

PCM-3864/PCM-3860

386-Based Single Board
Computer with SVGA/LCD
Interface

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Packing list

Before you begin installing your card, please make sure that the following materials have been shipped:

- 1 PCM-3864/3860 All-in-One Single Board Computer
- 1 utility disk with system BIOS, VGA BIOS utility programs (PCM-3864 only)
- 1 utility disk with SVGA utility programs and drivers for Windows 3.1, Windows 95 (PCM-3864 only)
- 1 3.5" IDE flat cable
- 1 DIN jack 5P-6P cable
- 1 secondary serial port cable (RS-232/422/485)
- 1 10-pin DIP cable (optional)

If any of these items are missing or damaged, contact your distributor or sales representative immediately.

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CHAPTER
1

General Information

This chapter gives background information on the PCM-3864/3860.

Sections include:

- Card specifications
- Card layout and dimensions

Introduction

The PCM-3864/3860 is the ultimate cost-effective solution for limited space applications. It offers all the functions of an AT-compatible industrial computer on a single board by taking only a tiny space area as that of a 3 1/2" hard drive.

The PCM-3864/3860 is especially designed as an ultra-compact all-in-one SBC which incorporates a PC/104 connector into its design, accommodating easy expansion to meet your application needs.

The board uses a newly-developed 386SX Embedded Microcontroller. This highly integrated, low-voltage single-chip combines Intel's 386SX compatible microprocessor and ALi's M1217B chipset. All the features required of a PC compatible embedded controller are included in the PCM-3864/3860.

The PCM-3864 is equipped with a 32-bit SVGA/LCD interface, 72-pin DRAM SIMM socket, enhanced IDE, multi-mode parallel port, 4-bit digital I/O, FDD interface, keyboard connector and two standard serial ports. The PCM-3860 does not support the SVGA/LCD interface.

Offering superior configuration flexibility, the PCM-3864/3860 has a compact size. Its built-in CPU, highly compact size and numerous features make it an ideal cost/performance solution for all kinds of embedded applications.

Features

- Compact size (145 mm x 102 mm) fits in the space of a 3½" HDD
- ISA-bus expansion with on-board PC/104 modules
- Built-in 100% PC/AT compatible 80386SX CPU with core logic
- ISA bus SVGA/LCD display controller (LCD, EL and CRT displays) plus on-board DB-15 connector (PCM3864 only)
- Up to 16 MB DRAM
- Built-in enhanced IDE hard disk drive interface
- One multi-mode parallel port supporting SPP/ECP/EPP
- Watchdog timer, interval 1.6 seconds
- Two serial ports: one RS-232 and one RS-232/422/485; on-board DB-9 connector is designated as COM1
- 4-channel digital I/O, TTL level compatible
- On-board PS/2 keyboard connector
- Single +5 V power supply
- Flexible OEM/ODM design

Specifications

Standard SBC functions

- **CPU with core logic:** ALi M6117B, 40 Mhz 80386SX CPU
- **BIOS:** AMI 128 KB Flash memory
- **RAM:** One 72-pin SIMM socket. Supports standard page mode DRAM from 1 to 16 MB (accepts 1, 4, 16 MB)
- **Enhanced IDE hard disk drive interface:** Supports up to two Enhanced IDE devices. BIOS auto-detect
- **Multi-mode parallel port:** Configured to LPT1, LPT2, LPT3 or disabled. Supports SPP/EPP/ECP; D-SUB 25-pin connector on board.
- **Floppy disk drive interface:** Supports up to two FDDs: 3.5" (720KB or 1.44MB) and/or 5.25" (360KB or 1.2MB)
- **Serial ports:** One serial RS-232 port, one serial RS-232/422/485 port. Two 16C550 compatible UARTs
- **PS/2 keyboard connector:** Mini-DIN keyboard connector

Digital I/O

- **Digital input x 4:** TTL compatible input voltage.
High at 2.0 V minimum.
Low at 0.8 V maximum.
- **Digital output x 4:** TTL compatible output V.
High: Source 0.4 mA at 2.4 V min.
Low: Sink 8 mA at 0.5 V max.

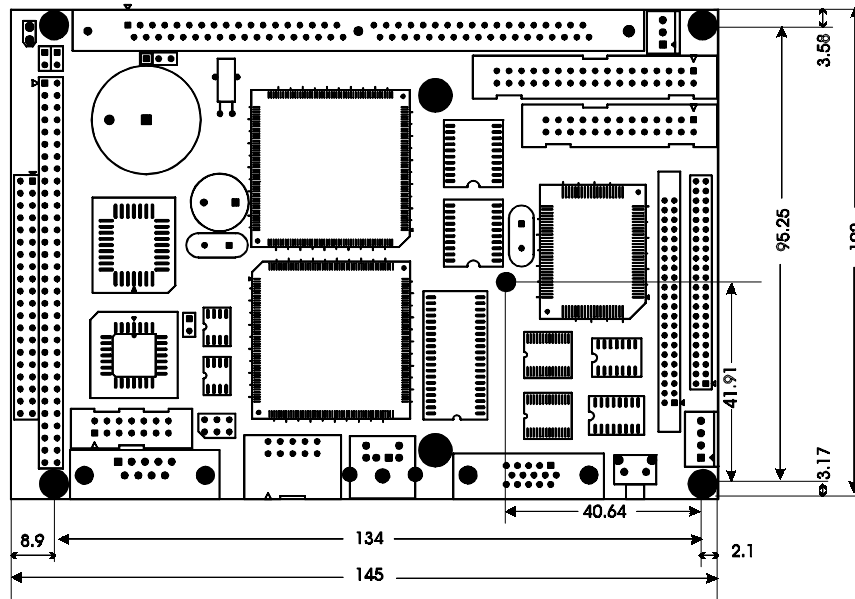
SVGA/Flat panel interface (PCM-3864)

- **Chipset:** C&T 65545
- **Display memory:** 512 KB DRAM
- **Hardware Windows acceleration:** 16-bit graphics engine. Hardware line drawing and 64 x 64 x 2 hardware cursor.
- **Resolution:** Panel resolution up to 640 x 480 @ 256 colors. Non-interlaced CRT resolutions up to 1024 x 786 @ 16 colors.

Mechanical and environmental

- **Dimension:** 5.9" (L) x 4.2" (W)/(145 mm x 102 mm)
- **Power supply voltage:** +5 V (4.75 V to 5.25 V)
- **Max. power requirements:** +5 V @ 1.5 A (typical)
- **Operating temperature:** 32°F to 140°F (0°C to 60°C)
- **Weight:** 0.2 kg

Board layout and dimensions



PCM-3864/3860 dimensions

CHAPTER
2

Installation

This chapter tells how to set up the PCM-3864/3860 hardware, including instructions on setting jumpers and connecting peripherals, switches and indicators. Be sure to read all the safety precautions before you begin the installation procedure.

Jumpers and connectors

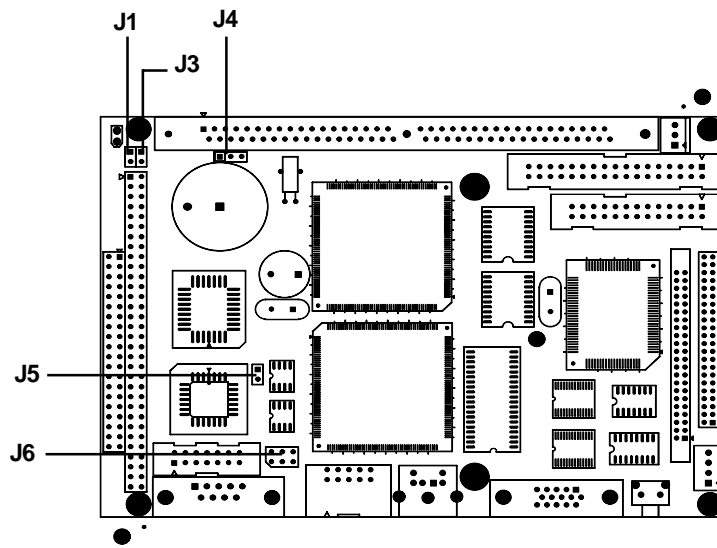
Connectors on the board link it to external devices such as hard disk drives, a keyboard, or floppy drives. In addition, the board has a number of jumpers that allow you to configure your system to suit your application.

The table below lists the function of each of the board jumpers and connectors:

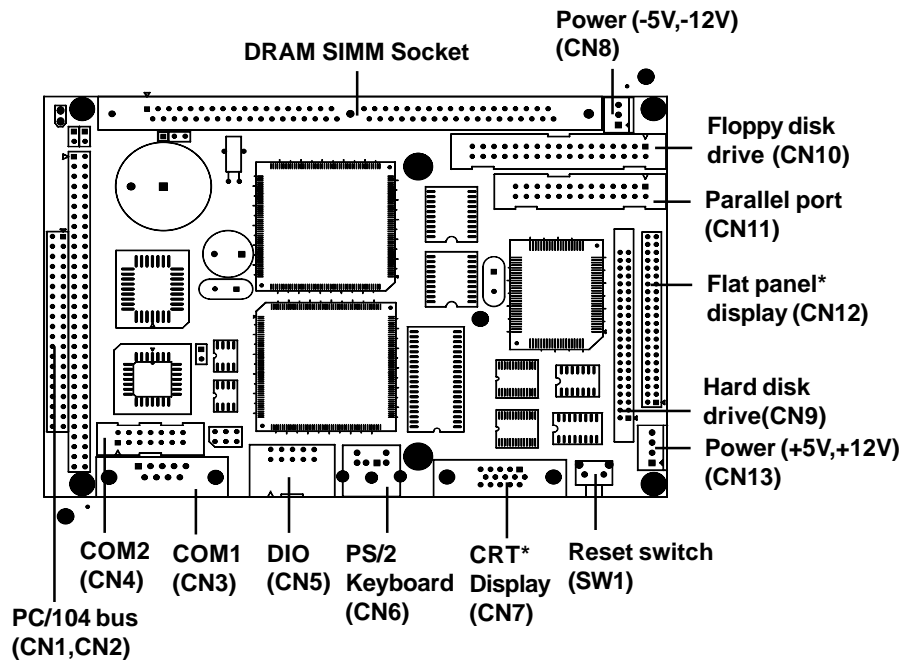
Jumpers	
Label	Function
J1	Enable watchdog timer
J3	Enable watchdog timer
J4	CMOS setup
J5	DIO port select
J6	COM2 RS-232/422/485 select

Connectors	
Label	Function
CN1	PC/104 connector
CN2	PC/104 connector
CN3	COM1
CN4	COM2
CN5	Digital I/O Port
CN6	PS/2 keyboard connector
CN7	CRT display connector (PCM-3864 only)
CN8	Power connector (-5V, -12V)
CN9	Hard disk connector
CN10	Floppy disk connector
CN11	Parallel port connector
CN12	LCD connector (PCM-3864 only)
CN13	Power connector (+5V, +12V)
SW1	Reset switch

Locating jumpers



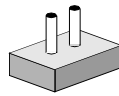
Locating connectors



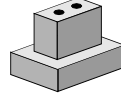
* PCM-3864 only

Setting jumpers

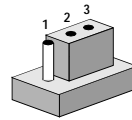
You may configure your card to match the needs of your application by setting jumpers. A jumper is the simplest kind of electrical switch. It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To "close" a jumper, you connect the pins with the clip. To "open" a jumper you remove the clip. Sometimes a jumper will have three pins, labeled 1, 2, and 3. In this case you would connect either pins 1 and 2 or 2 and 3.



Open



Closed



Closed 2-3

The jumper settings are schematically depicted in this manual as follows:



Open



Closed



Closed 2-3

A pair of needle-nose pliers may be helpful when working with jumpers.

If you have any doubts about the best hardware configuration for your application, contact your local distributor or sales representative before you make any changes.

Generally, you simply need a standard cable to make most connections.

Safety precautions

Warning! Always completely disconnect the power cord from your board whenever you are working on it. Do not make connections while the power is on because sensitive electronic components can be damaged by the sudden rush of power.





Caution! Always ground yourself to remove any static charge before touching the board. Modern electronic devices are very sensitive to static electric charges. Use a grounding wrist strap at all times. Place all electronic components on a static-dissipative surface or in a static-shielded bag when they are not in the chassis.



CMOS setup (J4)

CMOS setup		
	*3.6V Battery On	Clear CMOS
J4	1-2	2-3

DIO port select (J5)

DIO port select		
	*340 H	240 H
J5		

* default setting

Installing DRAM (SIMMs)

You can install from 1 MB up to 16 MB of on-board DRAM memory using 1, 4, or 16 MB 72-pin SIMMs (Single In-Line Memory Modules).

Installing SIMMs

NOTE: *The modules can only fit into a socket one way and their gold pins must point down into the SIMM socket.*

The procedure for installing SIMMs appears below. Please follow these steps carefully.

1. Ensure that all power supplies to the system are switched Off.
2. Install the SIMM card. Install the SIMM so that its gold pins point down into the SIMM socket.
3. Slip the SIMM into the socket at a 45 degree angle and carefully fit the bottom of the card against the connectors.
4. Gently push the SIMM into a perpendicular position until the clips on the ends of the SIMM sockets snap into place.
5. Check to ensure that the SIMM is correctly seated and all connector contacts touch. The SIMM should not move around in its socket.

IDE hard drive connector (CN9)

The built-in Enhanced IDE (Integrated Device Electronics) controller supports up to two IDE devices, including CD-ROM drives, tape backup drives, a large hard disk drive and other IDE devices. It also supports faster data transfer rates and allows the IDE hard disk drive installation of up to 8.4GB that uses Logic Block Addressing mode.

The system BIOS can automatically detect the IDE hard disk installed in your system.

Connecting the hard drive

Connecting drives is done in a daisy-chain fashion and requires one of two cables, depending on the drive size. 1.8" and 2.5" drives need a 1 x 44-pin to 2 x 44-pin flat-cable connector. 3.5" drives use a 1 x 44-pin to 2 x 40-pin connector.

Wire number 1 on the cable is red or blue, and the other wires are gray.

1. Connect one end of the cable to CN9. Make sure that the red (or blue) wire corresponds to pin 1 on the connector, which is labeled on the board (on the right side).
2. Plug the other end of the cable to the Enhanced IDE hard drive, with pin 1 on the cable corresponding to pin 1 on the hard drive. (See your hard drive's documentation for the location of the connector.)

Connect a second drive as described above.

Unlike floppy drives, IDE hard drives can connect to either end of the cable. If you install two drives, you will need to set one as the master and one as the slave by using jumpers on the drives. If you install just one drive, set it as the master.

Floppy drive connector (CN10)

You can attach up to two floppy disks to the PCM-3864/3860's on-board controller. You can use any combination of 5¼" (360 KB and 1.2 MB) and/or 3½" (720 KB and 1.44 MB) drives.

A 34-pin daisy-chain drive connector cable is required for a dual-drive system. On one end of the cable is a 34-pin flat-cable connector. On the other end are two sets of floppy disk drive connectors. Each set consists of a 34-pin flat-cable connector (usually used for 3½" drives) and a printed-circuit board connector (usually used for 5¼" drives).

Connecting the floppy drive

1. Plug the 34-pin flat-cable connector into CN10. Make sure that the red wire corresponds to pin one on the connector.
2. Attach the appropriate connector on the other end of the cable to the floppy drive(s). You can use only one connector in the set. The set on the end (after the twist in the cable) connects to the A: drive. The set in the middle connects to the B: drive.
3. If you are connecting a 5¼" floppy drive, line up the slot in the printed circuit board with the blocked-off part of the cable connector.

If you are connecting a 3½" floppy drive, you may have trouble determining which pin is pin number one. Look for a number printed on the circuit board indicating pin number one. Also, the connector on the floppy drive connector may have a slot. When the slot is up, pin number one should be on the right. Check the documentation that came with the drive for more information.

If you desire, connect the B: drive to the connectors in the middle of the cable as described above.

If you need to make your own cable, you can find the pin assignments for the card's connector in Appendix C.

Parallel port connector (CN11)

Normally, the parallel port is used to connect the card to a printer. The PCM-3864/3860 includes an on-board parallel port, accessed through CN16, a 26-pin flat-cable connector. You will need an adapter cable if you use a traditional DB-25 connector. The cable has a 26-pin connector on one end and a DB-25 connector on the other.

Parallel port IRQ/IO address/DMA/ Printer port mode select

The configuration of the parallel port is very simple. It is done in the Advanced CMOS setup BIOS screen. You can locate the items you want by scrolling down the BIOS screen.

I/O Address Options:	Disabled, 378H (LPT1), 278H (LPT2), 3BCH (LPT3)
----------------------	--

Parallel port mode select:	SPP, EPP, ECP, EPP & ECP
----------------------------	--------------------------

ECP DMA select:	DMA3, DMA1
-----------------	------------

Parallel IRQ select:	IRQ5, IRQ7
----------------------	------------

PS/2 Keyboard connector (CN6)

The PCM-3864/3860 board provides a mini-DIN keyboard connector which supports PS/2 keyboard. In most cases, especially in embedded applications, a keyboard is not used. The standard PC/AT BIOS will report an error or fail during power-on self test (POST) after a reset if the keyboard is not present. The PCM-3864/3860 board's BIOS standard setup menu allows you to select "All, But Keyboard" under the "Halt On" selection. This allows no-keyboard operation in embedded system applications without the system halting under POST (power-on-self-test).

Power connector (CN13)

Main power connector, +5V, +12V (CN13)

Supplies main power to the PCM-3864/3860 (+5 V) and devices that require +12 V.

Serial ports (CN3, CN4)

The PCM-3864/3860 offers two serial ports: one RS-232 and one RS-232/422/485. These ports let you connect to serial devices (a mouse, printers, etc.) or a communication network.

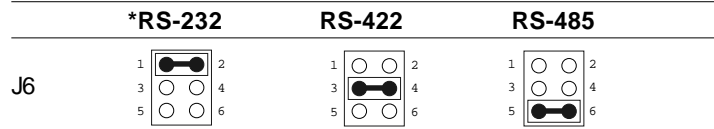
COM1 RS-232 port (CN3)

The serial port connectors are mounted on the bottom edge of the card. The 9-pin, D-SUB connector to the left of the card is the RS-232 port.

COM2 RS-232/422/485 selection (CN4)

The secondary port located above COM1, consists of a 14-pin, dual-in-line, male header and can be configured to operate in RS-232, RS-422, or RS-485 mode. This is done via J6.

COM2 selection (J6)



* default setting

The IRQ and address range for both ports are fixed. However if you wish to disable the port or change these parameters later, you can do this in the system BIOS setup. The table below shows the settings for the PCM-3864/3860 board's ports.

PCM-3864/3860 Serial port default settings

Port	Address Range	Interrupt	Default
COM1	2E8~3F8	IRQ4	3F8
COM2	2E8~3F8	IRQ3	2F8

Peripheral power connector (CN8)

This connector supplies secondary power to devices that require -5V and -12V.

VGA interface connections (PCM-3864 only)

The PCM-3864 board's SVGA interface can drive conventional CRT displays and is capable of driving a wide range of flat panel displays, including electroluminescent (EL), gas plasma, passive LCD and active LCD displays. The card has two connectors to support these displays, one for standard CRT VGA monitors and one for flat panel displays.

CRT display connector (CN7)

CN7 is a 15-pin, D-SUB connector commonly used for conventional CRT displays.

Pin assignments for CRT display connector CN7 are detailed in Appendix B.

Flat panel display connector (CN12)

CN12 consists of a 44-pin, dual-in-line header. Power supplies (+12 V) present on CN12 depend on the supply connected to the board.

The PCM-3864 provides a bias control signal on CN12 which can be used to control the LCD bias voltage. It is recommended that the LCD bias voltage not be applied to the panel until the logic supply voltage (+5 V) and panel video signals are stable. Under normal operation the control signal (ENAVEE) is active high. When the PCM-3864 board's power is applied, the control signal is low until just after the relevant flat panel signals are present.

Configuration of the LCD type is done completely via the software utility. You don't have to set any jumpers. Refer to Chapter 3 for software setup details.

Refer to Chapter 3 for details on connecting the four standard LCD's: Sharp LM64183P, Toshiba LTM09C016, Sharp 64C142, and Planar EL Display.

Watchdog timer configuration

The onboard watchdog timer reduces the chance of disruptions which EMP (electro-magnetic pulse) interference can cause. This is an invaluable protective device for standalone or unmanned applications. Setup involves two jumpers and running the control software (refer to Appendix A).



Watchdog timer enable/disable

You can enable or disable the watchdog timer by reading the card's I/O ports with your program. Read address 443 hex to enable and refresh the watchdog or address 043 to disable the watchdog. For information on programming the watchdog timer, see Appendix A.

Watchdog timer action (J1, J3)

When the watchdog timer activates (CPU processing has come to a halt), it can rest the system. (refer to Appendix A)

The watchdog timer can be activated via 2-pin jumpers (J1, J3)

Watchdog timer enable/disable setting		
Port	Enable	* Disable
J1		<input type="radio"/> <input type="radio"/>
J3		<input type="radio"/> <input type="radio"/>

* default setting

CHAPTER 3

Software Configuration

This chapter details the software configuration information (for PCM-3864 only). It shows you how to configure the card to match your application requirements. AMI System BIOS is covered in Chapter 4.

Sections include:

- LCD display configuration
- Connections for four standard LCDs

Introduction

The PCM-3864 system BIOS and custom drivers are located in a 128 Kbyte, 32-pin Flash ROM device, designated U2. A single Flash chip holds the system BIOS, and VGA BIOS. The display type can be configured via software. This method minimizes the number of chips and eases configuration. You can change the display BIOS simply by reprogramming the Flash chip.

Utility disk

The PCM-3864 is supplied with a software utility disk. This disk contains the necessary file for setting up the VGA display. Directories and files on the disk are as follows:

```
├── README.DOC
├── AMIFLASH.EXE
├── 3864_SYS.ROM
├── 3864_CRT.ROM
├── 3864_TFT.ROM
├── 3864_ST5.ROM
├── 3864_MON.ROM
└── 3864_EL.ROM
```

AMIFLASH.EXE

This program allows you to write the VGA BIOS files to the BIOS Flash ROM. The VGA files all come ready formatted for the PCM-3864 with .ROM extensions. See README.DOC. These files support various CRT and flat panel displays. They are custom written and can be made available upon request.

3864_SYS.ROM

This binary file contains the system BIOS.

3864_CRT.ROM

Supports CRT only.

3864_TFT.ROM (default)

Supports 640 x 480 color TFT
(Sharp LQ9D011, Toshiba LTM09C015A/016).

3864_ST5.ROM (512 KB DRAM)

Supports 640 x 480 color STN DD 8/16-bit displays (Sharp LM64C142).

NOTE: This BIOS does not support simultaneous CRT and flat panel display with 512 KB DRAM

3864_MON.ROM

Supports 640 x 480 dual scan monochrome displays (Sharp LM64P8X/837).

3864_EL.ROM

Supports 640 x 480 EL displays (PLANAR EL640480 - A Series).

VGA display software configuration

The PCM-3864 on-board VGA/LCD interface supports a wide range of popular LCD, EL, gas plasma flat panel displays and traditional analog CRT monitors. The interface can drive CRT displays with resolutions up to 1024 x 768 in 16 colors. It is also capable of driving color panel displays with resolutions of 640 x 480. The LCD type is configured completely via the software utility, so you don't have to set any jumpers. Configure the LCD type as follows:

1. Apply power to the PCM-3864 with a color TFT display attached. This is the default setting for the PCM-3864. Ensure that the AMIFLASH.EXE and *.ROM files are located in the working drive.

NOTE: Ensure that you do not run AMIFLASH.EXE while your system is operating in EMM386 mode.

2. At the prompt, type AMIFLASH.EXE and press <Enter>. The VGA configuration program will then display the VGA Setup screen.

3. At the prompt, type in the ROM file which supports your display. When you are sure that you have entered the file name correctly press <Enter>. The screen will ask “Do you want to save?” If you wish to continue press Y. If you change your mind or have made a mistake press N to abort and end the setup procedure.
4. If you decide to continue, the screen will issue a prompt which will then ask “Are you sure to program (Y/N)?” If you wish to continue, press Y. Press N to exit the program.

The new VGA configuration will then write to the ROM BIOS chip. This configuration will remain the same until you run the AMIFLASH.EXE program and change the settings.

Preparing your own VGA/LCD BIOS

If you need to combine a specific VGA/LCD BIOS binary file with the system BIOS ROM, refer to the following procedure:

At the DOS prompt type:

```

DEBUG                                     <ENTER>
-N 3864_CRT.ROM <ENTER>
-L 4000:0                                 <ENTER>
-N LCD.ROM                                <ENTER>
-L 4000:0                                 <ENTER>
-R CX                                     <ENTER>
CX 2000
: 0                                       <ENTER>
-R BX                                     <ENTER>
BX 0000                                  <ENTER>
: 2                                       <ENTER>
-N NEWBIOS.ROM                            <ENTER>
-W 4000:0                                  <ENTER>
-Q
C:>AMIFLASH NEWBIOS.ROM <ENTER>

```

The above files refer to:

DEBUG.EXE DOS utility program

3864_CRT.ROM BIOS file on PCM-3864 utility disk (could be variant depending on the display type)

LCD.ROM The LCD ROM file that you combine into the BIOS

NEWBIOS.ROM New BIOS file incorporating the Boot ROM image

FLASH.EXE Writes new BIOS file to Flash device

Note: *For the above procedure to work correctly ensure the TFTCLR.ROM, BOOTROM.ROM and AMIFLASH.EXE files are located in the same directory.*

Connections for four standard LCDs

Connections to Sharp LM64183P (640 x 480 DSTN MONO LCD)

LM64P83		PCM-3864 CN1	
Pin	Pin name	Pin	Pin name
CN1-1	S	36	FLM
CN1-2	CP1	38	LP
CN1-3	CP2	35	SHFCLK
CN1-4	DISP	5	+5 V
CN1-5	VDD	6	+5 V
CN1-6	VSS	3	GND
CN1-7	VEE	-	-17 V (external power)
CN1-8	DU0	12	P3
CN1-9	DU1	11	P2
CN1-10	DU2	10	P1
CN1-11	DU3	9	P0
CN1-12	DL0	16	P7
CN1-13	DL1	15	P6
CN1-14	DL2	14	P5
CN1-15	DL3	13	P4

Connections to PLANAR EL (640 x 480 AD4 EL)

PLANAR 640 x 480 AD4		PCM-3864 CN1	
Pin	Pin name	Pin	Pin name
1	GND	3	GND
2	DO	21	P12
3	GND	3	GND
4	D1	22	P13
5	GND	3	GND
6	D2	23	P14
7	NC	—	—
8	D3	24	P15
9	NC	—	—
10	D4	17	P8
11	NC	—	—
12	D5	18	P9
13	NC	—	—
14	D6	19	P10
15	GND	4	GND
16	D7	20	P11
17	GND	4	GND
18	VCLK	42	ASHFCLK
19	GND	4	GND
20	/BLANK	—	—
21	GND	8	GND
22	HS	37	M
23	NC	—	—
24	VS	36	FLM
25	NC	—	—
26	SELFTEST	39	GND
27	COLMAP	39	GND
28	ENABLE	—	—
29	RESERVED	—	—
30	/LOWPOW	—	—
31,32	NC	—	—
33	RESERVED	—	—
34	NC	—	—

Connections to Toshiba LTM09C016 (640 x 480 TFT Color LCD)

LTM09C016		PCM-3864 CN1	
Pin	Pin name	Pin	Pin name
CN1-1	NCLK	35	SHFCLK
CN1-2	GND	3	GND
CN1-3	R0	22	P13
CN1-4	GND	3	GND
CN1-5	R1	23	P14
CN1-6	GND	4	GND
CN1-7	R2	24	P15
CN1-8	GND	4	GND
CN1-9	G0	17	P8
CN1-10	GND	8	GND
CN1-11	G1	18	P9
CN1-12	GND	8	GND
CN1-13	G2	19	P10
CN1-14	GND	33	GND
CN1-15	NC	—	—
CN2-1	B0	11	P2
CN2-2	GND	33	GND
CN2-3	B1	12	P3
CN2-4	GND	34	GND
CN2-5	B2	13	P4
CN2-6	GND	34	GND
CN2-7	ENAB	37	M
CN2-8	GND	39	GND
CN2-9	VDD	5	+5 V
CN2-10	VDD	6	+5 V

**Connections to Sharp LM64C142
(640 x 480 DSTN Color LCD)**

LM64C142		PCM-3864 CN1	
Pin	Pin name	Pin	Pin name
CN1-1	YD	36	FLM
CN1-2	LP	38	LP
CN1-3	XCX	35	SHFCLK
CN1-4	DISP	5	+5 V
CN1-5	VDD	6	+5 V
CN1-6	VSS	3	GND
CN1-7	VEE	-	+27 V(external power)
CN1-8	DU0	20	P11
CN1-9	DU1	19	P10
CN1-10	DU2	18	P9
CN1-11	DU3	17	P8
CN1-12	DU4	12	P3
CN1-13	DU5	11	P2
CN1-14	DU6	10	P1
CN1-15	DU7	9	P0
CN2-1	VSS	4	GND
CN2-2	DL0	24	P15
CN2-3	DL1	23	P14
CN2-4	DL2	22	P13
CN2-5	DL3	21	P12
CN2-6	DL4	16	P7
CN2-7	DL5	15	P6
CN2-8	DL6	14	P5
CN2-9	DL7	13	P4
CN2-10	VSS	8	GND

CHAPTER
4

AMI Flash BIOS Setup

This chapter describes how to set BIOS configuration data.

System test and initialization

These routines test and initialize board hardware. If the routines encounter an error in during the tests, you will either hear a few short beeps or see an error message on the screen. There are two kinds of errors: fatal and non-fatal. The system can usually continue the boot up sequence with non-fatal errors. Non-fatal error messages usually appear on the screen along with the following instructions:

```
press <F1> to RESUME
```

Write down the message and press the F1 key to continue the bootup sequence.

System configuration verification

These routines check the current system configuration against the values stored in the card's CMOS memory. If they don't match, the program outputs an error message. You will then need to run the BIOS setup program to set the configuration information in memory.

There are three situations in which you will need to change the CMOS settings:

1. You are starting your system for the first time
2. You have changed the hardware attached to your system
3. The CMOS memory has lost power and the configuration information has been erased.

The PCM-3864/3860 board's CMOS memory has an integrated lithium battery backup. The battery backup should last ten years in normal service, but when it finally runs down, you will need to replace the complete unit.

AMI BIOS setup



Setup program initial screen

AMI's Flash BIOS has a built-in Setup program that allows users to modify the basic system configuration. This type of information is stored in battery-backed CMOS RAM so that it retains the Setup information when the power is turned off.

Entering setup

Power on the computer and press immediately. This will allow you to enter Setup.

Standard CMOS setup

When you choose the STANDARD CMOS SETUP option from the INITIAL SETUP SCREEN menu, the screen shown below is displayed. This standard Setup Menu allows users to configure system components such as date, time, hard disk drive, floppy drive, display, and memory. Once a field is highlighted, on-line help information is displayed in the left bottom of the Menu screen.



CMOS setup screen

Advanced CMOS setup

By choosing the ADVANCED CMOS SETUP option from the INITIAL SETUP SCREEN menu, the screen below is displayed. This sample screen contains the manufacturer's default values for the PCM-3864/3860.

AMIBIOS SETUP - ADVANCED CMOS SETUP		
(C)1995 American Megatrends, Inc. All Rights Reserved		
Druck Boot	Enabled	Available Options:
BootUp Sequence	C:,A:	Disabled
BootUp Num-Lock	On	Enabled
Floppy Drive Smp	Disabled	
System Keyboard	Present	
Password Check	Setup	
OS/2 Compatible Mode	Disabled	
System BIOS Cacheable	Enabled	
Hard disk Delay	Disabled	
CR00,32k Shadow	Enabled	
CR00,32k Shadow	Disabled	
DR00,32k Shadow	Disabled	
DR00,32k Shadow	Disabled	
DR00,32k Shadow	Disabled	
DR00,32k Shadow	Disabled	
Onboard IDE	Enabled	
Onboard FDC	Enabled	
Onboard Serial Port1	3F8	ESC:Exit F1:Sel
Onboard Serial Port2	2F8	F9/F10:Modify
Onboard Parallel port	378	F2/F3:Color

BIOS features setup

Advanced Chipset setup

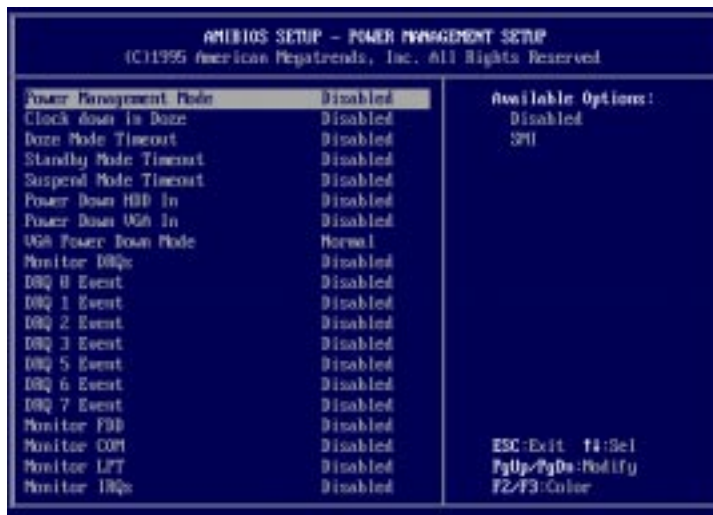
By choosing the ADVANCED CHIPSET SETUP option from the INITIAL SETUP SCREEN menu, the screen below is displayed. This sample screen contains the manufacturer's default values for the PCM-3864/3860.

AMIBIOS SETUP - ADVANCED CHIPSET SETUP		
(C)1995 American Megatrends, Inc. All Rights Reserved		
MT Bus Clock	14.318/2	Available Options:
Slow Refresh	15 us	14.318/2
Memory Refresh	Disable	PCLK2/2
RAS Precharge time	2.5T	PCLK2/3
RAS active Time Insert Wait	Disable	PCLK2/4
CAS Precharge Time Insert Wait	Disable	PCLK2/5
Memory Write Insert Wait	Disable	PCLK2/6
Memory Miss Read Insert Wait	Disable	PCLK2/8
ISA I/O High Speed	Disable	PCLK2/10
ISA Memory High Speed	Disable	
ISA Write cycle end Insert Wait	Disable	
I/O Recovery	Disable	
I/O Recovery Period	0 us	
On-Chip I/O Recovery	Disable	
16Bit ISA Insert Wait	Disable	
ESC:Exit F4:Sel		
F9/F10:Modify		
F2/F3:Color		

Advanced Chipset setup

Power management setup

By choosing the POWER MANAGEMENT SETUP option from the INITIAL SETUP SCREEN menu, the screen below is displayed. This sample screen contains the manufacturer's default values for the PCM-3864/3860.



Power management setup

Change supervisor password

This option allows you to setup your password.

To enter a new user password, choose the "Change Supervisor Password" option from the Setup Main menu and press <Enter>. The screen will display the following message for you to enter your password.



After you type the password, the screen will ask you to verify your password by displaying "Retype new supervisor password:" If you do not want to change the password, simply press <Enter>.

Auto Configuration with Optimal settings Auto Configuration with Fail Safe settings

Each of these items allows the user to load optimal settings or fail safe settings respectively. Both these items load the default system values directly from ROM. If the stored record created by the Setup program becomes corrupted (and therefore unusable), these defaults will load automatically when you turn the PCM-3864/3860 on.



You can load optimal default settings by choosing "Y" in the screen above. The high-performance settings are the most favorable values for optimum system performance.



You can also load the fail safe settings by choosing "Y" in the screen above. Fail safe settings lets you select the most stable settings for your system. You may use this option as a diagnostic aid when the system is behaving erratically.

Save settings & exit

If you select this option and press <Enter>, the values entered in the setup utilities will be recorded in the chipset's CMOS memory. The microprocessor will check this every time you turn your system on and compare this to what it finds as it checks the system. This record is required for the system to operate.

Exit without saving

Selecting this option and pressing <Enter> lets you exit the Setup program without recording any new values or changing old ones.

CHAPTER
5

SVGA Setup

The PCM-3864 features an on-board flat panel/VGA interface. This chapter provides instructions for installing and operating the software drivers on the included display driver diskette.

Simultaneous display mode

The 65545 VGA BIOS supports monochrome LCD, EL, color TFT and STN LCD flat panel displays. It also supports interlaced and non-interlaced analog monitors (VGA color and VGA monochrome) in high-resolution modes while maintaining complete IBM VGA compatibility. Digital monitors (i.e. MDA, CGA, and EGA) are NOT supported. Multiple frequency (multisync) monitors are supported as analog monitors.

Both CRT and panel displays can be used simultaneously. The PCM-3864 can be set in one of three configurations: on a CRT, on a flat panel display, or on both simultaneously. The system is initially set to simultaneous display mode. In the utility diskette, there are three COM files which can be used to select the display. Simply type the filename at the DOS prompt:

CT.COM Enables CRT display only

FP.COM Enables panel display only

SM.COM Enables both displays at the same time.

Sleep mode

The display driver diskette contains two files that support sleep mode. Simply type the filename at the DOS prompt:

ON.COM switches to normal display mode.

OFF.COM switches to sleep mode.

Software support

The drivers support the following applications using the filenames and resolutions listed:

<u>Application</u>	<u>Filename</u>	<u>Resolution</u>	<u>Colors</u>
Windows 3.1	LINEAR4.DRV	640x480	16
		800x600	16
		1024x768	16
	LINEAR8.DRV	640x480	256
		800x600	256
		1024x768	256
AutoCAD R12	LINEAR16.DRV	640x480	64K
	LINEAR24.DRV	640x480	16M
	RCTURBOC.EXP	640x480	16
		800x600	16
		1024x768	16
		640x480	256
		800x600	256
		1024x768	256
		640x480	32K
		640x480	64K
640x480	16M		
Lotus 1-2-3 2.0 and Lotus Symphony 1.0,1.1	V132X25.DRV	132x25 (Text)	16
	V132X50.DRV	132x50 (Text)	16
	VESA 1.2	VESA.COM	800x600
1024x768		16	
640x400		256	
640x480		256	
800x600		256	
1024x768		256	
640x480		32K	
640x480	64K		

Word 5.0	VGA600.VID	800x600	16
	VGA768.VID	1024x768	16
Word 5.5	VGA55600.VID	800x600	16
	VGA55768.VID	1024x768	16
WordPerfect 5.0	CHIPS600.WPD	800x600	16
	CHIPS768.WPD	1024x768	16
WordPerfect 5.1	VGA600.VRS	800x600	16
	VGA768.VRS	1024x768	16

Driver installation

Necessary prerequisites

The instructions in this manual assume that you understand elementary concepts of MS-DOS and the IBM Personal Computer. Before you attempt to install any driver or utility you should: know how to copy files from a floppy disk to a directory on the hard disk, understand the MS-DOS directory structure, and know how to format a floppy disk. If you are uncertain about any of these concepts, please refer to the DOS or Windows user reference guides for more information before you proceed with the installation.

Before you begin

Before you begin installing software drivers, you should make a backup copy of the display driver diskette and store the original in a safe place. The display driver diskette contains drivers for several versions of certain applications. You must install the correct version in order for the driver to work properly so make sure you know which version of the application you have.

Windows setup

These drivers are designed to work with Microsoft Windows 3.1. You may install these drivers through Windows or in DOS.

Step 1: Install Windows as you normally would for a VGA display. Run Windows to make sure that it is working correctly.

Step 2: Place the display driver diskette in drive A. In Windows Program Manager, choose *File* from the Options Menu. Then from the pull-down menu, choose *Run . . .*. At the command line prompt, type `A:\WINSETUP`. Press the <ENTER> key or click *OK* to begin the installation. At this point the setup program locates the directory where Windows is installed. For proper operation, the drivers must be installed in the Windows subdirectory. Press <ENTER> to complete the installation. Once completed, the Display Driver Control Panel appears on the screen. This Control Panel allows you to select and load the installed drivers.

Another method of installing these drivers is through the File Manager. Click on *Drive A:*. Then double-click on *WINSETUP.EXE* to begin installation.

Changing Display Drivers in Windows

To change display drivers in Windows, select the *Windows Setup* icon from the Main window. You will be shown the current setup configuration. Select *Change System Settings* from the Option menu. Click on the arrow at the end of the Display line. You will be shown a list of display drivers. Click on the driver you want. Then click on the *OK* button. Follow the directions to complete the setup.

Changing Color Schemes

After you change display drivers, you may notice that the color scheme used by Windows looks strange. This is because different drivers have different default colors. To change the color scheme, select the *Control Panel* from the Main window. Select the *Color* icon. You will be shown the current color scheme. Choose a new color scheme and click the *OK* button.

DOS Setup

Step 1: Install Windows as you normally would for a VGA display. Run Windows to make sure that it is working correctly. Then exit Windows.

Step 2: Place the display driver diskette in drive A. Type **A:** <ENTER> to make this the default drive. Type **SETUP** <ENTER> to run the driver SETUP program. Press any key to get to the applications list. Using the arrow keys, select **Windows Version 3.1** and press the <ENTER> key. Press the <ENTER> key to select **All Resolutions**, and then press <END> to begin the installation. At this point you will be asked for the path to your Windows System directory (default C:\WINDOWS). When the installation is complete, press any key to continue. Press <ESC> followed by Y to exit to DOS.

Step 3: Change to the directory where you installed Windows (usually C:\WINDOWS).

Step 4: Type **SETUP** <ENTER> to run the Windows Setup program. It will show the current Windows configuration. Use the up arrow key to move to the Display line and press <ENTER>. A list of display drivers will be shown. Use the arrow keys to select one of the drivers starting with an asterisk (*) and press <ENTER>.

Step 5: Follow the directions on the screen to complete the setup. In most cases, you may press <ENTER> to accept the suggested option. When Setup is done, it will return to DOS. Type **WIN** <ENTER> to start Windows with the new display driver.

Changing Display Drivers in DOS

To change display drivers from DOS, change to the Windows directory and run Setup, repeating steps 4 and 5 from the previous page. Besides the special display drivers marked by an asterisk (*), you should be able to use the following standard drivers:

VGA	640x480, 16 colors
Super VGA	800x600, 16 colors

Panning Drivers

Special panning drivers are provided to allow high-resolution modes to be displayed on a flat panel or CRT. These drivers will show a section of a larger screen and will automatically pan, or scroll, the screen horizontally and vertically when the mouse reaches the edge of the display.

Linear Acceleration Drivers

A special high-performance linear acceleration driver is provided for 256-color modes. This driver may require special hardware and may not be supported on all systems. It is only available for Windows3.1.

AutoCAD R12

These drivers are designed to work with Autodesk AutoCAD R12. They conform to the Autodesk Device Interface (ADI) for Rendering drivers and Display drivers. These display list drivers accelerate redraw, pan, and zoom functions.

Driver installation

Step 1: Place the display driver diskette in drive A. Type **A:** <ENTER> to make this the default drive. Type **SETUP** <ENTER> to run the SETUP program. Press any key to get to the applications list. Using the arrow keys, select **AutoCAD Release 12** and press <ENTER>. This will display a list of supported driver resolutions. Using the arrow keys and the <ENTER> key, select the resolutions that are appropriate for your monitor. When all of the desired resolutions have been selected, press <END> to begin the installation. At this point you will be asked for a drive and directory to copy the driver files. Enter the drive and directory that contains the installed AutoCAD R12. If the destination directory does not exist you will be asked for confirmation. When the installation is complete, press any key to continue. Press <ESC> followed by Y to exit to DOS.

Step 2: Go to the AutoCAD directory where the new drivers were installed and run the driver installation program by typing **ACAD12 -r** <ENTER>. This program will configure your AutoCAD R12 to use the new display drivers. Select **TurboDLD Classic**.

Configuring TurboDLD

Select **Configure Video Display**. In Display Device Configuration choose **Select Graphics Board/Resolution**. Then choose **Select Display Graphics Board**. After choosing a graphics board, go to **Select Display Resolution**. After selecting the display resolution, save the new configuration, and return to the main menu.

Basic Configuration Menu

This menu allows you to modify:

Number of AutoCAD Command Lines

Font Size 6x8/8x8/8x14/8x16/12x20/12x24

Dual Screen Enable/Disable

User Interface Configuration

Double Click Interval Time

BP Button

BP Highlight Patt Line/Xor Rect/Both

BP Refresh Enable/Disable

BP Cache Enable/Disable

Expert Configuration Menu

This menu allows you to modify:

Display List Enable/Disable

Drawing Cache Enable/Disable

Use Acad 31 bit space? Yes/No

Internal Command Echo Enable/Disable

BP Zoom Mode Freeze/Float

Regen Mode Incremental/Fast

If your previously installed driver is not TurboDLD, you will have to reconfigure the RENDER command the first time you use it.

Lotus 1-2-3 and Lotus Symphony

These drivers are designed to work with Lotus 1-2-3 versions 2.0, 2.01 and 2.2, and with Lotus Symphony versions 1.0 and 1.1.

Driver installation

Step 1: Place the display driver diskette into drive A. Make A the default drive by typing **A:** <ENTER>. Run the SETUP program by typing **SETUP** <ENTER>. Press any key to display a list of supported applications. Use the arrow keys to select **Lotus/Symphony**, and press <ENTER>. A list of supported screen resolutions will be displayed. Use the arrow keys to select the desired screen resolution and press <ENTER>. (Make sure your monitor is able to display the resolution desired) Press <END> to begin the driver installation process. A default drive and directory path will be displayed. Use the backspace key to erase this default and type in the 123 directory. At this point you may be asked to create the target directory if it does not already exist. After the files have been installed, press any key to return to the list of supported applications. Press <ESC> followed by Y to exit to DOS. Copy all the files that were just created in the temporary directory onto a formatted floppy diskette.

Step 2: Go to your 123 directory, and start the installation program. Type the following commands:

C: <ENTER>

INSTALL <ENTER>

Step 3: The Lotus installation program will load and present the installation menu. From this menu, select **Advanced Options**. From the Advanced Options menu, select **Add New Drivers To Library**. From the Add New Drivers Menu, select **Modify Current Driver Set**. From the Modify Driver Set Menu, select **Text Display**. From the Text Display menu, select one of drivers.

Step 4: After the selection of the appropriate VGA display driver, you will need to exit this menu and return to the Main Lotus Installation Menu. Do this by selecting **Return To Menu**.

Step 5: At the Main Lotus Installation Menu, select *Save Changes*.

Step 6: At this point the Installation Menu will prompt you for the name of your new Lotus configuration file. The Lotus system will prompt you with the default value — 123.SET, but you may want to use a filename that indicates the resolution of its driver. For example, if you installed the 132 column by 25 line driver, you could name this driver 132X25.SET, or if you installed the 80 by 50 driver, you may want to call the file 80X50.SET.

Step 7: The installation of your Lotus 1-2-3 driver is now complete. You will need to exit the Lotus installation program at this point. At the main Lotus Installation Menu, select *Exit*.

NOTE: If your driver set is not 123.SET, you have to type the filename of your driver set in the command line when you start Lotus 1-2-3. For example, if you named your driver set 132X25.SET, type the following to start Lotus 1-2-3:

123 132X25.SET <ENTER>

VESA

The Video Electronics Standards Association (VESA) has created a standard for a Super VGA BIOS Extension (VBE). This defines a standard software interface to allow application programs to set and control extended video modes, such as 800x600 graphics, on video adapters from different manufacturers.

The VESA driver adds this Super VGA BIOS Extension to the VGA BIOS. Any application program which supports the VESA standard driver interface can be used with this driver. This VESA driver conforms to the VESA Super VGA Standard #VS891001.

Driver installation

Step 1: Place the display driver diskette into drive A. Make A the default drive by typing **A:** <ENTER>. Run the SETUP program by typing **SETUP** <ENTER>. Press any key to display a list of supported applications. Use the arrow keys to select VESA Driver **Version 1.2** and press <ENTER>. Press the <ENTER> key to select **All Resolutions**, and press <END> to begin the installation. A default drive and directory path will be displayed. Use the back-space key to erase this and type in a directory that is in the directory path (such as C:\BIN or C:\UTILS). After the files have been installed, press any key to return to the list of supported applications. Press <ESC> followed by Y to exit to DOS.

Step 2: To install the VESA driver, type either **VESA** <ENTER> or **VESA +** <ENTER> at the DOS prompt. The optional + command line parameter enables all of the available modes. Make sure that your monitor is capable of displaying these high resolution modes before enabling them.

NOTE: If the video BIOS already supports VBE extended video modes, DO NOT use this driver. Run the VTEST.EXE program to see if the video BIOS supports the VBE modes.

Word

These drivers are designed to work with Microsoft Word 5.0 and 5.5.

Driver installation

If you have already installed Word on your computer, go to Step 2 to install the new video driver.

Step 1: Install Word as normal.

Step 2: After you complete the Word installation, place the display driver diskette into drive A. Make A the default drive by typing **A:** <ENTER>. Run the SETUP program by typing **SETUP** <ENTER>. Press any key to display a list of supported applications. Use the arrow keys to select **Word** and press <ENTER>. Use the arrow keys to select the desired screen resolution and press <ENTER> (make sure your monitor is able to display the resolution desired). Press <END> to begin the driver installation process. A default drive and directory path will be displayed. Use the backspace key to erase this and type in your Word directory. After the files have been installed, press any key to return to the list of supported applications. Press <ESC> followed by Y to exit to DOS.

Step 3: Copy the driver file for the desired resolution that was just installed to SCREEN.VID.

WordPerfect

These drivers are designed to work with WordPerfect 5.0 or 5.1. They support 132-column display in editing mode, and high-resolution graphics display in PreView mode.

Driver installation

Step 1: Place the display driver diskette into drive A. Make A the default drive by typing **A:** <ENTER>. Run the SETUP program by typing **SETUP** <ENTER>. Press any key to display a list of supported applications. Use the arrow keys to select **WordPerfect** and press <ENTER>. A list of supported screen resolutions will be displayed. Use the arrow keys to select the desired screen resolution and press <ENTER> (make sure your monitor is able to display the resolution desired). Press <END> to begin the driver installation process. A default drive and directory path will be displayed. Use the backspace key to erase this default and type in the WordPerfect directory. At this point you may be asked to create the target directory if it does not already exist. After the files have been installed, press any key to return to the list of supported applications. Press <ESC> followed by Y to exit to DOS.

Step 2: Start WordPerfect, and press <SHIFT>+<F1> to enter the setup menu. Select **D** for Display and **G** for Graphics Screen Type, and then choose the desired Chips VGA resolution.

Configuring WordPerfect 5.0 for 132 columns

Follow these instructions to configure WordPerfect 5.0 for 132 column text mode:

Step 1: To use the SETCOL program to set 132 columns and 25 rows, type the following command:

```
SETCOL 132,25 <ENTER>
```

Step 2: Start WordPerfect. The program will detect the number of rows and columns automatically. If for some reason WordPerfect is unable to adapt to 132 columns by 25 rows, start WordPerfect with the following command:

```
WP /SS=25,132 <ENTER>
```

Configuring WordPerfect 5.1 for 132 columns

Start WordPerfect and press <SHIFT>+<F1> to enter the setup menu. Select **D** for Display and **T** for Text Screen Type and then select *Chips 132 Column Text*.

APPENDIX

A

Programming the Watchdog Timer

The PCM-3864/3860 is equipped with a watchdog timer that resets the CPU if processing comes to a standstill for whatever reason. This feature ensures system reliability in industrial stand-alone, or unmanned environments.

Jumpers J1 and J3 control the watchdog timer hardware settings.

To enable the watchdog timer, you must write a program which reads I/O port address 443 (hex) at regular intervals. The first time your program reads the port, it enables the watchdog timer. After that, your program must read the port at time interval of less than 1.6 seconds, otherwise the watchdog timer will activate and reset the CPU. When you want to disable the watchdog timer, your program should read I/O port 043 (hex).

If CPU processing comes to a standstill because of EMI or a software bug, your program's signals to I/O port address 443 to the timer will be interrupted. The timer will then automatically reset the CPU, and data processing will continue normally.

You must write your program so that it reads I/O port address 443 at an interval shorter than the timer's preset interval. The timer's intervals have a tolerance of $\pm 30\%$, so you should program an instruction that will refresh the timer about every second.

The following program shows how you might program the watchdog timer in BASIC:

```
10      REM Watchdog timer example program
20      X=INP (&H443) REM Enable and refresh the watchdog
30      GOSUB 1000 REM Task #1, takes 1 second to complete
40      X=INP (&H443) REM Refresh the watchdog
50      GOSUB 2000 REM Task #2, takes 1 second to complete
60      X=INP (&H043) REM Disable the watchdog
70      END
1000    REM Subroutine #1, takes 1 second to complete
.
.
.
1070   RETURN
2000    REM Subroutine #2, takes 1 second to complete
.
.
.
2090   RETURN
```

APPENDIX
B

**Installing PC/104
Modules**

This appendix gives instructions for installing PC/104 modules.

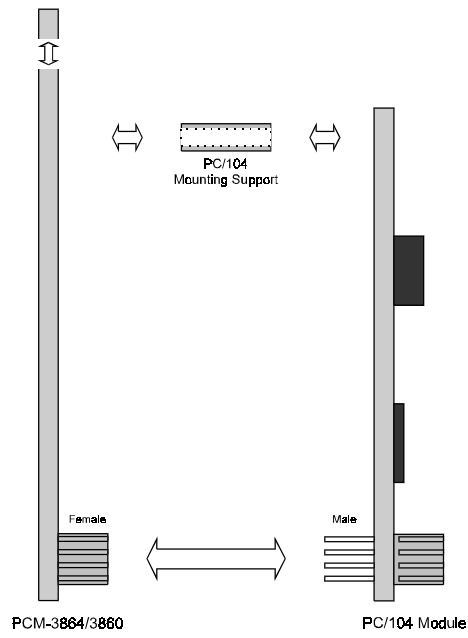
Installing PC/104 modules

The PCM-3864/3860's PC/104 connectors give you the flexibility to attach PC/104 expansion modules. These modules perform the functions of traditional plug-in expansion cards, but save space and valuable slots. Modules include:

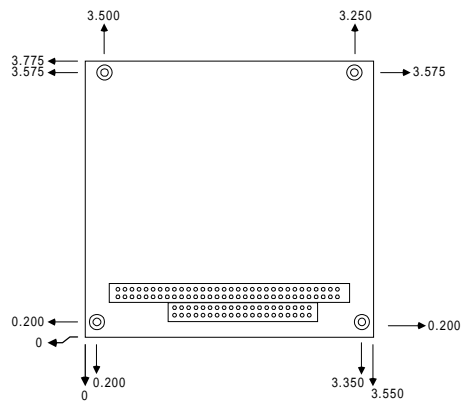
- **PCM-3290** GPS Module
- **PCM-3810** Solid State Disk Module
- **PCM-3820** High Density Flash Disk Module
- **PCM-3110** PCMCIA Module
- **PCM-3610** Isolated RS-232 and RS-422/485 Module
- **PCM-3660** Ethernet Module
- **PCM-3718** 30 KHz A/D Module
- **PCM-3724** 48-Channel DIO Module
- **PCM-3640** 4-Port RS-232 Module
- **PCM-3680** Dual Port CAN Module

Installing these modules on the PCM-3864/3860 is quick and simple. The following steps show how to mount the PC/104 modules:

1. Remove the PCM-3864/3860 from your system paying particular attention to the safety instructions already mentioned above.
2. Make any jumper or link changes required to the CPU card now. Once the PC/104 module is mounted you may have difficulty in accessing these.
3. Normal PC/104 modules have male connectors and mount directly onto the main card. However, to ensure better bus matching, the connectors on the PCM-3864/3860 and the PC/104 module are both female. For this reason, you may need to use the "male-male" adapter included with the PCM-3864/3860 in order to properly connect your PC/104 module. (Refer to the diagram on the following page.)
4. Mount the PC/104 module onto the CPU card by pressing the module firmly but carefully onto the mounting connectors.
5. Secure the PC/104 module onto the CPU card using the four mounting spacers and screws.



PC/104 Module Mounting Diagram



PC/104 module dimensions (inches $\pm 5\%$)

APPENDIX C

Pin Assignments

This appendix contains information of a detailed or specialized nature. It includes:

- CRT display connector
- Flat panel display connector
- DIO connector
- Main power connector
- RS-232/422/485 serial port connector
- Keyboard and mouse connector
- Peripheral power connector
- IDE connector
- RS-232 serial port connector
- PC/104 connector
- Floppy drive connector
- Parallel port connector

CRT display connector (CN7) --For PCM-3864 only

PCM-3864 CRT display connector

Pin	Signal	Pin	Signal
1	RED	9	N/C
2	GREEN	10	GND
3	BLUE	11	N/C
4	N/C	12	N/C
5	GND	13	H-SYNC
6	GND	14	V-SYNC
7	GND	15	N/C
8	GND		

Flat panel display connector (CN12) --For PCM-3864 only

PCM-3864 Flat panel display connector

Pin	Function	Pin	Function
1	+12 V	2	+12 V
3	GND	4	GND
5	Vcc	6	Vcc
7	ENAVEE*	8	GND
9	P0	10	P1
11	P2	12	P3
13	P4	14	P5
15	P6	16	P7
17	P8	18	P9
19	P10	20	P11
21	P12	22	P13
23	P14	24	P15
25	P16	26	P17
27	P18	28	P19
29	P20	30	P21
31	P22	32	P23
33	GND	34	GND
35	SHFCLK	36	FLM
37	M	38	LP
39	GND	40	ENABKL*
41	GND	42	ASHFCLK
43	Vcc	44	Vcc

* Active low

DIO Connector (CN5)

PCM-3864/3860 DIO connector

Pin	Signal
1	GND
2	V _{cc}
3	DO3
4	DO2
5	DO1
6	DO0
7	DI3
8	DI2
9	DI1
10	DI0

COM2 RS-232/422/485 serial port (CN4)

PCM-3864/3860 COM2 RS-232/422/485 serial port

Pin	Signal
1	DCD
2	DSR
3	RxD
4	RTS
5	TxD
6	CTS
7	DTR
8	RI
9	GND
10	N/C
11	485 TxD+
12	485 TxD-
13	485 RxD+
14	485 RxD-

PS/2 Keyboard connector (CN6)

PCM-3864/3860 PS/2 Keyboard connector

Pin	Signal
1	KBDATA
2	N/C
3	GND
4	V _{cc}
5	KB CLOCK
6	N/C

Main power connector (CN13)

PCM-3864/3860 Main power connector

Pin	Signal
1	+12 V
2	GND
3	GND
4	+5 V

Peripheral power connector (CN8)

PCM-3864/3860 peripheral power connector

Pin	Signal
3	-5V
2	GND
1	-12 V

IDE hard drive connector (CN9)

PCM-3864/3860 IDE hard drive connector

Pin	Signal	Pin	Signal
1	IDE RESET*	2	GND
3	DATA 7	4	DATA 8
5	DATA 6	6	DATA 9
7	DATA 5	8	DATA 10
9	DATA 4	10	DATA 11
11	DATA 3	12	DATA 12
13	DATA 2	14	DATA 13
15	DATA 1	16	DATA 14
17	DATA 0	18	DATA 15
19	SIGNAL GND	20	N/C
21	N/C	22	GND
23	IO WRITE*	24	GND
25	IO READ*	26	GND
27	IO CHANNEL READY	28	BALE
29	N/C	30	GND
31	IRQ14	32	IOCS16*
33	ADDR 1	34	N/C
35	ADDR 0	36	ADDR 2
37	HARD DISK SELECT 0*	38	HARD DISK SELECT 1*
39	IDE ACTIVE*	40	MGND
41	VCC	42	MVCC
43	GND	44	N/C

* Active low

COM1 RS-232 serial port (CN3)

PCM-3864/3860 COM1 RS-232 serial port

Pin	Signal
1	DCD
2	RxD
3	TxD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

PC/104 connectors (CN1, CN2)

PCM-3864/3860 PC/104 connectors

Pin Number	Signal (CN2)		Signal (CN1)	
	RowA	RowB	RowA	RowB
0	—	—	0V	0V
1	IOCHCHK	0V	SBHE	MEMCS16
2	SD7	RESETDRV	LA23	IOCS16
3	SD6	+5V	LA22	IRQ10
4	SD5	IRQ9	LA21	IRQ11
5	SD4	-5V	LA20	IRQ12
6	SD3	DRQ2	LA19	IRQ15
7	SD2	-12V	LA18	IRQ14
8	SD1	ENDXFR	LA17	DACK0
9	SD0	+12	MEMR	DRQ0
10	IOCHRDY	GND	MEMW	DACK5
11	AEN	SMEMW	SD8	DRQ5
12	SA19	SMEMR	SD9	DACK6
13	SA18	IOW	SD10	DRQ6
14	SA17	IOR	SD11	DACK7
15	SA16	DACK3	SD12	DRQ7
16	SA15	DRQ3	SD13	+5V
17	SA14	DACK1	SD14	MASTER
18	SA13	DRQ1	SD15	0V
19	SA12	REFRESH	N/C	0V
20	SA11	SYSCLK	—	—
21	SA10	IRQ7	—	—
22	SA9	IRQ6	—	—
23	SA8	IRQ5	—	—
24	SA7	IRQ4	—	—
25	SA6	IRQ3	—	—
26	SA5	DACK2	—	—
27	SA4	TC	—	—
28	SA3	BALE	—	—
29	SA2	+5V	—	—
30	SA1	OSC	—	—
31	SA0	0V	—	—
32	0V	0V	—	—

Floppy drive connector (CN10)

PCM-3864/3860 Floppy drive connector

Pin	Signal	Pin	Signal
1	GND	2	DENSITY SELECT
3	GND	4	N/C
5	GND	6	N/C
7	GND	8	INDEX
9	GND	10	MOTOR 0
11	GND	12	DRIVE SELECT 1
13	GND	14	DRIVE SELECT 0
15	GND	16	MOTOR 1
17	GND	18	DIRECTION
19	GND	20	STEP
21	GND	22	WRITE DATA
23	GND	24	WRITE GATE
25	GND	26	TRACK 0
27	GND	28	WRITE PROTECT
29	GND	30	READ DATA
31	GND	32	HEAD SELECT
33	GND	34	DISK CHANGE

Parallel port connector (CN11)

PCM-3864/3860 Parallel port connector

Pin	Signal
1	\STROBE
2	\AUTOFD
3	D0
4	ERR
5	D1
6	\INIT
7	D2
8	\SLCTINI
9	D3
10	GND
11	D4
12	GND
13	D5
14	GND
15	D6
16	GND
17	D7
18	GND
19	\ACK
20	GND
21	BUSY
22	GND
23	PE
24	GND
25	SLCT
26	N/C

APPENDIX **D**

Digital Input and Output Operations

This appendix contains some basic information on the Digital Input and Output operation of the PCM-3864/3860 board.

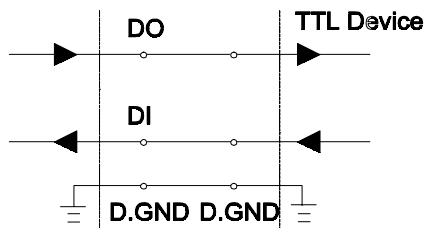
- Digital input and output operation
- Digital I/O Interface Specification

Digital Input and Output Operation

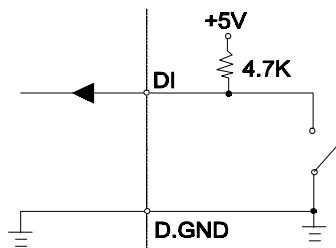
Digital Input and Output are a group of control signals that are utilized to control external devices requiring ON/OFF circuitry. The PCM-3864/3860 supports 4-channel digital input and 4-channel digital output feature. These digital input and output levels are TTL compatible.

You can use the I/O read or write command to access the digital I/O port. An output register has been designed to latch the output data. However, this cannot be read back for checking purposes.

The following figure shows a proposed circuitry when connecting with other TTL devices.



When receiving an OPEN/SHORT input signal from a switch or relay, you are advised to add a pull-up resistor in your system that will keep the input signal at a high level setting when the circuit is set OPEN.



Digital I/O Interface Specifications

Digital Input

Input channels: 4 bits

Level: TTL compatible

Input Voltage:

High: 2.0V min

Low: 0.8V max

Input Load:

High: 0.05mA max. at 2.7V

Low: 0.4mA max at 0.5V

Register Address: 340H (or 240H) (Read)

Register Format:

BIT	D3	D2	D1	D0
Value	DI3	DI2	DI1	DI0

Digital Output

Output channels: 4 bits

Level: TTL compatible

Output Voltage:

High: Source -0.4mA at 2.4V min

Low: Sink 8mA at 0.5V max

Register Address: 340H (or 240H) (Write)

Register Format:

BIT	D3	D2	D1	D0
Value	DO3	DO2	DO1	DO0

