

Smartio C168H/PCI

**8 Port Serial Board
for PCI**

Smart multiport serial board
with Plug and Play

Feb. 1998 (2nd Edition)

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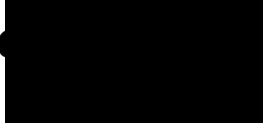
user ID: ftp

password: your_email_address

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1.1 Overview

Smartio - The Smart Multiport Async Solutions

The term *Smartio* stands for smart multiport serial I/O solution. *Smartio C168H/PCI* is designed for 32-bit PCI bus with "**Plug and Play**" feature. It offers 8 serial ports for connecting terminals, modems, printers, data acquisition equipment and any other serial devices to the PC and its compatible systems. With the well-designed and fine-tuned device driver, the *Smartio* boards make full use of the 32 byte Tx/Rx FIFO and on-chip H/W flow control, so that they can transfer data without data loss even at high speed such as 921.6 Kbps, which offers a reliable and high performance solution for serial multiport communications.

PCI Solution

The board has neither switch nor jumper. Hardware configuration for IRQ and I/O addresses is automatically assigned by PCI BIOS. Hence, it is a must to have the board plugged first before installing software driver.

Unlike ISA slots, different PCI slots in the same PC have different bus numbers and device numbers with respect to PCI specifications. The same PCI board will have different system configurations if switched to a different PCI slot, which may be called slot-sensitive or slot-dependent. This may also apply to PCI slots in PC of different main board.

At most **4** boards of *Smartio C168H/PCI* are allowed in a system. When installing multiple ones, keep in mind the order you plug the boards for distinguishing the boards installed.

MOXA Serial Comm Tool

The *PComm* is a serial comm tool under **Windows NT** and **Windows 95** which makes it easier to develop your own applications using Visual Basic, Visual C++, Borland Delphi, etc. **Utilities**, such as diagnostic and monitor, are included for diagnosing the board/port or monitoring the communication status.

In this manual, chapters for MOXA **Windows NT** and **Windows 95** device drivers are included. Please refer to each operating system's chapter for hardware and software installation, programming library, utilities and troubleshooting.

1.2 Features and Specifications

Features

- √ Compact board size, half-size
- √ Plug and play, no switch no jumper
- √ Surge/isolation protection option
- √ High speed TI550C Communication Controller with on-chip hardware flow control, no data loss
- √ Windows NT/95 device drivers and *PComm* serial comm tool

Specifications

- √ Bus interface : 32-bit PCI
- √ Number of ports : 8
- √ I/O address : Assigned by PCI BIOS
- √ IRQ : Assigned by PCI BIOS
- √ Data bits : 5, 6, 7, 8
- √ Stop bits : 1, 1.5, 2
- √ Parity : None, even, odd, space, mark
- √ UART : 8»TI550C
- √ Speed (bps) : 50 ~ 921.6K
- √ Connectors : 8»DB25/DB9, male or female
- √ Data signals : RS-232»TxD, RxD, RTS, CTS, DTR, DSR, DCD, GND

RS-422»TxD+(B), TxD-(A), RxD+(B), RxD-(A), GND
 (Opt8J: RTS+(B), RTS-(A), CTS+(B), CTS-(A))
 RS-485»TxD+(B), TxD-(A), RxD+(B), RxD-(A), GND

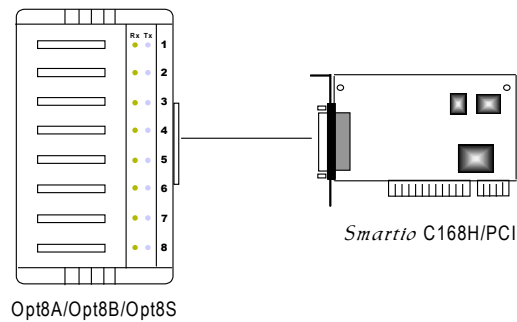
- √ Surge protection : Max. 2000V
- √ Isolation protection : Max. 500V
- √ Operating temp : 0 ~ 55 ¼[
- √ Power requirement: 98.3 mA max. (+5V), 324.6 mA max. (+12V), 324.6 mA max. (-12V)
- √ Dimensions : 123 cm»ë100 cm

Check List

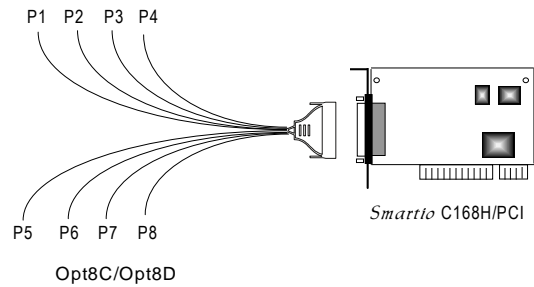
Upon unpacking the *Smartio* C168H/PCI, you should find the following items in the package,

1. *Smartio* C168H/PCI 8 port serial board
2. This User Manual
3. Windows NT/95 device driver»ë1 and *PCComm* diskette»ë1
4. One of the following interface options:

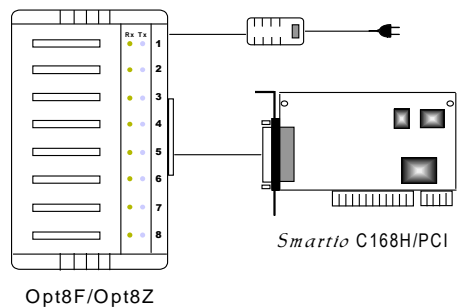
Opt8A/Opt8B/Opt8S: RS-232 connection box with 8 DB25 female/male ports (surge protection for Opt8S) and 1.5 meter DB62 to DB62 cable.



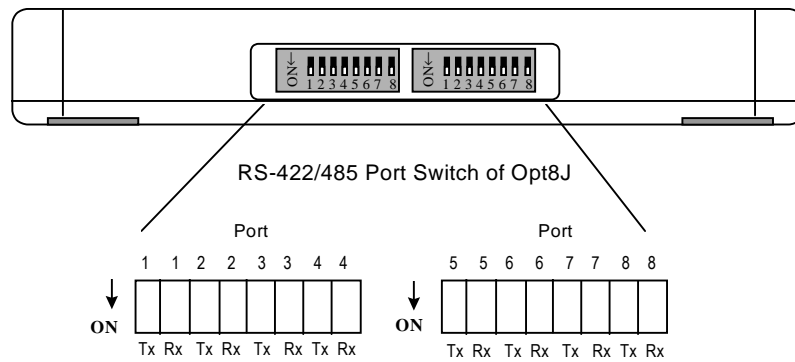
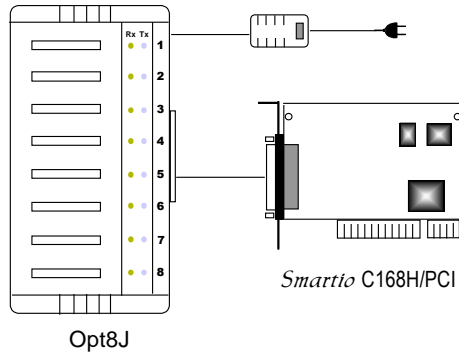
Opt8C/Opt8D: RS-232 octopus cable with 8 port male DB25 (or DB9 for Opt8D) connectors (1 meter long).



Opt8F/Opt8Z: RS-422 connection box with 8 port female DB25 connectors (isolation protection for Opt8F). 1.5 meter DB62 to DB62 cable and 110V or 220V adapter included.



Opt8J: RS-422/485 connection box with 8 port female DB25 connectors. 1.5 meter DB62 to DB62 cable and 110V or 220V adapter included.



- ON: Tx by RTS:** If RTS is high, the port is in output state.
Rx by /RTS: If RTS is low, the port is in input state.
 (normally for half-duplex RS-485 communication)
- OFF: Tx/Rx Always On:** The port is in both output and input state.
 (normally for RS-422 communication)

Chapter 2 **For Windows NT Users**

The no-switch-no-jumper *Smartio* C168H/PCI board's hardware configuration for IRQ and I/O addresses is automatically assigned by PCI BIOS. Hence, it is a must to have the board plugged first before installing software driver.

In this chapter, hardware installation, software installation, configuration and driver removal procedure are described. If it is necessary for you to develop your own applications, we strongly recommend the easy but powerful *PComm* Serial Comm Tool, which includes library for easy programming and useful utilities for diagnostic and monitor. Finally, Windows NT-specific troubleshooting is included.

2.1 Installation

The installation of *Smartio* C168H/PCI consists of hardware and software installation.

Hardware Installation

For hardware installation, follow the steps:

1. Power off the PC.
2. Plug the *Smartio* C168H/PCI(s) in the free PCI expansion slot(s) of the PC.
3. Connect the connection box/cable (also adapter if required) as shown in Chapter 1.
4. Power on the PC and check your PC's BIOS setup to select the free IRQ setting(s) for PCI slot. Change it if necessary.
5. Proceed with software installation detailed next.

Software Installation

The following is the procedure for installing the *Smartio* C168H/PCI driver under Windows NT 4.0. Make sure the board(s) has(have) been plugged in the system first.

1. Login NT as **Administrator**.
2. From [**Control Panel**] group, click [**Network**] icon, and then [**Adapters**] tab.
3. Select [**Add**] button, then [**Have Disk...**] button for "Select Network Adapter".
4. Specify the exact path for the driver diskette, e.g. **A:\WINDOWS.NT**. Click [**Continue**].
5. Select "**MOXA C168H/PCI Multiport Adapter**" in "Select OEM Option" dialog. Click [**OK**] to start installation.
6. When *Smartio* C168H/PCI configuration panel is popped up, start to configure the board(s), which is detailed in the next Section "Configuration".
7. Select [**OK**] for "Network Settings" dialog. The installation is now complete. Please restart system as prompted.

2.2 Configuration

The following is the procedure for configuring the *Smartio* C168H/PCI driver under Windows NT 4.0. Note that **the presence of the board(s) is(are) required for configuration**.

1. From [**Control Panel**], click on [**Network**] icon, then [**Adapters**] tab.
2. Select "**MOXA C168H/PCI Adapter**" item for "**Network Adapters:**", then [**Properties**] to start the "**MOXA C168H/PCI Configuration**" dialog. In the "MOXA C168H/PCI Configuration" dialog, only the boards physically plugged and detected, whether configured before or not, will be

displayed. For configured board, COM number field is **defined**. For newly installed board, including the board that switches to different PCI slot or different PC main board system, COM number field is **undefined**.

Select [**Properties**] to set up a board with desired "**COM Number**". Specify the COM number of the first port and subsequent ports are mapped to continuous COM numbers. For instance, if the first port is mapped to COM10, then the second port is mapped to COM11 sequentially.

Or further select [**Advanced..**] to set up "**Rx FIFO trigger level**" and "**Tx FIFO size**".

Rx FIFO trigger level, 1, 4, 8 or 14 bytes is available, and the default value is 14 bytes.

Tx FIFO size from 1 to 16 bytes is available, and the default value is 16 bytes.

3. Restart the system to activate the latest configuration.

2.3 Board Initialization Status Checking

There are two alternative ways to find out if ports of the board are initialized successfully:

1. Enter [**Control Panel**] and then [**Ports**] icon to check the port list and see if all configured ports are already added in the system correctly.

If no configured port shown in the port list, refer to Section "Troubleshooting" for solutions.

2. Enter [**Administrative**] group, then [**Event Viewer**] icon, and then [**System Event Log**] to check for message like "**MOXA C168H/PCI, with serial ports COM10 to COM17, has been enabled.**" for each configured board. If message is "**Can not find any configured MOXA C168H/PCI board!**",

refer to Section "Troubleshooting" for solutions.

2.4 Add/Remove Board

To add/remove boards after first time installation, simply:

1. Power off the system.
2. Plug/unplug the boards in the system.
3. Power on the system.
4. Run software configuration to setup the boards.

2.5 Driver Update

To update the driver for the *Smartio* C168H/PCI board, simply remove the driver first, as described in the next Section, and then reinstall the driver as detailed in Section 2.1.

2.6 Driver Removal

To remove the driver for the *Smartio* C168H/PCI board,

1. From [Control Panel], select [Network] icon, and then [Adapters] tab.
2. Select "MOXA C168H/PCI Adapter" in adapter list, then [Remove] button and then [OK] to start removing the driver
3. Restart the system to activate the new configuration.

2.7 MOXA Serial Comm Tool: *PComm*

PComm is a software package consisting of MOXA serial communication library and utilities for diagnostic and monitor as well as example programs under

Windows NT/95. Please see Chapter 4 "*PComm*" for details.

2.8 Troubleshooting

The error messages and solutions are stated as clearly as possible.

1. Can not find any configured *Smartio* C168H/PCI board!

- Plug in the board(s) properly.
- Sometimes slot for plugging board is malfunctional.
In this case, please try other slots until a good one is found.
- The board might be defective.

2. Another driver in the system, which did not report its resources, has already claimed the interrupt used by xxx.

- Check the IRQ reservation in the PCI settings of the system BIOS.
- The interrupt is used by more than one board. Try to avoid it.

3. The COM number of the *Smartio* C168H/PCI, with device number xx, conflicts with others.

The COM numbers of different boards happen to be the same.
Try to change the COM number mappings.

If all the possible solutions fail, the board or connection box might be defective. Please check the board or connection box one at a time to find out the defective. If necessary, contact and report it to your dealer at once for replacement or repair.

Chapter 3 For Windows 95 Users

Under Windows 95 which supports **Plug and Play**, users can easily have the board plugged and working right away with least installation effort.

Since *Smartio* C168H/PCI is without switch or jumper, its hardware configuration for IRQ and I/O addresses is automatically assigned by PCI BIOS. Hence, it is a must to have the board plugged first before installing software driver.

In this chapter, hardware installation, software installation, configuration and removal procedure are described. If it is necessary for you to develop your own applications, we strongly recommend the easy but powerful *PComm* Serial Comm Tool, which includes library for easy programming and useful utilities for diagnostics and monitor. Finally, Windows 95-specific troubleshooting is included.

3.1 Installation

The installation of *Smartio* C168H/PCI consists of hardware and software installation.

Hardware Installation

For hardware installation, follow the steps:

1. Power off the PC.
2. Plug the *Smartio* C168H/PCI(s) in the free PCI expansion slot(s) of the PC.
3. Connect the connection box/cable (also adapter if required) as shown in Chapter 1.

4. Power on the PC and check your PC's BIOS setup to select the free IRQ setting(s) for PCI slot. Change it if necessary.
5. The Windows 95 will automatically detect the presence of the new board and prompt to install the software driver if the first time installation.

Software Installation

For software installation of the very first time with the very first *Smartio* C168H/PCI board,

1. Upon detecting the first new board, Windows 95 will automatically show a dialog box with the message "**New hardware found**" and ask you for the driver diskette.
2. Select "**Driver from disk provided by hardware manufacturer**" and click on "**OK**". Then indicate the disk drive and directory (e.g. A:\Windows.95) where the *Smartio* C168H/PCI driver files are located and click on "**OK**". Windows 95 will read the files from the disk.
3. Windows 95 will show "**MOXA C168H/PCI Installation**" dialog box, in which user has to specify the COM number mapping and click on "**OK**". And this complete the whole installation procedure.

After the installation, the users can use **immediately** those COM ports of the *Smartio* C168H/PCI board **without restarting the Windows 95 system**.

If multiple boards are installed at the same time, from the second board, same scenario occurs except that no driver diskette is asked any more.

Similarly, if users want to add more board and the driver has been installed before, simply plug the *Smartio* C168H/PCI board and Windows 95 will automatically detect and install the required driver.

3.2 Configuration

The following is the procedure for configuring the *Smartio* C168H/PCI driver, specifically, for configuring COM number mapping.

1. Selecting [**Control Panel**] icon, then [**System**] wizard, then [**Device Manager**] tab, and then [**Moxa multiport board**] class. Then select the desired MOXA C168H/PCI board entry, then click on the [**Properties**] button and then select the [**Ports Configuration**] tab.
2. Assign the desired COM number for the *Smartio* C168H/PCI port mapping. Some other system-assigned information such as Interrupt number, Interrupt vector address, I/O Range, Bus number and Device number are displayed for reference only, but can not be modified. Where, Bus number and Device number indicate the information of the used PCI slot which can be helpful to distinguish multiple *Smartio* C168H/PCI boards.
3. Restart the system for the latest configuration to take effect.

The following is the procedure for configuring the *Smartio* C168H/PCI ports, specifically, for configuring the transmit and receive FIFO of the ports. The default transmit FIFO is 16 bytes and the receive FIFO trigger level is 14 bytes.

1. From [**Control Panel**], click on [**System**] wizard, then [**Device Manager**] tab, and then [**Ports (COM & LPT)**] class. Then select the desired COM port, then click on the [**Properties**] button, then select the [**Ports Settings**] tab and then [**Advanced**] button.
2. Select the desired transmit and receive FIFO.
3. Restart the system to activate the new configuration.

3.3 Driver Update

To update the driver for the *Smartio* C168H/PCI board,

1. From [**Control Panel**], click on [**System**] wizard, then [**Device Manager**] tab, then [**Moxa multiport board**] class, then select any [**MOXA C168H/PCI board**] icon, then click on the [**Properties**] button, then select the [**Drivers**] tab, then [**Change Driver ...**] button, and then [**Have Disk ...**] button to type the path of the new driver and start changing the driver.
2. Restart the system to activate the new configuration.

3.4 Removal

To remove a *Smartio* C168H/PCI board,

1. Enter [**Control Panel**] and double click on [**System**] wizard. Then select [**Device Manager**] tab and then double click on [**Moxa multiport board**] class.
2. Select the desired MOXA C168H/PCI board and click on the [**Remove**] button. Click on [**OK**] when asked to confirm the removal of the board.
3. The system freezes for a few seconds and prompt you to reboot the system. Then click [**Yes**] to shutdown. Shutdown the Windows 95, turn off the power and remove the board from the system.

3.5 MOXA Serial Comm Tool: *PComm*

PComm is a software package consisting of MOXA serial communication library and utilities for diagnostic and monitor as well as example programs under Windows NT/95. Please see Chapter 4 "*PComm*" for details.

3.6 Troubleshooting

1. **System fails to find the *Smartio* C168H/PCI board !**

- The board(s) is not plugged properly.
- Sometimes slot for plugging board is defective.
In this case, please try other slots until a good one is found.
- The board might be defective.

2. System fails to find the configured *Smartio* C168H/PCI board(s) !

To check if the system finds the configured *Smartio* C168H/PCI board(s), from [Control Panel], click on [System] wizard, then [Device Manager] tab, then [Moxa multiport board] class, then see if any [MOXA C168H/PCI board] icon is marked with a red cross. If yes, possible reasons are:

- The IRQ used by the PCI board might conflict with that used by ISA board.
- The board might be defective.

PComm, the professional serial comm tool for PC, is a software package under Windows NT/95, which consists of powerful serial communication library for easy programming in most popular languages, useful utilities such as diagnostic and monitor, illustrative example programs and comprehensive on-line documents.

The serial communication library is especially for users who develop a system for data communication, remote access, data acquisition or industrial control in the Windows NT/95 environment, which offers an easier solution compared with the more complex Windows Win32 COMM API.

4.1 Installation

To install *PComm*, please run `\Setup.exe` in the diskette.

Note that the MOXA Windows NT/95 device driver is required as using *PComm* diagnostic and monitor utilities.

4.2 Programming Library

The serial communication library is to assist users to develop programs for serial communications **for any COM port** complying with Microsoft Win32 API. It can ease the implementation of multi-process and multi-thread serial communication programs and hence greatly reduce the developing time.

For complete library function description and example programs for Visual C++, Visual Basic and Delphi, please see help file and example programs in *PComm* directory for more details

4.3 Utilities

The followings are short descriptions of each utility. For details, please see on-line help in the diskette.

Diagnostic

A convenient diagnostic program provides internal and external testing, such as IRQ, TxD/RxD, UART, CTS/RTS, DTR/DSR, DTR/DCD testing, etc., for the MOXA boards and ports to verify correct operation of both the software and hardware.

Monitor

A useful port status monitoring program allows users to watch the selected MOXA COM ports' data transmitting/receiving throughput and communication line status which are updated and displayed on the screen at every time interval. In addition, users may click on one of the specific displayed port in order to see the current communication parameters and status of that port.

Appendix A

Troubleshooting

Common *Smartio* C168H/PCI problems and possible solutions are listed below. If you still have problems, contact your dealer or Moxa for help. Or report it using "**Problem Report Form**" at the end of this manual to your dealer at once for faster technical support.

1. MOXA board not found.

Hardware Causes and Solutions:

- a. The board is not properly plugged in the system. If so, re-install the board and make sure that it fits well in a PCI slot. Sometimes the slot for plugging the board is bad. In this case, please try other slots until a good one is found.
- b. The board is not installed or missing (absent). Please install it.
- c. The board is out of order.

2. MOXA board found but can not transfer (transmitting/receiving) data.

Hardware Causes and Solutions:

- a. Check if wrong cable wiring. Refer to Appendix B for proper wiring.
- b. Cable or external box is defective.

Software Causes and Solutions:

- a. *Smartio* C168H/PCI will check line status (CTS) before it sends data out if RTS/CTS flow control feature is set to ON in the application program. Please see Appendix B for proper wiring.
- b. Perhaps the application controlling the board is not correctly written according to the corresponding API of the operating system. To verify, please run the existing application or Moxa-provided utility. For example, under Windows 95, "Hyperterminal" is good for testing COM ports.

Appendix B Pin Assignments and Cable Wiring

In serial data communications, the term **DTE** is for Data Terminal Equipment like terminal or PC COM1/2. The term **DCE** is for Data Communication Equipment like modem. Their precise pinouts and cable wiring are as follows.

B.1 RS-232 Cable Wiring

RS-232 connection boxes/octopus cable designed for *Smartio* C168H/PCI are:

- Opt8A** : Connection box with 8 female RS-232 DB25 ports.
- Opt8B** : Connection box with 8 male RS-232 DB25 ports.
- Opt8C** : Octopus cable with 8 male RS-232 DB25 ports.
- Opt8D** : Octopus cable with 8 male RS-232 DB9 ports.
- Opt8S** : Connection box with 8 female RS-232 DB25 ports and 2000V surge protection.

The following lists the port pin assignments:

Opt8A/S (DCE, DB25 Female)	Opt8B/C (DTE, DB25 Male)	Opt8D (DTE, DB9 Male)
3 TxD	2 TxD	2 RxD
2 RxD	3 RxD	3 TxD
5 RTS	4 RTS	4 DTR
4 CTS	5 CTS	5 GND
20 DSR	6 DSR	6 DSR
6 DTR	20 DTR	7 RTS
7 GND	7 GND	8 CTS
8 DCD	8 DCD	1 DCD

Type 1: To connect *Smartio* C168H/PCI to a DTE.

<i>Smartio</i> C168H/PCI DB25/DB9		DTE DB25 Male		<i>Smartio</i> C168H/PCI DB25/DB9		DTE DB9 Male	
TxD	_____	3	RxD	TxD	_____	2	RxD
RxD	_____	2	TxD	RxD	_____	3	TxD
RTS	_____	5	CTS	RTS	_____	8	CTS
CTS	_____	4	RTS	CTS	_____	7	RTS
DSR	_____	20	DTR	DSR	_____	4	DTR
GND	_____	7	GND	GND	_____	5	GND
DTR	_____	6	DSR	DTR	_____	6	DSR
DCD	_____	8	DCD	DCD	_____	1	DCD

Type 2: To connect *Smartio* C168H/PCI to a DCE.

<i>Smartio</i> C168H/PCI DB25/DB9		DCE DB25 Female	
TxD	_____	2	RxD
RxD	_____	3	TxD
RTS	_____	4	CTS
CTS	_____	5	RTS
DSR	_____	6	DTR
GND	_____	7	GND
DTR	_____	20	DSR
DCD	_____	8	DCD

Type 3: To connect *Smartio* C168H/PCI to a DTE with 3-pin wiring.

If [Hardware flow control] feature is set to "ON", user must loop back (or short) the RTS with CTS and DSR with DTR, DCD on MOXA site.

<i>Smartio</i> C168H/PCI DB25/DB9		DTE DB25 Male		<i>Smartio</i> C168H/PCI DB25/DB9		DTE DB9 Male	
TxD	_____	3	RxD	TxD	_____	2	RxD
RxD	_____	2	TxD	RxD	_____	3	TxD
GND	_____	7	GND	GND	_____	5	GND
RTS	□			RTS	□		
CTS	□			CTS	□		
DSR	□			DSR	□		
DTR	□			DTR	□		
DCD	□			DCD	□		

If [Hardware flow control] feature is set to "OFF", users could just leave RTS, CTS, DSR, DTR, DCD open.

<i>Smartio C168H/PCI</i> DB25/DB9	DTE DB25 Male	<i>Smartio C168H/PCI</i> DB25/DB9	DTE DB9 Male
TxD	3	TxD	2
RxD	2	RxD	3
GND	7	GND	5
RTS		RTS	
CTS		CTS	
DSR		DSR	
DTR		DTR	
DCD		DCD	

B.2 RS-422 Cable Wiring

RS-422 connection boxes designed for *Smartio C168H/PCI* are:

- Opt8J:** Connection box with 8 female RS-422/485 DB25 ports.
- Opt8F:** Connection box with 8 female RS-422 DB25 ports and Max. 500V DC isolation protection which can prevent damage caused by high potential voltage.
- Opt8Z:** Connection box with 8 female RS-422 DB25 ports but without isolation protection.

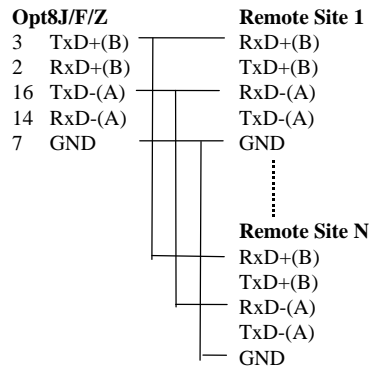
The RS-422 transmission distance can reach as long as 4000ft. The connection box needs an external power adapter to supply 5V DC power. Either 110V or 220V AC power adapter is selectable.

The followings are operation modes for RS-422:

RS-422 Point-to-point

Opt8F/Z	Remote Site
3 TxD+(B)	RxD+(B)
16 TxD-(A)	RxD-(A)
2 RxD+(B)	TxD+(B)
14 RxD-(A)	TxD-(A)
7 GND	GND

RS-422 Broadcasting



RS-422 Point-to-point full-duplex

Opt8J	Remote Site
3 TxD+(B)	RxD+(B)
16 TxD-(A)	RxD-(A)
2 RxD+(B)	TxD+(B)
14 RxD-(A)	TxD-(A)
7 GND	GND
5 RTS+(B)	CTS+(B)
13 RTS-(A)	CTS-(A)
4 CTS+(B)	RTS+(B)
19 CTS-(A)	RTS-(A)

For **Opt8J RS-422** communications, do set the [Tx, Rx] port switch on the side panel to [Off, Off] position and then use point-to-point full-duplex or broadcasting operation.

B.3 RS-485 Cable Wiring

RS-485 connection box designed for *Smartio* C168H/PCI is:

Opt8J: Connection box with 8 female RS-422/485 DB25 ports.

The RS-485 transmission distance can reach as long as 4000ft. The connection

box needs an external power adapter to supply 5V DC power. Either 110V or 220V AC power adapter is selectable.

The RS-485 standard is an enhanced version of the RS-422A balanced line standard. It allows multiple drivers and receivers in a multidrop systems. As many as 32 drivers and 32 receivers can be put on any multidrop system.

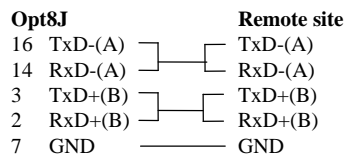
There are basically two operations for RS-485, **point-to-point** and **multidrop**. And each operation has **half** and **full-duplex** options. For half-duplex, there are still **echo** and **non-echo** modes. Since TxD+(B) and RxD+(B) are wired together (see pictures below), whatever data sent from TxD+(B) will be received by RxD+(B) of the local site and, of course, the RxD+(B) of the other site. If the local RxD+(B) is enabled to receive data, it is called **echo** mode. Otherwise, the local RxD+(B) is disabled and it is called **non-echo** mode. If the port switch is set to [On, On], only the non-echo mode is possible. See Appendix C "RS-485 Programming" for details.

The followings are operation modes for RS-485:

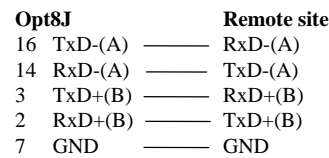
Point-to-point

Point-to-point communications means two devices located at two different places can be linked together to communicate via RS-485 interface. Depending on the wiring, half-duplex or full-duplex can be used.

Point-to-point RS-485 Half-duplex



Point-to-point RS-485 Full-duplex



In accordance with the point-to-point operation shown above, there are a couple of setting combinations for Tx and Rx:

1. Point-to-point full-duplex operation

Set [Tx, Rx] port switch to [Off, Off].

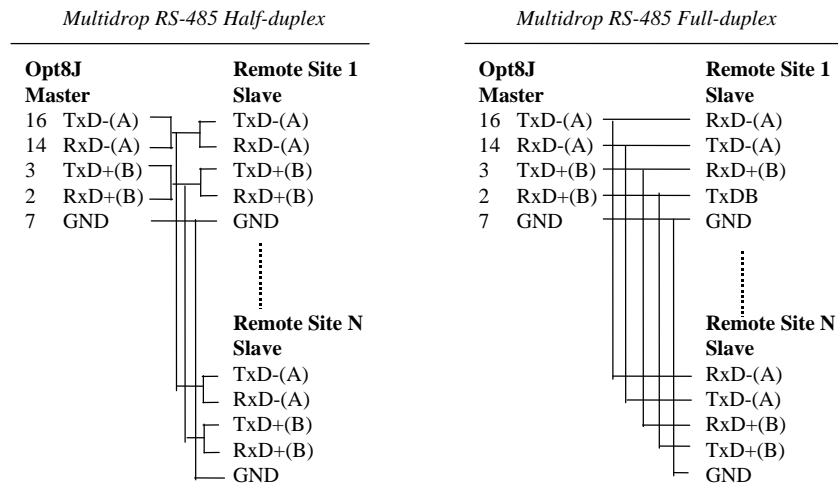
2. Point-to-point half-duplex operation

For echo mode, set [Tx, Rx] port switch to [On, Off]. For non-echo mode, set [Tx, Rx] port switch to [On, On].

Multidrop

Multidrop communication means that more than two devices can be linked together to communicate with one another via RS-485 interface. In this operation, one of the device serves as **master** device while the rest of the devices as **slaves**. Normally, master will send data to individual slave and the slave will receive the data according to its ID (or any site-specific identification) embedded in the data. This is how master communicate with each slave. However, **broadcasting** is also possible if the master sends data without any ID to all the slaves.

Depending on the wiring, half-duplex or full-duplex can be used.



In accordance with the multidrop operations shown above, there are a couple of setting combinations for Tx and Rx:

1. Multidrop full-duplex operation

Set [Tx, Rx] port switch of the master to [Off, Off]. Set [Tx, Rx] port switch of the slaves to [On, Off].

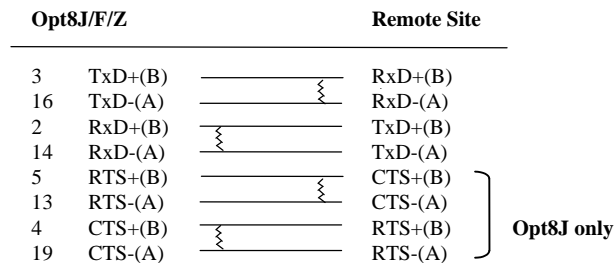
2. Multidrop half-duplex operation

For echo mode, set [Tx, Rx] port switch of the master and slaves to [On, Off].
For non-echo mode, set [Tx, Rx] port switch to [On, On].

B.4 RS-422/485 Impedance Matching

For RS-422/485 serial communications, when an electrical signal travels through two different resistance junctions in a transmission line, the mismatch will sometimes cause signal reflection. Signal reflection causes signal distortion, which in turn will contribute communication errors. The solution to this problem is to establish the same impedance at the line ends as in the line itself by terminating them with resistors.

The value of the termination resistor should equal the characteristic impedance of the transmission line. The resistors should be added near the receiving side.

**Note:**

1. ξ stands for termination resistor near the receiving side
2. The suggested termination resistor for AWG #26 cable is 100 ohm.
3. The suggested termination resistor for phone cable is 600 ohm.

B.5 DB62 Connector Pinouts

The following lists the pin assignments of the **DB62** connector on the bracket.

Pin Assignments and Cable Wiring 1**1 Appendix B**

Pin No.	Signal	Pin No.	Signal	Pin No.	Signal
1	TxD1	22	RxD1	43	CTS1
2	DTR1	23	DSR1	44	RTS1
		24	DCD1	45	GND
3	RxD2	25	TxD2	46	CTS2
4	DSR2	26	DTR2	47	RTS2
5	DCD2				
6	TxD3	27	RxD3	48	CTS3
7	DTR3	28	DSR3	49	RTS3
		29	DCD3	50	GND
8	RxD4	30	TxD4	51	CTS4
9	DSR4	31	DTR4	52	RTS4
10	DCD4	32	GND		
11	RxD5	33	TxD5	53	CTS5
12	DSR5	34	DTR5	54	RTS5
13	DCD5			55	GND
14	TxD6	35	RxD6	56	CTS6
15	DTR6	36	DSR6	57	RTS6
		37	DCD6	58	GND
16	RxD7	38	TxD7	59	CTS7
17	DSR7	39	DTR7	60	RTS7
18	DCD7	40	GND		
19	RxD8	41	TxD8	61	CTS8
20	DSR8	42	DTR8	62	RTS8
21	DCD8				

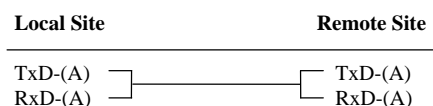
Appendix C

RS-485 Programming

If you are using RS-485 communication, such as Opt8J or A50/A51, please follow the RS-485 programming guide below and also refer to Appendix B.3 for more RS-485 operation details.

For RS-485 ports, each has one receiver (Rx) and one driver (Tx). Both driver and receiver can be either enabled or disabled in order to achieve either **point-to-point half/full-duplex** communication or **multidrop half/full-duplex** communication.

The principle for **RS-485 full-duplex programming** is same as that for RS-232/422 programming. However, for **RS-485 half-duplex programming**, remember that only one end of the signal line can be enabled when Tx and Rx of both ends are physically wired together. For example,



When the TxD-(A) of the local site is enabled to transmit data, the TxD-(A) of the remote site should be disabled and RxD-(A) of remote site should be enabled to receive data. Meanwhile, the RxD-(A) of the local site can be either enabled to receive data from TxD-(A) of the local site, which is called **echo** mode, or disabled, which is called **non-echo** mode.

In a **half-duplex** environment, **contention** problems (or **data collision**) will occur if two devices attempt to transmit data simultaneously. For example, if the TxD-(A) of both the local and the remote sites are enabled at the same time, the data sent will be garbled due to the contention problems. However, if the TxD-(A) of both the local site and the remote site are disabled, the line will be floating.

To control the enable/disable mode of the driver and receiver, there are 2 options: "**Always On**" and "**By RTS**" for the driver and 2 options: "**Always**

On" and "**By /RTS**" for the receiver to be chosen.

1. Always On

If the **Tx** and **Rx** port switch is set to **Off** position ("**Always On**"), the driver/receiver is always enabled and ready for transmitting/receiving data.

2. Tx By RTS or Rx By /RTS

The **Tx** or **Rx** port switch of each port can be set to **On** position ("**By RTS**" for Tx or "**By /RTS**" for Rx). That is, the driver and receiver are controlled independently.

The driver is enabled if it is set to "**By RTS**" and the RTS signal is on. The driver is disabled if it is set to "**By RTS**" and the RTS signal is off.

The receiver is disabled if it is set to "**By /RTS**" and the RTS signal is on. The receiver is enabled if it is set to "**By /RTS**" and the RTS signal is off.

"**By RTS**" or "**By /RTS**" is suitable for any system that allows RTS control from application programs. Any one of the following statements will set RTS signal true and turn on the driver or turn off the receiver:

```
sio_RTS(port, 1);           /* turn on RTS */
or
sio_putb_x();             /* turn on RTS before data sent */
```

Any one of the following statements will clear the RTS signal and turn off the driver or turn on the receiver:

```
sio_RTS(port, 0);        /* turn off RTS */
or
sio_putb_x();           /* turn off RTS after data sent */
```

For details about API-232 function, **sio_RTS()** and **sio_putb_x()**, please refer to the *PComm* Library on-line **Help** file and RS-485 example C program in the *PComm* diskette.

Problem Report Form

C168H/PCI

Customer name:	
Company:	
Tel:	Fax:
Email:	Date:

1. **Moxa Product:** C168H/PCI **Serial Number:** _____
2. **Moxa Driver version:** _____
3. **Moxa hardware settings:** PCI Slot number _____
4. **Operating System:**

<input type="radio"/> DOS	<input type="radio"/> Windows3.x	<input type="radio"/> Windows 95
<input type="radio"/> Windows NT 3.51	<input type="radio"/> Windows NT 4.0	<input type="radio"/> Windows 95 (ver. B)
<input type="radio"/> OS/2 ver _._	<input type="radio"/> Linux kernel _._._	<input type="radio"/> QNX ver _._
<input type="radio"/> SCO UNIX 3.2.4	<input type="radio"/> SCO OpenServer Release 5	
<input type="radio"/> SCO XENIX	<input type="radio"/> (SCO) UnixWare ver _._	
<input type="radio"/> Solaris x86 ver _._	<input type="radio"/> SVR4.2 UNIX	<input type="radio"/> FreeBSD
<input type="radio"/> Others		
5. **PC Host:** Make _____ Model _____
6. **CPU:** Speed _____MHz Make _____ Model _____
7. **BIOS:** Make _____ Version _____
8. **PCI IRQ Configuration in BIOS:**

Slot no.	1	2	3	4
IRQ no				

9. **Problem Description:** Please describe the symptom as clear as possible including the error message you see. We may have to follow your description to reproduce the symptom.

<input type="radio"/> Board not found.	<input type="radio"/> Board found, but can't transfer data.
<input type="radio"/> Can transfer data, but lose data	<input type="radio"/> Can transfer data but with garbled data.

Others. Detailed error message description is recommended:

RETURN PROCEDURE

For product repair, exchange or refund, the customer must:

- ✓ Provide evidence of original purchase
- ✓ Obtain a Product Return Agreement (PRA) from the sales representative or dealer
- ✓ Fill out the Problem Report Form (PRF) as detailed as possible for shorter product repair time.
- ✓ Carefully pack the product in anti-static package, and send it, pre-paid, to the dealer. The PRA should show on the outside of the package, and include a description of the problem along with the return address and telephone number of a technical contact.