


***Not Recommended for New Installations.***  
Please contact Technical Support for more information.

**RS-422/RS-485 PCMCIA Serial Card **  
**Model 485PCC**  
Documentation Number 485PCC0399

*This product designed and manufactured in Ottawa, Illinois USA  
of domestic and imported parts by*

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# Chapter 1: General Information

## Introduction

The 485PCC is a highly versatile PCMCIA asynchronous serial card. The card can be configured for use in RS-422 or RS-485 systems using the simple setup program provided. RS-485 mode supports both RTS and Automatic Send Data Control of the driver enable line and baud rates as high as 460.8 Kbaud are supported. A 16550 high speed UART reduces interrupt overhead to the host system.

## Card Specifications

- PCMCIA Type II Card (85.6 x 54.0 x 5 mm)
- DB9 Male Connector, 30 cm (12 inch) cable
- SMPTE (video standard) Controlling Device Pinouts
- Power Consumption:
  - 12 mA - 1× clock, loopback connection
  - 16 mA - 4× clock, loopback connection
  - <1 mA - Low power mode
- 16550 High Speed UART
- Data Bits: 5, 6, 7, 8
- Stop Bits: 1, 1½, 2
- Parity: Odd, Even or None
- Data Rate: 460.8 Kbaud Max (×4 mode)
- Selectable IRQ: 3-7, 9-12, 14 or 15
- Selectable port address: 0 – 3F8h, including COM 1 - 4
- Temp: 0°C - 50°C operating
- Differential Transceiver: SP491 or equivalent
- No additional termination is built in to the transceiver
- Receiver Biasing: 4.7 KΩ pulldown on RD A  
4.7 KΩ pullup on RD B

## Cable Pinout Diagrams

Pinouts of the 485PCC follow the SMPTE standard pinouts for a controlling device. Note that the "A" and "B" conventions used in the RS-422 and RS-485 specifications are equivalent to the "+" and "-" convention as listed in Table 1.

DB9M Pinouts	
Pin	Signal
2	RD A (-)
3	TD B (+)
4	Ground
6	Ground
7	RD B (+)
8	TD A (-)

## Chapter 2: DOS & Windows 3.x Installation

Even though the 485PCC supports RS-422 and RS-485 communications and includes advanced features, it will appear to software to be a standard serial port. In most notebooks, the B&B Electronics' Serial Card will be recognized and configured as soon as you insert the card into a free PCMCIA Socket. If your notebook or desktop does not recognize the Serial Card automatically, you can treat the card exactly the same as a DOS COM port. If the Serial Card is not recognized automatically, you should check with your manufacturer to see if your machine is loading the Card and Socket Service programs correctly. There may be a later version of Card and Socket Services available for your machine.

### ***Installing the Serial Card***

To install your Serial Card into your PCMCIA computer do the following:

1. Locate the PCMCIA socket on your computer. (Refer to your PC user's guide if needed)
2. With the product logo facing up (reference to B&B Electronics) and the 68-pin connector facing the PCMCIA socket, insert the card into the socket. Push firmly to engage the data cable into the exposed side of the Serial Card.

### ***Configuring the Serial Card Port Settings***

Once the Serial Card has been inserted, the PCMCIA socket must be configured for serial port operation. All PCMCIA input/output devices must be configured by software before they can be used. This configuring/enabling process must be repeated (that is, the enabling program must be run again) whenever the Card is powered off, then on again. A PCMCIA Serial Card will be powered off when the user removes it from the laptop and then re-inserts it. It may also be powered off, when the laptop goes into a "sleep" mode to conserve power.

There are two kinds of PCMCIA enabling software: Card and Socket Services, and Point Enablers. You must choose which software enabling method you will use to activate your Serial Card. Each method has its advantages and disadvantages. (See sections Card and Socket Service Users, or Point Enabler Users for more information.)

Most laptops and desktops that come equipped with PCMCIA slots come with Card and Socket Services (CSS) software. This software manages the PCMCIA ports. If Card and Socket Services are running on your machine, your Serial Card will be set up and configured for you automatically when you insert the card into the PCMCIA slot. This is usually the easiest and best way to configure your Card. In most cases all you will need to do is plug in your Serial Card and access the assigned COM port. (Refer to your PC documentation for information concerning the Card and Socket Services provided with your system.)

## ***Software Setup***

Once your card is configured, it can be accessed through your application software by choosing the appropriate COM port. (Refer to the user's manual associated with the software you are using for information on how to assign COM ports.) Configuration of the 485PCC is identical to an RS-232 serial port.

## ***Card and Socket Service Users***

Card and Socket Services is a set of programs that is installed so that they are executed when the laptop is turned on. The Card and Socket Service programs then stay resident - they remain in memory all of the time. Card and Socket Services are designed to detect when a PCMCIA device has been inserted or powered off and then it automatically re-enables the device. This allows "hot swapping" - you can pull a PCMCIA card out and put in a different one and the new card is automatically enabled. Card and Socket Services also "know" how to enable a variety of devices from different manufacturers and attempt to prevent all conflicts between different PCMCIA cards.

The main disadvantage of using Card and Socket Services are that they permanently occupy a certain amount of laptop or desktop memory, which could be used by other programs.

Most Card and Socket Service programs are loaded from the CONFIG.SYS file and use from 40K to 85K of memory space. If Card and Socket Services is running properly on your machine, then your Serial Card will be recognized and configured properly by simply inserting the card into one of the PCMCIA slots.

## **Point Enabler Users**

Point Enablers are programs that run, enable a specific device (such as your B&B Electronics Serial Card), and exit. Point Enabler commands can be installed in the AUTOEXEC.BAT file, or in a user made batch file used to start the application in which the card is used. The advantage of a Point Enabler, is that it uses system memory only while it runs. The disadvantage is that when the PCMCIA device is powered off, the user must remember to execute the Point Enabler command to re-enable the Serial Card. Another disadvantage in using Point Enablers is that you need a different one for each manufacturer's PCMCIA device. One manufacturer's Point Enabler may conflict with another's Point Enabler. A Point Enabler program may also conflict with an already running Card and Socket Service program. It is best NOT to run a Point Enabler if Card and Socket Services have already been loaded on your PC.

### **Using the Point Enabler Program**

B&B Electronics has supplied a Point Enabler program called ENABLE.EXE. To use this program perform the following:

1. Copy the file "ENABLE.EXE" from the supplied diskette onto your destination directory. (Typing ENABLE /? on the command line will bring up a program help screen.)
2. Use a text editor to add the following line to your AUTOEXEC.BAT file:

```
ENABLE /com2 /sA /MD000
```

**NOTE:** Putting the above line in your AUTOEXEC.BAT file will cause the Enable program to run each time you reboot or turn your PC on. Do not add this line if Card and Socket Service programs are being used.

The "/com#" switch indicates what COM port you want your Serial Card to be set up on. If you want COM4 instead of COM2, you would use the following:

```
ENABLE /com4 /sA /MD000
```

The "/s" switch indicates what PCMCIA slot contains your Serial Card. If you wanted slot B instead of slot A, you would use the following:

```
ENABLE /com2 /sB /MD000
```

(On machines with more than one slot, there is no standard way to distinguish which port will be A and which will be B. Usually they are not labeled. You may need to find out through trial and error.)

The "/M" switch indicates what memory window the ENABLE program will use for communication with your Serial Card. The four-character number following the /M is a hexadecimal address. If you have a memory conflict at the default D000 range, you could change it to something else. For example, if you wanted D800, you would enter:

```
ENABLE /com2 /sA /MD800
```

3. If you are not using an expanded memory manager such as EMM386.SYS, skip to step 4. If you are using an expanded memory manager such as EMM386.SYS, you must exclude the memory range you specified in step 2. (Each expanded memory manager has a command line switch that allows you to exclude a range of memory addresses from the memory manager's control. See your memory manager documentation for the exact form of the command line switch.) If you used the default D000 in step 2, you must exclude the range D000-D3FF; if you used D800, you must exclude D800-DBFF, etc.

If you are using an expanded memory manager before you run Microsoft Windows, you must also add an "EMMExclude" line to the [386Enh] section of your SYSTEM.INI file to inform Windows of the excluded range. For example:

```
[386Enh]
...
EMMExclude=D000-D3FF
...
```

4. If you are using Windows 3.1, you may want to use a high-speed COMM driver instead of the standard COMM driver shipped with Windows. (Do not make this change if you are using Windows for Workgroups.) In your Windows SYSTEM.INI file, replace the line in the [boot] section that reads

```
comm.driv=comm.driv
with
comm.driv=New High Speed Driver
```

Refer to your software vendor for a new high speed COMM driver. This is optional and will allow your Serial Card to perform reliably in Windows at higher speeds.

5. With your Serial Card inserted in a PCMCIA slot, it should now be configured and setup each time you turn on or reboot your PC. Note that since ENABLE.EXE is a Point Enabler, you will need to re-run the ENABLE command line with the appropriate switches each time your laptop goes to sleep or each time you remove and re-insert the Serial Card.

**NOTE:** The ENABLE.EXE program does not support all PCMCIA controller types out on the market. It will work on all controllers that are compatible with the Intel 82365 PCMCIA controller.

**NOTE:** The IBM 360 and 755/755C do not allow the range D000-D3FF to be used. We recommend using the range C800-CBFF instead.

## Chapter 3: Windows 95 Installation

To allow easy configuration of the 485PCC, a Windows 95 "INF" configuration file has been included on the distribution diskette. This file provides all of the setup information required by Windows 95 to allocate resources for the card.

The 485PCC installation procedure differs slightly between versions of Windows 95. In either case, the first step is to supply Windows 95 with the .inf configuration files supplied on the 232PCC disk.

### Installing a 485PCC in Windows 95

The following procedure is used to configure a 485PCC for use with Windows 95:

1. Insert the card into any available PC Card socket.
2. The first time a new PC Card type is installed, either the **New Hardware Found** window or the **Update Device Driver Wizard** window is displayed. After the initial installation, Windows 95 will automatically detect and configure the card. If the neither window is displayed, skip to the section "485PCC Resource Settings".
3. If your version of Windows displays the **New Hardware Found** window select the **Driver from Disk** option button and click **OK** to continue. An **Install From Disk** dialog box should open. Insert the 485PCC disk, select the correct drive letter (generally A:), and click the **OK** button. Windows 95 automatically browses the root directory for an INF file that defines configurations for the new hardware.
4. If your version of Windows displays the **Update Device Driver Wizard** window, insert the 485PCC disk into the A: or B: drive and click **Next**. Windows 95 automatically browses the root directory of A: and B: for an INF file that defines configurations for the new hardware. Windows 95 will report that it has found the driver for the device, click **Finish** to complete the installation.
5. During the installation, it may be necessary to supply the Windows 95 CD or installation disks. Two drivers are required for serial devices, SERIALUI.DLL and SERIAL.VXD. In many cases, these files are already installed on the host computer. If this is the case, click "OK" when prompted for disks and select the "skip" option. The version of these files that exist in the Windows system directory will be used.
6. Windows 95 socket services should indicate the 485PCC PCMCIA card configuration by a low-high tone beep.

The 485PCC should now be configured. Windows 95 automatically assigns the 485PCC to the first available COM port number. For detailed configuration information read the "485PCC Resource Settings" section. In the future, Windows 95 will automatically recognize and configure the 485PCC in this default configuration.

## 485PCC Resource Settings in Windows 95

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

1. Open the Windows 95 **System Properties** window. To access System Properties window double click the **System** icon in the Windows 95 control panel, or click the **My Computer** icon on the Windows 95 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.
3. Double click the device group **Ports (COM and LPT)**. The 485PCC device name should appear in the list of adapters.
4. Click the 485PCC'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.
6. The current address and interrupt configuration assigned by Windows 95 is shown in this window. Several predefined **Basic Configurations** have been included allowing easy selection of different configurations that match standard serial port settings.
7. When selecting a different 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.
8. To modify any of the system resources showing a conflict click the resource name and click the **Change Setting** button. An **Edit Resource** window will open up. Note that basic configuration 7 must be selected to modify the I/O address resource.

9. 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 485PCC. 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.
10. 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.
  11. The 485PCC will automatically be reconfigured to the new resources specified. Any time the card is inserted Windows 95 will attempt to configure the card at these resource settings. Click the **Use Automatic Settings** to reset the 485PCC for automatic configuration.

## Chapter 4: Special Feature Configuration

Included on the 485PCC diskette is a setup program that must be used to configure the advanced features of the 485PCC. The following settings can be configured with this program.

1. Driver Enable: Always Enabled, Automatic Send Data Control RTS
2. Receiver Enable: Always Enabled or Inverse of the Driver Enable (Echo On and Echo Off)
3. Clock Frequency: Standard (x1) or High Speed (x4)

The 485PCC can be reconfigured as often or as seldom as the user requires. The configuration is stored in non-volatile memory and will not be disturbed by normal use.

### ***Special Feature Configuration for Win95/98 Users***

To configure the 485PCC's special features, the card must be inserted and recognized by the system as a COM port. Special features can now be configured using the system Device Manager.

1. Open the Windows 95 **System Properties** window. To access System Properties window double click the **System** icon in the Windows 95 control panel, or click the **My Computer** icon on the Windows 95 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.
3. Double click the device group **Ports (COM and LPT)**. The 485PCC device name should appear in the list of adapters.
4. Click the 485PCC's device name and then click the **Properties** button to open a Port Properties box for this hardware adapter.
5. Click the **Card Options** tab located along the top of the properties box. After a short delay, the current configuration of the 485PCC will appear. Select the appropriate options for your system and click the **Apply** button. Descriptions of each of the special configuration options are given in the remainder of this chapter.

## ***Special Feature Configuration for DOS Users***

In order to run the configuration program, the 485PCC must be inserted and recognized by the system as a COM port. If the 485PCC is configured for address 3F8h, 2F8h, 3E8h or 2E8h (COM1 – COM4) the configuration program will automatically find the card. If your 485PCC is configured for another address, that address must be specified when the program is run. Any interrupt *except* IRQ 9 may be used. In some operating systems, including Windows 95, IRQ 9 may cause a conflict with the setup program. Change the 485PCC to a different IRQ before running the setup program.

To change the configuration, simply run the setup program PCCSETUP.EXE and select the appropriate operating modes.

Example 1. 485PCC configured as COM1 – COM4  
PCCSETUP

Example 2. 485PCC configured for I/O address 208h  
PCCSETUP /a208

Example 3. Display PCCSETUP help screen  
PCCSETUP /?

The program PCCSETUP allows the user to select one of five modes as well as toggle between the high speed (×4) and normal clock rates. Table 2 is a summary of the operating modes as found in the PCCSETUP program. Further information on each of the modes is given in the remainder of this chapter.

**Table 2: PCCSETUP Mode Options**

<b>Mode</b>	<b>Function</b>
1 – 422	Transmitter always enabled, Receiver always enabled
2 – 485	Transmitter enabled controlled by RTS, Receiver always enabled
3 – 485	Transmitter enable controlled by RTS, Receiver enable controlled by the inverse of RTS
4 – 485	Transmitter enable controlled by Send Data Control (SD), Receiver always enabled
5 – 485	Transmitter enable controlled by Send Data Control (SD), Receiver enable controlled by the inverse of SD

## ***Driver Enable Configuration***

### **Always Enabled (RS-422 mode)**

This setting should be used in four-wire point to point or master-slave systems where the 485PCC is the master node. This setting should not be used in any application where the driver of two or more nodes will be connected on the same twisted wire pair such as two-wire systems.

### **Automatic Send Data Control (RS-485 mode)**

This is the preferred setting in RS-485 systems. The Automatic Send Data Control circuitry will enable the RS-485 driver when data is transmitted and disable the driver within 10 bit times of the end of transmission.

### **RTS Control (RS-485 mode)**

In RTS mode, the 485PCC requires that the host software raise the Request to Send line before transmission, and lower the line immediately after transmission in order to prevent line contention with other RS-485 drivers sharing the same twisted wire pair. This mode requires additional software overhead compared to Automatic Send Data Control.

## ***Receiver Enable Configuration***

### **Always Enabled (RS-422 mode)**

This mode will keep the receiver enabled at all times and is typically used in all RS-422 systems and full-duplex RS-485 systems. Two wire RS-485 systems may wish to use this setting in order to receive a loopback signal of the port's transmissions. This is often referred to as the "Echo On" position.

### **Inverse of Driver Enable (Echo Off)**

In this configuration, the receiver is disabled anytime the driver is enabled. This mode should be used in two wire RS-485 systems where no local data echo is desired (Echo Off).

## ***Clock Configuration***

### **Normal $\times 1$ mode**

The  $\times 1$  clock mode uses the standard UART oscillator frequency of 1.8432 MHz. This mode results in the "standard" baud rates up to a maximum of 115.2 KBaud.

### **High Speed $\times 4$ mode**

This setting multiplies the standard UART oscillator frequency by four times to 7.3728 MHz. This in turn multiplies all standard baud rates by four times, so if the host software is set to 115.2 KBaud, the port's actual baud rate will be 460.8 KBaud, the software is unaware of the increased clock frequency. Note that increasing the baud rate may not always increase system throughput, if the system cannot respond quickly enough to interrupts it will simply increase the idle time between characters. For maximum efficiency, the data rate should be set no higher than where maximum throughput is obtained. This can be either measured in bytes per second or viewed on an oscilloscope.

## ***Default Configuration***

The 485PCC is shipped from the factory with the following configuration. For more information on RS-422 and RS-485, request or download a copy of B&B Electronics' free RS-422/485 Application Note.

Driver Enable	Automatic Send Data Control
Receiver Enable	Inverse of Driver Enable (Echo Off)
Clock Configuration	$\times 1$ (standard oscillator frequency)

## ***FCC Part 15 Compliance***

### **Class A Equipment**

This device has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at personal expense.

# Appendix A: DECLARATION OF CONFORMITY

## DECLARATION OF CONFORMITY

Manufacturer's Name: B&B Electronics Manufacturing Company  
Manufacturer's Address: P.O. Box 1040  
707 Dayton Road  
Ottawa, IL 61350 USA  
Model Numbers: 485PCC  
Description: RS-422/485 PCMCIA Serial Card Adapter  
Type: Light industrial ITE equipment  
Application of Council Directive: 89/336/EEC  
Standards: EN 50082-1 (IEC 801-2, IEC 801-3, IEC 801-4)  
EN 50081-1 (EN 55022, IEC 1000-4-2)  
EN 61000 (-4-3, -4-4)



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