



# **PC COM<sup>®</sup> 2 PORT RS422/485 ADAPTER USER MANUAL**

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## CHAPTER 1 INTRODUCTION

The PC COM RS422/RS485 adapter provides two asynchronous serial communication ports, which enables one computer to communicate with other computers via communication lines, or to link the computer and serial peripheral devices such as serial printers, plotters, etc.

The PC COM RS422/RS485 board can be installed in any IBM PC/XT, PC/AT, PC/386 or hardware compatible system. To accommodate a variety of operating systems seven jumpers permit maximum flexibility of configuration. You may select which interrupt (IRQ2 - IRQ7), I/O address you desire.

The PC COM RS422/RS485 adapter provides signal drivers and receivers which can be set by software or hardware. Since the adapter support differential communication lines, it provides longer and more reliable communication quality than does RS232. The communication speed is up to 56K baud and the maximum transmission distance is up to 4000 ft.

Under the RS422 mode, RTS and CTS are used to provide communication flow control protocol. Under the RS485 mode, only transmission and receive signal are used, both

drivers and receivers can be enabled or disabled by jumper setting or software. This means the RS485 provides a multi-point communication protocol.

The features of the RS422/RS485 adapter are:

- \* Standard RS422/RS485 serial communication interface.
- \* Maximum of 4000 ft transmission distance.
- \* Up to 56K baud transmission speed.
- \* I/O address selectable.
- \* Interrupt selectable.
- \* RS485 driver and receiver selectable.

## CHAPTER 2 UNPACKING INFORMATION

Your PC COM RS422/RS485 package should include the following items:

- \* PC COM RS422/RS485 adapter.
- \* User manual.
- \* Warranty form.

## CHAPTER 3 SYSTEM REQUIREMENTS

Before installing your PC COM RS422/RS485 adapter, make sure that:

- \* The host computer is an IBM PC/XT, PC/AT, PC/386 or compatible.
- \* The seven jumpers are correctly configured to coincide with the operating system you are using.
- \* The operating system you intend to use is capable of driving two serial ports.

## CHAPTER 4    HARDWARE INSTALLATION

Your PC COM RS422/RS485 adapter is designed to be inserted in any available slot in your PC/XT, PC/AT, PC/386 or compatible. In order to gain access to the expansion slots, follow the steps listed below:

1. Turn off all power to your computer and all peripheral devices before installing your PC COM RS422/RS485 adapter.
2. Remove the cover of the computer.
3. Insert the preconfigured PC COM RS422/RS485 adapter into any available slot. Make sure the adapter is firmly seated in the chosen slot.
4. Replace the cover of the computer.
5. Connect cables to DB25 connectors as required.

## CHAPTER 5 JUMPER SETTINGS

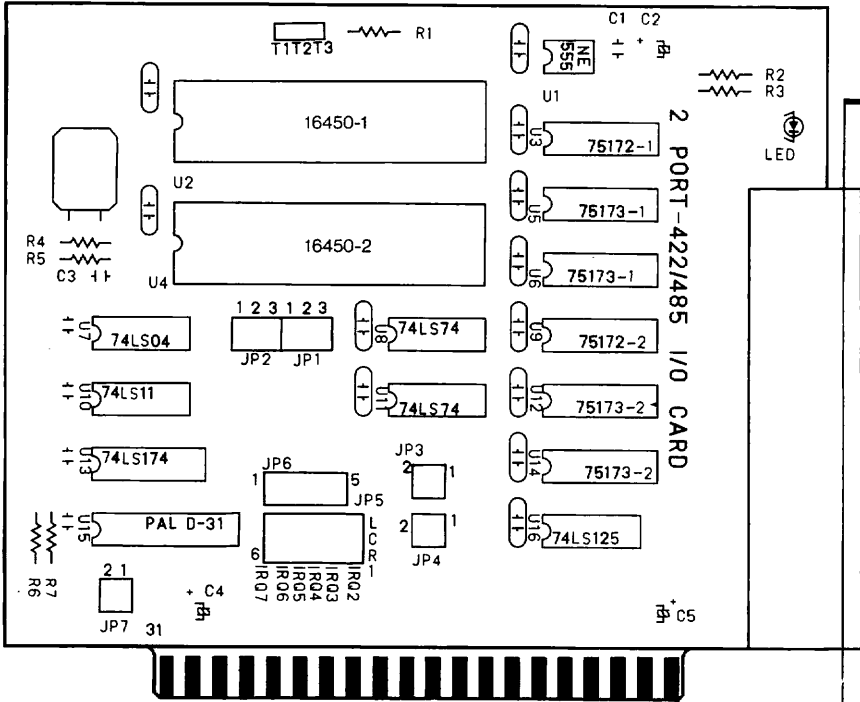
### 5.1 Introduction

The seven jumpers on the PC COM RS422/RS485 adapter must be configured correctly in accordance with the operating system you are using.

- JP1 (Jumper 1)  
Select driver enable mode of channel 1.
- JP2 (Jumper 2)  
Select driver enable mode of channel 2.
- JP3 (Jumper 3)  
Select receiver enable mode of channel 1.
- JP4 (Jumper 4)  
Select receiver enable mode of channel 2.
- JP5 (Jumper 5)  
Selects which interrupt will be used in the range IRQ2 through IRQ7.
- JP6 (Jumper 6)  
Select number of delay wait states.
- JP7 (Jumper 7)  
Determines the address of the UARTs [I/O address].



# PC COM PS-422/485 I/O Card



## 5.2 Selection of Jumper Settings

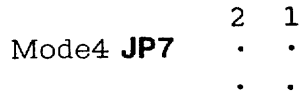
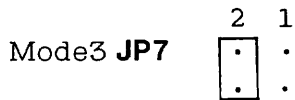
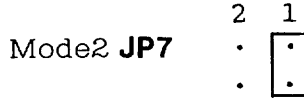
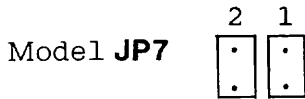
It is important to refer to the user manual supplied with your operating system to determine the correct configuration.

IMPORTANT: CARE MUST BE TAKEN IN SELECTING THE CONFIGURATION OF JUMPERS TO ENSURE YOU DO NOT DUPLICATE SETTINGS OF OTHER EQUIPMENT ALREADY INSTALLED IN YOUR COMPUTER. DUPLICATION OF SETTINGS WILL RESULT IN A MALFUNCTION OF ONE OR BOTH DEVICES.

Please refer to the following settings for each jumper. If you are installing more than one board do not duplicate jumper settings for any parameter.

## 1. I/O Port Address

The JP7 is used to select the I/O port address. The I/O address mapping of each port is shown below.

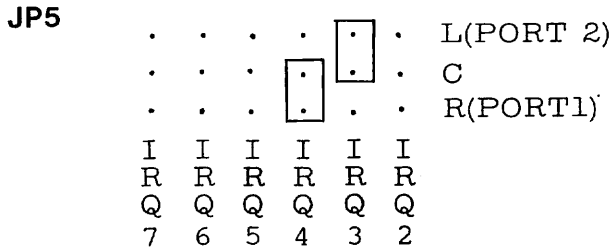


Mode	JP7-1	JP7-2	Port1	Port2
1	short	short	3F8-3FF	2F8-2FF
2	short	open	3E8-3EF	2E8-2EF
3	open	short	1A0-1A7	1A8-1AF
4	open	open		

Factory setting is in mode 1 which are standard COM1: and COM2:.

## 2. Interrupt Setting

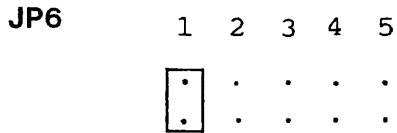
JP5 is used to select the interrupt level. To short the R and C side means to select interrupt the level of channel 1, shorting the L and C side selects the interrupt level of channel 2.



In a standard PC system, COM1: (3F8-3FF) and COM2: (2F8-2FF) generate interrupts on IRQ4 and IRQ3 respectively. Factory settings of this jumper are IRQ4 and IRQ3, which corresponds to COM1: and COM2:.

### 3. Delay Wait States

The number of delay wait states are selected by JP6. Shorting position 1 sets no wait CPU clock, shorting position 2 sets wait 1 CPU clock, ... etc.



## 4. Driver Mode Selection

JP1 and JP2 are used to select driver enable modes of channel 1 and 2 respectively. There are three enable modes:

a. Always enable.

This is required to set the always enable mode for RS422 applications.

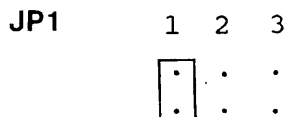
b. Enabled by RTS signal.

When the signal is 1, the driver is enabled, otherwise when the signal is 0, the driver is disabled. To turn on the driver for RTS, you only need to output 3 to the address of base address plus 4. To turn off the driver for RTS, you need to output 0 to the address of base address plus 4.

c. Enabled by bit 0(LSB) of control register

The address of control register is base address plus 7. When the bit is set to 1, it enables the driver, otherwise when the bit is set to 0, it turns off the driver.

The driver mode selection of channel 1 is shown below.

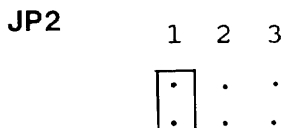


Short JP1-1 : driver always enabled.

Short JP1-2 : enabled by RTS.

Short JP1-3 : enabled by bit 0 of control register.

The driver mode selection of channel 2 is shown below.



Short JP2-1 : driver always enable.

Short JP2-2 : enabled by RTS.

Short JP2-3 : enabled by bit 0 of control register.

## 5. Receiver Mode Selection

JP3 and JP4 are used to select the receiver enable mode of channel 1 and 2 respectively. There are two enable modes:

a. Always enable.

For RS422 applications, setting to "always" enable is required.

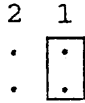
c. Enabled by bit 1(LSB) of control register

The address of control register is base address plus 7. When the bit is set to 1, the receiver is enabled, otherwise when the bit is set to 0, the receiver is turned off.



The receiver mode selection of channel 1 is shown below.

**JP3**

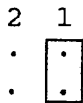


Short JP3-1 : receiver always enable.

Short JP3-2 : enabled by bit 1 of control register.

The receiver mode selection of channel 2 is shown below.

**JP4**

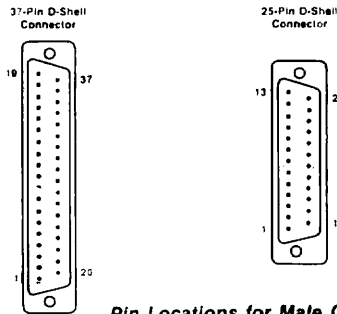


Short JP4-1 : receiver always enable.

Short JP4-2 : enabled by bit 1 of control register.

## CHAPTER 6 CABLING INFORMATION

Two special cables with a DB37 connector are provided in the package. This cable converts the signals from the DB37 connector into two standard DB25 connectors.



*Pin Locations for Male Connectors.*

DB37 Pin#	Channel	Signal Name
1	1	Ground
2	1	Transmit Data (+)
3	1	Receive Data (+)
4	1	Request to Send (+)
5	1	Clear to Send (+)
6	1	Data Set Ready (+)
7	1	Ground
8	1	DCD (+)
9	1	Data Terminal Ready (-)
10	1	Ring Indicator (-)
11	2	Transmit Data (+)
12	2	Receive Data (+)
13	2	Request to Send (+)
14	2	Clear to Send (+)
15	2	Data Set Ready (+)
16	2	Ground
17	2	DCD (+)
18	2	Data Terminal Ready (-)
19	2	Ring Indicator (-)
20	1	Transmit Data (-)
21	1	Receive Data (-)
22	1	Request to Send (-)
23	1	Clear to Send (-)
24	1	Data Set Ready (-)
25	1	DCD (-)
26	1	Data Terminal Ready (+)
27	1	Ring Indicator (+)
28	-	Ground
29	2	Ground
30	2	Transmit Data (-)
31	2	Receive Data (-)
32	2	Request to Send (-)
33	2	Clear to Send (-)
34	2	Data Set Ready (-)
35	2	DCD (-)
36	2	Data Terminal Ready (+)
37	2	Ring Indicator (+)

## 6.1 RS 422 Cabling Information

The signal assignments for a standard DB25 connector are shown as follows.

Pin	Name	Description
1	GND	Ground
2	TX+	Transmit Data (+)
3	RX+	Receive Data (+)
4	RTS+	Request to Send (+)
5	CTS+	Clear to Send (+)
6	DSR+	Data Set Ready (+)
7	GND	Ground
8	DCD+	Data Carrier Detect (+)
9	DTR-	Data Terminal Ready (-)
10	RI-	Ring Indicator (-)
14	TX-	Transmit Data (-)
15	RX-	Receive Data (-)
16	RTS-	Request to Send (-)
17	CTS-	Clear to Send (-)
18	DSR-	Data Set Ready (-)
19	DCD-	Data Carrier Detect (-)
20	DTR+	Data Terminal Ready (+)
22	RI+	Ring Indicator (+)

## 6.2 RS422 Cabling Connections

To connect RS422 ports to other DATA TERMINAL EQUIPMENT (DTE) devices, we recommend the use of DTE to DTE configuration which is shown as follows.

HOST PC RS422	REMOTE PC RS422
GND	GND
TX+	RX+
RX+	TX+
RTS+	CTS+
CTS+	RTS+
TX-	RX-
RX-	TX-
RTS-	CTS-
CTS-	RTS-

### 6.3 RS485 Cabling Information

The RS485 signal assignment is shown as follows.

Pin	Name	Description
1	GND	Ground
2	TX+	Transmit Data (+)
3	RX+	Receive Data (+)
14	TX-	Transmit Data (-)
15	RX-	Receive Data (-)

The RS485 communication is based on cable sharing method which is connected as following:

Computer at site 1	Computer at site 2
TX+, RX+ TX-, RX- Ground	TX+, RX+ TX-, RX- Ground

## CHAPTER 7 SOFTWARE PROGRAMMING

It is easy to achieve communications under MS/DOS by setting the RS422/RS485 board to COM1: and COM2:. The standard COM1: and COM2: communication statements are supported by most high level language such as: BASIC, PASCAL, C, ... etc.

In the following example, we will introduce users how to write an application program. In section 7.1, we will specify how to write high level language when the board is set to standard COM1: and COM2:. Suppose your setting is not standard COM ports, the section 7.2 introduces the user how to write a driver. Section 7.3 provides how to use a SERIAL DRIVER to drive the RS422/RS485 board. The PCCOM software is a powerful package for serial communication, we will introduce it in section 7.4.

### 7.1 Use Standard COM Ports

Since BASIC language provides a buffer for communications, in the follows, we will demonstrate how to program under BASIC language. To start the communication task under BASIC, the statement

```
OPEN "COMn:speed,parity, ..... " AS ID
```

is used, then you can use the file ID to send or receive data from communication port.

In the following, we list send and receive programs which are written in the BASIC language.

### 1. Loopback Test (Basic Version)

```
5 REM OPEN LOGICAL DEVICE COM1
10 OPEN "O",#1,"COM1"
25 CNT=0
30 FOR I=&H31 TO &H80
40     CNT=CNT+1
50     A$=CHR$(I)
60     PRINT #1,A$;
100 NEXT I
110 PRINT CNT
180 CLOSE #1
190 FOR I = 1 TO 1000 :NEXT I
200 OPEN "I",#2,"COM1"
230 FOR I= &H31 TO &H80
250     A$=CHR$(I)
271     B$=INPUT$(1,#2)
275     PRINT "DATA ";A$, B$
280     IF A$ <> B$ THEN PRINT "ERROR"
290     IF A$ <> B$ THEN GOTO 310
300 NEXT
310 CLOSE #2
320 END
```



## 2. File Transfer (Basic Version)

```
10 REM
20 REM SERIAL DRIVER DEMO PROGRAM FOR BASIC LANGUAGE
30 REM
40 REM THIS PROGRAM WILL TRASMIT MESSAGES TO
50 REM REMOTE SITE THROUGH DEVICE DRIVER
60 READ A$
70 OPEN "O",#1,A$
80 FOR I = 1 TO 10
90     READ M$
100    PRINT #1,"LINE ";I,M$
110 NEXT I
120 PRINT #1,"@";
130 CLOSE #1
140 PRINT "DATA TRANSMITTED"
150 END
155 REM THE DEVICE NAME IS COM1
160 DATA "COM1"
170 DATA "SERIAL DRIVER DEMO PROGRAM FOR BASIC LANGUAGE"
180 DATA "THIS MESSAGE IS RECEIVED FROM REMOTE SITE"
190 DATA "THIS IS LINE #3"
200 DATA "TRANSMIT OK"
210 DATA "ABCDEFGHIJKLMNOPQRSTUVWXYZ"
220 DATA "abcdefghijklmnopqrstuvwxyz"
230 DATA "THIS DEVICE DRIVER IS VERY EASY TO USE"
240 DATA "SEE REFERENCE MANUAL FOR MORE
INFORMATION"
250 DATA "COPYRIGHT BY DECISION-COMPUTER"
260 DATA "GOOD LUCK !"
```

```
10 REM
20 REM SERIAL DRIVER DEMO PROGRAM FOR BASIC LANGUAGE
30 REM
40 REM THIS PROGRAM WILL RECEIVE MESSAGES
50 REM FROM REMOTE-SITE COMPUTER
60 READ A$
70 OPEN "I",#1,A$
80 INPUT #1,M$
90 IF M$ = "@" THEN 120
100 PRINT M$
110 GOTO 80
120 CLOSE #1
130 PRINT "DATA RECEIVED"
140 END
145 REM THE DEVICE NAME IS COM1
150 DATA "COM1"
```

## 7.2 Write Your Own Driver

If you are going to set the port address thing other than standard COM ports, you must write a driver by yourself or use PCCOM software (see section 7.4), SERIAL DRIVER package (see section 7.3). In the following, we will demonstrate how to write a driver by yourself.

To write your own driver, the most important things are driver and receiver mode selection. When the adapter is set to always enable mode, the communication protocol is RS422. (Please refer the data book for 8250 chip to programming 8250 registers under RS422 mode)

When you select the RS485 mode, you may enable the driver for RTS or control register. We assume BASE=1A0, then

### 1. Enable RTS

Turn on driver	OUT BASE+4,3
Turn off driver	OUT BASE+4,0

### 2. Enable control register

Turn on driver	OUT BASE+7,1
Turn off driver	OUT BASE+7,0

The control register can be used to enable receiver.

```
Turn on receiver    OUT BASE+7,2
Turn off receiver   OUT BASE+7,0
```

A statement such as OUT BASE+7,3 will turn on both driver and receiver.

The PASCAL program listed below can be used to test the send and receiver functions.

```
program RS_485_test_PROPGRAM;
uses
  crt;
const
  p1 = $3f8;
  p2 = $2f8;
var
  delaytime : integer;
procedure init(p,n : integer);
begin
  port[p+3] := $80;
  port[p ] := Lo(n);
  port[p+1] := Hi(n);
  port[p+3] := 3;
end;
```

```

procedure test;
const
  baud1 : array[1..3] of integer = ( 96, 12, 2);
  baud2 : array[1..3] of word = (1200,9600,57600);
var
  tx,rx,dir,stat,testloop,baudindex,i : integer;
  b1,b2 : byte;
  c : char;
begin
  init(p1,96);
  init(p2,96);

  port[p2+4] := 3; { /RTS = Low   }
  port[p2+7] := 0;
  port[p1+7] := 2; { Enable RX   }
  port[p1+4] := 0;

  for i := 1 to 20 do
  begin
    repeat
      b1 := random(256);
    until b1 <> b2;
    port[p2] := b1;
    delay(delaytime);
    b2 := port[p1];
    writeln(b1:4,b2:12);
  end;
  c := readkey;
end;

begin { main }
  clrscr;
  randomize;
  delaytime := 100;
  write('Enter delay time (1..1000) (ms) : ');
  readln(delaytime);
  test;
  writeln('Done.....');
end.

```

### **7.3 Under Serial Driver**

The SERIAL DRIVER can be used to drive your RS422 or RS485 port. To drive RS485 or RS422 you need not give the interrupt vector address and active status, because the RS422/RS485 board does not support an interrupt vector. It is easily to control the RS422 mode under the SERIAL DRIVER. However, if you set the RS485 mode, you must take over the RTS signal or control register. The MCR (byte 1) of I/O control can be used to set RTS to enable the driver (see SERIAL DRIVER chapter 6). TO enable the driver by the control register, please use OUT BASE+7 statement.

### **7.4 Under PCCOM Software Package**

The PCCOM software can be used to drive your RS422 or RS485 port, to drive RS485 or RS422, you need not give interrupt vector address and active status, because the RS422/RS485 board does not support an interrupt vector. It is easy to control the RS422 mode under PCCOM. However, if you set the RS485 mode, you must take over the RTS signal or control register. The OUT BASE+4 statement can be used to set RTS to enable the driver. TO enable the driver by the control register, please use OUT BASE+7 statement.

## APPENDIX      WARRANTY INFORMATION

DECISION warrants that for a period of one year from the date of purchase (unless otherwise specified in the warranty card) that the goods supplied will perform according to the specifications defined in the user manual. Furthermore that the DECISION product will be supplied free from defects in materials and workmanship and be fully functional under normal usage.

In the event of the failure of a DECISION product within the specified warranty period, DECISION will, at its option, replace or repair the item at no additional charge. This limited warranty does not cover damage resulting from incorrect use, electrical interference, accident, or modification of the product.

All goods returned for warranty repair must have the serial number intact. Goods without serial numbers attached will not be covered by the warranty.

Transportation costs for goods returned must be paid by the purchaser. Repaired goods will be dispatched at the expense of DECISION.

To ensure that your DECISION product is covered by the warranty provisions, it is necessary that you return the Warranty card.

Under this Limited Warranty, DECISION's obligations will be limited to repair or replacement only, of goods found to be defective as specified above during the warranty period. DECISION is not liable to the purchaser for any damages or losses of any kind, through the use of, or inability to use, the DECISION product.

DECISION reserves the right to determine what constitutes warranty repair or replacement.

**Return Authorization:** It is necessary that any returned goods are clearly marked with an RA number that has been issued by DECISION. Goods returned without this authorization will not be attended to.