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EXM-22

High Speed GPIB

Hardware Reference

RadiSys® Corporation

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07-0172-00 August 1993

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Hardware Warranty

RadiSys Corporation ("RadiSys") warrants the EPC system and component modules to the original purchaser for two years from the product's shipping date. If an EPC product fails to operate in compliance with its specification during this period, RadiSys will, at its option, repair or replace the product at no charge. The customer is, however, responsible for shipping the product; RadiSys assumes no responsibility for the product until it is received. This warranty does not cover repair of products that have been damaged by abuse, accident, disaster, misuse, or incorrect installation.

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1. Product Description

This manual contains the information required to install and use the EXM-22 high-speed General Purpose Instrumentation Bus (GPIB) expansion module. The EXM-22 conforms to both the IEEE 488.1 and IEEE 488.2 GPIB standards.

The EXM-22 provides a high-performance connection from a RadiSys EPC to the GPIB instrumentation bus. The EXM-22 is based on the Texas Instruments 9914 GPIB controller chip, and with the exception of one interrupt line, is compatible with the Hewlett-Packard 82341A GPIB interface card. Refer to Chapter 3, Configuration, for more information on the interrupt line difference.

The EXM-22 is a produced for use with VXI systems only. Software drivers for the EXM-22 are available as part of the RadiSys EPConnect package.

There are two versions of the EXM-22: a standard EXM-22, and a higher-performance EXM-22+. The standard version supports GPIB read transfers at a 350KB/second rate, and GPIB write transfers up to 600KB/second. The EXM-22+ contains 1MB or 4MB of DRAM to buffer transfers, yielding read and write burst rates up to 1MB/second.

This manual will refer to both versions generally as the EXM-22.

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Specifications

Table 1 defines the environmental and electrical specifications of the EXM-22.

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		
Current	maximum	5V @ 1.6A
	typical	5V @ 0.7A

Table 1. EXM-22 Environmental and Electrical Specifications.

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

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2. Installation

2 2

Before installing the EXM-22, 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-22, 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

Remove a blank EXM panel from the carrier (by unscrewing the thumbscrews) and insert the EXM-22 into the card guides. Firmly press the EXM-22 front panel to ensure that the module is properly seated in the subplane and secure it with the thumbscrews. **Do not** over-tighten the thumbscrews.

✉ **MAKE SURE THAT POWER TO YOUR SYSTEM IS OFF. THIS 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.**

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2 2

Configuring the BIOS Setup

The EXM configuration data in the EPC to which the EXM-22 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 will be displayed 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    D9  FF  00
     3    F5  05  00
     4    ED  01  00
     5    DC  F5  00
```

Figure 1. EXM Setup Screen.

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. Typical configuration data for the EXM-22 is shown in bold in slot 2. 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 EXM slot the EXM-22 occupies. Note that dashed lines indicate EXM slots that may not be available on all systems.

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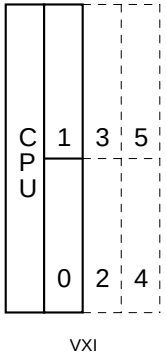


Figure 2. EXM Slot Numbering.

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

OB1/OB2 are two bytes of option information.

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-22 should be set to **D9**h.

OB1 is a hexadecimal value derived by combining the following:

Unused (bits 7 - 3)	I/O Address Select (bits 2- 1)	EXM-22 card enable (bit 0)
11111	00 - 250-257, 650-657, A50-A57, E50-E57 01 - 270-277, 670-677, A70-A77, E70-E77 10 - 350-357, 750-757, B50-B57, F50-F57 11 - 370-377, 770-777, B70-B77, F70-F77	0 - disabled 1 - enabled

Figure 3. OB1 Register.

For example, a typical OB1 value is **FF**h (11111111) indicating the card is using I/O address 370-377, 770-777, B70-B77, and F70-F77 and the card is enabled.

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

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3. Configuration

The EXM-22 includes interrupt and DMA capability. It may be configured to use any one of the following IRQ lines: IRQ3, IRQ5, IRQ7, IRQ9, IRQ11, IRQ12, and IRQ15.

Refer to the *EPConnect User's Guide* for details on how to configure the EXM-22 IRQ line.

A detailed register map of the EXM-22 is beyond the scope of this manual. Note that the important Configuration State (Cnfg State) register (located at I/O offset 0x10 to 0x17 from the I/O address base selected in OB1) is used to program and monitor the gate array and set the IRQ level that the EXM-22 card utilizes. The IRQSEL bits (bits 2 - 0) select one of the following interrupt request levels:

IRQSel 2, 1, 0	IRQ level
000	IRQ9
001	IRQ7
010	IRQ5
011	IRQ3
100	IRQ15
101	IRQ12
110	IRQ11
111	Invalid

Table 2. IRQ Selection.

The "111" encoding supports IRQ10 on HP's 82341A GPIB card. The EXM expansion interface does not support IRQ10.

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4. Connector

Connector

The EXM-22 has a standard female GPIB connector on the front panel. The pin-out is in Table 3.

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

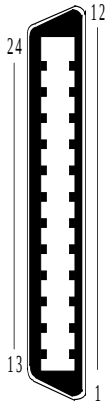


Table 3. EXM-22 GPIB Pin-out.



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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.

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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.

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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.

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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

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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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