QUATECH

SPP-100

Enhanced Parallel Port
Type II PCMCIA Card

for PCMCIA Card Standard compatible machines

User's Manual

INTERFACE CARDS FOR IBM PC/AT AND PS/2

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Warranty Information

Quatech Inc. warrants the ___**SPP-100**___ to be free of defects for _**one (1) year**_ from the date of purchase. Quatech Inc. will repair or replace any adapter that fails to perform under normal operating conditions and in accordance with the procedures outlined in this document during the warranty period. Any damage that results from improper installation, operation, or general misuse voids all warranty rights.

The authors have taken due care in the preparation of this document and any associated software program(s). In no event will Quatech Inc. be liable for damages of any kind, incidental or consequential, in regard to or arising out of the performance or form of the materials presented herein and in the program(s) accompanying this document. No representation is made regarding the suitability of this product for any particular purpose.

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Please complete the following information and retain for your records. Have this information available when requesting warranty service.

Date of purchase: _____

Model Number: **SPP-100**_____

Product Description: Type II PCMCIA Enhanced Parallel Port_____

Serial Number: _____

ℂ𝔼 **Declaration of Conformity**

Manufacturer's Name: Quatech Inc.

Manufacturer's Address: 5675 Hudson Industrial Pkwy.
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Application of Council Directive: 89/336/EEC

**Standards to which
Conformity is Declared:**
* EN50081-1
   (EN55022)
* EN50082-1
   (IEC 801-2, IEC 801-3, & IEC 801-4)

Type of Equipment: Information Technology Equipment

Equipment Class: Commercial, Residential, & Light
Industrial

Product Name: PCMCIA Card

Model Number : SPP-100

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1. Introduction

The SPP-100 is an Enhanced Parallel Port (EPP) adapter for systems equipped with PCMCIA Type II and/or Type III expansion sockets. The SPP-100 is a PCMCIA Type II (5 mm) card and is PCMCIA PC Card Standard Specification 2.1 compliant.

The figure below illustrates a complete SPP-100 system. The system includes the CP-SPP cable assembly which converts the SPP-100's 0.8mm I/O connector into a standard D-25 female connector.

Figure 1. SPP-100 System Configuration.

Starting with the original PC, IBM defined the standard parallel printer port. The original standard parallel printer port only supported data output. The IBM PS/2 series added bi-directional support to the parallel port. This was done by using one more bit in the control out register to control tristating of the data out port. The next generation of parallel ports is the EPP parallel port, which is defined by the IEEE P1284 standard. The IEEE standard defines a signaling method for asynchronous, fully interlocked, bi-directional parallel communications between hosts and printers or other peripheral devices.

The SPP-100 provides a single IEEE P1284 compliant EPP parallel port which is also backward compatible with the standard PC-compatible parallel port and the PS/2 type bi-directional parallel port.

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2. DOS / Windows 3.x Installation

Two configuration software programs are provided with the SPP-100: a Client Driver, SPP100CL.SYS, and a card Enabler, SPP100EN.EXE. Both of these programs are executed from DOS (before entering Windows) and allow operation of the SPP-100 in both the DOS and Windows 3.x environments. For optimal operation, however, the Client Driver is the preferred method of installation and configuration. The table below highlights the differences between these programs.

Client Driver (recommended)	Enabler (not recommended)
File name: SPP100CL.SYS	File name: SPP100EN.EXE
Interfaces to PCMCIA Card and Socket Services software (PCMCIA host adapter independent)	Interfaces directly to Intel 82365SL and other PCIC compatible PCMCIA host adapters
Allows automatic configuration of SPP-100 adapters upon insertion (Hot Swapping)	Does not support automatic configuration of SPP-100 adapters upon insertion (Hot Swapping)
Requires PCMCIA Card and Socket Services software	Does not require PCMCIA Card and Socket Services software

Figure 2. Client Driver versus Enabler for DOS/Windows 3.x.

Card and Socket Services software is commercially available from several vendors for most desktop and laptop PCs. If you are unsure whether Card and Socket Services software is currently installed on your system, install the SPP-100 Client Driver as discussed in following section. When loaded, the Client Driver will display an error message if Card and Socket Services software is not detected.

2.1 SPP-100 Client Driver for DOS

In order to use the SPP-100 Client Driver, the system must be configured with Card and Socket Services software. Card and Socket Services software is not provided with the SPP-100 but is available from Quatech.

> **IMPORTANT:**
> Some versions of Card and Socket Services dated before 1993 do not support general purpose I/O cards. If after careful installation of the Client Driver the SPP-100 does not configure or operate properly, an updated version of Card and Socket Services may be required.

2.1.1 Client Driver Installation

The following procedure is used to install the SPP-100 Client Driver:

1. Copy the file SPP100CL.SYS from the SPP-100 distribution diskette onto the system's hard drive.

2. Using an ASCII text editor, open the system's CONFIG.SYS file located in the root directory of the boot drive.

3. Locate the line(s) in the CONFIG.SYS file where the Card and Socket Services software is installed.

4. **AFTER** the line(s) installing the Card and Socket Services software, add the following line to the CONFIG.SYS file:

   DEVICE = *drive*:*path*\\SPP100CL.SYS *options*

   where *options* are the SPP-100 Client Driver command line options discussed on the following pages.

5. Save the CONFIG.SYS file and exit the text editor.

6. Insert the SPP-100 into one of the system's PCMCIA slots.

   NOTE: Since the SPP-100 Client Driver supports "Hot Swapping", it is not necessary to have the SPP-100 installed when booting the system. By inserting the card before booting, however, the Client Driver will report the adapter configuration during the boot process thereby verifying the changes made to the CONFIG.SYS.

7. Reboot the system and note the message displayed when the SPP-100 Client Driver is loaded. If the Client Driver reports an "invalid command line option", correct the entry in the CONFIG.SYS file and reboot the system again. If the Client Driver reports "Card and Socket Services not found", a version of Card and Socket Services must be installed on the system or the SPP-100 Enabler program must be used to configure the adapter. If the Client Driver reports the desired adapter configuration, the installation process is complete and the SPP-100 may be removed and / or inserted from the system as desired. On each insertion into the PCMCIA socket, the SPP-100 will be automatically reconfigured according to the command line options.

2.1.2 Command Line Options

The SPP-100 Client Driver accepts up to eight command line arguments from the user to determine the configuration of the SPP-100. If any arguments are provided, the Client Driver will attempt to configure any SPP-100s with the options specified in the order they are entered on the command line. Each argument must be enclosed in parenthesis and must be separated from other arguments by a **space** on the command line. Within each argument, any or all of the following parameters may be specified using a **comma (no spaces)** to separate each parameter:

B*address*   specifies the base I/O address of the SPP-100 in hexadecimal. This address must reside on an even 8-byte boundary. If this option is omitted, a base address will be assigned by Card and Socket Services.

I*irq*   specifies the interrupt level (IRQ) of the SPP-100 in decimal. *irq* must be one of the following values: 3, 4, 5, 7, 9, 10, 11, 12, 14, 15, or 0 if no IRQ is desired. If this option is omitted, an interrupt level will be assigned by Card and Socket Services.

S*socket*   specifies which PCMCIA socket the SPP-100 must be inserted into for this configuration argument to be used. *socket* must be in the range 0 - 15. If this option is omitted, the configuration argument will apply to SPP-100s inserted into any socket.

E*mode*   specifies EPP mode operation for the SPP-100 (This overrides the mode selection bit in the Extended Control Register.). If this option is omitted, the SPP-100 defaults to standard printer port mode operation.

L*list*   specifies that the client driver update the BIOS equipment list on card insertion and removal. If this option is omitted, the BIOS equipment list is not updated.

2.1.2.1 Example 1

DEVICE = C:\SPP-100\SPP100CL.SYS

In example 1, no command line arguments are specified. The Client Driver will configure an SPP-100 inserted into any socket with a base address and IRQ assigned by Card and Socket Services. The SPP-100 will

operate as a standard printer port, and the BIOS equipment list will not be updated.

2.1.2.2 Example 2

DEVICE = C:\SPP-100\SPP100CL.SYS (b278)

In example 2, a single command line argument is provided. The Client Driver will attempt to configure an SPP-100 inserted into any socket at base address 278H with an IRQ assigned by Card and Socket Services. If address 278H is unavailable, the SPP-100 will not be configured. If successfully configured, the SPP-100 will operate as a standard printer port and the BIOS equipment list will not be updated.

2.1.2.3 Example 3

DEVICE = C:\SPP-100\SPP100CL.SYS (s0,b378,i7)

In example 3, a single command line argument is provided. The Client Driver will attempt to configure an SPP-100 inserted into socket 0 with a base address of 378H and IRQ 7. If address 378H or IRQ 7 is unavailable, the SPP-100 will not be configured. In addition, if an SPP-100 is inserted into any other socket, it will not be configured. If successfully configured, the SPP-100 will operate as a standard printer port and the BIOS equipment list will not be updated.

2.1.2.4 Example 4

DEVICE = C:\SPP-100\SPP100CL.SYS (i5,e,l,b220)

In example 4, a single command line argument is provided. Because the parameter order is not significant, the Client Driver will attempt to configure an SPP-100 inserted into any socket with a base address of 220H and IRQ 5. If address 220H or IRQ 5 is unavailable, the SPP-100 will not be configured. If successfully configured, the SPP-100 will operate in EPP compatible printer port mode and the BIOS equipment list will be updated by the client driver during card insertion and removal events.

2.1.2.5 Example 5

DEVICE = C:\SPP-100\SPP100CL.SYS (b3BC,i5) (i10) ( )

In example 5, three command line arguments are provided. The Client Driver will first attempt to configure an SPP-100 inserted into any socket with a base address of 3BCH and IRQ 5. If address 3BCH or IRQ 5 is unavailable, the Client Driver will proceed to the second command line argument and attempt to configure the card with a base address assigned by Card and Socket Services and IRQ 10. If IRQ 10 is also unavailable, the Client Driver will proceed to the third command line argument and configure the SPP-100 with a base address <u>and</u> an IRQ assigned by Card and Socket Services. If successfully configured, the SPP-100 will operate as a standard printer port and the BIOS equipment list will not be updated.

2.1.2.6 Example 6

DEVICE = C:\SPP-100\SPP100CL.SYS (b3BC,i5) ( ) (i10)

In example 6, the three command line arguments of example 5 have been rearranged. The Client Driver will first attempt to configure a SPP-100 inserted into any socket with a base address of 3BCH and IRQ 5. If address 3BCH or IRQ 5 is unavailable, the Client Driver will proceed to the second command line argument and attempt to configure the card with a base address and IRQ assigned by Card and Socket Services. Since the second command line argument includes all available address and all available IRQ resources, the third command line argument will never be reached by the Client Driver. It is the user's responsibility to place the command line arguments in a logical order.

2.1.2.7 Example 7

DEVICE = C:\SPP-100\SPP100CL.SYS (s0,b378,i7) (s1,b278,i5)

The type of configuration shown in example 7 may be desirable in systems where more than one SPP-100 is to be installed. In this example, the Client Driver will attempt to configure an SPP-100 inserted into socket 0 with a base address of 378H and IRQ 7. If the SPP-100 is inserted into socket 1, the Client Driver will attempt to configure it with base address 278H and IRQ 5. This allows the user to force the SPP-100's address and IRQ settings to be socket specific which may simplify cable connections and software development. As in the previous examples, however, if the requested address or interrupt resources are not available, the SPP-100 will not be configured.

2.1.3 Common Problems

<u>Generic Client Drivers:</u>
Many Card and Socket Services packages include a generic client driver (or SuperClient) which configures standard I/O devices. If one of these generic client drivers is installed, it may configure the SPP-100 causing the SPP-100 client driver to fail installation. In these cases, the user should do one of the following:

1. modify the operation of the generic client driver to disable the configuration of parallel port cards. Consult the Card and Socket Services documentation for availability and details of this feature.

2. place the SPP-100 client driver before the generic client driver in the CONFIG.SYS.

<u>Available Resources:</u>
One function of the Card and Socket Services software is to track which system resources (memory addresses, I/O addresses, IRQs, etc.) are available for assignment to inserted PCMCIA cards. Sometimes, however, the Card Services software assumes or incorrectly determines that a particular resource is used when it is actually available. Most Card and Socket Services generate a resource table in a file (typically in the form of an .INI file) which the user can modify to adjust the available system resources. Consult the Card and Socket Services documentation for availability and details of this feature.

<u>Multiple Configuration Attempts:</u>
Some Card and Socket Services have a setting which aborts the configuration process after a single configuration failure (such as a request for an unavailable resource). The user should change this setting to allow for multiple configuration attempts. Consult the Card and Socket Services documentation for availability and details of this feature.

<u>Older Versions of Card and Socket Services:</u>
Some versions of Card and Socket Services dated before 1993 do not support general purpose I/O cards. If after careful installation of the Client Driver the SPP-100 does not configure or operate properly, an updated version of Card and Socket Services may be required. Card and Socket Services software is available from Quatech.

2.2 SPP-100 Enabler for DOS

For systems that are not operating PCMCIA Card and Socket Services software, the SPP-100 DOS Enabler may be used to enable and configure the adapter. This Enabler, SPP100EN.EXE, will operate on any DOS system using an Intel 82365SL or PCIC compatible PCMCIA host adapter including the Cirrus Logic CL-PD6710 ∕ 6720, the VLSI VL82C146, and the Vadem VG-365 among others.

> **IMPORTANT:**
> In order to use the SPP-100 Enabler for DOS, the system MUST NOT be configured with Card and Socket Services software. If a Card and Socket Services software is installed, the SPP-100 Enabler may interfere with its operation and with the device(s) it controls.

The SPP-100 Enabler does not support automatic configuration of adapters upon insertion, more commonly referred to as "Hot Swapping". This means the adapter must be installed in one of the system's PCMCIA sockets before executing SPP100EN.EXE. If more than one adapter is installed in a system, the Enabler must be executed separately for each adapter. Furthermore, SPP100EN.EXE should be executed to release the resources used by the adapter before it is removed from the PCMCIA socket. Since PCMCIA adapters do not retain their configuration after removal, any adapter that is removed from the system must be reconfigured with the Enabler after re-inserting it into a PCMCIA socket.

> **IMPORTANT:**
> The Enabler requires a region of high DOS memory when configuring a SPP-100. This region is 1000H bytes (4KB) long and by default begins at address D0000H (the default address may be changed using the "W" option). If a memory manager such as EMM386, QEMM, or 386Max is installed on the system, this region of DOS memory must be excluded from the memory manager's control. Consult the documentation provided with the memory manager software for instructions on how to exclude this memory region.

2.2.1 Command Line Options

To configure a SPP-100 in the system, the Enabler requires one command line argument from the user to determine the configuration of the card. This argument must be enclosed in parenthesis and within the argument, any or all of the following parameters may be specified using a **comma (no spaces)** to separate each parameter:

S*socket*   specifies which PCMCIA socket the SPP-100 must be inserted into for this configuration argument to be used. *socket* must be in the range 0 - 15. This option is always required.

B*address*   specifies the base I/O address of the SPP-100 in hexadecimal and must reside on an even 8-byte boundary. This option is required if the 'R' option is not used.

I*irq*   specifies the interrupt level (IRQ) of the SPP-100 in decimal. *irq* must be one of the following values: 3, 4, 5, 7, 9, 10, 11, 12, 14, 15, or 0 if no IRQ is desired. This option is required if the 'R' option is not used.

W*address* specifies the base address of the memory window required to configure the SPP-100. Set *address* = D0 for a memory window at segment D000, *address* = D8 for a memory window at segment D800, etc. Valid settings for *address* are C8, CC, D0, D4, D8, and DC. If this option is omitted, a memory window at segment D000 will be used.

E*mode*   specifies EPP mode operation for the SPP-100 (This overrides the mode selection bit in the Extended Control Register.). If this option is omitted, the SPP-100 defaults to standard printer port mode operation.

L*list*   specifies that the enabler update the BIOS equipment when the enabler is executed. The enabler, however, can not remove the SPP-100 from the BIOS equipment when the card is removed or when the enabler is executed with the 'R' option.   If this option is omitted, the BIOS equipment list is not updated.

Before removing an SPP-100 from its PCMCIA socket, the Enabler should be executed to free the system resources allocated when the card was installed. For this operation the Enabler provides on additional command line option:

R   instructs the enabler to release the resources previously allocated to the SPP-100. When the 'R' option is used, any settings specified by the 'B', 'T', 'E', and 'L' options are ignored.

2.2.1.1 Example 1

SPP100EN.EXE

In example 1, no command line argument is specified. The Enabler will report an error and display the proper usage of the command.

2.2.1.2 Example 2

SPP100EN.EXE (s0,b378,i7)

In example 2, the Enabler will configure the SPP-100 in socket 0 with a base address of 378H and IRQ 7 using a configuration memory window at segment D000. The SPP-100 will operate as a standard printer port, and the BIOS equipment list will not be updated.

2.2.1.3 Example 3

SPP100EN.EXE (i10,l,e,b340,s1)

In example 3, because the parameter order is not significant, the Enabler will configure the SPP-100 in socket 1 with a base address of 340H and IRQ 10 using a configuration memory window at segment D000. The SPP-100 will operate in EPP compatible printer port mode and the BIOS equipment list will be updated.

2.2.1.4 Example 4

SPP100EN.EXE (e,s0,b278,i5,wd8)

In example 4, the Enabler will configure the SPP-100 in socket 0 with a base address of 278H and IRQ 5 using a configuration memory window at segment D800. The SPP-100 will operate in EPP compatible printer port mode and the BIOS equipment list will not be updated.

2.2.1.5 Example 5

SPP100EN.EXE (s0,b3BC,i5,r)

In example 5, the Enabler will release the configuration used by the SPP-100 in socket 0 using a configuration memory window at segment D000. The base address and IRQ parameters are ignored and may be omitted.

2.2.1.6 Example 6

SPP100EN.EXE (s1,r,wcc)

In example 6, the Enabler will release the configuration used by the SPP-100 in socket 1 using a configuration memory window at segment CC00.

2.2.2 Common Problems

<u>Memory Range Exclusion:</u>
The Enabler requires a region of high DOS memory when configuring a SPP-100. This region is 1000H bytes (4KB) long and by default begins at address D0000H (the default address may be changed using the "W" option). If a memory manager such as EMM386, QEMM, or 386Max is installed on the system, this region of DOS memory must be excluded from the memory manager's control. Consult the documentation provided with the memory manager software for instructions on how to exclude this memory region.

Furthermore, some systems use the high memory area for BIOS shadowing to improve overall system performance. In order for the Enabler to operate, any BIOS shadowing must be disabled in the address range specified for the configuration window. BIOS shadowing can usually be disabled through the system's CMOS setup utility.

<u>Socket Numbers:</u>
The Enabler requires the SPP-100's socket number to be specified on the command line and the SPP-100 must be inserted into the socket before the Enabler is invoked. Some vendors number their sockets from 1 to N while other vendors number their sockets from 0 to N-1. For the SPP-100 Enabler, the lowest socket number in the system is designated socket 0.

<u>Card and Socket Services Software:</u>
In order to use the SPP-100 Enabler for DOS, the system MUST NOT be configured with Card and Socket Services software. If a Card and Socket Services software is installed, the SPP-100 Enabler may interfere with its operation and with the device(s) it controls. For systems configured with Card and Socket Services, the SPP-100 Client Driver is the recommended method of configuration.

3. Windows 95/98/ME Installation

To simplify the installation of the SPP-100 on Windows 95/98/ME **based systems, an** configuration file is provided on the distribution disk. This configuration file supports the SPP-100 in both standard printer port mode and EPP mode.

3.1 Installing an SPP-100 in Windows 95/98/ME.

1. Insert the SPP-100 into any available PC Card socket.

2. The first time a new PC Card type is installed the **New Hardware Found** window opens. After this first installation Windows 95/98/ME will automatically detect and configure the card. If the **New Hardware Found** window does not open, then skip to the next section, "SPP-100 Resource Settings".

Figure 3. SPP-100 Driver Installation in Windows 95/98/ME

3. The New Hardware Found window provides several options to configure the SPP-100 card. Click the *Driver from Disk* option button. Click *OK* to continue.

4. An **Install From Disk** dialog box should open. Insert the SPP-100 drivers diskette, select the correct drive letter, and click the *OK* button. Windows 95/98/ME automatically browses the root directory for an INF file that defines configurations for the

new hardware type found. If no INF files are found, click the ***Browse*** button and search the Win95 sub directory on the installation diskette. The user is not required to select the file name. When the directory containing the INF files is located, Windows 95/98/ME will automatically select the correct file.

5. The SPP-100 parallel port requires two drivers supplied by Microsoft on the Windows 95/98/ME CD or diskettes: **LPT.VXD** and **LPTENUM.VXD**. If these files do not already exist on the system, the user will be prompted to insert the Windows 95/98/ME CD or installation diskettes. If prompted to do so, insert the necessary CD or diskettes and click ***OK***.

> **IMPORTANT NOTE:**
> If the user already has these files installed on the computer, or if the installation disks are unavailable, it may not be necessary to supply the computer with the Windows 95 CD or installation diskettes. If prompted for the disks, click ***OK***. A dialog box with an option to skip will appear. Click the ***Skip*** button and the files will not be installed. If these files exist in the windows system directory, those files will be used.

6. Windows 95/98/ME socket services should indicate the SPP-100 PCMCIA card configuration by a low-high tone beep.

7. A **System Settings Change** dialog box should open up. To assure that Windows 95/98/ME properly assigns the SPP-100 a logical printer port number (LPT2, etc.), you must restart your computer with the SPP-100 installed. Click the ***Yes*** button to restart your computer now. Do not remove the SPP-100 from the PCMCIA socket during the restart process

The SPP-100 PC Card should now be configured. Windows 95/98/ME automatically enumerates the SPP-100 to the first available LPT port number. For additional configuration information, consult the "SPP-100 Resource Settings" section of this document. In the future, Windows 95/98/ME will automatically recognize and configure the SPP-100 in this default configuration.

3.2 SPP-100 Resource Settings in Windows 95/98/ME

To view and / or edit hardware devices in Windows 95/98/ME use the system **Device Manager**. Consult Windows 95/98/ME on-line help for details on the use of the **Device Manager**.

1. Open the Windows 95/98/ME **System Properties** window. To access System Properties window double click the *System* icon in the Windows 95/98/ME control panel, or click the *My Computer* icon on the Windows 95/98/ME desktop with the right mouse button and select *Properties* from the pull down menu.

2. Click the *Device Manager* tab located along the top of the System Properties box. This lists all hardware devices connected to your computer. Configuration information is available on any of these devices via the **Properties** command button.
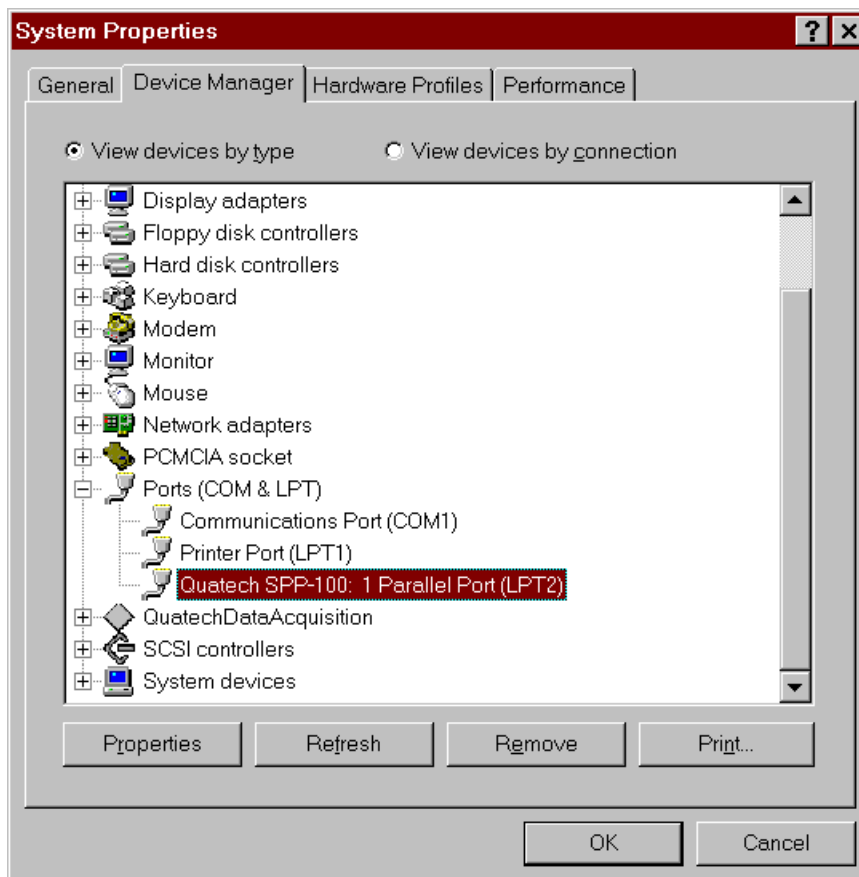
Figure 4. Windows 95/98/ME Device Manager

3. Double click the device group *Ports (Com and LPT)*. The SPP-100 device name should appear in the list of adapters.

4. Click the SPP-100's device name and then click the *Properties* button to open a Port Properties box for this hardware adapter.

5. Click the *Resources* tab located along the top of the properties box.
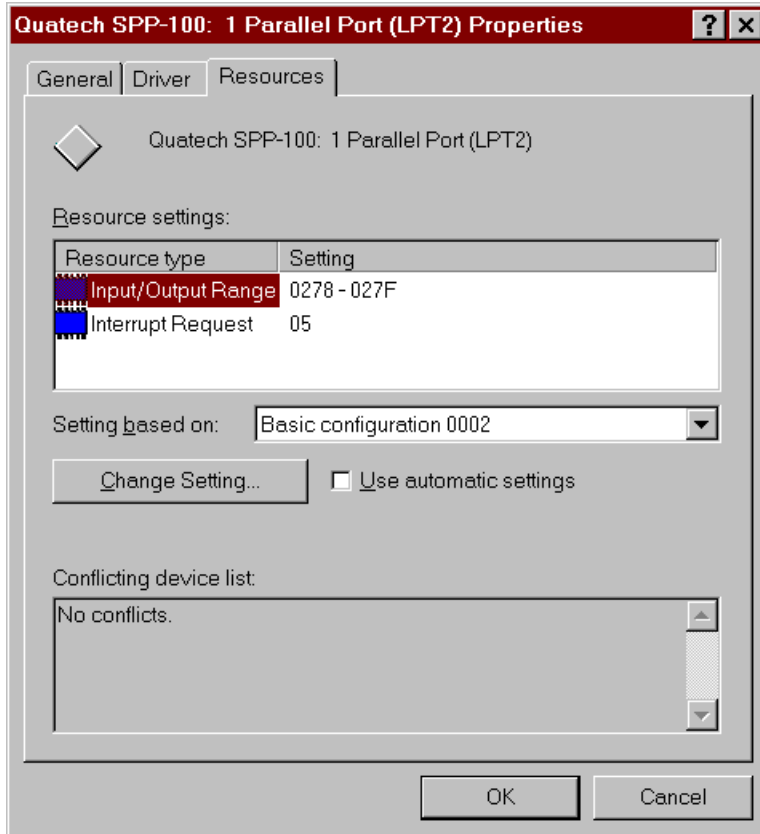
Figure 5. SPP-100 Resource Allocations in Windows 95/98/ME

6. Several predefined **Basic Configurations** have been included allowing easy selection of different configurations that match standard printer port settings (see table below).

Basic Configuration	I/O Address	Port Mode
0	378H	Standard
1	278H	Standard
2	Variable	Standard
3	Variable	EPP

Figure 6a. Windows 95/98/ME Basic Configurations Table
Revision E (Refer to back of PCMCIA Card)

Basic Configuration	I/O Address	Port Mode	IRQ
0	378	EPP	7
1	278	EPP	5
2	378	EPP	Variable
3	278	EPP	Variable
4	Variable	EPP	Variable
5	378	EPP	None
6	278	EPP	None
7	Variable	EPP	None
8	Variable	Standard	Variable
9	Variable	Standard	None

Figure 6b. Windows 95/98/ME Basic Configurations Table
Revision E2 and later (Refer to back of PCMCIA Card)

When selecting a basic configuration from the "Setting based on list" pay attention to the Conflicting device list information. Try to select a configuration that displays "No conflicts". If resource conflicts can be resolved by switching to one of the predefined basic configurations then skip down to the last step.

7. To modify any of the system resource showing a conflict click the resource name and click the ***Change Setting*** button. An **Edit Resource** window will open up. Note that the I/O address resources for basic configurations 0 and 1 are not allowed to be changed.
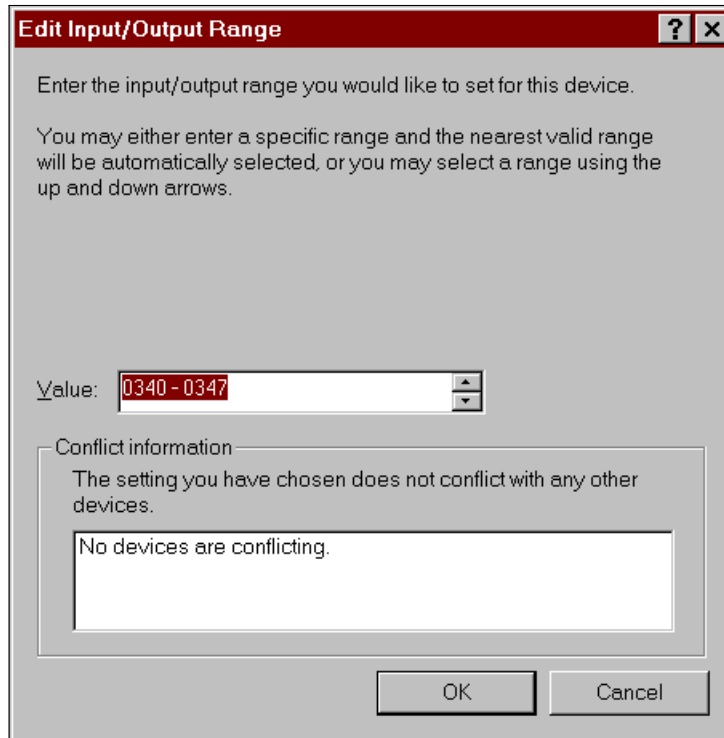
Figure 7. Windows 95/98/ME Edit Resources Window

8. Inside the Edit Resource window click on the up/down arrows to the right of the resource value. This scrolls you through all of the allowable resources for the SPP-100. Pay attention to the conflict information at the bottom of the window. Select a resource value that reports "No devices are conflicting". Click *OK* to save your changes, or *Cancel* to abort.

9. Repeat the above steps to resolve of resource conflicts. Once satisfied with the settings make a note of the new settings and click the *OK* button to accept. Clicking the *Cancel* button does not save your changes.

10. Windows 95/98/ME enumerates the SPP-100 to the first available LPT port number. Use this Logical LPT Port name to access the SPP-100 parallel port through your software applications. This name is required by a Windows 95/98/ME application when accessing a particular port.

11. The Quatech SPP-100 will automatically be reconfigured to the new resources specified. Any time a SPP-100 is inserted Windows 95/98/ME will attempt to configure the card at these resource settings. Click the *Use Automatic Settings* to reset the SPP-100 for automatic configuration.

3.3 Common Problems

Windows 95/98/ME does not assign a LPT number to SPP-100:
Windows 95/98/ME handles enumerating PCMCIA COM ports (i.e. PCMCIA modems) much better than the case of parallel ports. After initial installation or any configuration changes of the SPP-100, Windows 95/98/ME may fail to assign a logical LPT number to the parallel port. The solution to this problem is to shut down and restart Windows 95/98/ME with the SPP-100 installed.

How do I change the LPT port number assigned to the SPP-100?
Windows 95/98/ME enumerates the SPP-100 to the first available LPT port number available at the time of initial installation. Changing the I/O address or IRQ settings of the SPP-100 does not affect the LPT port number. Also, changes in the configuration of other LPT ports on the computer does not effect the LPT port number assigned to the SPP-100 by Windows 95/98/ME. The solution to this problem is to use Windows 95/98/ME Device Manager and "Remove" the SPP-100 adapter from the system. This action clears the registry of all entries and configurations for the SPP-100. When the SPP-100 is installed again, the first available LPT port number will be assigned.

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4. Windows NT Installation

To allow easy configuration of the DSP-100 the Quatech Device Manager for Windows NT has been written for the hardware. This configuration utility supports the SPP-100 only in block addressing mode.

To begin the installation, open Windows Explorer and search for the 'Setup.exe' command to install the Quatech Device Manager. <See following Windows Explorer figure.> (D:\Serial Port Adapters\Drivers\Windows NT 4.0 for PCI, PCMCIA,ISA). Once the installation is complete an icon will be placed on the desktop.
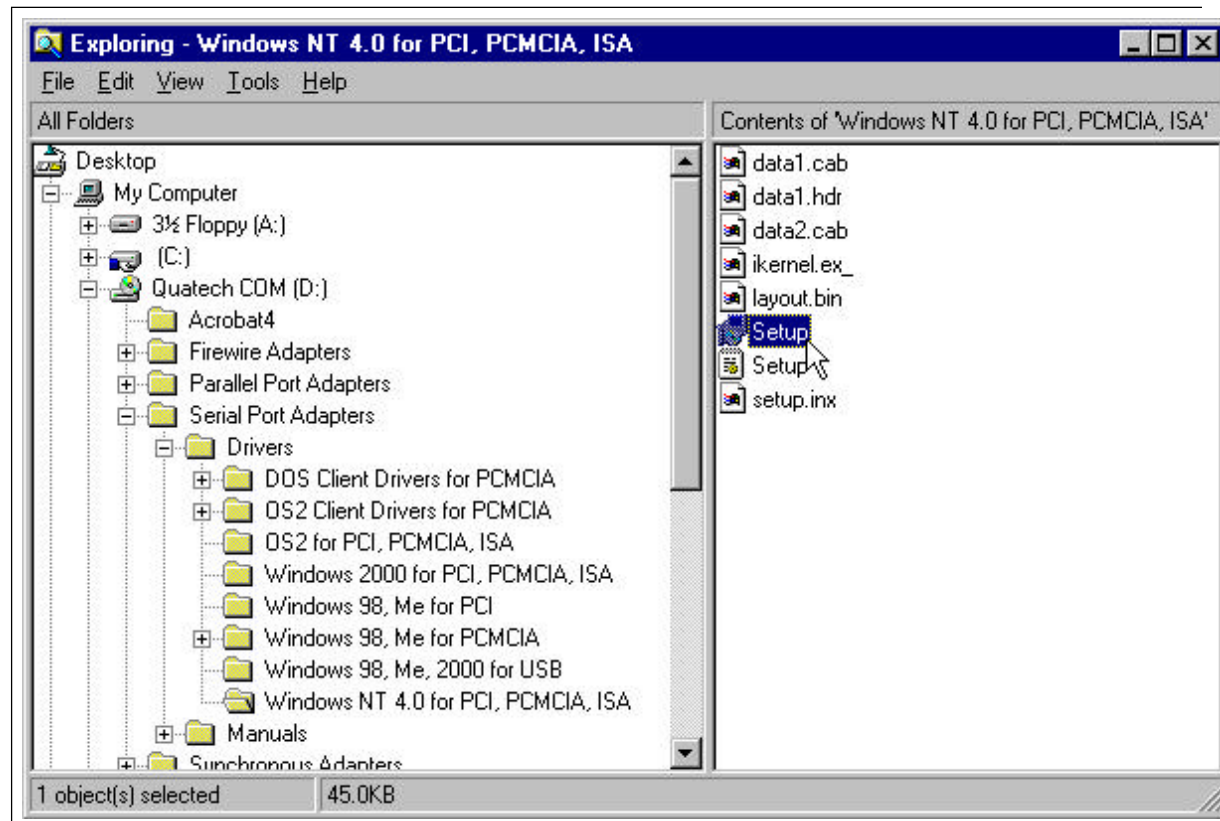
Figure 8. Windows NT Explorer

1. Locate and double click the Quatech Device Manager icon on the desktop

Figure 9. Device Manager Icon on Desktop
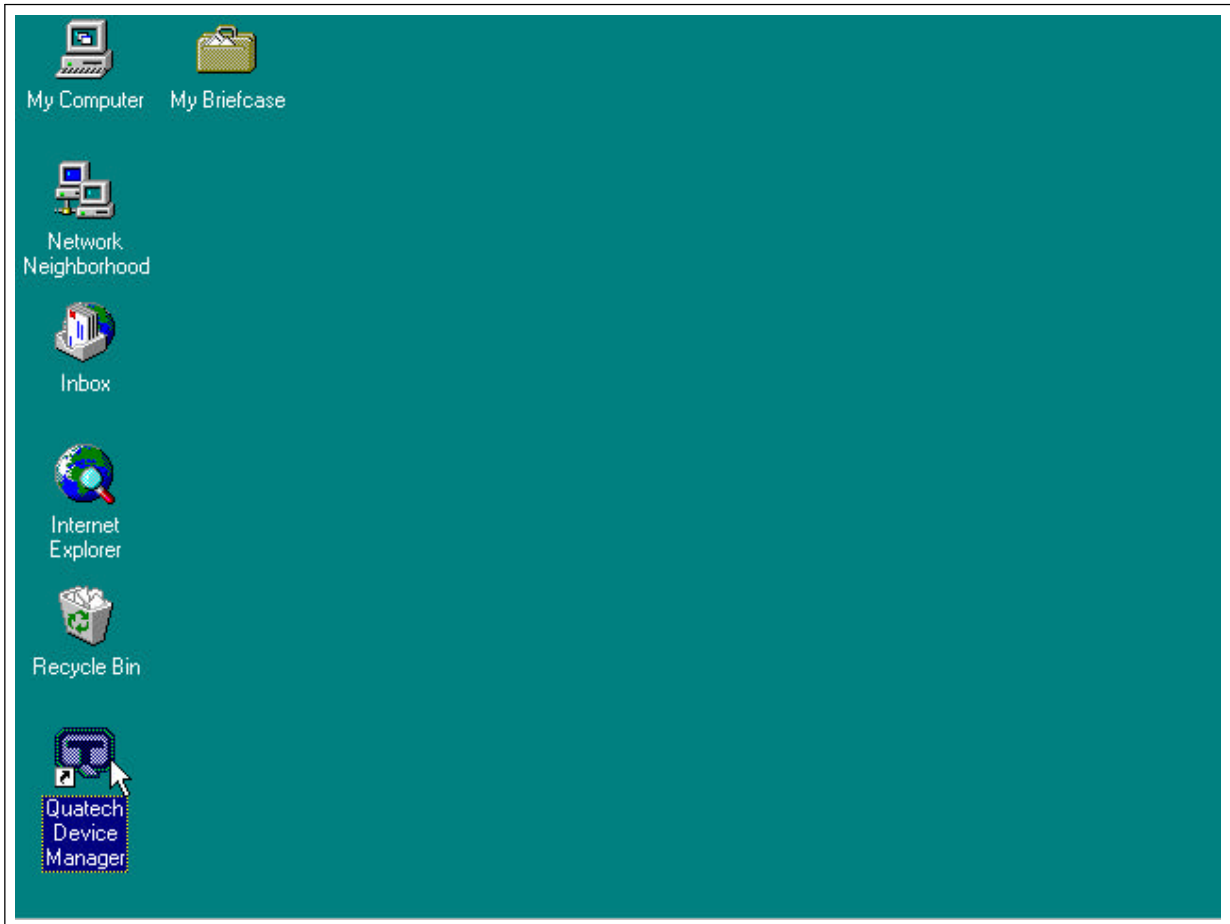
2 Click the 'Add' button at the bottom of the Quatech Device Manager Window.

3 Follow the steps for the 'Add Quatech Hardware Wizard'.
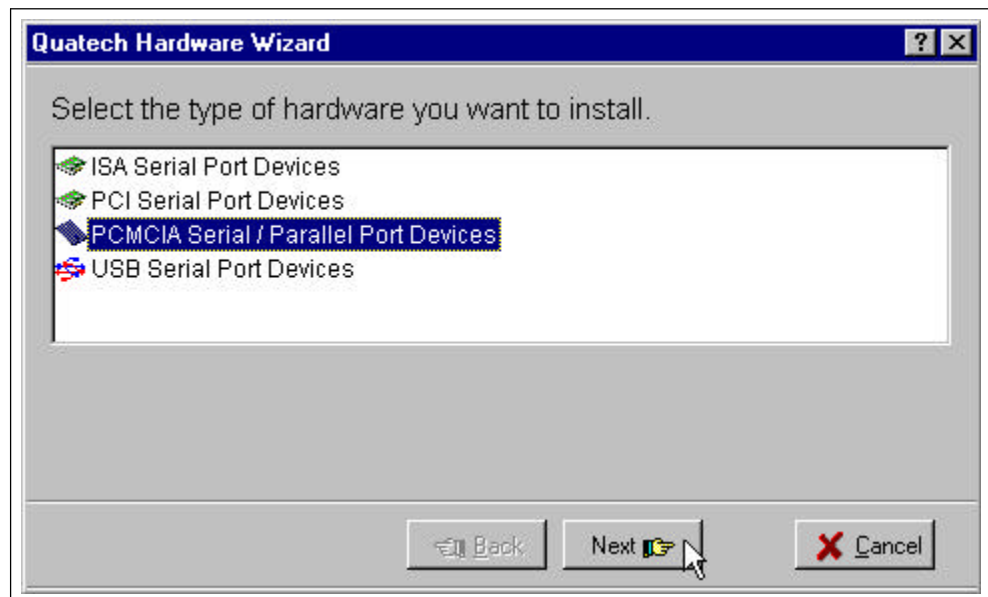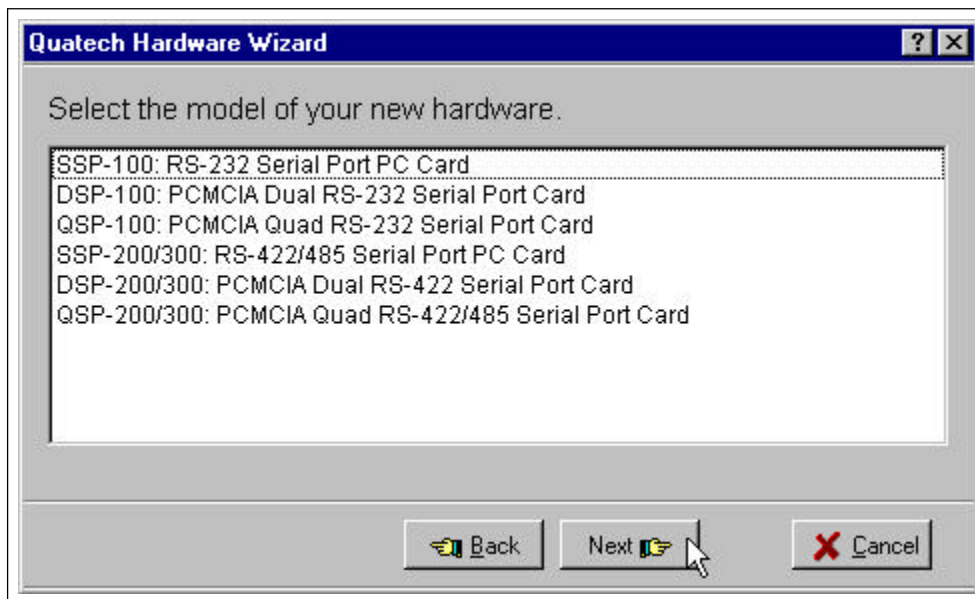
4 Complete the final steps of the installation, insert the PCMCIA Card and reboot the computer.

   v Additional help is available online

The PCMCIA PC Card should now be configured. In the future, Windows NT will automatically recognize and configure the DSP-100.

Note: Windows NT does not support 'Plug and Play' for PCMCIA cards. The PCMCIA Card must be inserted prior to starting Windows NT and can not be removed and reinserted while Windows NT is running.

5. Windows 2000/XP Installation

To simplify the installation of the SPP-100 on Windows 2000/XP **based systems, an** configuration file is provided on the distribution disk. This configuration file supports the SPP-100 in both standard printer port mode and EPP mode.

5.1 Installing an SPP-100 in Windows 2000/XP.

1. Insert the SPP-100 into any available PC Card socket.

2. The first time a new PC Card type is installed the **New Hardware Found** window opens. After this first installation Windows 2000/XP will automatically detect and configure the card. If the **New Hardware Found** window does not open, then skip to the next section, "SPP-100 Resource Settings".

Figure 10. SPP-100 Driver Installation in Windows 2000/XP

3. The New Hardware Found window provides several options to configure the SPP-100 card. Click the *Search for a suitable driver* option. Click *Next* to continue.

4. An **Install From Disk** dialog box should open. Insert the SPP-100 drivers diskette, select the floppy drive letter A (or appropriate letter), and click the *Next* button. Windows 2000/XP automatically browses the root directory for an INF file that defines configurations for the new hardware type found. If no INF files are found, click the *Browse* button and search the Win2000 sub directory on the installation diskette. The user is not required to select the file name. When the directory containing the INF files is located, Windows 2000/XP will automatically select the correct file.

> **IMPORTANT NOTE:**
> If the user already has these files installed on the computer, or if the installation disks are unavailable, it may not be necessary to supply the computer with the Windows 2000/XP CD or installation diskettes. If prompted for the disks, click *Next*. A dialog box with an option to skip will appear. Click the *Skip* button and the files will not be installed. If these files exist in the windows system directory, those files will be used.

5. Windows 2000/XP socket services should indicate the SPP-100 PCMCIA card configuration by a low-high tone beep.

6. A **System Settings Change** dialog box should open up. To assure that Windows 2000/XP properly assigns the SPP-100 a logical printer port number (LPT2, etc.), you must restart your computer with the SPP-100 installed. Click the *Yes* button to restart your computer now. Do not remove the SPP-100 from the PCMCIA socket during the restart process

The SPP-100 PC Card should now be configured. Windows 2000/XP automatically enumerates the SPP-100 to the first available LPT port number. For additional configuration information, consult the "SPP-100 Resource Settings" section of this document. In the future, Windows

2000/XP will automatically recognize and configure the SPP-100 in this default configuration.

5.2 SPP-100 Resource Settings in Windows 2000/XP

To view and / or edit hardware devices in Windows 2000/XP use the system **Device Manager**. Consult Windows 2000/XP on-line help for details on the use of the **Device Manager**.

1. Open the Windows **System Properties** window. To access System Properties window double click the *System* icon in the Windows 2000/XP control panel, or click the *My Computer* icon on the Windows 2000/XP desktop with the right mouse button and select *Properties* from the pull down menu.

2. Click the *Hardware* tab located along the top of the System Properties box. Click the *Device Manager* button. This lists all hardware devices connected to your computer. Configuration information is available on any of these devices via the **Properties** command button.

Figure 11. Windows 2000/XP Device Manager
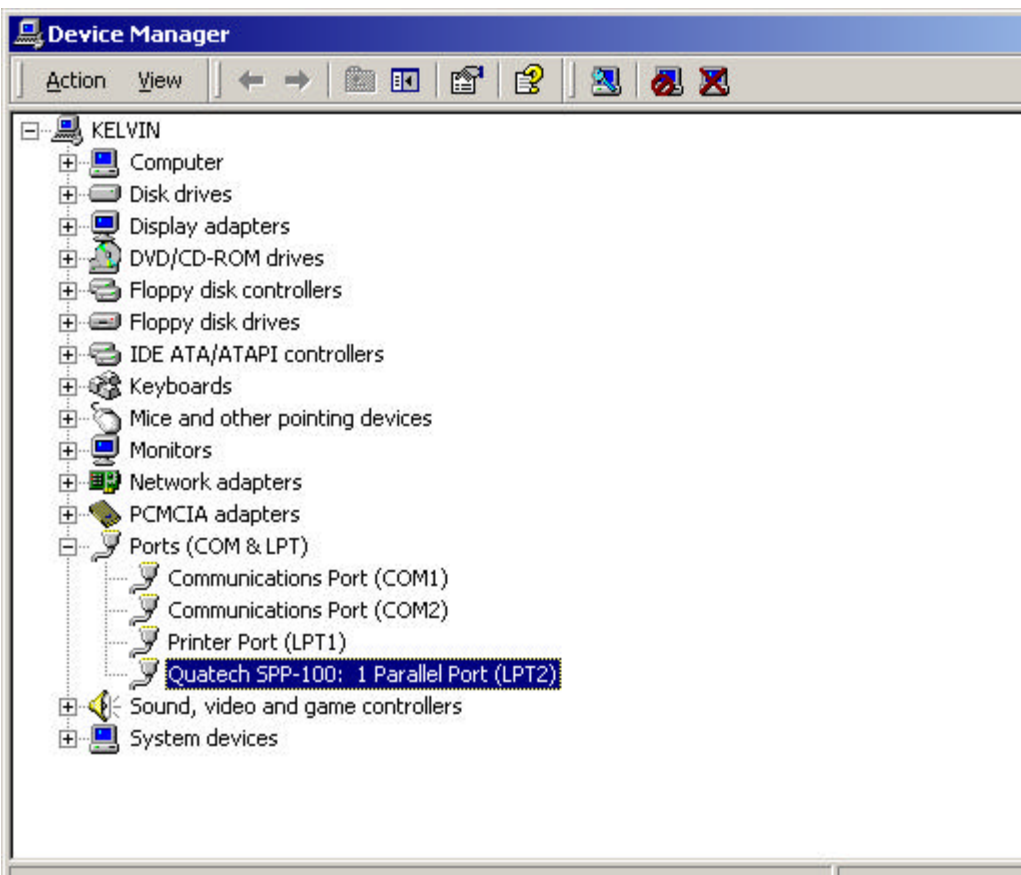
3. Double click the device group *Ports (Com & LPT)*. The SPP-100 device name should appear in the list of adapters.

4. Click the SPP-100's device name and then click the *Properties* button to open a Port Properties box for this hardware adapter.

5. Click the *Resources* tab located along the top of the properties box.
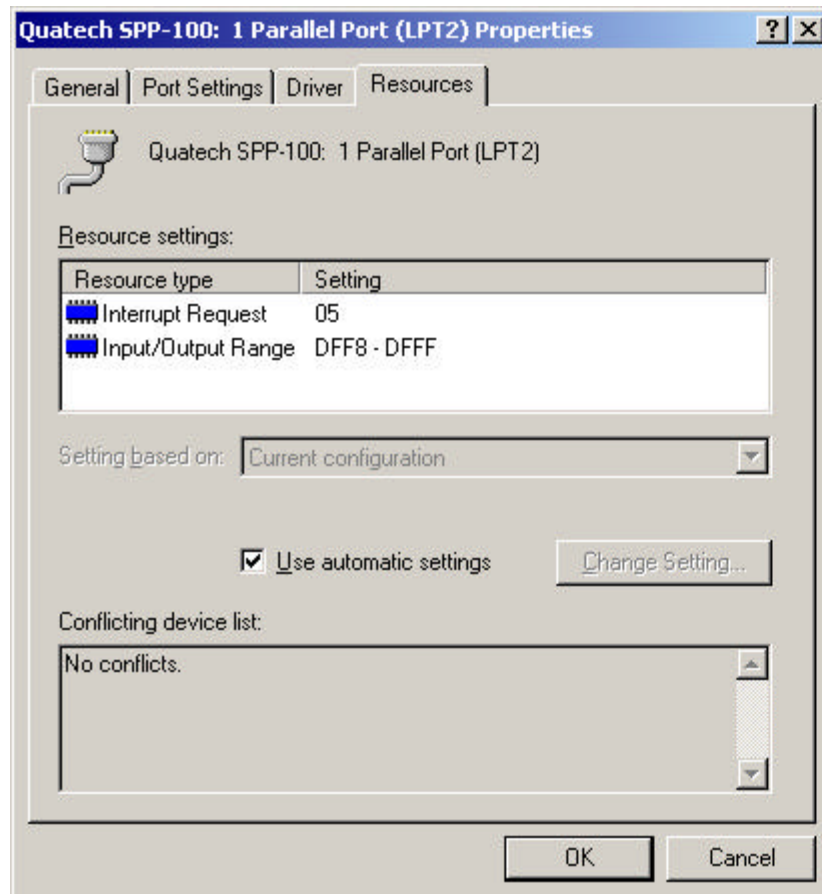
Figure 12. SPP-100 Resource Allocations in Windows 2000/XP

6. Several predefined **Basic Configurations** have been included allowing easy selection of different configurations that match standard printer port settings (see table below).

Basic Configuration	I/O Address	Port Mode
0	378H	Standard
1	278H	Standard
2	Variable	Standard
3	Variable	EPP

Figure 13a. Windows 2000 Basic Configurations Table Revision E (Refer to back of PCMCIA Card)

Basic Configuration	I/O Address	Port Mode	IRQ
0	378	EPP	7
1	278	EPP	5
2	378	EPP	Variable
3	278	EPP	Variable
4	Variable	EPP	Variable
5	378	EPP	None
6	278	EPP	None
7	Variable	EPP	None
8	Variable	Standard	Variable
9	Variable	Standard	None

Figure 13b. Windows 2000 Basic Configurations Table
Revision E2 and later (Refer to back of PCMCIA Card)

Basic Configuration	I/O Address	Port Mode	IRQ
0	Variable	EPP	Variable
1	Variable	EPP	None
2	278	EPP	Variable
3	278	EPP	None
4	378	EPP	Variable
5	378	EPP	None

Figure 13c. Windows XP Basic Configurations Table
Revision E2 and later (Refer to back of PCMCIA Card)

When selecting a basic configuration from the "Setting based on list" pay attention to the Conflicting device list information. Try to select a configuration that displays "No conflicts". If resource

conflicts can be resolved by switching to one of the predefined basic configurations then skip down to the last step.

7. To modify any of the system resource showing a conflict click the resource name and click the *Change Setting* button. An **Edit Resource** window will open up. Note that the I/O address resources for basic configurations 0 and 1 are not allowed to be changed.
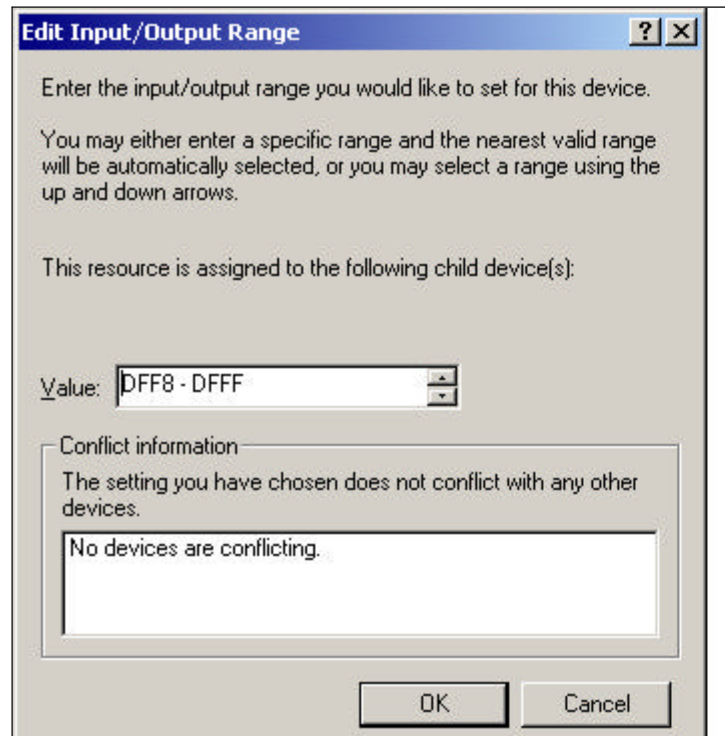
Figure 14. Windows 2000/XP Edit Resources Window

8. Inside the Edit Resource window click on the up/down arrows to the right of the resource value. This scrolls you through all of the allowable resources for the SPP-100. Pay attention to the conflict information at the bottom of the window. Select a resource value that reports "No devices are conflicting". Click *OK* to save your changes, or *Cancel* to abort.

9. Repeat the above steps to resolve of resource conflicts. Once satisfied with the settings make a note of the new settings and click the *OK* button to accept. Clicking the *Cancel* button does not save your changes.

10. Windows 2000/XP enumerates the SPP-100 to the first available LPT port number. Use this Logical LPT Port name to access the

SPP-100 parallel port through your software applications. This name is required by a Windows 2000/XP application when accessing a particular port.

11. The Quatech SPP-100 will automatically be reconfigured to the new resources specified. Any time a SPP-100 is inserted Windows 2000/XP will attempt to configure the card at these resource settings. Click the *Use Automatic Settings* to reset the SPP-100 for automatic configuration.

5.3 Common Problems

<u>Windows 2000/XP does not assign a LPT number to SPP-100:</u>
Windows 2000/XP handles enumerating PCMCIA COM ports (i.e. PCMCIA modems) much better than the case of parallel ports. After initial installation or any configuration changes of the SPP-100, Windows 2000/XP may fail to assign a logical LPT number to the parallel port. The solution to this problem is to shut down and restart Windows 2000/XP with the SPP-100 installed.

<u>How do I change the LPT port number assigned to the SPP-100?</u>
Windows 2000/XP enumerates the SPP-100 to the first available LPT port number available at the time of initial installation. Changing the I/O address or IRQ settings of the SPP-100 does not affect the LPT port number. Also, changes in the configuration of other LPT ports on the computer does not effect the LPT port number assigned to the SPP-100 by Windows 2000/XP. The solution to this problem is to use Windows 2000/XP Device Manager and "Remove" the SPP-100 adapter from the system. This action clears the registry of all entries and configurations for the SPP-100. When the SPP-100 is installed again, the first available LPT port number will be assigned.

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6. Windows CE

The Quatech PCMCIA Windows CD installation copies a multiple device-specific .cab files and the ini file to your desktop computer and launches the Application Manger (which resides on the user's desktop computer as a result of installing Active Sync) with the Application Manager .ini file as a parameter. This in turn will install the driver onto the Windows CE connected device or if not connected will install it on the next device connection to the desktop.

6.1 Installing an SPP-100 in Windows CE

1. Connect and establish communication to the device to the desk to using Active Sync (refer to Active Sync factory documentation).

2. Locate and run the setup.exe file located in the Windows CE for PCMCIA folder on the Quatech COM CD.
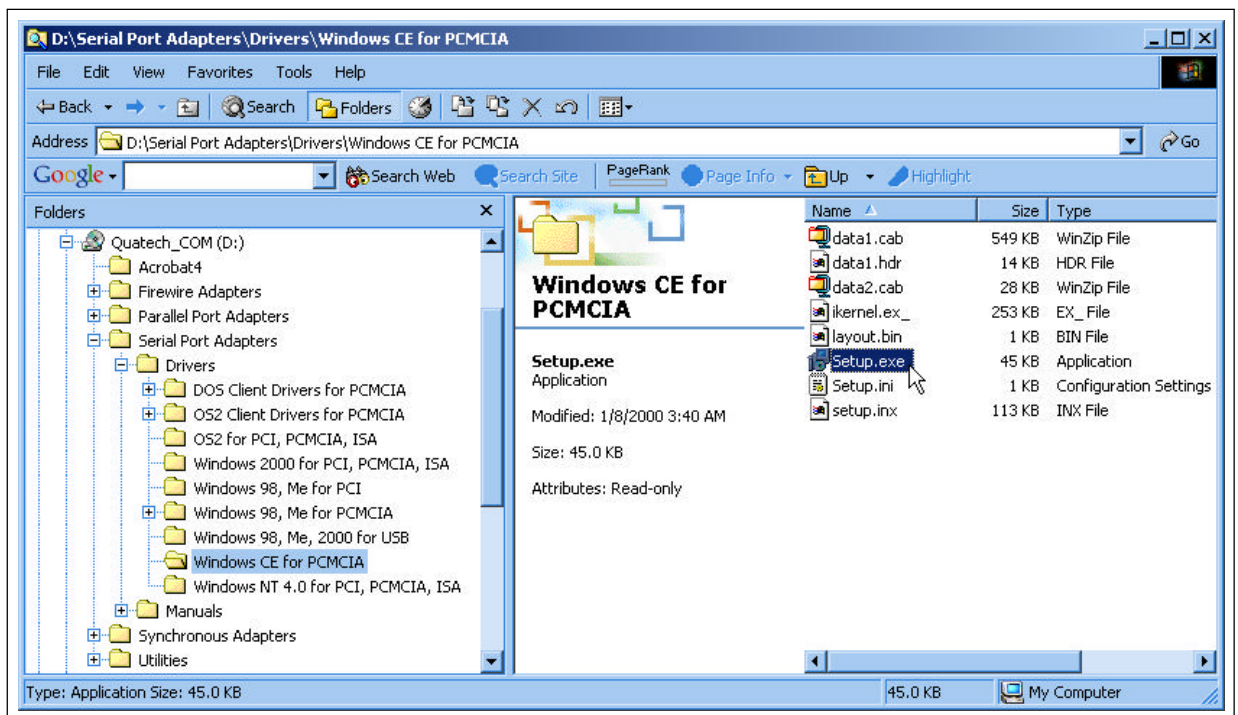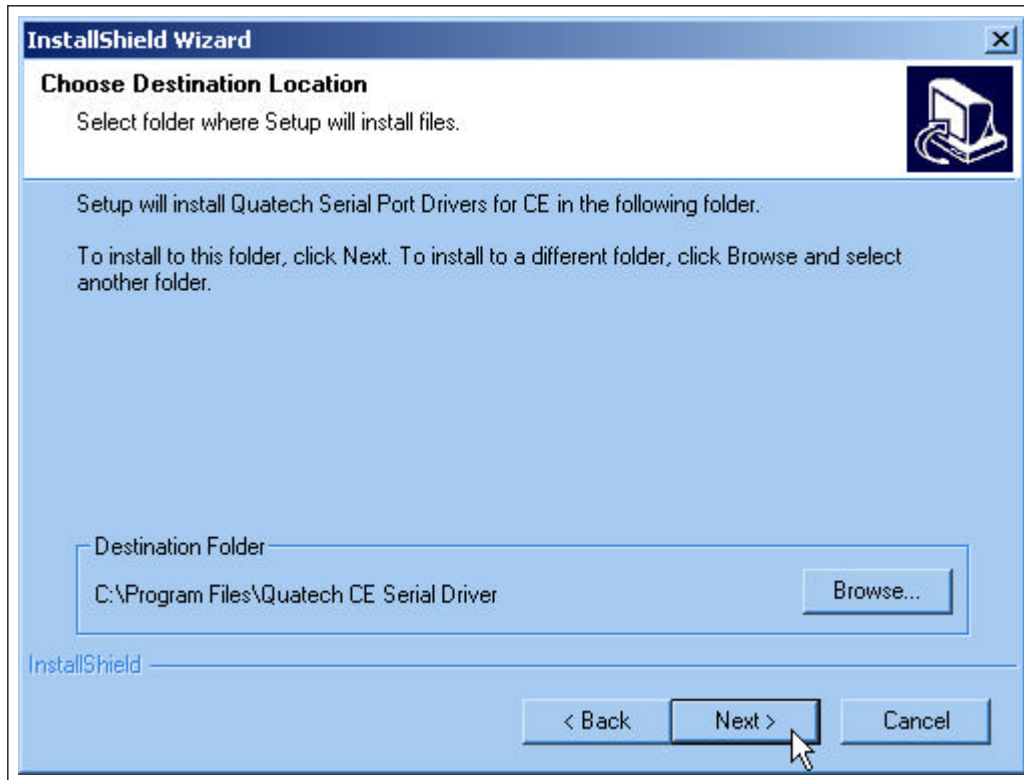
3. The setup program will copy the files to predetermined location, which can be changed by the user. Click next to proceed.. Installation is now complete. In the event that installation process took place with out having the Windows CE device connected to the computer and the install program will prompt the user that on the next on the next connection the device will complete the installation.
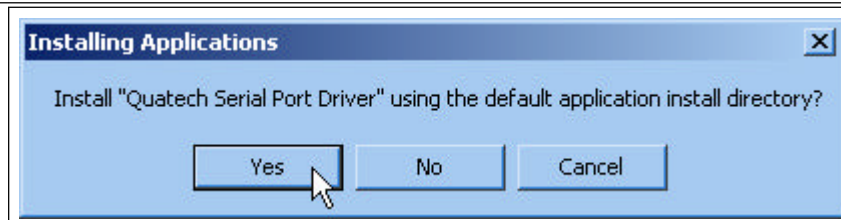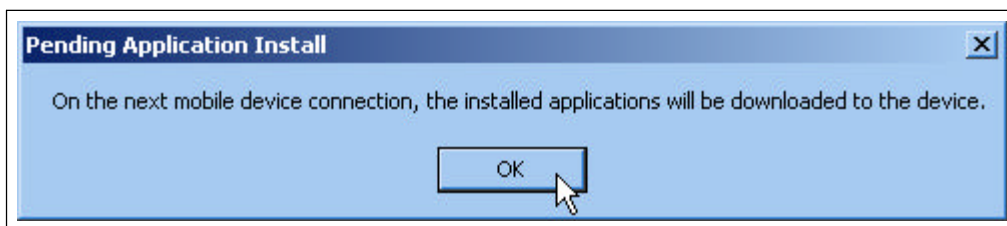
Choose 'Yes' on the following window and you installation is now complete

7. OS/2 Installation

In order to use the SPP-100 Client Driver for OS/2, the system must be configured as follows:

1. The system must be running OS/2 version 2.1 or later.

2. The system must not be a MicroChannel System.

3. The system must be running with complete PCMCIA support. OS/2 Warp 3.0 and above are supplied with complete PCMCIA support. Earlier versions of OS/2 contain card services, but require a separate add on installation of Socket Services.

7.1 Installation of the OS/2 SPP-100 Client Driver

After the system has been configured to the specifications described in the previous paragraph., the SPP-100 Client Driver may be installed with the procedure listed below. Be certain to follow these instructions carefully or the system may fail to boot.

1. Users of OS/2 version 3.0 and above must copy the SPP100.SYS client driver file from the distribution disk to \OS2\BOOT directory on the boot drive partition. Users of OS/2 version 2.x must copy the SPP100.SYS file from the distribution disk to the \OS2 directory on the boot drive partition.

2. Open the CONFIG.SYS file by opening an OS/2 command prompt window, an type "E CONFIG.SYS" from the command prompt window.

3. Find the line in CONFIG.SYS that reads: "BASEDEV=PRINT01.SYS"

4. Comment out this line by inserting "REM" in front of it. The line should now read "REM BASEDEV=PRINT01.SYS"

5. Add the following line to the CONFIG.SYS file below the commented-out line:

    BASEDEV=SPP100.SYS

    Do not include any path information for the SPP-100.SYS file.

BASEDEV device drivers must be located in the directory specified in step 1.

6. Save the CONFIG.SYS file, exit the text editor, shutdown the system, and reboot to activate the changes.

7.2 Configurations

The SPP-100 Client Driver supports a limited set of configurations. These choices have been made to maintain maximum compatibility with the standard OS/2 parallel port device driver.

Configuration 1 : LPT2 at base address 378H
Configuration 2 : LPT3 at base address 278H

The client driver tries configuration 1 first, then configuration 2. If neither configuration is available, the SPP-100 is left unconfigured.

7.2.1 Configuration Notes

1. The client driver examines the BIOS equipment list during boot to see how many non-PCMCIA parallel ports are already installed.

2. A configuration will fail if the port (LPT2 or LPT3) already exists in the system or if Card Services reports the address range already in use.

3. The client driver will not attempt to configure an SPP-100 for LPT1.

4. The addresses used for LPT2 (378H) and LPT3 (278H) cannot be changed.

5. On a card removal , the client driver will unconfigure the SPP-100 and make the resources it was using available for any device.

6. The use of interrupts (IRQs) varies according to the version of OS/2 being used. See the section labeled "Interrupts for the SPP-100 Under OS/2" for more information.

7. If multiple SPP-100 cards are present in sockets when the computer is booted, Card Services will normally try to configure the card in the lowest numbered socket first and progress to higher numbered sockets.

7.3 Interrupts for the SPP-100 Under OS/2

If using OS/2 Version 2.1, the client driver will not use interrupts for parallel ports. All parallel ports operate in a polled mode. This is true for both PCMCIA and non-PCMCIA ports. (Note that this is a change from the standard parallel port device driver, which always requires IRQ7 for LPT1 and LPT2 and IRQ5 for LPT3.

If using OS/2 Version 3.0 and above, the client driver will use interrupts for parallel ports if the /IRQ switch is present on the driver's command line. If the switch is not present, polled mode is used for all parallel ports. To use IRQs, the driver's CONFIG.SYS line should read:

BASEDEV=SPP100.SYS /IRQ

The "/IRQ" switch changes the configurations to include IRQs.

Configuration 1: LPT2 at base address 378H, using IRQ7.
Configuration 2: LPT3 at base address 278H, using IRQ5.

7.4 EPP Mode Under OS/2

EPP operation is not supported by OS/2, and therefore no command switch on the client driver exists to place the SPP-100 into EPP mode.

7.5 Monitoring The Status Of PCMCIA Cards

OS/2 Warp provides a utility called "Plug and Play for PCMCIA" that can be used to monitor the status of each PCMCIA socket. In OS/2 version 2.1, this utility is called "Configuration Manager".   When an SPP-100 is inserted, the Card Type for the appropriate socket will display "Parallel". If the card is successfully configured, the Card Status will display "Ready". If the card cannot be configured, the Card Status will be "Not Ready".   You can view the resources claimed by a configured card by double-clicking on that card's line in the window.

8. Programming the SPP-100

8.1 Program Registers

The program registers of the SPP-100 occupy eight contiguous bytes of I/O address space. In addition, the Extended Control Register (ECR) is located at an offset of 402h from the I/O space base address. By writing this Extended Control Register, one of three parallel port modes may be configured: standard (unidirectional) parallel port mode, bi-directional parallel port mode, or EPP (Enhanced Parallel Port) mode. Setting the EPP mode through the configuration software (the Enabler or the Client Driver) overrides the value written to the Extended Control Register. After the correct mode is configured, the program registers may be programmed to control the operation of the SPP-100. The table below lists the program registers along with their offsets relative to the I/O space base address at which the SPP-100 is located:

Offset	Read/Write	Register
0	R/W (in standard mode, this register is write only)	Data Register
1	R/W (in standard and bi-directional modes, this register is read only)	Device Status Register (DSR)
2	R/W	Device Control Register (DCR)
3	R/W	* EPP Address Register
4	R/W	* EPP Data Register 0
5	R/W	* EPP Data Register 1
6	R/W	* EPP Data Register 2
7	R/W	* EPP Data Register 3
402h	R/W	+ Extended Control Register (ECR)

Figure 15. SPP-100 Program Registers Table

* **NOTE:**   These registers are present only if EPP mode is selected.
+ **NOTE:**   Present only in Revision E and earlier PCMCIA Cards

8.2 Program Register description

The program register description information provided is a technical description of the interface to parallel devices. This information is intended for advance users intending to do custom programming with the SPP-100.

8.2.1 Data Register (Base + 0)

The Data Register is used to write data into and read data from the external data port (D0-D7). A write to the Data Register latches a byte of data into this register. In the standard (unidirectional) mode, the contents of the Data Register are always buffered and output onto the external data port (D1-D8). In the bi-directional or EPP mode, the contents of the Data Register are only output onto the external data port if Direction (bit 5 of the Device Control Register) is set low; if Direction is set high, the external data port may be accessed by reading the Data Register. In the standard mode (or bi-directional or EPP mode with Direction set low) reading the Data Register will access the last byte written to the Data Register.

Bit	Name	Description
7	D8	Parallel Port Data 8
6	D7	Parallel Port Data 7
5	D6	Parallel Port Data 6
4	D5	Parallel Port Data 5
3	D4	Parallel Port Data 4
2	D3	Parallel Port Data 3
1	D2	Parallel Port Data 2
0	D1	Parallel Port Data 1

Figure 16. Data Register Table

8.2.2 Device Status Register (Base + 1)

The Device Status Register reports the real-time status of the parallel port control signals.

Bit	Name	Description
7	nBusy	Compliment of the level of the BUSY input signal. '0' = Printer is busy and cannot accept a new character. '1' = Printer is ready to accept the new character.
6	nAck	Level of the ACK input signal. '0' = Printer has accepted the previous character and is ready to accept another character. '1' = Printer is still processing the last character or has not received the data.
5	PError	Level of the PERROR input signal. '1' = Paper end. '0' = Indicates presence of paper.
4	Select	Level of the SELECT input signal. '1' = Printer is on line. '0' = Printer is not selected.
3	nFault	Level of the NFAULT input signal. '0' = Error has been detected. '1' = No error has been detected.
2	-	Returns 0.
1	-	Returns 0.
0	EPP Time-out	Valid in EPP mode only and indicates that a 10 usec time out has occurred on the EPP bus. Writing a '1' to this bit will reset the EPP Time-out condition. '1' = An EPP time-out has occurred '0' = No EPP time-out

Figure 17. Device Status Register Table

8.2.3 Device Control Register (Base + 2)

The Device Control Register is written to control the parallel port control signals, to enable the interrupt, and to set the data direction control bit.

Bit	Name	Description
7	-	Always reads a 0
6	-	Always reads a 0
5	Direction	Controls the direction of the data port in bi-directional and EPP modes. This bit is write only. This bit is ignored in the standard (unidirectional) parallel port mode. '1' = To read data port in EPP and bi-directional modes. '0' = To configure the parallel port for output mode.
4	ackIntEn	Interrupt Request Enable Bit. '1' = A system interrupt is generated by a positive going ACK input. '0' = Interrupt is disabled.
*3	SelectIn	This bit is inverted and output onto the SELECTIN output. '1' = Selects the printer. '0' = Printer is not selected.
*2	nInit	This bit is output onto the INIT output. This bit controls the initialize signal.
*1	autofd	This bit is inverted and output onto the AUTOFEED output. '1' = Printer will generate a line feed after each line is printed. '0' = No automatic line feed will occur.
*0	strobe	This bit is inverted an output onto the STROBE output. This bit controls the strobe signal.

Figure 18. Data Control Register Table

* NOTE: The control lines represented by these bits have open collector drivers in the standard mode. In the bi-directional and EPP modes, they have active pull-ups (TTL compatible).

8.2.4 EPP Address Register (Base + 3)

This register is only available in the EPP mode. Writing this register initiates an EPP Address Write Cycle. Reading this register initiates an EPP Address Read Cycle.

8.2.5 EPP Data Registers 0-3 (Base + 4 through Base + 7)

These registers are only available in EPP mode. Writing any one of these registers will initiate an EPP Data Write Cycle, and reading any one of these registers will initiate an EPP Data Read Cycle. These four addresses all access the same 8-bit register. This is useful in that it will allow the CPU to do 8,16, or 32 bit data writes to the port.

8.2.6 Extended Control Register (Base + 402h)

The Extended Control Register (Present only in Revision E and earlier PCMCIA Cards) is used to set the mode of the SPP-100 parallel port. The upper three bits (7:5) are written to configure the appropriate parallel port mode.

Bit	Description
7:5	Sets the mode of the EPP port. (see the table below)
4:0	These bits are not used.

Figure 19. Extended Control Register Table

Three parallel port modes are available, as described below:

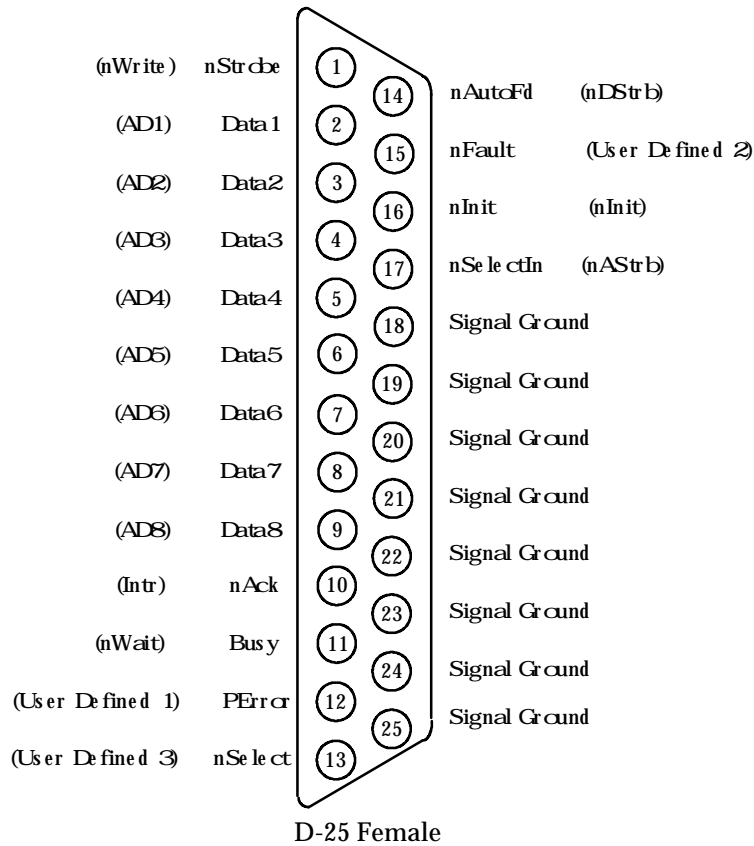| Bits[7:5]	Mode	Description
'000'	Standard Parallel Port Mode	In this mode, the parallel data bits D0-D7 may be used as output only; The Direction bit has no effect. In this mode, the control lines are driven by open collector drivers.
'001'	Bi-directional Mode	This mode is identical to the Standard Parallel Port mode except that the Direction bit may be used to set the parallel data lines D0-D7 for input. The value of the parallel data lines D0-D7 may be accessed by reading the Data Register. In this mode, the control lines have active pull-ups.
'100'	EPP Mode	In this mode, EPP cycles are initiated by writing and reading the EPP Address Register and the EPP Data Registers. In this mode, the control lines have active pull-ups.

Figure 20. Parallel Port Modes Table

NOTE: If the EPP mode is selected, the bi-directional mode is also available. When no EPP cycle is currently executing, the parallel port is fully operational in the bi-directional mode.

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9. External Connections

An adapter cable is included with the SPP-100 to convert the 25-pin output connector into a standard D-25 female connector as shown in the figure below.

Left label	Pin		Pin	Right label
(nWrite) nStrobe	1		14	nAutoFd (nDStrb)
(AD1) Data1	2		15	nFault (User Defined 2)
(AD2) Data2	3		16	nInit (nInit)
(AD3) Data3	4		17	nSelectIn (nAStrb)
(AD4) Data4	5		18	Signal Ground
(AD5) Data5	6		19	Signal Ground
(AD6) Data6	7		20	Signal Ground
(AD7) Data7	8		21	Signal Ground
(AD8) Data8	9		22	Signal Ground
(Intr) nAck	10		23	Signal Ground
(nWait) Busy	11		24	Signal Ground
(User Defined 1) PError	12		25	Signal Ground
(User Defined 3) nSelect	13			

D-25 Female

NOTES:
1. Signal names in parentheses represent EPP naming convention.
2. Signal names beginning with 'n' indicate low-active signals.

Figure 21. Connector Signal Assignment

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Appendix A: Parallel Port Terminology

A.1 Explanation of parallel port terminology

Starting with the original IBM PC, IBM defined the standard parallel printer port. This port uses a female DB-25S connector on the computer, and a special male DB-25P to Centronics male 36 pin "Printer cable" is used to connect to standard Centronics parallel printers.

IBM defined three standard port base addresses (in 80x86 IO address space). The printer adapter could use base address 0x378, or later 0x278, while the monochrome display and printer adapter used base address 0x3BC. The SPP-100 and other EPP compatible parallel ports should not use base address 0x3BC to avoid I/O conflicts.

A PC's BIOS defines RAM space for 4 parallel printer port base addresses, stored as 4 16 bit words starting at main memory address 0x408. During bootup, the BIOS will check for parallel printer ports at base addresses 0x3BC, 0x378, and 0x278, in order, and store the base addresses of any that are found in consecutive locations in this table.

DOS maps the BIOS table entries as LPTn devices. The first entry in the BIOS table becomes LPT1, the second entry LPT2, and the third entry LPT3 (if there are that many).   Other operating systems and some DOS based software support parallel ports located at non-standard addresses. Nonstandard parallel ports may or may not be mapped as LPTn devices, depending on the software or operating system.

The primary printer adapter (base 0x378) and the monochrome display and printer adapter (base 0x3BC) are allocated hardware interrupt 7. Secondary printer adapters (base 0x278) are supposed to use IRQ 5 for their interrupt.   These IRQs are commonly "stolen" for other usage since most (nearly all) DOS software does not use the printer port IRQ for driving printers. Other operating systems may use it for the printer port, as may some parallel port transfer programs.

> **v** If a parallel port device is configured at an LPT port, the I/O base address assigned to the parallel port device is added to the BIOS equipment list located at system memory location 0040:0008.

v A parallel port device may also be configured as a 'non-standard device'; this means that the I/O base address assigned to the parallel port device is not added to the BIOS equipment list.

v 'Standard' parallel port resources for the purposes of the SPP-100 are:

- I/O base address 278h and IRQ 5
- I/O base address 378h and IRQ 7

v 'Nonstandard' parallel port resources include any I/O base address and IRQ level other than the 'standard' resources.