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OPERATIONS MANUAL
PCM-SX

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1 GENERAL INFORMATION

1.1 FEATURES

- High Integration 33MHz 386sx Processor Board
- PC/104 Sized Module
- Up to 8 Megabytes of ruggedized SMT DRAM
- Onboard Solid State Disk support for EPROM, SRAM, or FLASH
- Industry Standard AWARD BIOS with POST
- Two PC Compatible Serial Ports with optional RS-422/RS-485 support
- Standard Parallel Printer Port
- Watchdog Timer with Powerfail/Reset
- Onboard 16-bit IDE Interface
- Onboard Dual Floppy Disk Controller
- Standard AT Keyboard Support
- Real-Time Clock with Battery Backup
- Status and Hard Disk LEDs
- +5 Volt Only Operation

1.2 GENERAL DESCRIPTION

The PCM-SX is a small, high-performance, embeddable computer system on a single PC/104 form factor board. It features the high integration ALI M6117 CPU/Chipset combination IC running at 33MHz. It can be factory populated with up to 8 Megabytes of factory installed SMT DRAM. Its full PC/AT hardware complement and industry standard AWARD BIOS assures full hardware and software compatibility with PC software and operating systems. The PCM-SX includes onboard interfaces for floppy disks, IDE fixed disks, parallel printer, and two serial channels with RS-232, RS-422, or RS-485 capability on either or both channels. A full 16-bit PC/104 expansion bus is provided for further expansion to an entire industry of add-on peripherals including high-speed VGA controllers, sound and speech modules, SCSI controllers, Analog I/O modules, and literally hundreds of other options available from WinSystems and a variety of vendors supporting the PC/104 standard. An onboard Silicon Disk array supports disks of up to 1 Megabyte in size and can utilize SRAM, PEROM or EPROM as the disk media. Boot capability is provided onboard and a set of utilities and drivers are provided to make the silicon disk based system very user friendly. Alternately, the M-Systems' DiskOnChip FLASH modules may be populated and disk sizes range from 2 Megabyte to 72 Megabytes.

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1.3 Specifications

1.3.1 Electrical

Bus Interface :	PC/104 8-Bit or 16-Bit expansion Bus
System Clock :	Factory configured for 33Mhz
Interrupts :	TTL Level input
VCC :	+5V +/-5% at 375mA typical at 33Mhz and 2MB DRAM
VCC1:	+12V +/-5% (Not required. PC/104 Expansion Only)
VCC2:	-12V +/-5% (Not required. PC/104 Expansion Only)

1.3.2 Memory

Addressing :	16 Megabyte addressing
BIOS ROM :	128K OTPROM
Memory :	Factory installed SMT DRAM in sizes from 2M, 4M, and 8M
SSD Memory :	One 32-pin JEDEC standard sockets support 4-MBit SRAM, 4-MBit PEROM, 4-MBit EPROM, 16-MBit EPROM or the M-Systems 32-pin DOC (DiskOnChip) Module

1.3.3 Mechanical

Dimensions :	4.2 X 4.5 X .60 inches (Non-stackthrough without PC/104 modules or cables)	
PC-Board :	FR4 Epoxy Glass with 4 signal layers and 2 power planes with screened component legend, and plated through holes.	
Jumpers :	0.025" square posts on 0.10" centers	
Connectors :	Multi I/O :	50 pin RN type IDH-50-LP
	Floppy Disk :	34 Pin RN type IDH-34-LP
	Fixed Disk :	40 pin RN type IDH-40-LP
	PC/104 BUS :	64 pin SAMTEC type ESQ-132-12-G-D 40 pin SAMTEC type ESQ-120-12-G-D
	Power/Reset Connector : 8 Pin AMP	

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1.3.4 Environmental

Operating Temperature :	-40° to +85°C
Non-Condensing Humidity :	5 to 95%

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2 PCM-SX Technical Reference

2.1 Introduction

This section of the manual is intended to provide sufficient information regarding the configuration and usage of the PCM-SX board. WinSystems maintains a Technical Support Group to help answer questions regarding configuration, usage, or programming of the board. For answers to questions not adequately addressed in this manual, contact Technical Support at (817) 274-7553 between 8AM and 5PM Central Time.

2.2 ALI M6117 Processor/Chipset

The PCM-SX utilizes the ALI M6117B Processor/Chipset which provides a highly integrated, high-performance backbone for full PC/AT compatibility. The M6117B contains not only a fully compatible 80386sx processor but also the logic for DRAM and Bus state control as well as the standard complement of 'AT' class peripherals internally, including :

8 DMA Channels compatible with PC-AT 8237A DMA Controllers

15 Interrupt inputs compatible with master/slaved 8259 interrupt controllers

Three 8254 compatible timer/counter channels

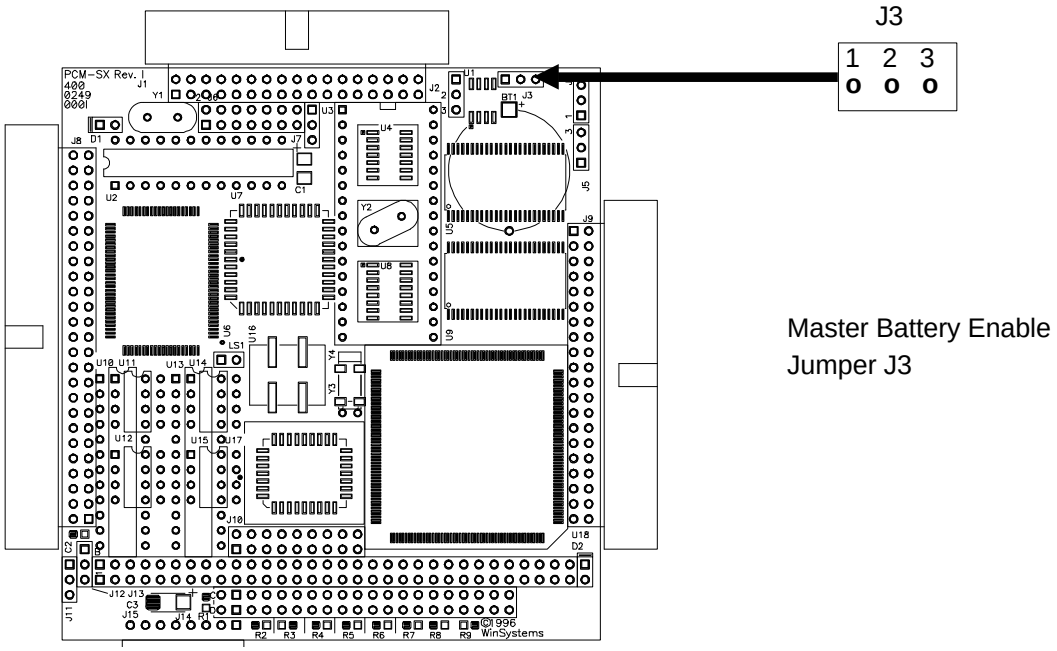
A PC-AT compatible real time clock/calendar with CMOS RAM

The functional units are 100% PC-AT compatible and are supported by the Award BIOS and Setup. Users desiring to access these internal peripherals directly should refer to any manufacturer's generic literature on the equivalent discrete component.

There are a number of internal registers within the M6117 Chipset section that are used by the BIOS for control and configuration. Refer to the I/O Map in Appendix A for port usage to avoid conflicts when adding external I/O devices.

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2.3 Real Time Clock Calendar



The PCM-SX contains an onboard Clock/Calendar within the ALI M6117 chip. This clock is fully compatible with the MC146818A used in the original PC-AT computers. This clock has a number of features including periodic and alarm interrupt capabilities. In addition to the Time and Date keeping functions, the system configuration is kept in CMOS RAM contained within the clock section. This RAM holds all of the setup information regarding hard and floppy disk types, video type, shadowing, wait states, etc. Refer to the section on the Award BIOS Setup for complete information on what is configured via the CMOS RAM.

It may become necessary at some time to make the CMOS RAM forget its current configuration and to start fresh with factory defaults. This may be accomplished by removing power and the board from the system. Then remove the jumper from J3 for approximately 10 seconds. Replace the jumper to its original position, reinstall the board, power up, and reconfigure the CMOS setup as desired.

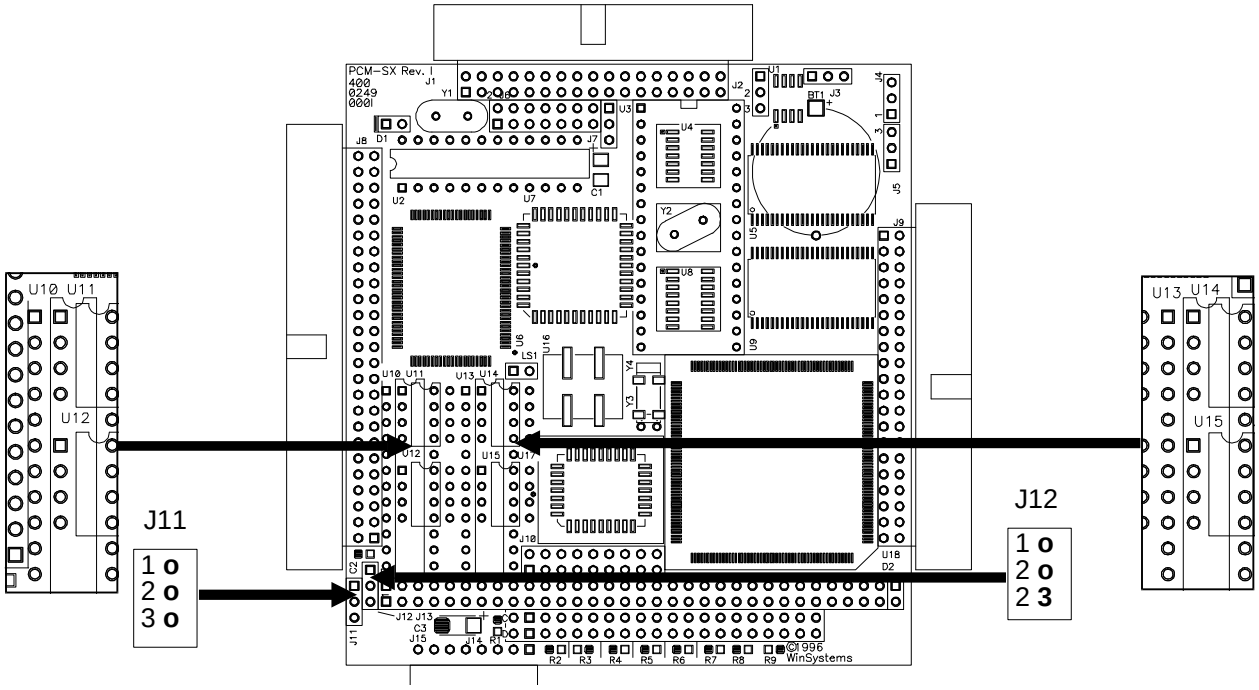
NOTE : J3 must always be reinstalled. The system will not function correctly without this jumper installed.

2.4 Keyboard Interface

The PCM-SX contains an onboard PC-AT style keyboard controller. Connection is made through the Multi-I/O connector at J8. An adapter cable, P/N CBL-162-1, is available from WinSystems to make ready access to all of the devices terminated at the Multi-I/O connector. Users desiring custom connections should refer to the Multi-I/O connector pin definitions given later in this manual.

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2.5 Serial Interface



The PCM-SX provides two RS-232 serial channels onboard, configurable as RS-422 or RS-485 with the addition of optional driver ICs. The configuration options for each of the supported modes are shown on the following pages.

2.5.1 COM 1 - RS-232

COM1 is I/O mapped at 3F8H and utilizes a 16550 type UART contained in the Super-I/O chip. When used in RS-232 mode, COM1 is terminated via the Multi-I/O connector at J8. The configuration details and the pin definitions when used with the CBL-162-1 cable are shown here :

J11

1 o
2 o
3 o

U10 - Installed
U11 - Not Installed
U12 - Not Installed

COM1 - DB9
PIN DEFINITIONS

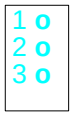
1 DCD
2 RX Data
3 TX Data
4 DTR
5 GND
6 DSR
7 RTS
8 CTS

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2.5.2 COM 2 - RS-232

COM2 is I/O mapped at 2F8H and utilizes a 16550 type UART contained in the Super-I/O chip. When used in RS-232 mode, COM2 is terminated via the multi-I/O connector at J8. The configuration details and the pin definitions, when used with the CBL-162-1 cable, are shown here :

J12



U13 - Installed
U14 - Not Installed
U15 - Not Installed

COM2 - DB9
PIN DEFINITIONS

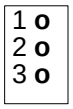
1 DCD
2 RX Data
3 TX Data
4 DTR
5 GND
6 DSR
7 RTS
8 CTS
9 RI

2.5.3 RS-422 Mode Configuration

RS-422 signal levels are supported on either, or both serial channels, with the installation of the optional “Chip Kit” WinSystems' part number CK-75176-2. This kit provides the driver ICs necessary for a single channel of RS-422. If two channels of RS- 422 are required then two kits will be needed. RS-422 is a 4-wire point-to-point full-duplex interface allowing much longer cable runs than are possible than with RS-232. The differential transmitter and receiver twisted-pairs offer a higher degree of noise immunity. RS-422 usually requires that the lines be terminated at both ends. The following illustrations show the correct jumpering, driver IC installation, and I/O connector pin definitions for each of the channels when used in RS-422 mode.

2.5.4 COM 1 - RS-422

J11



U10 - Not Installed
U11 - Installed
U12 - Installed

COM1 - DB9
PIN DEFINITIONS

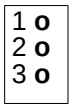
1 N/A
2 TX+
3 TX-
4 N/A
5 GND
6 RX+
7 RX-
8 N/A
9 N/A

RS-422 NOTE : When used in RS-422 mode, the transmitter must be enabled via software by setting the RTS bit in the Modem Control Register (Bit 1).

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2.5.5 COM 2 - RS-422

J12



U13 - Not Installed
U14 - Installed
U15 - Installed

COM2 - DB9
PIN DEFINITIONS

1	N/A
2	TX+
3	TX-
4	N/A
5	GND
6	RX+
7	RX-
8	N/A
9	N/A

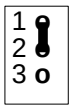
RS-422 NOTE : When used in RS-422 mode, the transmitter must be enabled via software by setting the RTS bit in the Modem Control Register (Bit 1).

2.5.6 RS-485 Mode Configuration

The RS-485 multi-drop interface is supported on both serial channels with the installation of the optional “Chip Kit” WinSystems' part number CK-75176-2. A single kit is sufficient to configure both channels for RS-485. RS-485 is a 2-wire multi-drop interface where only one station at a time talks (transmits) while all others listen (receive). RS-485 usually requires the twisted line-pair be terminated at each end of the run. The following illustrations show the correct jumpering, driver IC installation, and I/O connector pin-out for each of the channels when used in RS-485 mode.

2.5.7 COM 1 - RS-485

J11



Normal RS-485 Operation is achieved by jumpering J11 pins 1-2. For RS-485 with Echo-back jumper pins 2-3

U10 - Not Installed
U11 - Not Installed
U12 - Installed

COM1 - DB9
PIN DEFINITIONS

1	N/A
2	TX+/RX+
3	TX-/RX-
4	N/A
5	GND
6	N/A
7	N/A
8	N/A
9	N/A

RS-485 NOTE : Because RS-485 uses a single twisted-pair, all transmitters are connected in parallel. Only one station may transmit, or have its transmitter enabled at a time. The transmitter enable/disable is controlled by bit 1 in the Modem Control Register (RTS). When set, the transmitter is enabled, when cleared (the normal state), the transmitter is disabled and the receiver is enabled. Note that it is necessary to allow some minimal settling time after enabling the transmitter before transmitting the first character. Likewise, following a transmission, it is necessary to be sure that all characters have been completely shifted out of the UART (Check bit 6 in the Line Status Register) before disabling the transmitter to avoid chopping off the last character sent.

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2.5.8 COM 2 - RS-485

J12

1
2
3 o

Normal RS-485 Operation is achieved by jumpering J12 pins 1-2. For RS-485 with Echo-back jumper pins 2-3

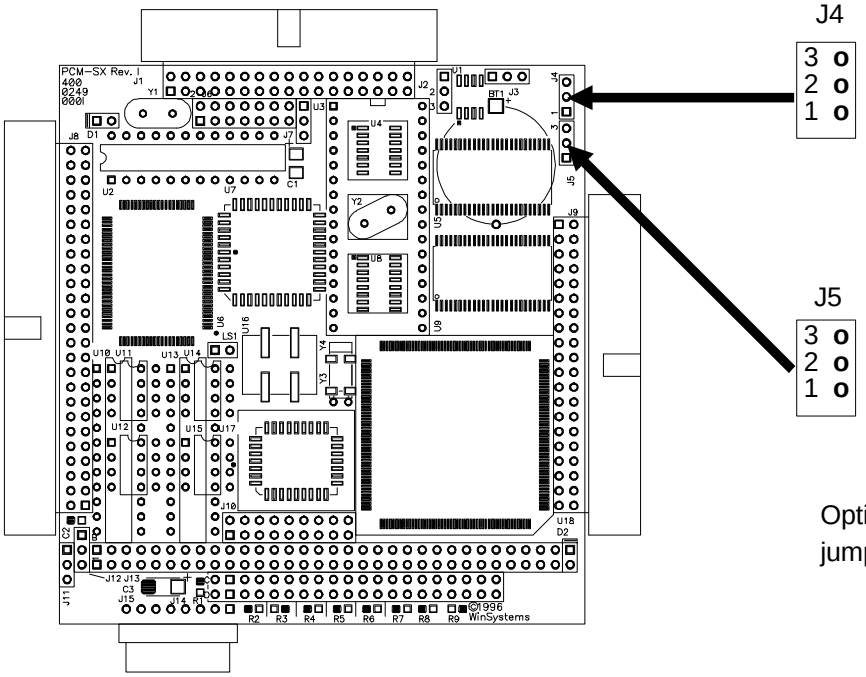
U13 - Not Installed
U14 - Not Installed
U15 - Installed

COM2 - DB9
PIN DEFINITIONS

1 N/A
2 TX+/RX+
3 TX-/RX-
4 N/A
5 GND
6 N/A
7 N/A
8 N/A
9 N/A

RS-485 NOTE : Because RS-485 uses a single twisted-pair, all transmitters are connected in parallel. Only one station may transmit, or have its transmitter enabled at a time. The transmitter enable/disable is controlled by bit 1 in the Modem Control Register (RTS). When set, the transmitter is enabled, when cleared (the normal state), the transmitter is disabled and the receiver is enabled. Note that it is necessary to allow some minimal settling time after enabling the transmitter before transmitting the first character. Likewise, following a transmission, it is necessary to be sure that all characters have been completely shifted out of the UART (Check bit 6 in the Line Status Register) before disabling the transmitter to avoid chopping off the last character sent.

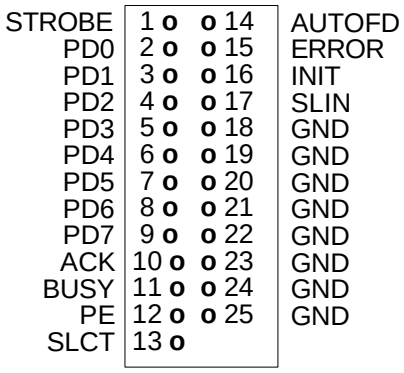
2.6 Parallel Printer Interface



Optional ECP configuration jumpers J4 and J5.

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The PCM-SX supports a standard parallel printer port. An optional configuration is available with a parallel port capable of enhanced EPP and ECP operations. The parallel port is I/O mapped at 278H and is terminated at the Multi-I/O connector J2. The pin definitions for the parallel port connector DB-25, when used with the CBL-162-1, cable is shown below :



2.6.1 ECP DMA Configuration

When the optional enhanced parallel port is used in an ECP configuration, J4 and J5 are used to configure the DMA channel to be used for ECP transfers. DMA Channel 1 or Channel 3 is selectable as shown below :



DMA CHANNEL 1 DMA CHANNEL 3

2.7 Speaker/Sound Interface

The PCM-SX utilizes a high-impedance, piezo-type device for audio output. BIOS beep codes, error signaling, or user-defined tones can be presented via this device.

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2.8 PC/104 Bus interface

The PCM-SX supports I/O expansion through the standard PC/104 connectors at J13 and J14. The PCM-SX supports both 8-bit and 16-bit PC/104 modules. The PC/104 connector pin definitions are provided here for reference.

J13

GND	B1	A1	IOCHK
RESET	B2	A2	BD7
+5V	B3	A3	BD6
IRQ9	B4	A4	BD5
-5V	B5	A5	BD4
DRQ2	B6	A6	BD3
-12V	B7	A7	BD2
0WS	B8	A8	BD1
+12V	B9	A9	BD0
GND	B10	A10	IOCHRDY
MEMW	B11	A11	AEN
MEMR	B12	A12	SA19
IOW	B13	A13	SA18
IOR	B14	A14	SA17
DACK3	B15	A15	SA16
DRQ3	B16	A16	SA15
DACK1	B17	A17	SA14
DRQ1	B18	A18	SA13
REFRESH	B19	A19	SA12
SYSCLK	B20	A20	SA11
IRQ7	B21	A21	SA10
IRQ6	B22	A22	SA9
IRQ5	B23	A23	SA8
IRQ4	B24	A24	SA7
IRQ3	B25	A25	SA6
DACK2	B26	A26	SA5
TC	B27	A27	SA4
BALE	B28	A28	SA3
+5V	B29	A29	SA2
OSC	B30	A30	SA1
GND	B31	A31	SA0
GND	B32	A32	GND

J14

GND	C0	D0	GND
SBHE	C1	D1	MEMCS16
LA23	C2	D2	IOCS16
LA22	C3	D3	IRQ10
LA21	C4	D4	IRQ11
LA20	C5	D5	IRQ12
LA19	C6	D6	IRQ15
LA18	C7	D7	IRQ14
LA17	C8	D8	DACK0
MEMR	C9	D9	DRQ0
MEMW	C10	D10	DACK5
SD8	C11	D11	DRQ5
SD9	C12	D12	DACK6
SD10	C13	D13	DRQ6
SD11	C14	D14	DACK7
SD12	C15	D15	DRQ7
SD13	C16	D16	VCC
SD14	C17	D17	MASTER
SD15	C18	D18	GND
KEY	C19	D19	GND

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2.9 Floppy Disk Interface

The PCM-SX supports up to 2 standard 3 1/2" or 5 1/4" PC compatible floppy disk drives. The drives are connected via the I/O connector at J1. Note that the interconnect cable to the drives is a standard floppy I/O cable used on desktop PCs. The cable must have the twisted section prior to the drive A: position. The pin definitions for the J1 connector are shown here for reference.

J1

GND	1	2		RPM/LC
GND	3	4		N/C
GND	5	6		N/C
GND	7	8		INDEX
GND	9	10		MTR0
GND	11	12		DRV1
GND	13	14		DRV0
GND	15	16		MTR1
GND	17	18		DIR
GND	19	20		STEP
GND	21	22		WDATA
GND	23	24		WGATE
GND	25	26		TRK0
GND	27	28		WPRT
GND	29	30		RDATA
GND	31	32		HDSEL
GND	33	34		DSKCHG

2.10 IDE Hard Disk Interface

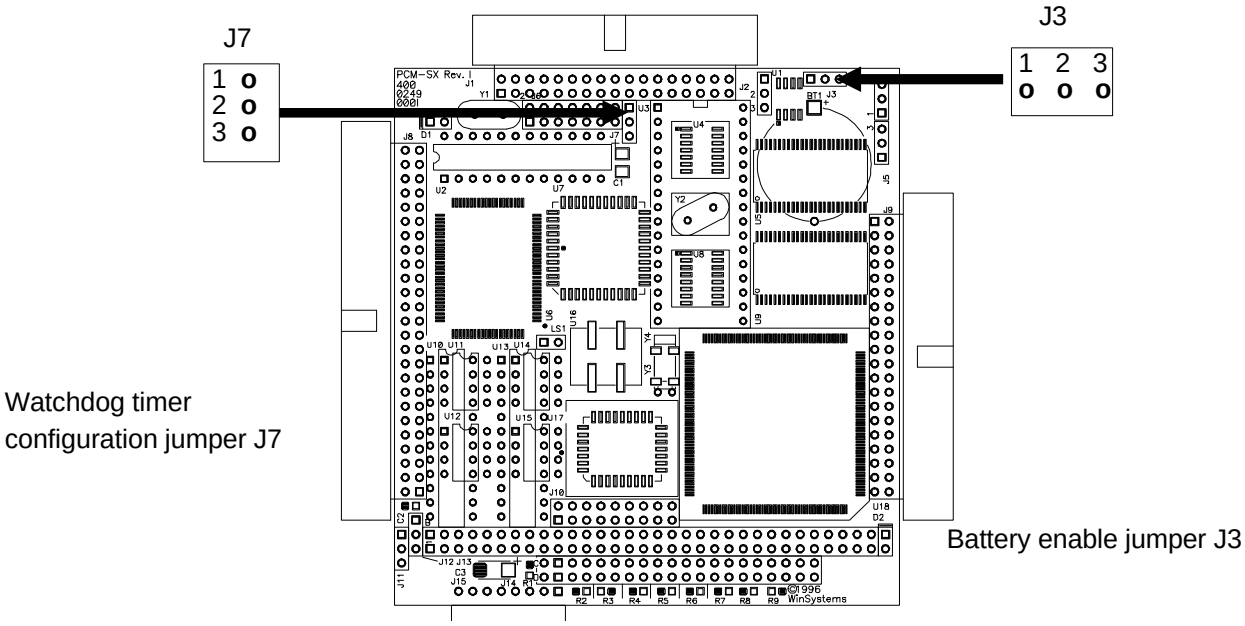
The PCM-SX supports standard IDE fixed disks through the I/O connector at J9. A red activity LED is present at D2. The pin definitions for the J9 connector are shown here :

J9

RESET	1	2		GND
D7	3	4		D8
D6	5	6		D9
D5	7	8		D10
D4	9	10		D11
D3	11	12		D12
D2	13	14		D13
D1	15	16		D14
D0	17	18		D15
GND	19	20		N/C
GND	21	22		GND
IOW	23	24		GND
IOR	25	26		GND
N/C	27	28		ALE
N/C	29	30		GND
INTRQ	31	32		IOCS16
A1	33	34		N/C
A0	35	36		A2
HDCS0	37	38		HDCS1
N/C	39	40		GND

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2.11 Watchdog Timer Configuration



The PCM-SX board features a power-on voltage detect and a power-down/power brown-out reset circuit to protect memory and I/O from faulty CPU operation during periods of illegal voltage levels. This supervisory circuitry also features a watchdog timer which can be used to guard against software lockups. An internal self- timer with a period of 1.5 seconds will, when enabled, reset the CPU if the watchdog has not been serviced (petted) within the allotted time. There are three watchdog operational modes available on the PCM-SX. With no jumper installed on J7, the watchdog is totally disabled and can never reset the CPU. When J7 is jumpered pins 2-3 the watchdog circuit is permanently enabled and timing begins immediately with power-on. This mode is NOT compatible with the Award BIOS or with MS-DOS but is available for directly embedded code that takes the place of the BIOS. The watchdog must be accessed at least every 1.5 seconds or a reset will occur. Petting in this mode is accomplished by writing to I/O port 1EEH with an alternating 1 and 0 value.

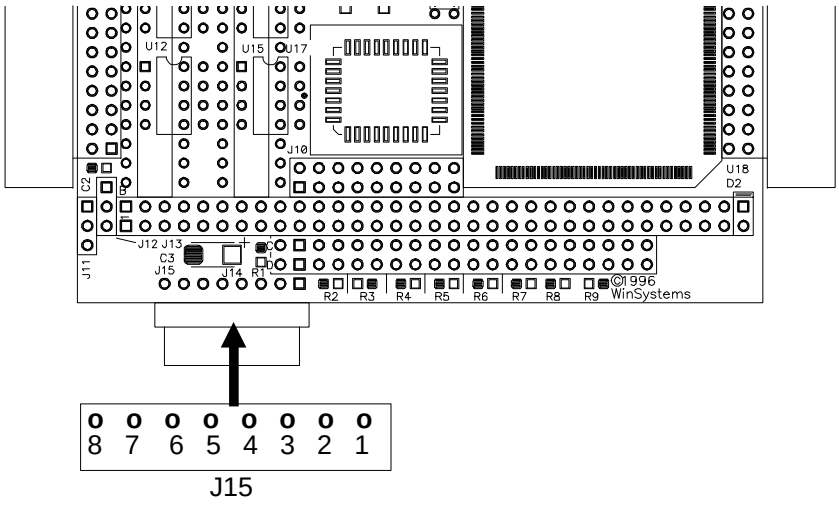
The alternate mode of operation is via software enable/disable control. This mode is set by jumpering J7 pins 1-2. In this mode the watchdog timer powers-up disabled and must be enabled in software before timing will begin. Enabling is accomplished by writing a 1 to I/O port 1EEH. Writing a 0 to I/O port 1EEH will disable the watchdog. After enabling, the watchdog must be serviced at least every 1.5 seconds or a reset will occur. The petting is accomplished by simply writing any value to I/O port 1EFH. This mode of operation can be used with the BIOS and DOS provided that the watchdog is disabled before making any extensive BIOS or DOS calls, especially video or disk I/O calls, which in some cases could exceed the 1.5 seconds allowed. The drawback to this mode is that a lockup during the time the watchdog is disabled will not allow for auto-recovery but will require an external source for a reset.

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2.12 Battery Select Control

The PCM-SX has an onboard lithium battery used to sustain the Clock/Calendar CMOS setup information, and Solid State Disk information when SRAMs are used. A master battery enable jumper is provided at J3. With J3 unjumpered the battery is totally disconnected and no battery voltage is supplied to any circuitry on the board. The Solid State Disk socket may be jumpered for battery backup when using SRAMs if desired. Refer to the Silicon Disk Configuration section of this manual for details. It may become necessary or desirable at some time to erase the CMOS setup information due to incorrect or undesirable settings which are causing an inability to execute the setup utility or improper operation. To reset the CMOS memory to factory defaults, remove the jumper from J3 for at least 10 seconds and then restore the jumper J3. This should result in the BIOS restoring defaults and prompting for setup during the next boot. Refer to section 3, “AWARD BIOS Configuration”, for setup options and details.

2.13 Power/Reset Connections



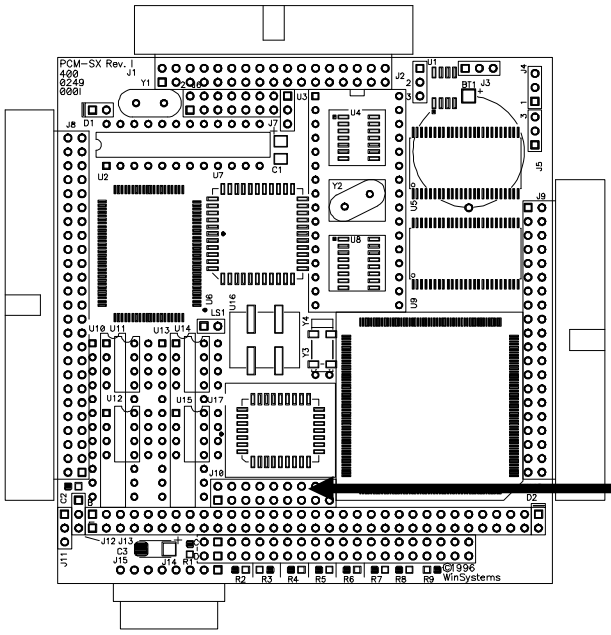
Power is applied to the PCM-SX via the connector at J15. The pin definitions for J15 are given below. An optional push-button-reset may also be routed into J15 if desired.

J15

8 o	PBRESET*
7 o	GND
6 o	GND
5 o	GND
4 o	+5V
3 o	+5V
2 o	+12V
1 o	-12V

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2.14 Interrupt Routing



Interrupt routing header J10

J10

2	4	6	8	10	12	14	16	18
o	o	o	o	o	o	o	o	o
o	o	o	o	o	o	o	o	o
1	3	5	7	9	11	13	15	17

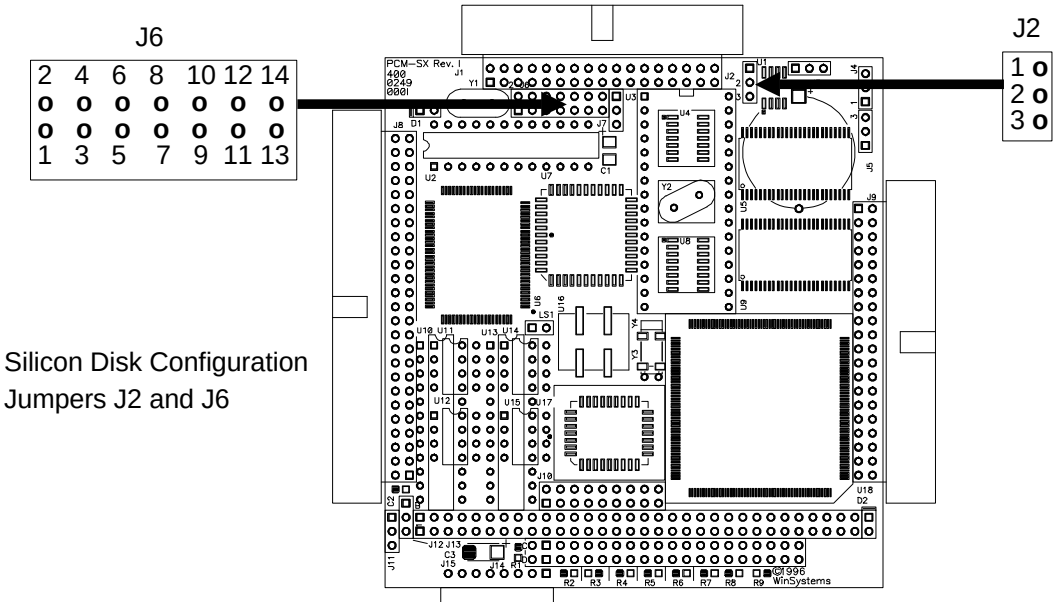
All interrupt inputs are routed to their respective PC/104 bus pins as shown earlier in the PC/104 bus interface section. Onboard peripherals, serial, parallel, and disk are routed to their typical interrupt inputs using the jumper block at J10. This block allows disconnecting or rerouting of the onboard interrupts. The layout of the J10 jumper block is shown here, along with its default settings :

J10

COM1	1 o-o	2	IRQ4
COM2	3 o-o	4	IRQ3
FLOPPY	5 o-o	6	IRQ6
LPT	7 o-o	8	IRQ7
HARD DISK	9 o-o	10	IRQ14
N/A	11 o	o 12	IRQ10
N/A	13 o	o 14	IRQ12
IRQ9	15 o	o 16	IRQ15
IRQ5	17 o	o 18	IRQ11

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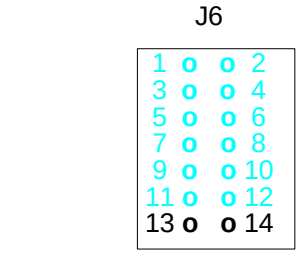
2.15 Silicon Disk Configuration



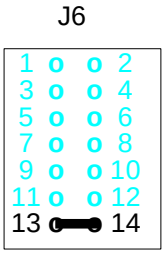
The PCM-SX supports the use of EPROM, PEROM (Flash), SRAM, and the M-Systems DiskOnChip (DOC) devices to be used as a Solid State Disk drive. Section 4 of this manual provides the necessary information for the generation and usage of the Silicon drive. This section documents the required hardware configurations for the various types of devices. The 32-pin JEDEC memory socket at U3 is used to contain the RAM, ROM, FLASH, or DOC device used for the disk. The Silicon disk array is memory mapped into a 32K byte hole at segment E800H and has an I/O control register at 1ECH.

2.15.1 Silicon Disk Mode

There are two basic modes of Silicon Disk operation available on the PCM-SX. The first uses the onboard BIOS extension and supports the use of a 512K or 1M EPROM, 512K SRAM, or 512K ATMEL Flash device. The second mode uses the M-Systems DiskOnChip device. The mode is controlled via pins 13-14 on jumper block at J6 as shown here :



EPROM, SRAM, PEROM USAGE



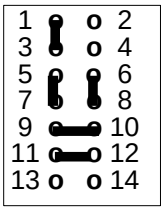
DOC USAGE

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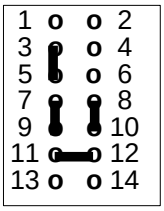
Note : Jumpering for DOC mode with EPROM, RAM, or FLASH installed effectively acts to disable the Solid State Disk and similarly when a DOC device is installed and the jumper is selected for standard devices the DOC is disabled.

2.15.2 Device Type Selection

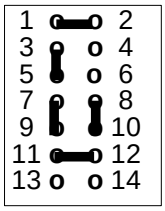
Before using the Silicon Disk the proper device type must be selected by properly jumpering J6. The supported device type jumperings are shown here :



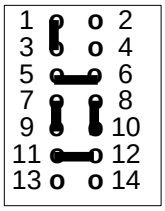
512K X 8 SRAM



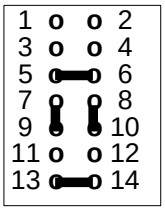
512K X 8 EPROM



1M X 8 EPROM



512K X 8 PEROM

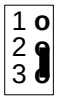


DOC DEVICE

2.15.3 Battery Backup Selection

When using SRAM devices and nonvolatile operation is desired, battery backup can be selected. J2 provides for selecting battery-backed vs. normal operating mode as shown here:

J2



Normal Operation

J2



Battery Backup Selected

NOTE : Having the jumper selected for battery backup when using anything other than low-power-standby SRAMs (such as with EPROMs, or PEROMs) will result in the rapid draining of the onboard battery.

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2.16 Multi-I/O Connector

The I/O to the serial channels, the printer port, and keyboard are all terminated via the connector at J8. An adapter cable, part number CBL-162-1, is available from WinSystems to adapt to the conventional I/O connectors. The pin-out for J8 is shown here:

J8

COM1 - DCD	1 o	o 2	COM1 - DSR
COM1 - RXD	3 o	o 4	COM1 - RTS
COM1 - TXD	5 o	o 6	COM1 - CTS
COM1 - DTR	7 o	o 8	COM1 - RI
COM1 - GND	9 o	o 10	COM2 - DCD
COM2 - DSR	11 o	o 12	COM2 - RSX
COM2 - RTS	13 o	o 14	COM2 - TXD
COM2 - CTS	15 o	o 16	COM2 - DTR
COM2 - RI	17 o	o 18	COM2 - GND
LPT - STROBE	19 o	o 20	LPT - AUTOFD
LPT - PD0	21 o	o 22	LPT - ERROR
LPT - PD1	23 o	o 24	LPT - INIT
LPT - PD2	25 o	o 26	LPT - SLCTIN
LPT - PD3	27 o	o 28	LPT - GND
LPT - PD4	29 o	o 30	LPT - GND
LPT - PD5	31 o	o 32	LPT - GND
LPT - PD6	33 o	o 34	LPT - GND
LPT - PD7	35 o	o 36	LPT - GND
LPT - ACK	37 o	o 38	LPT - GND
LPT - BUSY	39 o	o 40	LPT - GND
LPT - PE	41 o	o 42	LPT - GND
LPT - SLCT	43 o	o 44	KEYBD - GND
KEYBD - GND	45 o	o 46	KEYBD - GND
KEYBD - KDATA	47 o	o 48	KEYBD - CLK
KEYBD - +5V	49 o	o 50	KEYBD - +5V

2.17 Status LED

A red LED is populated on the board at D1 which can be used for any application specific purpose. The LED can be turned on in software by writing a 1 to I/O port 1EDH. The LED can be turned off by writing a 0 to 1EDH.

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2.18 Jumper/Connector Summary

Jumper/ Connector	Description	Page Reference
J1	Floppy I/O Connector	2-9
J2	Battery Backup Enable Jumper	2-14
J3	Master Battery Enable Jumper	2-11
J4	ECP DRQ Select Jumper	2-7
J5	ECP DACK Select Jumper	2-7
J6	SSD Device Configuration	2-15
J7	Watchdog Timer Configuration Jumper	2-10
J8	Multi-I/O Connector	2-15
J9	IDE I/O Connector	2-9
J10	Interrupt Routing Header	2-12
J11	COM1 Configuration Jumper	2-5
J12	COM2 Configuration Jumper	2-6
J13	PC/104-8 Connector	2-8
J14	PC/104-16 Connector	2-8
J15	Power/Reset Connector	2-11

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3 AWARD BIOS Configuration

3.1 General Information

The PCM-SX comes equipped with a standard Award BIOS with Setup in ROM that allows users to modify the basic system configuration. This type of information is stored in battery-backed CMOS RAM so that it retains Setup information when power is turned off.

3.2 Entering Setup

To enter setup, power on the computer and press the DEL key immediately after the message "Press DEL to Enter Setup" appears on the lower left of the screen. If the message disappears before you respond and you still wish to enter setup, restart the system by turning it OFF and then ON or by pressing the RESET button, if so equipped, or by pressing the CTRL, ALT and DEL keys simultaneously. Alternately, under certain error conditions of incorrect setup the message :

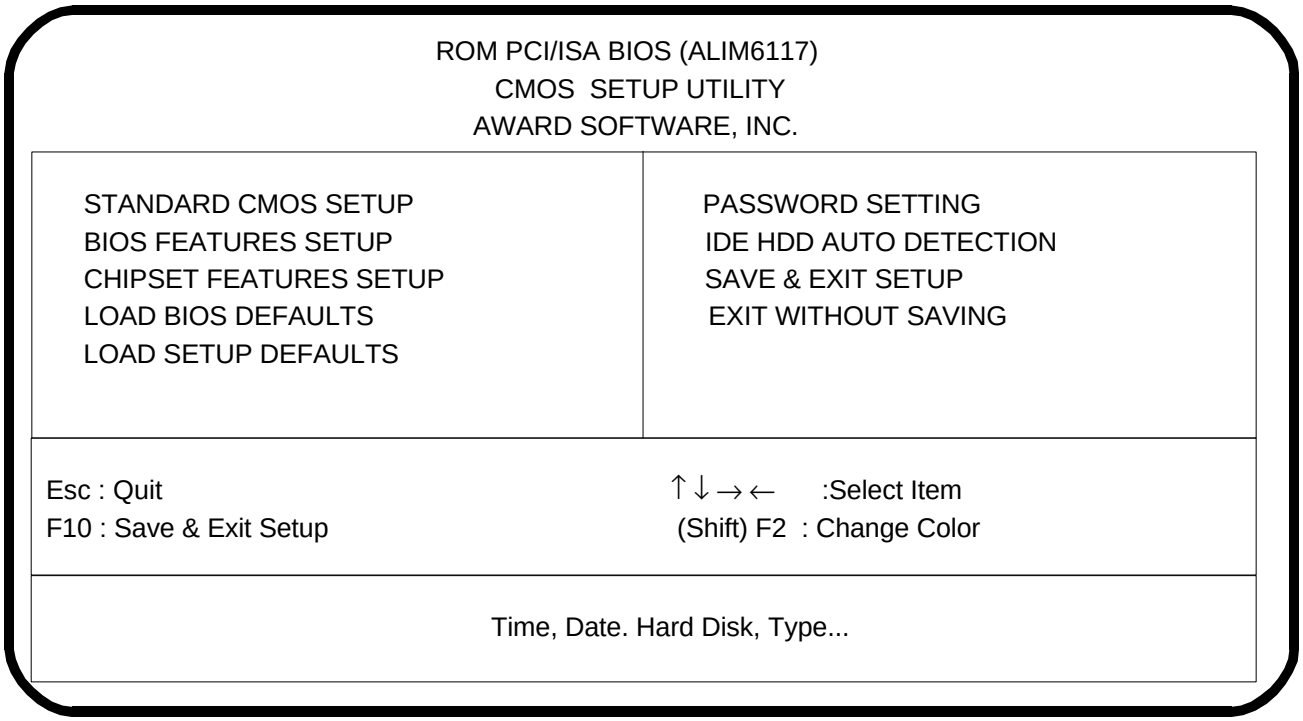
"Press F1 to continue or DEL to Enter Setup"

may appear. To Enter Setup at that time, press the DEL key. To attempt a boot, ignoring the error condition, press the F1 key.

3.3 Setup Main Menu

The main menu screen is displayed on the following page. Each of the options will be discussed in this section. Use the arrow keys to highlight the desired selection and press ENTER to enter the sub-menu or to execute the function selected.

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3.4 Standard CMOS Setup

The items in the Standard CMOS Setup menu are divided into several categories. Each category may include one or more setup items. Use the arrow keys to highlight the item and then use the PgUp, PgDn, +, -, keys to select the desired value for the item.

Date

The date format is <day>, <date>,<month>,<year>

day = The day, from Sun to Sat, determined by the BIOS and is display only.

date = The date, from 1 to 31 (or the maximum for the current month)

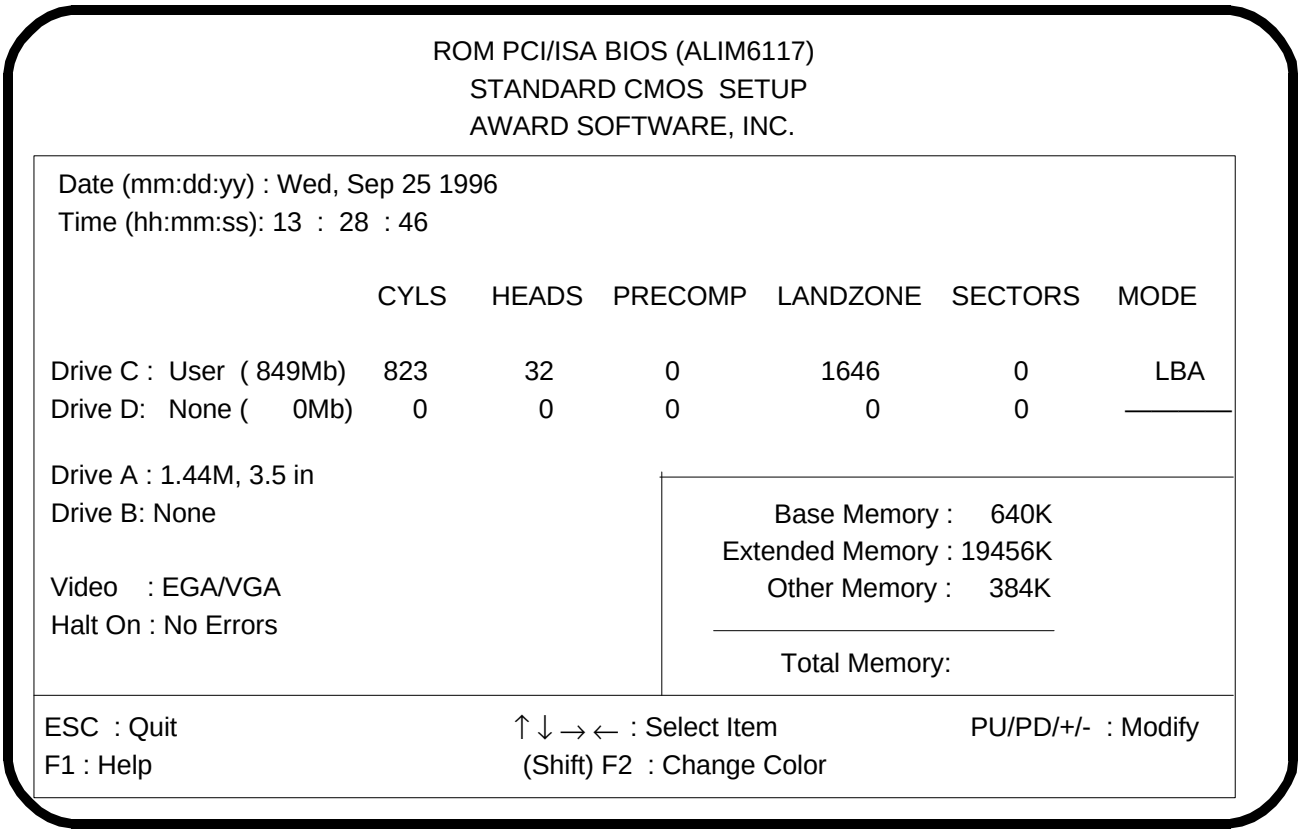
month = The month, Jan through Dec

year = The year, from 1900 to 2099

Time

The time format is <hour> <minute> <second>. The time is calculated on the 24-hour military-time clock, such that 1:00PM is 13:00:00.

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Drive C: type/Drive D: type

This category identifies the type of hard disk C: or hard disk D: that have been installed in the system. There are 46 predefined types and a user definable type. Types 1-46 are predefined as shown in the following table.

Type	Size	Cylinders	Heads	Sectors	Precomp	Landzone
1	10	306	4	17	128	305
2	20	615	4	17	300	615
3	30	615	6	17	300	614
4	62	940	8	17	512	940
5	46	940	6	17	512	940
6	20	615	4	17	None	615
7	30	462	8	17	256	511
8	30	733	5	17	None	733
9	112	900	15	17	None	901
10	20	820	3	17	None	820
11	35	855	5	17	None	855
12	49	855	7	17	None	855
13	20	306	8	17	128	319
14	42	733	7	17	None	733
15		Reserved				
16	20	612	4	17	0	663

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17	40	977	5	17	300	977
18	56	977	7	17	None	977
19	59	1024	7	17	512	1023
20	30	733	5	17	300	732
21	42	733	7	17	300	732
22	30	306	5	17	300	733
23	10	977	4	17	0	336
24	40	1024	5	17	None	976
25	76	1224	9	17	None	1023
26	71	1224	7	17	None	1223
27	111	1224	11	17	None	1223
28	152	1024	15	17	None	1223
29	68	1024	8	17	none	1023
30	93	918	11	17	None	1023
31	83	925	11	17	None	1023
32	69	1024	9	17	none	926
33	85	1024	10	17	None	1023
34	102	1024	12	17	None	1023
35	110	1024	13	17	None	1023
36	119	1024	14	17	None	1023
37	17	1024	2	17	None	1023
38	136	1024	16	17	None	1023
39	114	918	15	17	None	1023
40	40	820	6	17	None	820
41	42	1024	5	17	None	1023
42	65	1024	5	26	None	1023
43	40	809	6	17	None	852
44	61	809	6	26	None	852
45	100	776	8	33	None	775
46	203	684	16	38	None	685

Press PgUp or PgDn to select a numbered hard disk type, or type the number and press Enter. Most manufacturers supply hard disk information with their drives that can be used to help identify the proper drive type. Modern IDE drives seldom fall into the predefined types and are usually best handled with the “user” defined types. The “user” mode allows for either manual or automatic entry of the drive parameters, via the setup option “IDE Auto Detect” .

If you decide to create the user type manually, you must supply the required parameters as to Cylinder count, Head count, Precomp Cylinder, Landing Zone Cylinder, and number of sectors per track.

On fixed disks larger than 528MB it will also be necessary to choose the Logical Block Addressing (LBA) mode if you wish the drive to be accessible as a single drive letter.

If there is no hard disk installed, be sure to select type “none”.

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Drive A: type/Drive B: type

This category identifies the type of floppy drives attached as Drive A: or Drive B:. The choices are as follows :

NONE
360K, 5.25 in.
1.2M, 5.25 in.
720K, 3.5 in.
1.44M, 3.5 in.
2.88M, 3.5 in.

Note that the standard PCM-SX board does not support the 2.88M floppy drives. If 2.88M floppy support is required, contact your WinSystems Applications Engineer to inquire about this option.

VIDEO

This category specifies the type of video adapter used for the primary system monitor that matches your video display board and monitor. The available choices are :

EGA/VGA
CGA40
CGA80
MONO

It is recommended that if no display card is present that EGA/VGA be chosen.

Error Halt

This category determines whether the system will halt if a non-fatal error is detected during the power up self test. The choices are :

No Errors : The system will not be stopped for any error that may be detected.

All Errors : Whenever the BIOS detects a non-fatal error the system will be stopped and a prompt will appear.

All, but Keyboard : The system will not stop for a keyboard error, it will stop for all other errors.

All, but Diskette : The system will only stop on Disk errors. All other will be ignored.

All, but Disk/Key : All errors except disk and keyboard will result in a halt and a prompt.

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Memory

This category is display only and is determined by the BIOS POST (Power On Self Test).

Base Memory

The POST routines in the BIOS will determine the amount of base (or conventional) memory installed in the system. The value of the base memory is typically 640K for systems with a Megabyte or greater of RAM installed.

Extended Memory

The BIOS determines how much extended memory is present during the POST. This is the amount of memory located above 1MB in the CPU's memory address space.

Other Memory

This refers to memory located in the 640K to 1024K address space. This is memory that can be used for different applications. DOS may use this area to load device drivers and TSRs to keep as much base memory free as possible for application programs. The most common use of this area is for Shadow RAM.

3.5 BIOS Features Setup

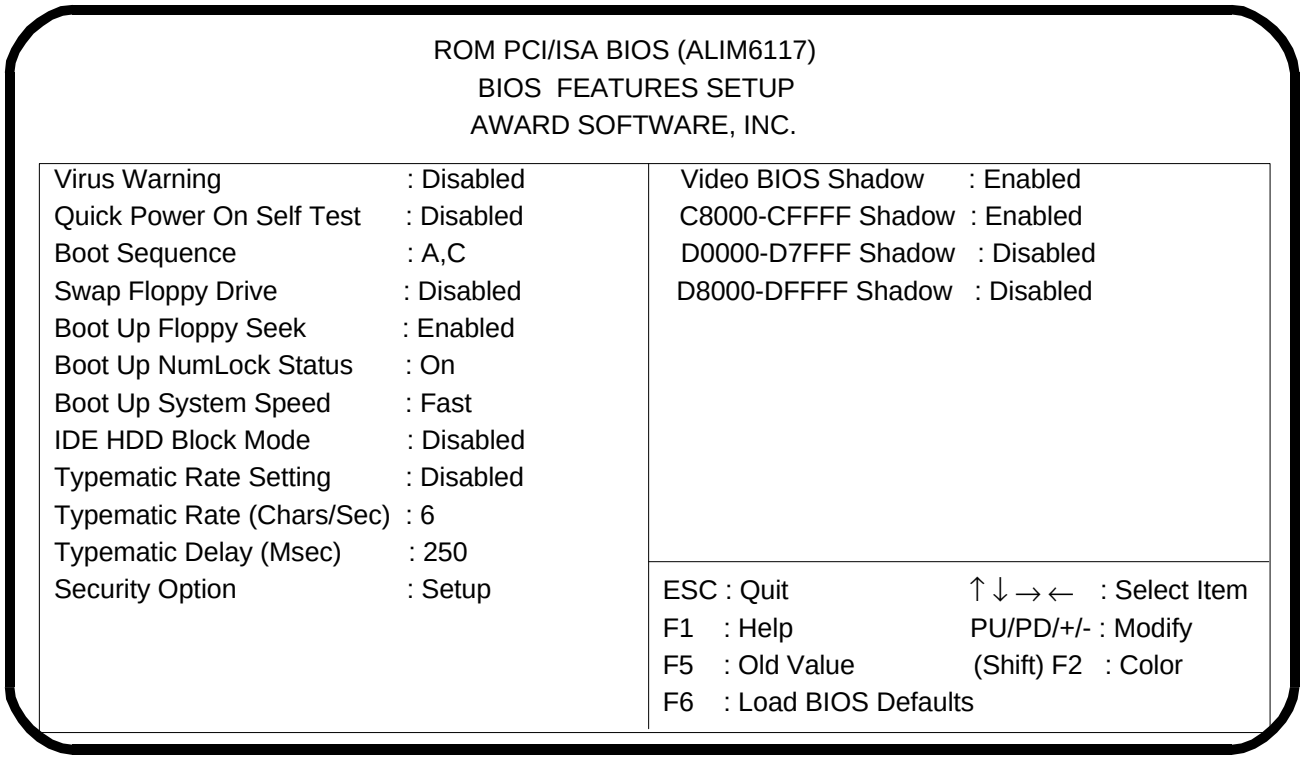
Virus Warning

This option when enabled, protects the boot sector and partition table of the hard disk against unauthorized writes through the BIOS. Any attempt to alter these areas will result in an error message and a prompt for authorization of the activity.

Quick Power On Self Test

This option when enabled, speeds up the POST during power up. If it is enabled, the BIOS will shorten and/or skip some test items during POST.

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Boot Sequence

This option determines the boot attempt sequence for the fixed disk and floppy disk. The choices are:

C,A System will attempt Hard disk boot first
A,C System will attempt Floppy disk boot first

Swap Floppy Drive

This option allows for swapping of the A: and B: floppy drives without actually relocating the drives on the cable.

Boot Up Floppy Seek

During POST, when this option is enabled, the BIOS will determine if the floppy drive is 40 tracks or 80 tracks. If disabled, no seek test will be performed and no error can be reported.

Boot Up Numlock Status

This allows user selection of the Numlock state at Boot time.

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Boot Up System Speed

This option allows specification of the processor speed at boot time. The options are :

FAST
SLOW

IDE HDD Block Mode

Block mode is also called block transfer, multiple commands, or multiple sector read/write. If the IDE drive supports block mode (most new drives will), select Enabled for automatic detection of the optimal number of block read/writes per sector that the drive can support.

Typematic Rate Setting

This enables or disables typematic rate programming at boot time. Typematic is the auto-repeat function for the keyboard.

Typematic Rate

When the typematic rate setting is enabled, the typematic repeat speed is set via this option. The supported rates are :

6 characters per second
8 characters per second
10 characters per second
12 characters per second
15 characters per second
20 characters per second
24 characters per second
30 characters per second

Typematic Delay

When typematic rate setting is enabled, this option specifies the time in milliseconds before auto-repeat begins. The supported values are :

250mS
500mS
750mS
1000mS

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Security Option

This option allows you to limit access to the system and setup, or just to setup. The choices are :

System - The system will not boot, and access will be denied if the correct password is not entered at the prompt.

Setup - The system will boot, but access to Setup will be denied if the correct password is not entered at the prompt.

NOTE : To disable security, select "Password Setting" at the Setup Main Menu and then you will be asked to enter a password. Do not type anything, just hit ENTER. Once the security is disabled, the system will boot and you can enter Setup freely.

Shadowing Options

When shadowing for a particular address range is enabled, it instructs the BIOS to copy the BIOS located in ROM into DRAM. This shadowing from an 8-bit EPROM into fast 16-bit DRAM results in a significant performance increase. The main BIOS is shadowed automatically but there are other areas that may be selected for shadowing. There areas available for shadowing are shown here :

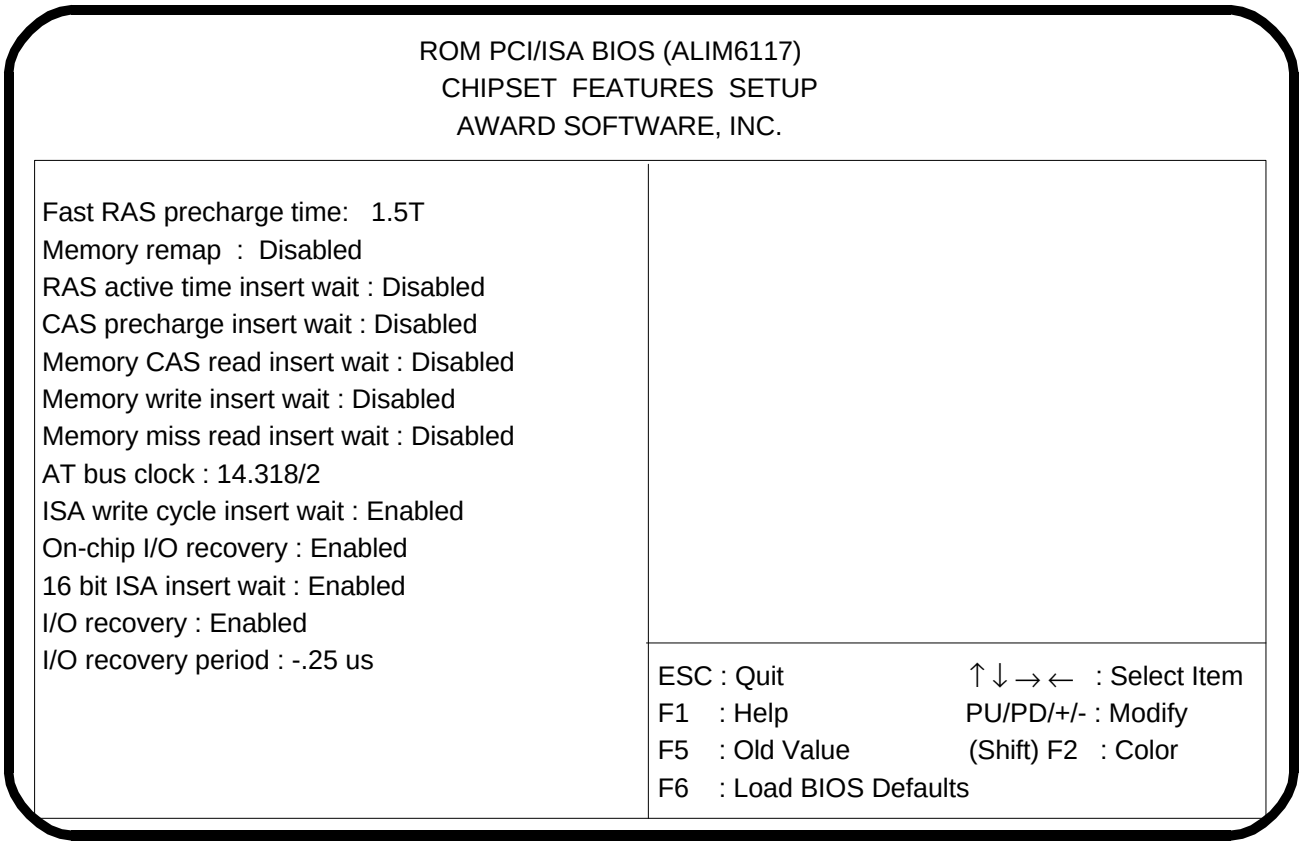
Video BIOS Shadow - C000-C7FFF EGA/VGA BIOS ROM
C8000-CFFFF
D0000-D7FFF
D8000-DFFFF

3.6 Chipset Features Setup

The options in this section control the chipset programming at boot time. In most cases, the default settings should be used unless you have a clear understanding of the significance of the change. It is possible using these options to create a system that will either not boot at all or is very unstable or unreliable. If this should occur, there are two alternatives to return the system to a stable configuration. If the system works well enough to get into Setup, simply choose the "Load BIOS Defaults" option and then "Save and Exit Setup" to restore to factory defaults. If the system will not run well enough to run setup, it will be necessary to remove the battery source temporarily. Refer to section 2.11 for details on reinitializing the CMOS RAM.

Each of the options for the Chipset Features Menu will be briefly discussed in the pages that follow.

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Fast RAS Precharge Time

This option allows selection of the RAS precharge timing. The choices are :

1.5T Default
2.5T

Memory Remap

This option allows for the remapping of unused shadow RAM to the top of installed memory. The default is disabled.

RAS active time insert wait

This option, when enabled, adds a wait state to the RAS cycle time. The default is disabled.

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CAS Precharge Insert Wait

This option, when enabled, adds a wait state to the CAS precharge timing. The default is disabled.

Memory CAS Read Insert Wait

This option, when enabled, adds a wait state to a memory CAS read cycle. The default is disabled.

Memory Write Insert Wait

This option, when enabled, adds a wait state to a memory write cycle. The default is disabled.

Memory miss read insert wait

This option, when enabled, adds a wait state to a memory read cycle following a cache miss. The default is disabled.

AT Bus Clock

This option sets the speed of the AT Bus in terms of the CPU clock speed (PCLK2) or at a fixed speed of 7.16Mhz. The available choices are :

14.318/2
PCLK2/3
PCLK2/4
PCLK2/5
PCLK2/6
PCLK2/8
PCLK2/10
PCLK2/12

ISA Write Cycle insert wait

This option, when enabled, adds a wait state to all ISA bus write cycles. The default is enabled.

On-Chip I/O Recovery

This option, when enabled, adds I/O recovery time for the On-Chip peripherals. The default is enabled.

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16 Bit ISA Insert Wait

This option, when enabled, adds a wait state to 16-bit ISA I/O cycles. The default is enabled.

I/O Recovery

This option, when enabled, selects a I/O recovery time from the next setup option. The default is enabled.

I/O Recovery Period

0.00 uS
0.25 uS Default
0.50 uS
0.75 uS
1.00 uS
1.25 uS
1.50 uS
1.75 uS
2.00 uS
2.25 uS
2.50 uS
2.75 uS
3.00 uS
3.25 uS
3.50 uS
3.75 uS

3.7 Load BIOS Defaults

This main-menu option will cause the CMOS to be loaded with the default values assigned by the factory. These are usually consider safe values and do not necessarily represent the highest performance values.

3.8 Load Setup Defaults

The options will cause the CMOS to be loaded with the default Setup values assigned by the factory. These are usually values that were determined to give a higher level of performance along with reliable operation.

3.9 Password Setting

This option allows the setting of the security password. Pressing “Enter” at the password prompt disables the security function completely.

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3.10 IDE HDD Auto Detection

This function allows modern IDE fixed disks to be used to their maximum potential by interrogating the drive as to its preferred configuration of tracks, heads, and sectors and automatically loading these parameters into a “user defined” hard disk type.

3.11 Save & Exit Setup

This function writes all changes to CMOS RAM and restarts the system.

3.12 Exit Without Saving

This option exits setup without saving any changes made and then restarts the system.

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4 PCM-SX Silicon Disk Reference

4.1 Introduction

WinSystems provides Silicon disk support for the PCM-SX using four different media types depending upon the needs of the application.

1. The PCM-SX provides support for a bootable ROMDISK with a size of up to 1 Megabyte. A simple disk imaging technique allows for the easy creation and maintenance of ROMDISKS. Since the bootable ROMDISK is an exact image of a bootable floppy diskette, all testing and debugging can be accomplished using a floppy drive. Once the application is ready for ROM, it's a simple matter to use the MKDISK utility to create the EPROM files necessary for the bootable ROMDISK equivalent of the functioning floppy diskette.

2. In applications requiring occasional program or data updates, PEROM (Flash) disks of 512K bytes may be used as the boot media. Onboard support is provided for the formatting, reading, and writing of the Floppy drive emulating PEROMs.

3. For applications needing to log data, update the application, or for convenience during development, battery backed SRAM may be used as the boot media with a size of 512K bytes.

4. The PCM-SX supports the M-Systems DiskOnChip Device (DOC). These are single chip devices containing the BIOS Extension, True Flash File System (TFFF), and a Flash array ranging in size from 2 Megabyte to 72 Megabytes. These devices emulate a Hard disk at the BIOS level.

4.2 ROMDISK Usage

MKDISK is a menu driven utility for creating the ROM image(s) duplicating the desired floppy diskette. MKDISK is invoked at the DOS command line with :

MKDISK

Select the USSD mode from menu number 1. The other menu options are used with other WinSystems Silicon Disk systems and are NOT compatible with the PCM-SX board.

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MKDISK - Solid State RomDisk Creation Utility V6.00
(C) 1988-1994, WinSystems Inc.

SELECT SSD TYPE

Paged Memory Mode (SSD-XT)
Extended Memory Mode (SSD-AT)
V53 Expanded Memory Mode
I/O Mapped Silicon Disk (USSD)
sx386 On Board ROMDISK
SBC53sx Expanded Memeory Mode
SAT-V40 Expanded Memory Mode

Use arrow keys and ENTER to make your selection.

MKDISK - Main Menu

From menu number 2 select the appropriate source disk size and type.

MKDISK - Solid State RomDisk Creation Utility V6.00
(C) 1988-1994, WinSystems Inc.

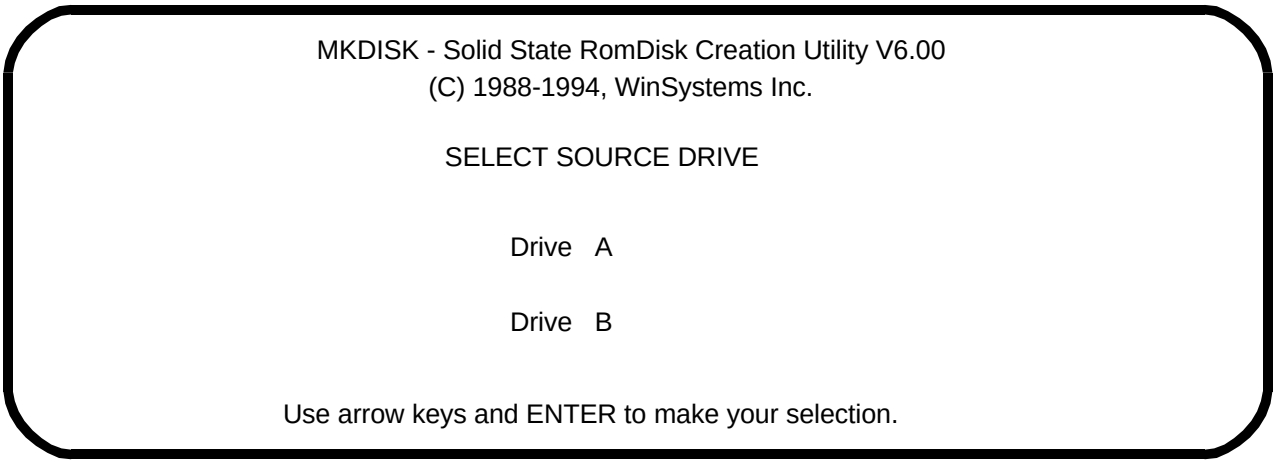
SELECT SOURCE DISK TYPE

160 KB 5 1/4 Single Sided 8 Sectors 40 tracks
180 KB 5 1/4 Single Sided 9 Sectors 40 tracks
320 KB 5 1/4 Double Sided 8 Sectors 40 tracks
360 KB 5 1/4 Double Sided 9 Sectors 40 tracks
720 KB 3 1/2 Double Sided 9 Sectors 80 tracks
720 KB 5 1/4 Double Sided 9 Sectors 80 tracks
954 KB 3 1/2 Double Sided 9 Sectors 53 tracks
960 KB 5 1/4 Double Sided 15 Sectors 64 tracks
1.2 Meg 5 1/4 Double Sided 15 Sectors 80 tracks
1.4 Meg 3 1/2 Double Sided 18 Sectors 80 tracks

Use arrow keys and ENTER to make your selection.

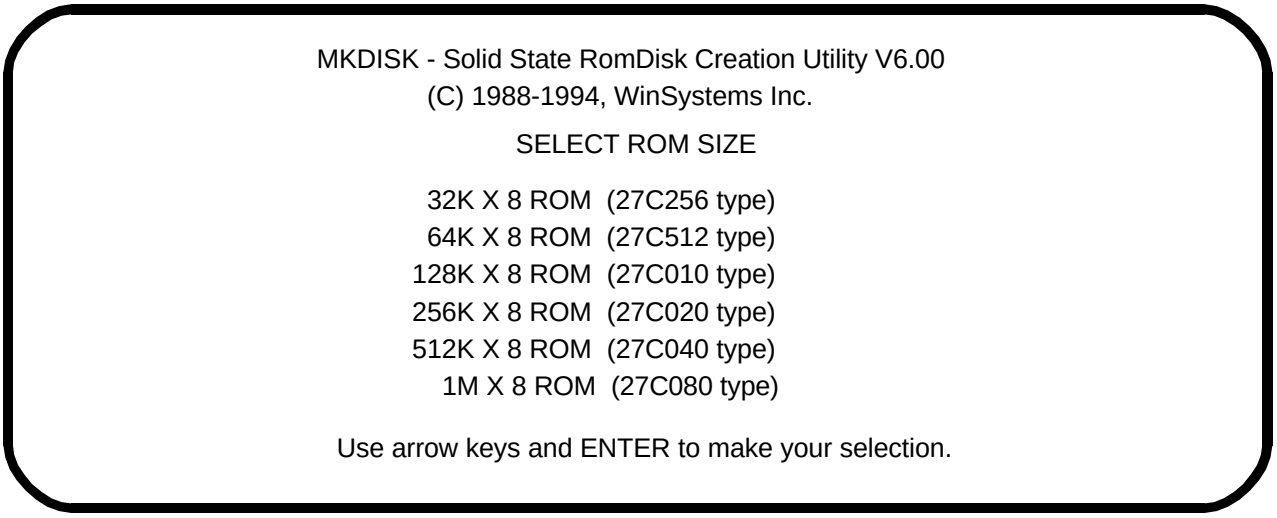
MKDISK - Drive type Menu

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MKDISK - Drive Menu

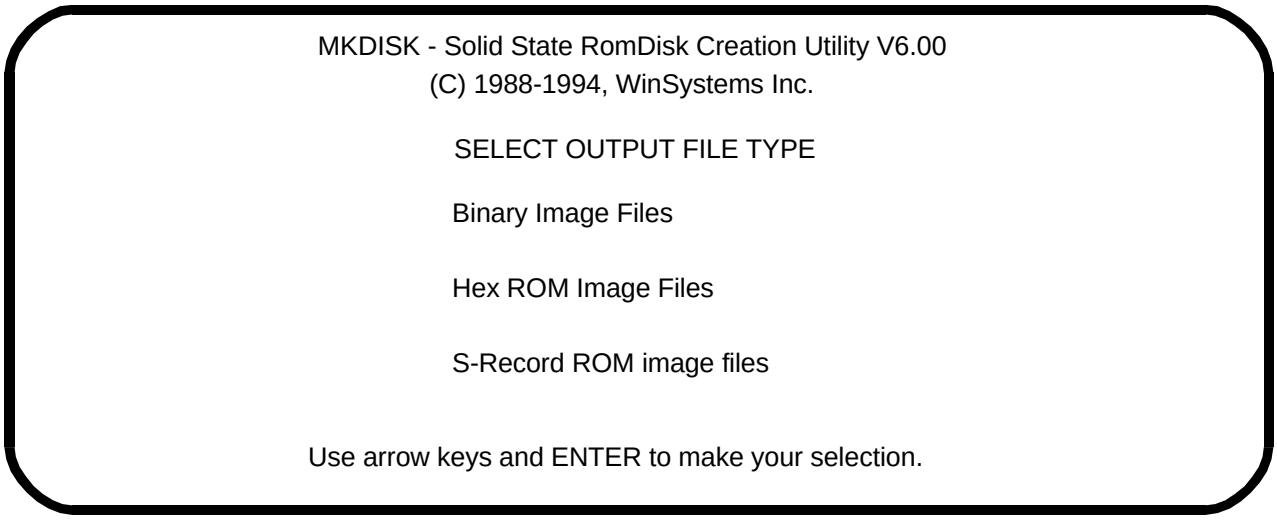
Select the source drive as appropriate



MKDISK - ROM type Menu

From menu number 4 select the appropriate EPROM size for the ROMDISK. EPROM sizes smaller than 512K or not usable with the PCM-SX but are provided as choices with other silicon disk devices.

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MKDISK - Output Menu

From menu number 5, select the appropriate ROM image file format that your EPROM programmer accepts. Selecting the Binary ROM image file format will result in the smallest files. MKDISK will then read the specified floppy diskette and create a ROMx.HEX or ROMx.S19 where x is the ROM number in the sequence (starting with 1) and the extension (.BIN, .HEX, .S19) indicates the output format for Binary, Hex, and Motorola respectively. If more than one file is created, it means that the disk will span more than a single EPROM. Once the ROM has been created using the image file, install the ROM, jumper for correct ROM size, and enable the Silicon Disk boot option. The next powerup should result in a boot from the A: Silicon Disk. The actual floppy drive if present will then be available as drive B:.

4.3 Bootable RAMDISK usage

The PCM-SX supports a bootable RAMDISK of 512K bytes in size. A 512K X 8 Static RAM/PEROM can be installed in the board at U3. Once the RAM/PEROM is installed, the device jumpers should be appropriately set as described in section 2.15. After powerup it is necessary to configure the silicon disk for the actual size of the drive using the SSDINIT utility. SSDINIT is invoked at the DOS command line with :

```
SSDINIT [A: | B: ] disk_size[K | M]
```

the K or M arguments are optional and are actually ignored. Values below 32 are assumed to be in Megabytes while values above 32 are assumed to be in Kilobytes. An example might help to clarify. To prepare a 512K FLASH or SRAM disk for formatting type :

```
SSDINIT B: 512K
```


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The disk is now prepared for formatting. The system must be rebooted prior to formatting with the simple DOS command :

```
format b: /s/u
```

After the next reset the formatted silicon disk will boot as the A: drive. If it is ever necessary to bypass the silicon disk boot in order to reformat or to boot the actual floppy drive, or the hard disk, simply press the <CTRL> <ALT> <LSHIFT> keys simultaneously immediately following display of the BIOS configuration BOX. The message :

```
Silicon Disk Boot Aborted by User
```

will be displayed and the system will boot from one of the available boot drives.

IMPORTANT NOTE : The FLASHDISK is fully writeable at all times but is not recommended for continuous updating or data logging. The onboard BIOS implements a simple FAT based file system (identical to a floppy disk) with no wear leveling implemented. The PEROMs can and will wear out with excessive write cycles. ATMEL specifies at least 10,000 write cycles.

4.4 Non-Bootable RAMDISK Usage

A non-bootable RAMDISK is often desired in conjunction with rotational media. It can then be used for program updates, parameter storage, or data logging applications. A non-bootable RAMDISK uses the WinSystems Universal Solid State Disk Driver (USSD) which is loaded via the boot media's CONFIG.SYS file with the entry :

```
device = ussd.sys /mod:p /pad:1ec /seg:e800 /psz:32 /inc:1 /spg:80 /dsz:512
```

where the 512 in /DSZ:512 is the size of the disk in kilobytes and the 80 in the /SPG:80 is the starting page address in the array for this silicon disk. This hexadecimal value is actually the count of 32K byte blocks preceding the start of the RAMDISK.

NOTE : USSD, as is the convention with DOS installable disk devices, creates a drive with the NEXT AVAILABLE drive letter. Drives A: and B: are always reserved for the physical floppy drive or the BIOS supported bootable Silicon Disk. In a system without a hard disk, the next available drive letter would be C:. In a system with one or more hard drive partitions, the silicon disk created with USSD will be the first available letter following any other drive letters already in use. Also note, that it is never necessary to format a disk created with USSD. The disks are self formatting using the size and address information provided on the CONFIG.SYS invocation line. During initialization, USSD examines the silicon disk to determine if a disk already exists which matches the parameters speci-

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fied. If so, no action is taken and the disk is used as is. If there is not a disk of the type and size specified, it is created.

4.5 Non-Bootable Flash Disk Usage

The ATMEL 5 Volt Flash Part (29C040/29C040A) may also be used as a non-bootable drive in a manner nearly identical to the RAMDISK usage described in the previous section. The only change when using USSD for the ATMEL PEROMs is the addition of the /EPT:256 parameter to the CONFIG.SYS line which installs the USSD driver. An example using the 512K PEROM device would need the line :

```
device = ussd.sys /mod:p /pad:1ec /seg:e800 /psz:32 /inc:1 /spg:80 /dsz:512 /ept:256
```

in the CONFIG.SYS file on the floppy or hard disk. This invocation will create a 512K Flash disk in U3. Refer to the previous section on non-bootable RAMDISK usage for additional details regarding the USSD driver.

4.6 DiskOnChip Usage

The PCM-SX supports the M-Systems DiskOnChip (DOC) flash device in sizes ranging from 2MB to 72MB. The DOC device contains a BIOS extension, the TFFS (Tiny Flash File System), and the flash memory all in a single 32-pin device. The DOC, unlike the other WinSystems SSD support for the PCM-SX, emulates a hard disk rather than a floppy disk. The DOC can be used as a secondary hard disk to a physical IDE drive or it can be the only hard disk in the system.

The DOC is installed into the socket at U3. Refer to Section 2.15 for correct device jumpering and enabling of the DOC.

4.6.1 DOC Initialization

The DOC is initialized in an identical fashion to a fixed disk. DOS is booted (from floppy or hard disk), FDISK is run on the DOC drive (be sure to get the right drive), the system is rebooted and then the DOC is formatted using the DOS format command.

If the /S switch was used during formatting and there is no other fixed disk device specified or attached to the system, the DOC will become the boot device. If a hard disk is present, the DOC will become a secondary fixed disk.

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5 APPENDIX A

I/O Port Map

The following is a list of PC I/O ports. Addresses marked with a '-' are not used on the PCM-SX but their use should be carefully qualified so as not to conflict with other I/O boards. I/O addresses marked with a '+' are used by the PCM-SX board and are unique to the WinSystems design. I/O Addresses marked with '**' are generally unused and should be the basis for the first choices in I/O address selection.

Hex Range	Usage
000-00F	8237 DMA #1
**0010-01F	FREE
020-021	8259 PIC #1
+022-023	M6117 Chipset Registers
**024-03F	FREE
040-043	8254 Timer
**044-05F	FREE
060-06F	8042 Keyboard controller
070-071	CMOS RAM/RTC
**0072-07F	FREE
080-08F	DMA Page Registers
**090-09F	FREE
0A0-0BF	8259 PIC #2
0C0-0CF	8237 DMA #2
**0E0-0FF	FREE
0F0-0F1	Coprocessor Control
0F2-1DF	FREE
+1E0-1EF	Watchdog timer, SSD Control, SSD configuration, and LED
1F0-1FF	Fixed Disk I/O
-200-20F	Joystick Port
-210-21F	PCM-SSD I/O Ports
-220-22F	Soundblaster I/O Ports
**230-237	FREE
-238-23B	BUS Mouse
**240-277	FREE
278-27F	LPT1
**280-2AF	FREE
-2B0-2DF	EGA Video
-2E0-2E7	GPIB Interface
-2E8-2EF	COM4
**2F0-2F7	FREE
2F8-2FF	COM2
-300-31F	Prototype Card
-320-32F	XT Hard Disk
**330-377	FREE

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-378-37F	Parallel Printer
-380-3AF	SDLC
-3B0-3BB	MDA
-3C0-3CF	EGA Video
-3D0-3DF	CGA
**3E0-3E7	FREE
-3E8-3EF	COM3
3F0-3F6	Floppy Disk
3F8-3FF	COM1

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6 APPENDIX B

Interrupt Map

No.	Address	Type	Description
0	00	CPU	Divide by 0
1	04	CPU	Single Step
		386	Debug Exception
2	08	CPU	NMI
3	0C	CPU	Breakpoint
3	10	CPU	Overflow
5	14	BIOS	Print Screen
		186	Bound Fault Exception
6	18	186	Invalid Opcode Exception
7	1C	186	Coprocessor unavailable
8	20	Hardware	IRQ0 - 18.2 Hz heart beat
		286	LIDT - Double fault exception
9	24	Hardware	IRQ1- Keyboard interrupt
		286	Coprocessor Segment
A	28	Hardware	IRQ2 - XT Reserved, AT - Slaved Controller
		286	Invalid TSS exception
B	2C	Hardware	IRQ3 - COM2
		286	Segment not present
C	30	Hardware	IRQ4 - COM1
		286	Stack fault exception
D	34	Hardware	IRQ5 - XT Hard Disk, AT = LPT
		286	Protection fault exception
E	38	Hardware	IRQ6 - Floppy Disk Interrupt
		386	Page fault exception
F	3C	Hardware	IRQ7 - LPT1
10	40	BIOS	Video BIOS functions
		286	Coprocessor error exception
11	44	BIOS	BIOS Equipment check
		486	Alignment check exception
12	48	BIOS	Memory size function
13	4C	BIOS	BIOS Disk functions
14	50	BIOS	BIOS serial functions
15	54	BIOS	Cassette/Protected mode functions
16	58	BIOS	Keyboard BIOS functions
17	5C	BIOS	BIOS Printer functions
18	60	BIOS	SROM Basic Entry Point (IBM Only)
19	64	BIOS	Boot loader function
1A	68	BIOS	BIOS Time of Day functions
1B	6C	BIOS	Keyboard break vector
1C	70	BIOS	User chained timer tick
1D	74	BIOS	Video Initialization

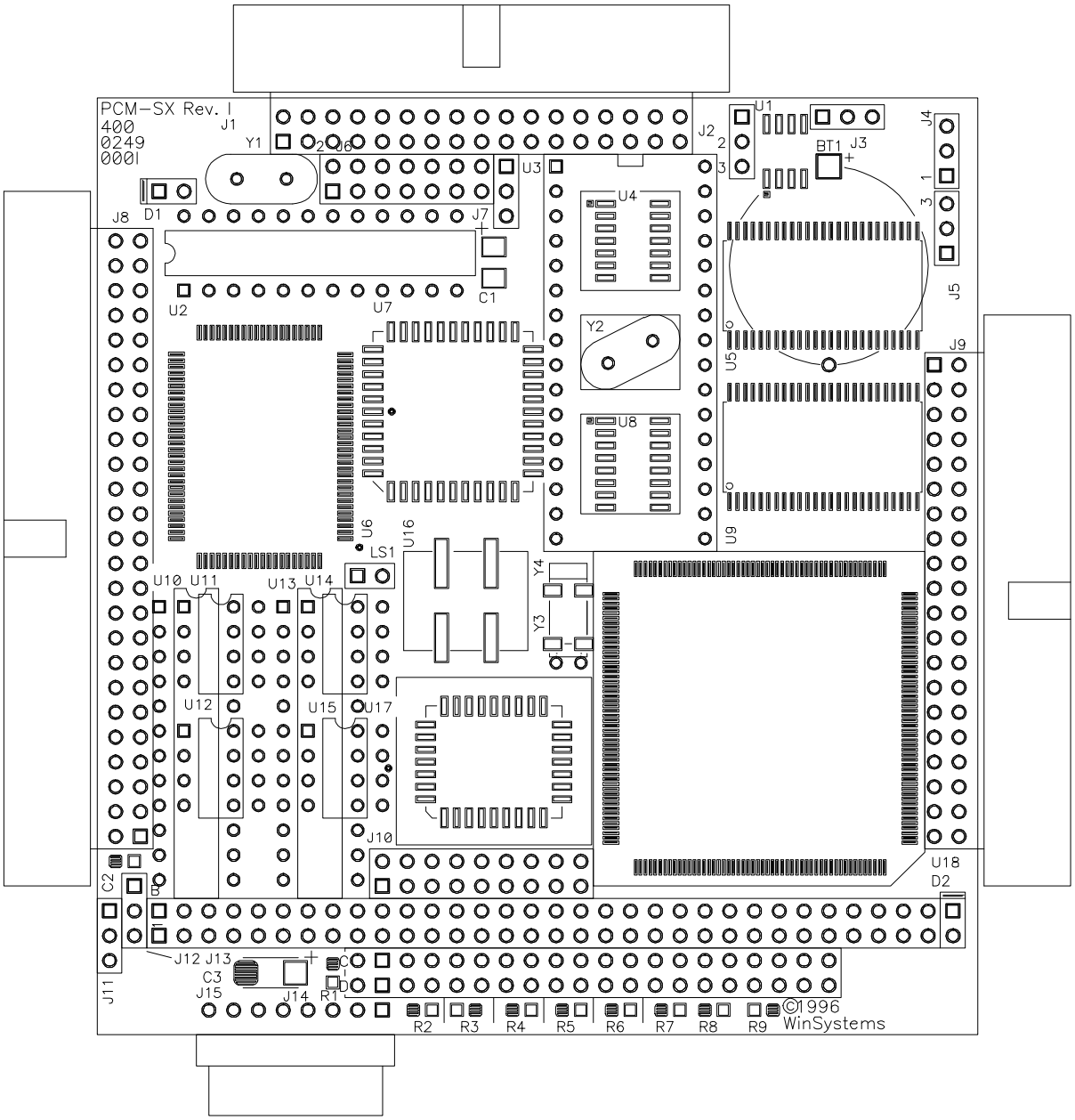
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1E	78	BIOS	Floppy Disk parameter table
1F	7C	BIOS	CGA graphic character font
20	80	MS-DOS	Program terminate
21	84	MS-DOS	DOS function call
22	88	MS-DOS	Terminate Address
23	8C	MS-DOS	Ctrl-Break exit address
24	90	MS-DOS	Fatal Error Vector
25	94	MS-DOS	Absolute disk read
26	98	MS-DOS	Absolute disk write
27	9C	MS-DOS	Terminate
28	A0	MS-DOS	Idle signal
29	A4	MS-DOS	TTY output
2A	A8	MS-DOS	MS-NET services
2F	BC	MS-DOS	Print Spool
30	C0	MS-DOS	Long jump interface
33	CC	MS-DOS	Mouse functions
3F	FC	MS-DOS	Overlay interrupt
40	100	BIOS	Floppy I/O when fixed disk present
41	104	BIOS	Hard disk 1 parameter table
42	108	BIOS	EGA Chain
43	10C	BIOS	EGA Parameter table pointer
44	110	BIOS	EGA graphics character font
4A	128	BIOS	AT Alarm exit address
50	140	BIOS	AT alarm interrupt
51	144	BIOS	Mouse functions
5A	168	NET	Functions
5B	16C	NET	Boot chain
5C	170	NET	Net BIOS Entry
67	19C	MS-DOS	EMS Functions
6D	1B4	VGA	VGA Service
70	1C0	Hardware	IRQ8 - Real time clock
71	1C4	Hardware	IRQ9 - Redirected IRQ2
72	1C8	Hardware	IRQ10 - Unassigned
73	1CC	Hardware	IRQ11 - Unassigned
74	1D0	Hardware	IRQ12 - Unassigned
75	1D4	Hardware	IRQ13 - 80287 Coprocessor
76	1D8	Hardware	IRQ14 - AT Hard Disk
77	1DC	Hardware	IRQ15 - Unassigned
80	200		
F0	3C0	Basic	
F1	3C4		
FF	3FC	Not used	

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7 APPENDIX C

PCM-SX Parts Placement Guide



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8 APPENDIX D

PCM-SX Parts List

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BEGINNING RANGE: PCM-SX-33-2M ENDING RANGE: PCM-SX-33-2M

LEVEL	ITEM KEY	ITEM DESCRIPTION	BOM DESCRIPTION	LOC	OVHD KEY	ITEM TYPE	QTY REQUIRED
1	PCM-SX-33-2M	PC/104, 33MHZ 386SX SBC WITH 2MB	DRAM				1
2	999-9999-001	SPECIAL NOTES	10-08-96 MEB (NEW)	ARLIN		Inv	1
2	0249-000-0000I	ASSY-SMT-TOP, PCM-SX ALL SPEEDS		ARLIN		Inv	1
3	>999-9999-001	SPECIAL NOTES	05-15-98 MEB (REV.I) ECO 98-49	ARLIN		Inv	1
3	>999-9999-001	SPECIAL NOTES	02-10-97 MEB ECO 97-04	ARLIN		Inv	1
3	>999-9999-001	SPECIAL NOTES	12-04-96 MEB EC0 96-144	ARLIN		Inv	1
3	>999-9999-001	SPECIAL NOTES	10-08-96 MEB (NEW)	ARLIN		Inv	1
3	>603-1047-803	CAP .1uF 50v 20% CER 0805	C2	ARLIN		Inv	1
3	>603-1063-82D	CAP 10uF 16v 20% TAN 6032	C3	ARLIN		Inv	1
3	>603-2255-72B	CAP 2.2uF 25v 10% TAN 3528	C1	ARLIN		Inv	1
3	>601-0331-503	RES 330 Oh, 5%, 0805	R1,R2	ARLIN		Inv	2
3	>601-0102-503	RES 1K Ohm 5% 1/10W 0805	R3,R6,R7,R9	ARLIN		Inv	4
3	>601-0103-503	RES 10K Ohm 5% 1/10W 0805	R4,R5,R8	ARLIN		Inv	3
3	>622-0007-001	IC, MAX692ACSA (Maxim only!)	U1	ARLIN		Inv	1
3	>611-0004-001	IC, 74HC04M	U4	ARLIN		Inv	1
3	>631-0002-023	1Mb X 16 DRAM 70n TSOP-II	U9	ARLIN		Inv	1
3	>621-0020-016	IC, F82C735/A C&T	U6	ARLIN		Inv	1
3	>621-0015-015	IC, MEGA-KB-H-QT 82C42 PLCC	U7	ARLIN		Inv	1
3	>611-0175-002	IC, 74HC175D S0-16	U8	ARLIN		Inv	1
3	>650-0032-002	SOCKET 32P AMP 822273-1 (28)	U17	ARLIN		Inv	1
3	>620-0001-016	IC, 386SX ALi M6117 (180)	U18	ARLIN		Inv	1
2	0249-001-0000I	ASSY-SMT-BOT, PCM-SX ALL MEM SIZ		ARLIN		Inv	1
3	>999-9999-001	SPECIAL NOTES	05-15-98 MEB (REV.I)	ARLIN		Inv	1
3	>999-9999-001	SPECIAL NOTES	03-06-98 MEB ECO 98-21	ARLIN		Inv	1
3	>999-9999-001	SPECIAL NOTES	11-10-97 MEB ECO 97-104	ARLIN		Inv	1
3	>999-9999-001	SPECIAL NOTES	02-10-97 MEB ECO 97-04	ARLIN		Inv	1
3	>999-9999-001	SPECIAL NOTES	12-14-96 MEB ECO 96-144	ARLIN		Inv	1
3	>999-9999-001	SPECIAL NOTES	10-08-96 MEB (NEW)	ARLIN		Inv	1
3	>400-0249-000I	PCB, PCM-SX REV.I		ARLIN		Inv	1
3	>603-1047-803	CAP .1uF 50v 20% CER 0805	C4-C16,C17-C20,C23-C29,C32,C34,C37-C40	ARLIN		Inv	30
3	>603-2207-503	CAP 22PF 50v 2% NPO 0805	C30,C31,C35,C36	ARLIN		Inv	4
3	>603-1007-303	CAP 10pF 50v +/- .5pF CER 0805	C21	ARLIN		Inv	1
3	>603-1037-803	CAP .01uF 50v 20% CER 0805	C33	ARLIN		Inv	1
3	>665-0001-102	TRANSISTOR 2N7002 (SOT-23)	Q1,Q2	ARLIN		Inv	2
3	>602-0103-512	RN 10K Oh, 5%, 2506/16 pin, Bus	RP1,RP2	ARLIN		Inv	2
3	>601-0331-503	RES 330 Oh, 5%, 0805	R11	ARLIN		Inv	1
3	>601-0102-503	RES 1K Ohm 5% 1/10W 0805	R10,R12,R16,R24,R26,R28-R30,R35,R37,	ARLIN		Inv	17
3	>999-9999-001	SPECIAL NOTES	R41-R47	ARLIN		Inv	1
3	>601-0103-503	RES 10K Ohm 5% 1/10W 0805	R17,R21,R22,R25,R33,R34,R36	ARLIN		Inv	7
3	>601-0271-503	RES 270 Ohm 5% 1/10w 0805	R13,R32,R50	ARLIN		Inv	3
3	>601-0474-503	RES 470K Ohm 5% 1/10W 0805	R18	ARLIN		Inv	1
3	>601-0220-503	RES 22 Ohm 5% 1/10w 0805	R15,R19,R38,R49	ARLIN		Inv	4
3	>601-0101-503	RES 100 Ohm 5% 1/10w 0805	R31	ARLIN		Inv	1
3	>601-0105-503	RES 1M Ohm 5% 1/10W 0805	R27	ARLIN		Inv	1
3	>612-0688-002	IC, 74HCT688AF (SM)	U20,U21	ARLIN		Inv	2
3	>618-0006-001	IC, SN7406D (SM)	U22	ARLIN		Inv	1
3	>615-0069-001	IC, CD4069UBCM (NAT)	U26	ARLIN		Inv	1
3	>601-0000-503	RES 0 Ohm 5% 1/10w 0805	R14,R23,R48	ARLIN		Inv	3
2	0249-002-0000I	ASSY-TH, PCM-SX ALL REV.I		ARLIN		Inv	1
3	>999-9999-001	SPECIAL NOTES	05-15-98 MEB (REV.I)	ARLIN		Inv	1
3	>999-9999-001	SPECIAL NOTES	05-15-98 MEB (REV.I)	ARLIN		Inv	1
3	>999-9999-001	SPECIAL NOTES	11-10-97 MEB ECO 97-104	ARLIN		Inv	1

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LEVEL	ITEM KEY	ITEM DESCRIPTION	BOM DESCRIPTION	LOC	OVHD KEY	ITEM TYPE	QTY REQUIRED
3	>999-9999-001	SPECIAL NOTES	02-10-97 MEB ECO 97-04	ARLIN		Inv	1
3	>999-9999-001	SPECIAL NOTES	12-04-96 MEM ECO 96-144	ARLIN		Inv	1
3	>999-9999-001	SPECIAL NOTES	10-08-96 MEB (NEW)	ARLIN		Inv	1
3	>124-0016-000	LED RED RECTANGLE L-153HDT (KNGB	D1,D2	ARLIN		Inv	2
3	>201-0072-120	HDR 2X36 UN TSW-136-07-G-D	J6=2X7	ARLIN		Inv	.45
3	>999-9999-001	SPECIAL NOTES	J10=2X9	ARLIN		Inv	1
3	>201-0034-121	HDR 2X17 IDH-34LP-SR3-TG/TR (450	J1	ARLIN		Inv	1
3	>201-0040-121	HDR 40 POS RA IDH-40LP-SR3-TG/TR	J9	ARLIN		Inv	1
3	>201-0050-121	HEADER RA 2X25 IDH50LP-SR3-TR/TG	J8	ARLIN		Inv	1
3	>201-0036-010	HDR 1X36 UN TSW-136-07-G-S (SAM)	J2,J4,J5,J7,J11,J12=1X3	ARLIN		Inv	.5
3	>999-9999-001	SPECIAL NOTES	J3=1X2	ARLIN		Inv	1
3	>201-0008-602	HDR 8 POS RA, MOLEX 22-12-2084	J15	ARLIN		Inv	1
3	>200-0243-100	SOCKET 24 P .3 ICO-243-S8A-T (14	U2	ARLIN		Inv	1
3	>250-0320-200	SKT STRP 32 POS SS-132-G-2 (SAM)	U10,U13=2X12 U3=2X16	ARLIN		Inv	3.5
3	>999-9999-001	SPECIAL NOTES	U11,U12,U14,U15=2X4	ARLIN		Inv	1
3	>220-0053-000	XTAL 24 MHZ (SHORT) U49S-S-240	Y1	ARLIN		Inv	1
3	>220-0000-000	HC49 INSULATOR XTAL	UNDER Y1 & Y2, ADD INSULATOR	ARLIN		Inv	2
3	>220-0056-000	XTAL R26-32.768KHz-6pF (RALTRON)	Y3	ARLIN		Inv	1
3	>220-0032-001	XTAL-14.31818 (ABRACON) ABL-14.3	Y2	ARLIN		Inv	1
3	>999-9999-001	SPECIAL NOTES	MASK: BT1,LS1	ARLIN		Inv	1
2	0249-010-0000I	ASSY, TOP-SMT PCM-SX-33 ANY MEM.		ARLIN		Inv	1
3	>999-9999-001	SPECIAL NOTES	05-15-98 MEB (REV.I)	ARLIN		Inv	1
3	>999-9999-001	SPECIAL NOTES	05-15-98 MEB (REV.I)	ARLIN		Inv	1
3	>999-9999-001	SPECIAL NOTES	02-10-97 MEB ECO 97-04	ARLIN		Inv	1
3	>999-9999-001	SPECIAL NOTES	03-20-97 MEB (NEW)	ARLIN		Inv	1
3	>220-0052-000	OSC SG-8002JA-66.000M-PHC	U16	ARLIN		Inv	1
2	0249-011-0000I	ASSY, BOT-SMT PCM-SX-33 ANY MEM.		ARLIN		Inv	1
3	>999-9999-001	SPECIAL NOTES	05-15-98 MEB (REV.I)	ARLIN		Inv	1
3	>999-9999-001	SPECIAL NOTES	11-10-97 MEB ECO 97-104	ARLIN		Inv	1
3	>999-9999-001	SPECIAL NOTES	02-10-97 MEB ECO 97-04	ARLIN		Inv	1
3	>999-9999-001	SPECIAL NOTES	03-20-97 MEB (NEW)	ARLIN		Inv	1
3	>601-0151-503	RES 150 Ohm 5% 1/10w 0805	R20	ARLIN		Inv	1
2	0249-040-0000I	ASSY, TOP-THR PCM-SX NON-STACKTH		ARLIN		Inv	1
3	>999-9999-001	SPECIAL NOTES	05-15-98 MEB (REV.I)	ARLIN		Inv	1
3	>999-9999-001	SPECIAL NOTES	02-10-97 MEB ECO 97-04	ARLIN		Inv	1
3	>999-9999-001	SPECIAL NOTES	03-20-97 MEB (NEW)	ARLIN		Inv	1
3	>200-0064-000	SOCKET 64 POS AT-ES1-64-02-2-GF	J13	ARLIN		Inv	1
3	>200-0040-000	SOCKET 40 PIN PC104 ES1-40-02-2-	J14	ARLIN		Inv	1
2	0249-100-0000I	SUB-ASSY, PCM-SX ALL REV.I		ARLIN		Inv	1
3	>999-9999-001	SPECIAL NOTES	05-15-98 MEB (REV.I)	ARLIN		Inv	1
3	>999-9999-001	SPECIAL NOTES	07-30-97 MEB ECO 97-68	ARLIN		Inv	1
3	>999-9999-001	SPECIAL NOTES	02-10-97 MEB ECO 97-04	ARLIN		Inv	1
3	>999-9999-001	SPECIAL NOTES	11-01-96 MEB ECBOM U17 CS	ARLIN		Inv	1
3	>999-9999-001	SPECIAL NOTES	10-08-96 MEB (NEW)	ARLIN		Inv	1
3	>111-0001-000	BAT 3V LI COIN CR2032-H04 (SONY)	BT1 *MUST BE HAND SOLDERED,USE INSULATOR	ARLIN		Inv	1
3	>730-0026-000	PIEZO TRANSDUCER BRP2407L-30	LS1 *MUST BE HAND SOLDERED,USE INSULATOR	ARLIN		Inv	1
3	>111-0032-000	INSULATOR BATTERY CR2032	LS1,BT1 INSTALL 1 UNDER EACH	ARLIN		Inv	2
3	>730-0083-000	IC, SP208CP (SIPEX), MAX208CNG (	U10,U13	ARLIN		Inv	2
3	>901-0011-000	IC, PALC22V10-35PC (15,TI) (17,C	U2 CS=BA1A \PCMSX\PCMSXU2.JED	ARLIN		Inv	1
3	>633-0001-015	IC, AT27C010-15JC (32) (ATMEL)	U17 CS=CB00 \PCMSX\REL0724.BIN	ARLIN		Inv	1
3	>201-0002-000	PLUG JUMPER 999-19-310-00	J2=2-3	ARLIN		Inv	14
3	>999-9999-001	SPECIAL NOTES	J3=1 *PLACE JUMPER ON PIN 1 ONLY	ARLIN		Inv	1
3	>999-9999-001	SPECIAL NOTES	J6=1-3 5-7 6-8 9-10 11-12 13-14	ARLIN		Inv	1
3	>999-9999-001	SPECIAL NOTES	J10=1-2 3-4 5-6 7-8 9-10	ARLIN		Inv	1
2	910-0024-000	LABEL, STATIC SENSITIVE 130-02		ARLIN		Inv	1
2	950-0002-000	BAG PINK POLY 6X10 6 MIL 09-0610		ARLIN		Inv	1
2	910-0030-000	LABEL, AWARD BIOS	PLACE ON U17 AFTER PROGRAMMING	ARLIN		Inv	1

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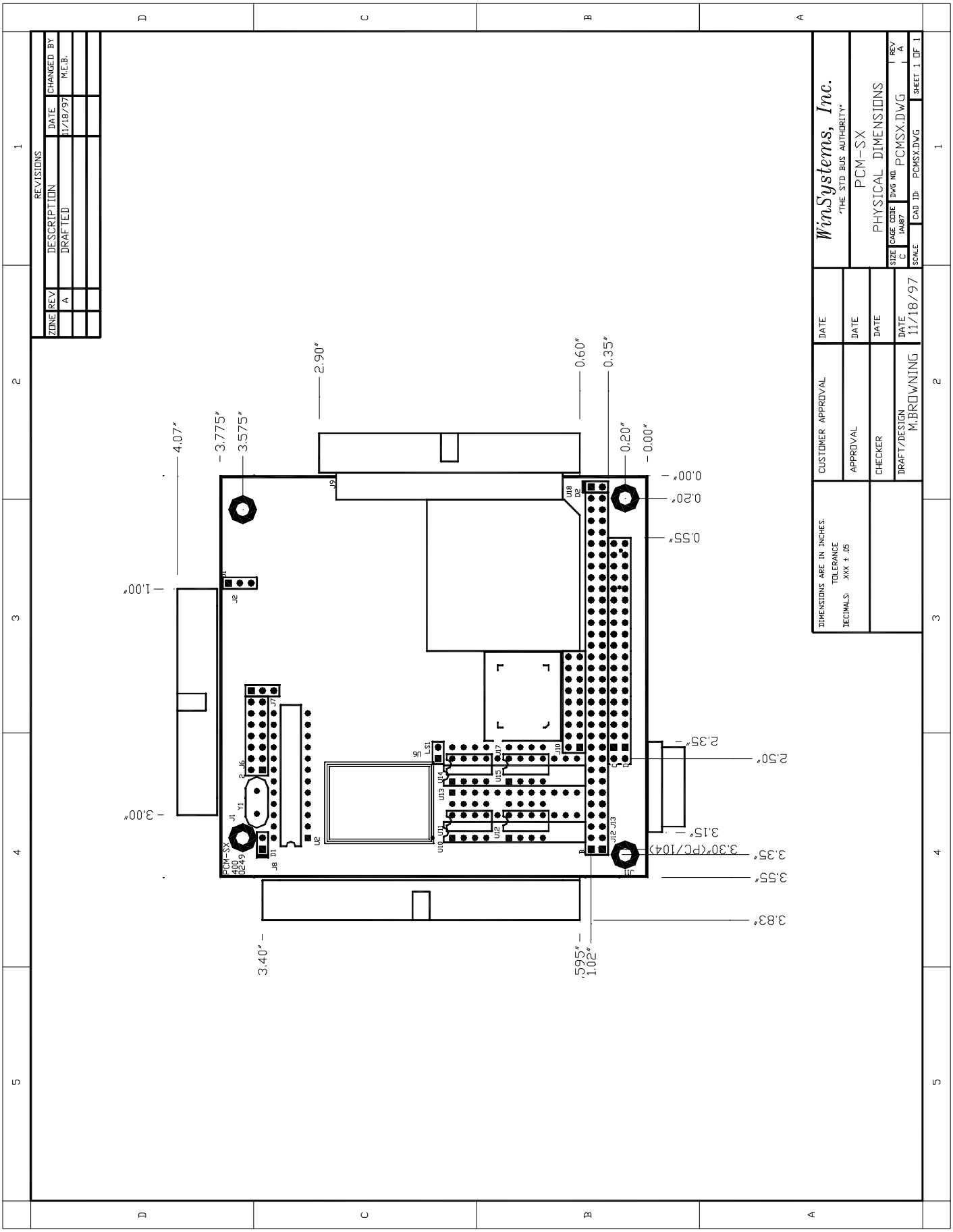
9 APPENDIX E

PCM-SX Mechanical Drawing

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