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EXM-7

Serial Port Interface

Reference

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NOTES

1. Product Description

This manual contains the information you need to install and use the EXM-7 serial-port interface.

The EXM-7 provides two RS-232 serial ports. When used in an EPC, which typically has two serial ports already configured as the COM1 and COM2 devices, the EXM-7 is normally used as the COM3 and COM4 devices. The EXM-7 is fully compatible with the serial ports in the IBM PC architecture, thus a wide range of software packages operate with the EXM-7.

1 1

Specifications

The following table defines the environmental and electrical specifications of the EXM-7.

Characteristic		Value
Environmental Specifications		
Temperature	operating	0 to 60°C ambient
	storage	-40 to 85°C
Humidity	operating	5% to 95% non condensing
	storage	5% to 95% non condensing
Altitude	operating	10,000 ft (3,000 m)
	storage	50,000 ft (15,000 m)
Vibration	operating	0.015 inch (0.38 mm) Peak to Peak displacement with 2.5 g peak (max) acceleration over 5 to 2000 Hz
	storage	0.030 inch (0.76 mm) Peak to Peak displacement with 5.0 g peak (max) acceleration over 5 to 2000 Hz
Shock	operating	30 g, 11 ms duration, half-sine shock pulse
	storage	50 g, 11 ms duration, half-sine shock pulse
Electrical Specifications		
Current		+5V @ 0.30A
		+12V @ 0.1A
		-12V @ 0.1A

Table 1. EXM-7 Environmental and Electrical Specifications.

2. Installation

2 2

Before installing your EXM-7, you should unpack and inspect it for shipping damage.

✉ **DO NOT REMOVE THE MODULE FROM ITS ANTI-STATIC BAG UNLESS YOU ARE IN A STATIC-FREE ENVIRONMENT. THE EXM-7, LIKE MOST OTHER ELECTRONIC DEVICES, IS SUSCEPTIBLE TO ESD DAMAGE. ESD DAMAGE IS NOT ALWAYS IMMEDIATELY OBVIOUS, IN THAT IT CAN CAUSE A PARTIAL BREAKDOWN IN SEMICONDUCTOR DEVICES THAT MIGHT NOT IMMEDIATELY RESULT IN A FAILURE.**

✉ **ENSURE THAT THE INSTALLATION PROCESS AS DESCRIBED HEREIN IS ALSO PERFORMED IN A STATIC-FREE ENVIRONMENT.**

Insertion in an EXM Carrier

Insertion of the EXM-7 into an EXM carrier, such as the EXP-MC, is straightforward. In the case of the EXP-MC, first ensure that the subplane has been inserted into the backplane and that the EXP-MC has been inserted into the subplane and attached to the chassis. Then remove any blank EXM panel from the carrier (by unscrewing the thumbscrews) and insert the EXM-7 into the cardguides. Firmly press the EXM-7 front panel to ensure that it has mated with the rear connector, and secure it with the thumbscrews.

✉ **MAKE SURE THAT POWER TO YOUR SYSTEM IS OFF. THE EXM IS NOT DESIGNED TO BE INSERTED OR REMOVED FROM A LIVE SYSTEM.**

✉ **WHEN INSERTING THE EXM, AVOID TOUCHING THE CIRCUIT BOARD, AND MAKE SURE THE ENVIRONMENT IS STATIC-FREE.**

2 2

Configuration Using BIOS Setup Screen

The EXM configuration data in the EPC to which the EXM-7 is connected needs to be modified to recognize and enable the card and select from the available options. Invoke the BIOS setup function by pressing the CTRL-ALT-ESC keys simultaneously.

Enabling the EXM module

Once in the setup program, a menu displays specifying which function keys are available for further configuration. Press the F2 function key to invoke the EXM menu. The screen display resembles Figure 1 below.

```
          ID OB1 OB2
Slot 0    FF  00  00
     1    DB  C1  00
     2    F8  15  0C
     3    DE  00  39
     4    ED  01  00
     5    DC  F5  91
```

Figure 1. EXM Setup Screen.

The setup screen displays the EXM configuration data (in hexadecimal) stored in nonvolatile memory which the EPC uses at power-up to recognize and configure each installed EXM. The displayed data shows SLOT, ID, OB1 and OB2 for each installed EXM.

Note that all slots are listed on the screen even if the actual system configuration does not have all the possible EXM slots. All slots **not** occupied by an EXM module should show an ID of FF and OB1/OB2 of 00 00 indicating that no EXM is present. A typical value for the EXM-7 is shown in bold letters in slot 2.

Slot, OB1 and OB2 are defined as follows:

SLOT — indicates the slot in which the EXM is installed. See the diagram below to determine which EXM slot the EXM-7 occupies. Note that dashed lines indicate EXM slots that may not be available on all systems.

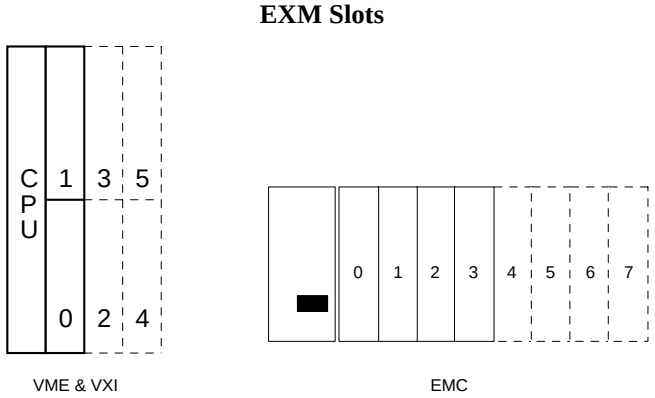


Figure 2. EXM Slot Numbering.

ID is a hard-wired ID value. Each EXM has a unique ID value.

OB1/OB2 are two bytes of option information.

To add or change an EXM configuration, use the cursor keys (arrows) to move between the fields on the screen. Move the cursor to the appropriate slot entry and type in the correct value.

The **ID** for the EXM-7 is **F8**h.

OB1 and OB2 are two bytes of option information.

OB1 is a hexadecimal value derived by combining the following:

Bit 7-5 unused	Bit 4-3 Port B I/O Base		Bit 2-1 Port A I/O Base		Bit 0 EXM Enable	
000	00	disabled	00	disabled	0	disable
	01	2F8 (COM2)	01	3F8 (COM1)	1	enable
	10	2E8 (COM4)	10	3E8 (COM3)		
	11	2B8	11	2A0		

Table 2. OB1 Configuration Bit Definition.

OB2 is a hexadecimal value derived by combining the following:



Bits 7-4 Unused		Bits 3-2 Port B Interrupt		Bits 1-0 Port A Interrupt	
0000		00	IRQ9(2)	00	IRQ9(2)
		01	IRQ3	01	IRQ3
		10	IRQ4	10	IRQ4
		11	IRQ5	11	IRQ5

Table 3. OB2 Configuration Bit Definition.

For instance, a typical OB1 value is **15**h (00010101), representing Port B set to 2E8h (COM4) and Port A set to 3E8h (COM3), and EXM-7 enabled.

A typical OB2 value is **0C**h (00001100), representing Port B set to IRQ5 and Port A set to IRQ9(2).

When making your selections, keep the following points in mind:

1. Choose values that don't create conflicts with other EXMs or PC add-in cards.

2. Do not choose COM1 (3F8h) and COM2 (2F8h) if your EPC already uses these serial ports.

3. Connectors

3 3

The EXM-7 has two standard male DB-9 connectors. The signals are shown below.

Pin	Signal	Direction
1	CD (carrier detect)	input
2	RXD (receive data)	input
3	TXD (transmit data)	output
4	DTR (data terminal ready)	output
5	GND (signal ground)	
6	DSR (data set ready)	input
7	RTS (request to send)	output
8	CTS (clear to send)	input
9	RI (ring indicator)	input

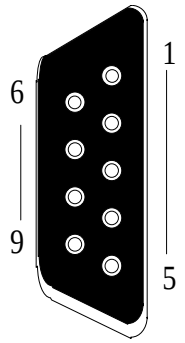


Table 4. DB-9 Pin-out.

Power Consumption

The maximum power consumption is 5V @ 0.3A, +12V @ 0.1A, and -12V @ 0.1A.

NOTES



4. Programming Interface

This chapter contains information needed to write custom software drivers for the EXM-7. Anyone using the EXM-7 with software compatible with standard PC COM ports can skip reading this chapter. The EXM-7 defines the following registers in the I/O space.

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	I/O Port
1	1	1	1	0	1	1	1	100
Device ID Register								
			Port B base		Port A base		CDEN	102
Configuration Option Byte 1 Register								
				Port B int		Port A int		103
Configuration Option Byte 2 Register								
								xx0
Receiver/Transmitter Buffer / Baud Rate Divisor Latch								
								xx1
Interrupt Enable Register / Baud Rate Divisor Latch								
								xx2
Interrupt ID Register								
								xx3
Line Control Register								
								xx4
Modem Control Register								

								xx5

Line Status Register

								xx6

Modem Status Register

The I/O port denoted `XX0` represents the selected I/O base address for the EXM-7, `XX1` represents this address plus one, and so on.

The first three are standard EXM registers for device identification and configuration. The EXM-7 responds to accesses to these ports only if EXMbus line -EXMID is asserted. An 8-bit read from I/O address 100h returns the value F8, the device ID of the EXM-7. Read/write configuration registers appear at I/O addresses 102h amd 103h. The bit encodings are defined in the previous chapter.

Port B base selects the place in the I/O space in which the 8-byte I/O port area of serial port B of the EXM-7 appears, or disables this port.

Port A base selects the place in the I/O space in which the 8-byte I/O port area of serial port A of the EXM-7 appears, or disables this port.

CDEN specifies whether the EXM is disabled or enabled. If disabled, the EXM will not respond to any I/O or memory addresses and will not assert an interrupt output; it will only respond to reads from I/O port 100h and reads and writes from I/O ports 102h and 103h, and then only if EXMbus line -EXMID is asserted.

Port B int selects the interrupt to be generated by port B.

Port A int selects the interrupt to be generated by port A.

For details on the remaining registers, refer to documentation on any of the many UARTs compatible with the IBM PC architecture (e.g., NS16450, i82050).

5. Support and Service

In North America

Technical Support

RadiSys maintains a technical support phone line at (503) 646-1800 that is staffed weekdays (except holidays) between 8 AM and 5 PM Pacific time. If you have a problem outside these hours, you can leave a message on voice-mail using the same phone number. You can also request help via electronic mail or by FAX addressed to RadiSys Technical Support. The RadiSys FAX number is (503) 646-1850. The RadiSys E-mail address on Internet is support@radisys.com. If you are sending E-mail or a FAX, please include information on both the hardware and software being used and a detailed description of the problem, specifically how the problem can be reproduced. We will respond by E-mail, phone or FAX by the next business day.

Technical Support Services are designed for customers who have purchased their products from RadiSys or a sales representative. If your RadiSys product is part of a piece of OEM equipment, or was integrated by someone else as part of a system, support will be better provided by the OEM or system vendor that did the integration and understands the final product and environment.

Bulletin Board

RadiSys operates an electronic bulletin board (BBS) 24 hours per day to provide access to the latest drivers, software updates and other information. The bulletin board is not monitored regularly, so if you need a fast response please use the telephone or FAX numbers listed above.

The BBS operates at up to 14400 baud. Connect using standard settings of eight data bits, no parity, and one stop bit (8, N, 1). The telephone number is (503) 646-8290.

Repair Services

Factory Repair Service is provided for all RadiSys products. Standard service for all RadiSys products covers factory repair with customers paying shipping to the factory and RadiSys paying for return shipment. Overnight return shipment is available at customer expense. Normal turn-around time for repair and re-certification is five working days.

Quick Exchange services (immediate shipment of a loaner unit while the failed product is being repaired) or other extra-cost services can be arranged, but need to be negotiated in advance to allow RadiSys to pool the correct product configurations. RadiSys does not maintain a general "loaner" pool: units are available only for customers that have negotiated this service in advance.

RadiSys does not provide a fixed-price "swap-out" repair service, as customers have indicated that issues of serial number tracking and version control make it more convenient to receive their original products back after repair.

5 5

Warranty Repairs

Products under warranty (see warranty information in the front of this manual) will have manufacturing defects repaired at no charge. Products sent in for warranty repair that have no faults will be subject to a recertification charge. Extended Warranties are available and can be purchased at a standard price for any product still under warranty. RadiSys will gladly quote prices for Extended Warranties on products whose warranties have lapsed; contact the factory if this applies.

Customer induced damage (resulting from misuse, abuse, or exceeding the product specifications) is not covered by the standard product warranty.

Non-Warranty Services

There are several classes of non-warranty service. These include repair of customer induced problems, repairs of failures for products outside the warranty period, recertification (functional testing) of a product either in or out of warranty, and procurement of spare parts.

All non-warranty repairs are subject to service charges. RadiSys has determined that pricing repairs based on time and materials is more cost-effective for the customer than a flat-rate repair charge. When product is received, it will be analyzed and, if appropriate, a cost estimate will be communicated to the customer for authorization. After the customer authorizes the repair and billing arrangements have been made, the product will be repaired and returned to the customer.

A recertification service is provided for products either in or out of warranty. This service will verify correct operation of a product by inspection and testing of the product with standard manufacturing tests. There is a product-dependent charge for recertification.

There are only a few components that are generally considered field-repairable, but, because RadiSys understands that some customers want or need the option of repairing their own equipment, all components are available in a spares program. There is a minimum billing charge associated with this program.

Arranging Service

To schedule service for a product, please call RadiSys Technical Support directly at (503) 646-1800. Have the product model and serial numbers available, along with a description of the problem. A Technical Support representative will issue a Returned Materials Authorization (RMA) number, a code number by which we track the product while it is being processed. Once you have received the RMA number, follow the instructions of the Technical Support representative and return the product to us, freight prepaid, with the RMA number clearly marked on the exterior of the package. If possible re-use the original shipping containers and packaging. In any case, be sure you follow good ESD-control practices when handling the product, and ensure that anti-static bags and packing materials with adequate padding and shock-absorbing properties are used.

Ship the product, freight prepaid, to the following address:

Product Service Center
RadiSys Corporation
15025 SW Koll Parkway
Beaverton, Oregon 97006-6902

When shipping the product, include the following information: return address, contact names and phone numbers in purchasing and engineering, and a description of the suspected problem. Any ancillary information that might be helpful with the debugging process will be appreciated.

Other Countries

Contact the sales organization from which you purchased your RadiSys product for service and support.

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