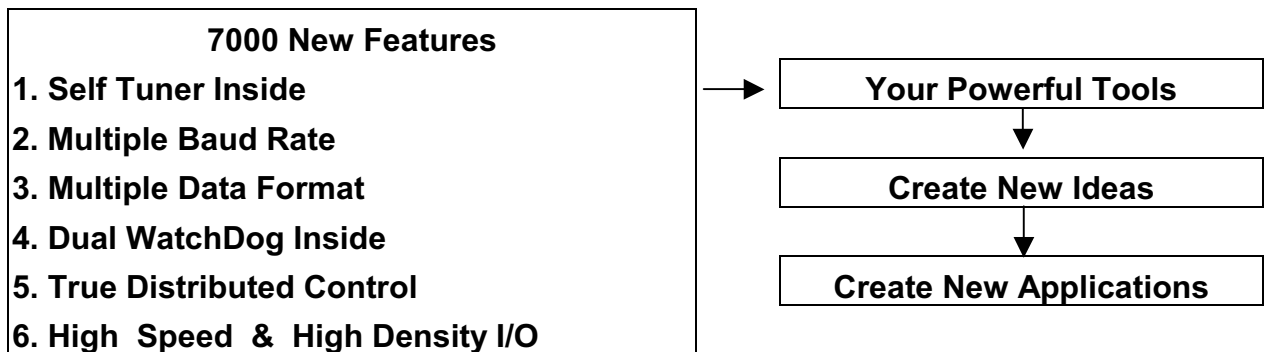


# 7188 Series

## 7188(D)/DOS Hardware User's Manual



### Warranty

All products manufactured by ICP DAS are warranted against defective materials for a period of one year from the date of delivery to the original purchaser.

### Warning

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# 1. Introduction

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The 7188 is an embedded controller designed for industry applications. It can be used to replace the PC or PLC for the harsh environment. The 7000 series is a family of network data acquisition and control modules. They provide A/D, D/A, DI/O, Timer/Counter and other functions. These modules can be remote controlled by a set of commands.

The 7188 can be ordered as following:

Order Item	Flash Rom size	5-digit LED	O. S.
7188/DOS	256K Bytes	No	ROM-DOS
7188D/DOS	256K Bytes	Yes	ROM-DOS
7188/DOS/512	512K Bytes	No	ROM-DOS
7188D/DOS/512	512K Bytes	Yes	ROM-DOS

## What is DOS?

DOS is an acronym for Disk Operating System. Several brands of DOS' have been created by various companies. In all cases, DOS--whether PC-DOS, MS-DOS, or ROM-DOS--is a set of commands or code which tells the computer how to process information.

DOS runs programs, manages files, controls information processing, directs input and output, and performs many other related functions.

## What is ROM-DOS?

ROM-DOS is an operating system which can be embedded in ROM (Read Only Memory) and can run entirely from within ROM. ROM-DOS is functionally equivalent to other brands of DOS, and can run programs that are executable under a standard DOS (which executes out of RAM). With ROM-DOS, the executable program may reside in RAM or may be placed in ROM along with

ROM-DOS. The 7188D/DOS & 7188/DOS & 7188D/DOS/512 & 7188/DOS/512 are equipped with Datalight's ROM-DOS.

### **More Information**

Refer to "7000 Bus Converter User Manual" chapter 1 for more information as following:

- 1.1 7000 Overview**
- 1.2 7000 Related Documentation**
- 1.3 7000 Common Features**
- 1.4 7000 System Network Configuration**
- 1.5 7000 Dimension**

### **Package List**

In addition to this manual, the package includes the following items:

- One 7188 hardware module
- One software utility disks
- One software user's manual
- One download cable,CA0910

### **Accessory Order Information**

- CA0910: Download cable, 3-terminal to DB-9, for COM3, COM4 of 7188
- CA0915: female DB-9 to male DB-9, for COM1 of 7188(D)/DOS

### **Note**

If any of these items are missing or damaged, contact the local distributors for more information. Save the shipping materials and cartons in case you want to ship in the feature.

## 1.1 Features

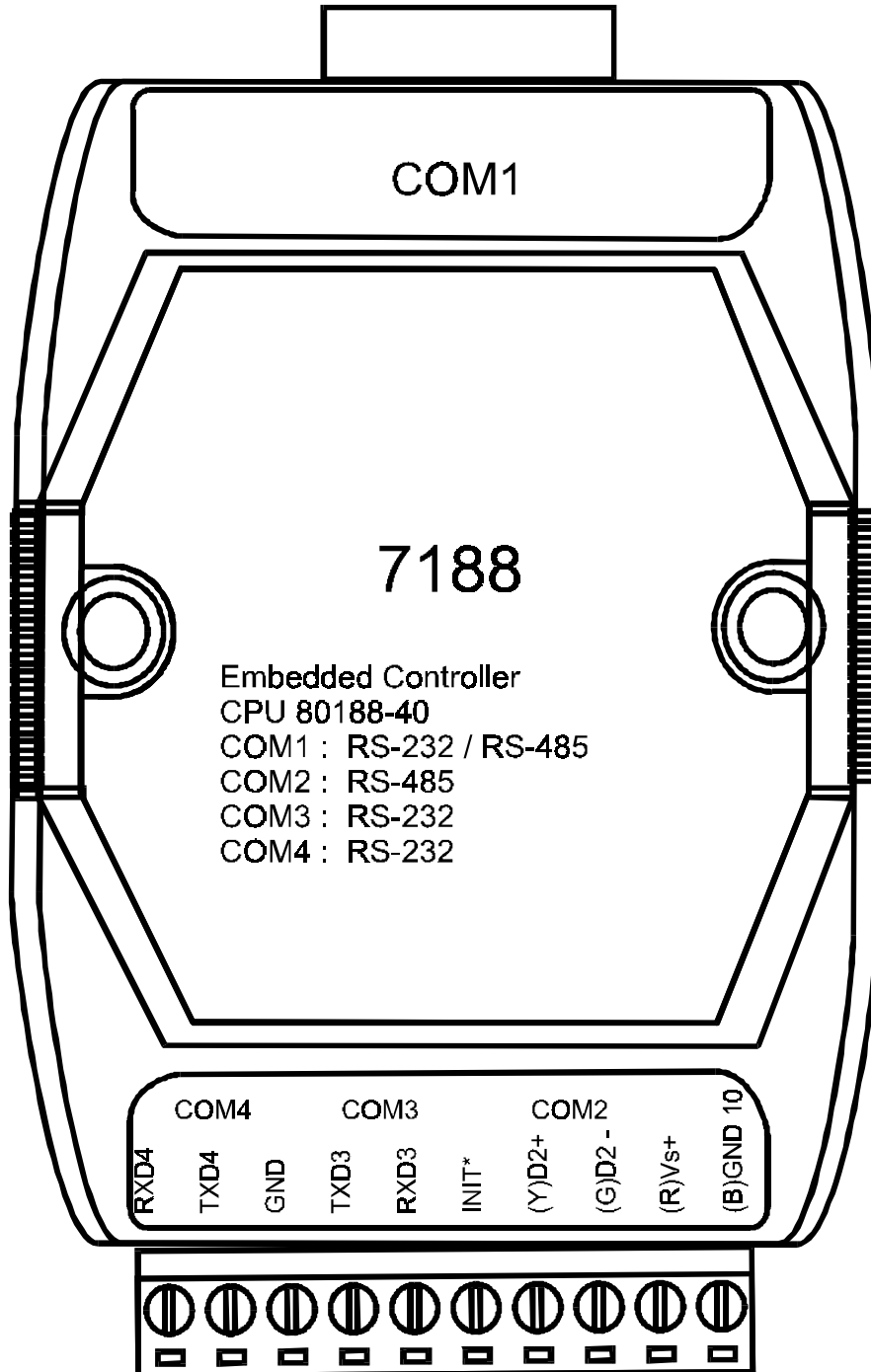
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- AMD's embedded CPU, Am188™ES, 40M Hz
- 256K SRAM & 256K (or 512K) Flash ROM
- Built-in RTC & NVSRAM & EEPROM
- Built-in 4 channels of COM port
- COM driver support interrupt & 1K QUEUE input buffer
- Built-in watchdog timer for harsh environment
- Built-in power protection circuit
- Built-in RS-485 network protection circuit
- Program download from PC
- Built-in Datalight's ROM-DOS & ROM-DISK
- **Year 2000-Compliance**
- **RTC leap year compensation from 1980 to 2079**
- BIOS support RTC time & date
- ROM-DOS support RTC time & date
- Built-in 5-digit LED display (7188D/DOS or 7188D/DOS/512)

**WARNING 1: The COM2 is not isolated to CPU. If there is large noise in the RS-485 network, the 7188 may be damaged. It is recommended to add one 7510 between the COM2 & external RS-485 network. Refer to Sec. 1.6.4 for more information.**

**WARNING 2: The COM1 can be used as RS-485 port. If the COM1 is used as RS-485, it is recommended to add one 7510 between the COM1 & external RS-485 network. Refer to Sec. 1.6.4 for more information.**

## 1.2 Pin Assignment



**WARNING:** The COM2 is not isolated to CPU. If there is large noise in the RS-485 network, the 7188 may be damaged. It is recommended to add one 7510 between the COM2 & external RS-485 network. Refer to Sec. 1.6.4 & Sec. 1.1 for more information.

Pin assignment of 10-pin screw terminal block:

Pin	Name	Description
1	RXD4	RXD pin of COM4 (RS-232)
2	TXD4	TXD pin of COM4 (RS-232)
3	GND	GND pin of COM3 & COM4
4	TXD3	TXD pin of COM3 (RS-232)
5	RXD3	RXD pin of COM3 (RS-232)
6	INIT*	Initial pin for ROM-DISK download
7	D2+	DATA+ pin of COM2 (RS-485)
8	D2-	DATA- pin of COM2 (RS-485)
9	+VS	V+ of power supply (+10 to +30VDC unregulated)
10	GND	GND of power supply

Note 1: COM2=(D2+, D2-)

Note 2: COM3=(TXD3, RXD3, GND)

Note 3: COM4=(TXD4, RXD4, GND)

Note 4: COM3&COM4 share the same GND-pin(pin 3)

Pin assignment of COM1 connector (DB-9 Male):

Pin	Name	Description
1	DCD	Data Carrier Detect
2	RXD	Receive Data (JP1 select RS-232)
	D1+	DATA+ of RS-485 (JP1 select RS-485)
3	TXD	Transmit Data (JP1 select RS-232)
	D1-	DATA- of RS-485 (JP1 select RS-485)
4	DTR	Data Terminal Ready
5	GND	Signal ground
6	DSR	Data Set Ready
7	RTS	Request To Send
8	CTS	Clear To Send
9	RI	Ring Indicator

Note 5: The COM1 can be used as RS-232 or RS-485 port selected by JP1. Refer to Sec. 1.5 for JP1 setting.

Note 6: The connector of COM1 is the same as the DB-9 RS-232 connector of PC. (JP1 select RS-232)

Note 7: The COM1 can direct drive 7000 modules if JP1 is set in the RS-485. Refer to Sec. 1.6.6 for wire connection.

## 1.3 Specifications

---

### System

- CPU: Am188™ES, 40M Hz
- SRAM: 256K bytes. **User program can use memory (SRAM) 235K max. for code, data, heap and stack.**
- FLASH ROM: 256K bytes(or 512K bytes)
- **User ROM-DISK support : up to 192K (or 448K)**
- OS: Datalight's "ROM-DOS" v6.22
- COM port: COM1, COM2, COM3, COM4
- Built-in Watch Dog Timer (1.6 seconds)
- Built-in power protection & network protection circuit
- Program download from PC
- EEPROM support (2 K bytes)
- RTC & NVSRAM(31 bytes) support

### Real Time Clock

- Year-2000 compliance
- seconds, minutes, hours, date of the month
- month, year, valid up **form 1980 to 2079**
- NVSRAM: 31 bytes, data valid up to 10 years
- Lithium battery for RTC & NVSRAM

### EEPROM

- 2048 bytes ( 8 blocks, each block has 256 bytes)
- Data retention > 100 years
- 1,000,000 erase/write cycles

### Flash Memory

- 256/512K bytes
- 64K bytes are used by miniBIOS & ROM-DOS
- At least 64K bytes are used by ROM-DISK
- Others can be use to store data. (128/384K bytes max.)
- Erase unit is one sector(64K bytes)
- 100,000 erase/write cycles



**Datalight's "ROM-DOS" for 7188(D)/DOS**

- Fully MS DOS 6.x compatible
- RAM-DISK & ROM-DISK support

**COM1**

- RS-232 or RS-485 jumper select(JP1), default is RS-232
- RS-232: TXD,RXD,RTS,CTS,DTR,DSR,DCD,RI,GND
- RS-485: D1+, D1+
- Communication speed: 115200 max.
- 16 bytes FIFO

**COM2**

- RS-485: D2+, D2-
- Communication speed: 115200 max.
- 16 bytes FIFO
- Direct connect to 7000 RS-485 network

**COM3**

- RS-232: TXD3, RXD3, GND
- Communication speed: 115200 max.

**COM4**

- RS-232: TXD4, RXD4, GND
- Communication speed: 115200 max.
- The standard I/O for 7188(D)/DOS. (57600,N,8,1)
- Can be used as general purpose RS-232

**Display**

- 7-segment LED: 5-digit (for 7188D/DOS & 7188D/DOS/512)

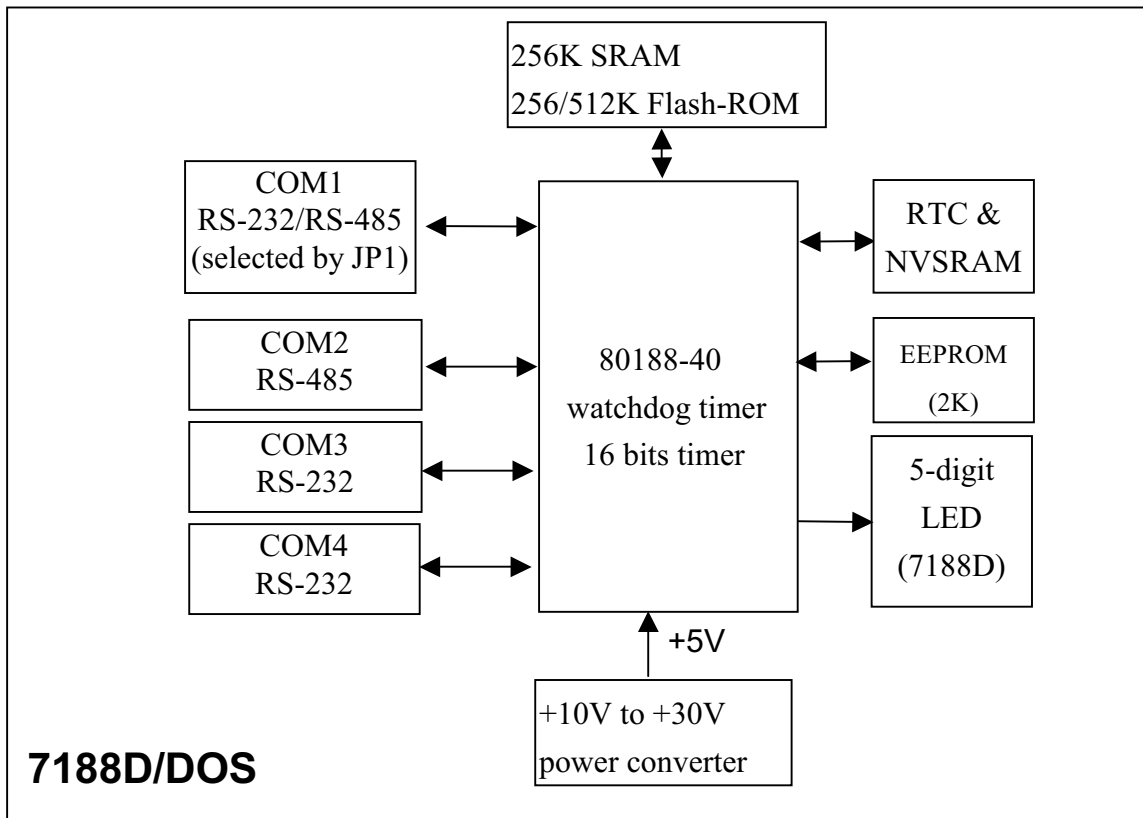
**Power**

- Power requirements: 10 to 30VDC(non-regulated)
- Power consumption: 2.0W for 7188/DOS & 7188/DOS/512  
3.0W for 7188D/DOS & 7188D/DOS/512

**General environment**

- Operating temperature: -20°C to +75°C
- Storage temperature:-40°C to +85°C
- Humidity: 0 to 90 %

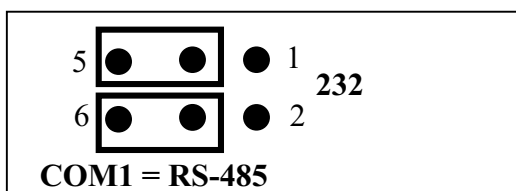
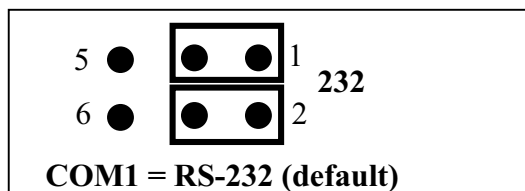
## 1.4 Block Diagram of 7188



## 1.5 Jumper Setting

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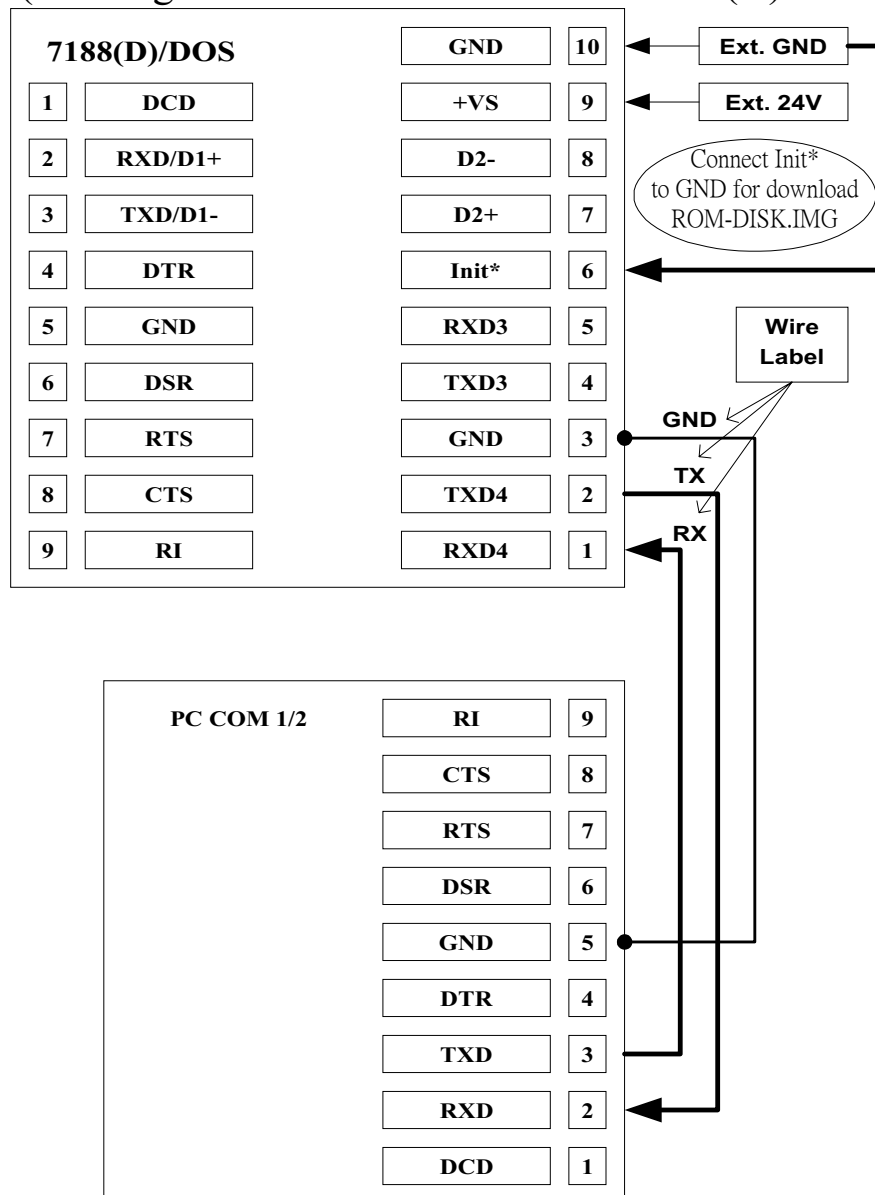
The JP1 setting is given as follows.



## 1.6 Wiring Diagrams for Application

### 1.6.1 Connect COM4 to PC

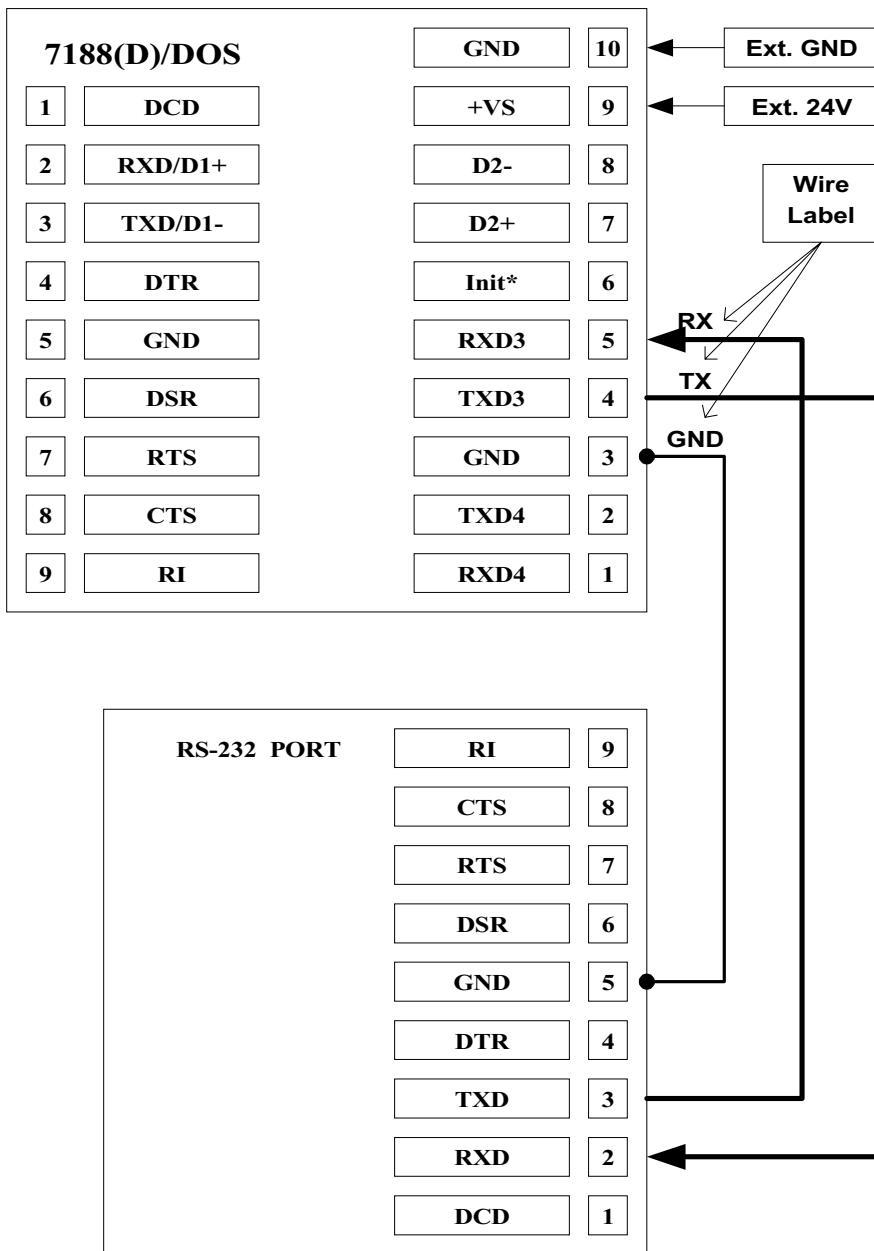
(for Program Download from PC to 7188(D)/DOS)



#### Note:

- There are 3 wires in the download cable
- Connect the wire-1, label RX, to pin-1 of 7188(D)/DOS
- Connect the wire-2, label TX, to pin-2 of 7188(D)/DOS
- Connect the wire-3, label GND, to pin-3 of 7188(D)/DOS
- Connect the DB-9 of download cable to PC COM-1/2 port

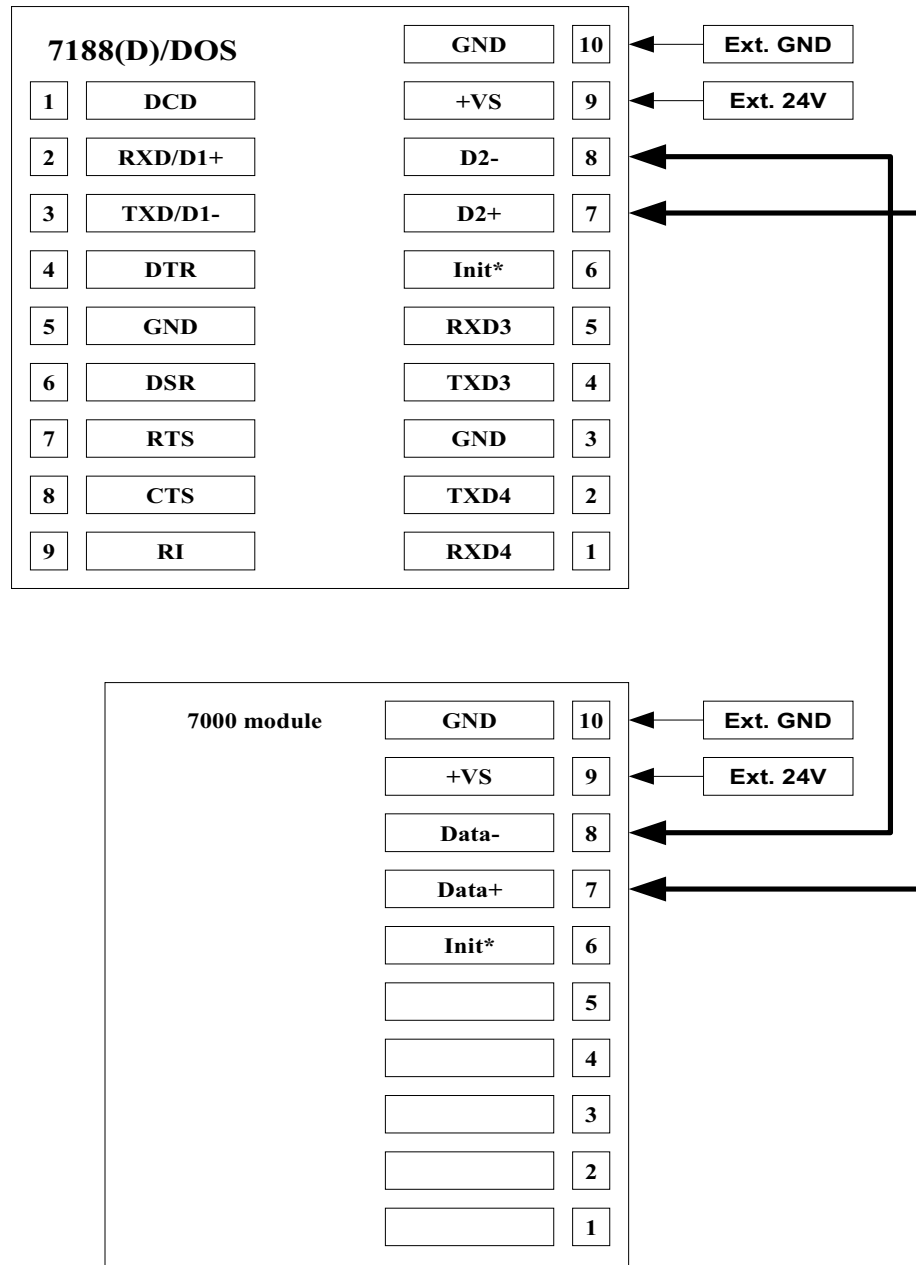
### 1.6.2 Connect COM3 to 3-wire RS-232 Device



**Note:**

- There are 3 wires in the download cable
- Connect the wire-1, label RX, to pin-5 of 7188(D)/DOS
- Connect the wire-2, label TX, to pin-4 of 7188(D)/DOS
- Connect the wire-3, label GND, to pin-3 of 7188(D)/DOS
- Connect the DB-9 of download cable to RS-232 COM port

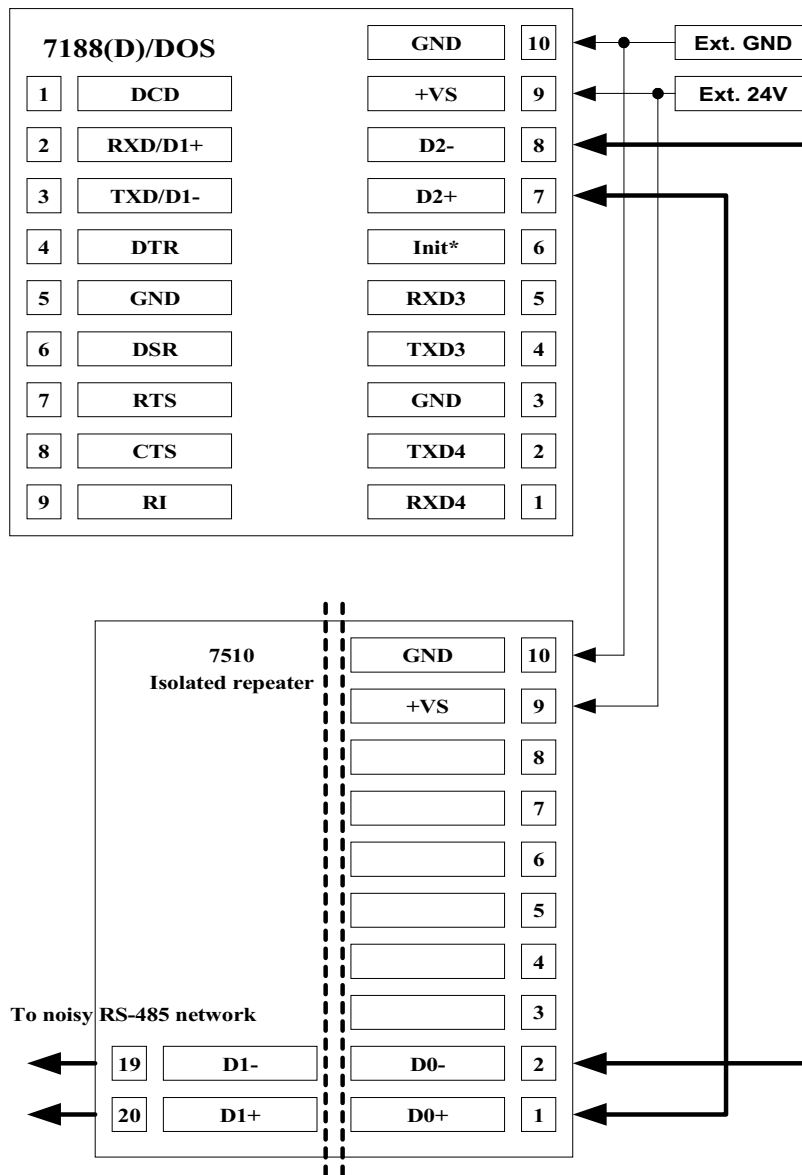
### 1.6.3 Connect COM2 to 2-wire RS-485 Device



**Note:**

- The 7188(D)/DOS can directly drive 256 sets of 7000 modules without repeater
- The 7188(D)/DOS can connect to the RS-485 repeater 7510 for long distance applications.
- The 7188(D)/DOS can drive any 2-wire RS-485 network

### 1.6.4 Connect COM2 to 7510 for Isolation



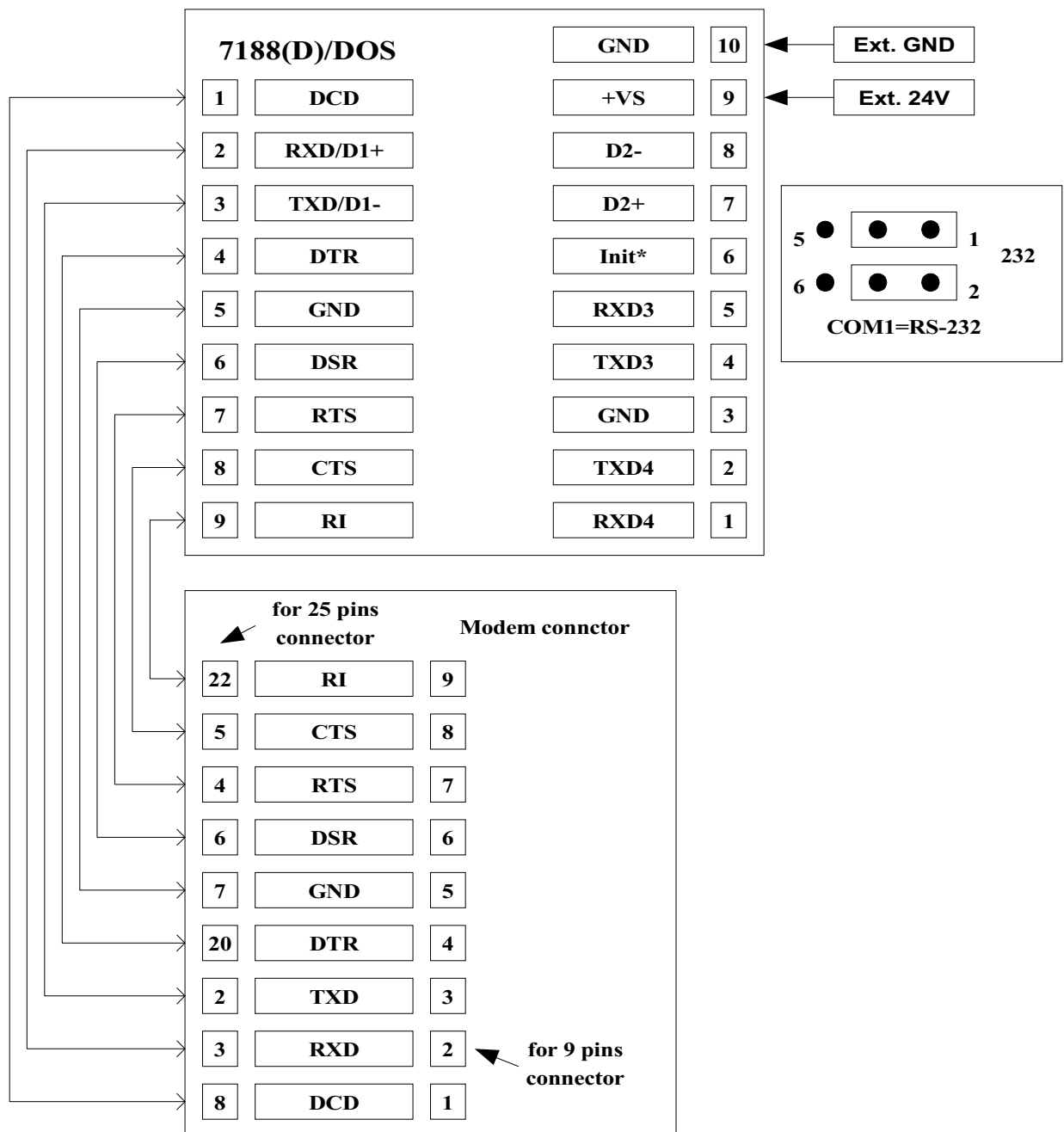
**Note:**

- The 7188(D)/DOS can directly drive 256 set of 7000-modules without repeater
- The 7188(D)/DOS can drive any 2-wire RS-485 network

**WARNING:** The COM2 is not isolated to CPU. If there is large noise in the RS-485 network, the 7188 may be damaged. It is recommended to add one 7510 between the COM2 & external RS-485 network. Refer to Sec. 1.1 for more information.



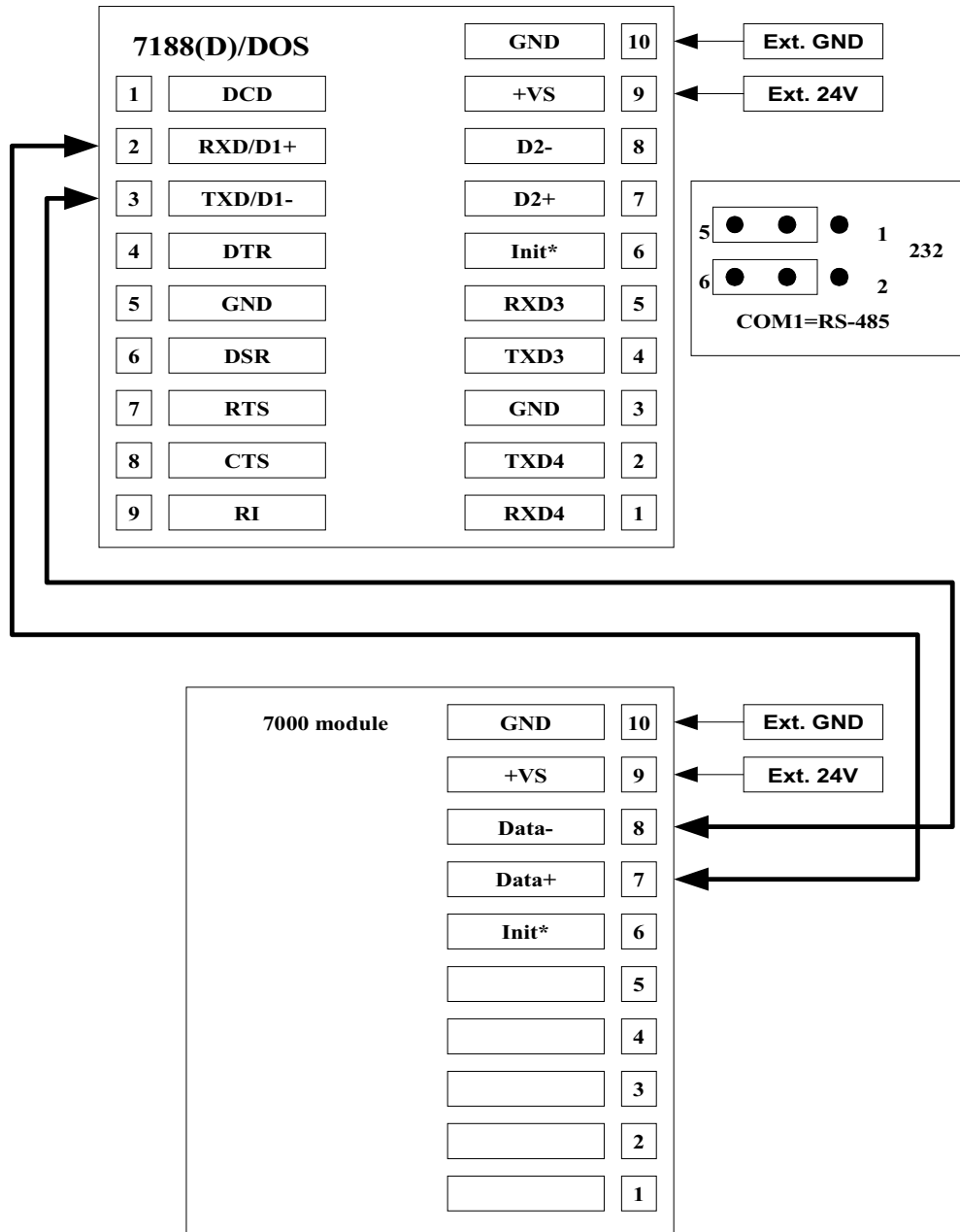
## 1.6.5 Connect COM1 to 9-wire Modem



### Note:

- The COM1 pin assignment of 7188(D)/DOS is the same as PC.

### 1.6.6 Connect COM1 to two-wire RS-485 Device



**Note:**

- The 7188(D)/DOS can directly drive 256 set of 7000-modules without repeater
- **The 7188(D)/DOS can connect to the RS-485 repeater 7510 for safety & long distance applications. (Refer to Sec. 1.1 for more information)**
- The 7188(D)/DOS can drive any 2-wire RS-485 network

## 1.7 Comparison Table

	<b>I-7188D/DOS</b>	<b>4500</b>
<b>Module name</b>	<b>Embedded Controller</b>	<b>PC-Based Communication Controller</b>
<b>CPU</b>	<b>AMD 80188, 40M</b>	<b>AMD 80188, 40M</b>
<b>RAM</b>	<b>256K</b>	<b>256K</b>
<b>Flash ROM</b>	<b>256K (or 512K)</b>	<b>256K</b>
<b>User ROM-DISK</b>	<b>192K</b>	<b>171K</b>
<b>User EXE program in ROM-DISK</b>	<b>192K-0K=192K (system=nearly 0K)</b>	<b>171K-44K=127K (system=44K)</b>
<b>ROM DOS</b>	<b>Yes</b>	<b>Yes</b>
<b>RTC</b>	<b>Yes</b>	<b>Yes</b>
<b>Program Download</b>	<b>Yes</b>	<b>Yes</b>
<b>Watch Dog CKT</b>	<b>Yes</b>	<b>Yes</b>
<b>COM port</b>	<b>4 (interrupt driven, 1K QUEUE buffer for every channel)</b>	<b>2 (another one for program download)</b>
<b>EEPROM</b>	<b>2048 bytes</b>	<b>No</b>
<b>7-Seg LED</b>	<b>5-digit</b>	<b>No</b>

	<b>I-7188D/DOS</b>	<b>4521</b>
<b>Module Name</b>	<b>Embedded Controller</b>	<b>Addressable RS-232/485 to RS-232 Converter</b>
<b>Program Download</b>	<b>Yes</b>	<b>No</b>
<b>Number of RS-232 device can handle</b>	<b>3</b>	<b>1</b>
<b>Build-in program</b>	<b>No (with demo program to connect 3-RS-232 device at the same time)</b>	<b>Yes</b>
<b>Function</b>	<b>flexible (programmable)</b>	<b>limit (non-programmable)</b>

## 2. Operation Principle

### 2.1 System Mapping

Device	Address mapping
Flash ROM	From C000(Or 8000):0000 to F000:FFFF
SRAM	From 0000:0000 to 3000:FFFF
COM1 BASE	0x200
COM2 BASE	0x100
COM3	FF80 to FF88
COM4	FF10 to FF18

Interrupt No.	Interrupt mapping
0	Divided by zero
1	Trace
2	NMI
3	Break point
4	Detected overflow exception
5	Array bounds exception
6	Unused opcode exception
7	ESC opcode exception
8	Timer 0
9	Reserved
0A	DMA-0
0B	DMA-1
0C	COM 1
0D	COM 2
0E-10	Reserved
11	COM 4
12	Timer 1
13	Timer 2
14	COM 3

**Four independent COM port:**

Port	Description
COM1	<ul style="list-style-type: none"> <li>● For general purpose 9-wire RS-232 application</li> <li>● For general purpose 3-wire RS-232 application</li> <li>● For general purpose 2-wire RS-485 application</li> <li>● For remote control application (by Modem)</li> <li>● 16C550 compatible</li> </ul>
COM2	<ul style="list-style-type: none"> <li>● Direct control 7000 series modules</li> <li>● For general purpose 2-wire RS-485 application</li> <li>● 16C550 compatible</li> </ul>
COM3	<ul style="list-style-type: none"> <li>● For general purpose 3-wire RS-232 application</li> <li>● UART of AMD-80188 compatible</li> </ul>
COM4	<ul style="list-style-type: none"> <li>● For program download</li> <li>● For program debug</li> <li>● For general purpose 3-wire RS-232 application</li> <li>● UART of AMD-80188 compatible</li> </ul>

**WARNING 1:** The COM2 is not isolated to CPU. If there is large noise in the RS-485 network, the 7188 may be damaged. It is recommended to add one 7510 between the COM2 & external RS-485 network. Refer to Sec. 1.6.4 for more information.

**WARNING 2:** The COM1 can be used as RS-485 port. If the COM1 is used as RS-485, it is recommended to add one 7510 between the COM1 & external RS-485 network. Refer to Sec. 1.6.4 for more information.

**NOTE:**

- The 7510 can be used to isolate the 7188(D)/DOS from the noisy RS-485 network.
- The 7510 can be used to extend the RS-485 network distance to more than 1.2Km.
- The 7510 can be used to extend the 7000 modules to more than 256 modules.

## **2.2 Use COM4 for Debug Program**

---

The COM4 of 7188(D)/DOS has three major functions.

- The first function is to download program from PC.
- The second function is to link PC for program debug.
- The last function is to be used as a general-purpose COM port.

When the 7188(D)/DOS was power on, it will initialize the COM4 to the following configuration:

- **Start-bit=1, data-bit=8, stop-bit=1, no parity**
- **Baud rate = 57600**

Then the 7188(D)/DOS will send all power-on information to COM4. The user can see all power-on message as following:

- Power-off PC & 7188(D)/DOS
- Install the download cable between COM4 of 7188(D)/DOS & COM1 of PC (refer to Sec. 1.6.1)
- Power-on PC & Run 7188.EXE
- Power-on 7188(D)/DOS
- All power-on message will be shown in monitor of PC

After the power-on stage, the 7188(D)/DOS will use the COM4 as its standard input/output. So the standard output of 7188(D)/DOS will be shown in PC's monitor. If the user press any key in PC's keyboard, this key will be sent to 7188(D)/DOS as standard input. Therefore the keyboard & monitor of PC can be used as standard input & output of 7188(D)/DOS as following:

- Use 7188.EXE as a bridge between 7188(D)/DOS & PC
- Run 7188.EXE in PC to setup this bridge
- **Keyboard of PC → standard input of 7188(D)/DOS**
- **Monitor of PC → standard output of 7188(D)/DOS**

In this way, the 7188(D)/DOS can read some data from keyboard & show some information in monitor. So the program debug will become more easy & effective.

**Note: 7188.EXE is given in the companion floppy disk of 7188(D)/DOS.**

## 2.3 Use COM4 to Download Program

---

The 7188(D)/DOS use COM4 to download program from PC.

The steps for 7188(D)/DOS to download program to RAM-DISK please make reference to “*7188(D)/DOS Software User’s Manual (Ver. 1.1)* , *sec. 1.11 Using LD3.EXE*”.

The steps for 7188(D)/DOS to download ROM-DISK.IMG please make reference to “*7188(D)/DOS Software User’s Manual(Ver. 1.1)* , *sec. 1.12 Using TOROM.EXE* , & *sec. 1.13 Using INIT\**”.

## **2.4 Use COM4 as a COM Port**

---

The user can use COM4 as a general purpose RS-232 port as following:

- Download ROM\_DISK program from PC first.
- Power off 7188(D)/DOS & remove the download cable from PC.
- Disconnect the INIT\*-pin from GND-pin of 7188(D)/DOS if they are connected.
- Power on 7188(D)/DOS (no standard input, no standard output, no debug information)
- Install the download cable between new RS-232 device & COM4 of 7188(D)/DOS
- Initialize the COM4 to new configuration.
- The COM4 is a general purpose RS-232 port now.
- **Refer to “7188(D)/DOS Software User’s Manual (Ver. 1.1)” for demo program**



## **2.5 Use COM3 for RS-232 Applications**

---

The COM3 is a 3-wire RS-232 port. It includes 3 pins as following:

- GND: signal ground, shared with COM4
- TXD3: transmit data to external RS-232 device
- RXD3: receive data from external RS-232 device
- Refer to **Sec. 1.6.2** for wire connection
- Refer to “**7188(D)/DOS Software User’s Manual (Ver. 1.1)**” for demo program.

## **2.6 Use COM2 for RS-485 Applications**

---

The COM2 is a 2-wire RS-485 port. It includes 2 pins as following:

- D2+: connect to DATA+ of RS-485 network
- D2-: connect to DATA- of RS-485 network

The COM2 is designed to directly drive 7000 series modules. It is a half-duplex 2-wire RS-485 network. The direction control in 2-wire RS-485 network is very important. It is recommended to control the direction of COM2 as following:

- Initiate the direction of COM2 to RECEIVE state
- Keep the RECEIVE state until 7188 has to transmit command
- If 7188(D)/DOS has to transmit command
  1. set the direction of COM2 to TRANSMIT state
  2. transmit the command string out
  3. **wait until all command chars are transmitted over to the RS-485 network (not to the FIFO, refer to “7188(D)/DOS Software User’s Manual” for more information)**
  4. **set the direction of COM2 to RECEIVE state**
  5. receive the response string
  6. keep in the RECEIVE state until next transmit

The working steps for 7000 related applications are given as follows:

1. 7188(D)/DOS send command string to 7000 modules
2. Destination 7000 module execute this command
3. Destination 7000 module **delay 1 byte for settling time**
4. Destination 7000 module echo back the result string to 7188(D)/DOS

**The delay time in step 3 is only 1 byte, the 7188(D)/DOS has to change the direction from TRANSMIT to RECEIVE before the delay time is up.**

NOTE: the COM2 can not be used in the full-duplex 4-wire RS-485 application.

## **2.7 Use COM1 for RS-232 Applications**

---

The features of COM1 are given as following:

- Pin assignment is compatible to RS-232 DB-9 connector of PC.
- Programming is 16C550 compatible
- I/O base address is different from of COM1 PC
- Interrupt handling sequence is different from PC
- Can be used as 9-wire RS-232 signal
- Can be used as 3-wire RS-232 signal
- Can be used as 2-wire RS-485 signal
- RS-232/RS-485 is selected by JP1
- Refer to Sec. 1.6.5 for wire connection & jumper setting

The I/O base address & the interrupt handling sequence is different from PC. Therefore if user download the PC's RS-232 application program into 7188(D)/DOS, it will not work.

## **2.8 Use COM1 for RS-485 Applications**

---

The COM1 can be used as a 2-wire RS-485 port. It includes 2 pins as follows:

- RXD/D2+: connect to DATA+ of RS-485 network
- TXD/D2-: connect to DATA- of RS-485 network

The COM1 is very similar to COM2 in RS-485 applications. Refer to **Sec. 2.6** for more information.

## 2.9 COM port Comparison: 7188 & PC

---

The COM ports of 7188(D)/DOS are given as following:

COM port	Hardware
COM1	16C550
COM2	16C550
COM3	80188's on-chip UART-0
COM4	80188's on-chip UART-1

The programming of 16C550 is very different to 80188's UART. The interrupt handling of 80188 is also very different to PC's 8259. **Therefore if user download the PC's RS-232 application program into 7188(D)/DOS, it will not work.**

The software driver of 7188(D)/DOS is a interrupt driven library which provide 1K QUEUE buffer for every COM port. The software is well-designed & easy to use.

The software driver provide the same interface for all these 4 COM ports. The user can use these COM port in the same way without any difficulty.

## **2.10 Use Red LED & 7-SEG LED Display**

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The red LED of 7188 can be turned-ON or turned-OFF by software program. The 5 digits of seven-segment LED are also programmable. **The 5-digit LED is very useful in real world applications.** It can be used to replace the monitor & touch-screen in many applications.

7188/DOS, 7188/DOS/512	Red LED
7188D/DOS, 7188D/DOS/512	Red LED & 5-digit LED

## 2.11 Use RTC & NVSRAM

---

The RTC & NVSRAM are located in the same chip. There is a Li-battery to backup the RTC & NVSRAM for 10 yeas. The features of RTC are given as following:

- **Year 2000 Compliance**
- BIOS support RTC time & date
- ROM-DOS support RTC time & date
- seconds, minutes, hours, date of the month
- month, day of week, year, Leap year valid up to 2079
- NVSRAM: 31 bytes

The user can use DOS command or BIOS call to read/write RTC.

The NVSRAM can be read/write any number of times. The features of NVSRAM are given as following:

- Data Valid : 10 years
- Read/write cycles: without limit
- Total 31 bytes

## **2.12 Use EEPROM**

---

The EEPROM is designed to store the data which are not changed very frequently. These data are given as following:

- Module ID, configuration setting
- COM port configuration setting
- Small data base

**The erase/write cycle of EEPROM is limited**, the user should not change the EEPROM frequently for testing. The EEPROM can be **erase/write in single byte**, so it is very useful in real world applications.



## 2.13 Use Watchdog Timer

---

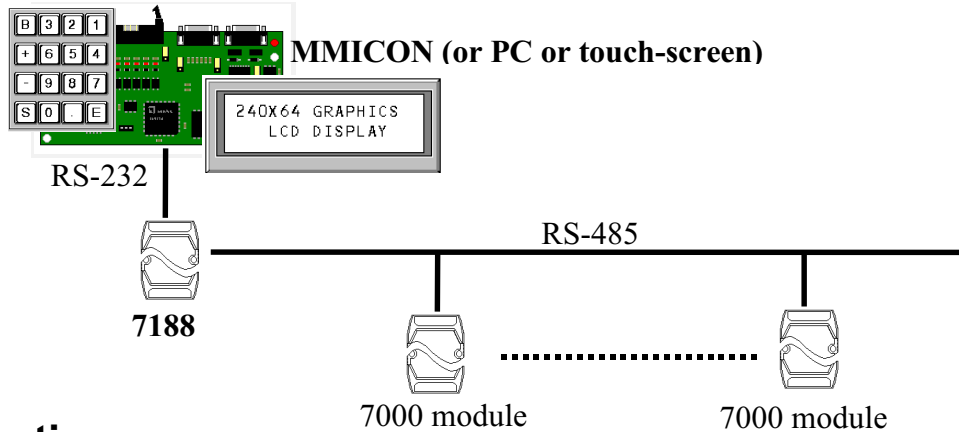
The watchdog timer of 7188(D)/DOS is fixed at 1.6 sec. **When the 7188(D)/DOS is power on, this watchdog timer will be always enable.** If the 7188(D)/DOS do not reset this watchdog timer for 1.6 second, the watchdog will RESET the 7188(D)/DOS.

The miniBIOS of 7188(D)/DOS will automatically reset the watchdog after first power on. The user program can call the software driver to tell miniBIOS stop to reset the watchdog timer, then the user program must reset the watchdog timer. If the user program does not reset the watchdog timer for 1.6 second, the watchdog timer will RESET the 7188(D)/DOS.

The user program can tell the miniBIOS to reset the watchdog timer again, then the user program can stop & return to the ROM-DOS. **Refer to “7188(D)/DOS Software User’s Manual” for demo program**

# 3. Applications

## 3.1 Embedded Controller



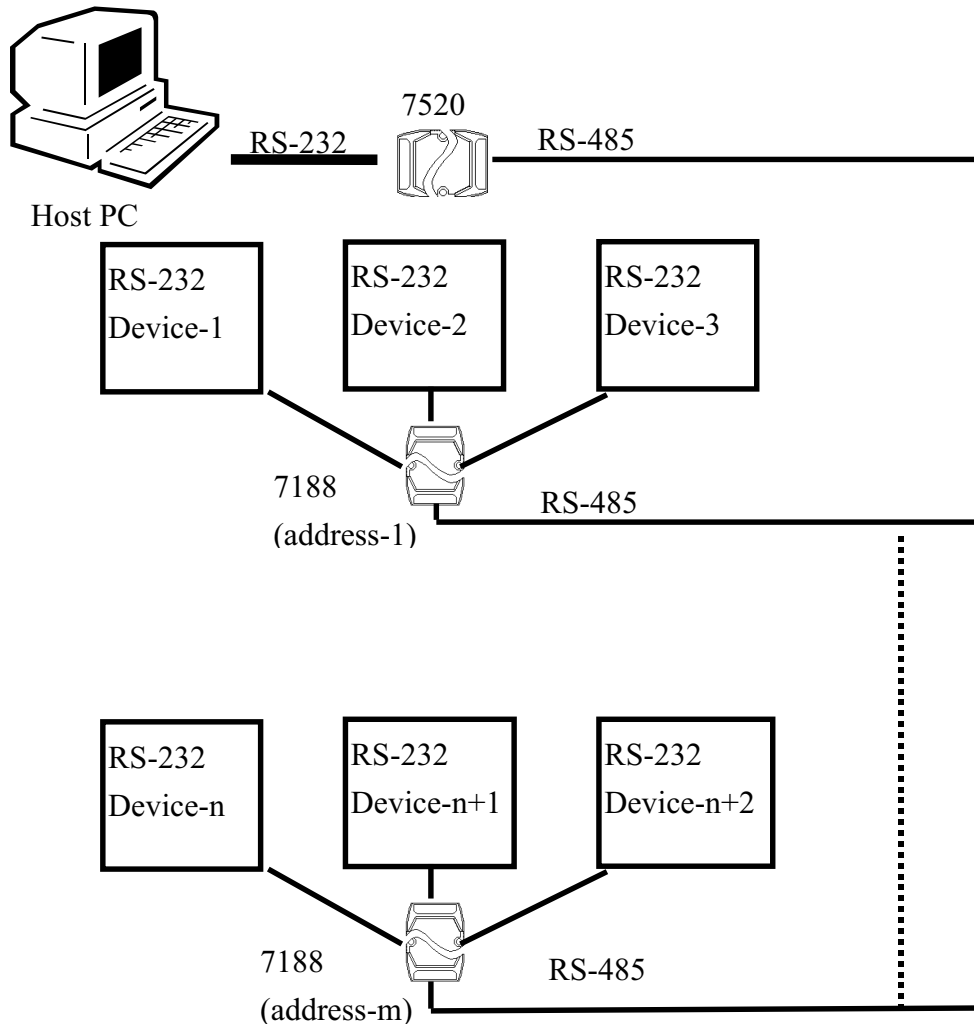
### Applications:

- **ADAM-4500 replacement & enhancement (not compatible)**
- **PC-Based controller replacement**
- **PLC replacement**
- **Special controller replacement**

The 7188 can be use as embedded controller for general application. Therefore it can be used to replace PC, PLC or special controller.

Programming Tool	TC or BC++ or MSC or VC++ or QuickBASIC for a DOS real mode execution program.
Debug Tool	<ul style="list-style-type: none"> <li>● Program via standard input or standard output (keyboard &amp; monitor of PC)</li> </ul>
Man Machine Interface	<ul style="list-style-type: none"> <li>● MMICON</li> <li>● Keyboard &amp; monitor of PC</li> <li>● Touch Screen (RS-232 or RS-485 interface)</li> </ul>
program	<ul style="list-style-type: none"> <li>● Stored in Flash ROM-DISK</li> </ul>
Input/Output	<ul style="list-style-type: none"> <li>● 7000 series modules</li> <li>● can directly control 256 modules = thousands of I/O points</li> </ul>

## 3.2 Addressable RS-232 Protocol Converter



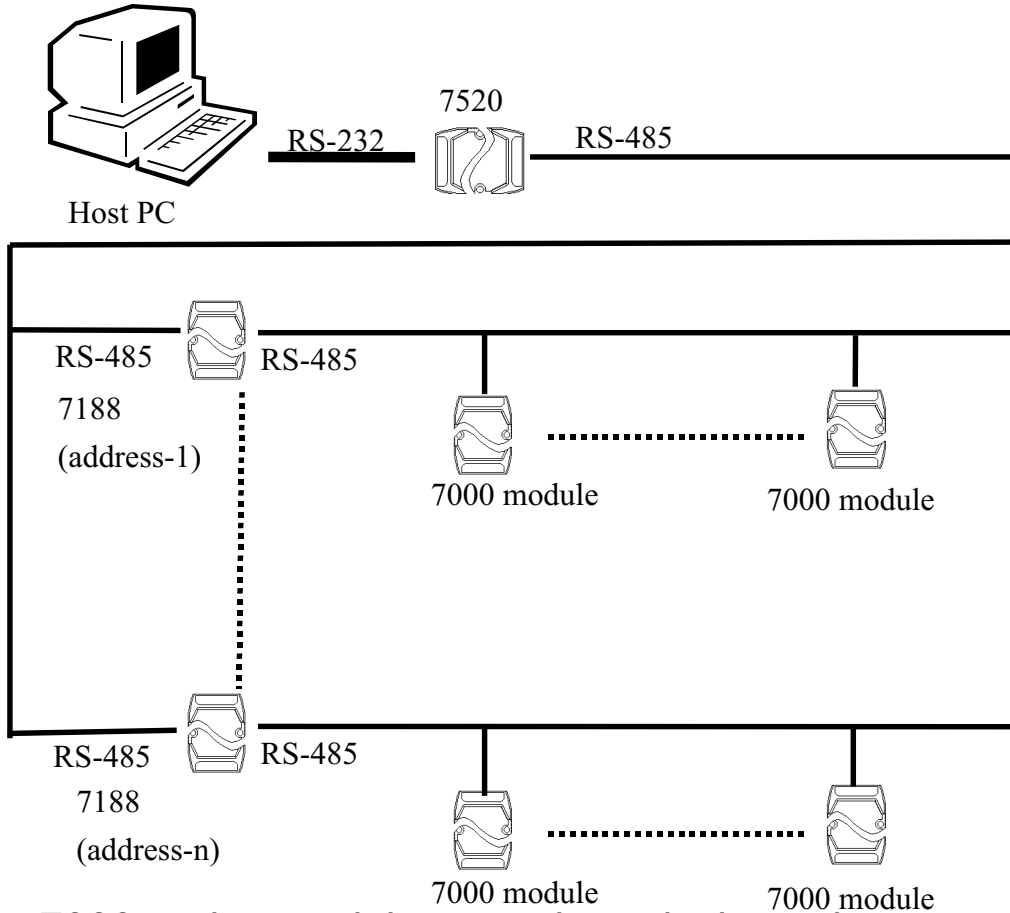
### Applications:

- **ADAM-4521 replacement & enhancement**
- **Multiple RS-232 devices networking**

The key points are given as following:

- Connect RS-232 devices to COM1/3/4 of 7188(D)/DOS
  - Connect COM2 of 7188 to RS-485 network
  - Store the 7188 module address into EEPROM(inside of 7188)
  - 7188 communicate to its local RS-232 devices & store data
- Host PC communicate to every 7188 for reading data from these RS-232 devices Refer to "7188(D)/DOS Software User's Manual" for demo program.

### 3.3 Local Real Time Controller



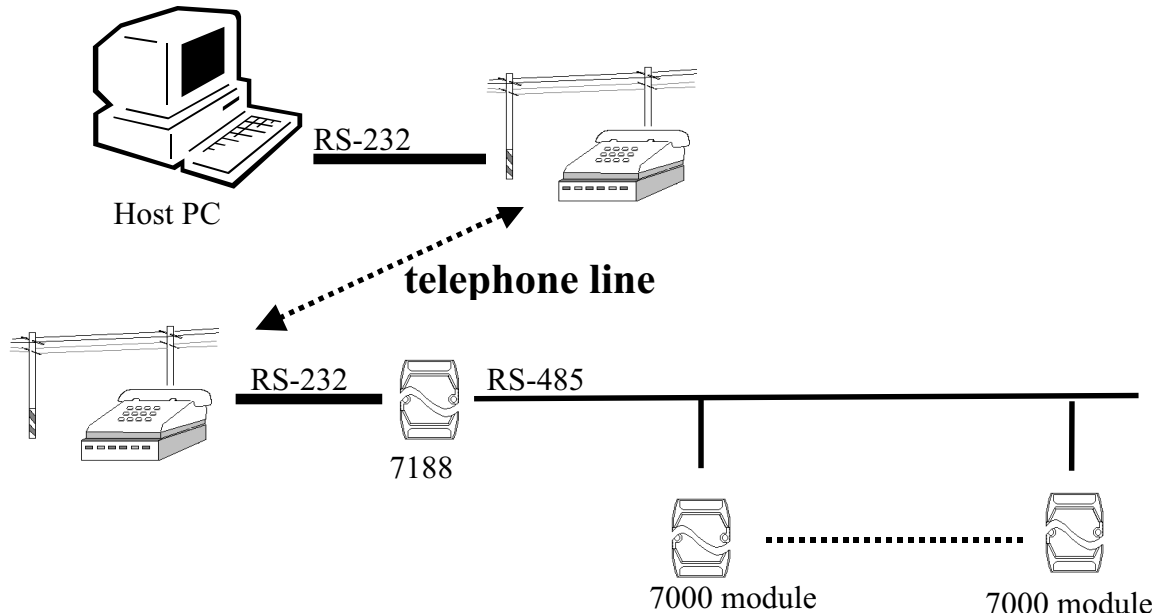
The 7000 series modules are slave devices, the control program are implemented in host PC. The working steps are given as following:

1. PC send out command to 7000 modules for input data.
2. PC analyze these input data & generate some output data
3. PC send out command to 7000 modules for output data

If there are hundred of 7000 modules, the PC will take a long time to analyze & control these modules.

The control program can be implemented in local 7188. The PC only has to send control arguments to 7188, the 7188 will control the local 7000 modules based on these control arguments. In this way, the PC can handle thousands of 7000 modules with 7188. Some control functions are **timing critical**. The local 7188 can real time handle these functions without PC. Refer to “7188(D)/DOS Software User’s Manual” for demo program.

## 3.4 Remote Local Controller



The control program is implemented in local 7188(D)/DOS. The 7188(D)/DOS will direct control the 7000 modules based on these control arguments.

The PC can access the remote 7188(D)/DOS for the following items:

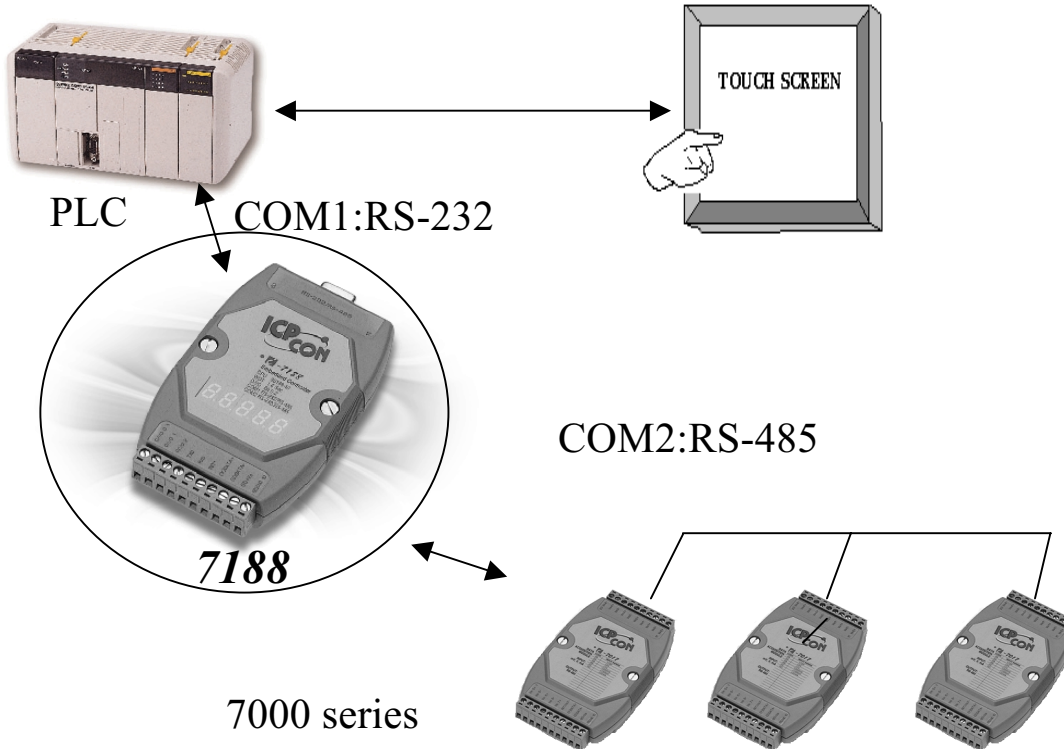
- query & record the remote system status
- download the control arguments to remote 7188(D)/DOS

The remote 7188(D)/DOS can communicate to PC for the following items:

- emergency events call back
- remote system status send back

Refer to “7188(D)/DOS Software User’s Manual” for demo program.

### 3.5 I/O Extension of PLC applications



There is a Man Machine Interface in most PLC. This interface is originally designed for MMI application. The 7188(D)/DOS can use this interface to build a bridge between PLC & 7000 modules. The 7188(D)/DOS can direct read/write the internal memory of PLC. Therefore the **PLC can access the 7000 input modules** as following:

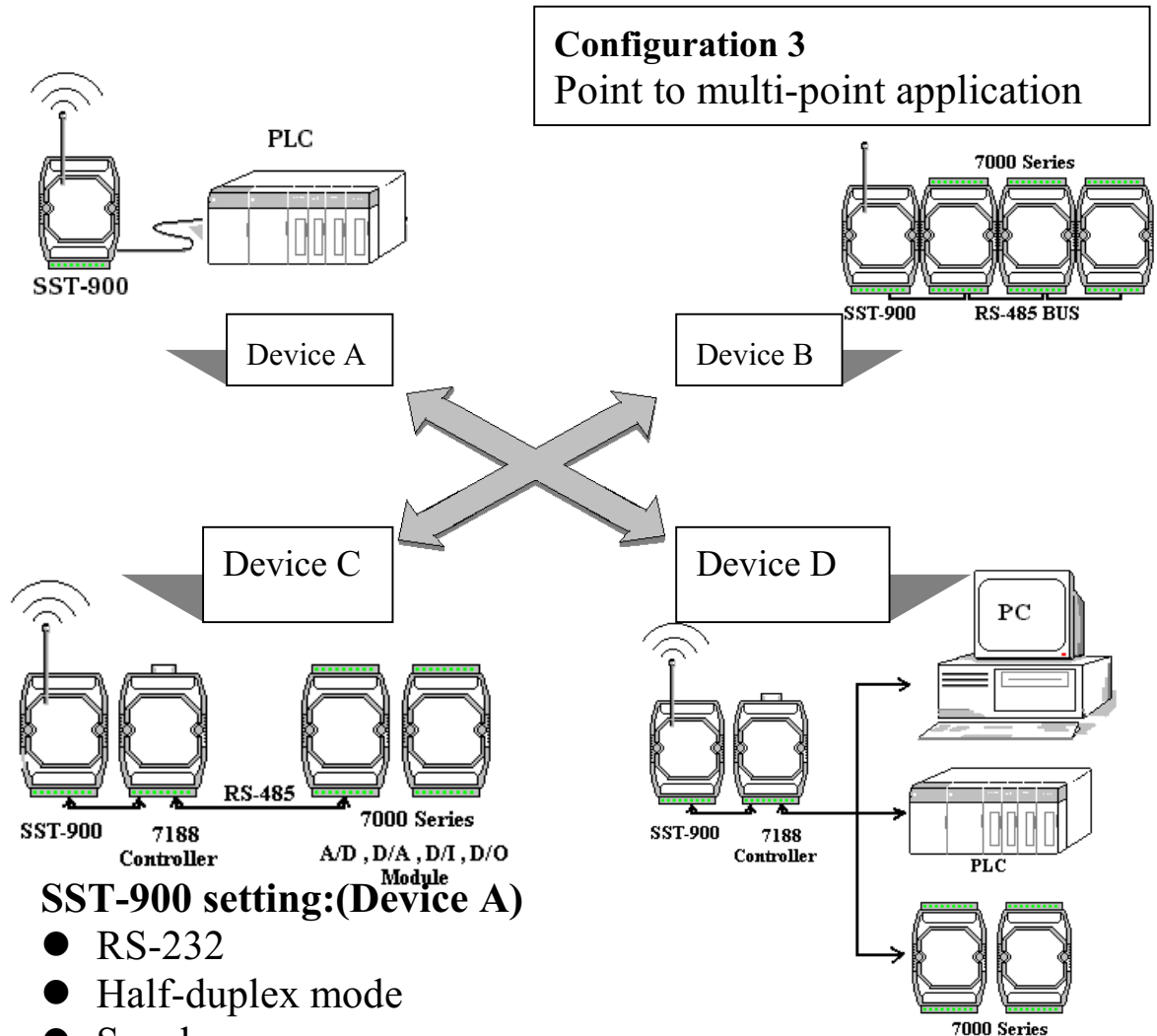
1. 7188(D)/DOS send command to 7000 input modules
2. 7188(D)/DOS write these data to PLC's internal memory
3. PLC access these data from internal memory

The **PLC can control the 7000 output modules** as following:

1. PLC write data to its internal memory
2. 7188(D)/DOS read these output data from PLC's memory
3. 7188(D)/DOS send command to 7000 output modules

In this way, the input data of 7000 modules can be shown in touch screen. Also, the user can control the output of 7000 modules in touch screen. Refer to "7188(D)/DOS Software User's Manual" for demo program.

## 3.6 Radio Modem Applications



The 7188 is a embedded controller. Because the 7188 is programmable, **it can be used as a bridge between the SST-900 & external devices.** These devices can be PLC, controller or 7000 modules.

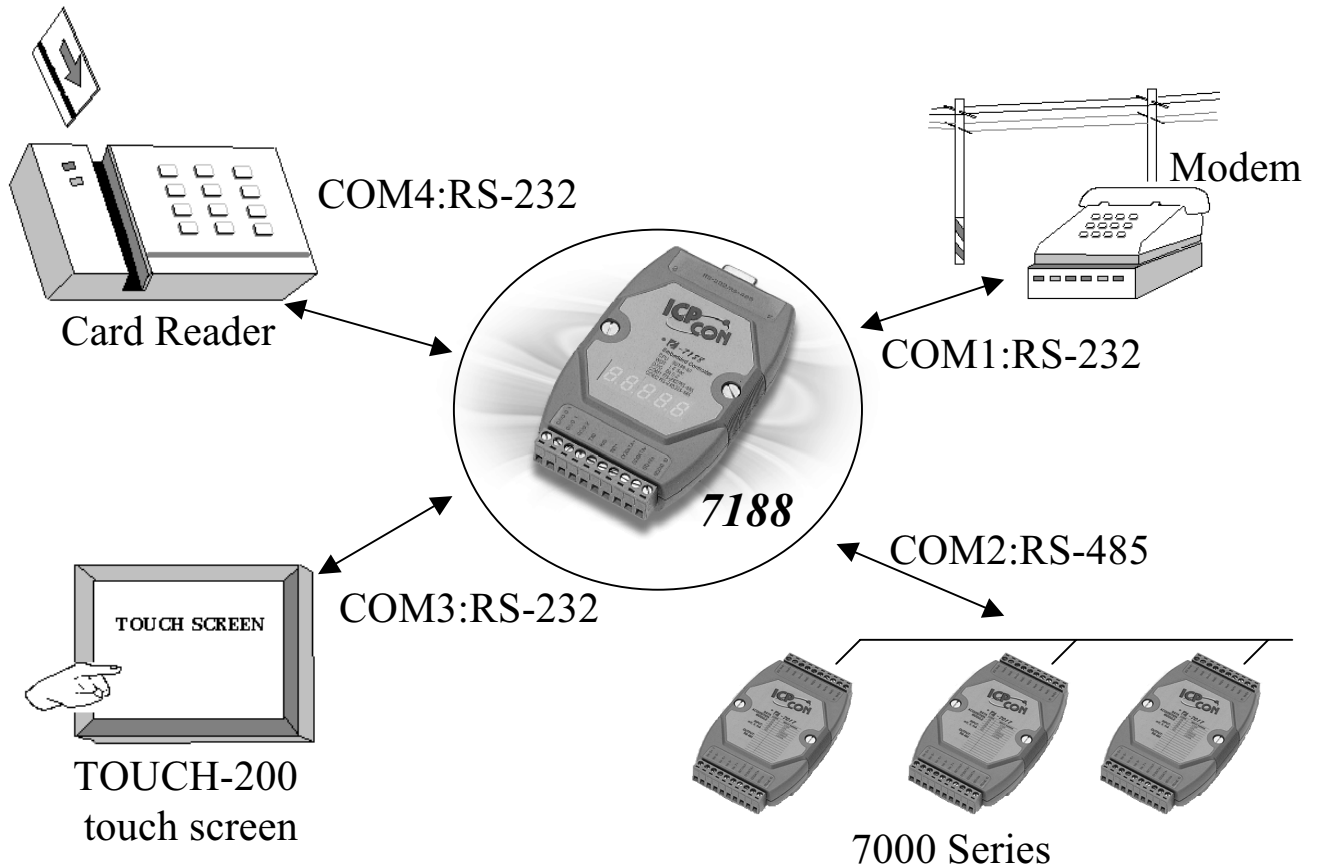
### 3.7 Use all 4 COM port Application-1



COM1: PLC can access the I/O states of 7000 modules  
COM2: direct control 7000 input/output modules  
COM3: MMICON is used as the local MMI  
COM4: PC is used to monitor & record the system data.  
Refer to “7188(D)/DOS Software User’s Manual” for demo program.



## 3.8 Use all 4 COM port Application-2



COM1: link to remote host PC

COM2: direct control 7000 input/output modules

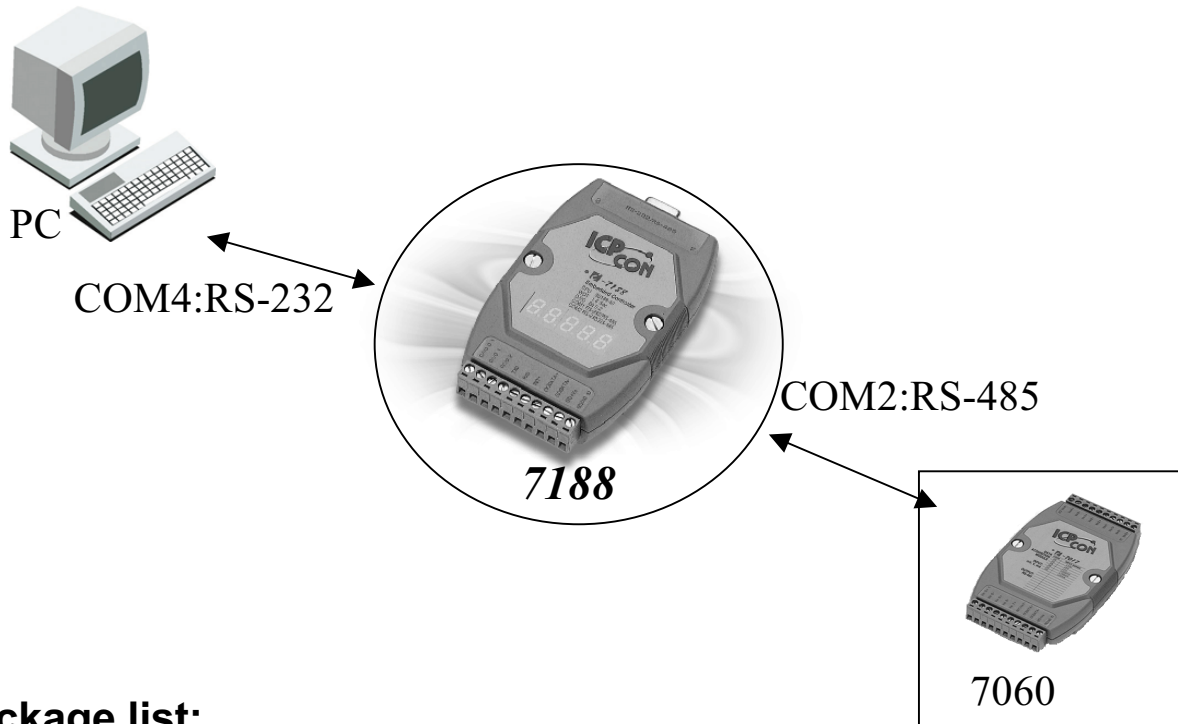
COM3: TOUCH-200 is used as the local MMI

COM4: Card reader is used as standard input device.

Refer to “7188(D)/DOS Software User’s Manual” for demo program.

# 4. Learning Kits

## 4.1 IKIT-07/110 & IKIT-07/220



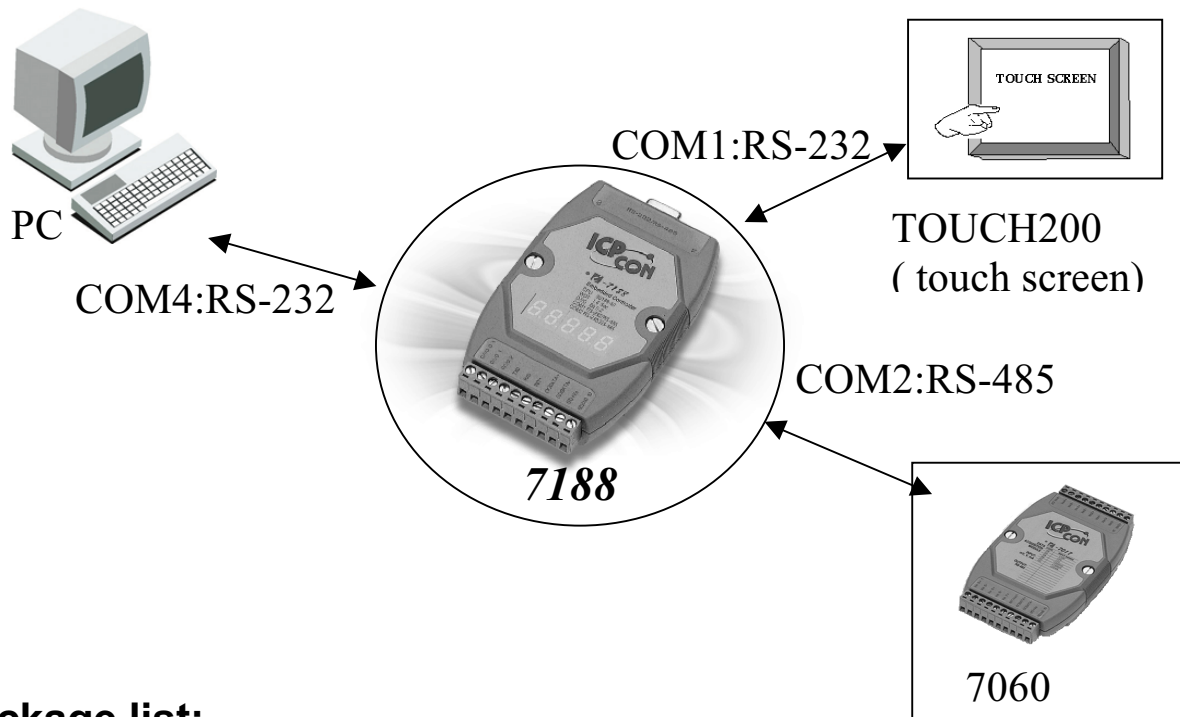
### Package list:

- 7188D/DOS \* 1, 7060 \* 1, download cable CA0910 \* 1
- PWR-24/110 \* 1 or PWR-24/220 \* 1
- “7188(D)/DOS Hardware User’s Manual” \* 1
- “7188(D)/DOS Software User’s Manual” \* 1
- 7188(D)/DOS software utility disk \* 1

### Features:

- All wire connections are ready for use.
- DEMO50.EXE will be executed automatically after first power on.
- The PC can directly control the D/O of the 7060
- All D/I of the 7060 will be shown in the PC’s monitor
- All debug information will be shown in the PC’s monitor
- Refer to \7188DOS\C\DEMO50\README.TXT for more information.

## 4.2 IKIT-08/110 & IKIT-08/220



### Package list:

- 7188D/DOS \* 1, 7060 \* 1, download cable CA0910 \* 1
- PWR-24/110 \* 2 or PWR-24/220 \* 2
- TOUCH-200\*1, user manual\*1, utility disk\*2, cable CA0910B \* 1
- “7188(D)/DOS Hardware User’s Manual” \* 1
- “7188(D)/DOS Software User’s Manual” \* 1
- 7188(D)/DOS software utility disk \* 1

### Features:

- All wire connections are ready for use.
- DEMO51.EXE will be executed automatically after first power on.
- The TOUCH-200 & PC can directly control the D/O of the 7060
- All D/I of the 7060 will be shown in the TOUCH7 & PC’s monitor
- All debug information will be shown in the PC’s monitor
- Refer to \7188DOS\C\DEMO51\README.TXT for more information.

## Appendix: Specifications of TOUCH-200

Input power	24VDC +/- 5%
CE	complies with EN50081-2 and EN50082-2 standards
EMI	complies with FCC Class A
Isolation resistance	Exceed 50MW at 500VDC
Vibration endurance	10 to 25 Hz(X,Y,Z direction 2G 30minutes)
Protection structure	IP65 front panel(O ring seal)
Operating Temperature	0~45C
Operation humidity	10-90% RH
Dimensions HxWxD	204x150x75mm
Weight	Approx. 1.0kg

### Hardware Specification

Display	<b>5.7" high contrast, blue mode LCD</b>
Resolution	320(W) x 240(H) dots
Display area	120(W) x 90(H) mm
Dot size	0.33(W) x 0.33 (H) mm
Back light	CCFT (MTBF 10,000hr, w/ auto shutdown, replaceable)
Touch panel	resistive type, audible feedback on touch
Touch resolution(grid)	40(W) x 30(H)
Surface hardness	4H
Serial port	RS-232 x1 RS-485 x1 (2/4 wires auto setup)
Memory	512K bytes flash ROM
System diagnostic	power failure detection

### Functional Specification

Screen edit	by EasyBuilder screen editor (running under MS Windows 95/98)
No. of screen	256
No. of object	5370
Text string	1792 (max. capacity 52k bytes)
Bitmap graphics	288K bytes

### NOTE:

- The TOUCH-200 is a special OEM version of EasyView.
- EasyBuilder is a screen editor provided by EasyView.