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EXM-4

IEEE-488 Interface

Reference

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NOTES

1. Getting Started

This manual contains the information you need to install and use the EXM-4 IEEE-488 interface.

The EXM-4 is fully software-compatible with the popular National Instruments GPIB-PCII IEEE-488 interface; a wide range of software packages for the GPIB-PCII can be used with the EXM-4.

1 1

Specifications

Table 1 defines the environmental and electrical specifications of the EXM-4.

Characteristic		Value
Environmental		
Temperature	operating	0° to 60° C (* see below)
	storage	-40° to 85° C
Humidity	operating	5% - 95% (non-condensing)
	storage	5% - 95% (non-condensing)
Vibration	operating	.015"displacement with 2.5 g peak (max) acceleration over 5 to 2000 Hz
	storage	.030" displacement with 5 g peak (max) acceleration over 5 to 2000 Hz
Shock	operating	30g 11 msec duration, half-sine shock pulse
	storage	50g 11 msec duration, half-sine shock pulse
Electrical		
Voltage	+5V Supply	+5V ± 5%
Current	max	5V @ 1.2A
Miscellaneous		
Weight		3.0 ounces

Table 1. EXM-4 Environmental and Electrical Specifications.

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

2. Installation

Before installing your EXM-4, 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-4, 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-4 into an EXM carrier is straightforward. Remove any blank EXM panel from the carrier (by unscrewing the thumbscrews) and insert the EXM-4 into the card guides. Firmly press the EXM-4 front panel to ensure that it has mated with the rear connector, and secure it with the thumbscrews. DO NOT OVERTIGHTEN.

- **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.**

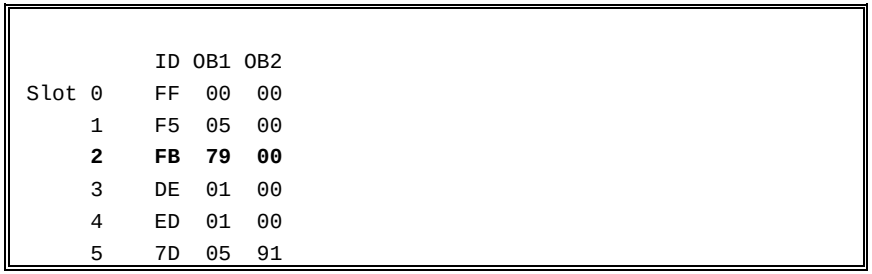
2 2

Configuration Using the BIOS Setup Screen

The EXM configuration data in the EPC to which the EXM-4 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	F5	05	00
2	**FB**	**79**	**00**
3	DE	01	00
4	ED	01	00
5	7D	05	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.

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-4 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-4 occupies. Note that dashed lines indicate EXM slots that may not be available on all systems.

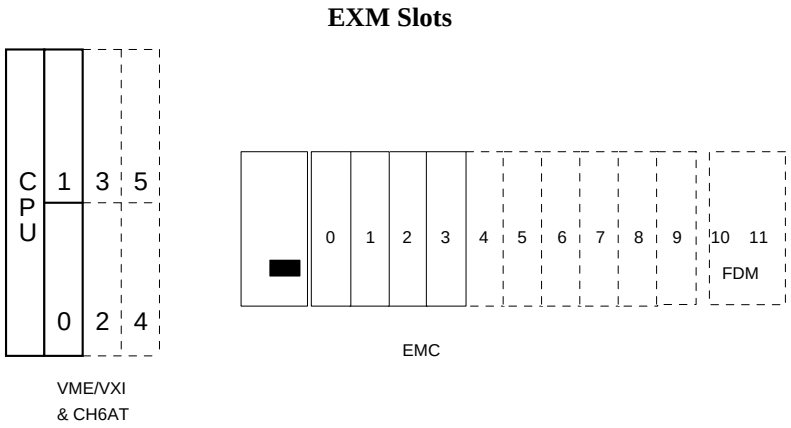


Figure 2. EXM Slot Numbering.

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-4 is **FB**h.

OB1 and OB2 are two bytes of option information. **OB1** is a hexadecimal value derived by combining the following:

DMA Channel Bits 7-6		Interrupt Bits 5-3		I/O Base Bits 2-1		EXM Enable Bit 0	
00	none	000	none	00	2B8	0	disabled
01	1	001	none	01	2C0	1	enabled
10	2	010	IRQ9	10	2C8		
11	3	011	IRQ3	11	2D0		
		100	IRQ4				
		101	IRQ5				
		110	IRQ6				
		111	IRQ7				



When making these selections, keep the following in mind:

- Choose values that don't create conflicts with other EXMs or PC add-in cards.
- Do not choose IRQ3 if you will also use the EPC's COM2 serial port.
- Do not choose IRQ4 if you will also use the EPC's COM1 serial port.
- Do not choose IRQ6 if you will also use a floppy disk drive.
- Do not choose IRQ7 if you will also use the EPC's LPT1 parallel port.
- Do not choose IRQ9 if you have another EXM or PC add-in card using IRQ2. In the IBM PC architecture, IRQ2 and IRQ9 mean the same thing.
- Do not choose DMA channels 2 and 3 if your system has a floppy disk drive and hard disk drive installed (e.g., an EXP-MS).

For instance, a typical OB1 value is **79**h (01111001), representing DMA channel 1, IRQ7, an I/O base of 2B8, and EXM enabled.

OB2 is not used and should be set to **00**h.

3. Connector

IEEE-488 Receptacle

The EXM-4 has a standard shielded IEEE-488 receptacle. The signals are shown below.

Pin	Signal	Pin	Signal
1	DIO1	13	DIO5
2	DIO2	14	DIO6
3	DIO3	15	DIO7
4	DIO4	16	DIO8
5	EOI	17	REN
6	DAV	18	GND
7	NRFD	19	GND
8	NDAC	20	GND
9	IFC	21	GND
10	SRQ	22	GND
11	ATN	23	GND
12	SHIELD	24	SIG GND

NOTES

3 3

4. Programming Interface

This chapter contains information needed to write custom software drivers for the EXM-4. Anyone using the EXM-4 with software compatible with the National Instruments GPIB-PCII can skip reading this chapter.

The EXM-4 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	1	0	1	1	100
Device ID Register								
DMA Channel		Interrupt			I/O	BASE	CDEN	102
Configuration Option Byte 1 Register								
								xx0
Data-in / Byte-out Register								
								xx1
Interrupt Status / Mask 1 Register								
								xx2
Interrupt Status / Mask 2 Register								
								xx3
Serial Poll Status / Mode Register								
								xx4
Address Status / Mode Register								
								xx5
Command Pass-Through / Auxiliary Mode Register								
								xx6

Address 0 Register

	xx7

Address 1 / End-of-String Register

The I/O port denoted `XX0` represents the selected I/O base address for the EXM-4, `XX1` represents this address plus one, and so on.

The first two are standard EXM registers for device identification and configuration. The EXM-4 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 FB, the device ID of the EXM-4. A read/write configuration register appears at I/O address 102h. The bit encodings are defined in the previous chapter.



DMA channel selects the DMA channel to be used, or specifies that no DMA channel will be used.

Interrupt selects the interrupt to be generated, or specifies that no interrupt is to be generated.

I/O base selects the place in the I/O space in which the 8-byte I/O port area of the EXM-4 appears.

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 port 102h, and then only if EXMbus line -EXMID is asserted.

For details on the remaining registers, refer to documentation on the NEC 7210 GPIB controller chip.

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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