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EXM-16
Reference

Adaptec SCSI and Floppy Disk Drive Controller

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1. Product Description

This manual contains the information you need to install and use the EXM-16 Adaptec SCSI and Floppy Disk Drive Controller EXM.

The EXM-16 SCSI controller is based on the Adaptec AIC-6360 SCSI controller chip. This controller is compatible with the SCSI-2 specification and CCS (common command set). This controller is supported by a large base of software drivers. The drivers support a range of operating systems (DOS, OS/2, Novell and SCO UNIX) and SCSI devices, including fixed disks, removable disks, streaming tapes, CD ROMs, and digital audio tapes. A BIOS extension ROM is provided for the SCSI controller allowing a SCSI disk to be a boot device. A high density 50-pin SCSI-2 connector is provided on the front panel. For a complete description of the supported SCSI devices and the documentation of the SCSI driver software, please refer to the companion *SCSI Controller Software Guide*.

The Floppy Disk Drive controller is based on the Western Digital 37C65 Floppy Disk controller chip and is fully compatible with the IBM PC/AT architecture. A 34-pin ribbon connector header is provided for connecting to an externally mounted Floppy Disk Drive. The floppy interface supports one or two floppy drives. Power for a 3.5" floppy disk drive may be optionally supplied through the front panel connector. Power is fused with a socketed 2 Amp fuse, and is selected by a jumper on the EXM-16 circuit board.

Option registers are provided to enable the SCSI and floppy controllers independently, locate the SCSI BIOS extension ROM in different regions of memory, select which interrupt and DMA channel to use for the SCSI controller, and select between two alternate I/O register regions for the SCSI controller. The floppy controller is mapped to the standard PC/AT floppy disk I/O register addresses and uses the standard PC/AT floppy disk interrupt.

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Compatibility

The EXM-16 can be used with any RadiSys EPC with the following restrictions.

- The EXM-16 is fully compatible with the EXM-MX. When using the EXM-16 and the EXM-MX, both of which have floppy controllers, either floppy controller can be enabled, but only one of the floppy controllers can be enabled at a time.

- The EXMbus interface of the EXM-3, the EXM-9, the EXP-MX and the EXP-MS preclude their use together with an EXM-16 if the floppy controller in the EXM-16 is enabled.

- The EXM-16 cannot be used in the EXM slot of an EPC-2e. The EPC-2e EXM slot only supports 8-bit EXMs. The EXM-16 requires 16-bit transfers.

- The EXM-16 always has the SCSI termination installed and so it can only be used as an end device on the SCSI chain.

The EPC setup menu for the fixed disk drive does not relate to any disk drives attached to the EXM-16. In particular, do not specify SCSI for the fixed disk drive in the EPC setup screen unless you are using the EXM-16 with an EXP-MS which contains an integrated SCSI disk and controller. The SCSI setting in the EPC setup screen enables the SCSI BIOS for the EXP-MS SCSI controller which is not compatible with the EXM-16. The recommended setting for the EPC fixed disk setup menu is NONE. The EXM-16 contains its own BIOS extension ROM that can be enabled by bits in the configuration registers. These registers are described in a later chapter.

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Specifications

The following table defines the power and environmental specifications of the EXM-16.

Characteristic		Value
Environmental		
Temperature	operating	0 to 60°C ambient
	storage	-40 to 85°C
Humidity	operating	5% - 95% noncondensing
	storage	5% - 95% noncondensing
Altitude	operating	10,000 ft (3000 m)
	storage	50,000 ft (15,000 m)
Vibration	operating	0.015 inch (0.38 mm) P-P displacement with 2.5 g peak (max) acceleration over 5-2000 Hz
	storage	0.030 inch (0.76 mm) P-P displacement with 5.0 g peak (max) acceleration over 5-2000 Hz
Shock	operating	30 g, 11 ms duration, half-sine shock pulse
	storage	50 g, 11 ms duration, half-sine shock pulse
Electrical		
Power	maximum	9.5 W
	typical	6.5 W
Current	maximum	+5V @ 1.8A
	typical	+5V @ 1.3A
Other		
Weight		3.5 oz

Table 1. EXM-16 Specifications.

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2. Installation

Before installing your EXM-16, 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-16, 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-16 into an EXM carrier, such as the EXP-MC or the integrated EXM carriers in the EPC is straightforward. First ensure that the subplane has been inserted into the backplane. If an EXP-MC is being used, insert it in the desired VMEbus slot and attach it to the chassis. Then remove any blank EXM panel from the carrier (by unscrewing the thumbscrews) and insert the EXM-16 into the card guides. Firmly press the EXM-16 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.**

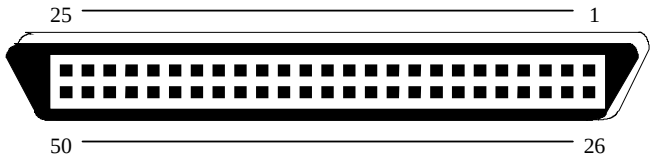
☛ **WHEN INSERTING THE EXM, AVOID TOUCHING THE CIRCUIT BOARD, AND MAKE SURE THE ENVIRONMENT IS STATIC-FREE.**

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2 2

Connectors

The high-density 50-pin SCSI connector is an AMP 174726-4 or equivalent socket



and is defined as the following:

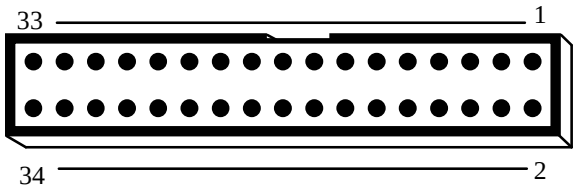
Pin	Signal	Pin	Signal
1	GND	26	-DB0
2	GND	27	-DB1
3	GND	28	-DB2
4	GND	29	-DB3
5	GND	30	-DB4
6	GND	31	-DB5
7	GND	32	-DB6
8	GND	33	-DB7
9	GND	34	-DBP
10	GND	35	GND
11	GND	36	GND
12	GND	37	GND
13	No connect	38	TERMPWR
14	GND	39	GND
15	GND	40	GND
16	GND	41	-ATN
17	GND	42	GND
18	GND	43	-BSY
19	GND	44	-ACK
20	GND	45	-RST
21	GND	46	-MSG
22	GND	47	-SEL
23	GND	48	-C/D
24	GND	49	-REQ
25	GND	50	-I/O

Table 2. SCSI Connector Pinout.

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Notes:
1. The minus sign next to a signal indicates active low
2. The signal names are the same as defined in the SCSI specification
3. The contact assignments refer to the connector contact set 2 for the Shielded Alternative 1 connector as defined in the SCSI specification

The 34-pin header for the external floppy disk drive is defined as



Pin	Signal	Pin	Signal
1	GND	2	-DENS
3	No connect	4	No connect
5	No connect	6	No connect
7	GND or fused VCC	8	-IDX
9	GND or fused VCC	10	-MO2
11	GND or fused VCC	12	-DS1
13	GND	14	-DS2
15	GND	16	-MO1
17	GND	18	-DIR
19	GND	20	-STEP
21	GND	22	-WDATA
23	GND	24	-WGATE
25	GND	26	-TRK00
27	GND	28	-WPROT
29	GND	30	-RDATA
31	GND	32	-SIDE
33	GND	34	-DSKCHNG

Table 3. Floppy Connector Pinout.

Notes:
1. The minus sign next to a signal indicates active low

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2 2

Adding Floppy Disk Drives

Attaching an external floppy drive to the EXM-16 requires removing a machined metal part from the front panel. This part is fastened with two screws. The floppy connector on the EXM-16 is a 3M series 3594 (or equivalent) header with 0.100" x 0.100" spacing and mates with a 3M series 3414 or equivalent wiremount socket.

The EXM-16 is configured at the factory for use with one or two standard 5.25" and 3.5" floppy disk drives. These can be connected with a simple ribbon cable to the unit. There are several configuration options available.

Floppy disk drives are addressable. Normally, all PC disk drives are configured as the second drive of four. A single drive connected with a straight cable will be addressed as the A: drive. The second drive (B:), also configured as the second drive, is typically connected with a twisted cable (pins 10-16 are swapped) that swaps the drive address lines.

Some floppy drives can be powered through the data cable. This provides a convenience to the user so that an external power supply is not needed. These drives connect VCC through pins 7, 9, and 11 of the cable. Other drives connect GND to these pins. The EXM-16 supports both types of floppy drives. However, care must be taken when connecting the EXM-16 to the floppy so that VCC and GND are not shorted together. In particular, be careful with floppy drives that provide jumpers to configure whether VCC or GND is connected to these signals. If you are unsure which type of drive you have or don't know how the jumpers are configured for a specific drive, determine this from the drive specifications before connecting the drive to the EXM-16.

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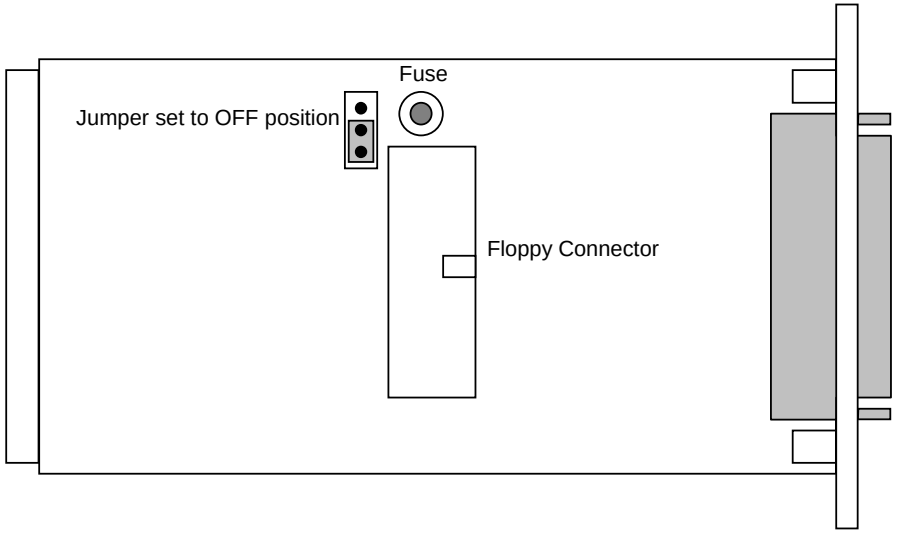


Figure 1. Fuse and Jumper Location.

A jumper on the EXM-16 selects either GND or fused VCC to pins 7, 9, and 11 of the floppy connector. This is a two position jumper (three stake pins) that is labeled "Enable +5 -> FDD" with positions that are labeled ON or OFF. Select the ON position to connect VCC to pins 7, 9, and 11 of the floppy connector. Select the OFF position to connect GND to pins 7, 9 and 11 of the floppy connector (see figure above). If the jumper is not installed, pins 7, 9, and 11 of the floppy connector are shorted together but unconnected to anything else.

CAUTION

If the jumper is set to the ON position and the floppy requires GND on these pins, then upon applying power to the EXM-16, the fuse will be blown because of a short circuit from VCC to GND.

CAUTION

If the jumper is set to the ON position, then using a twisted cable will blow the fuse. This configuration is not supported.

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The following table summarizes the possible configurations:

EXM-16 Jumper position	Floppy power source	Cable type	Drive
Not installed	External	Straight	A:
Not installed	External	Twisted	B:
OFF	External	Straight	A:
OFF	External	Twisted	B:
ON	Data cable	Straight	A:

Table 4. EXM-16 Configurations.

The part number for the fuse is Schurter 3402.0012.22. The factory setting for this jumper is neither the ON or OFF position. This allows you to connect to any floppy disk regardless of its jumper positions without causing damage to the fuse. Be sure that when using either the ON or OFF position of the jumper, that the floppy drive is configured to match the voltage applied to pins 7, 9, and 11 of the floppy connector.

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3. Operation

Configuring the BIOS Setup Screen

To establish the EXM's configuration, there are parameters that need to be entered in the BIOS setup screen.

First, use Figure 2 below to determine which EXM slot the EXM-16 is occupying.

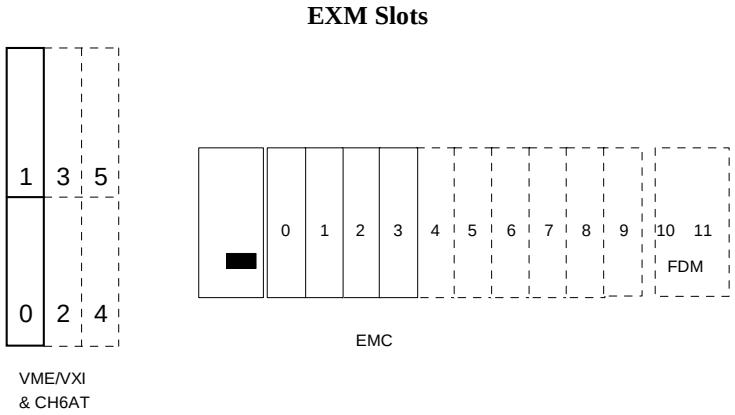
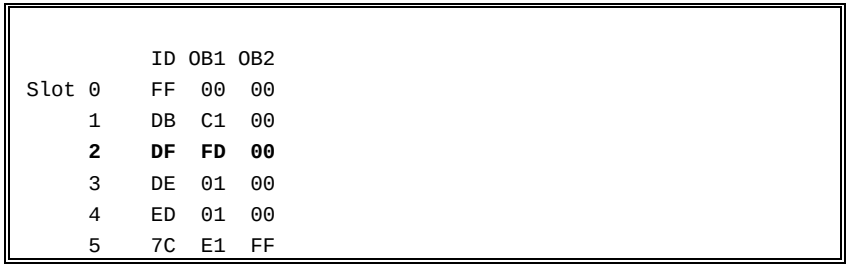


Figure 2. EXM Slot Numbering.

Next invoke the setup program, press CTRL+ALT+ESC at the operating-system prompt. Once in the setup program, press the designated function key to invoke the EXM menu. On the screen you should see a display resembling the following:

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```
          ID OB1 OB2
Slot 0    FF  00  00
     1    DB  C1  00
     2    DF  FD  00
     3    DE  01  00
     4    ED  01  00
     5    7C  E1  FF
```

Figure 3. EXM Setup Screen.

This displays the data (in hexadecimal) stored in nonvolatile memory describing the EXM configuration. ID is the EXM's ID (the ID for EXM-16 is **DF**h; the ID for "no device expected" is FF). OB1 and OB2 are two bytes of option information. Typical settings for the EXM-16 are listed in bold in slot 2.

To add or change an EXM-16 configuration, the ID byte for the slot in which the EXM-16 resides should be set to DFh, and OB1 and OB2 should be set according to the following bit definitions:

Bits 7-6 DMA channel	Bits 5-4 Interrupt	Bit 3 I/O register base address	Bit 2 SCSI enable	Bit 1 Floppy enable	Bit 0 Card enable
00 none 01 reserved 10 reserved 11 channel 0	00 none 01 IRQ9 10 IRQ12 11 IRQ11	0 140h 1 340h	0 disabled 1 enabled	0 enabled 1 disabled	0 disabled 1 enabled

Figure 4. OB1 Bit Definitions.

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Bits 7-4 unused	Dual Speed	Bits 2-0 ROM base address
xxxx	0 Dual speed floppy drive	000 No ROM (disabled)
		001 C0xxxh
		010 C8xxxh
	1 Single speed dual-density floppy drive	011 CCxxxh
		100 D0xxxh
		101 D4xxxh
		110 D8xxxh
		111 DCxxxh

Figure 5. OB2 Bit Definitions.

Default settings

The recommended setting for OB1 is to set to **FD**h, representing DMA channel 0, IRQ11, 340h, SCSI enabled, floppy controller enabled, and card enabled.

The recommended setting for OB2 is to set to **00**h, representing dual speed floppy drive and disabled ROM.

Note that the default is to enable the floppy controller.

If you want to boot from a SCSI device that uses the EXM-16 SCSI controller without another disk controller or floppy controller, you must enable the floppy controller on the EXM-16. The EXM-16 boot BIOS requires the existence of a floppy controller whether or not a floppy drive is connected to it. To do this, clear bit 1 of the register OB1 and in the main EPC setup screen, set the *Diskette Drive A* parameter to "1.44M 3.5 inch". You can set the *Configuration errors* parameter in the EPC setup screen to "Ignore disk errors". This will ignore any associated errors that are seen as a result of the floppy drive not being present. This setting does not ignore disk errors from the SCSI interface.

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3 3

Trouble Shooting

If you have trouble getting your EXM-16 to work please check for the following problems before calling for technical support.

If you cannot boot from a floppy disk, the problem could be

1. The software configuration
2. The drive configuration
3. Power to the drive
4. The ribbon cable
5. An improperly formatted diskette
6. A blown fuse
7. The EXM-16

Invoke the BIOS setup program and ensure that the floppy drive specification matches that of your drive, that the EXM-16 is in the proper slot, and that the EXM-16 configuration data specifies that both the EXM-16 and floppy controller are enabled. Take care to enable only the correct floppy controller if more than one exists in your system configuration. Ensure that you are supplying power to the drive. Check the cable connections and the cable itself. Ensure that you have a bootable diskette (e.g., try booting from it in another PC). Try the drive and ribbon cable in another PC.

If you cannot boot from or access a SCSI device connected to the EXM-16, the problems listed above apply. Invoke the BIOS setup program and ensure that you have the fixed disk specified as NONE. In particular, do not specify SCSI in the EPC setup screen. This specifies the SCSI BIOS for the SCSI controller on the EXM-3 and the EXP-MX/MS. This SCSI BIOS is provided in the main BIOS of the EPC and is not compatible with the SCSI controller on the EXM-16. Ensure that the EXM-16 is in the proper slot (consistent with the EXM configuration information) and that the configuration data specifies that both the EXM-16 and SCSI interface are enabled. Check power to the drive. Check the cable connections and the cable itself. If the trouble is booting, ensure that the device has been formatted as a system disk (which will require connecting and booting from a floppy to do so) and that the formatted partition is the active partition. Also, ensure that the SCSI extension BIOS is enabled.

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You may use the SCSI controller on the EXM-16 with the SCSI controller on the EXM-3 or an EXM-MS, but care must be taken regarding boot devices. Do not enable the EXM-16 extension ROM and the EXM-3 or EXP-MS at the same time. Only one of these can be the boot device. A typical example uses the EXP-MS unit as the boot disk and an EXM-16 with devices connected to a CD-ROM or a tape backup unit. In this case, enable the fixed disk in the EPC setup menu as SCSI (this will enable the SCSI BIOS included in the main EPC BIOS). Do not enable the extension ROM in the EXM-16 in this case. The extension ROM applies only for boot devices.

This chapter contains a summary of error and warning messages alphabetized by message text. These are messages generated by the BIOS and MS-DOS that may be related to your hardware configuration.

BIOS Error messages

Bad partition table

Your hard disk cannot be formatted because it has not yet been partitioned. Boot from a DOS floppy disk and run the FDISK program.

Disk boot failure

No boot disk could be found. This could occur if your BIOS setup screen has all disks disabled, if your hard disk is disabled and no floppy diskette is inserted, if there is no operating system installed on the disk, or if the disk is inoperable.

Diskette drives or types mismatch error - run setup

The configuration information in the nonvolatile CMOS RAM does not match the floppy diskette installed in the system. Press CTRL+ALT+ESC to run the BIOS setup program. Drive A should be set to "1.4M" and drive B to NONE.

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3 3

EXM configuration error

The EXMs installed (or not installed) do not match the configuration information in the nonvolatile CMOS RAM. Hitting any key will allow you to continue, but doing so may cause problems later if software tries to use the EXMs. To correct the problem, enter the setup program (via CTRL+ALT+ESC) to change the information on the setup screen and reboot.

General Failure error reading ...

This almost always indicates the presence of an unformatted disk or diskette.

Invalid drive specification

You are trying to access a logical drive (e.g., A:, B:, ...) that is not known to the operating system.

Non-system disk or disk error

This is usually caused by an attempt to boot from a disk or diskette that is not formatted as a system disk. Most often it results when you reboot with a non-system diskette in the floppy drive, because the BIOS always attempts to boot from the floppy drive if a diskette is installed.

Not ready error reading drive ...

This is usually caused by not fully inserting a diskette into the floppy drive.

Floppy related problems

Some of the above problems may be caused by the following conditions:

The settings are incorrect in the setup menu. Press CTRL+ALT+ESC to enter the setup menu and check the settings for Diskette drive A: or Diskette drive B: and make sure that the selected drive type matches the attached drive.

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The floppy controller is not enabled or it conflicts with another floppy controller in the system. In the EXM setup menu (F2 from the main setup menu), make sure that the floppy enable bit is set correctly and that there are no conflicts with other floppy controllers. Note that the EXM-16 when operated with an EXM-3, EXM-9, EXP-MX, EXP-MS, requires that the floppy controller on the EXM-16 be disabled. Also, ensure that if the EXM-16 contains the active floppy controller, then the Card Enable bit must also be set correctly or the floppy controller will be disabled.

The fuse is blown on the EXM-16. A fuse exists on the EXM-16 that connects VCC to pins 7, 9, and 11 of the floppy connector. If the EXM-16 has the jumper positioned such that fused VCC is attached to these pins and a floppy drive that connects GND to these signals is used, then the fuse may be blown.

SCSI related problems

SCSI device attached to the EXM-16 won't boot: The BIOS extension ROM must be enabled for the SCSI device to be a boot device. Check the settings of the OB2 register in the EXM setup menu. Also, the Fixed disk drive in the main setup menu must be set to specify NONE as the drive type. Finally, the hard drive **must** have been partitioned and formatted on the EXM-16 and the SCSI partition must be the active partition. See your operating system manual for instructions on formatting a disk.

If you want to boot from a SCSI device that uses the EXM-16 SCSI controller without another disk controller or floppy controller, you must enable the floppy controller on the EXM-16. The EXM-16 boot BIOS requires the existence of a floppy controller whether or not a floppy drive is connected to it. To do this, clear bit 1 of the register OB1 and in the main EPC setup screen, set the *Diskette Drive A* parameter to "1.44M 3.5 inch". You can set the *Configuration errors* parameter in the EPC setup screen to "Ignore disk errors". This will ignore any associated errors that are seen as a result of the floppy drive not being present. This setting does not ignore disk errors from the SCSI interface.

For error messages other than those listed, please consult your operating system manuals.

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4. Programming Interface

Registers

Register	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	I/O port
Device ID	1	1	1	1	1	1	0	1	100
Option Byte 1	DMA channel		Interrupt		IO base	SCSI enable	Floppy enable	Card enable	102
Option Byte 2	unused				Dual Speed	ROM base address			103



EXM Configuration Registers

The EXM Configuration Registers are standard EXM registers for device identification and configuration. The EXM-16 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 DF, the device ID of the EXM-16. A read/write configuration register appears at I/O address 102h and 103h. The defined bits are:

Card enable specifies whether the EXM-16 is enabled (1) or disabled (0). If disabled, the EXM-16 will not respond to and floppy or SCSI I/O or memory addresses; it will not assert interrupts or DMA requests nor respond to DMA cycles; it will only respond to reads from I/O port 100h and reads and writes from I/O port 102h and 103h, and then only if EXMbus line -EXMID is asserted.

Floppy enable specifies whether the floppy diskette controller is enabled (0) or disabled (1). If Card enable is set and floppy enable is clear, the I/O addresses 3F0-3F7 and the floppy diskette controller are active. Otherwise, the floppy controller is disabled. In the disabled state, it will not respond to accesses to I/O addresses 3F0-3F7 or DMA cycles and IRQ6 and DRQ2 are tristate. Note that if this bit is 0, other EXMs or DISK modules that contain enabled floppy controllers may conflict causing the system to fail. Be sure that there is only one floppy controller enabled in the system at a given time.

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SCSI enable specifies whether the SCSI controller is enabled (1) or disabled (0). If Card enable and SCSI enable are set, the SCSI controller is active. When active, the SCSI controller will respond to accesses to its I/O space as defined by the I/O base address bit and it will respond to memory accesses to the BIOS extension ROM if enabled. It will also DMA requests and respond to DMA acknowledges if enabled by the DMA channel selection bits and will generate interrupts on the selected interrupt signal as specified by the interrupt bits. Otherwise, it is disabled. When disabled, the SCSI controller will not respond to any I/O or memory address and will not signal interrupts or DMA requests.

I/O base specifies the base address of the I/O registers to which the SCSI controller will respond. If 0 the base address is 140h; if 1 the base address is 340h.

Interrupt selects the interrupt channel on which the SCSI controller will signal interrupt requests according to the following table:

00	no IRQ (interrupts are disabled)
01	IRQ9(2)
10	IRQ12
11	IRQ11

DMA channel selects the DMA channel according to the following table:

00	no DMA (disabled)
01	reserved
10	reserved
11	channel 0 (8-bit DMA)

Dual Speed selects the appropriate crystal according to the following table:

0	Dual-speed floppy drive
1	Single-speed floppy drive

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ROM base address locates the 16K BIOS extension ROM in memory according to the following table:

000 No ROM (disabled)
001 C0xxxh
010 C8xxxh
011 CCxxxh
100 D0xxxh
101 D4xxxh
110 D8xxxh
111 DCxxxh

Take care when setting the ROM base address. Some EPCs cannot map accesses to the C-page of DOS memory. For those systems, use one of the D-page settings.

The extension ROM must be enabled if you want to boot from a SCSI disk drive that is attached to the EXM-16. Also, the fixed disk setting in the EPC setup screen fixed disk menu should be set to NONE.



AIC-6360 Registers

The following registers are offsets from the base address:

Primary Address	Secondary Address	Read Register	Write Register
Base Address	Base Address	SCSISEQ	SCSISEQ
Base + 1h	Base + 1h	SXFRCTL0	SXFRCTOL0
Base + 2h	Base + 2h	SXFRCTL1	SXFRCTL1
Base + 3h	Base + 3h	SCSISIG1	SCSISIG0
Base + 4h	Base + 4h	None	SCSIRATE
Base + 5h	Base + 5h	SELID	SCSIID
Base + 6h	Base + 6h	SCSIDAT	SCSIDAT
Base + 7h	Base + 7h	SCSIBUS	None
Base + 8h	Base + 8h	STCNT0	STCNT0
Base + 9h	Base + 9h	STCNT1	STCNT1
Base + Ah	Base + Ah	STCNT2	STCNT2
Base + Bh	Base + Bh	SSTAT0	CLRSINT0
Base + Ch	Base + Ch	SSTAT1	CLRSINT1
Base + Dh	Base + Dh	SSTAT2	None

Table 5. AIC-6360 Registers.

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Base + Eh	Base + Eh	SSTAT3	SCSITEST
Base + Fh	Base + Fh	STAT4	CLRSERR
Base + 10h	Base + 10h	SIMODE0	SIMODE0
Base + 11h	Base + 11h	SIMODE1	SIMODE1
Base + 12h	Base + 12h	DMACNTRL0	DMACNTRL0
Base + 13h	Base + 13h	DMACNTRL1	DMACNTRL1
Base + 14h	Base + 14h	DMASTAT	None
Base + 15h	Base + 15h	FIFOSTAT	None
Base + 16h	Base + 16h	DMADATA	DMADATA
Base + 17h	Base + 17h	None	None
Base + 18h	Base + 18h	BRSTCNTRL/ DMADATA	BRSTCNTRL/ DMADATA
Base + 19h	Base + 19h	None/ DMADATA	None/ DMADATA
Base + 20h	Base + 20h	PORTA/ DMADATA	PORTA/ DMADATA
Base + 21h	Base + 21h	PORTB/ DMADATA	PORTB/ DMADATA
Base + 22h	Base + 22h	REV	None
Base + 23h	Base + 23h	STACK	STACK
Base + 24h	Base + 24h	None	Test
Base + 25h	Base + 25h	ID	None

Table 5. AIC-6360 Registers, ctd.

For a complete explanation of the SCSI controller registers, refer to the documentation on the AIC-6360 controller chip.

WD37C65 Registers

Floppy Operations Register	3F2
Floppy Command Register	3F4
Floppy Data Register	3F5
Alternate Status Digital Output Register	3F6
Floppy Control Register	3F7

For a complete explanation of the floppy diskette controller registers, refer to documentation on the WD37C65 controller chip. The floppy diskette controller in the EXM-16 uses interrupt IRQ6 and DMA channel 2.

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5. Support and Service

In North America

Technical Support

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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.

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.

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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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