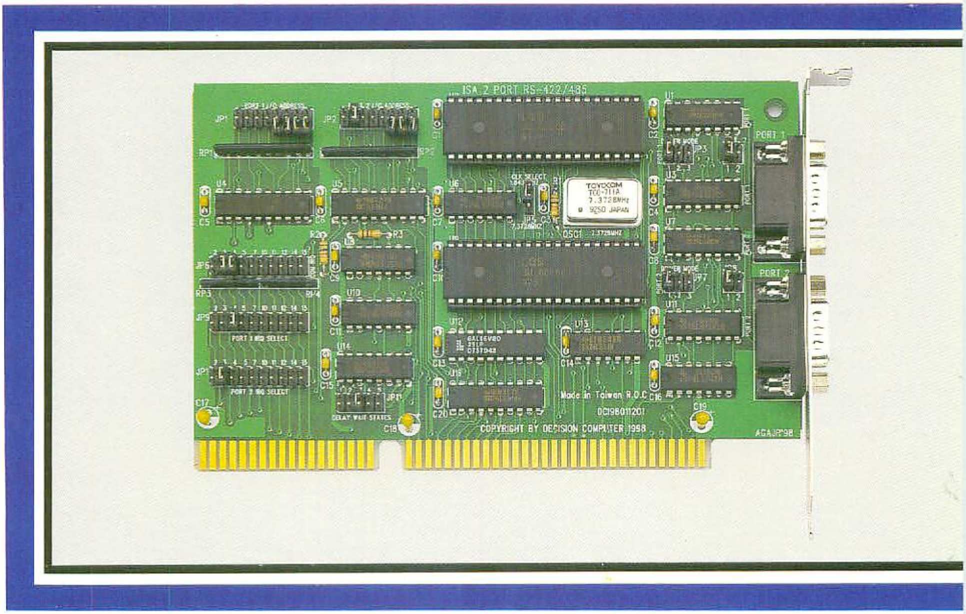
PC COM ISA BUS 2 PORT RS-422/RS-485 CARD USER MANUAL



PC COM ISA 2 PORT
RS422/RS485
SERIAL ADAPTER

OPERATION MANUAL

DECISION
Computer International Co., Ltd.

98/03/14

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98/03/14

CHAPTER 1

INTRODUCTION

The PCCOM ISA bus 2 port 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 terminals, modems, serial printers, plotters, ... etc.

The PCCOM ISA bus 2 port RS422/RS485 adapter may be configured with up to two individually addressable RS422/485 ports and individually interruptible for any PC/AT, PC/386, PC/486, Pentium or compatible system. It can be addressed anywhere within the full range of PC I/O ports and each port address can be set individually as your requirement. The interrupt selectable feature provides individual interrupt selection for each port, so that you can arrange the 2 ports in any combination of interrupt you need.

The PC COM ISA bus 2 port 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 460K 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 he 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 PCCOM ISA bus 2 port RS422/RS485 board can be used to plug in 8250, 16450, 16550, or 16650 chips, and the PCCOM98 device driver can detect it automatically. There are two kinds of communication speed can be choose, one is normal speed mode that its baud rate up to 115200, another is high speed mode that its baud rate up to 460K.

When set the PCCOM board to RS422 mode, it is particularly suited to facilitate the connection of terminals (VDUs) in multi-user operating systems.

The features of the PCCOM ISA bus RS422/485 adapter are:

- Standard RS422/RS485 serial communication interface.
- Suitable for XENIX/UNIX (SCO, AT&T, Interactive, UNIXWARE), MS/DOS, WINDOWS/NT, WINDOWS/95, OS/2, MS/WINDOWS, PICK, CONCURRENT DOS, QNX, PROLOGUE, MUMPS, ... etc.
- IBM PC/AT, PC/386, PC/486, Pentium hardware compatibles.
- ISA bus Interrupt selectable. (IRQ2 – IRQ15)
- I /O address selectable for each port.
- Interrupt selectable for each port.
- Maximum of 4000ft transmission speed.
- RS485 driver mode and receiver mode selectable.
- Auto-detect 16450 or 16550 or 16650 chips on board.
- Baud rate up to 115200 for normal speed mode and up to 460K for high speed mode.

CHAPTER 2

UNPACKING INFORMATION

Check that your PCCOM package includes the following items:

- PCCOM ISA bus 2 port RS422/RS485 adapter.
- User manual.
- PCCOM98 software.
- Warranty form.

CHAPTER 3

SYSTEM REQUIREMENTS

Before installing your PCCOM ISA bus 2 port RS422/RS485 adapter, make sure that:

- The host computer is an IBM PC/AT, PC/386, PC/486, and Pentium compatibles.
- All the jumpers' blocks are correctly configured to coincide with the operating system you are using.
- The operating system you intend to use is capable of driving multiple serial ports.

CHAPTER 4

HARDWARE INSTALLATION

Your PCCOM ISA bus 2 port RS422/RS485 adapter is designed to be inserted in any available slot in your PC/AT, PC/386, PC/486, Pentium or compatibles. 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 PCCOM ISA bus 2 port RS422/RS485 adapter.
2. Remove the cover of the computer.
3. Insert the pre-configured PCCOM ISA bus 2 port 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 D9 connectors as required.

CHAPTER 5

JUMPER SETTINGS

5.1 Introduction

The eleven jumper blocks on the PCCOM ISA bus 2 port RS422/RS485 adapter must be configured correctly in accordance with the operating system you are using.

JP1 (Jumper 1)
Determines the I/O address of the port 1.

JP2 (Jumper 2)
Determines the I/O address of the port 2.

JP3 (Jumper 3)
Select driver enable mode of channel 1.

JP4 (Jumper 4)
Select receiver enable mode of channel 1.

JP5 (Jumper 5)
Select high speed mode or normal speed mode.

JP6 (Jumper 6)
Enable selected interrupt. The selection of this jumper should correspond to the selection of JP9 and JP10.

JP7 (Jumper 7)
Select driver enable mode of channel 2.

JP8 (Jumper 8)

Select receiver enable mode of channel 2.

JP9 (Jumper 9)

Select interrupt for port 1. The range is from IRQ2 to IRQ15.

JP10 (Jumper 10)

Select interrupt for port 2. The range is from IRQ2 to IRQ15.

JP11 (Jumper 11)

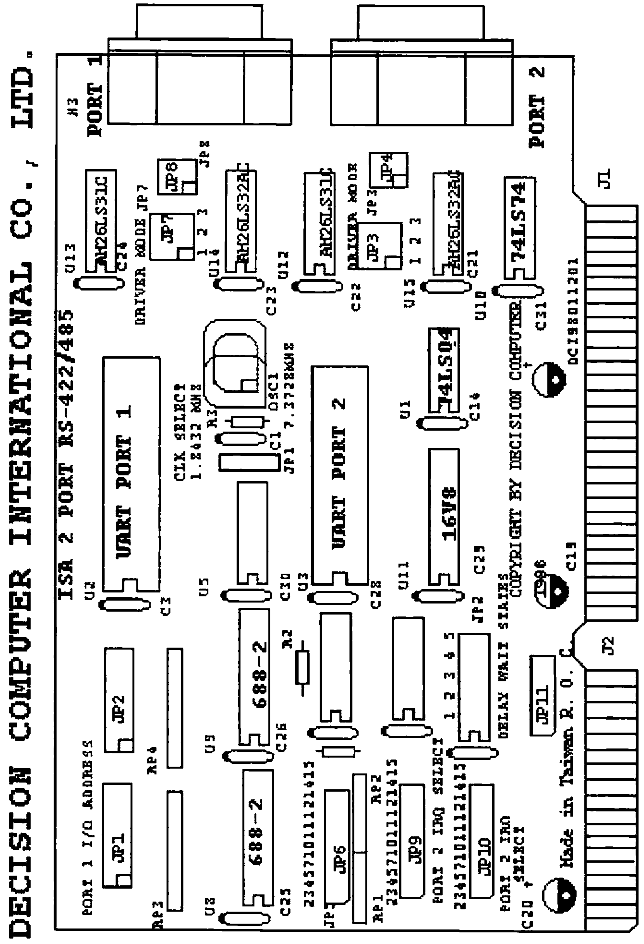
Select number of delay wait states.

5.2 Configuration for Jumper

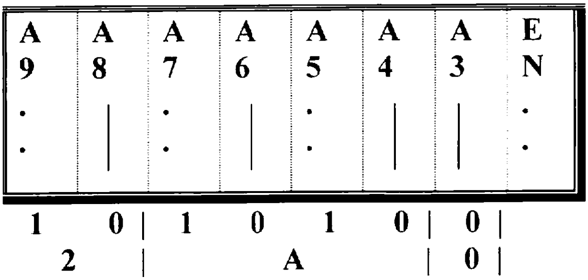
It is important to refer to the user manual supplied with your operating system to determine the correct configuration. Although we provide installation advice for various operating systems, it is not possible to cover all systems in this user guide. Please contact your supplier if you have any difficulties with 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 block. If you are installing more than one board, do not duplicate jumper settings for any parameter.

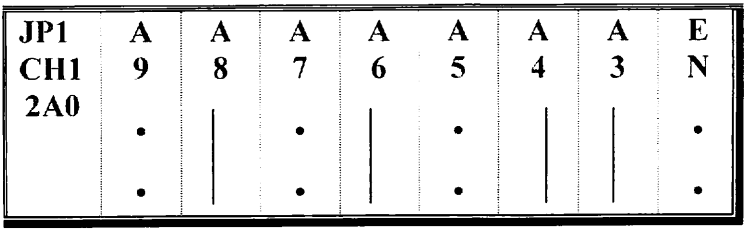

DECISION COMPUTER INTERNATIONAL CO., LTD.
ISA 2 PORT RS-422/485
PORT 1
PORT 2
H3
J1
J2
UART PORT 1
UART PORT 2
AM26LS31C
AM26LS32AC
AM26LS31C
AM26LS32AC
74LS74
74LS04
16V8
688-2
688-2
DRIVER MODE JP7
DRIVER MODE JP3
1 2 3
1 2 3
JP1
JP2
JP3
JP4
JP5
JP6
JP7
JP8
JP9
JP10
JP11
CLK SELECT 1.8432 MHZ
JP1 7.3728MHZ
OSC1
PORT 1 I/O ADDRESS
2345710111214 15
PORT 2 IRQ SELECT
PORT 2 IRQ SELECT
DELAY WAIT STATES
1 2 3 4 5
COPYRIGHT BY DECISION COMPUTER
1996
DCI980011201
Made in Taiwan R. O. C.
U1
U2
U3
U5
U8
U9
U10
U11
U12
U13
U14
U15
C1
C3
C14
C15
C20
C21
C22
C23
C24
C25
C26
C28
C29
C30
C31
R2
R3
RP1
RP2
RP3
RP4

1. I/O Port Address



JP1 and JP2 are used to select UART I/O address for each port. Where JP1 is used to select port 1 address, JP2 is used to select port 2 address. Each JP contains A9 to A3 jumper pins and EN jumper pin. The A9 to A3 are used to set I/O port address, when the corresponding pin is short means 0, otherwise no pin short means 1. The figure above set the I/O address to 2A0H. The EN pin is used to enable the selected port, not short the jumper means enable the port, otherwise, if short the jumper means disable this port.

➢ ***The setting examples of this board are:***



JP2	A	A	A	A	A	A	A	E
CH2	9	8	7	6	5	4	3	N
2A8								
	•	│	•	│	•	│	•	•
	•	│	•	│	•	│	•	•

2. Interrupt Selection

IRQ JP9	2	3	4	5	7	10	11	12	14	15
	•	•	•	•	•	•	•	│	•	•
	•	•	•	•	•	•	•	│	•	•

JP9 is used to select interrupt for port 1 and JP10 is used to select interrupt for port 2. It can arrange these interrupts in any combination, this means it can set all ports in different interrupt, or combine several ports into a group to share the same interrupt. The figures shown above is to set interrupt on 12.

3. Common IRQ

IRQ JP6	2	3	4	5	7	10	11	12	14	15
	•	•	•	•	•	•	•	│	•	•
	•	•	•	•	•	•	•	│	•	•

The JP6 is used to enable IRQ2 to IRQ15 bus lines. Note that the selection of this jumper should correspond to the selection of the interrupts on the JP9 and JP10. For example, if you select IRQ5 and IRQ10 on the JP9 and JP10, you need short IRQ5 and IRQ10 of JP6.

4. Select Wait State

JP11

```
    1  2  3  4  5
    .  .  .  .  .
    .  .  .  .  .
```

The number of delay wait state are selected by JP11. Shorting position 1 means not wait CPU clock, shorting position 2 means wait 1 CPU clock, ... etc.

5. Select High Speed or Normal Speed Mode

JP5

```
    . 1
    . 2
    . 3
```

The JP5 is used to select high speed mode or normal speed mode, the clock is 7.3728MHZ for high speed mode, and 1.8432MHZ for normal speed mode. For high speed mode, the baud rate speed up to 460K.

Pin	Mode
Short 1,2	Normal Speed
Short 2,3	High Speed

6. Driver Mode Selection

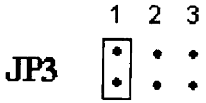
JP3 and JP7 are used to select driver enable modes of channel 1 and 2 respectively. There are three enable modes:

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 drivers for RTS, you need to output 0 to the address of base address plus 4.

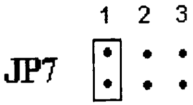
c. **Enabled by bit 0 (LSB) of control register**
The address of the control register is base address plus 7. When the bit is set to 1, it enables the driver, otherwise when the bit is set to 0, it turns off the driver.

The driver mode selection of channel 1 is shown below:



Short JP3-1: driver always enabled.
Short JP3-2: enabled by RTS.
Short JP3-3: enabled by bit 0 of control register.

The driver mode selection of channel 2 is shown below:



Short JP7-1: driver always enabled.
Short JP7-2: enabled by RTS.
Short JP7-3: enabled by bit 0 of control register.

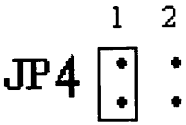
7. Receiver Mode Selection

JP4 and JP8 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.

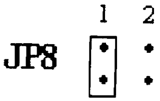
b. **Enabled by bit 1 (LSB) of control register**
The address of control register is base address plus 7. When the bit is set to 1, the receiver is enabled, otherwise when the bit is set to 0, the receiver is turned off.

The receiver mode selection of channel 1 is shown below.



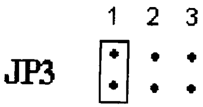
Short JP4-1: receiver always enable.
Short JP4-2: enabled by bit 1 of control register.

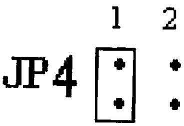
The receiver mode selection of channel 2 is shown below:



Short JP8-1: receiver always enable.
Short JP8-2: enabled by bit 1 of control register.

5.3 RS422 Mode





You can set (JP3,JP4) and (JP7,JP8) of this board to RS422 mode, then use PCCOM device driver and utilities in different operating systems.

🕮 ***The PCCOM software provides device driver for different operating systems under RS422 mode, please refer APPENDIX.***

5.4 RS485 Mode

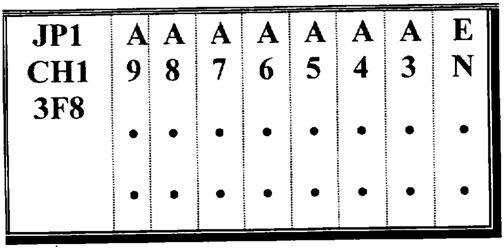
You can set (JP3,JP4) and (JP7,JP8) by yourself to control the driver mode and receiver mode. In this mode, you must control driver and receiver by your application software.

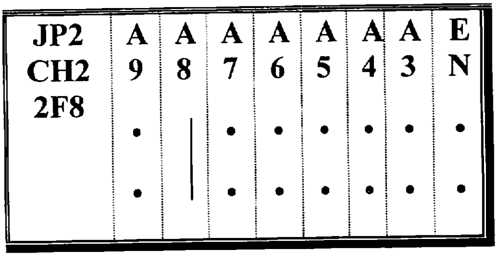
🕮 ***To write your own driver, please refer Chapter 7.***

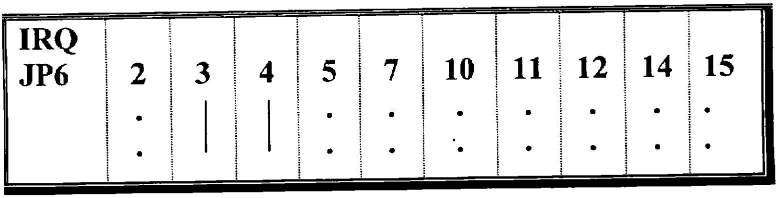
5.5 Standard COM1 and COM2 ports

If you want to set the adapter as standard COM1 and COM2, please refer the following settings.

Port 1 Address	3F8
Port 2 Address	2F8
Port 1 Interrupt	IRQ4
Port 2 Interrupt	IRQ3







IRQ JP9 CH1	2	3	4	5	7	10	11	12	14	15
	• •	• •	│	• •	• •	• •	• •	• •	• •	• •

IRQ JP10 CH2	2	3	4	5	7	10	11	12	14	15
	• •	│	• •	• •	• •	• •	• •	• •	• •	• •

CHAPTER 6

CABLING INFORMATION

6.1 RS422 Cabling Information

The communication interface follows the EIA RS422 standard. The signal assignments for a standard DB9 connector are shown below:

Pin	Description
1	Ground
2	Request to Send+(RTS+)
3	Request to Send-(RTS-)
4	Transmit Data+(TxD+)
5	Transmit Data-(TxD-)
6	Clear to Send+(CTS+)
7	Clear to Send-(CTS-)
8	Receive Data+(RxD+)
9	Receive Data-(RxD-)

To connect the RS422 to other DATA TERMINAL EQUIPMENT (DTE) devices, the developers recommend using a DTE to DTE connection as shown below.

HOST	REMOTE
Ground	Ground
Transmit Data(+)	Receive Data(+)
Receive Data(+)	Transmit Data(+)
Transmit Data(-)	Receive Data(-)
Receive Data(-)	Transmit Data(-)
Request to Send(+)	Clear to Send(+)
Clear to Send(+)	Request to Send(+)
Request to Send(-)	Clear to Send(-)
Clear to Send(-)	Request to Send(-)

6.2 RS485 Cabling Information

The RS485 signal assignment is shown as follows.

Pin	Description
1	Ground
4	Transmit Data+(TxD+)
5	Transmit Data-(TxD-)
8	Receive Data+(RxD+)
9	Receive Data-(RxD-)

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

Computer at site 1	Computer at site 2
TxD+ , RxD+	TxD+ , RxD+
TxD- , RxD–	TxD- , RxD–
Ground	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 user 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. The PCCOM software is a powerful package for serial communication, we will introduce it in section 7.3.

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 $ (I)
275  PRINT “DATA” ; A$, B$
280  IF A$ <> B$ THEN PRINT “ERROR”
290  IF A$ <> B$ THEN GOTTO 310
300 NEXT
310 CLOSE
320 END
```

2. *File Transfer (Basic Version)*

```
10  REM
20  REM SERIAL DRIVER DEMO PROGRAM FOR BASIC
21  REM LANGUAGE
30  REM
40  REM THIS PROGRAM WILL TRANSMIT 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 EASY TO USE”
240 DATA “  SEE REFERENCE MANUAL FOR MORE
INFORMATION”
250 DATA “ COPYRIGHT BY DECISION-COMNPUTER”
260 DATA “GOOD LUCK !”
```

```
*****************************************************

10  REM
20  REM SERIAL DRIVER DEMO PROGRAM FOR BASIC
21  REM LANGUAGE
30  REM
40  REM THIS PROGRAM WILL RECEIVE  MESSAGES
50  REM 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

When the adapter is set to always enable mode, the communication protocol is RS422. Please refer the data book for UART chip to programming UART registers under RS422 mode.

🕮 *The PCCOM software provides device driver for different operating systems under RS422 mode, please refer APPENDIX.*

To write your own driver for RS485 mode, the most important things are driver and receiver mode selection. In the following we will demonstrate how to write a driver by yourself.

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_PROGRAM;

```
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 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 A

PC COM DIAGNOSTIC UNDER MS/DOS

The PCCOMQC program provides a diagnostic routine to test your PCCOM ISA bus 2 port serial adapter under MS/DOS. It provides internal and external loopback tests for **RS422 mode**. A loopback plug must be connected to each port being tested, and you can select different signal's connection to test communication signals from hardware configuration function.

■ To test your PCCOM 2 port adapter under MS/DOS, please type

```
A>PCCOMQC
```

(A> means system prompt)
*Then select "PCCOM/ ISA 2 port RS422" item.

The hardware configuration is shown in the following.

Port 1 Address	**2A0**
Port 2 Address	**2A8**
Interrupt	**IRQ5**

JP1 CH1 2A0	A 9	A 8	A 7	A 6	A 5	A 4	A 3	E N
	• •	│	• •	│	• •	│	│	• •

JP2 CH2 2A8	A 9	A 8	A 7	A 6	A 5	A 4	A 3	E N
	• •	│	• •	│	• •	│	• •	• •

IRQ JP6	2	3	4	5	7	10	11	12	14	15
	• •	• •	• •	│	• •	• •	• •	• •	• •	• •

IRQ JP9 CH1	2	3	4	5	7	10	11	12	14	15
	• •	• •	• •	│	• •	• •	• •	• •	• •	• •

IRQ JP10 CH2	2	3	4	5	7	10	11	12	14	15
	• •	• •	• •	│	• •	• •	• •	• •	• •	• •

APPENDIX B

PC COM98 DEVICE DRIVER FOR MS/DOS

B.1 PCCOM Software

The PCCOM V2.0 is a high performance, easy to use **RS232/RS422** device driver for PC/XT, PC/AT, PC/386, PC/486, Pentium or compatibles. Under MS/DOS environment, you can set up your serial ports by PCCOM device driver, and these serial ports can be treated as COM1: and COM2: devices. The setup procedure provides flexible functions to specify the configuration of multi-serial card, that is, the hardware configurations of I/O port number, I/O port address, interrupt and interrupt vector are user selectable.

After the device driver is installed, It takes over communication between CPU and multi-serial cards such as four port card, eight port card, ... etc. For each I/O port, the service routine handles a ring buffer to keep track of all I/O data. Moreover, the PCCOM software provides library routines (C, PASCAL, BASIC, FoxPro) and DOS communication interface (DOS device driver, BIOS call) for several access levels.

The PCCOM V2.0 is an upgrade version of PCCOM V1.0 software, it combines with PCCOM V1.0 and SERIAL DRIVER utilities. Each serial port may be either 8250, 16450, 16550, or 16650 chip that was detected automatically.

🕮 ***For more details, please refer PCCOMV2 manual.***

🕮 ***Please write application program to control RS485 by yourself, you can use function call to control driver and receiver of RS485.***

B.2 Hardware Configuration

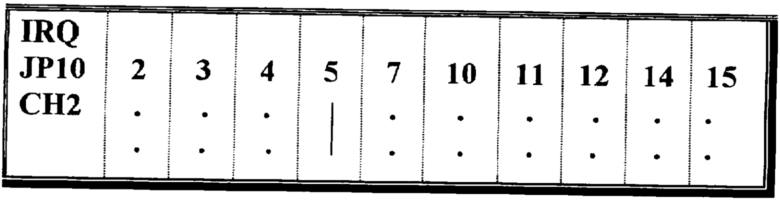
Port 1 Address	2A0
Port 2 Address	2A8
Interrupt	IRQ5

JP1 CH1 2A0	A 9	A 8	A 7	A 6	A 5	A 4	A 3	E N
	● ●	│	● ●	│	● ●	│	│	● ●

JP2 CH2 2A8	A 9	A 8	A 7	A 6	A 5	A 4	A 3	E N
	● ●	│	● ●	│	● ●	│	● ●	● ●

IRQ JP6	2	3	4	5	7	10	11	12	14	15
	● ●	● ●	● ●	│	● ●	● ●	● ●	● ●	● ●	● ●

IRQ JP9 CH1	2	3	4	5	7	10	11	12	14	15
	● ●	● ●	● ●	│	● ●	● ●	● ●	● ●	● ●	● ●



B.3 Software Installation

When the board is installed, please install software drivers as follows:

STEP 1: Prepare PCCOM2.OPT file

The PCCOM2.OPT file contents are :

```
/B:2
/D:COM3
/A:[5:2A0,2,0,LO:(2k:9600:N-8-1:RTS+DTR:XON) * 2]
```

STEP 2: Prepare CONFIG.SYS file

Insert statement into CONFIG.SYS file

```
DEVICE = PCCOM.SYS @c:\pccom2.opt
```

☞ If more than one PCCOM board is installed, Please refer to PCCOMV2 manual.

APPENDIX C

XENIX/UNIX CONFIGURATION

The distribution disk contains SCO, AT&T, UNIXWARE, and INTERACTIVE UNIX/XENIX driver for **RS422**, it detects non-FIFO or FIFO chips automatically. Our drivers also provide transparent printer features that let user to connect local printer from auxiliary port of terminal. The hardware configuration and software installation procedures are shown is the bellows.

C.1 Suggested Hardware Configuration

1. **First adapter**

I/O port address: 2A0H, 2A8H
Interrupt level: IRQ3 or IRQ5 or IRQ10

Port	Device Name	MODEM Name	Transparent Printer Name
1	/dev/ttyj11	/dev/ttyJ11	/dev/lpj11
2	/dev/ttyj12	/dev/ttyJ12	/dev/lpj12

JP1 CH1 2A0	A 9	A 8	A 7	A 6	A 5	A 4	A 3	E N
	● ●	│	● ●	│	● ●	│	│	● ●

JP2 CH2 2A8	A 9	A 8	A 7	A 6	A 5	A 4	A 3	E N
	• •	|	• •	|	• •	|	• •	• •

IRQ JP6	2	3	4	5	7	10	11	12	14	15
	• •	• •	• •	|	• •	• •	• •	• •	• •	• •

IRQ JP9 CH1	2	3	4	5	7	10	11	12	14	15
	• •	• •	• •	|	• •	• •	• •	• •	• •	• •

IRQ JP10 CH2	2	3	4	5	7	10	11	12	14	15
	• •	• •	• •	|	• •	• •	• •	• •	• •	• •

2. Second Adapter

I/O port address: 1A0H, 1A8H
Interrupt level: IRQ4 or IRQ12

Port	Device Name	MODEM Name	Transparent Printer Name
1	/dev/ttyj21	/dev/ttyJ21	/dev/lpj21
2	/dev/ttyj22	/dev/ttyJ22	/dev/lpj22

JP1 CH1 1A0	A 9	A 8	A 7	A 6	A 5	A 4	A 3	E N
	│	• •	• •	│	• •	│	│	• •

JP2 CH2 1A8	A 9	A 8	A 7	A 6	A 5	A 4	A 3	E N
	│	• •	• •	│	• •	│	• •	• •

IRQ JP6	2	3	4	5	7	10	11	12	14	15
	• •	• •	• •	• •	• •	• •	• •	│	• •	• •

IRQ JP9 CH1	2	3	4	5	7	10	11	12	14	15
	• •	• •	• •	• •	• •	• •	• •	|	• •	• •

IRQ JP10 CH2	2	3	4	5	7	10	11	12	14	15
	• •	• •	• •	• •	• •	• •	• •	|	• •	• •

C.2 Software Installation

The installation procedure for the device drivers is described as follows:

❶ Login as a root user.

❷ Insert distribution diskette (which contains device drivers) into floppy disk drive A:, then copy the files from the distribution diskette to a temporary directory.

```
#cd /
# doscp a:dc.tz ./dc.tar.Z   ["dosget" in Interactive UNIX]
# zcat dc.tar / tar xvfp -
```

❸ To install device drivers, please type:

```
#cd /usr/sys/pccom/dc
# ./install
```

❹ Reboot the system. Now, your new UNIX system that includes device drivers is activated.

❺ Enable each terminal by using the **entty** or **enable** command. For USL UNIX (AT&T, UNIXWARE), Interactive UNIX

```
# entty   ttyj11
# entty   ttyj12
              .
              .
```

For SCO UNIX & XENIX by using **enable** command.

❻ Connect each terminal to connector.

NOTE:

❶ If the new system fails to reboot, please boot the original system. When system is boot, please press return key to halt autoboot, then type

```
:unix.old
```

❷ To remove device driver from UNIX, please type

```
a. login as a root user
b. # cd /usr/sys/pccom/dc
c. Remove PCCOM Driver from the kernel
   #./ remove
```

❸ After installation, please enable each port by **entty** (for USL, Interactive UNIX) or **enable** (for SCO UNIX and XENIX) command and disable port by **distty** (for USL, Interactive UNIX) or **disable** (for SCO UNIX and XENIX) command.

```
#distty ttyj11
```

❹ To change baud rate, please update /etc/inittab and /etc/conf/cf.d/init.base files.

C.3 Option for High Speed

The configuration of High-Speed Baud Rate card is change as follows:

Original	Extensible
50	14.4 K
75	28.8 K
110	57.6 K
134	76.8 K
150	115.2 K
200	153.6 K
300	230.4 K
600	460.8 K
1200	1200 (unchanged)
2400	2400 (unchanged)
4800	4800 (unchanged)
9600	9600 (unchanged)
EXTA	19200 (unchanged)
EXTB	38400 (unchanged)

C.4 Transparent Printer

The default device names to Transparent Printer(TP) are /dev/lpXYY, that is, the prefix name is changed from "tty" to "lp" but the other "XYY" is the same. e.g. under default device names, the corresponding TTY line of /dev/lpj11 is /dev/ttyj11.

By multiplexing a serial line, there are two sorts of data channels for TTY data(by /dev/ttyXYY) and TP data(by /dev/lpXYY). If the /dev/ttyj11 is used for a TTY, it has to be enabled before you would like to print data through /dev/lpj11 to a printer that connected to the terminal that is operated via /dev/ttyj11.

The channel for TP data that is uni-directional is used to transmit the data from a host to a terminal only. The differentiates of TTY data and TP data in the same serial line is that TP data are encapsulated within a couple of PRINT-ON and PRINT-OFF escape strings that are recognized by connected terminals. The PRINT-ON and PRINT-OFF is defined by connected terminals.

The scheme to multiplex a serial line for these two channels is based on time-division method. The time slices for TTY or TP data are generated according to the entry procedure, polling, in the PCCOM driver, which is periodically called by system clock. The period of system clocks is different among various operating systems, e.g. most UNIXs is 100hz, but SCO Xenix is 50hz.

The interval reserved for TTY or TP channel in the same serial line is important to output TP data to a low-speed printer through high-throughput line from PCCOM cards if there is no flow control XON/XOFF to the serial line.

The lpx command is used to adjust the time interval for TTY or TP data and the TP protocol.

lpx [option] device name

- **option:**

-t number: set interval for TTY
-l number: set interval for Transparent Printer
-n string: set esc string to turn on printer
-f string: set esc string to turn off printer
-T : get interval for TTY
-L : get interval for Transparent Printer
-N : get esc_string to turn on printer
-F : get esc_string to turn off printer

- **device_name : lpXYY**

The range of interval reserved for TTY or TP channel is from 1 to maximum integer. The default setting for any /dev/lpXYY is as follows:

Interval for TTY : 50
Interval for TP : 1
PRINT - ON escape : "\033[5i" (ESC[5i)
PRINT – OFF escape : "\033[4i" (ECS[4i)

☞ The examples to invoke lpx

❶ Set 60 time slices reserved for /dev/ttyj11

```
# lpx -t 60 /dev/ttyj11
```

❷ Set 2 time slices reserved for /dev/lpj11

```
# lpx –12 /dev/lpj11
```

❸ Get the time slices reserved for /dev/lpj11

```
# lpx –L /dev/lpj11
```

❹ Set PRINT-ON string for /dev/lpj11

```
# lpx –n "\033[51" /dev/lpj11
```

❺ Get PRINT-OFF string for /dev/lpj11

```
# lpx –F /dev/lpj11 \033[4i
```

APPENDIX D

MS-WINDOWS CONFIGURATION for version 3.x

The PCCOM 2 port **RS422** device driver for MS/WINDOWS works for 8250, 16450, 16550 (FIFO), 16650 etc. User can set up any address to PCCOM 2 port card, and the address must be set to consecutive.

D.1 Installation

1. You may set arbitrary I/O address and interrupts. However, we suggest you use the following:

Port 1 Address	2A0
Port 2 Address	2A8
Interrupt	IRQ5

2. Insert the distribution diskette to floppy disk drive, then run PCCOMW.EXE.
3. Select [Install].
4. Select the source path and the directory you want to install in it.
5. When copy file is finish, enter to configuration window.
6. Select your card type and the correct address/ IRQ value, then press [OK].
7. When the window presents 'complete', please restart Windows to let the driver work.

D.2 Uninstall

1. Enter Windows to run PCCOMW.EXE by click on PCCOM icon.
2. Select [Uninstall], and confirm that sure to uninstall.
3. When the window shows 'Uninstall complete", restart Windows to let old driver work.

D.3 Utilities

1. Programming Manual

Since window manager can recognize only COM1 to COM9, however, to install PCCOM 2 port card, it may occupy COM3 to COM10. In the distribution diskette, we provide DLL library and include file, all functions are similar to USER.EXE functions.

Files:	**COMMX.DLL**	**(Dynamic linked library for aux COMs)**
	COMMX.LIB	**(Static library for aux COMs API)**
	COMMX.H	**(The include file for C/C++)**
	COMMX.DOC	**(Document)**

PCCOM library functions are similar to API Comm function

API functions are	**???COMM???()**
PCCOM functions are	**???COMMX???()**

For example, OpenComm() become OpenCommX() , parameters are the same.

- **Following are the functions used with communications devices.**

```
int  FAR PASCAL _export BuildCommXDCB(LPCSTR, DCB
FAR*);
int  FAR PASCAL _export OpenCommX(LPSTR, UINT,
UINT);
int  FAR PASCAL _export CloseCommX(int);
int  FAR PASCAL _export ReadCommX(int, LPSTR , int);
int  FAR PASCAL _export WriteCommX(int,LPSTR , int);
int  FAR PASCAL _export UngetCommXChar(int, char);
int  FAR PASCAL _export FlushCommX(int, int);
int  FAR PASCAL _export TransmitCommXChar(int, char);
int  FAR PASCAL _export SetCommXState(const DCB FAR*);
int  FAR PASCAL _export GetCommXState(int, DCB FAR*);
int  FAR PASCAL _export GetCommXError(int, COMSTAT
FAR* );
int  FAR PASCAL _export SetCommXBreak(int);
int  FAR PASCAL _export ClearCommXBreak(int);
UINT FAR* FAR PASCAL _export SetCommXEventMask(int,
UINT);
UINT  FAR PASCAL _export GetCommXEventMask(int, int);
LONG FAR PASCAL _export EscapeCommXFunction(int, int);
BOOL FAR PASCAL _export EnableCommXNotification(int,
HWND, int,  int);
```

2. Under standard WINDOW environment, to use "TERMINAL" and "CONTROL PANEL", only COM1 to COM4 can be used. If you need use COMx (more than COM4) with TERMINAL.EXE, please modify WIN.INI before enter to WINDOW. For example, to use COM6 with TERMINAL.EXE, please find

```
[TERMINAL]
 port=COMx
```

in WIN.INI, then modify port=COMx to port=COM6.

3. No modification are necessary for applications using up to COM9, and the printers , modems may be connected up to COM9.

4. **SPECIAL NOTE** : When you set 115200 baud(only with FIFOs), please set 0xFF20 (or CBR_56000+1) to certain functions.

D.4 Testing

1. Open two terminal applications under Windows.
2. Open COM port for each terminal, and have the same configuration(baud, stop bit, protocol...) e.g.

Open COM3 to one terminal (9600 baud, 1 stop bit, 8 data bit)
Open COM4 to another terminal (9600 baud, 1 stop bit, 8 data bit)

3. Use 'NULL MODEM' method to connect the two ports.
4. Try to transmit and receive data between the two terminal windows.

APPENDIX E

WINDOWS95 CONFIGURATION

The PCCOM 2 port adapter can be installed in the Windows 95 by using **RS422** device driver in the distribution diskette, and the device driver will detect 8250, 16450, 16550, 16650 chips automatically.

E.1 Installation

1. You may set arbitrary I/O address and interrupts. However, we suggest you use the following:

Port 1 Address	2A0
Port 2 Address	2A8
Port 1 Interrupt	IRQ4
Port 2 Interrupt	IRQ3

2. Insert the distribution diskette to floppy disk drive, then run SETUP.EXE.
3. Click 'PCCOM98 Setup Panel' to run configuration setup.
4. Select your card type and the correct address/IRQ value, then press [OK].
5. When a dialog box presents 'Setup Complete', restart Windows 95 to let driver work.

☞ If you need install more than one card, please run 'PCCOM98 Setup Panel' again. Do not set the same address and interrupt.

E.2 Remove Ports

1. Enter Windows 95.
2. Enter [Control Panel]\[System]\[Device Manager]\[Ports].
3. Select the port that you want to remove, then press [Remove] to remove it.

E.3 Uninstall

1. Remove the file group and icons that created by InstallShield.
2. Enter [Control Panel]\[Add/Remove Program], select the 'PCCOM98 Setup Panel' and remove it.

APPENDIX F

OS/ 2 CONFIGURATION

Under OS/2 2.x and OS/2 Warp operating system, the PCCOM **RS422** device driver provides total 96 ports and baud rate up to 115200. PCCOM also supports device driver for high speed card, and the baud rate can be up to 460800. The device driver works for 8250, 16450, 16550 (FIFO), 16650 etc.

F.1 Installation

The installation procedures are shown in the following.

1. Add command into CONFIG.SYS file then reboot.

```
DEVICE=C:\PCCOM2.SYS/Axxx,yyy /Imm,nn/Czz /4
```

• xxx	The first I/O port address
• yyy	The second I/O port address
• mm	IRQ2 to IRQ15 of port 1
• nn	IRQ2 to IRQ15 of port 2
• zz	Assign the first port name (1 to 92)
• 4	high speed card used only

☞ **if "/C" is not use, the first port is COM3.**

☞ **if option /C1 or /C2 is use, the port COM1 or COM2 is a logical port but not compatible to COM1 or COM2 on a PC machine.**

2. To set up communication parameters, please use the MODE.COM command from OS/2, or use PCCOM.EXE command. We highly recommend to use PCCOM.EXE

command, because MODE.COM can be used only for COM1 to COM9 and for maximum baud rate to 57600.

The PCCOM.EXE can be used to set COM1 to COM96. The syntax of PCCOM.EXE is the same as MODE.COM.

- ***For example :***

1. **Set two cards from COM3 to COM4 and COM7 to COM8.**

```
DEVICE=C:\PCCOM2.SYS /A2A0,2A8 /I5,7 /C3
DEVICE=C:\PCCOM2.SYS /A1A0,1A8 /I10,15 /C7
```

2. **Set up communication parameters.**

```
C:\PCCOM  COMx:38400,N,8,1,TO=OFF,XON=OFF,
IDSR=ON, ODSR=ON, OCTS=ON, RTS=OFF,DTR=OFF
C:\PCCOM COMx:115200,N,1
```

F.2 Utilities

COMTEST.EXE is a general testing program for COM port. It will create the threads associated with each communication port that will be test. The testing function includes OPEN/CLOSE/READ/WRITE/Non-Destructive Read/Non-Destructive WRITE/Get Status/Device IOCTL. Due to lack of OS/2 API, Non-Destructive I/O is not support for OS/2 even this device driver has implemented this feature.

In the COMTEST program, you can use up-right arrow to choice the option, and use enter/escape to start/stop the program.

The ComSent/ComRecv are a pair of communication programs for testing the performance of communication port. You have to connect the test ports with a null modem before you test communication port. You can use PCCOM.EXE to change the parameters of communication port. Then use this program to test heavy (transmission) duty on communication port.

F.3 API Communication Functions

In the following, there are API communication functions, for more detail information, please refer to Control Program Programming Ref. of OS/2, and programming Guide Vol. I-III of OS/2.

- **DosClose** - Close a Handle to a File, Pipe, or Devices
  #define INCL_DOSFILEMGR APIRET DosClose(HFILE FileHandle);

- **DosDevConfig** - Get Information about Attached Devices
  #define INCL_DOSPROCESS APIRET DosDevConfig(PVOID pDeviceInfo, ULONG ulDeviceType);

- **DosDevIOCtl** - Perform Control Function on a Device Specified by an Opened Device Handle
  #define INCL_DOSPROCESS APIRET DosDevIOCtl(HFILE DevHandle, ULONG ulCategory, ULONG ulFunction, PVOID pParmList, ULONG ulParmLengthMax, PULONG pParmLengthInOut, PVOID pDataArea, ULONG ulDataLengthMax, PULONG pDataLengthInOut);

- **DosOpen** - Open a File
  #define INCL_DOSFILEMGR APIRET DosOpen(PSZ pszFileName, PHFILE ppFileHandle, PULONG pActionTaken,

ULONG ulFileSize, ULONG ulFileAttribute,ULONG ulOpenFlag, ULONG ulOpenMode, PEAOP2 ppEABuf);

- **DosRead** - Read from a File, Pipe, or Device to a Buffer
  #define INCL_DOSFILEMGR APIRET DosRead(HFILE FileHandle, PVOID pBufferAre, ULONG ulBufferLength, PULONG pByteRead);

- **DosWrite** - Write to a File from a Buffer
  #define INCL_DOSFILEMGR APIRET DosWrite(HFILE FileHandle, PVOID pBufferArea, ULONG ulBufferLength, PULONG pByteWritte);

APPENDIX G

WINDOWS/NT CONFIGURATION

For version 3.51 up

The PCCOM 2 port adapter can be installed in the Windows NT by using **RS422** device driver in the distribution diskette, and the device driver will detect 8250, 16450, 16550, 16650 chips automatically.

G.1 Installation

1. You may set arbitrary I/O address and interrupts. However, we suggest you use the following:

Port 1 Address	2A0
Port 2 Address	2A8
Port 1 Interrupt	IRQ4
Port 2 Interrupt	IRQ3

2. Insert the distribution diskette into floppy disk drive, then run SETUP.EXE.
3. Click ‘PCCOM98 Setup Panel’ to run configuration setup.
4. Select your card type and the correct address/IRQ value, then press [OK].
5. When a dialog box presents 'Setup Complete', restart Windows NT to let driver work or execute the following two commands:

```
net stop serial          // stop the origin driver
net start serial         // start our new driver
```

then our driver will start to work.

6. The COM1 to COM9 can be directly referenced just like a filename from program and from the command line. However, COM10 and above must be referenced with the following syntax:

```
\\.\com10
```

Because the command line mode doesn't recognize ports above COM9.

7. Don't overlap port address and interrupt vector address, otherwise, it may conflict with UART chips.
8. If you need install more than one card, please run 'PCCOM98 Setup Panel' again. Do not set the same address and interrupt.

G.2 Remove Ports

1. Enter Windows NT.
2. Enter [Control Panel]\[Ports].
3. Select the port to delete.

G.3 Uninstall

1. Remove the file group and icons that created by InstallShield.
2. Enter [Control Panel]\[Add/Remove Program], select the 'PCCOM98 Setup Panel' and remove it.

APPENDIX H

LINUX CONFIGURATION

The PCCOM 2 port adapter can be installed in the Linux by using **RS422** device driver supported by Linux, and the device driver will detect 8250, 16450, 16550, 16650 chips automatically. For more details, please refer to 'setserial' man-pages.

I/O port address = 2A0H
Interrupt = IRQ5
Chip type = 16550A

Port	Address
1	2A0-2A7
2	2A8-2AF

☞ ***Please add the following lines to /etc/rc.d/rc.serial or rc.local file.***

```
SETSERIAL="/bin/setserial -b"
${SETSERIAL} /dev/cua8 uart 16550A port 0x2A0 irq 5
${SETSERIAL} /dev/cua9 uart 16550A port 0x2A8 irq 5
```

APPENDIX I

WARRANTY INFORMATION

I.1 Copyright

Copyright 1997, 1998 DECISION COMPUTER INTERNATIONAL CO., LTD. All rights reserved. No part of PCCOM software and manual may be reproduced, transmitted, transcribed, or translated into any language or computer language, in any form or by any means, electronic, mechanical, magnetic, optical, chemical, manual, or otherwise, without the prior written permission of DECISION COMPUTER INTERNATIONAL CO., LTD.

Each piece of PCCOM package permits user to use PCCOM only on a single computer, a registered user may use the program on a different computer, but may not use the program on more than one computer at the same time.

Corporate licensing agreements allow duplication and distribution of specific number of copies within the licensed institution. Duplication of multiple copies is not allowed except through execution of a licensing agreement. Welcome call for details.

I.2 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 PCCOM 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 PCCOM 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 PCCOM.

To ensure that your PCCOM 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 PCCOM 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.

NOTE:

NOTE:

NOTE: