarification: For Windows 98, DEVMODE structure is defined in the “New Function and Structure Reference” of the “Printer Driver Overview” in “Windows 95 Documentation” in the Windows 98 DDK (online at http://www.microsoft.com/ddk/ddkdocs/win98ddk/printer_0qwk.htm).

For Windows 2000, DEVMODEW structure is defined in the “Chapter 3: Graphics Driver Structures” in “Part 1: Common Graphics Driver Interface” in the “Graphics Drivers Reference” of the Windows 2000 DDK (online at http://www.microsoft.com/ddk/ddkdocs/Win2kRC1/grstrcts_6v8n.htm).

21.13. Driver supports error notification

Required

At a minimum, the device driver must support notifying the user of errors reported by the hardware.

21.14. Driver supports ICC color management

Required

Windows 95/98 and Windows 2000 operating systems support using color profiles that comply with the International Color Consortium (ICC) Profile Format specification. The device either must create sRGB output or must embed the ICC profile for the newly acquired image into the image file to identify the color-space information for that image.

For contact information on device profiles, see the references at the end of this chapter. The Integrated Color Management (ICM) APIs and functionality for Windows 98 and Windows 2000 operating systems are described in the Microsoft Platform SDK and the Windows 2000 DDK.

PC 99A clarification: Implementation details are defined in “Chapter 12: Color Management for Printers” in “Part 3: Printer Drivers and Spooler Components” of the “Graphics Drivers Design Guide” in the Windows 2000 DDK (online at http://www.microsoft.com/ddk/ddkdocs/Win2kRC1/printicm_77vr.htm).

Color-capable devices such as desktop monitors, printers, scanners, still-image cameras, LCDs, color plasma displays, or other flat-panel devices are required to install one or more ICC profiles for ICM. Providing a monitor color-calibration utility is recommended for generating, editing, and installing ICC profiles. The sRGB profile is distributed with Windows 98 and Windows 2000. Devices that are sRGB compliant are not required to associate a profile.

21.15. Port monitor software meets DDK guidelines*Required*

Any port monitor or language monitor software provided with a print device must accurately report errors and support bi-directional communication as defined in the Windows 95 DDK and Windows 2000 DDK.

PC 99A clarification: For implementation information about port monitor software, see “Writing a Print Monitor” in “Part 3: Printer Drivers and Spooler Components” of the “Graphics Drivers Design Guide” in the Windows 2000 DDK (online at http://www.microsoft.com/ddk/ddkdocs/Win2kRC1/provider_6cyv.htm).

21.16. Driver supports point-and-print network installation*Required*

The user must be able to install a driver from a server by double-clicking on the printer share.

21.17. Device is available immediately following installation*Required*

The user must not have to restart the system after device installation in order to print.

21.18. Device supports accurate printable regions*Required*

The printable regions that can be selected in the user interface must be accurately supported in the actual print output.

21.19. Driver supports required DDIs*Required*

Printer drivers must ensure that print commands from Win32-based applications are executed correctly on the specified printer or plotter. Because Win32 APIs are not hardware-specific, it is the job of each printer driver to interpret the commands for its specific hardware.

PC 99A Change: It is strongly recommended that printer drivers run only in user mode. Drivers that run in kernel mode can incur stability problems. For driver implementation guidelines, see “Part 3: Printer Drivers and Spooler Components” in the Graphics Drivers section of the Windows 2000 DDK (online at http://www.microsoft.com/ddk/ddkdocs/Win2kRC1/printro_592f.htm). See also “Choosing User Mode or Kernel Mode” in the DDK (online at http://www.microsoft.com/DDK/ddkdocs/Win2kRC1/drvarch_2ief.htm).

This is expected to be a requirement in future versions of these guidelines.

For Windows 2000 drivers, the required device driver interfaces (DDIs) are defined in the Windows 2000 DDK.

For Windows 98 drivers, this requirement includes correct support of all features advertised for the device, plus required support for Windows features. The required DDIs for Windows 98 drivers are listed in the “Printer Driver Overview” section of the Windows 95 DDK. This includes the following support, in addition to other support defined in the DDK:

- TrueType glyph indexes
- Big fonts (those that require more than 64K to express)
- Enhanced metafile (EMF) spooling
- Bezier curve output
- Services from the Windows device-independent bitmap (DIB) engine

PC 99A clarification: The required DDIs for Windows 2000 printer drivers are defined in “Part 3: Printer Drivers and Spooler Components” in the “Graphics Drivers Reference” of the Windows 2000 DDK (online at http://www.microsoft.com/ddk/ddkdocs/Win2kRC1/spoolfnc_6r13.htm).

The required DDIs for Windows 98 printer drivers are defined in the “Printer Driver Reference” in the “Windows 95 Documentation” in the Windows 98 DDK (online at http://www.microsoft.com/ddk/ddkdocs/win98ddk/printer_0r1v.htm).

21.20. Driver is based on Unidriver

Recommended

Microsoft provides a universal printer driver (Unidriver) that is capable of carrying out requests such as printing text, rendering bitmaps, or advancing a page on most printer types. To build a driver for a particular printer, a developer builds a minidriver. This minidriver accepts requests from the Graphics Device Interface (GDI) and then, in most cases, passes the request to the Unidriver along with information that describes the capabilities, commands, and resident fonts of the particular printer. For more information, see the Windows 2000 DDK and Windows 95 DDK.

PC 99A clarification: For information about the Unidrv for Windows 2000, see “Chapter 4: Microsoft Universal Printer Driver” in “Part 3: Printer Drivers and Spooler Components” of the “Graphics Drivers Reference” in the Windows 2000 DDK (online at http://www.microsoft.com/ddk/ddkdocs/Win2kRC1/nt5gpd_4mcn.htm).

For information about the Unidriver for Windows 98, see the “Printer Driver Overview” in the “Windows 95 Documentation” in the Windows 98 DDK (online at http://www.microsoft.com/ddk/ddkdocs/win98ddk/printer_0o1f.htm).

Printer References

The following represents some of the references, services, and tools available to help build hardware that is optimized to work with Windows operating systems.

ICC Profile Format Specification, Version 3.4,

International Color Consortium

<http://www.color.org/profiles.html>

Microsoft Windows 95 DDK, Windows 98 DDK, Windows 2000 DDK, and
Microsoft Platform SDK

MSDN Professional subscription

*Standard Signaling Method for a Bi-directional Parallel Peripheral Interface
for Personal Computers (IEEE 1284 specification)*

ASK*IEEE

Phone: (800) 949-4333

Fax: (212) 310-4091

Global Engineering Documents

Fax: (303) 397-2740

Phone: (800) 854-7179 (US)

(613) 237-4250 (Canada)

(303) 792-2181 (Outside North America)

Universal Serial Bus Device Class Definition for Printing Devices, Version 1.0

<http://www.usb.org/developers/index.html>

White papers on printing under Microsoft operating systems

<http://www.microsoft.com/hwdev/print/>

Checklist for Printers

If a recommended feature is implemented, it must meet the PC 99 requirements for that feature as defined in this document.

21.1. IEEE 1394 printer meets PC 99 requirements for IEEE 1394

Required

21.2. USB printer meets PC 99 requirements for USB devices

Required

21.3. IEEE 1284 printer supports compatibility mode, nibble mode, and ECP, compliant with IEEE 1284-I

Required

21.4. IEEE 1284 printer meets IEEE 1284-II requirements

Recommended

21.5. ECP printer works correctly when ECP mode is turned off

Required

21.6. IEEE 1284 hardware supports error notification

Required

21.7. *Daisy-chained parallel port device is Plug and Play capable*
Required

21.8. *Network printer supports standard port monitor*
Required

21.9. *Plug and Play support implemented for all supported buses*
Required

21.10. *Peripheral device meets IEEE 1284 requirements*
Required

21.11. *Printer INF file and installation meet PC 99 requirements*
Required

21.12. *Driver correctly reports device capabilities*
Required

21.13. *Driver supports error notification*
Required

21.14. *Driver supports ICC color management*
Required

21.15. *Port monitor software meets DDK guidelines*
Required

21.16. *Driver supports point-and-print network installation*
Required

21.17. *Device is available immediately following installation*
Required

21.18. *Device supports accurate printable regions*
Required

21.19. *Driver supports required DDIs*
Required

21.20. *Driver is based on Unidriver*
Recommended

