HS-4020

**Cyrix Geode GX1 ISA Bus SBC
with CRT/Panel, Audio & LAN**

• CRT/Panel • LAN • Audio • RS-232/422/485 •
• 4COM • PC/104 • IrDA •
• USB • DiskOnChip • WDT •
• ISA Bus Industrial Single Board Computer •

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Safety Instructions

Integrated circuits on computer boards are sensitive to static electricity. To avoid damaging chips from electrostatic discharge, observe the following precautions:

- ■ Do not remove boards or integrated circuits from their anti-static packaging until you are ready to install them.

- ■ Before handling a board or integrated circuit, touch an unpainted portion of the system unit chassis for a few seconds. This helps to discharge any static electricity on your body.

- ■ Wear a wrist-grounding strap, available from most electronic component stores, when handling boards and components. Fasten the ALLIGATOR clip of the strap to the end of the shielded wire lead from a grounded object. Please wear and connect the strap before handle the HS-4020 to ensure harmlessly discharge any static electricity through the strap.

- ■ Please use an anti-static pad when putting down any components or parts or tools outside the computer. You may also use an anti-static bag instead of the pad. Please inquire from your local supplier for additional assistance in finding the necessary anti-static gadgets.

NOTE: *DO NOT TOUCH THE BOARD OR ANY OTHER SENSITIVE COMPONENTS WITHOUT ALL NECESSARY ANTI-STATIC ROTECTION.*

Chapter 1

General Description

The HS-4020 is an ISA bus industrial single board computer. The board design combine together with all necessary input and output effects interface which makes it an ideal all-in-one industrial single board computer.

The HS-4020 designed with Cyrix® Geode GX1 300MHz CPU. Audio provides an ideas sound adapter in any sound application. The IDE interface with LBA mode assess of ATA/33 to IDE drive interface architecture, supports with max. 33MB/sec. In data transfer rating to two IDE drive connection and provides an onboard 10/100 based LAN for easy network connection.

A single Flash chip holds the system BIOS, and you can change the Flash BIOS by the utility update. Advanced IrDA port provides a faster data transmission. You can also use the DOS version of the "DiskOnChip™" socket by issuing commands from the DOS prompt without the necessity of other software supports up to 288MB.

The board design with Cyrix® CX5530 VGA chipset provides internal connections to CRT or Panel display. The VGA with shared 4MB main memory supporting CRT/Panel displays up to 1024 x 768 at 64K colors.

1

The HS-4020 supports SDRAM at one DIMM socket. This gives you the flexibility of configuring your system from 8MB to 256MB SDRAM (PC-133 or PC-100) by using the most economical DIMM memory modules for its onboard system SDRAM.

If a non-expect program cause halts, the onboard Watchdog Timer (WDT) will automatically reset the CPU or generate an interrupt. The WDT is designed with pure hardware and doesn't need any arithmetical functions of a real-time clock chip. This ensures the reliability in an unmanned or standalone system.

1.1　Major Features

The HS-4020 comes with the following features:
- ➢ Cyrix Geode GX1 300MHz Low Power CPU
- ➢ Cyrix Geode GX1/CX5530 system chipset
- ➢ One DIMM socket with a max. capacity of 256MB
- ➢ NS 97317, SMC 37C669 super I/O chipset
- ➢ Three RS-232 and one RS-232/422/485 serial ports
- ➢ PC/104 Bus connector
- ➢ Cyrix CX5530 CRT/Panel display controller
- ➢ NS 83815 10/100 Based LAN
- ➢ Cyrix CX5530 3D audio controller
- ➢ DiskOnChip™ socket supporting memory sizes of up to 288MB
- ➢ Two USB connectors
- ➢ Supports ATX power function

1.2   Specifications

- **CPU:** Cyrix Geode GX1 300MHz Low Power CPU
- **Bus Interface:** ISA Bus
- **Memory:** One DIMM socket supporting up to 256MB (PC-133 or PC-100)
- **Chipset:** Cyrix Geode GX1/CX5530
- **I/O Chipset:** NS 97317, SMC 37C669
- **VGA:** Cyrix CX5530 with 4MB shared main memory supporting CRT/Panel displays up to 1024 x 768 at 64K colors
- **IDE:** Two IDE disk drives supporting LBA mode and with a transfer rate of 33MB/sec.
- **FDD:** Supports up to two floppy disk drives
- **Parallel:** One enhanced bi-directional parallel port supporting SPP/ECP/EPP
- **LAN:** NS 83815 10/100 Based LAN
- **Audio:** Cyrix CX5530 3D audio controller
- **Serial Port:** 16C550 UART-compatible RS-232 x 3 and RS-232/422/485 x 1 serial ports with 16-byte FIFO
- **PC/104:** PC/104 connector for 16-bit ISA Bus
- **IrDA:** One IrDA TX/RX header
- **USB:** Two USB connectors
- **Keyboard:** PS/2 6-pin Mini DIN or 5-pin connector
- **Mouse:** PS/2 6-pin Mini DIN or 4-pin header
- **DiskOnChip™:** DiskOnChip™ socket supporting memory sizes of up to 288MB
- **BIOS:** Award PnP Flash BIOS
- **Watchdog Timer:** Sets 1, 2, 10, 20, 110, 220 seconds activity trigger with Reset or NMI
- **CMOS:** Battery backup
- **DMA Channels:** 7
- **Interrupt Levels:** 15
- **Power:** +5V, +12V, -12V
- **Extra Power Connectors:** One 5-pin +5V/+12V/+5Vsb/ATX power connector
- **Operating Temperature:** 0~60 ^{o}C
- **Board Size:** 18.6 x 12.2 cm

1.3   Board Dimensions
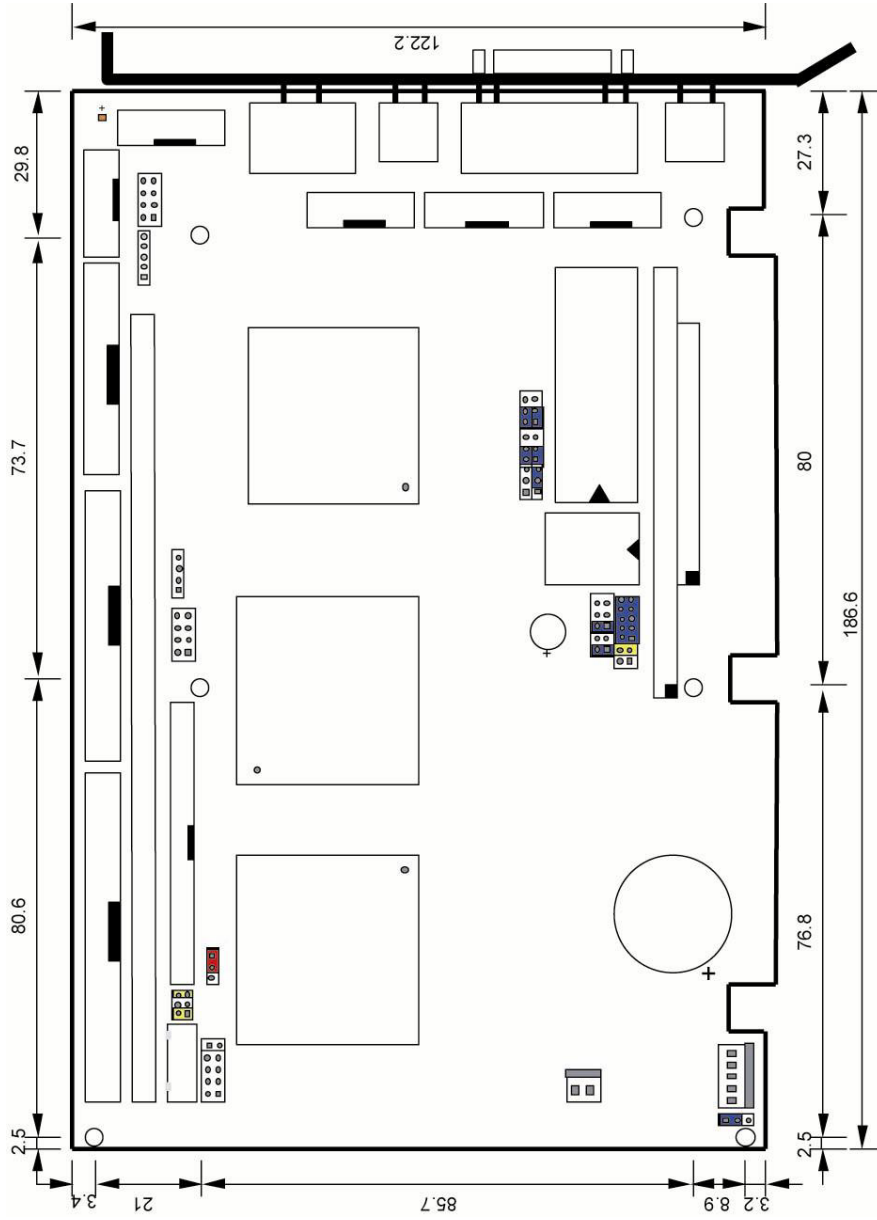
Chapter 2

Unpacking

2.1 Opening the Delivery Package

The HS-4020 is packed in an anti-static bag. The board has components that are easily damaged by static electricity. Do not remove the anti-static wrapping until proper precautions have been taken. Safety Instructions in front of this manual describe anti-static precautions and procedures.

2.2 Inspection

After unpacking the board, place it on a raised surface and carefully inspect the board for any damage that might have occurred during shipment. Ground the board and exercise extreme care to prevent damage to the board from static electricity.

Integrated circuits will sometimes come out of their sockets during shipment. Examine all integrated circuits, particularly the BIOS, processor, memory modules, ROM-Disk, and keyboard controller chip to ensure that they are firmly seated. The HS-4020 delivery package contains the following items:

- **HS-4020 board x 1**
- **IDE flat cable x 1**
- **FDD flat cable x 1**
- **Printer flat cable with bracket x 1**
- **MIC/Audio 8-pin cable with bracket x 1**
- **Two COM Port flat cable with bracket x 1**
- **8-pin USB split type cable with bracket x 1**
- **5-pin ATX power cable x 1**
- **Utility CD Disk x 1**
- **User's Manual x 1**
- **Jumper Bag x 1**

It is recommended that you keep all the parts of the delivery package intact and store them in a safe/dry place for any unforeseen event requiring the return shipment of the product. In case you discover any missing and/or damaged items from the list of items, please contact your dealer immediately.

Chapter 3

Hardware Installation

This chapter provides the information on how to install the hardware using the HS-4020. This chapter also contains information related to jumper settings of switch, watchdog timer, and the DiskOnChip™ address selection etc.

3.1   Before Installation

After confirming your package contents, you are now ready to install your hardware. The following are important reminders and steps to take before you begin with your installation process.

1.   Make sure that all jumper settings match their default settings and CMOS setup correctly. Refer to the sections on this chapter for the default settings of each jumper.

2.   Go through the connections of all external devices and make sure that they are installed properly and configured correctly within the CMOS setup. Refer to the sections on this chapter for the detailed information on the connectors.

3.   Keep the manual and diskette in good condition for future reference and use.

3.2 Board Layout
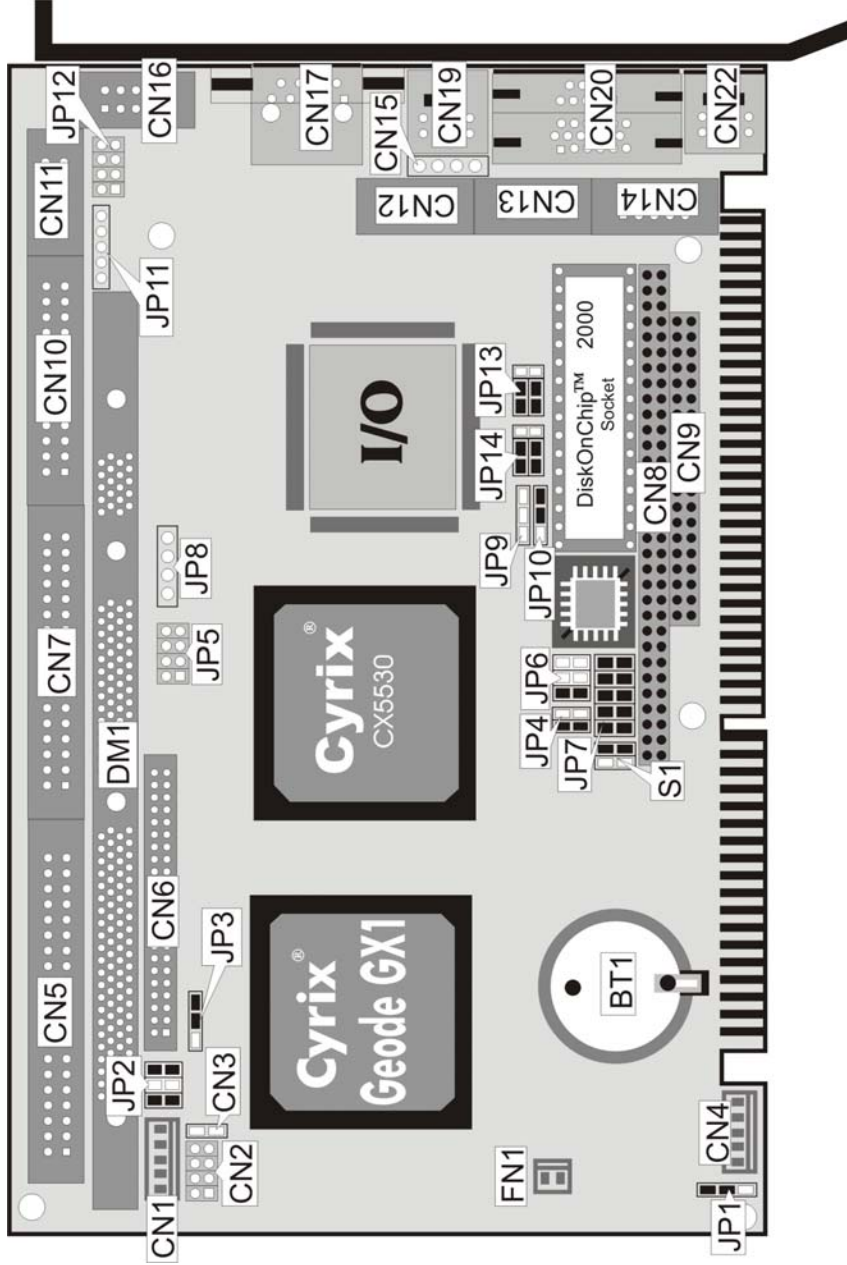
3.3   Jumper List

Jumper	Definition	Default	Page
JP1	Clear CMOS: *Normal Operating*	Short 1-2	18
JP2	Host Bus Clock Ratio: *9x*	Short 1-2, 5-6	10
JP3	Panel Voltage Select: *3.3V*	Short 2-3	12
JP4	RS-422/485 Receiver Enabled/Disabled Select: *Always Disabled*	All Open	15
JP6	RS-422/485 Transceiver Enabled/Disabled Select: *Always Disabled*	All Open	15
JP7(1-4)	DiskOnChip™ Address Select: *D000*	Short 1-2, 3-4	10
JP7(5-10)	Watchdog Timer Out Period Select: *1 sec.*	Short 5-6, 7-8, 9-10	21
JP10	Watchdog Timer Active Type Select: *Reset*	Short 2-3	21
JP13, JP14	RS-232 or RS-422/485 Select: *RS-232*	Short 1-3, 2-4	15
S1	CPU Clock-in Multiplex Weighted Value: *33.25MHz*	Short 3-4	10

3.4   Connector List

Connector	Definition	Page
CN1	5-pin Keyboard Connector	19
CN2	Front Panel Signal Connector	20
CN3	2-pin ATX Power On/Off Connector	18
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CN5	IDE Connector	14
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CN11	COM1 Connector (5x2 header)	15
CN12	COM3 Connector (5x2 header)	15
CN13	RS-422/485 Connector (5x2 header)	15
CN14	COM4 Connector (5x2 header)	15
CN15	4-pin Mouse Connector	19
CN16	COM2 Connector (5x2 header)	15
CN17	RJ-45 Connector	17
CN19	PS/2 6-pin Mini DIN Mouse Connector	19
CN20	15-pin CRT Connector	12
CN22	PS/2 6-pin Mini DIN Keyboard Connector	19
FN1	2-pin Fan Connector	18
JP5	Line Out/Mic In Connector	20
JP8	Line In Connector	20
JP11	IrDA Connector	18
JP12	USB Connector	18

3.5   Configuring the CPU

The HS-4020 provides all possibility in jumper setting, *JP2* for internal host bus clock ratio and *S1* for CPU clock-in multiplex weighted value setting as following. ***Please contact with your CPU's supplier in getting those information for correctly setting. Any wrong setting may cause CPU defect.***

● **S1: CPU Clock-in Multiplex Weighted Value**

Options	PIN 1-2	PIN 3-4
24.85MHz	Open	Open
29.95MHz	Short	Open
33.25MHz (default)	Open	Short

● **JP2: Host Bus Clock Ratio**

Options	PIN 1-2	PIN 3-4	PIN 5-6
5x	Short	Open	Open
6x	Open	Short	Open
7x	Open	Open	Short
8x	Open	Open	Open
9x (default)	Short	Open	Short
10x	Short	Short	Open

3.6   System Memory

The HS-4020 provides one DIMM socket at location *DM1*. This memory socket can support up to 256MB SDRAM modules.

3.7   DiskOnChip™ Address Setting

The DiskOnChip™ function allows the system to boot or operate without a FDD or a HDD. DiskOnChip™ modules may be formatted as drive C. With DiskOnChip™, user may also execute DOS commands such as FORMAT, SYS, COPY, XCOPY, DISCOPY and DISKCOMP etc.

The *U10* location onboard the HS-4020 is the DiskOnChip™ module socket. If you have another memory device that has a similar memory capacity with that of the DOC in your system, please set both at different memory address mapping to avoid mapping area conflicts. Failing to do so will not make the HS-4020 and the additional memory device function properly. *JP7(1-4)* selects the starting memory address of the DiskOnChip™ (D.O.C.) to avoid the mapping area with any other memory devices.

● **JP7(1-4): DiskOnChip™ Address Select**

Address	PIN 1-2	PIN 3-4
D000 (default)	Short	Short
D800	Open	Short

3.7.1 Installing DiskOnChip™ Modules

When installing a DiskOnChip™ module onto your board, please take note of the following:

1. Orient yourself properly with the location of the DiskOnChip™ socket. Try to locate the pin 1 location on your socket. Pin numbers are usually printed on either the component side or the solder side of your board.

2. Locate the Pin 1 location on your DiskOnChip™ module. More often than not, Pin 1 can be found on the lower right corner of the chip. Please refer to the diagram for the exact location.

3. Once you have figured out where the pin 1 locations are on both chip and socket, align the module's pins on an upright angle against the socket. Using both thumbs, gently press the module into the socket until all the pins are secured to their designations.

**Pin 1
Location**
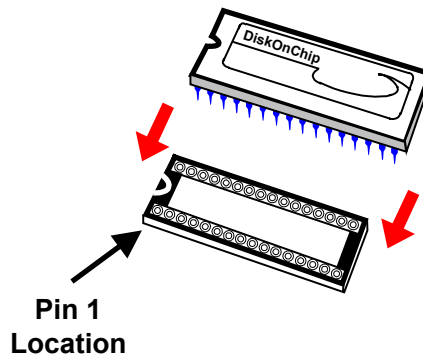
4. The installation is now complete and your module is now ready for use.

NOTE: *If you encounter difficulty installing your DiskOnChip™ module, please consult a qualified technician or engineer to perform the installation.*

3.7.1 Removing DiskOnChip™ Modules

When removing a DiskOnChip™ module from its socket, please take note of the following:

1. Loosen the contact of the module from its socket using a screwdriver.

2. Insert the screwdriver's flat head into a gap on either end of the socket. Do not insert the screwdriver head on either side where the pins are located. Doing so might damage the pins in the process.

3. Slowly lift the screwdriver handle upwards. This will disengage the module from its socket.

NOTE: *If you encounter difficulty removing your DiskOnChip™ module, please consult a qualified technician or engineer to remove it for you.*

3.8 VGA Controller

The onboard Cyrix CX5530 chipset with 4MB shared main memory supporting CRT/Panel displays up to 1024 x 768 at 64K colors. The board provides the user to auto disabled VGA if another ISA bus display card is plug in into the ISA slot.

There is no need to set any jumper to disabled the onboard VGA if any 2nd ISA bus VGA card is plug in into the ISA slot.

The HS-4020 provides two possible connectors for VGA connections. One standard CRT connector *CN20* and one 44-pin panel connection as *CN6*.

● **CN20: 15-pin CRT Connector**

PIN	Description	PIN	Description
1	Red	2	Green
3	Blue	4	N/C
5	GND	6	GND
7	GND	8	GND
9	N/C	10	GND
11	N/C	12	N/C
13	HSYNC	14	VSYNC
15	N/C		
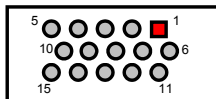
IMPORTANT: *In connecting the cable for CN6, note that the connector cannot be shifted nor connected in the wrong direction in order not to damage the board.*

- **CN6: 44-pin Panel Connector**

PIN	Description	PIN	Description
1	+12V	2	+12V
3	GND	4	GND
5	3.3V / 5V [Note]	6	ENAVDD
7	N/C	8	GND
9	N/C	10	N/C
11	P0	12	P1
13	P2	14	P3
15	P4	16	P5
17	N/C	18	N/C
19	P6	20	P7
21	P8	22	P9
23	P10	24	P11
25	N/C	26	N/C
27	P12	28	P13
29	P14	30	P15
31	P16	32	P17
33	N/C	34	N/C
35	SHFCLK	36	VSYNC
37	Panel Enabled	38	HSYNC
39	GND	40	ENABKL
41	N/C	42	N/C
43	N/C	44	N/C

```
    4  6  8  10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44
  2 ○○○○○○○○○○○○○○○○○○○○○○
  1 ■○○○○○○○○○○○○○○○○○○○○○
    3  5  7  9  11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43
```
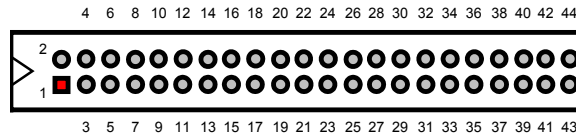
NOTE: *Please set the proper voltage of your panel using JP3 before proceeding on installing it.*

The HS-4020 has an onboard jumper that selects the working voltage of the flat panel connected to the system. Jumper *JP3* offers two voltage settings for the user.

- **JP3: Panel Voltage Select**

Options	Settings
5V	Short 1-2
3.3V (default)	Short 2-3

```
  ■ 1
  ○ 2
  ○ 3
```
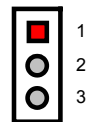
WARNING: *Please contact the supplier of your panel and make sure of the correct voltage it uses. Incorrect settings on JP3 may cause internal damage to your panel.*

3.9 PCI E-IDE Drive Connector

CN5, a 40-pin connector, provides the PCI E-IDE drive provisions onboard. A maximum of two IDE drives may be connected on them.

● **CN5: IDE Connector**

PIN	Description	PIN	Description
1	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	GND	20	N/C
21	N/C	22	GND
23	IOW#	24	GND
25	IOR#	26	GND
27	N/C	28	Bale - Default
29	N/C	30	GND - Default
31	Interrupt	32	IOCS16# - Default
33	SA1	34	N/C
35	SA0	36	SA2
37	HDC CS0	38	HDC CS1#
39	HDD Active	40	GND
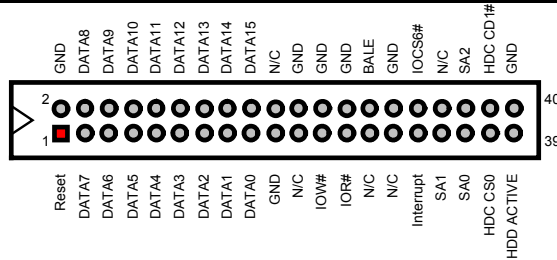
3.10 Floppy Disk Drive Connector

The HS-4020 uses a standard 34-pin header connector, *CN7*, for floppy disk drive connection. A total of two FDD drives may be connected to *CN7* at any given time.

● **CN7: Floppy Connector**

PIN	Description	PIN	Description
1	GND	2	Reduce Write
3	GND	4	N/C
5	GND	6	N/C
7	GND	8	INDEX#
9	GND	10	Motor Enable A#
11	GND	12	Drive Select B#
13	GND	14	Drive Select A#
15	GND	16	Motor Enable B#
17	GND	18	Direction#
19	GND	20	SETP#
21	GND	22	Write Data#
23	GND	24	Write Data#
25	GND	26	Track 0#
27	GND	28	Write Protect#
29	GND	30	Read Data#
31	GND	32	Side1 Select
33	GND	34	Disk Change#
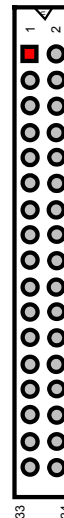
3.11 Serial Port Connectors

The HS-4020 offers four NSIGC550 compatible USRTs with Read/Receive 16-byte FIFO serial ports with four internal 10-pin connectors. The HS-4020 also provides one RS-422/485 port, the *CN13* for uses as or RS-422/485. Please reference to the following for setting *JP13* and *JP14* at enabled or disabled the RS-232 or RS-422/485 function.

● **CN11, CN16, CN12 and CN14: COM1~COM4 Connectors (5x2 Header)**

PIN	Description	PIN	Description
1	DCD	2	DSR
3	RXD	4	RTX
5	TXD	6	CTX
7	DTR	8	RI
9	GND	10	N/C
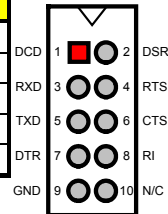
- **CN13: RS-422/485 Connector (5x2 Header)**

PIN	Description	PIN	Description
1	TX-	2	TX+
3	RX+	4	RX-
5	GND	6	RTS-
7	RTS+	8	CTS+
9	CTS-	10	N/C
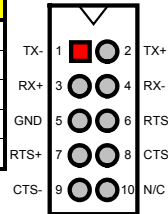
- **JP4: RS-422/485 Receiver Enabled/Disabled Select**

Options	Settings
Always Enable	Short 1-2
Enable by "-RTS" signal	Short 3-4
Always Disabled (default)	All Open

- **JP6: RS-422/485 Transceiver Enabled/Disabled Select**

Options	Settings
Always Enable	Short 1-2
Enable by "-RTS" signal	Short 3-4
Enable by writing the REG:2 EFH BIT0=1	Short 5-6
Always Disabled (default)	All Open

- **JP13, JP14: RS-232 or RS-422/485 Select**

Options	JP13	JP14
RS-232 (default)	Short 1-3, 2-4	Short 1-3, 2-4
RS-422/485	Short 3-5, 4-6	Short 3-5, 4-6

3.12 Parallel Connector

CN10 is a standard 26-pin flat cable connector designed to accommodate parallel port connection onboard the HS-4020.

● **CN10: Parallel Connector**

PIN	Description	PIN	Description
1	STROBE	2	DATA0
3	DATA1	4	DATA2
5	DATA3	6	DATA4
7	DATA5	8	DATA6
9	DATA7	10	Acknowledge
11	Busy	12	Paper Empty
13	Printer Select	14	Auto Form Feed
15	ERROR#	16	Initialize
17	Printer Select LN#	18	GND
19	GND	20	GND
21	GND	22	GND
23	GND	24	GND
25	GND	26	N/C
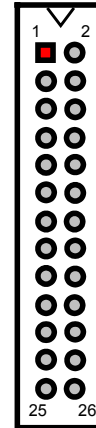
3.13 Ethernet Connector

The Fast Ethernet controller provides with 32-bit performance, PCI bus master capability, and full compliance with IEEE 802.3 10/100Based-T specifications. For 10/100 Based operations, please connect the network connection by plugging one end of the cable into the RJ-45 of the *CN17* connector. Please refer to the following detail of pin information.

● **CN17: RJ-45 Connector**

PIN	Description
1	TX+
2	TX-
3	RX+
4	RC-GND
5	RC-GND
6	RX-
7	RC-GND
8	RC-GND
9	GND
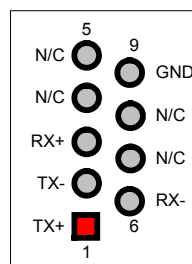
3.14 IrDA Connector

JP11 is a 5-pin internal IR communication connector for connection of an IrDA device.

● **JP11: IrDA Connector**

PIN	Description
1	VCC
2	FIRRX
3	IRRX
4	GND
5	IRTX
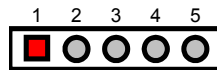
3.15 USB Connector

The HS-4020 provides one 8-pin connectors for two USB port connections at location *JP12*.

● **JP12: USB Connector**

PIN	Description	PIN	Description
1	VCC	2	VCC
3	USB P0-	4	USB P1-
5	USB P0+	6	USB P1+
7	GND	8	GND
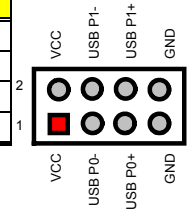
3.16 CMOS Data Clear

The HS-4020 has a Clear CMOS jumper on *JP1*. The *JP1* settings below apply to the standard HS-4020 using a battery backed up CMOS chip.

● **JP1: Clear CMOS**

Options	Settings
Normal Operating (default)	Short 1-2
Clear CMOS	Short 2-3
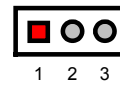
3.17 Power and Fan Connectors

HS-4020 provides one 5-pin power connector at *CN4,* one 2-pin ATX power switch at *CN5,* one 2-pin 5V power in connector at *CN3,* and a fan connector at *FN1.*

● **CN3: 2-pin ATX Power On/Off Connector**

PIN	Description
1	Power On/Off
2	GND
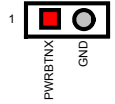
● **CN4: 5-pin ATX Power Control**

PIN	Description
1	VCC
2	5V_SB
3	+12V
4	PS_ON
5	GND
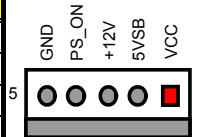
● **FN1: 2-pin Fan Connector**

PIN	Description
1	VCC
2	Fan On
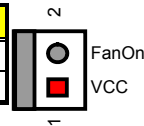
3.18 Keyboard/Mouse Connectors

The HS-4020 offers two possibilities for keyboard connections to PS/2 keyboard at *CN22* or 5-pin internal connector at *CN1.*

CN19 is a PS/2 6-pin Mini DIN connector of HS-4020 that provides Mouse signals or 4-pin internal connector at *CN15*.

● **CN22: PS/2 6-pin Mini DIN Keyboard Connector**

PIN	Description
1	Keyboard Data
2	Mouse Data
3	GND
4	+5V
5	Keyboard Clock
6	Mouse Clock
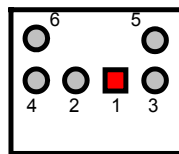
● **CN1: 5-pin Keyboard Connector**

PIN	Description
1	Keyboard Clock
2	Keyboard Data
3	N/C
4	GND
5	+5V
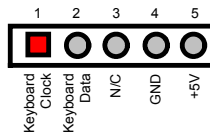
● **CN19: PS/2 6-pin Mini DIN Mouse Connector**

PIN	Description
1	Mouse Data
2	N/C
3	GND
4	+5V
5	Mouse Clock
6	N/C
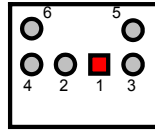
● **CN15: 4-pin Mouse Connector**

PIN	Description
1	Mouse Clock
2	Mouse Data
3	+5V
4	GND
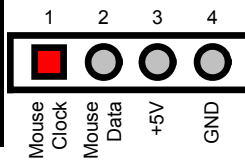
3.19 Front Panel Signal Connector

The *CN2* connector of HS-4020 allows users connection to an external control button.

● **CN2: Front Panel Signal Connector**

PIN	Description	PIN	Description
1	Reset	2	GND
3	N/C	4	GND
5	Speaker	6	VCC5V
7	HDD LED	8	330Ω Pull +5V
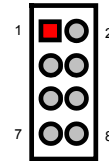
3.20 Audio Connector

The HS-4020 has an onboard Cyrix® CX5530 audio interface. The following tables list the pin assignments of the Line In and Line Out connectors. This Line In and Line Out port supports a preamp function that allows user to connect either a passive set of speakers or earphones.
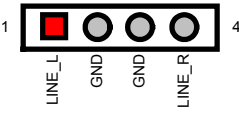
● **JP5: Line Out/MIC In Connector**

PIN	Description	PIN	Description
1	Audio Out/R	2	Audio Out/L
3	GND	4	GND
5	MIC In	6	N/C
7	GND	8	GND

20
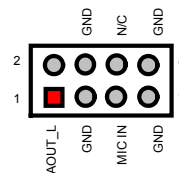
- **JP8: Line In Connector**

PIN	Description
1	LINE L
2	GND
3	GND
4	LINE R
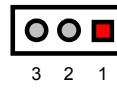
3.21 Watchdog Timer

There are three access cycles of Watchdog Timer as Enable, Refresh and Disable are the three access cycles of Watchdog Timer. The Enable cycle proceeds via READ PORT 443H whereas the Disable cycle proceeds via READ PORT 043H. A continued Enable cycle after a first Enable cycle means Refresh.

Once the Enable cycle is active, a Refresh cycle is requested before the time-out period. This restarts counting of the WDT period. When the time counting goes over the period preset of WDT, it will assume that the program operation is abnormal. A System Reset signal to re-start or a NMI cycle to the CPU transpires when such error happens. Jumper *JP10* is used to select the function of Watchdog Timer.

- **JP10: Watchdog Timer Active Type Select**

Options	Settings
Active NMI	Short 1-2
System Reset (default)	Short 2-3
Disabled Watchdog Timer	Open

- **JP7(5-10): Watchdog Timer Out Period Select**

Period	Pins 5-6	Pins 7-8	Pins 9-10
1 sec (default)	Short	Short	Short
2 sec	Open	Short	Short
10 sec	Short	Open	Short
20 sec	Open	Open	Short
110 sec	Short	Short	Open
220 sec	Open	Short	Open

The Watchdog Timer is disabled after the system Power-On. It can be enabled via an Enable cycle and reading the control port (443H), or via a Refresh cycle and reading the control port (443H), or via a Disable cycle and reading the disable control port (043H).

After an Enable cycle of WDT, user must immediately execute a Refresh cycle to WDT before its period setting comes to an end every 1, 2, 10, 20, 110 or 220 seconds. If the Refresh cycle does not activate before WDT period cycle, the onboard WDT architecture will issue a Reset or NMI cycle to the system. There are three I/O ports that control the Watchdog Timer.

443H	I/O Read	The Enable cycle
443H	I/O Read	The Refresh cycle
045H	I/O Read	The Disable cycle

The following sample program shows how to Enable, Disable and Refresh the Watchdog Timer：

```
WDT_EN_RF      EQU       0433H
WDT_DIS        EQU       0045H
WT_Enable      PUSH      AX            ; keep AX DX
               PUSH      DX
               MOV       DX,WDT_EN_RF  ; enable the WDT
               IN        AL,DX
               POP       DX            ; get back AX, DX
               POP       AX
               RET
WT_Refresh     PUSH      AX            ; keep AX, DX
               PUSH      DX
               MOV       DX,WDT_ET_RF  ; refresh the WDT
               IN        AL,DX
               POP       DX            ; get back AX, DX
               POP       AX
               RET
WT_DISABLE     PUSH      AX
               PUSH      DX
               MOV       DX,WDT_DIS    ; disable the WDT
               IN        AL,DX
               POP       DX            ; get back AX, DX
               POP       AX
               RET
```

3.22 PC/104 Connectors

The PC/104 expansion bus offers provisions to connect all types of PC/104 modules. With the PC/104 bus being known as the new generation of industrial embedded 16-bit PC standard bus, thousands of PC/104 modules from multiple venders can be easily installed onboard. The detailed pin assignment of the PC/104 expansion bus connectors *CN8* and *CN9* are listed on the following tables:

NOTE： *The PC/104 connector allows direct plugging or stack-through piling of PC/104 modules without requiring the PC/104 mounting kit.*

● **CN9: PC/104 40-pin Connector**

PIN	Description	PIN	Description
1	GND	21	GND
2	MEMCS16*	22	SBHE*
3	IOSC16*	23	LA23
4	IRQ10	24	LA22
5	IRQ11	25	LA21
6	IRQ12	26	LA20
7	IRQ15	27	LA19
8	IRQ14	28	LA18
9	DACK0*	29	LA17
10	DRQ0	30	MEMR*
11	DACK5*	31	MEMW*
12	DRQ5	32	SD8
13	DACK6*	33	SD9
14	DRQ6	34	SD10
15	DACK7*	35	SD11
16	DRQ7	36	SD12
17	+5V	37	SD13
18	MASTER*	38	SD14
19	GND	39	SD15
20	GND	40	N/C
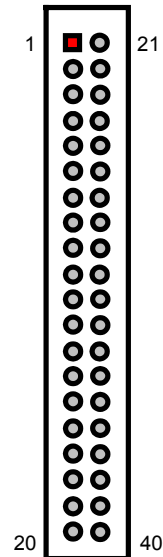
- **CN8: PC/104 64-pin Connector**

PIN	Description	PIN	Description
1	IOCHECK*	33	GND
2	SD7	34	RESETDRV
3	SD6	35	+5V
4	SD5	36	IRQ9
5	SD4	37	-5V
6	SD3	38	DRQ2
7	SD2	39	-12V
8	SD1	40	NOW*
9	SD0	41	+12V
10	IOCHRDY	42	GND
11	AEN	43	SMEMW*
12	SA19	44	SMEMR*
13	SA18	45	IOW*
14	SA17	46	IOR*
15	SA16	47	DACK3*
16	SA15	48	DRQ3
17	SA14	49	DACK1*
18	SA13	50	DRQ1
19	SA12	51	REFRESH*
20	SA11	52	SYSCLK
21	SA10	53	IRQ7
22	SA9	54	IRQ6
23	SA8	55	IRQ5
24	SA7	56	IRQ4
25	SA6	57	IRQ3
26	SA5	58	DACK2*
27	SA4	59	TC
28	SA3	60	BALE
29	SA2	61	+5V
30	SA1	62	OSC
31	SA0	63	GND
32	GND	64	GND

1   33

32   64
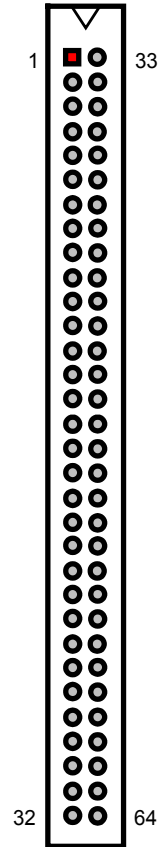
Chapter 4

Award BIOS Setup

The HS-4020 uses Award PCI/ISA BIOS for the system configuration. The Award BIOS setup program is designed to provide the maximum flexibility in configuring the system by offering various options that could be selected for end-user requirements. This chapter is written to assist you in the proper usage of these features.

4.1   Starting Setup

The Award BIOS is immediately activated when you first power on the computer. The BIOS reads the system information contained in the CMOS and begins the process of checking out the system and configuring it. When it finishes, the BIOS will seek an operating system on one of the disks and then launch and turn control over to the operating system.

While the BIOS is in control, the Setup program can be activated in one of two ways:

1. By pressing <Del> immediately after switching the system on, or

2. By pressing the <Del> key when the following message appears briefly at the bottom of the screen during the POST (Power On Self Test).

Press DEL to enter SETUP.

If the message disappears before you respond and you still wish to enter Setup, restart the system to try again by turning it OFF then ON or pressing the "RESET" button on the system case. You may also restart by simultaneously pressing <Ctrl>, <Alt>, and <Delete> keys. If you do not press the keys at the correct time and the system does not boot, an error message will be displayed and you will again be asked to...

RESS F1 TO CONTINUE, DEL TO ENTER SETUP

4.2　Using Setup

In general, you use the arrow keys to highlight items, press <Enter> to select, use the <PageUp> and <PageDown> keys to change entries, press <F1> for help and press <Esc> to quit. The following table provides more detail about how to navigate in the Setup program using the keyboard.

Up arrow	Move to previous item
Down arrow	Move to next item
Left arrow	Move to the item in the left hand
Right arrow	Move to the item in the right hand
Esc key	Main Menu -- Quit and not save changes into CMOS Status Page Setup Menu and Option Page Setup Menu -- Exit current page and return to Main Menu
PgUp key	Increase the numeric value or make changes
PgDn key	Decrease the numeric value or make changes
+ key	Increase the numeric value or make changes
- key	Decrease the numeric value or make changes
F1 key	General help, only for Status Page Setup Menu and Option Page Setup Menu
(Shift)F2 key	Change color from total 16 colors. F2 to select color forward, (Shift) F2 to select color backward
F3 key	Calendar, only for Status Page Setup Menu
F4 key	Reserved
F5 key	Restore the previous CMOS value from CMOS, only for Option Page Setup Menu
F6 key	Load the default CMOS value from BIOS default table, only for Option Page Setup Menu
F7 key	Load the default
F8 key	Reserved
F9 key	Reserved
F10 key	Save all the CMOS changes, only for Main Menu

4.2.1　Getting Help

Press F1 to pop up a small help window that describes the appropriate keys to use and the possible selections for the highlighted item. To exit the Help Window press <Esc> or the F1 key again.

4.3   Main Menu

Once you enter the Award BIOS CMOS Setup Utility, the Main Menu will appear on the screen. The Main Menu allows you to select from several setup functions and two exit choices. Use the arrow keys to select among the items and press <Enter> to enter the sub-menu.

ROM PCI/ISA BIOS (2A434D2x)
CMOS SETUP UTILITY
AWARD SOFTWARE, INC.

STANDARD CMOS SETUP	INTEGRATED PERIPHERALS
BIOS FEATURES SETUP	SUPERVISOR PASSWORD
CHIPSET FEATURES SETUP	USER PASSWORD
POWER MANGEMENT SETUP	IDE HDD AUTO DETECTION
PNP/PCI CONFIGURATION	SAVE & EXIT SETUP
LOAD BIOS DEFAULTS	EXIT WITHOUT SAVING
LOAD SETUP DEFAULTS	
Esc：Quit	↑↓→←：Select Item
F10：Save & Exit	(Shift)F2：Change Color

NOTE: *A brief description of the highlighted choice appears at the bottom of the screen.*

● **Standard CMOS Setup**
   This setup page includes all the items in a standard, AT-compatible BIOS.

● **BIOS Features Setup**
   This setup page includes all the items of Award special enhanced features.

● **Chipset Features Setup**
   This setup page includes all the items of chipset special features.

● **Power Management Setup**
   This entry only appears if your system supports Power Management, "Green PC", standards.

● **PNP/PCI Configuration Setup**
   This entry appears if your system supports PNP/PCI.

● **Load BIOS Defaults**
   The BIOS defaults have been set by the manufacturer and represent settings that provide the minimum requirements for your system to operate.

● **Load Setup Defaults**

The chipset defaults are settings that provide for maximum system performance. While Award has designed the custom BIOS to maximize performance, the manufacturer has the right to change these defaults to meet their needs.

● **Integrated Peripherals**

This section page includes all the items of IDE hard drive and Programmed Input / Output features.

● **Set Supervisor / User Password**

Change, set, or disable password. It allows you to limit access to the system and Setup, or just to Setup.

● **IDE HDD Auto Detection**

Automatically detect and configure hard disk parameters. The Award BIOS includes this ability in the event you are uncertain of your hard disk's parameters.

● **Save & Exit Setup**

Save CMOS value changes to CMOS and exit setup.

● **Exit Without Saving**

Abandon all CMOS value changes and exit setup.

4.4   Standard CMOS Setup

The Standard Setup is used for the basic hardware system configuration. The main function is for Data/Time and Floppy/Hard Disk Drive settings. Please refer to the following screen for the setup. When the IDE hard disk drive you are using is larger than 528MB, you must set the HDD mode to **LBA** mode. Please use the IDE Setup Utility in BIOS SETUP to install the HDD correctly.

ROM PCI/ISA BIOS (2A434D2x)
STANDARD CMOS SETUP
AWARD SOFTWARE, INC.

```
Data (mm:dd:yy) : Fri, Oct 19 1999
Time (hh:mm:ss) : 00:00:00

                                 CYLS  HEAD  PRECOMP  LANDZ  SECTOR   MODE
Driver C        :   Auto  (  0Mb)   0     0       0       0       0    AUTO
Driver D        :   Auto  (  0Mb)   0     0       0       0       0    AUTO




Drive A         : 1.44M , 3.5in.
Drive B         : None

Video           : EGA/VGA


Halt On         : All, But Keyboard
ESC : Quit                 ↑↓→← : Select Item        PU/PD/ + / - : Modify
F1  : Help                 (Shift) F2: Change Color
```

● **Date:**
  The date format is <day>, <date> <month> <year>. Press <F3> to show the calendar.

day	The day, from Sun to Sat, determined by the BIOS and is display-only
date	The date, from 1 to 31 (or the maximum allowed in the month)
month	The month, Jan through Dec.
year	The year, from 1900 through 2099

● **Time:**
  The time format is <hour> <minute> <second>. The time is calculated based on the 24-hour military-time clock. For example, 1 p.m. is 13:00:00.

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● **Driver C & Driver D:**

The categories identify the types of 4 channels that have been installed in the computer. There are 45 predefined types with 4 user-definable types for Enhanced IDE BIOS. Type 1 to Type 45 are predefined. Type user is user-definable.

Press PgUp or PgDn to select a numbered hard disk type or type the number and press <Enter>. Note that the specifications of your drive must match with the drive table. The hard disk will not work properly if you enter improper information for this category. If your hard disk drive type is not matched or listed, you can use Type "User" to define your own drive type manually.

If you select Type "User", you will need to know the information listed below. Enter the information directly from the keyboard and press <Enter>. This information should be included in the documentation from your hard disk vendor or the system manufacturer.
If the controller of HDD interface is ESDI, the selection shall be "Type 1".

If the controller of HDD interface is SCSI, the selection shall be "None".

If you select Type "Auto", BIOS will Auto-Detect the HDD & CD-ROM Drive at the POST stage and showing the IDE for HDD & CD-ROM Drive.

If a hard disk has not been installed select NONE and press <Enter>.

TYPE	drive type
CYLS.	number of cylinders
HEADS	number of heads
PRECOMP	write precompensation
LANDZONE	landing zone
SECTORS	number of sectors
MODE	mode type

● **Drive A / Drive B:**

The category identifies the types of floppy disk drive A or drive B that have been installed in the computer.

None	No floppy drive installed
360K, 5.25 in	5-1/4 inch PC-type standard drive; 360 kilobyte capacity
1.2M, 5.25 in	5-1/4 inch AT-type high-density drive; 1.2 megabyte capacity
720K, 3.5 in	3-1/2 inch double-sided drive; 720 kilobyte capacity
1.44M, 3.5 in	3-1/2 inch double-sided drive; 1.44 megabyte capacity
2.88M, 3.5 in	3-1/2 inch double-sided drive; 2.88 megabyte capacity

● **Video:**
The category selects the type of video adapter used for the primary system monitor. Although secondary monitors are supported, you do not have to select the type in Setup.

EGA/VGA	Enhanced Graphics Adapter/Video Graphics Array. For EGA, VGA, SEGA, SVGA or PGA monitor adapters.
CGA 40	Color Graphics Adapter, power up in 40 column mode
CGA 80	Color Graphics Adapter, power up in 80 column mode
MONO	Monochrome adapter, includes high resolution monochrome adapters

● **Halt On:** The category determines whether the computer will stop if an error is detected during power up.

No errors	The system boot will not be stopped for any error that may be detected.
All errors	Whenever the BIOS detects a non-fatal error the system will be stopped and you will be prompted.
All, But Keyboard	The system boot will not stop for a keyboard error; it will stop for all other errors.
All, But Diskette	The system boot will not stop for a disk error; it will stop for all other errors.
All, But Disk/Key	The system boot will not stop for a keyboard or disk error; it will stop for all other errors.

4.5　BIOS Features Setup

This section allows you to configure your system for the basic operation. You have the opportunity to select the system's default speed, boot-up sequence, keyboard operation, shadowing and security.

```
                    ROM PCI/ISA BIOS (2A434D2x)
                      BIOS FEATURES SETUP
                      AWARD SOFTWARE, INC.
┌─────────────────────────────────────────────────────────────────────────────┐
│ Virus Warning            :  Disabled   Video BIOS    Shadow  :  Enabled       │
│ CPU Internal Cache       :  Enabled    C8000-CBFFF   Shadow  :  Disabled      │
│                                        CC000-CFFFF   Shadow  :  Disabled      │
│ External Cache           :  Enabled    D0000-D3FFF   Shadow  :  Disabled      │
│ Quick Power On Self Test :  Disabled   D4000-D7FFF   Shadow  :  Disabled      │
│ Boot Sequence            :  A,C,SCSI   D8000-DBFFF   Shadow  :  Disabled      │
│ Swap Floppy Drive        :  Disabled   DC000-DFFFF   Shadow  :  Disabled      │
│ Boot Up Floppy Seek      :  Enabled    Cyrix 6x86/MII CPUID  :  Enabled       │
│ Boot Up NumLock Status   :  ON                                                │
│ Boot Up System Speed     :  High                                              │
│ Gate A20 Option          :  Fast                                              │
│ Memory Parity Check      :  Enabled                                           │
│ Typematic Rate Setting   :  Disabled                                          │
│ Typematic Rate (Chars/Sec) :  6                                               │
│ Typematic Delay (Msec)   :  250                                               │
│ Security Option          :  Setup                                             │
│ PCI/VGA Palette Snoop    :  Disabled   ESC    : Quit    ↑↓→←: Select Item     │
│ OS Select For DRAM > 64MB :  Non-OS2   F1     : Help    PU/PD/+/-: Modify     │
│ Report No FDD For WIN 95 :  Yes        F5     : Old Values  (Shift) F2 : Color │
│                                        F6     : Load BIOS Defaults             │
│                                        F7     : Load Setup Defaults            │
└─────────────────────────────────────────────────────────────────────────────┘
```

● **Virus Warning:**

When this item is enabled, the Award BIOS will monitor the boot sector and partition table of the hard disk drive for any attempt at modification. If an attempt is made, the BIOS will halt the system and the following error message will appear. Afterwards, if necessary, you will be able to run an anti-virus program to locate and remove the problem before any damage is done.

```
┌─────────────────────────────────────────────────┐
│                  ! WARNING !                     │
│         Disk boot sector is to be modified       │
│   Type "Y" to accept write or "N" to abort write │
│                Award Software, Inc.              │
└─────────────────────────────────────────────────┘
```

Enabled	Activates automatically when the system boots up causing a warning message to appear when anything attempts to access the boot sector or hard disk partition table.
Disabled	No warning message will appear when anything attempts to access the boot sector or hard disk partition table.

● **CPU Internal Cache:**

These two categories speed up memory access. However, it depends on CPU/chipset design. The default value is en able.

Enabled	Enable cache
Disabled	Disable cache

● **Quick Power On Self Test:**

This category speeds up Power On Self Test (POST) after you power up the computer. If it is set to Enable, BIOS will shorten or skip some check items during POST.

Enabled	Enable quick POST
Disabled	Normal POST

● **Boot Sequence:**

This category determines which drive to search first for the disk operating system (i.e., DOS). The available options are:

■ **A, C, SCSI**	■ **E, A, SCSI**
■ **C, S, SCSI**	■ **F, A, SCSI**
■ **C, CD-ROM, A**	■ **SCSI, A, C**
■ **CD-ROM, C, A**	■ **SCSI, C, A**
■ **D, A, SCSI**	■ **C only**

● **Boot Up Floppy Seek:**

During POST, BIOS will determine if the floppy disk drive installed is 40 or 80 tracks. 360K type is 40 tracks while 760K, 1.2M and 1.44M are all 80 tracks.

Enabled	BIOS searches for floppy disk drive to determine if it is 40 or 80 tracks. Note that BIOS cannot tell from 720K, 1.2M or 1.44M drive type as they are all 80 tracks.
Disabled	BIOS will not search for the type of floppy disk drive by track number. Note that there will not be any warning message if the drive installed is 360K.

● **Boot Up NumLock Status:**

This allows you to determine the default state of the numeric keypad. By default, the system boots up with NumLock on.

On	Keypad is number keys
Off	Keypad is arrow keys

● **Boot Up System Speed:**

Selects the default system speed -- the normal operating speed at power up.

High	Set the speed to high
Low	Set the speed to low

● **Gate A20 Option:**

This entry allows you to select how the gate A20 is handled. The gate A20 is a device used to address memory above 1 Mbytes. Initially, the gate A20 was handled via a pin on the keyboard. Today, while keyboards still provide this support, it is more common, and much faster, for the system chipset to provide support for gate A20.

Normal	keyboard
Fast	chipset

● **Memory Parity Check:**

Select Enabled if the DRAM chips in your system support parity.

● **Typematic Rate (Chars/Sec):**

When the typematic rate is enabled, this selection allows you select the rate at which the keys are accelerated.

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

● **Typematic Delay (Msec):**

When the typematic rate is enabled, this selection allows you to select the delay between when the key was first depressed and when the acceleration begins.

250	250 msec
500	500 msec
750	750 msec
1000	1000 msec

● **Security Option:**

This category allows you to limit access to the system and Setup, or just 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.

● **PCI/VGA Palette Snoop:**

It determines whether the MPEG ISA/VESA VGA Cards can work with PCI/VGA or not.

Enabled	When PCI/VGA working with MPEG ISA/VESA VGA Card
Disabled	When PCI/VGA not working with MPEG ISA/VESA VGA Card

● **OS Select For DRAM > 64MB:**

This item allows you to access the memory that over 64MB in OS/2. The available choices are Non-OS2, OS2.

● **Report No FDD For WIN 95:**

Whether report no FDD for Win 95 or not. The available choices are Yes, No.

● **Video BIOS Shadow:**

Determines whether video BIOS will be copied to RAM. However, it is optional depending on chipset design. Video Shadow will increase the video speed.

Enabled	Video shadow is enabled
Disabled	Video shadow is disabled

● **C8000 - CBFFF Shadow/D0000 - DFFFF Shadow:**

These categories determine whether option ROMs will be copied to RAM. An example of such option ROM would be support of on-board SCSI.

Enabled	Optional shadow is enabled
Disabled	Optional shadow is disabled

● **Cyrix 6x86/MII CPUID:**

This item allows you to view the CPU ID of your Cyrix chip during the boot up process of your computer. The available choices are Enabled and Disabled.

4.6   Chipset Features Setup

This section allows you to configure the system based on the specific features of the installed chipset. This chipset manages bus speeds and the access to the system memory resources, such as DRAM and the external cache. It also coordinates the communications between the conventional ISA and PCI buses. It must be stated that these items should never be altered. The default settings have been chosen because they provide the best operating conditions for your system. You might consider and make any changes only if you discover that the data has been lost while using your system.

```
               ROM PCI/ISA BIOS (2A434D2x)
                 CHIPSET FEATURES SETUP
                  AWARD SOFTWARE, INC.
┌─────────────────────────────────────────┬─────────────────────────────────────┐
│ SDRAM CAS latency Time      : 3T          │                                     │
│ SDRAM Clock Ratio Div By     : 4          │                                     │
│                                           │                                     │
│ 16-bit I/O Recovery (CLK)    : 5          │                                     │
│ 8-bit  I/O Recovery (CLK)    : 5          │                                     │
│                                           │                                     │
│ USB Controller              : Enabled     │                                     │
│ USB Legacy Support          : Disabled    │                                     │
│                                           │                                     │
│ Multiple Monitor Support    : No onboard  │                                     │
│                                           │                                     │
│ Video Memory Size           : 2.5M        │                                     │
│ Flat Panel Status           : Enabled     ├─────────────────────────────────────┤
│ Flat Panel Resolution       : 800 x 600   │ ESC  : Quit        ↑↓→←: Select Item │
│                                           │ F1   : Help        PU/PD/+/-: Modify │
│                                           │ F5   : Old Values  (Shift) F2 : Color│
│                                           │ F6   : Load BIOS Defaults            │
│                                           │ F7   : Load Setup Defaults           │
└─────────────────────────────────────────┴─────────────────────────────────────┘
```

Panel Type
640 x 480
800 x 600
1024 x 768

● **SDRAM CAS latency Time:**
> You can select CAS latency time in HCLKs of 2/2 or 3/3. The system board designer should set the values in this field, depending on the DRAM installed. Do not change the values in this field unless you change specifications of the installed DRAM or the installed CPU. The available choices are 2, 3.

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- **16-bit I/O Recovery (CLK) :**

  The I/O recovery mechanism adds bus clock cycles between PCI-originated I/O cycles to the ISA bus. This delay takes place because the PCI bus is so much faster than the ISA bus. The available choices range from 1 to 16 CPU clocks.

- **8-bit I/O Recovery (CLK):**

  The I/O recovery mechanism adds bus clock cycles between PCI-originated I/O cycles to the ISA bus. This delay takes place because the PCI bus is so much faster than the ISA bus.

  This item allows you to determine the recovery time allowed for 8 bit I/O. The available choices range from 1 to 16 CPU clocks.

- **USB Controller:**

  Select Enabled if your system contains a Universal Serial Bus (USB) controller and you have a USB keyboard. The available choices are Enabled, and Disabled.

- **USB Legacy Support:**

  With USB devices installed on your system, enabling the USB legacy support allows the user to operate the USB devices under DOS mode. The available choices are Enabled and Disabled.

4.7   Power Management Setup

The Power Management Setup allows user to configure the system for saving energy in a most effective way while operating in a manner consistent with his own style of computer use.

ROM PCI/ISA BIOS (2A434D2x)
POWER MANAGEMENT SETUP
AWARD SOFTWARE, INC.

Power Management	: Disabled	IRQ1 (KeyBoard)	:	ON
		IRQ3 (COM2)	:	OFF
Doze Mode	: Disabled	IRQ4 (COM1)	:	OFF
Standby Mode	: Disabled	IRQ5 (LPT2)	:	OFF
HDD Power Down	: Disabled	IRQ6 (Floppy Disk)	:	OFF
MODEN Use IRQ	: NA	IRQ7 (LPT1)	:	OFF
		IRQ9 (IRQ2 Redir)	:	OFF
Throttle Duty Cycle	: 33.3%	IRQ10 (Reserved)	:	OFF
		IRQ11 (Reserved)	:	OFF
RING POWER ON Controller	: Disabled	IRQ12 (PS/2 Mouse)	:	OFF
Net POWER ON Controller	: Disabled	IRQ13 (Coprocessor)	:	OFF
		IRQ14 (Hard Disk)	:	OFF
RTC Alarm Function	: Disabled	IRQ15 (Reserved)	:	OFF

```
ESC   : Quit              ↑↓→←: Select Item
F1    : Help              PU/PD/+/-: Modify
F5    : Old Values        (Shift) F2 : Color
F6    : Load BIOS Defaults
F7    : Load Setup Defaults
```

● **Power Management:**
This category allows you to select the type (or degree) of power saving and is directly related to the following modes:

■ Doze Mode   ■ Suspend Mode
■ Standby Mode   ■ HDD Power Down

There are four selections for Power Management, three of which have fixed mode settings.

Disable (default)	No power management. Disables all four modes
Min. Power Saving	Minimum power management. Doze Mode = 1 hr. Standby Mode = 1 hr., Suspend Mode = 1 hr., and HDD Power Down = 15 min.
Max. Power Saving	Maximum power management -- **ONLY AVAILABLE FOR SL CPU'S**. Doze Mode = 1 min., Standby Mode = 1 min., Suspend Mode = 1 min., and HDD Power Down = 1 min.
User Defined	Allows you to set each mode individually. When not disabled, each range is from 1 min. to 1 hr. except for HDD Power Down that ranges from 1 min. to 15 min. and disable.

- **PM Control by APM:**
  When enabled, an Advanced Power Management device will be activated to enhance the Max. Power Saving mode and stop the CPU internal clock. If the Max. Power Saving is not enabled, this will be preset to *No*.

- **Video Off Method:**
  This determines the manner in which the monitor is blanked.

V/H SYNC+Blank	This selection will cause the system to turn off the vertical and horizontal synchronization ports and write blanks to the video buffer.
Blank Screen	This option only writes blanks to the video buffer.
DPMS	Initial display power management signaling.

- **Video Off After:**
  When enabled, this feature allows the VGA adapter to operate in a power saving mode.

N/A	Monitor will remain on during power saving modes.
Suspend	Monitor blanked when the systems enters the Suspend mode.
Standby	Monitor blanked when the system enters Standby mode.
Doze	Monitor blanked when the system enters any power saving mode.

- **MODEM Use IRQ:**
  This item determines the IRQ in which the MODEM can be used. The available choices are 3, 4, 5, 7, 9, 10, 11, and NA.

4.7.1 PM Timers

The following four modes are Green PC power saving functions that are only user configurable when *User Defined* Power Management has been selected. See above for available selections.

- **Doze Mode:**
  When enabled and after the set time of system inactivity, the CPU clock will run at slower speed while all other devices still operate at full speed.

- **Standby Mode:**
  When enabled and after the set time of system inactivity, the fixed disk drive and the video would be shut off while all other devices still operate at full speed.

- **Suspend Mode:**
  When enabled and after the set time of system inactivity, all devices except the CPU will be shut off.

- **HDD Power Down:**
  When enabled and after the set time of system inactivity, the hard disk drive will be powered down while all other devices remain active.

- **Throttle Duty Cycle:**

    When the system enters Doze mode, the CPU clock runs only part of the time. You may select the percent of time that the clock runs. The available choices are 12.5%, 25.0%, 37.5%, 50.0%, 62.5%, and 75.0%

- **PCI/VGA Act-Monitor:**

    When Enabled, any video activity restarts the global timer for Standby mode. The available choices are Enabled, Disabled.

- **Soft-Off by PWR-BTTN:**

    When Enabled, turning the system off with the on/off button places the system in a very low-power-usage state, with only enough circuitry receiving power to detect power button activity or Resume by Ring activity. The available choices are Instant-Off, Delay 4 Sec.

- **CPUFAN Off in Suspend:**

    When Enabled, the CPU fan turns off during Suspend mode.

- **PowerOn by Ring:**

    An input signal on the serial Ring Indicator (RI) line (in other words, an incoming call on the modem) awakens the system from a soft off state. The available choices are Enabled, Disabled.

- **Wake Up On LAN:**

    An input signal on the local area network (LAN) awakens the system from a soft off state.

- **IRQ 8 Break Suspend:**

    You can Enable or Disable monitoring of IRQ8 so it does not awaken the system from Suspend mode. The available choices are Enabled, Disabled.

4.7.2 Reload Global Timer Events

When Enabled, an event occurring on each device listed below restarts the global time for Standby mode.

- **Parallel Port IRQ[3-7,9-15], NMI**
- **Floppy Disk**
- **Primary IDE 0/1**
- **Serial Port**
- **Secondary IDE 0/1**
- **Parallel Port**

4.8 PNP/PCI Configuration

This section describes configuring the PCI bus system. PCI, or **P**ersonal **C**omputer **I**nterconnect, is a system that allows I/O devices to operate at speeds nearing the speed the CPU itself uses when communicating with its own special components. This section covers some very technical items and it is strongly recommended that only experienced users should make any changes to the default settings.

```
                    ROM PCI/ISA BIOS (2A434D2x)
                      PNP/PCI CONFIGURATION
                      AWARD SOFTWARE, INC.
┌──────────────────────────────────────────┬────────────────────────────────────────┐
│ PnP OS Installed         :   Yes          │ PCI IRQ Activated By         : Level     │
│ Resources Controlled by  :   Manual       │                                          │
│ Reset Configuration Data :   Disabled     │ Used MEM base addr           : N/A       │
│                                           │                                          │
│ IRQ-3    assigned to  :  Legacy ISA       │                                          │
│ IRQ-4    assigned to  :  Legacy ISA       │                                          │
│ IRQ-5    assigned to  :  PCI/ISA PnP      │                                          │
│ IRQ-7    assigned to  :  PCI/ISA PnP      │                                          │
│ IRQ-9    assigned to  :  PCI/ISA PnP      │                                          │
│ IRQ-10   assigned to  :  Legacy ISA       │                                          │
│ IRQ-11   assigned to  :  Legacy ISA       │                                          │
│ IRQ-12   assigned to  :  PCI/ISA PnP      │                                          │
│ IRQ-14   assigned to  :  PCI/ISA PnP      │                                          │
│ IRQ-15   assigned to  :  PCI/ISA PnP      │                                          │
│ DMA-0    assigned to  :  PCI/ISA PnP      │                                          │
│ DMA-1    assigned to  :  PCI/ISA PnP      │ ESC   : Quit        ↑↓→←: Select Item    │
│ DMA-3    assigned to  :  PCI/ISA PnP      │ F1    : Help        PU/PD/+/-: Modify    │
│ DMA-5    assigned to  :  PCI/ISA PnP      │ F5    : Old Values  (Shift) F2 : Color   │
│ DMA-6    assigned to  :  PCI/ISA PnP      │ F6    : Load BIOS Defaults               │
│ DMA-7    assigned to  :  PCI/ISA PnP      │ F7    : Load Setup Defaults              │
└──────────────────────────────────────────┴────────────────────────────────────────┘
```

● **PnP OS Installed:**
   This item allows you to determine install PnP OS or not. The available choices are Yes or Not.

● **Resources Controlled by:**
   The Award Plug and Play BIOS has the capacity to automatically configure all of the boot and Plug and Play compatible devices. However, this capability means absolutely nothing unless you are using a Plug and Play operating system such as Windows® 95. The available choices are *Auto* and Manual.

● **Reset Configuration Data:**
   This item allows you to determine reset the configuration data or not. The available choices are *Enabled* and *Disabled*.

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- **IRQ n Assigned to:**
  When resources are controlled manually, assign each system interrupt as one of the following types, depending on the type of device using the interrupt:

  Legacy ISA Devices compliant with the original PC AT bus specification, requiring a specific interrupt (such as IRQ4 for serial port 1).

  PCI/ISA PnP Devices compliant with the Plug and Play standard, whether designed for PCI or ISA bus architecture.

- **DMA n Assigned to:**
  When resources are controlled manually, assign each system DMA channel as one of the following types, depending on the type of device using the interrupt:

  Legacy ISA Devices compliant with the original PC AT bus specification, requiring a specific DMA channel

  PCI/ISA PnP Devices compliant with the Plug and Play standard, whether designed for PCI or ISA bus architecture.

- **PCI IRQ Activated by:**
  This sets the method by which the PCI bus recognizes that an IRQ service is being requested by a device. Under all circumstances, you should retain the default configuration unless advised otherwise by your system manufacturer. The available choices are Level and Edge.

- **Used MEM base addr:**
  Select a base address for the memory area used by any peripheral that requires high memory. The available choices are C800, CC00, D000, D400, D800, DC00, and N/A.

4.9 Load BIOS Defaults

When you press <Enter> on this item you will get a confirmation dialog box with a message shown below. This option allows you to load/restore the BIOS default values permanently stored in the BIOS ROM. Pressing 'Y' loads the BIOS default values for the most stable, minimal-performance system operations.

ROM PCI/ISA BIOS (2A434D2x)
LOAD BIOS DEFAULTS
AWARD SOFTWARE, INC.

STANDARD CMOS SETUP	INTEGRATED PERIPHERALS
BIOS FEATURES SETUP	SUPERVISOR PASSWORD
CHIPSET FEATURES SETUP	USER PASSWORD
POWER MANAGEMENT SETUP	IDE HDD AUTO DETECTION
PCI CONFIGURATION S **Load BIOS Defaults (Y/N)? N** ETUP	
LOAD BIOS DEFAULTS	SAVING
LOAD SETUP DEFAULTS	

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

Load BIOS Defaults except Standard CMOS Setup

4.10 Load Setup Defaults

When you press <Enter> on this item you get a confirmation dialog box with a message similar to the figure below. This option allows you to load/restore the default values to your system configuration, optimizing and enabling all high performance features. Pressing 'Y' loads the default values that are factory settings for optimal performance system operations.

ROM PCI/ISA BIOS (2A434D2x)
LOAD SETUP DEFAULTS
AWARD SOFTWARE, INC.

STANDARD CMOS SETUP	INTEGRATED PERIPHERALS
BIOS FEATURES SETUP	SUPERVISOR PASSWORD
CHIPSET FEATURES SETUP	USER PASSWORD
POWER MANAGEMENT SETUP	IDE HDD AUTO DETECTION
PCI CONFIGURATION S **Load SETUP Defaults (Y/N)? N** ETUP	
LOAD BIOS DEFAULTS	SAVING
LOAD SETUP DEFAULTS	

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

Load BIOS Defaults except Standard CMOS Setup

4.11 Integrated Peripherals

The IDE hard drive controllers can support up to two separate hard drives. These drives have a master/slave relationship that is determined by the cabling configuration used to attach them to the controller. Your system supports two IDE controllers--a primary and a secondary--so you can install up to four separate hard disks.

PIO means Programmed Input/Output. Rather than having the BIOS issue a series of commands to affect the transfer to or from the disk drive, PIO allows the BIOS to tell the controller what it wants and then let the controller and the CPU perform the complete task by them. This is much simpler and more efficient (also faster).

```
                    ROM PCI/ISA BIOS (2A434D2x)
                      INTEGRATED PERIPHERALS
                      AWARD SOFTWARE, INC.
┌──────────────────────────────────────────────────────────────────────┐
│ IDE HDD Block Mode       : Enabled   Serial Port 4 Use IRQ    : IRQ11  │
│ Primary IDE Channel      : Enabled   Build in CPU Audio       : Enabled│
│   Master Drive PIO Mode  : Auto      Audio I/O Base Address    : 220H  │
│   Slave Drive PIO Mode   : Auto      MPU-401 I/O Base Address  : 330H  │
│ IDE Primary Master UDMA  : Auto                                        │
│ IDE Primary Slave UDMA   : Auto      Audio IRQ Select          : IRQ 5 │
│                                      Audio Low DMA Select      : DMA 1 │
│ KBC input clock          : 8MHz      Audio High DMA Select     : DMA 5 │
│ Onboard FDC Controller   : Enabled   Joystick Status           : Enabled│
│ Onboard Serial Port 1    : 3F8/IRQ4                                    │
│ On board Serial Port 2   : 2F8/IRQ3                                    │
│ UR2 Mode                 : Standard                                    │
│ Onboard Parallel Port    : 378/IRQ7                                    │
│ Parallel Port Mode         ECP+EPP                                     │
│ ECP Mode Use DMA           3         ESC   : Quit    ↑↓→←: Select Item │
│ Onboard Serial Port3       3E8       F1    : Help    PU/PD/+/-: Modify │
│ Serial Port3 Use IRQ       IRQ10     F5    : Old Values  (Shift) F2 : Color│
│ Onboard Serial Port4       2E8       F6    : Load BIOS Defaults        │
│                                      F7    : Load Setup Defaults       │
└──────────────────────────────────────────────────────────────────────┘
```

- **IDE HDD Block Mode:**
    This allows your hard disk controller to use the fast block mode to transfer data to and from your hard disk drive (HDD).

Enabled	IDE controller uses block mode
Disabled	IDE controller uses standard mode

- **Primary/Secondary IDE Channel**

  You may separately disable the primary/second channel on an IDE interface installed in a PCI expansion slot.

- **IDE Primary/Secondary Master/Slave PIO Mode**

  The four IDE PIO (Programmed Input/Output) fields let you set a PIO mode

  (0-4) for each of the four IDE devices that the onboard IDE interface supports.

  Modes 0 through 4 provide successively increased performance. In Auto mode, the system automatically determines the best mode for each device.

- **IDE Primary/Secondary Master/Slave UDMA:**

  Ultra DMA/33 is possible only if your IDE drive supports it and the operating environment includes a DMA driver (Windows 95 OSR2 or a third-party IDE bus master driver). If your hard drive/system software both support Ultra DMA/33, select Auto to enable BIOS support.

- **KBC Input Clock:**

  The input clock setting of your onboard keyboard controller is set from here.

- **Onboard FDC Controller:**

  Select Enabled if your system has a floppy disk controller (FDC) installed on the system board and you wish to use it. If you install and-in FDC or the system has no floppy drive, select Disabled in this field. The available choices are Enabled, Disabled.

- **Onboard Serial Port 1/2/3/4:**

  This item allows you to determine access onboard serial port 1/2/3/4 controller with which I/O address. The available choices are 3F8/IRQ4, 2F8/IRQ3, 3E8/IRQ4, 2F8/IRQ3, Disabled, Auto.

- **UART2 Mode**

  Select the value required by the IR device connected to the IR port. Full-duplex mode permits simultaneous two-direction transmission. Half-duplex mode permits transmission in one direction only at a time. The available choices are Half, Full.

- **Onboard Parallel Port:**

  Select a logical LPT port name and matching address for the physical parallel (printer) port. The available choices are 378H/IRQ7, 278H/IRQ5, 3BCH/IRQ7, Disabled.

- **Parallel Port Mode:**

  Select an operating mode for the onboard parallel port. Select Compatible or Extended unless you are certain both your hardware and software support EPP or ECP mode. The available choices are SPP, ECP+EPP1.7, EPP1.7+SPP, EPP1.9+SPP, ECP, ECP+EPP1.9, and Normal.

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● **ECP Mode Use DMA:**
　　Select a DMA channel for the port. The available choices are 3, 1.

● **Serial Port 3/4 Use IRQ:**
　　This category assigns the interrupt request for both serial ports 3 and 4. The available options are 3F8/3, 3F8/4, 3F8/10, 3F8/11, 2F8/3, 2F8/4, 2F8/10, 2F8/11, 3E8/3, 3E8/4, 3E8/10, 3E8/11, 2E8/3, 2E8/4, 2E8/10, and 2E8/11.

● **Build in CPU Audio:**
　　This item allows you to select the option of the build in CPU Audio function. The available choices are Enable and Disable.

● **Audio I/O Base Address:**
　　This chipset traps I/O accesses for Sound Blaster compatibility at either 220H or 240H. The available choices are 220H, and 240H.

● **MPU-401 I/O Base Address:**
　　This chipset traps I/O accesses for ROLAND MPU 401 UART interface at 330H , 300H or Disable. The available choices are 330H, 300H, and Disable.

● **Audio IRQ Select:**
　　Select an interrupt for the audio port. The available choices are IRQ 3, IRQ 5, IRQ 7, IRQ 10, and Disable .

● **Audio Low DMA Select:**
　　This chipset supports I/O trapping for low DMA accesses and allows you to select the Audio Low DMA type. The available choices are DMA 0, DMA 1, DMA 3, and Disable.

● **Audio High DMA Select:**
　　This chipset supports I/O trapping for high DMA accesses and allows you to select the Audio High DMA type. The available choices are DMA 5, DMA 6, DMA 7, Disable.

4.12 Supervisor/User Password Setting

ROM PCI/ISA BIOS (2A434D2x)
CMOS SETUP UTILITY
AWARD SOFTWARE, INC.

STANDARD CMOS SETUP	INTEGRATED PERIPHERALS
BIOS FEATURES SETUP	SUPERVISOR PASSWORD
CHIPSET FEATURES SETUP	USER PASSWORD
POWER MANAGEMENT SETUP	IDE HDD AUTO DETECTION
PNP/PCI CONFIGURA	**Enter Password :** ETUP
LOAD BIOS DEFAULT	SAVING
LOAD SETUP DEFAULTS	
Esc : Quit	↑ ↓ → ← : Select Item
F10 : Save & Exit Setup	(Shift) F2 : Change Color

Change / Set / Disable Password

You can set either supervisor or user password, or both of then. The differences between are:

● **supervisor password:** can enter and change the options of the setup menus.

● **user password:** just can only enter but do not have the right to change the options of the setup menus.

When you select this function, the following message will appear at the center of the screen to assist you in creating a password.

ENTER PASSWORD:

Type the password, up to eight characters in length, and press <Enter>. The password typed now will clear any previously entered password from CMOS memory. You will be asked to confirm the password. Type the password again and press <Enter>. You may also press <Esc> to abort the selection and not enter a password.

To disable a password, just press <Enter> when you are prompted to enter the password. A message will confirm the password will be disabled. Once the password is disabled, the system will boot and you can enter Setup freely.

PASSWORD DISABLED.

When a password has been enabled, you will be prompted to enter it every time you try to enter Setup. This prevents an unauthorized person from changing any part of your system configuration.

Additionally, when a password is enabled, you can also require the BIOS to request a password every time your system is rebooted. This would prevent unauthorized use of your computer.

You determine when the password is required within the BIOS Features Setup Menu and its Security option (see Section 3). If the Security option is set to "System", the password will be required both at boot and at entry to Setup. If set to "Setup", prompting only occurs when trying to enter Setup.

4.13 IDE HDD Auto Detection

This option detects the parameters of an IDE hard disk drive, and automatically enters them into the Standard CMOS Setup screen.

Up to four IDE drives can be detected, with parameters for each appearing in sequence inside a box. To accept the displayed entries, press the "Y" key; to skip to the next drive, press the "N" key. If you accept the values, the parameters will appear listed beside the drive letter on the screen.

ROM PCI/ISA BIOS (2A434D2x)
CMOS SETUP UTILITY
AWARD SOFTWARE, INC.

HARD DISKS	TYPE	SIZE	CYLS	HEAD	PRECOMP	LANDZ	SECTOR	MODE
Primary Master:								

	Select Primary Master Option (N=SKIP) : N							
OPTIONS	TYPE	SIZE	CYLS	HEAD	PRECOMP	LANDZ	SECTOR	MODE
1 (Y)	0	0	0	0	0	0	0	NORMAL

NOTE: Some OSes (like SCO-UNIX) must use "NORMAL" for installation

4.14 Save & Exit Setup

Pressing <Enter> on this item asks for confirmation: Pressing "Y" stores the selections made in the menus in CMOS – a special section of memory that stays on after you turn your system off. The next time you boot your computer, the BIOS configures your system according to the Setup selections stored in CMOS. After saving the values the system is restarted again.

ROM PCI/ISA BIOS (2A434D2x)
CMOS SETUP UTILITY
AWARD SOFTWARE, INC.

STANDARD CMOS SETUP	INTEGRATED PERIPHERALS
BIOS FEATURES SETUP	SUPERVISOR PASSWORD
CHIPSET FEATURES SETUP	USER PASSWORD
POWER MANAGEMENT SETUP	IDE HDD AUTO DETECTION
PNP/PCI CONFIGURA	ETUP
LOAD BIOS DEFAULT	SAVING
LOAD SETUP DEFAULTS	

SAVE to CMOS and EXIT (Y/N)? N

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

Saves all Data & Exit Setup

4.15 Exit Without Saving

Pressing <Enter> on this item asks for confirmation:

Quit without saving (Y/N)? Y

This allows you to exit Setup without storing in CMOS any change. The previous selections remain in effect. This exits the Setup utility and restarts your computer.

ROM PCI/ISA BIOS (2A434D2x)
CMOS SETUP UTILITY
AWARD SOFTWARE, INC.

STANDARD CMOS SETUP	INTEGRATED PERIPHERALS
BIOS FEATURES SETUP	SUPERVISOR PASSWORD
CHIPSET FEATURES SETUP	USER PASSWORD
POWER MANAGEMENT SETUP	IDE HDD AUTO DETECTION
PNP/PCI CONFIGURA	**Quit Without Saving (Y/N)? N** ETUP
LOAD BIOS DEFAULT	SAVING
LOAD SETUP DEFAULTS	
Esc : Quit	↑ ↓ → ← : Select Item
F10 : Save & Exit Setup	(Shift) F2 : Change Color
Abandon all Data & Exit Setup	

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Chapter 5

Software Utilities

This chapter contains the detailed information of VGA, Audio and LAN driver installation procedures.

5.1 VGA Driver Installation for WIN95 & WIN98

1. Click the **Start** button on the lower left hand corner of your screen, then select **Setting**. Choose **Control Panel** and double-click on the **Display** icon to launch its **Display Properties** window.

2. Select the setting page from the top menu then click on the **Advanced Properties** button.

3. Select the **Change** button in the adapter area.

4. Click on the **Next** button to continue. Select **Display a list of all drivers in a specific location**, so you can select the drivers you want.

5. Click on **Next** to proceed. Select the **Specify a location** checkbox and click on **Browse**.

6. Specify the path of the new driver and press **Enter**. (if in driver A:, select a:\win95)

7. The **Select** device dialog box will appear. Select

   National Geode XpressGRAPHICS™

8. Continue your selection until the program *FINISHES* and asks you to restart your machine.
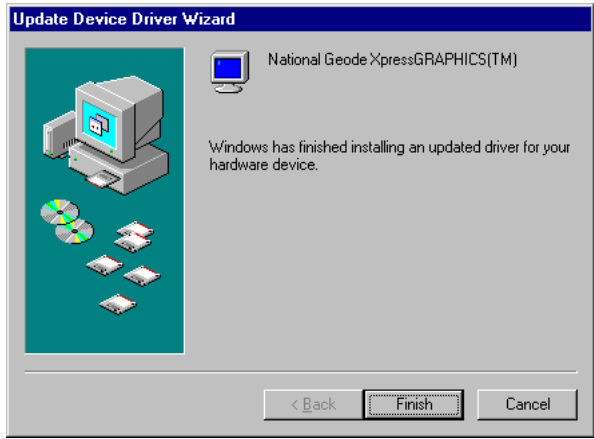
9. After the restarting your system, return to the display applet (step 1) and select alternate screen resolutions and color depths.

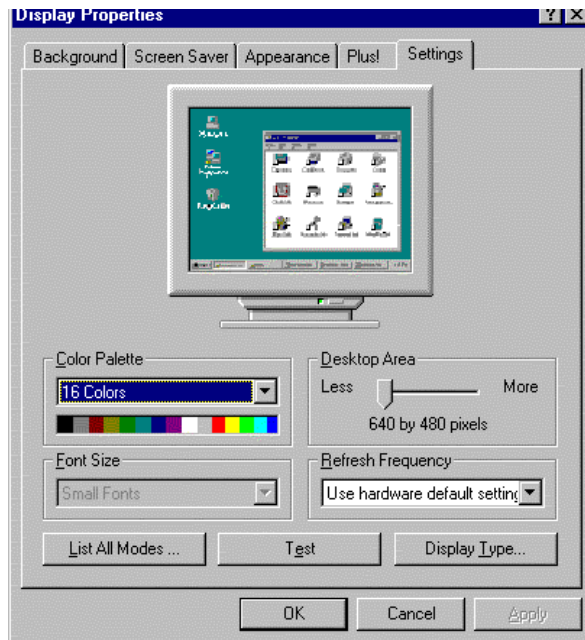**NOTE:** *Installation procedure for Windows 98 is similar to Windows 95.*

5.2 VGA Driver Installation for WIN NT4.0

1. Click the **Start** button on the lower left hand corner of your screen, then select **Setting**. Choose **Control Panel** and double-click on the **Display** icon to launch its **Display Properties** window.

2. Click on the **Settings** tab, and then choose **Display Type**.

3. In the **Change Display Type** window, click on **Have Disk**.

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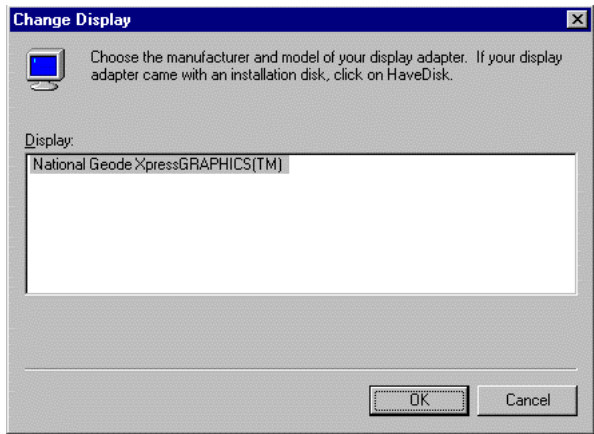
4. Specify the path of the new driver and then press on **Enter**. (If in driver A:, type a:\nt40)

5. Select

<div style="background-color:pink;text-align:center">**National Geode XpressGRAPHICS™**</div>

6. Click **OK** or press **Enter**.

7. You will see warning panel about **Third Party Drivers**. Click on **Yes** to finish the installation.

8. Once the installation is completed, you must shut down the system and restart for the new driver to take effect.

9. After restarting, check the VGA driver. The properties of the driver should look similar with the following figure.

5.3 Network Driver Installation for WIN98 & WIN95

WIN98

Windows 98 will detect the network driver automatically.

WIN95

1. Click the **Start** button on the lower left hand corner of your screen, then select **Setting**. Choose **Control Panel** and double-click on the **Networks** icon to launch its **Network** applet window.

2. From the **Network** applet program, click on **Add**.

3. In the **Select Network Component Type**, select **Adapter** then click **Add**.

4. Specify the path of the new driver and press **Enter**. (If in driver a:, type a:\). If you're not sure exactly where the drivers are, choose the **Browse** button to locate it.
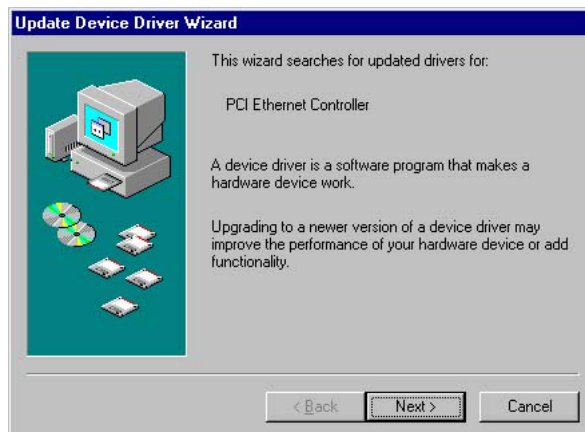
5. Once you have located the drivers, select

| National Semiconductor Corp. |
| DP83815 10/100 MacPhyter3v PCI Adapter |

6. Click **OK**. Windows 95 will copy the network drivers to the proper directories in your system.
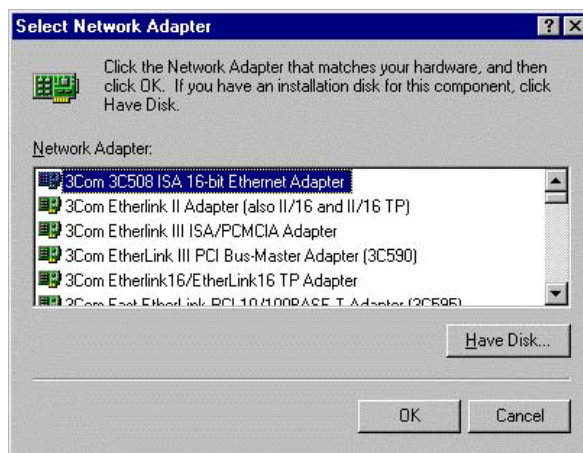
7. Continue clicking on **OK** until asked to restart your system.

8. After restarting, check on the network driver. Make sure the **Properties** of the driver should look similar with the following figure.
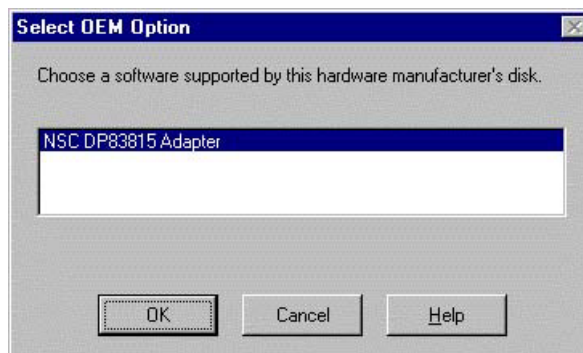
5.4 Network Driver Installation for WIN NT4.0

1. Click the **Start** button, then go to **Settings** and click on **Control Panel**.

2. Click on the **Network** icon to start the Network window. Click on the **Adapters** tab, and then click on **Add**.

3. In the **Select Network Adapter** window, click on **Have Disk**. This will bring up the **Insert Disk** window.

4. Specify the directory where the Windows NT driver files are located. (If in driver A:, type a:\)
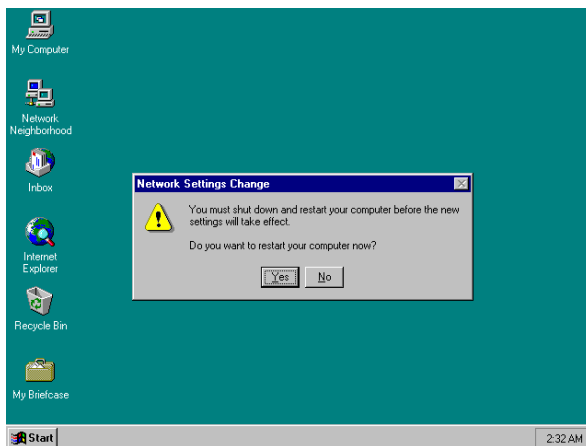

5. The **Select OEM Option** window will then pop up on your screen.

6.   Select

<div style="background:pink">
National Semiconductor Corp.
DP83815 10/100 MacPhyter3v PCI Adapter
</div>

7.   Click **OK** to finish the installation process.

8.   Once the installation is complete, the system must be shut down and restarted for the new driver to take effect.

9.   After restarting the system, check on the Network driver and make sure that the **Properties** of the driver should look similar with the following figures.

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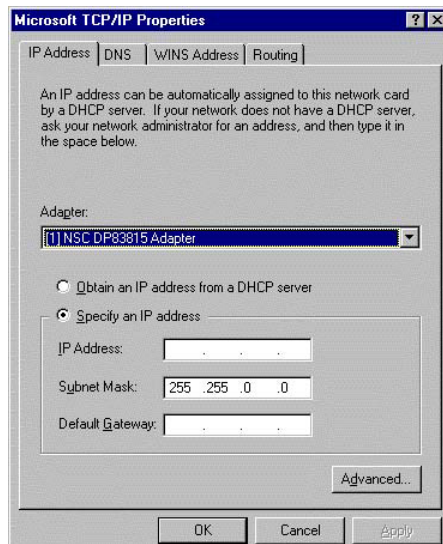
5.5   Audio Driver Installation for WIN NT4.0

1.   Click the **Start** button, then go to **Setting** and click on **Control Panel**.

2.   Click on the **Display** icon to launch the **Multi Media Window**.

3.   Click on the **Settings** tab, and then select on **Multi Media Type**.

4.   In the **Change Display Type** window, click on **Have Disk** properties.

5.   Click on **Unlisted or update driver** and press **OK**.

6.   Specify the path of the new driver and press **Enter**. (If in driver A:, type a:\nt40)

7.   Select

National XpressAudio^{TM} Driver

8.   Click **OK** or press **Enter**.

9.   When you see **National XpressAudio^{TM} Driver**, click on **Continue** to finish the installation.

10.   Once the installation is completed, you must shut down and restart the system for the new driver to take effect.

11.   After restarting, check the audio driver. The properties of the driver should look similar to the following figure.