PCA-6149

Full-size 486 PCI/ISA-bus CPU card
with SVGA interface

User's Manual

Copyright Notice

Acknowledgements

A Message to the Customer....

Advantech Customer Services

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Your satisfaction is our number one concern. Here is a guide to Advantech's customer services. To ensure you get the full benefit of our services, please follow the instructions below carefully.

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1. Collect all the information about the problem encountered (e.g. type of PC, CPU speed, Advantech products used, other hardware and software used etc.). Note anything abnormal and list any on-screen messages you get when the problem occurs.

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3. If your product is diagnosed as defective, obtain an RMA (return material authorization) number from your dealer. This allows us to process your return more quickly.

4. Carefully pack the defective product, a completely filled-out Repair and Replacement Order Card and a photocopy of a dated proof of purchase (such as your sales receipt) in a shippable container. A product returned without dated proof of purchase is not eligible for warranty service.

5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

Packing list

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

- 1 PCA-6149 CPU card
- 1 6-pin mini-DIN keyboard and PS/2 mouse adapter
- 1 Hard disk drive (IDE) interface cable (40 pin)
- 1 Floppy disk drive interface cable (34 pin)
- 1 Parallel port adapter (26 pin) and COM2 adapter (9 pin) kit
- 2 Utility disks with SVGA utility programs and drivers

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

Contents

Hardware Configuration

This chapter gives background information on the PCA-6149. It then shows you how to configure the card to match your application and prepare it for installation into your PC.

Sections include:

- Card specifications
- Board layout
- Safety precautions
- Jumper settings
- Installing DRAM (SIMMs)

Introduction

The PCA-6149 is an all-in-one single board 486 computer that includes an **on-board SVGA controller with PCI bus and ISA bus support**. It packs all the functions of an industrial computer, including display capabilities, on a single full-size card. The PCA-6149 is fully PC/AT compatible, so your software will run without modifications.

The on-board PCI bus SVGA controller uses the ET4000/W32P chipset with 1 or 2 MB video memory. This chipset, used with the local PCI bus, enables 32-bit graphic throughput at up to 33 MHz. The ET4000/W32 also offers Windows graphics acceleration. These features are excellent for display-intensive applications.

Another feature of the PCA-6149 is the inclusion of a fast VL bus enhanced IDE controller. This controller supports mode 3, which enables data transfer rates in excess of 11 MB/second. Up to four IDE devices can be connected, including large hard disks (up to 8 GB), CD-ROM drives, Tape backup drives or other enhanced IDE devices.

On-board features also include two high-speed RS-232 serial ports with 16C550 UARTs, one bidirectional SPP/EPP/ECP parallel port and a floppy drive controller. In addition to the 486's 8 KB of on-chip cache memory, the PCA-6149 includes an extra 256 KB or 512 KB of second level cache memory on-board.

If program execution is halted by a program bug or EMI, the board's 12-level watchdog timer can automatically reset the CPU or generate an interrupt. This ensures reliability in unmanned or standalone systems. The timer interval of the watchdog timer is set in the BIOS, eliminating jumper switch setting.

The PCA-6149 provides four 72-pin SIMM (Single In-line Memory Module) sockets for its on-board system DRAM. These sockets give you the flexibility to configure your system from 1 MB to 256 MB of DRAM using the most economical combination of SIMMs.

The CMOS data of the PCA-6149 is backed up in EEPROM, which avoids data loss, even when the battery fails.

To make using the DX4-100 easy, the PCA-6149 includes an on-board DC-to-DC converter that automatically switches to 3.3 V.

Specifications

System

- **CPU**: 80486SX/DX/DX2/DX4-25/33/40/50/66/75/100 MHz, or P24T Pentium Overdrive Processor

- **Cache memory size**: 8 KB on-chip and 256/512 KB 2nd level

- **Bus interface**: ISA and PCI (PC/AT) bus

- **Chipset**: SIS 496/497

- **BIOS**: AWARD

- **Display controller**: SVGA, PCI bus, ET4000/W32P chipset with 1 MB standard video memory, upgradable to 2 MB. Provides 32-bit graphic throughput with Windows acceleration. Supports resolutions up to 1280 x 1024 in 16 colors, 1024 x 768 in 65536 colors, or 800 x 600 in 16.8 million colors.

- **Data bus**: 32 bit

- **Processing ability**: 32 bit

- **Bus speed**: 8 MHz (ISA), CPU clock or ½ CPU clock speed (PCI)

- **RAM memory**: 1 MB to 256 MB. Uses four 72-pin SIMM sockets. 72-pin sockets accept 1, 2, 4, 8, 16, 32 or 64 MB SIMMs

- **Shadow RAM memory**: Supports system and video BIOS of up to 256 KB in 32 KB blocks

I/O

- **Enhanced IDE hard disk drive interface**:
  Fast VL bus. Supports up to four IDE (AT bus) large (up to 8 GB) hard disk drives or other enhanced IDE devices. Supports mode 3 (11.1 MB/sec. data transfer rate). BIOS enabled/disabled

- **Floppy disk drive interface**: Supports up to two floppy disk drives, 5.25" (360 KB and 1.2 MB) and/or 3.5" (720 KB, 1.44 MB and 2.88 MB). BIOS enabled/disabled

- **Enhanced bidirectional parallel port**: Configurable to LPT1, LPT2, LPT3, or disabled. Standard DB-25 female connector provided. Supports SPP/EPP/ECP

- **Serial ports**: Two serial RS-232 ports, both with 16C550 UARTs (or compatible) with 16-byte FIFO buffer. Support speeds up to 115 Kbps. Ports can be individually configured as COM1, COM2 or disabled.

- **Real time clock/calendar**: Dallas DS-12887 with lithium battery backup for 10 years of data retention

- **Keyboard/ PS/2 mouse connector**: A 6-pin mini DIN keyboard connector is located on the mounting bracket for easy connection of a keyboard and/or a PS/2 mouse (selected by jumper). An on-board keyboard 5-pin header connector is also available.

Industrial features

- **Watchdog timer:** Can generate a system reset or IRQ11. BIOS enabled/disabled. The timer interval is 0.5 ~ 1008 sec. (12 levels), and is also set in the BIOS.

- **CMOS backup**: CMOS data backup in EEPROM, avoiding data loss

General

- **System performance (with 80486DX4-100 MHz CPU)**: 363 MHz, Landmark speed V2.0

- **Max. power requirements**: +5 V @ 3.5 A

- **Power supply voltage**: +5 V (4.75 V to 5.25 V), +12 V, -12 V

- **Operating temperature**: 32º to 140ºF (0º to 60ºC)

- **Storage temperature**: -40º to 176ºF (-40º to 80ºC)

- **Board size**: 13.3" (L) x 4.8" (W) (338.5 mm x 122 mm)

- **Board weight**: 1.2 lbs (0.5 Kg)

Board layout
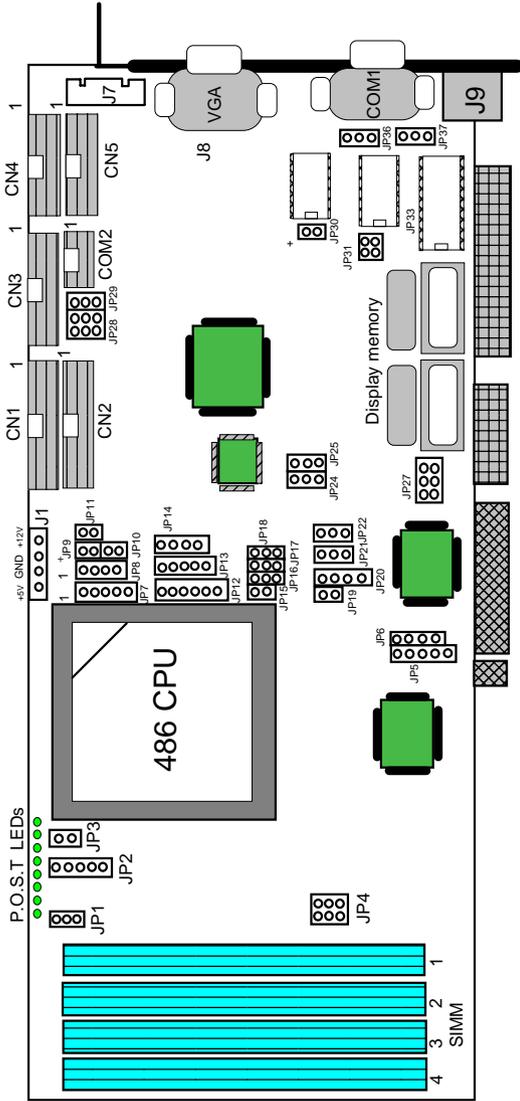
PCA-6149 PCB Layout

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 which you use to configure it for your application.

The table below lists the function of each of the board jumpers and connectors. Later sections in this chapter give instructions on setting jumpers and detailed information on each jumper setting. Chapter 2 gives instructions for connecting external devices to your card.

Jumpers and connectors

Number	Function
JP1	P24D WB/WT select
JP2	CPU type select
JP3	CPU type select
JP4	Cache size select
JP5	CPU type select
JP6	CPU type select
JP7	Power LED and keylock
JP8	External speaker
JP9	Turbo LED
JP10	Reset switch
JP11	Turbo switch
JP12~JP20	CPU type select
JP21	P24T WB/WT select
JP22	CPU type select
JP23	Factory reserved
JP24	PCI bus clock select
JP25	CPU clock delay time select
JP26	Factory reserved
JP27	CPU bus clock select
JP28	Parallel port ECP/EPP DMA channel
JP29	On-board Super I/O enabled/disabled select
JP30	HDD LED
JP31	Watchdog timer reset/IRQ11 select

Number	Function
JP32~35	Factory reserved
JP36	DIN connector keyboard or PS/2 mouse select
JP37	DIN connector keyboard or PS/2 mouse select
CN1	1st enhanced IDE connector
CN2	2nd enhanced IDE connector
CN3	FDD connector
CN4	Parallel connector
CN5	VGA feature connector
J1	Cooling fan power connector
J2~J6	Factory reserved
J7	External keyboard connector
J8	VGA connector
J9	Keyboard or PS/2 mouse connector
COM1	Serial port 1
COM2	Serial port 2

Safety precautions

Follow these simple precautions to protect yourself from harm and your PC from damage.

1. To avoid electric shock, always disconnect the power from your PC chassis before you work on it. Don't touch any components on the CPU card or other cards while the PC is on.

2. Disconnect power before making any configuration changes. The sudden rush of power as you connect a jumper or install a card may damage sensitive electronic components.

3. Always ground yourself to remove any static charge before you touch your CPU card. Be particularly careful not to touch the chip connectors. Modern integrated electronic devices, especially CPUs and memory chips, are extremely sensitive to static electric discharges and fields. Keep the card in its antistatic packaging when it is not installed in the PC, and place it on a static dissipative mat when you are working with it. Wear a grounding wrist strap for continuous protection.

Jumper settings

This section tells how to set the jumpers to configure your card. It gives the card default configuration and your options for each jumper. After you set the jumpers and install the card, you will also need to run the BIOS Setup program (discussed in Chapter 3) to configure the serial port addresses, floppy/hard disk drive types and system operating parameters. Connections, such as hard disk cables, appear in Chapter 2.

For the locations of each jumper, see the board layout diagram depicted earlier in this chapter.

How to set jumpers

You configure your card to match the needs of your application by setting jumpers. A jumper is the simplest kind of electric 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 connect either pins 1 and 2 or 2 and 3.

Open   Closed   Closed 2-3
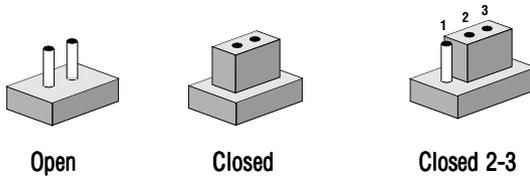
You may find pair of needle-nose pliers useful for setting the jumpers.

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.

CPU type select (JP1, 2, 5, 6, 12~20, 22~25, 27)

In order for the system to function properly, the jumpers must be set to accommodate the CPU installed on the CPU card.

CPU type select (JP2, 5, 6, 12~20, 22)

CPU \ JP	1	2	5	6	12	13	14	15	16	17	18	19	20	22	23	24	25	27
Intel SX-33																		
Intel DX-33 DX2-66																		
Intel DX4-100																		
Cyrix DX2-66; SGS DX2-66																		
Cyrix DX2-80 (5V)																		
Cyrix DX2-80 (3.45V)																		
AMD DX4-100 (standard & enhanced)																		
AMD DX4-120																		

CPU \ JP	1	2	5	6	12	13	14	15	16	17	18	19	20	22	23	24	25	27
AMD 5x86-133																		
Intel DX4-75; P24D																		

CPU clock select (JP27)

The user can choose the CPU frequency by setting the clock generator jumper JP27. If you change processor in the future, you must make sure that the jumpers are configured for the correct CPU clock speed. Do this before installing and applying power to the CPU board.

CPU bus clock			
	25MHz	**33MHz**	**40MHz**
JP27			

CPU clock delay time select (JP25)

For better system reliability, enable the CPU clock delay time select (JP25) for CPUs with an external clock faster than 33 MHz (i.e. 486DX-40).

CPU clock delay time select (JP25)	
Delay disabled	**Delay enabled**
JP25	

PCI bus clock setting (JP24)

The PCI clock speed can be synchronized with either the CPU clock speed or one-half the CPU clock speed to accommodate older software. JP24 controls the PCI clock.

PCI bus clock setting (JP24)		
	CPU clock	**½ CPU clock**
JP24	(jumper on top two pins)	(jumper on bottom two pins)

The following table lists some CPU types and their respective CPU clocks:

CPU type	CPU clock
486DX/SX-33	33 MHz
486DX-40	40 MHz
486DX2-50	25 MHz
486DX2-66	33 MHz
486DX4-75	25 MHz
486DX4-100	33 MHz

Note: *If the CPU external clock is faster than 33 MHz, set the PCI clock to ½ CPU clock.*

P24D WB/WT select (JP1) and P24T WB/WT select (JP21)

The P24D and P24T Pentium OverDrive processors include write-back or write-through on-chip cache memory that can be selected using JP1 and JP21, respectively.

P24D WB/WT select (JP1) and P24T WB/WT select (JP21)

	P24D (JP1)	P24T (JP21)
Write-back	1 ● 2 ● 3 ○	1 ● 2 ● 3 ○
Write-through	1 ○ 2 ● 3 ●	1 ○ 2 ● 3 ●

Note: For AMD DX/DX2 CPUs, close pins 2 and 3 on JP1. For all other CPU types, simply leave JP1 and JP21 open.

Cache memory size select (JP4)

When you upgrade the cache memory on the PCA-6149 to 512 KB, you will need to set JP4 as follows:

Cache memory size select (JP4)

	256 KB (default)	512 KB
JP4	●● ●● ○ ○	○ ○ ●● ●●

Parallel port ECP/EPP DMA channel (JP28)

You can set the DMA channel of the parallel port to either DMA 1 or DMA 3.

Parallel port ECP/EPP DMA channel (JP28)

	DMA 1 (default)	DMA 3
JP28		

Watchdog timer – system reset/IRQ11 (JP31)

When the watchdog timer activates (CPU processing has come to a halt), it can reset the system or generate an interrupt on IRQ11. Set JP31 as shown below:

Watchdog timer system reset/IRQ11 select (JP31)

	Reset (default)	IRQ11
JP31	2 ● ○ 4 1 ● ○ 3	2 ○ ● 4 1 ○ ● 3

Keyboard or PS/2 mouse select (JP36, JP37)

JP36 and JP37 allow you to select the J9 connector function to a keyboard and/or PS/2 mouse. Note that both jumpers must be set to the same function for the connector to work properly.

Keyboard or PS/2 mouse select (JP36, JP37)

	JP36	JP37
Keyboard and PS/2 mouse		
PS/2 mouse only		

Installing DRAM (SIMMs)

On the left end of the card (away from the mounting bracket) are the four SIMM (Single In-line Memory Module) sockets that hold the card's DRAM memory. See the board layout diagram depicted earlier in this chapter.

You can use anywhere from 1 MB to 256 MB of DRAM with your PCA-6149. The card provides four 72-pin SIMM (Single In-Line Memory Module) sockets that each accept from 1 to 64 MB DRAM. The sockets (numbered from 1 to 4) are arranged into four banks. The following table shows the bank assignments for the SIMM sockets:

Bank	SIMM socket(s)	Size
1	SIMM1	72-pin
2	SIMM2	72-pin
3	SIMM3	72-pin
4	SIMM4	72-pin

The PCA-6149's memory sockets accept any combination of SIMMs (up to 256 MB), inserted in any order.

Connecting Peripherals

This chapter tells how to connect peripherals, switches and indicators to the PCA-6149 board. You can access most of the connectors from the top of the board while it is installed in the chassis. If you have a number of cards installed, or your chassis is very tight, you may need to partially remove the card to make all the connections.

The following table lists the connectors on the PCA-6149. See Chapter 1 for help locating the connectors.

Connectors	
Label	**Component**
CN1	1st EIDE connector
CN2	2nd EIDE connector
CN3	FDD connector
CN4	Parallel port connector
CN5	VGA feature connector
J1	CPU cooling fan power connector
J7	External keyboard connector
J8	VGA connector
J9	Keyboard or PS/2 mouse connector
JP7	Power LED and keylock
JP8	External speaker
JP9	Turbo LED
JP10	Reset switch
JP11	Turbo switch
JP30	HDD LED

The following sections tell how to make each connection. In most cases, you will simply need to connect a standard cable.

Warning! *Always completely disconnect the power cord from your chassis whenever you are working on it. Do not make connections while the power is on. Sensitive electronic components can be damaged by the sudden rush of power. Only experienced electronics personnel should open the PC chassis.*

Caution! *Always ground yourself to remove any static charge before touching the CPU card. 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.*

Enhanced IDE connectors (CN1, CN2)

You can attach four IDE (Integrated Device Electronics) drives to the PCA-6149's internal controller. The PCA-6149 CPU card has two EIDE connectors: CN1 and CN2. Each EIDE connector can support two IDE devices.

CN1 is the first EIDE connector, and must be used first. CN2 is the second EIDE connector. There must be at least one device attached to CN1 before CN2 can be used.

Wire number 1 on the cable is red or blue, the other wires are gray. Connect one end to connector CN1 or CN2 on the CPU card. Make sure that the red (or blue) wire corresponds to pin 1 on the connector (on the right side). See Chapter 1 for help finding the connector.

Unlike floppy drives, IDE hard drives can connect in either position on the cable. If you install two drives, you will need to set one as the master and one as the slave. You do this by setting the jumpers on the drives. If you use just one drive, you should set it as the master. See the documentation that came with your drive for more information.

Connect the first hard drive to the other end of the cable. Wire 1 on the cable should also connect to pin 1 on the hard drive connector, which is labeled on the drive circuit board. Check the documentation that came with the drive for more information.

Connect the second drive as described above on CN1 or CN2.

Floppy drive connector (CN3)

You can attach up to two floppy disk drives to the PCA-6149's on-board controller. You can use any combination of 5.25"
(360 KB and 1.2 MB) and/or 3.5" (720 KB and 1.44 MB) drives.

The card comes with a 34-pin daisy-chain drive connector cable. 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 3.5" drives) and a printed-circuit-board connector (usually used for 5.25" drives). You can use only one connector in each set. The set on the end (after the twist in the cable) connects to the A: floppy. The set in the middle connects to the B: floppy.

Parallel port (CN4)

The parallel port is normally used to connect the CPU card to a printer. The PCA-6149 includes an on-board parallel port, accessed through a 26-pin flat-cable connector, CN4. The card comes with an adapter cable which lets 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, mounted on a retaining bracket. The bracket installs at the end of an empty slot in your chassis, giving you access to the connector.

To install the bracket, find an empty slot in your chassis. Unscrew the plate that covers the end of the slot. Screw in the bracket in place of the plate. Next, attach the flat-cable connector to CN4 on the CPU card. Wire 1 of the cable is red or blue, and the other wires are gray. Make sure that wire 1 corresponds to pin 1 of CN4. Pin 1 is on the right side of CN4.

Keyboard and PS/2 mouse connectors (J7, J9)

The PCA-6149 board provides two keyboard connectors. A 5-pin connector (J7) supports passive backplane applications. A second 6-pin mini-DIN connector (J9) on the card mounting bracket supports single-board computer applications. The card comes with an adapter to convert from the 6-pin mini-DIN connector to a standard DIN connector.

Keyboard connector (J7)	
Pin	**Function**
1	K.B. clock
2	K.B. data
3	N.C.
4	GND
5	+5 V$_{DC}$

Keyboard and PS/2 mouse DIN connector (J9)	
Pin	**Function**
1	K.B. data
2	PS/2 data
3	GND
4	+5 V$_{DC}$
5	K.B. clock
6	PS/2 clock

The PCA-6149 package includes an adaptor (shown below), which supports keyboard and/or PS/2 mouse peripherals.
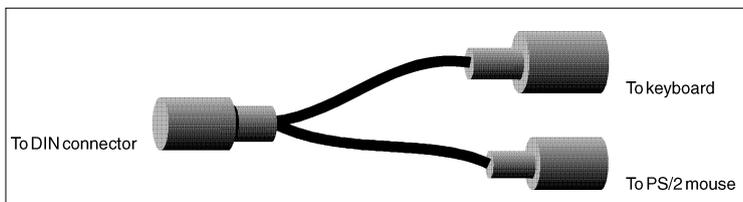
External switches and indicators

Next you may want to install external switches to monitor and control your CPU card. These features are completely optional —install them only if you need them.

Power LED and keylock (JP7)

You can connect an LED to indicate when the CPU card is on. Pin 1 of JP7 supplies power to the LED and Pin 3 is the ground.

You can use a switch (or a lock) to disable the keyboard. In this state the PC will not respond to any input. This is useful if you don't want anyone to change or stop a running program. Simply connect the switch between Pins 4 and 5 of JP7. The pin assignments for JP7 appear in the following table:

Power LED and keylock (JP7)	
Pin	Function
1	LED Power (+5 V)
2	No Connector
3	Ground
4	Keyboard lock
5	Ground

External speaker (JP8)

The CPU card has its own buzzer. You can also connect to the external speaker on your computer chassis. Connect leads to connector JP8 as shown below:

External speaker (JP8)	
Pin	Function
1	+5 V
2	Speaker
3	Speaker
4	Speaker

Turbo LED (JP9)

You can connect a LED indicator across jumper JP9 to indicate when the CPU is in Turbo mode. Marks on the circuit board indicate LED polarity.

Reset switch (JP10)

You can connect an external switch to easily reset your computer. This switch restarts your computer as if you had turned off the power, then turned it back on. Install the switch so that it closes the two pins of JP10.

Turbo switch (JP11)

You can connect a switch across the pins of jumper JP11 to change the CPU between Turbo and non-Turbo mode. When you close (short) the pins, the CPU card operates at full speed. When you leave the pins open, the card operates at slow speed for compatibility with older software.

You can also switch the CPU back and forth between Turbo mode and non-Turbo mode using the keyboard, but only when jumper JP11 is open. When jumper JP11 is closed, the CPU is fixed in Turbo mode. To switch into Turbo mode from the keyboard simultaneously press the <CTRL>, <ALT> and keypad plus (+) keys. To switch into non-Turbo mode press the <CTRL>, <ALT> and keypad minus (-) keys.

Hard disk drive LED (JP30)

You can connect a LED to connector JP30 to indicate when the HDD is active. Marks on the circuit board indicate LED polarity.

Display connectors

VGA connector (J8)

The PCA-6149 provides a VGA controller for high resolution VGA interface. J8 is a DB-15 connector for VGA monitor input.

Feature connector (CN5)

The PCA-6149's VGA controller offers a feature connector, which can connect to another multimedia display card for special display functions. The following chart lists the feature connector's pin assignments:

Feature connector (CN5)

Pin	Function	Pin	Function
1	PBX/C0	14	Ground
2	PGX/C1	15	Ground
3	PRX/C2	16	Ground
4	PIX/C3	17	ESYC
5	SBX/C4	18	ECLK
6	SGX/C5	19	EVID
7	SRX/C6	20	Not used
8	SIX/C7	21	Ground
9	OPCLK	22	Ground
10	BLANK	23	Ground
11	HSNC	24	Ground
12	VSNC	25	Not used
13	Ground	26	Not used

Cooling fan power connector (J1)

The PCA-6149 provides a +5 V/+12 V 4-pin power connector for CPU cooling fan.

CPU power connector (J1)	
Pin	**Function**
1	+5 V
2	GND
3	GND
4	+12 V

Serial ports

The PCA-6149 offers two RS-232 serial ports. These ports let you connect to serial devices (a mouse, printers, etc.) or a communication network.

You can select the address for each port (3F8H [COM1], 2F8H [COM2] or 3E8H) or disable it, using the BIOS Advanced Setup program, covered in Chapter 3.

The card mounting bracket holds the serial port connector for the one port, and the parallel port and serial port adapter kit (supplied with the card) holds the connector for the other port. This lets you connect and disconnect cables after you install the card. The DB-9 connector on the bottom of the bracket is the first RS-232 port, COM1. The DB-9 connector on the adapter kit is the second serial port, COM2.

RS-232 connections (COM1, COM2)

Different devices implement the RS-232 standard in different ways. If you are having problems with a serial device, be sure to check the pin assignments for the connector. The following table shows the pin assignments for the card's RS-232 port:

RS-232 connector pin assignment

Pin	Signal
1	DCD
2	RX
3	TX
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI
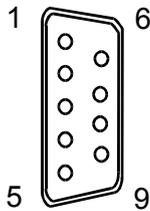
COM1   **COM2**
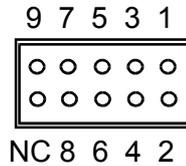
AWARD BIOS Setup

This chapter describes how to set the card's BIOS configuration data. BIOS POST (Power On Self Test) test codes are listed in Appendix B.

AWARD BIOS Setup

```
                ROM PCI/ISA BIOS (2A4IBAK1)
                     CMOS SETUP UTILITY
                    AWARD SOFTWARE, INC.

    STANDARD CMOS SETUP             PASSWORD SETTING

    BIOS FEATURES SETUP             IDE HDD AUTO DETECTION

    CHIPSET FEATURES SETUP          HDD LOW LEVEL FORMAT

    POWER MANAGEMENT SETUP          SAVE & EXIT SETUP

    PCI CONFIGURATION SETUP         EXIT WITHOUT SAVING

    LOAD BIOS DEFAULTS

    LOAD SETUP DEFAULTS

    ESC : Quit                 ↑ ↓ ← →  : Select Item
    F10 : Save & Exit Setup    (Shift)F2 : Change Color

               Time, Date, Hard Disk Type...
```

Setup program initial screen

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

Entering setup

Turning on the computer and pressing <DEL> immediately will allow you to enter Setup.

Standard CMOS setup

Choose the "STANDARD CMOS SETUP" option from the INITIAL
SETUP SCREEN Menu, and the screen 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.

```
                    RCM PCI/ISA BIOS (2A4IBAK1)
                        CMCS SETUP UTILITY
                       AWARD SCFTWARE, INC.

 Λατε (μμ·δδ·ψυ) :  Νοv   Φυλψ 17,  1995
 Τιμε (ηη:μμ:σσ) :  17 : 13 : 24

 ΗΑΡΔ ΔΙΣΚ        ΤΨΓΕ  ΣΙ ZE   ΧΨΛΣ ΗΕΑΔ ΓΡΕΧΟΜΠ ΛΑΝΔZ ΣΕΧΤΟΡ   ΝΟΔΕ

 Γοι μοσω Ναστερ  : Ψσεο  547 1060   16    65535 1059    63  Νορυολ
 Γοι μοσω Σλοτε   : Νουε    0    0    0        0    0     0  ─────
 Σεχονδροω Ναστερ: Νουε    0    0    0        0    0     0  ─────
 Σεχονδορψ Σλοτε : Νουε    0    0    0        0    0     0  ─────

 Λοι τε A :  1.44Ν,  3.5 ιν.
 Δρι τε B :  1.2Ν,  5.25 ιν.                   ┌──────────────────────┐
                                               │ Βοσε Νεμορυ:    640K  │
 ςι δεο   :  ΕΓΑ/ςΓΑ                           │ Εξτενδεδ Νεμορυ: 15360K │
 Ηολτ Cv :  Αλλ Ερρορσ                         │  Στηερ Νεμορψ:   384K  │
                                               ├──────────────────────┤
                                               │ Τοτολ Νεμορψ: 16384K  │
                                               └──────────────────────┘

 ESC : Cuit        ↑ ↓ ← →  : Select Item      PU/PD/+/-: Modify
 F1  : Help       (Shift)F2 : Change Colcr
```

CMOS setup screen

BIOS features setup

By choosing the "BIOS FEATURES SETUP" option from the INITIAL SETUP SCREEN Menu, the screen below is displayed. This sample screen contains the manufacturer's default values for the PCA-6149.

```
                ROM PCI/ISA BIOS (2A4IBAK1)
                    BICS FEATURES SETUP
                   AWARD SOFTWARE, INC.

ςι ουσ Ωαονι νγ        : Εναβλεδ    ςι δεο ΒΙ ΣΣ Σηαδοω    : Εναβλεδ
ΧΠΥ Ι ντεοναλ Χαχηε    : Εναβλεδ    Χ8000–ΧΦΦΦΦΣηαδοω       : Δι σαβλεδ
ΓΈτεοναλ Χαχηε         : Εναβλεδ    Λ0000–Λ7ΦΦΦΦΣηαδοω      : Δι σαβλεδ
Θυι γκ Γοαεο Ον Σελφ Τεστ : Εναβλεδ  Δ8000–ΔΦΦΦΦΣηαδοω      : Δι σαβλεδ
Βοοτ Σεθυενγε          : Α, Χ
Σωαπ Φλοππυ Δρι πε      : Δι σαβλεδ   ΩΑΤΧΗ–ΔΟΓ ΤΙ ΜΕΡ ΣΕΤΤΙ ΝΓ : 2. 0
Βοοτ Υπ Φλοππυ Σεεκ    : Εναβλεδ
Βοοτ υπ Νυμ Λοχκ Στατυσ : Ον
Βοοτ Υπ Σψστεμ Σπεεδ   : Ηι γη
Γατε Α20 Οπτι ον       : Νορμαλ
Τυπεματι γ Ρατε Σεττι νγ : Δι σαβλεδ
Τυπεματι γ Ρατε ( Χηαα/ Σεχ) : 6
Τυπεματι γ Δελαω ( Μσεχ)   : 250
Σεχυρι τψ Οπτι ον      : Σετυπ     ┌──────────────────────────────────────┐
ΠΧΙ / ςΓΑ Γαλεττε Σνοοπ : Δι σαβλεδ  ESC : Cuit      ↑↓ ←→  :Select Item
                                     F1  : Help      PU/PD/+/- :Modify
                                     F5  : Old Values (Shift)F2 :Color
                                     F6  : Load BIOS Defaults
                                     F7  : Load Setup Defaults
```

BIOS features setup

Virus Warning
During and after the system boots up, any attempt to write to the boot sector or partition table of the hard disk drive will halt the system. In this case, if Virus Warning is enabled, the following error message will automatically appear:

```
               !WARNING!
      Disk boot sector is to be modified
 Type "Y" to accept write or "N" to abort write
            Award Software, Inc.
```

You can run the anti-virus program to locate the problem.

If Virus Warning is Disabled, no warning message will appear if anything attempts to access the boot sector or hard disk partition.

CPU Internal Cache/External Cache
Depending on the CPU/chipset design, these options can speed up memory access when enabled.

Quick Power On Self Test
This option speeds up the Power-On Self Test (POST) conducted as soon as the computer is turned on. When enabled, BIOS shortens or skips some of the items during the test. When disabled, normal POST procedures assumes.

Boot Sequence
This function determines the sequence in which the computer will search the drives for the disk operating system (i.e. DOS). The default value is "A, C".

C,A	System will first search the hard drive, then the floppy drive.
A,C	System will first search the floppy drive, then the hard drive.

Boot Up Floppy Seek
During POST, BIOS will determine if the floppy disk drive installed is 40 or 80 tracks. 360 KB type is 40 tracks while 720 KB, 1.2 MB, and 1.44 MB are all 80 tracks.

Enabled	BIOS searches the floppy drive to determine if it is 40 or 80 tracks. Note that BIOS cannot differentiate 720 KB, 1.2 MB, and 1.44 MB type drives as they are all 80 tracks.
Disabled	BIOS will not search for the floppy drive type by track number. Note that there will not be any warning message if the drive installed is 360 KB.

Boot Up NumLock Status
The default is "On".

On	Keypad boots up to number keys.
Off	Keypad boots up to arrow keys.

Boot Up System Speed
Sets the speed of the system immediately after power-up to high or low.

Gate A20 option

Normal	Keyboard
Fast	Chipset

Typematic Rate setting
The typematic rate determines the characters per second accepted by the computer. Typematic Rate setting enables or disables the typematic rate. Typematic Delay (msec)

Typematic Rate (Char/Sec)
BIOS accepts the following input values (character/second) for Typematic Rate: 6, 8, 10, 12, 15, 20, 24, 30.

Typematic Delay (msec)
When holding down a key, the Typematic Delay is the time interval between the appearance of the first and second characters. The input values (msec) for this category are: 250, 500, 750, 1000.

Security Option
This setting determines whether the system will boot if the password is denied, while limiting access to Setup.

System	The system will not boot, and access to Setup 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 in the main menu. At this point, you will be asked to enter a password. Simply hit the <ENTER> key to disable security. When security is disabled, the system will boot, and you can enter Setup freely.

Video BIOS Shadow

This determines whether video BIOS will be copied to RAM, which is optional according to the chipset design. When enabled, Video Shadow increases the video speed.

C8000 - CFFFF Shadow/D8000-DFFFF Shadow

These determine whether optional ROM will be copied to RAM in blocks of 16 KB.

Enabled	Optional shadow is enabled
Disabled	Optional shadow is disabled

Watchdog timer setting

The Watchdog timer setting determines the period of time between the halt in CPU processing and the Watchdog timer's reset signal.

CHIPSET features setup

By choosing the "CHIPSET FEATURES SETUP" option from the INITIAL SETUP SCREEN Menu, the screen below is displayed. This sample screen contains the manufacturer's default values for the PCA-6149.

```
              RCM PCI/ISA BICS (2A4IBAK1)
                 CHIPSET FEATURES SETUP
                  AWARD SOFTWARE, INC.

 Αυτο Χονφιγυρατιον    : Ενοβλεδ     Ονβοαρδ 496Β Ι ΛΕ Γορτ  : Βοτη
                                    Ι ΛΕ 0 Λαστερ Νοδε       : Αυτο
 Ι ΣΑ Βυσ Χλογκ        : 1/4 ΓΧΛΚ    Ι ΛΕ 0 Σλαστε Νοδε       : Αυτο
 ΛΒΔ# Σαμπλε Γοιντ     : Ενδ οφ Τ2   Ι ΛΕ 1 Λαστερ Νοδε       : Αυτο
                                    Ι ΛΕ 1 Σλαστε Νοδε       : Αυτο
 Χαχηε Γοιτε Χιγλε     : 2 ΧΧΛΚ      Ι ΛΕ Γρεφετγη Ρεαδ Βυφφερ : Δισαβλεδ
 Χαχηε Βυοστ Ρεαδ Χιγλε : 1 ΧΧΛΚ    Ι ΔΕ ΕΔΔ Βλοχκ Νοδε      : Δισαβλεδ
 Λ2 Χαχηε/ ΔΡΑΜΧιψχλε ΩΣ : 2 ΧΧΛΚ
                                    Ονβοαρδ ΦΔΧ Χοντρολλερ    : Ενοβλεδ
 ΛΡΑΜΡΑΣ το ΧΑΣ Λελαψ  : 3 ΧΧΛΚ      Ονβοαρδ Σεριαλ Γορτ 1    : ΧΟΜ1
 ΛΡΑΜΓοιτε Χιγλε       : 1 ΩΣ        Ονβοαρδ Σεριαλ Γορτ 2    : ΧΟΜ2
 ΛΡΑΜΓοιτε ΧΑΣ Γυλσε   : 2 ΧΧΛΚ      ΧΟΜ3 & ΧΟΜ4 Αδδρεσσ      : 338Η 238Η
 ΛΡΑΜΧΑΣ Γρεγηαργε Τιμε : 1 ΧΧΛΚ    Ονβοαρδ Γαραλλελ Γορτ    : 278Η
 ΛΡΑΜΡΑΣ το ΝΑ Δελαψ   : 1 ΧΧΛΚ      Γαρολλελ Γορτ Νοδε       : Νορμαλ
 ΛΡΑΜΣπεδ              : Φαστερ
 ΔΡΑΜΣλοω Ρεφρεση      : Δισαβλεδ

 ΧΓΥ Βυοστ Γαιτε       : Δισαβλεδ   ESC: Quit          ↑↓←→   : Select Item
 Λ2 Χαχηε Γολιγιν      : Γριτε Τηρυ  F1 : Help      PU/PD/+/-  : Modify
 Λ2 Χαχηε Ταγ Βιτσ     : 8 βιτσ     F5 : Old Values (Shift)F2  : Color
                                    F6 : Load BICS Defaults
```

CHIPSET features setup

Note: If you enable the IDE HDD block mode, the enhanced IDE driver will be enabled.

Power management setup

The power management setup controls the CPU cards' "green"
features. The following screen shows the manufacturer's default.

```
              ROM PCI/ISA BIOS (2A4IBAK1)
                POWER MANAGEMENT SETUP
                 AWARD SOFTWARE, INC.

Γοαεο Μαναγειεντ   : Λι σαβλεδ    I P64  ( ΧCM1)       · Εναβλεδ
ΓΜΧοντοολ Βιι ΑΓΜ  : Ψεσ          I P65  ( ΑΓΤ 2)      · Εναβλεδ
ει δεο Cφφ Cπτι ον  · Σγαπ  Στβιι—> Cφφ  I P66  ( dΛoππψΔι σκ)  · Εναβλεδ
ει δεο Cφφ Νετποδ   · c/ ΗΣΨΝΧ+Βλανκ     I P67  ( ΑΓΤ 1)       · Εναβλεδ
Συσπενδ Σαι τχη     : Εναβλεδ     I P68  ( PΤΧ Αλοοιι)  · Λι σαβλεδ
                                  I P69  ( I P62 Pεδι ρ)  · Εναβλεδ
      ** ΓΜΤι ιεοσ **             I P610 ( Pεσεοπεδ)    · Εναβλεδ
ΗΛΛ Cφφ Αφτερ      : Λι σαβλεδ    I P611 ( Pεσερπεδ)    · Εναβλεδ
Λοζε Νοδε          : Λι σαβλεδ    I P612 ( ΓΣ/2 Λουσε)  · Εναβλεδ
Στονδβιι Νοδε      · Λι σαβλεδ    I P613 ( Χοπαονεσαορ)  · Εναβλεδ
Συσπενδ Νοδε       : Δι σαβλεδ    I P614 ( Εοαδ δι σκ)   · Εναβλεδ
                                  I P615 ( Pεσερπεδ)    : Εναβλεδ
      ** ΓΜΕαεντσ **
ΓΧΙ Ναστερ Αχτι αι τψ: Εναβλεδ
ΧCΜΓοοτσ Αχτι αι τψ : Εναβλεδ
ΛΓΤ Γορτσ Αχτι αι τψ : Εναβλεδ
ΗΛΛ Γοοτσ Αχτι αι τψ : Εναβλεδ    ─────────────────────────────────
ΛΝΑ Γοοτσ Αχτι αι τψ : Εναβλεδ    ESC: Ουit        ↑↓←→ : Select Item
ΓΓΑ Αχτι αι τψ       · Λι σαβλεδ   F1 : Help     PU/PD/+/- : Modify
I P63  ( ΧCΜ2)       : Εναβλεδ    F5 : OldValues (Shift)F2 : Color
                                  F6 : Load BIOS Defaults
                                  F7 : Load Setup Defaults
```

Power management

Power Management
This option allows you to determine if the values in power manage-
ment are disabled, user-defined, or predefined.

PM Control by APM
This option is only effective if APM (Advanced Power Management)
is installed. If under APM control, system BIOS will wait for APM's
prompt before entering any power management mode.

Note: If there is a task running, the APM will not prompt BIOS to
activate any power saving mode.

Video Off Option
This option allows you to determine if the screen will always stay on,
or turn off when in SUSPEND and/or STANDBY modes.

Video Off Method

This option controls to what degree will the video be downed:

1. Blank screen only turns off the screen

2. V/H SYNC + Blank will also turn off the V-SYNC and H-SYNC signals from the VGA cards to the monitor

3. DPMS is enabled only for VGA cards that support DPMS.

Suspend Switch

This enables or disables the External Suspend Switch.

PM Timers

The options under this category allow you to disable or set the duration of time that the system is inactive before entering the listed modes.

HDD Off After

You can choose to turn the HDD off after a one of the time interval listed, or when the system is in Suspend mode. If in a power saving mode, any access to the HDD will wake it up.

Doze Mode and Standby Mode

These modes will put the system into low speed or 8 MHz. Screen may turn off depending on the setting for Video Off method.

Suspend Mode

Suspend mode puts the system into low speed or 8 MHz, and the system clock is stopped. Screen may turn off depending on the setting for Video Off method.

Note: *System Doze, Standby Doze, and System Suspend will be loaded with predefined values if the Power Management option is not set to "User defined".*

Note: *HDD will not power down if the Power Management option is disabled.*

PM Events

Each of the options in this category can be enabled or disabled. If a particular option is enabled, the activity of the specified event will cause the PM timers for Doze, Standby, and Suspend modes to reload. If disabled, the specified event will have no effect on the PM timers, and the prevailing power saving mode continues.

PCI slot configuration

By choosing the "PCI SLOT CONFIGURATION" option from the INITIAL SETUP SCREEN Menu, the screen below is displayed. This sample screen contains the manufacturer's default values for the CPU card.

```
                ROM PCI/ISA BIOS (2A4IBAK1)
                   PCI CONFIGURATION SETUP
                     AWARD SOFTWARE, INC.
Σλοτ 1 Υσι νγ ΙΝΤ#      : ΑΥΤΟ
Σλοτ 2 Υσι νγ ΙΝΤ#      : ΑΥΤΟ
Σλοτ 3 Υσι νγ ΙΝΤ#      : ΑΥΤΟ
Σλοτ 4 Υσι νγ ΙΝΤ#      : ΑΥΤΟ
1στ Απαι λοβλε ΙΡΘ      : 9
2νδ Απαι λοβλε ΙΡΘ      : 10
3ρδ Απαι λοβλε ΙΡΘ      : 11
4τη Απαι λοβλε ΙΡΘ      : 12
ΓΧΙ ΙΡΘ Αντι πεδ Βψ     : Εδγε
ΓΧΙ ΙΛΕ 2νδ Χηαννελ     : Εναβλεδ
ΓΧΙ ΙΛΕ ΙΡΘ Μαπ το      : ΓΧΙ –ΑΥΤΟ
  Γοι μαρψ   ΙΛΕ ΙΝΤ#   : Α
  Σεχονδαρψ ΙΛΕ ΙΝΤ#   : Β

Νασστεδ Αρβι τρατι ον Γροτοχολ : Ωεακ     ┌─────────────────────────────
ΧΓΥ–>ΓΧΙ Λεω Γοστ Ωρι τε Βυφ  : Εναβλεδ  │ESC : Quit          ↑↓← → :Select Item
ΧΓΥ–>ΓΧΙ Λεωοοω Βυρστ Ωρι τε  : Εναβλεδ  │F1  : Help      PU/PD/+/- :Modify
ΓΧΙ Μαστερ Βυρστ Ρεαδ/ Ωρι τε : Εναβλεδ  │F5  : Old Values (Shift)F2 :Color
                                          │F6  : Load BIOS Defaults
                                          │F7  : Load Setup Defaults
```

PCI slot configuration

The PCA-6149 supports up to four PCI I/O devices. Each PCI device is assigned a different ID number (IDSEL#). Make sure that the back-plane in your chassis uses the same IDSEL# for each PCI device number as your CPU card.

The table below lists the IDSEL# used by the PCA-6149.

PCI device#	IDSEL #
1	31
2	30
3	29
4	28

Slot 1 Using INT#   , Slot 2 Using INT#,
Slot 3 Using INT#, Slot 4 Using INT#
These allow you to assign each PCI device to INT# A, B, C, or D.
Generally, choose AUTO unless you have a device that does not tell
BIOS which INT# to use.

Note: For multifunction PCI devices, choose only AUTO.

1st/2nd/3rd/4th Available IRQ
The system BIOS will assign the specified available IRQ to the found
PCI devices.

PCI IRQ Activated by
This tells the chipset whether the IRQ signals input is level or edge
trigger.

PCI IDE 2nd Channel
This option enables or disables the second channel of the PCI/IDE
card. It includes I/O port (170H~177H) and IRQ15 assignment.

PCI IDE IRQ Map to
For the specified slot, the BIOS will determine the location of the PCI
IDE device and assign IRQ14 for the primary IDE INT#, and IRQ15 for
the secondary IDE INT#. If ISA is chosen, BIOS will not assign any
IRQ even if a PCI IDE is found.

Primary IDE NT#, Secondary IDE INT#
These determine which INT# the PCI IDE card is using for its inter-
rupts.

Load BIOS defaults

"LOAD BIOS DEFAULTS" indicates the most appropriate values for the system parameters for minimum performance. These default values are loaded automatically if the stored record created by the Setup program becomes corrupted (and therefore unusable).

Load setup defaults

"LOAD SETUP DEFAULTS" loads the values required by the system for maximum performance.

Password setting

To change, confirm, or disable the password, choose the "PASS-WORD SETTING" option form the Setup main menu and press [Enter]. The password can be at most 8 characters long.

Remember, to enable this feature. You must first select the Security Option in the BIOS FEATURES SETUP to be either "Setup" or "System."

IDE HDD auto detection

"IDE HDD AUTO DETECTION" automatically self-detect for the correct hard disk type.

Save & Exit setup

If you select this and press the [Enter] key, the values entered in the setup utilities will be recorded in the CMOS memory of the chipset. 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 the [Enter] key lets you exit the Setup program without recording any new values or changing old ones.

PCI VGA Setup

The PCA-6149 features an on-board VGA interface. This chapter describes the installation and use of the display utilities and drivers.

Before you begin

To facilitate the installation of the enhanced display device drivers and utility software, you should read the instructions in this chapter carefully before you attempt installation. The enhanced display drivers for the VIEWTOP ET-Series board are located on the software installation diskette. You must install the drivers and utility software by using the supplied SETUP program for DOS driver. (WINSETUP program for Windows 3.1x Driver.)

Note: The files on the software installation diskette are compressed. Do not attempt to install drivers by copying the files manually. You must use the supplied SETUP (or WINSETUP) program to install the drivers (except in the case of Windows NT, which can read the compressed files on the software installation diskette directly).

Before you begin, it is important to note that most display drivers need to have the relevant software application already installed in the system prior to installing the enhanced display drivers. In addition, many of the installation procedures assume that you are familiar with both the relevant software application and certain operating system commands. Please review the relevant operating system commands and the pertinent sections of your application software's user manual before performing the installation.

Installation

To install the enhanced display drivers and utilities, follow these steps:

1. If you have not already done so, make a backup copy of the software installation diskette and store the original in a safe place. Refer to your operating system manual for details on how to duplicate a diskette. You should use the backup copy you have made for all subsequent steps. Alternatively, you can copy all the files on the software installation diskette to your hard disk and install the drivers from there. The steps below assume you are installing from a diskette.

2. Insert the backup copy of the software installation diskette into drive A: or B:. From the DOS command line, run the SETUP program by typing: `A: SETUP Enter` (or `B: SETUP Enter` as appropriate).

3. Scroll through the list of options by using a mouse or the cursor keys until you come to the option you wish to install. Click on the left mouse button or press <ENTER> to select the option.

4. After reading the application notes (if any), click the left mouse button or press <ENTER> to continue with the installation procedure. The SETUP program will search your environment path in attempt to locate the installed application, and you will be prompted to confirm a directory to which the files should be copied (normally the application's directory). You also have the option of entering a drive and directory of your choice. If the directory you choose does not exist, it will be created for you. The relevant files will be copied there or to appropriate sub-directories.

5. Finally, if an application specific setup program or procedure is required in order to configure the software to recognize the new driver(s) and the SETUP program has been able to locate the application specific program, you will be given the option of running the relevant program to configure the application at this time.

6. After the installation procedure is completed, you will be returned to SETUP program. Select another option for installation as required. To exit SETUP, click on the right mouse button or press <ESC>. You will be prompted for confirmation before returning to the DOS command prompt.

APPENDIX

A

Programming the Watchdog Timer

The PCA-6149 is equipped with a watchdog timer that resets the CPU or generates an interrupt if processing comes to a standstill for whatever reason. This feature ensures system reliability in industrial stand-alone and unmanned environments.

Programming the watchdog timer

If you decide to program 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 intervals less than 2.0 seconds (as set in the BIOS). Otherwise, the watchdog timer will activate and reset the CPU or generate an interrupt on IRQ11. 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 or invoke an IRQ, and data processing will continue normally.

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

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

POST LEDs

This appendix lists the codes generated by the POST (Power On Self Test) routines. It also discusses how to read the PCA-6149's POST LED indicators.

Whenever you start up your system, the CPU card runs a series of programs to 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. The cure for most nonfatal error messages is simply to run the BIOS SETUP program, discussed in Chapter 3.

If the routines encounter a fatal error, they will stop the tests and output a message indicating which test failed. If the fatal error comes before the screen device initializes, the card will indicate the error code through a series of beeps.

You can also determine the number of the test that failed by reading the LED indicators on the top of the PCA-6157 board.

Please make a note of any BIOS error codes before you contact Advantech for technical support.

POST LEDs

Before the BIOS performs each system test, it writes a checkpoint code to I/O address 80H. If the test fails, the code will stay in memory. You can read the code and determine which test has failed.

The PCA-6149's POST LED indicators make this process extremely easy. You don't need any special diagnostic tools, you just read the POST code from the LEDs.

The table below shows how to read the LEDs, a series of eight LEDs located in the top left-hand corner of the board.

SELF-TEST INDICATORS

● ● ● ●   ● ● ● ●
D7 D6 D5 D4   D3 D2 D1 D0

● : LIGHT OFF

○ : LIGHT ON

● ● ● ● : 0	● ○ ● ● : 4	○ ● ● ● : 8	○ ○ ● ● : C
● ● ● ○ : 1	● ○ ● ○ : 5	○ ● ● ○ : 9	○ ○ ● ○ : D
● ● ○ ● : 2	● ○ ○ ● : 6	○ ● ○ ● : A	○ ○ ○ ● : E
● ● ○ ○ : 3	● ○ ○ ○ : 7	○ ● ○ ○ : B	○ ○ ○ ○ : F

EXAMPLE

● ● ● ○   ○ ● ● ○
D7 D6 D5 D4   D3 D2 D1 D0

   1   9

POST checkpoint LED indicators

The following list of checkpoint codes gives the number of each checkpoint for the AWARD BIOS POST. Codes are Copyright AWARD-BIOS CHECK-POINT, (C) 1994 Award Software Inc.

Code	Name	Description of check-point
01	Processor test 1	Processor status (IFLAGS) verification tests the following processor status flags, carry, zero, sign, BIOS overflow. It will set each of these flags, verify that they are set, then turn each flag off and verify it is off.
02	Processor test 2	Read, write, verify all CPU registers except SS, SP, and BP with data pattern FF and 00.
03	Initialize chips	Disable NMI, PLE, ALE, UEL, SQWV. Disable video, parity checking, DMA. Reset math coprocessor, clear all page registers, CMOS shutdown byte. Initialize timer 0, 1, and 2. Set EISA timer to a known state. Initiallze DMA controllers 0 and 1. Initialize interrupt controllers 0 and 1. Initialize EISA extended registers.
04	Test memory	RAM must be periodically refreshed in order to keep the memory from decaying.
	Refresh toggle	This function assures that the memory refresh function is working properly.
05	Blank video	Keyboard controller initialization. Initialize keyboard.
06	Reserved	
07	Test CMOS interface	Verifies CMOS is working correctly. Checks battery status, detects bad battery.
08	Setup low memory	Early chip set initialization memory presence test. OEM chipset routines. Clear low 64 KB of memory. Test first 64 KB memory.
09	Early cache initialization	Cyrix CPU initialization, cache initialization
0A	Setup interrupt vectors	Initialize first 120 vectors in interrupt vector table with SPURIOUS_INT_HDLR and initialize INT 00h-1Fh according to INT_TBL.

Code	Name	Description of check-point
0B	Test CMOS RAM	Test CMOS RAM checksum. If bad or insert key pressed, INT OOh-1Fh according to INT_TBL.
0C	Initialize keyboard	detect type of keyboard controller (optional). Set num_lock status.
0D	Initalize video interface	Detect CPU clock. Read interface CMOS location 14h to find out type of video in use. Detect and initialize video adaptor.
0E	Test video memory	Test video memory, write sign-on message to screen. Set up shadow RAM-enable according to setup.
0F	Test DMA controller 0	BIOS checksum test. Keyboard detection and initialization.
10	Test DMA controller 1	
11	Test DMA page registers	Test DMA page registers.
12-13, 1B, 1E		Reserved
14	Test timer counter 2	Test 8254 timer 0 counter 2.
15	Test 8259-1 mask bits	Verify 8259 channel 1 masked interrupts by alternately turning off and on the interrupt lines.
16	Test 8259-2 mask bits	Verify 8259 channel 2 masked interrupts by alternately turning off and on the interrupt lines.
17	Test 8259-1 mask bits	Turn off interrupts then verify no interrupt mask register is on.
18	Test 8259 interrupt ality	Force an interrupt and verify the function-interrupt occurred.
19	Test stuck NMI bits (parity/IO check)	Verify NMI can be cleared.
1A	Display CPU clock	
20	Enable slot 0	Initialize slot 0 (system board).
21-2F	Enable slots 1-15	Initialize slots 1 through 15.
30	Size base and extended memory	Size base memory from 256 KB to 640 KB and extended memory above 1 MB.

Code	Name	Description of check-point
31	Test base and extended memory	Test base memory from 256 KB to 640 KB and extended memory above 1 MB using various patterns. Note: this will be skipped in EISA mode and can be "skipped" with ESC key in EISA mode.
32	Test EISA extended memory	If EISA mode flag is set then test EISA memory found in slot initialization. Note: this will be skipped in ISA mode and can be 'skipped" with ESC key in EISA mode.
33-3B	Reserved	
3C	Setup enabled	
3D	Initialize and install mouse	Detect if mouse is present, initialize mouse, install interrupt vectors.
3E	Set up cache controller	Initialize cache controller.
40	Virus protect	Display virus protect disable or enable.
41	Initialize floppy drive and controller	Initialize floppy disk drive controller and any drives.
42	Initialize hard disk drive and controller	Initialize hard disk drive controller and any drives.
43	Detect & initialize serial and parallel ports	Initialize serial/parallel ports (also game port).
44	Reserved	
45	Detect & initialize math coprocessor	Initialize math coprocessor.
46-47	Reserved	
4E	Manufacturing post loop or display messages	Reboot if manufacturing loop post loop pin is set. Otherwise display and messages (i.e. any non-fatal errors that were detected during post and enter setup).
4F	Security check	Ask for password security (optional).
50	Write CMOS	Write all CMOS values back to RAM and clear screen.

Code	Name	Description of check-point
51	Pre-boot enable	Enable parity checker, enable NMI, enable cache before boot.
52	Initiallze option ROMs	Initialize any option ROMs present from C8000h to EFFFFh. Note: when fscan option is enabled, it will initialize from C8000h to F7FFFh.
53	Initialize time value	Initialize time value in 40h: BIOS area.
60	Set up virus protection	Set up virus protection according to setup.
61	Set boot speed	Set system speed for boot.
62	Set numlock	Set numlock status according to setup.
63	Boot attempt	Set low stack boot via INT 19h.
B0	Spurious	If interrupt occurs in protected mode.
B1	Unclaimed NMI	If unmasked NMI occurs, display "Press F1 to disable NMI, F2 to reboot".
BE	Chipset default initialization	Program chipset registers with power-on BIOS defaults.
BF	Chipset initialization	Program chipset registers with setup values.
C0	Turn off chipset cache	OEM specific-cache control.
C1	Memory presence test	OEM specific test to size onboard memory.
C5	Early shadow	OEM specific early shadow enable for fast boot.
C6	Cache presence test	External cache size detection test.
E1-EF	Setup pages	E1-page 1, E2-page2, etc.
FF	Boot	

APPENDIX

C

Hardware Interrupt Information

Interrupt assignments

Priority	Interrupt#	Interrupt source
-	IRQ2	Interrupt from controller 2 (cascade)
1	NMI	Parity error detected
2	IRQ0	Interval timer, counter 0 output
3	IRQ1	Keyboard
4	IRQ8	Real-time clock
5	IRQ9	Reserved
6	IRQ10	Reserved
7	IRQ11	Watchdog IRQ
8	IRQ12	PS/2 mouse
9	IRQ13	INT from co-processor
10	IRQ14	IDE 0 driver
11	IRQ15	IDE 1 driver
12	IRQ3	Serial communication port 2
13	IRQ4	Serial communication port 1
14	IRQ5	Reserved
15	IRQ6	Diskette controller (FDC)
16	IRQ7	Parallel port 1 (print port)