INDUSTRIAL COMPUTER SOURCE
TM

Model EXM 7
Product Manual

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INDUSTRIAL COMPUTER SOURCE

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FORWARD

This product manual provides information to install, operate and or program the referenced product(s) manufactured or distributed by Industrial Computer Source. The following pages contain information regarding the warranty and repair policies.

Technical assistance is available at: **1-800-480-0044**.

Manual Errors, Omissions and Bugs: A "Bug Sheet" is included as the last page of this manual. Please use the "Bug Sheet" if you experience any problems with the manual that requires correction.

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Chapter 1: Getting Started

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

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. EXM-7 is fully compatible with the serial ports in the IBM PC architecture, thus a wide range of software packages will operate with the EXM-7.

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Chapter 2: Installation

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.

Running the EXM Configuration Program

The configuration program eliminates the need for the jumpers and DIP switches typically found on interface cards. With the configuration program you select among a set of options. This information is recorded in the EPC's nonvolatile memory and is used by the EPC's BIOS at initialization time to configure the EXM-7. The options are:

the interrupt lines to be used

the range of I/O addresses used

whether each port is enabled

whether the EXM-7 should be enabled or disabled at EPC initialization

To use the configuration program, you can execute it from the floppy diskette or first copy it from the floppy diskette to a hard disk. For instance, to execute it from the floppy diskette, put the diskette in your EPC and type:

a:exmcfg

The configuration program must be executed on the EPC in which you've installed the EXM-7. An alternative lower-level way to enter your configuration information via the EPC's BIOS setup screen is described in the next chapter.

The configuration program first displays a screen showing what devices appear to be installed in each EXMbus slot, and what devices it expects to find in each slot. Follow the instructions and select the slot in which your EXM-7 is installed. (If you are installing multiple EXM-7's in your system, repeat the steps for each.)

The next screen, specific to the EXM-7, shows four categories of choices. You must make one selection from each of the four categories.

Port A I/O Base	Port B I/O Base	Port A Interrupt	Port B Interrupt	Status
port is disabled	port is disabled	IRQ2 (9)	IRQ2 (9)	disabled
3F8 (COM1)	2F8 (COM2)	IRQ3	IRQ3	enabled
3E8 (COM3)	2E8 (COM4)	IRQ4	IRQ4	
2A0	2B8	IRQ5	IRQ5	

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 COM1 and COM2 if your EPC already contains these serial ports.

Follow the remainder of the instructions on the screen of the configuration program to save the specified configuration in the EPC's nonvolatile RAM. After this, every time you boot or reset your EPC, the BIOS will initialize the EXM-7 in the specified slot to the specified configuration.

Chapter 3: Operation

Configuration Using BIOS Setup Screen

As an alternative to running the EXM configuration program, you can also establish the EXM-7's configuration using the BIOS setup screen. To invoke the setup program, press CTRL+ALT+ESC at the operating-system prompt, or reboot your EPC, wait for the selftests to complete, and press CTRL+ALT+ESC. Once in the setup program, press the designated function key to invoke the EXM menu. On the screen you should see something like

EXM Setup Screen

	ID	OB1	OB2
Slot 0	F8	15	OC
1	FF	OO	OO
2	FF	OO	OO
3	FF	OO	OO
4	FF	OO	OO
5	FF	OO	OO

This displays the data (in hexadecimal) stored in nonvolatile memory describing the EXM configuration. ID is the EXM's ID (the ID for EXM-7 is F8, the ID for "no device expected" is FF). OB1 and OB2 are two bytes of option information.

To add or change an EXM-7 configuration, the ID byte for the slot in which the EXM-7 resides should be set to F8, and OB1 should be set according to the following bit definitions:

Bits 7-5 unused	Bits 4-3 Port B I/O base	Bits 2-1 Port A I/O base	Bit 0 EXM enable
OOO	OO disabled O1 2F8 (COM2) 1O 2E8 (COM4) 11 2B8	OO disabled O1 3F8 (COM1) 1O 3E8 (COM3) 11 2AO	O disabled 1 enabled

OB2 should be set according to the following bit definitions:

Bits 7-4 unused	Bits 3-2 Port B Interrupt		Bits 1-0 Port A Interrupt	
OOOO	OO	IRQ2 (9)	OO	IRQ2 (9)
	O1	IRQ3	O1	IRQ3
	1O	IRQ4	1O	IRQ4
	11	IRQ5	11	IRQ5

For instance, a typical OB1 value is 15h (00010101), representing COM4, COM3, EXM enabled. A typical OB2 value is 0C (00001100), representing COM4 interrupt of IRQ5 and COM3 interrupt of IRQ2 (same as IRQ9). See the section in Chapter 2 on using the configuration program for a discussion of cautions when selecting options.

Power Consumption

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

Chapter 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	1	0	0	0	100
Device ID Register								
			Port B Base		Port A Base		CDEN	102
Configuration Option Byte 1 Register								
				Port B Interrupt		Port A Interrupt		103
Configuration Option Byte 2 Register								
								XX0
Receiver / Transmitter Buffer / Baud Rate Divisor Latch (LSB)								
								XX1
Interrupt Enable Register / Baud Rate Disvisor Latch (MSB)								
								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).

BUG REPORT

While we have tried to assure this manual is error free, it is a fact of life that works of man have errors. We request you to detail any errors you find on this BUG REPORT and return it to us. We will correct the errors/problems and send you a new manual as soon as available. Please return to:

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Product: **EXM 7**

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