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EXM-18

Reference

RadiSys®Corporation

15025 S.W. Koll Parkway

Beaverton OR 97006

Phone: 800-950-0044

In Oregon: (503) 646-1800

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1. Product Description

This manual contains the information you will need to install and use the EXM-18 parallel and serial I/O expansion module.

The EXM-18 is an expansion module containing a single PC compatible parallel port and a PC compatible serial port. There are two different versions of the EXM-18; one has an RS-232 serial port and the other has RS-422. The serial port standard for each card is clearly labeled on the front panel to the left of the serial port. Throughout this manual, sections that refer to both versions of the expansion module will refer generically to the EXM-18. For those sections specific to each version, that section will refer to the particular serial standard.

The EXM-18 is fully software configurable via the setup screen allowing the user to enable or disable the card and select the I/O address and interrupt level for each port.

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Specifications

The following table defines the environmental and power specifications of the EXM-18.

Characteristic		Value
Environmental		
Temperature	operating	0° to 60° C (* see below)
	storage	-40° to 125° C
Humidity	operating	0 - 95% (non-condensing)
	storage	0 - 95% (non-condensing)
Vibration	operating	.015"PP 2.5g (max) 5-2000 Hz
	storage	.030"PP 5g (max) 5-2000 Hz
Shock	operating	30g 11 msec duration
	storage	50g 11 msec duration
Electrical		
EXM-18-422	maximum	+5V @ 1 A
	typical	+5V @ 700 mA
EXM-18-232	maximum	+5V @ 600 mA
	typical	+5V @ 400 mA

* Upper temperature limit degrades 2° C per 1000 ft. elevation. Maximum elevation 10,000 ft.

2. Installation

Before installing your EXM-18, 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-18, LIKE MOST OTHER ELECTRONIC DEVICES, IS SUSCEPTIBLE TO ESD DAMAGE. ESD DAMAGE IS NOT ALWAYS IMMEDIATELY OBVIOUS,**

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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-18 into an EXM carrier is straightforward. Remove a blank EXM panel from the carrier (by unscrewing the thumbscrews) and insert the EXM-18 into the card guides. Firmly press the EXM-18 front panel to ensure that the module is properly seated in the subplane 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.**

☛ **INSERT IT WITH ADEQUATE CONTINUOUS FORCE RATHER THAN TAPPING OR HAMMERING ON IT.**

Configuring the BIOS Setup

The EXM configuration data in the EPC to which the EXM-18 is connected needs to be modified to recognize and enable the card and select from the available options. Follow the instructions in the EPC reference manual for your specific EPC model to invoke the BIOS setup function. This is typically done by pressing the CTRL-ALT-ESC keys simultaneously. EPC system configuration procedures differ slightly depending on BIOS versions.

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Enabling the EXM module

Once in the setup program, a menu will be displayed specifying which function keys are available for further configuration. Press the designated function key to invoke the EXM menu. The screen looks something like

```
EXM Setup Screen

          ID OB1 OB2
Slot 0    DD  FD  00
     1    FF  00  00
     2    FF  00  00
     3    FF  00  00
     4    FF  00  00
     5    FF  00  00
```

This 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. These are defined as follows:

SLOT — indicates the slot in which the EXM is installed. See the diagram below to determine which slot the EXM occupies.

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EXM Slots

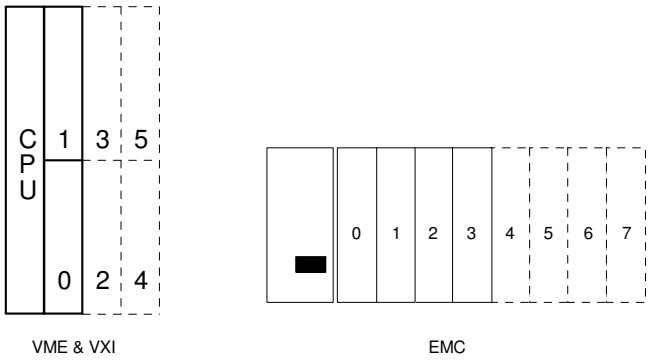


Figure 1: EXM Slot Numbering

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

OB1/OB2 are two bytes of option information.

Note that all slots are listed even if the 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.

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-18 should be set to **DD**.

OB1 is a hexadecimal value derived by combining the following:

RTS Gate Enable (bit 7)	Parallel port I/O select (bit 6)	Parallel port base address select (bit 5)	Serial port interrupt select (bits 4 & 3)	Serial port base address (bits 2 & 1)	EXM-18 card enable (bit 0)
RS232 - x - don't care RS422 - 0 - disabled 1 - enabled	0 - input 1 - output	0 - 278, IRQ5 1 - 378, IRQ7	00 - none 01 - IRQ3 10 - IRQ4 11 - IRQ2	00 - none (disabled) 01 - 2F8 10 - 3E8 11 - 2E8	0 - disabled 1 - enabled

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For example, a typical OB1 value is FDh (11111101) indicating RTS gate enabled, the parallel port is set for output, the parallel port is set for a base address of 378h, IRQ7. The serial port is set to IRQ2, 3E8 (COM3) and the card is enabled.

RTS Gate enable - This bit has no effect on the RS-232 version. For the RS-422 version, when this bit is set (1) the 422 port is enabled for output only when RTS is asserted. This bit should be set (1) for RS-423 multi-drop applications. When clear (0), outputs are always enabled.

Parallel port I/O select - The parallel port is not simultaneously bi-directional. When this bit is set (1), the port is configured for output, when clear (0) the port is set for input.

Special Note:

To allow the parallel port to be used for input, the direction bit (bit 5 of register 2) on the 16C452 must also be programmed for input. To program this bit, read register 2 (addressed at parallel port base address + 2). Next OR the data with 10h. Then write the data out to the same address.

Since the parallel port defaults to output at power-up, this will have to be done after each hardware reset (power-on, front panel reset, loss of power reset, etc.).

Parallel port base address select - The standard PC architecture defines the parallel port base address and interrupt levels together. Therefore one selection sets both. If LPT1 already exists in the system, this bit must be clear (0) so the interrupt and base address of this port do not conflict with the existing LPT1. When using DOS, whichever port is found first during power-up will be assigned the alias LPT1 and the second parallel port found will be assigned LPT2. Unlike serial ports, the base address does **not** determine which port is assigned which alias. At power-up, the system will check the motherboard (CPU) first, then check each EXM slot starting at slot 0.

Serial port interrupt select - These bits determine which hardware interrupt level the serial port will use. Keep in mind that COM1: is IRQ4 and COM2 is IRQ3. These bits should be set to not conflict with any other port in the system.

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Serial port base address - These bits determine which base address the serial port will respond to. 00 indicates that the serial port is disabled. Like all standard PCs, serial port aliases (COM1:, COM2:, etc) are determined by the base address. These bits should be set so that the base address of this serial port does not conflict with other serial ports in the system. COM2 is at 2F8h, COM3 at 3E8h, and COM4 at 2E8h.

Card enable - This bit determines whether the EXM-18 will be enabled or disabled at power-up.

OB2 is not used by the EXM-18 and should be set to **00**.

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3. Operation

The EXM-18 provides both a standard 25-pin parallel port and a 9-pin serial port, either RS-232 or RS-422. Both ports are implemented using a single VLSI VL16C452 chip. The VL16C452 provides two serial channels, channel 0 and channel 1. Channel 0 is not used. The serial port on the EXM-18 is wired to channel 1.

This chip does not support HDLC and SDLC protocols. For detailed programming information, see the VLSI Technology data manual.

The driver chips used are National Semiconductor DS3691M.

The RS422 version uses 100 ohm, line to line termination.

The input clock speed is set at 1.8432 MHz. This provides baud rates based on the following divisors:

Desired Baud rate	Divisor used	Desired Baud rate	Divisor used
50	2304	2000	58
75	1536	2400	48
110	1047	3600	32
134.5	857	4800	24
150	768	7200	16
300	384	9600	12

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600	192	19200	6
1200	96	38400	3
1800	64	56000	2

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Connectors

The parallel port is a standard DB-25 with the pin-out defined as:

Pin	Signal	Pin	Signal
1	Strobe	14	Auto line feed
2	DB0	15	Error
3	DB1	16	Initialize printer
4	DB2	17	Select in
5	DB3	18	Signal ground
6	DB4	19	Signal ground
7	DB5	20	Signal ground
8	DB6	21	Signal ground
9	DB7	22	Signal ground
10	Acknowledge	23	Signal ground
11	Busy	24	Signal ground
12	Paper end	25	Signal ground
13	Select		



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The Serial port is a Micro-D 9-pin female connector. The mating connector is an ITT Cannon MDSM-9SC-Z11 male connector or equivalent. The pin-out for each version of the serial port is shown below.

RS-232 version:

Pin	Signal	Pin	Signal
1	CD	6	DSR
2	RxD	7	RTS
3	TxD	8	CTS
4	DTR	9	RI
5	Gnd		



RS-422 version:

Pin	Signal	Pin	Signal
1	Gnd	6	CTS -
2	RTS+	7	CTS+
3	RTS-	8	RxD+
4	TxD+	9	RxD-
5	TxD-		

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4. Support and Service

In North America

Technical Support

RadiSys maintains a technical support phone line at (800) 950-0044 or (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 numbers. Alternately, you can request help via FAX addressed to RadiSys Technical Support. The RadiSys FAX number is (503) 646-1850. If you are sending 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 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.

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Repair Services

Factory Repair Service is provided for all RadiSys products. Standard service for all RadiSys products covers factory repair and shipment back to customer's site, 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 recertification is five working days.

Quick Exchange services (immediate shipment of a loaner unit to cover failed product) 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.

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.

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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, call RadiSys Technical Support at (800) 950-0044. 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. Remember, this is your product you are entrusting to the carrier, and you are assuming liability for correct packaging.

Ship the product, freight prepaid, to

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

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.

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Other Countries

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

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