

HS-4500

Pentium® MMX™ Embedded Little Board

• CRT/Panel • LAN • Audio • 4COM • RS-232/422/485 •
• PC/104 • GPS • USB • DOC • WDT • CTA •
Embedded 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:

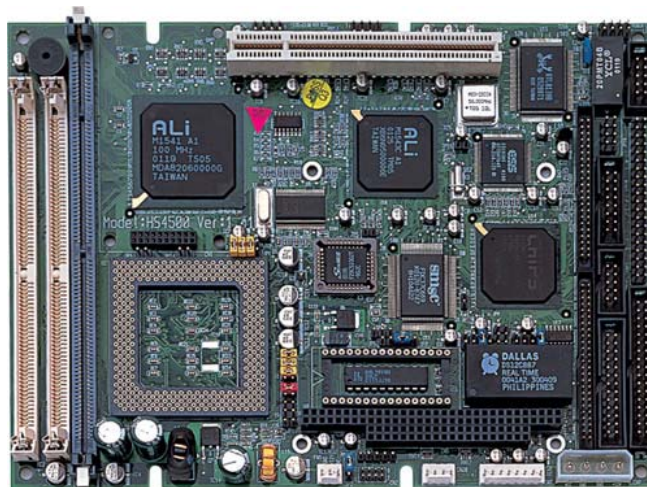
- Do not remove boards or integrated circuits from their anti-static packaging until you are ready to install them.
- Before handling a board or integrated circuit, touch an unpainted portion of the system unit chassis for a few seconds. This helps to discharge any static electricity on your body.
- 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-4500 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 PROTECTION.*

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Chapter 1

General Description



The HS-4500 is Little Board size Embedded Pentium[®] MMX[™] Industrial Single Board Computer. The board design combine together with all necessary input and output effects interfaces which makes it an ideal all-in-one industrial single board computer. The board design with 100MHz Bus clock rate architecture.

With the PCI bus slot for provides to a PCI add-on card where necessary.

One set of PC/104 bus connector for industrial PC/104 board add-in for GPS system application, the board provides a 2 x 10 pin-field internal I/O connector for easy add-in Rockwell's "Jupiter" Global Positioning System (GPS) Receiver. The board also design with an ESS[®] Solo1 3D audio interface which provides an ideas sound adapter in any sound application.

The IDE interface with ATA/33 access of mode 4 to IDE drive interface architecture, supports with max. 33.3 MB/sec in a data transfers rating to two IDE drive connection. The board also provides a onboard 10/100 Based LAN for easy network connection.

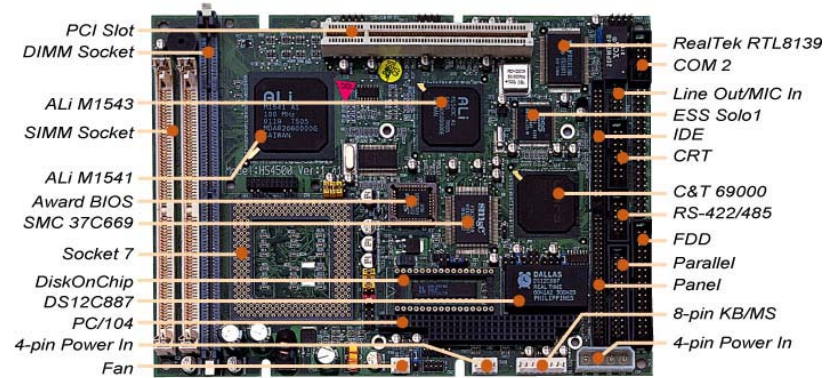
A single Flash chip holds the system BIOS, and you can change the Flash BIOS by the Utility Update. Advanced IR also provides a faster data transmission. You can also use the DOS version of the "DiskOnChip" socket by issuing commands from the DOS prompt without the necessity of other software supports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

The board design with 69000 CRT/Panel display controller provides internal connections to CRT or Panel. The VGA provides up to 1280 x 1024 x 256 colors resolution.

The HS-4500 support two SIMM or one DIMM sockets. This gives you the flexibility of configuring your system from 256MB DRAM by using the most economical SIMMs and DIMM memory modules for its on board system DRAM.

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-4500 comes with the following features:

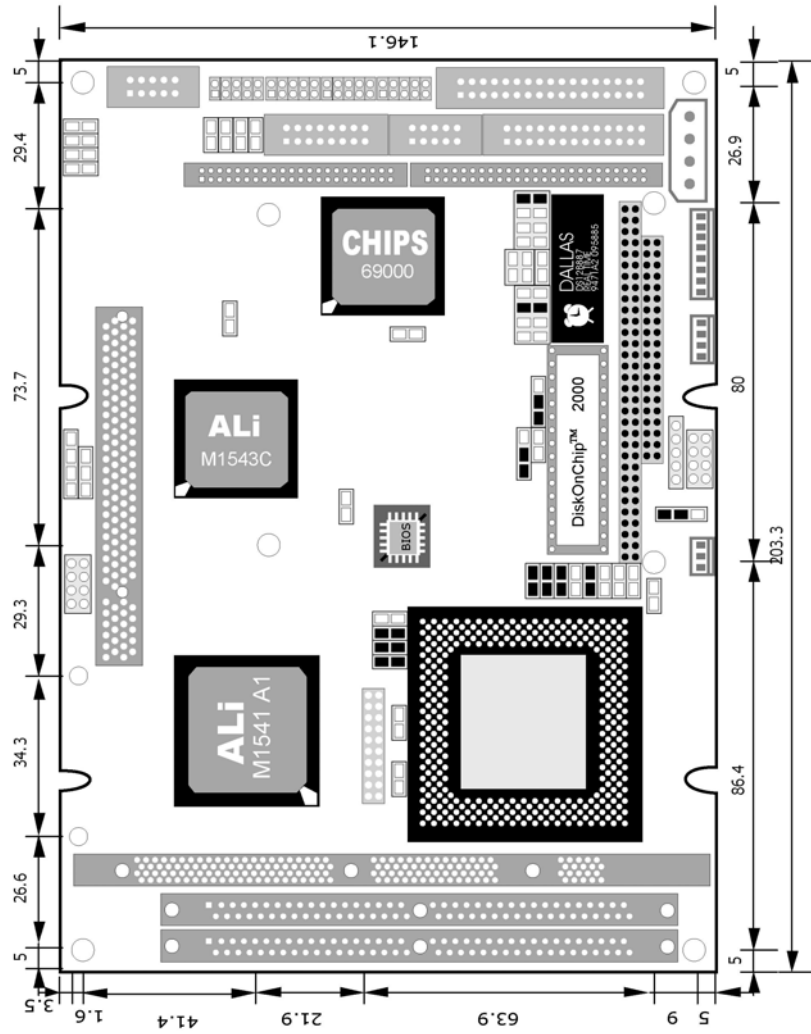
- 75~450MHz CPU for Intel® Pentium® MMX™/Tillamook/K5/K6
- Ali M1541/M1543 system chipset
- Two SIMM or one DIMM sockets with a maximum capacity of 256MB
- SMC 37C669 super I/O chipset
- Three RS-232 and one RS-232/422/485 serial ports
- C&T 69000 CRT/Panel display controller
- RealTek RTL8139 10/100 Based LAN
- ESS® Solo1 3D audio controller
- DiskOnChip™ memory size up to 288MB
- Supports Single +5V power in
- Supports Rockwell GPS connector
- Supports CPU Temperature Alarm function

1.2 Specifications

- **CPU** : 75~450MHz CPU for Intel® Pentium® MMX™ / Tillamook / K5 / K6
- **Bus Interface** : PCI Bus
- **Memory** : Two SIMM or one DIMM sockets provides up to 256MB
- **Catch Memory**: 512KB pipeline burst
- **Chipset** : ALi M1541/M1543
- **I/O Chipset** : SMC 37C669 x 2
- **PCI Slot** : One standard PCI Slot
- **VGA**: C&T69000 with 2MB memory supporting CRT/Panel displays up to 1280 x 1024 at 256 colors
- **IDE** : Two IDE disk drives supporting ATA/33 and with a transfer rate of up to 33.3MB/sec.
- **Floppy** : Supports up to two floppy disk drives
- **Parallel Port** : One enhanced bi-directional parallel port supporting SPP/ECP/EPP
- **LAN** : RealTek RTL8139 10/100 Based LAN
- **Audio** : ESS Solo1 3D audio controller
- **Serial Port** : 16C550 UART-compatible RS-232/422/485 x 1 and Rs-232 x 3 serial ports with 16-byte FIFO
- **PC/104** : PC/104 connector for 16-bit ISA Bus

- **GPS** : Supports one Rockwell GPS module-compatible socket
- **IrDA** : One IrDA TX/RX header
- **USB** : Two USB ports
- **Keyboard/Mouse** : 8-pin connector support standard PC/AT Keyboard and PS/2 Mouse
- **DiskOnChip** : Socket for DiskOnChip and memory size 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** : DS12C887 or equivalent device
- **DMA Channels:** 7
- **Interrupt Levels:** 15
- **Power Connector** : One 4-pin +5V/+12V and one 4-pin -5V/-12V connector
- **Maximum Power Consumption** : +5V@4A, +12V@100mA, -12V@20mA
- **Operating Temperature** : 0~60°C
- **CPU Temperature Alarm** : Beeping alarm when CPU temperature exceeds temperature limits
- **Board Size** : 20.3 x 14.6 cm

1.3 Board Dimensions



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Chapter 2

Unpacking

This chapter explains unpacking the board, checking the equipment and documentation and where to go from there.

2.1 Opening the Delivery Package

The HS-4500 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-4500 delivery package contains the following items:

- ◆ HS-4500 Board
- ◆ One IDE port flat cable
- ◆ One FDD port flat cable
- ◆ One Printer port flat cable
- ◆ One RS-232 cable
- ◆ One Panel flat cable
- ◆ One VGA flat cable
- ◆ One Front Panel cable
- ◆ One Ethernet cable
- ◆ One PS/2 Keyboard and Mouse Transfer cable
- ◆ One SPK cable
- ◆ One DC -5V/-12V cable
- ◆ One USB cable
- ◆ Utility CD Disk
- ◆ User's Manual

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

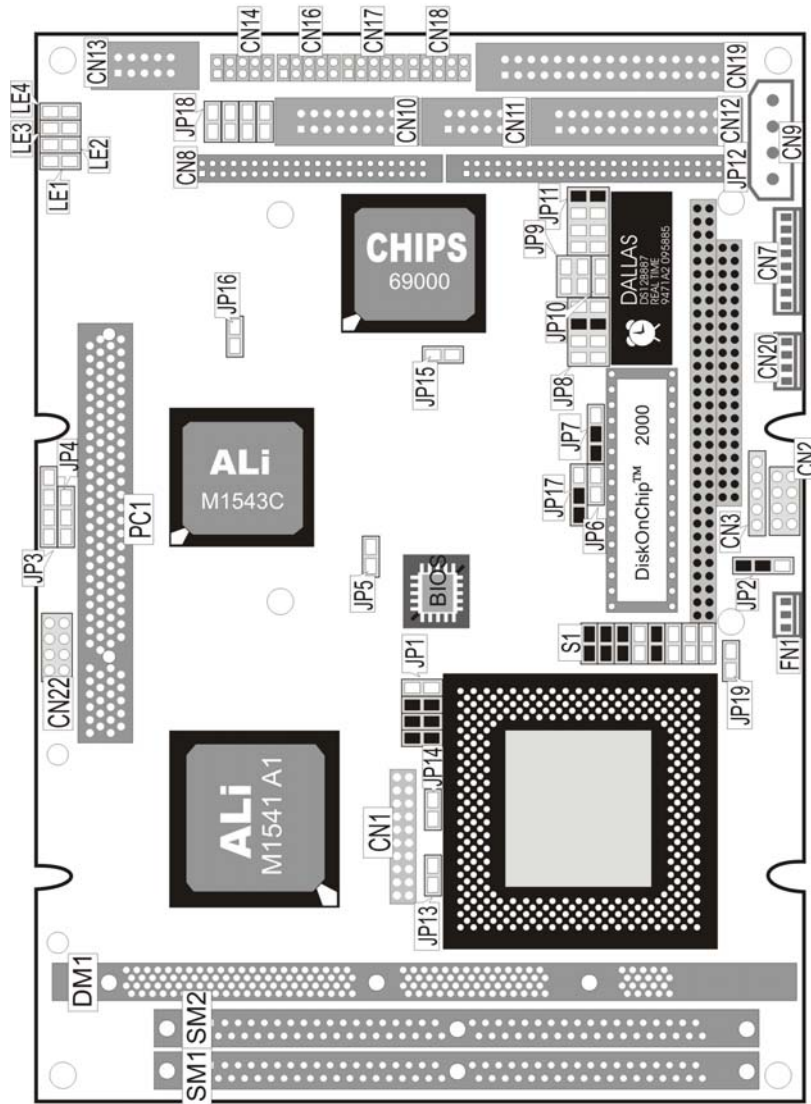
This chapter provides the information on how to install the hardware using the HS-4500. This chapter also contains information related to jumper settings of switch, watchdog timer, and the DiskOnChip address selection etc.

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 HS-4500 Board Layout



3.3 HS-4500 Jumper List

Jumper	Definition	Setting
JP1(1-8)	Host Bus Clock Rate Select: <i>66.8MHz</i>	Short 3-4, 5-6, 7-8
JP2	Watchdog Timer Active Type Select: <i>Reset</i>	Short 1-2
JP5	COM2 Enabled/Disabled Select: <i>Enabled</i>	Open
JP6	COM4 Enabled/Disabled Select: <i>Enabled</i>	Open
JP7	DiskOnChip Address Select: <i>D000</i>	Short 1-2
JP8	WDT Out Period Select: <i>1sec.</i>	Short 1-2, 3-4, 5-6, 7-8
JP9	RS-422/485 Receiver Enabled/Disabled Select: <i>Always Disabled</i>	All Open
JP10	Clear CMOS: <i>Normal Operation</i>	Short
JP11	RS-422/485 Transceiver Enabled/Disabled Select: <i>Always Disabled</i>	Short 7-8
JP13	Host Communications Protocol Select	Open
JP14	Host Communications Protocol Select	Open
JP15	COM3 Enabled/Disabled Select: <i>Enabled</i>	Open
JP17	Panel Voltage Select: <i>3.3V</i>	Short 1-2
JP19	Supports Tillamook CPU Enabled/Disabled Select: <i>Tillamook</i>	Short
S1(1-6)	System Clock In Multiplex Weighted Value Select: <i>Tillamook 266MHz</i>	Short 1-2 Open 3-4, 5-6
S1(7-16)	CPU Vcore Voltage Select: <i>2.9V</i>	Short 7-8, 13-14

3.4 HS-4500 Connector List

Connector	Definition
CN1	GPS Connector
CN2(1-2)	IDE LED Connector
CN2(3-4)	Speaker Connector
CN2(7-8)	Reset Connector
CN3(1-3)	Power LED Connector
CN3(4-5)	Keylock Connector
CN4	PC/104 64-pin Connector
CN5	PC/104 40-pin Connector
CN7	8-pin Keyboard/Mouse Connector
CN8	IDE Connector
CN9	4-pin +5V/+12V Power Connector
CN10	CRT Connector (8x2 header)

...More on next page...

Connector	Definition
CN11	RS-422/485 Connector (5x2 header)
CN12	Parallel Connector
CN13	LAN Connector (5x2 header)
CN14	COM1 Connector (5x2 header)
CN16	COM2 Connector (5x2 header)
CN17	COM3 Connector (5x2 header)
CN18	COM4 Connector (5x2 header)
CN19	Floppy Connector
CN20	4-pin -5V/-12V Power Connector
CN22	USB Connector
FN1	Fan Power Connector
JP3	AUXA Connector
JP4	AUXB Connector
JP12	pin Panel Connector
JP16	2-pin ATX Power On/Off Connector
JP18	MIC In/Audio Out Connector

3.5 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 or A. With DiskOnChip™, user may also execute DOS commands such as FORMAT, SYS, COPY, XCOPY, DISCOPY and DISKCOMP etc.

The *U9* location onboard the HS-4500 is the DiskOnChip module socket. Jumper *JP7* assigns the address setting of the installed module. Setting the 4 pins of *JP7* allows you to select the starting memory address of the DiskOnChip™ (D.O.C.). If you have additional memory devices in the system, please set both at different memory address mapping to avoid the mapping area conflicts.

- **JP7: DiskOnChip™ Address Select**

PIN	Address
Short 1-2	D000
Short 2-3	E000

3.6 Setting the CPU of HS-4500

The HS-4500 offers the convenience in CPU installation with its auto-detect feature. After installing a new microprocessor onboard, the HS-4500 automatically identifies the frequency and clock speed of the installed microprocessor chip, thereby eliminating the need for user to do additional CPU configuration or hardware settings related to it. The HS-4500 provides all possibility in jumper setting for wide using all types of CPU with *S1(7-16)* for CPU Vcore Voltage, *JP1(1-8)* for internal Host Bus Clock Rate and *S1(1-6)* 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.

Correspond to different type CPU, it is request to set *S1(7-16)* for match the CPU's Vcore operating voltage. Here shows at below of the proper jumper settings for their respective Vcore at range 1.8V to 3.5V.

- **S1(7-16): CPU Vcore Voltage Select**

CPU Vcore Voltage	S1(7-16)
1.8V	Short 9-10, 13-14, 15-16
1.9V	Short 11-12, 13-14, 15-16
2.0V	Short 9-10, 11-12, 13-14, 15-16
2.1V	Short 7-8
2.2V	Short 9-10
2.3V	Short 7-8, 9-10
2.4V	Short 11-12
2.5V	Short 7-8, 11-12
2.6V	Short 9-10, 11-12
2.7V	Short 7-8, 9-10, 11-12
2.8V	Short 13-14
2.9V	Short 7-8, 13-14
3.0V	Short 9-10, 13-14
3.1V	Short 7-8, 9-10, 13-14
3.2V	Short 11-12, 13-14
3.3V	Short 7-8, 11-12, 13-14
3.4V	Short 9-10, 11-12, 13-14
3.5V	Short 7-8, 9-10, 11-12, 13-14

JP1(1-8) used to setting the Host Bus clock Rate. The setting of internal host bus clock rate is for defined the defined the operating clock base rate of the internal bus of core logic.

- **JP1(1-8): System Clock Select**

System Clock	JP1(1-8)
60MHz	Short 1-2, 3-4, 5-6, 7-8
66.8MHz	Short 3-4, 5-6, 7-8
75MHz	Short 1-2, 3-4, 7-8
83.3MHz	Short 3-4, 7-8
100MHz	Short 7-8

S1(1-6) used to setting the CPU Clock in Multiplex Weighted Value. The setting value is for multiplex to internal host bus clock rate and obtain the CPU operating clock value.

- **S1(1-6): System Clock In Multiplex Weighted Value Select**

S1(1-6)			CPU Type			
1-2	3-4	5-6	Pentium MMX 2.8V(66MHz)	Tillamook 1.9V(66MHz)	AMD K6 (66MHz)	AMD K6 (100MHz)
Short	Short	Short	166MHz	166MHz	300MHz	450MHz
Short	Short	Open	----	----	166MHz	250MHz
Short	Open	Short	133MHz	133MHz	266MHz	400MHz
Short	Open	Open	----	266MHz	400MHz	----
Open	Short	Short	200MHz	200MHz	333MHz	500MHz
Open	Short	Open	----	----	200MHz	300MHz
Open	Open	Short	233MHz	233MHz	366MHz	550MHz
Open	Open	Open	----	----	233MHz	350MHz

- **JP19: Supports Tillamook CPU Enabled/Disabled Select**

JP19	Description
Short	Tillamook
Open	Other CPU

3.7 Watchdog Timer

There are three access cycles of watchdog timer as Enable, Refresh and Disable. The Enable cycle should proceed by READ PORT 443H. The Disable cycle should proceed by READ PORT 043H. A continue Enable cycle after a first Enable cycle means Refresh.

Once if the Enable cycle activity, a Refresh cycle is request before the time-out period for restart counting the WDT Timer's period. Otherwise, it will assume that the program operation is abnormal when the time counting over the period preset of WDT Timer. A System Reset signal to start again or a NMI cycle to the CPU comes if over.

The JP2 is using for select the active function of watchdog timer in disable the watchdog timer, or presetting the watchdog timer activity at the reset trigger, or presetting the watchdog timer activity at the NMI trigger.

- **JP2: Watchdog Timer Active Type Setting**

JP2	Description
Short 1-2	System Reset
Short 2-3	Active NMI
Open	Disabled Watchdog Timer

- **JP8 (1-8): Watchdog Timer Out Period Select**

Period	PINS 1-2	PINS 3-4	PINS 5-6	PINS 7-8
1 sec	Open	Open	Short	Open
2 sec	Open	Open	Short	Short
10 sec	Open	Short	Open	Open
20 sec	Open	Short	Open	Short
110 sec	Short	Open	Open	Open
220 sec	Short	Open	Open	Short

The watchdog timer is disabled after the system power-on. The watchdog timer can be enabled by a Enable cycle with reading the control port(443H), a Refresh cycle with reading the control port(443H) and a Disable cycle by reading the watchdog timer disable control port(043H). After a Enable cycle of WDT, user must constantly proceed a Refresh cycle to WDT before its period setting comes ending of every 1, 2, 10, 20, 110 or 220 seconds (Please reference to the selection table of JP8 for WDT Time Out period setting). If the Refresh cycle does not active before WDT period cycle, the onboard WDT architecture will issue a Reset or NMI cycle to the system. The watchdog timer is controlled by two IO ports.

443H	I/O Read	The Enable cycle
443H	I/O Read	The Refresh cycle
043H	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    0043H

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

```

3.8 CMOS Data Clear

The HS-4500 has a Clear CMOS jumper on *JP10*.

- **JP10: Clear CMOS(Only for DS12B887)**

JP10	Description
Short	Clear CMOS
Open	Normal Operation

3.9 VGA Controller

The onboard C&T 69000 CRT/Panel display controller provides up to 1280 x 1024 at 256 colors resolution. The board provides an auto disable VGA once a display card is plugged into the PCI slot. The HS-4500 provides two connection methods of CRT and Panel device. *CN10* offers an internal CRT connector, and *JP12* offers a 50-pin Panel connector.

- **CN10: CRT Connector (8x2 header)**

CN10	Description	CN10	Description
1	RED	2	GND
3	GREEN	4	GND
5	BLUE	6	GND
7	GND	8	DDDA
9	GND	10	HSYNC
11	GND	12	VSYNC
13	GND	14	DDCLK
15	GND	16	N/C

The HS-4500 provides a 50-pin 2.0mm pitch header connector (*JP12*).
JP17 is Panel voltage select jumper.

- **JP17: Panel Voltage Selection**

JP17	Description
Short 1-2	3.3V (default)
Short 2-3	5V

- **JP12: Panel Connector**

JP12	Description	JP12	Description
1	+12V	2	+12V
3	GND	4	GND
5	+3V PVcc	6	ENAVdd
7	FPVee	8	GND
9	P ₀	10	P ₁
11	P ₂	12	P ₃
13	P ₄	14	P ₅
15	P ₆	16	P ₇
17	P ₈	18	P ₉
19	P ₁₀	20	P ₁₁
21	P ₁₂	22	P ₁₃
23	P ₁₄	24	P ₁₅
25	P ₁₆	26	P ₁₇
27	P ₁₈	28	P ₁₉
29	P ₂₀	30	P ₂₁
31	P ₂₂	32	P ₂₃
33	P ₂₄	34	P ₂₅
35	SHFCLK	36	FLM
37	M	38	LP
39	GND	40	ENABKL

...More on next page...

JP12	Description	JP12	Description
41	P26	42	P27
43	P28	44	P29
45	P30	46	P31
47	P32	48	P33
49	P34	50	P35

3.9.1 Flat Panel Display Interface

HS-4500		Mono					Color								
		SS	DD		TFT			STN-HR	STN-SS		STN-DD				
PIN#	Name	8-bit		16-bit	9/12/16-bit	18-bit	18/24-bit	36-bit	18/24-bit	8-bit (4bP)	16-bit (4bP)	8-bit (4bP)	16-bit (4bP)	24-bit	
9	P0	D0	UD3	UD7	B0		B0	FB0	FB0	R1	R1	UR1	UR0	UR0	
10	P1	D1	UD2	UD6	B1		B1	FB1	FB1	B1	G1	UG1	UG0	UG0	
11	P2	D2	UD1	UD5	B2	B0	B2	FB2	FB2	G2	B1	UB1	UB0	UB0	
12	P3	D3	UD0	UD4	B3	B1	B3	FB3	FB3	R3	R2	UR2	UR1	LR0	
13	P4	D4	LD3	UD3	B4	B2	B4	FB4	SB0	B3	G2	LR1	UR0	LG0	
14	P5	D5	LD2	UD2	G0	B3	B5	FB5	SB1	G4	B2	LG1	LG0	LB0	
15	P6	D6	LD1	UD1	G1	B4	B6	SB0	SB2	R5	R3	LB1	LB0	UR1	
16	P7	D7	LD0	UD0	G2	B5	B7	SB1	SB3	B5	G3	LR2	LR1	UG1	
17	P8			LD7	G3		G0	SB2	FG0		B3		UG1	UB1	
18	P9			LD6	G4		G1	SB3	FG1		R4		UB1	LR1	
19	P10			LD5	G5	G0	G2	SB4	FG2		G4		UR2	LG1	
20	P11			LD4	R0	G1	G3	SB5	FG3		B4		UG2	LB1	
21	P12			LD3	R1	G2	G4	FG0	SG0		R5		LG1	UR2	
22	P13			LD2	R2	G3	G5	FG1	SG1		G5		LB1	UG2	
23	P14			LD1	R3	G4	G6	FG2	SG2		B5		LR2	UB2	
24	P15			LD0	R4	G5	G7	FG3	SG3		R6		LG2	LR2	
25	P16						R0	FG4	FR0					LG2	
26	P17						R1	FG5	FR1					LB2	
27	P18					R0	R2	SG0	FR2					UR3	
28	P19					R1	R3	SG1	FR3					UG3	
29	P20					R2	R4	SG2	SR0					UB3	
30	P21					R3	R5	SG3	SR1					UR3	
31	P22					R4	R6	SG4	SR2					LG3	
32	P23					R5	R7	SG5	SR3					LB3	
33	P24							FR0							
34	P25							FR1							
41	P26							FR2							
42	P27							FR3							
43	P28							FR4							
44	P29							FR5							
45	P30							SR0							
46	P31							SR1							
47	P32							SR2							
48	P33							SR3							
49	P34							SR4							
50	P35							SR5							
35	SHFCLK: Pixel clock .Shift Clock														
36	FLM.VSYNC: First line marker														
37	M: Panel AC driver control														
38	LP.DE,HSYNC: Latch pulse														
40	ENABKL: Power sequencing control for enabling the backlight.(high active)														

3.10 Serial Port Connectors

The HS-4500's CN14, 16, 17 and 18 headers provide four high speeds NS16C550 compatible USRT with Read/Receive 16 byte FIFO serial ports.

- **CN14, 16, 17, 18: COM1~COM4 Connector (5x2 header)**

COM Port	PIN	Description	PIN	Description
COM 1 (CN14)	1(1)	DCD1	2(2)	DSR1
	3(3)	RXD1	4(4)	RTS1
	5(5)	TXD1	6(6)	CTS1
	7(7)	DTR1	8(8)	RI1
	9(9)	GND	10(10)	N/C
COM 2 (CN16)	1(11)	DCD2	2(12)	DSR2
	3(13)	RXD2	4(14)	RTS2
	5(15)	TXD2	6(16)	CTS2
	7(17)	DTR2	8(18)	RI2
	9(19)	GND	10(20)	N/C
COM 3 (CN17)	1(21)	DCD3	2(22)	DSR3
	3(23)	RXD3	4(24)	RTS3
	5(25)	TXD3	6(26)	CTS3
	7(27)	DTR3	8(28)	RI3
	9(29)	GND	10(30)	N/C
COM 4 (CN18)	1(31)	DCD4	2(32)	DSR4
	3(33)	RXD4	4(34)	RTS4
	5(35)	TXD4	6(36)	CTS4
	7(37)	DTR4	8(38)	RI4
	9(39)	GND	10(40)	N/C

- **JP5: COM2 Enabled/Disabled Select**

JP5	Description
Short	Disabled
Open	Enabled

NOTE: *If the onboard GPS feature is in use, please set COM2 as "Disabled".*

- **JP15: COM3 Enabled/Disabled Select**

JP15	Description
Short	Disabled
Open	Enabled

- **JP6: COM4 Enabled/Disabled Select**

JP6	Description
Short	Disabled
Open	Enabled

- **CN11: 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

- **JP9: RS-422/485 Receiver Enabled/Disabled Select**

JP9	Description
Short 1-2	Always Enable
Short 3-4	Enable by writing the REG : 2 EFH BIT1=1
All Open	Always Disable

- **JP11: RS-422/485 Transceiver Enabled/Disabled Select**

JP11	Description
Short 1-2	Always Enable
Short 3-4	Enable by "-RTS" signal
Short 5-6	Enable by writing the REG : 2 EFH BIT0=1
Short 7-8	Always Disable

3.11 Keyboard & Mouse Connector

The HS-4500 offers a possibility for keyboard and mouse connections with the transfer cable in obtain the connectors for keyboard and mouse by connect to 8-pin header.

- **CN7: 8-pin Keyboard/Mouse Connector**

PIN	Description	PIN	Description
1	GND	5	GND
2	VCC	6	VCC
3	MS Data	7	KB Data
4	MS Clock	8	KB Clock

3.12 Front Panel Connector

The onboard front panel connector *CN2* provides a multi connection to reset button, WDT indicator, speaker connector and IDE-Drives activity indicator.

A ON between pin-7 and pin-8 may cause a hardware reset cycle to system. The reset button may connection to pin-7 and pin8. Normal off is necessary for operating. The pin-5 and pin-6 provides a WDT (Watchdog Timer) indicator for the user application. It may also to used as an control signal in WDT activity control. The pin-3 and pin-4 provides a speaker out put connection for extra sound out. The pin-1 and pin-2 provides a IDE-Drive's activity indicator connection to a LED for indicate the IDE-Drive activity status. A light on says activity.

- **CN2: Front Panel Connector**

CN2	Description	Input/Output
1	IDE-Drive's Indicator	Output
2	VCC	Power VCC
3	Speaker	Output
4	GND	Power GND
5	GND	Power GND
6	WDT Indicator	Output
7	GND	Power GND
8	Reset Button	Input

3.13 PCI E-IDE Drive Connector

One standard 44-pin header daisy-chain driver connector provides as CN8 with following pin assignment. Total two IDE (Integrated Device Electronics) drivers may connect.

- **CN8: IDE Connector**

CN8	Description	CN8	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	DREQ	22	GND
23	IOW#	24	GND
25	IOR#	26	GND
27	IRDY	28	Resistance Pull Low
29	DACK	30	Ground# - Default
31	Interrupt	32	N/C
33	PA1	34	PDIAG#
35	PA0	36	PA2
37	HDC CS0	38	HDC
39	HDD Active	40	GND
41	VCC	42	VCC
43	GND	44	VCC

3.14 Parallel Connector

A standard 26-pin flat cable driver connector provides as CN12 with following pin assignment for connection to parallel printer.

- **CN12: Parallel Connector**

PIN	Description	PIN	Description
1	STROBE	2	DATA 0
3	DATA 1	4	DATA 2
5	DATA 3	6	DATA 4
7	DATA 5	8	DATA 6
9	DATA 7	10	Acknowledge
11	Busy	12	Paper Empty
13	Printer Select	14	Auto Form Feed
15	VCC	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

3.15 Keylock and Power LED Connector

The following provides the pin information for CN3(4-5) keylock with CN3(1-3) power's LED indicator connection.

- **CN3: Keylock and Power LED Connector**

PIN	Description
1	VCC
2	N/C
3	GND
4	Keylock
5	GND

3.16 GPS Connector

CAUTION: *The information provided herein are for reference only. For details and accurate information, please refer to the document that came along with the GPS Receiver you purchased.*

The HS-4500 provides a 20-pin optional connector, CN1, for installation of Rockwell's "Jumper" Global Positioning system (GPS) Receiver.

NOTE: When enabling the GPS function, please set COM 2 as “Disabled”.

● **CN1: GPS Connector**

CN1	Description	CN1	Description
1	N/C	2	VCC
3	N/C	4	N/C
5	RESET#	6	N/C
7	NOTE ⁽¹⁾	8	NOTE ⁽¹⁾
9	N/C	10	GND
11	RX2	12	TX2
13	GND	14	RX3
15	TX3	16	GND
17	GND	18	GND
19	NOTE ⁽²⁾	20	NOTE ⁽³⁾

NOTE⁽¹⁾: Please reference to the next table for detail.

NOTE⁽²⁾: Test only. 1PPS time mark output, rising edge synchronized with each set valid navigation binary message data.

NOTE⁽³⁾: Test only. 10KHz clock waveform, positive logic synchronized to pin 19.

● **JP14, JP13: Host Communications Protocol Select**

JP14	JP13	Description
Open	Open	Data stored in SRAM or EEPROM determines message format, host port communication settings, and default message set.
Open	Short	Binary message format; host port communication settings=9600bps, no parity, 8 data bits, 1 stop bit. The receiver operates from default initialization values stored in ROM.
Short	Open	NMEA message format; host port communication settings=4800bps, no parity, 8 data bits, 1 stop bit. The receiver selects the default NMEA output message set and uses initialization values from the data stored in SRAM or EEPROM.
Short	Short	NMEA message format; host port communication settings=4800bps, no parity, 8 data bits, 1 stop bit. The receiver operates from default initialization values stored in ROM and will output the default NMEA message set from ROM.

3.17 Floppy Disk Drive Connector

The HS-4500 uses a standard 34-pin header connector, *CN19*, for floppy disk drive connection. A total of two FDD drives may be connected at any given time.

- **CN19: FDD Connector**

CN19	Description	CN19	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	Step#
21	GND	22	Write Data#
23	GND	24	Write Gate #
25	GND	26	Track 0#
27	GND	28	Write Protect#
29	GND	30	Read Data#
31	GND	32	Side 1 Select
33	GND	34	Disk Change#

3.18 Audio Connectors

The HS-4500 has an onboard ESS Solo1 3D audio interface. The following are the connectors of AUXA, AUXB and MIC/Audio Speaker connectors.

The AUXA and AUXB connectors are for audio sound input. The AUXA provides for 4-pin connection, and AUXB provides for 3-pin connection.

- **JP3: AUXA Connector**

JP3	Description
1	AUXAL
2	GND
3	AUXAR
4	GND

- **JP4: AUXB Connector**

JP4	Description
1	AUXBL
2	GND
3	AUXBR

- **JP18: MIC In/Audio Out Connector**

JP18	Description	JP18	Description
1	AOUTL	2	AOUTR
3	GND	4	GND
5	MIC	6	N/C
7	GND	8	GND

When using a MIC In/Audio Out cable, user can connect right/left speakers to the AOUTL and AOUTR pins of *JP18*, and connect microphone to the MIC pin of *JP18*.

3.19 Fast Ethernet Connector

The Fast Ethernet controller provides 32-bit performance, and PCI bus master capability that fully complies with IEEE 802.3 10/100 Base-T specifications.

For 10/100 Base-T operations, simply plug one end of the cable into the 10-pin header of *CN13* connector.

- **CN13: LAN Connector (5x2 header)**

PIN	Description	PIN	Description
1	VCC	2	LILED
3	RX+	4	RX-
5	ACTLED	6	GND
7	SPELED	8	GND
9	TX+	10	TX-

3.20 PC/104 Bus Connection

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 vendors can be easily installed onboard. The detailed pin assignment of the PC/104 expansion bus connectors CN4 and CN5 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.*

- **CN4: PC/104 64-pin Connector**

PIN	CN4 Row A	PIN	CN4 Row B
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

...More on next page...

PIN	CN4 Row A	PIN	CN4 Row B
28	SA3	60	BALE
29	SA2	61	+5V
30	SA1	62	OSC
31	SA0	63	GND
32	GND	64	GND

- **CN5: PC/104 40-pin Connector**

PIN	CN5 Row D	PIN	CN5 Row C
1	GND	21	GND
2	MEMCS16*	22	SBHE*
3	IOSC16*	23	LA23
4	IRQ10	24	LA22
5	IRQ11	25	LA21
6	MSDATA	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

3.21 USB Connector

The HS-4500 provides one 10-pin connector for USB0 & USB1 ports at location CN22.

- **CN22: USB Connector**

CN22	USB	CN22	USB
1	VCC	2	VCC
3	USB PO-	4	USB P1-
5	USB PO+	6	USB P1+
7	GND	8	GND

3.22 Power and FAN Connectors

- **CN9: 4-pin +5V/+12V Power Connector**

PIN	Description
1	+12V
2	GND
3	GND
4	+5V

- **CN20: 4-pin -5V/-12V Power Connector**

PIN	Description
1	-12V
2	GND
3	-5V
4	GND

- **JP16: 2-pin ATX Power On/Off Switch**

PIN	Description
1	GND
2	PWRBT

- **FN1: Fan Power Connector**

PIN	Description
1	GND
2	+12V
3	N/C

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Chapter 4

Award BIOS Setup

The HS-4500 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 immediately after switching the system on, or
2. By pressing the 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...

PRESS 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 (xxxxxxxx)
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	HDD LOW LEVEL FORMAT
LOAD BIOS DEFAULTS	SAVE & EXIT SETUP
LOAD SETUP DEFAULTS	EXIT WITHOUT SAVING
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**
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.

- **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, please 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 (xxxxxxxx)
STANDARD CMOS SETUP
AWARD SOFTWARE, INC.

Data (mm:dd:yy) : Fri, Dec 20 2002							
Time (hh:mm:ss) : 14 : 50 : 1							
		CYLS	HEAD	PRECOMP	LANDZ	SECTOR	MODE
Driver C	: 0 (0Mb)	0	0	0	0	0	Normal
Driver D	: 0 (0Mb)	0	0	0	0	0	Normal
Drive A	: None						
Drive B	: None						
LCD&CRT	: Both						
Halt On	: All Errors						
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.

- **Drive C/Drive D:**

The categories identify the types of 2 channels that have been installed in the computer. There are 45 predefined types and 4 user definable types are 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 Type/Drive B Type:**

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

- **LCD&CRT:**

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

BOTH	Enables display of both CRT and LCD
LCD	Enables display of LCD displays only
CRT	Enables display of CRT displays only
Auto	Auto detects the installed display on the system

- **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 (xxxxxxx) BIOS FEATURES SETUP AWARD SOFTWARE, INC.

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

NOTE: *Many disk diagnostic programs which attempt to access the boot sector table can cause the above warning message. If you will be running such a program, we recommend that you first disable Virus Protection beforehand.*

- **CPU Internal Cache/External Cache:**

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

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 | ■ SCSI, C, A |
| ■ C, A, SCSI | ■ C only |
| ■ C, CD-ROM, A | ■ LS, C |
| ■ CD-ROM, C, A | ■ Zip100, C |
| ■ D, A, SCSI | ■ USB-FDD, C |
| ■ E, A, SCSI | ■ USB-Zip, C |
| ■ F, A, SCSI | ■ USB-CD, C |
| ■ SCSI, A, C | ■ USB-HDD, C |

- **Swap Floppy Drive:**

This item allows you to determine whether enable the swap floppy drive or not. The available choices are Enabled/Disabled.

- **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

- **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

- **Typematic Rate Setting:**

This determines if the typematic rate is to be used. When disabled, continually holding down a key on your keyboard will generate only one instance. In other words, the BIOS will only report that the key is down. When the typematic rate is enabled, the BIOS will report as before, but it will then wait a moment, and, if the key is still down, it will begin the report that the key has been depressed repeatedly. For example, you would use such a feature to accelerate cursor movements with the arrow keys.

Enabled	Enable typematic rate
Disabled	Disable typematic rate

- **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.

NOTE: *To disable security, select PASSWORD SETTING at Main Menu and then you will be asked to enter password. Do not type anything and just press <Enter>, it will disable security. Once the security is disabled, the system will boot and you can enter Setup freely.*

- **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

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 (xxxxxxxx)
CHIPSET FEATURES SETUP
AWARD SOFTWARE, INC.

Auto Configuration	: Enabled	
AT Bus Clock	: 7.16MHz	
L2 TA RAM Size	: 8	
DRAM Timing	: Normal	
SDRAM CAS Latency	: 3	
Pipelined Function	: Disabled	
Graphics Aperture Size	: 16MB	
DRAM Date Integrity Mode	: Disabled	
Memory Hole At 15M-16M	: Disabled	
Host Read DRAM Command Mode	: Syn.	
AGP Read Burst	: Enabled	
ISA Line Buffer	: Enabled	
Passive Release	: Enabled	
Delay Transaction	: Disabled	
Primary Frame Buffer	: All	
VGA Frame Buffer	: Enabled	
Data Merge	: Disabled	
IO Recovery Period	: 1 us	
		ESC : Quit ↑↓→←: Select Item
		F1 : Help PU/PD/+/-: Modify
		F5 : Old Values (Shift) F2: Color
		F6 : Load BIOS Defaults
		F7 : Load Setup Defaults

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 (xxxxxxxx)
POWER MANAGEMENT SETUP
AWARD SOFTWARE, INC.

Power Management	: User Define	** External Switch **	
PM Control by APM	: No	Power Button Mode	: Disabled
MODEM Use IRQ	: NA	DOCK I/O SMI	: Disabled
Video Off Option	: Always On	AC Power SMI	: Disabled
Video Off Method	: Blank Screen	Thermal SMI Mode	: Disabled
** PM Monitor **			
HDD Power Down	: Disabled		
Doze Mode	: Disabled		
Standby Mode	: Disabled		
Suspend Mode	: Disabled		
FAN Off Option	: Always On		
Wake On LAN Use	: NA		
** PM Events **			
Primary HDD	: Disabled	ESC : Quit	↑↓→←: Select Item
Floppy	: Disabled	F1 : Help	PU/PD/+/-: Modify
COM Ports	: Disabled	F5 : Old Values	(Shift) F2: Color
Keyboard	: Disabled	F6 : Load BIOS Defaults	
LPT Ports	: Disabled	F7 : Load Setup Defaults	

4.8 Integrated Peripherals

The IDE hard drive controllers can support up to two separate hard drives. These drives have a master/slave relationship which 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 (2A69KD2I)
INTEGRATED PERIPHERALS
AWARD SOFTWARE, INC.**

On-Chip Primary IDE	: Enabled	KB Power ON Password	: Enter
Master PIO	: Auto	KBC clock Source	: 8 MHz
Slave PIO	: Auto	Onboard FDC Controller	:
Master Ultra DMA	: Disabled	Onboard UART Port 1	: 3F8/IRQ4
Slave Ultra DMA	: Disabled	Onboard UART Port 2	: 2F8/IRQ3
:	:	UAT2 Mode	:
:	:	Half Duplex time-put	: Disabled
IDE HDD Block Mode	: Disabled	Onboard Parallel Port	: 378/IRQ7
On-Chip USB Controller	: Enabled	Parallel Port Mode	: Normal
USB Keyboard Support	: Disabled	ECP Mode Use DMA	: Disabled
Init Display Mode	: PCI Slot	Onboard IrDA Port	: Disabled
Ring/Wake On LAN Controller	: Disabled	IR IRQ Select	: URQ10
		IrDA Mode	: IrDA 1.0
RIC Alarm Controller	: Disabled	FIR transceiver Type	Use 6-pin
		DMA channel for IrDA1.1	1
		Onboard Serial Port 3	: 3E8/IRQ10
		Onboard Serial Port 4	: 2E8/IRQ11
POWER ON Function	:	LCD Panel Type	: Panel 5

4.9 PNP/PCI Configuration Setup

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 (xxxxxxxx)
PNP/PCI CONFIGURATION
AWARD SOFTWARE, INC.

PNP OS Installed	: No	PCI IDE 2nd Channel	: Disabled
Resources Controlled by	: Auto	PCI IRQ Activated By	: Level
Reset Configuration Data	: Disabled	PCI IDE IRQ Map To	: ISA
IRQ3	: Legacy ISA		
IRQ4	: Legacy ISA		
IRQ5	: Legacy ISA		
IRQ6	: Legacy ISA		
IRQ7	: Legacy ISA		
IRQ10	: Legacy ISA		
IRQ11	: Legacy ISA		
IRQ12	: Legacy ISA		
IRQ14	: Legacy ISA		
IRQ15	: Legacy ISA		
DMA0	: PCI/ISA PNP		
DMA1	: PCI/ISA PNP		
DMA2	: PCI/ISA PNP		
DMA3	: PCI/ISA PNP	ESC : Quit	↑ ↓ → ← : Select Item
DMA4	: PCI/ISA PNP	F1 : Help	PU/PD/+/- : Modify
DMA5	: PCI/ISA PNP	F5 : Old Values	(Shift)F2 : Color
DMA6	: PCI/ISA PNP	F6 : Load BIOS Defaults	
DMA7	: PCI/ISA PNP	F7 : Load Setup Defaults	

4.10 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 (2A69KD2I)
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 CONFIGURATION	LOAD BIOS DEFAULTS (Y/N)? N
LOAD BIOS DEFAULT	LOAD SETUP DEFAULTS
LOAD SETUP DEFAULTS	ETUP SAVING
Esc : Quit	↑ ↓ → ← : Select Item
F10 : Save & Exit Setup	(Shift) F2 : Change Color
Load BIOS Defaults except Standard CMOS Setup	

You can set either supervisor or user password, or both of them. 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.

**ROM PCI/ISA BIOS (2A69KD2I)
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	
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 (2A69KD2I)
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	
Esc : Quit	
↑ ↓ → ← : Select Item	
F10 : Save & Exit Setup	
(Shift) F2 : Change Color	
Abandon all Data & Exit Setup	

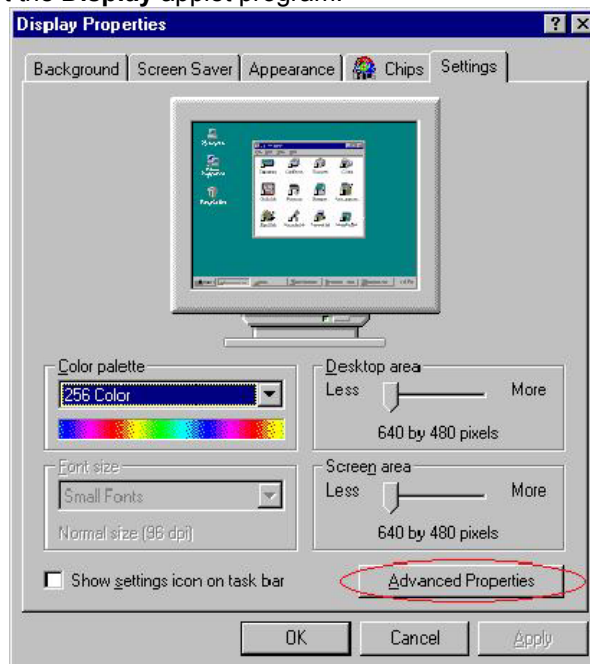
Chapter 5

Software Utilities

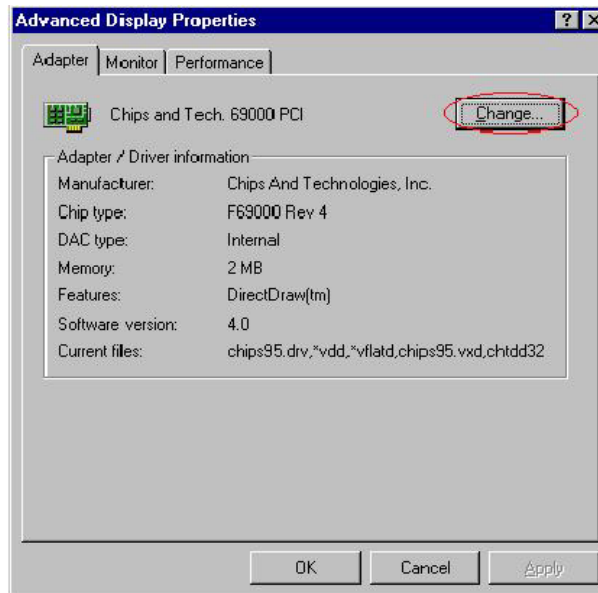
This chapter contains the detailed information of VGA, Audio and LAN driver installation procedures.

5.1 VGA Driver Installation for Win 95/98

1. Click **Start**, then **Setting**, then **Control Panel**.
2. Start the **Display** applet program.



3. Select the setting page, click on the **Advanced** properties button.
4. Press the **Change** button in the adapter area.



5. Click on **Next** to continue and then select

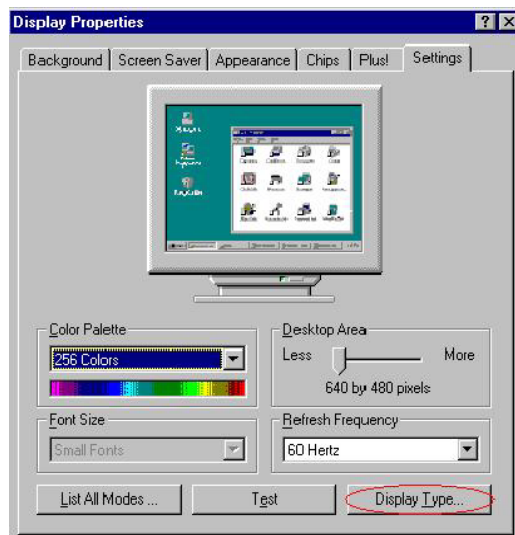
Display a list of all drivers in a specific location, so you can select the drivers you want.
6. Click on **Next**.
7. Select the **Specify a location** checkbox then **Browse**.
8. Specify the path to the new driver and then press the <ENTER> key (if in driver A: select a:\win95).
9. Once completed, the **Select** device dialog box will appear. Choose on:

Chips and Tech. 69000 PCI
10. Continue choosing until asked to restart machine.
11. After the system has restarted, you can go back into the display applet and select alternate screen resolutions and color depths.

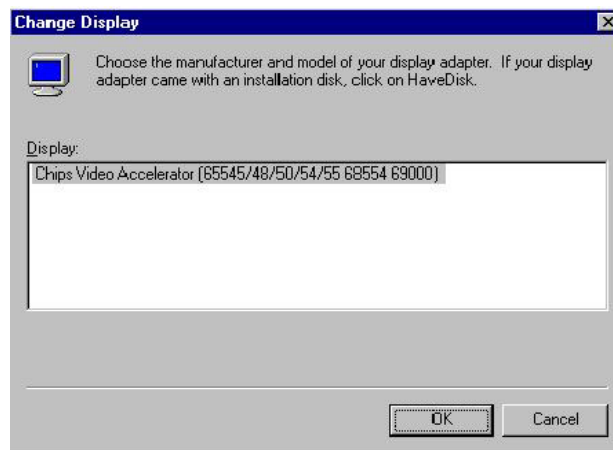
NOTE: *Installation procedure for Windows 98 is similar to Windows95.*

5.2 VGA Driver Installation for Win NT4.0

1. Click the **Start** button, then go to **Settings** and click on **Control Panel**.
2. Click on **Display** icon to start the **Display Properties** window.
3. Click on the **Settings** tab, and then click on **Display Type**.



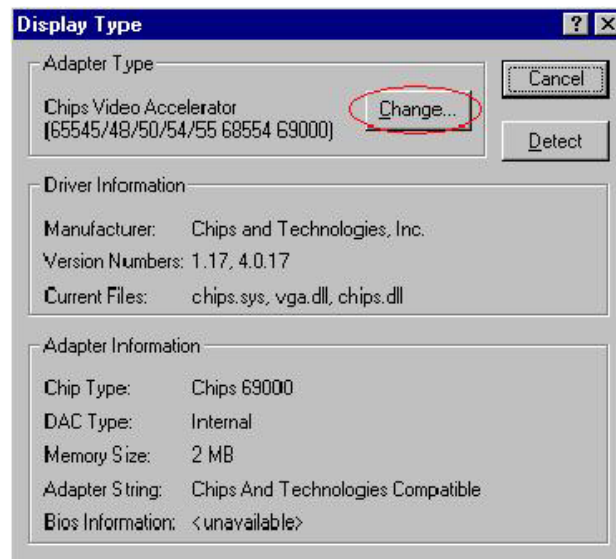
4. In the **Change Display Type** window, click on **Have Disk**.



- Specify the path to the new driver and press the <ENTER>key (if in driver A:, type a:\nt40). Select

**Chips Video Accelerator
(65545/48/50/54/55/68554 69000)**

- Click **OK** or press Enter.
- You will then see warning panel about Third Party Drivers. Click on **Yes** to complete installation.
- Once the installation is complete, the system must be shut down and restarted for the new driver to take effect.
- After restarting, check on the VGA driver and make sure the properties of the driver look similar to the following figure.



5.3 Audio Driver Installation for Win 98/95

5.3.1 Win98

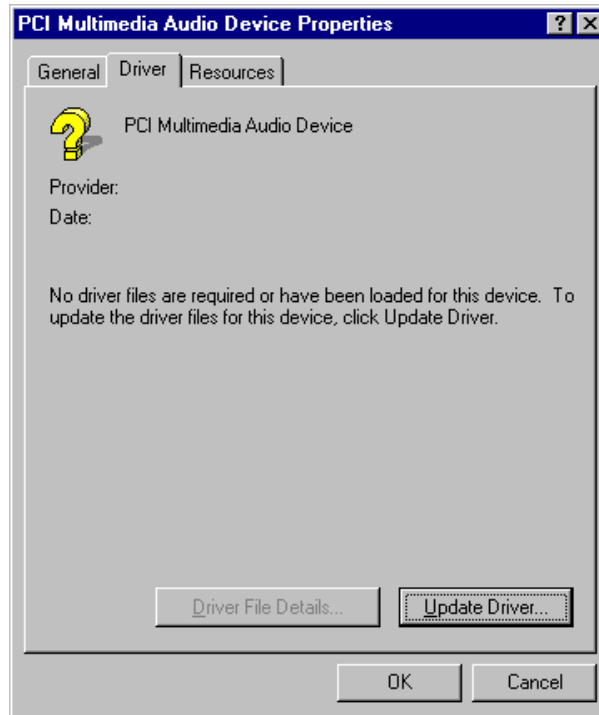
Windows 98 will detect the audio driver automatically therefore there is no need for further configuration.

5.3.2 Win95

1. Click **Start**, then go to **Setting** and select **Control panel**.
2. Click on the **Add New Hardware** icon to start the applet program.
3. In the window, click **Next**, choose **PCI Multimedia Audio Device**, and click **Next**.



4. In the **Driver** window, select **Update Driver** then click **Next**.

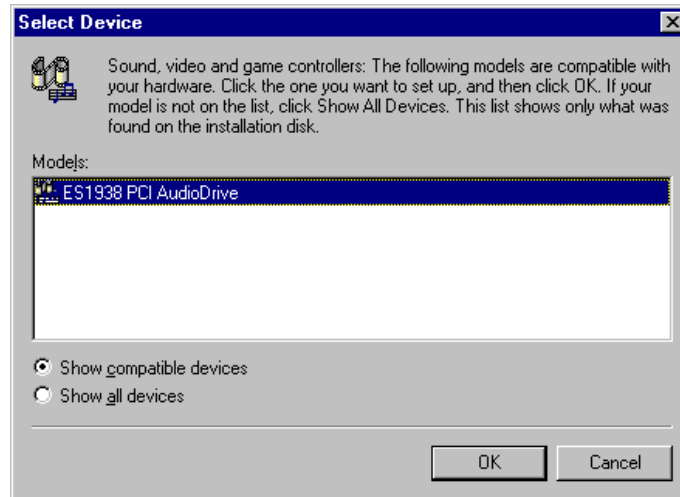


5. This will bring up the **Insert Disk** window.
6. Specify the path where the new driver is and then press <ENTER>. (If in driver a:, type a:\) If you're not sure exactly where the drivers are, choose the **Browse** button and locate the file.

ES1938 PCI Audio Drive

7. Click **OK**.
8. Windows 95 will copy the sound drivers to the proper directories on your system.
9. Continue choosing **OK** until asked to restart your system.

10. After restarting your system, check the sound driver and its properties. Be sure it looks similar with the following figure.



5.4 Audio Driver Installation for Win NT4.0

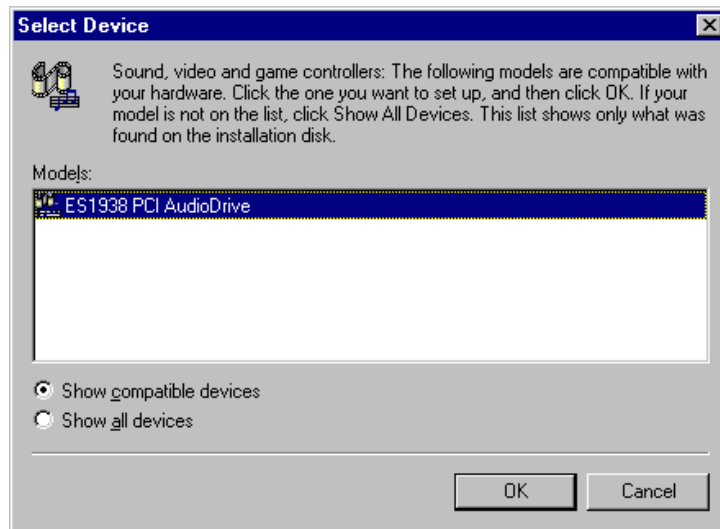
5.4.1 WinNT

1. Click **Start**, then go to **Setting** and select **Control panel**.
2. Click on the **Add New Hardware** icon to start the applet program.
3. In the window, click **Next**, choose **PCI Multimedia Audio Device**, and click **Next**.
4. In the Driver window, select **Update Driver** then click **Next**.
5. This will bring up the **Insert Disk** window.
6. Specify the path the new driver and press <ENTER> key. (If in driver a:, type a:\). If you're not sure exactly where the drivers are, choose the **Browse** button and locate it.

ES1938 PCI Audio Drive

7. Click **OK**.
8. Windows 95 will copy the sound drivers to the proper directories on your system.
9. Continue choosing **OK** until asked to restart your system.

10. After restart your computer, check the sound driver and its properties. Be sure that the driver looks similar to the following figure.



5.5 Network Driver Installation for Win 95/98

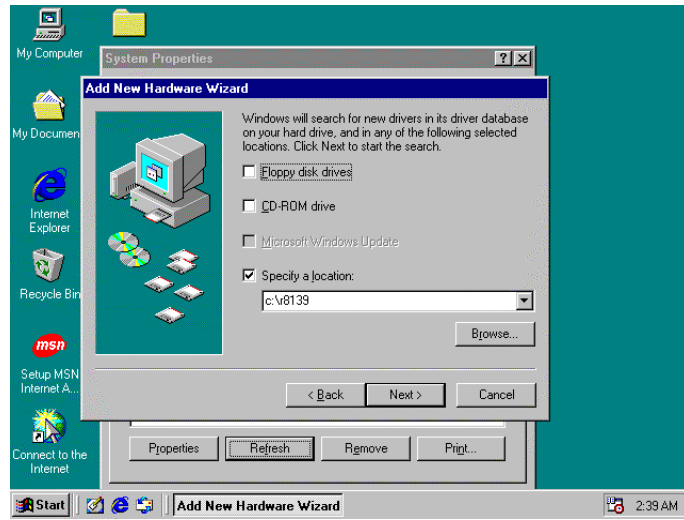
5.5.1 Win98

Windows 98 will detect the network driver automatically therefore there is no need for further configuration.

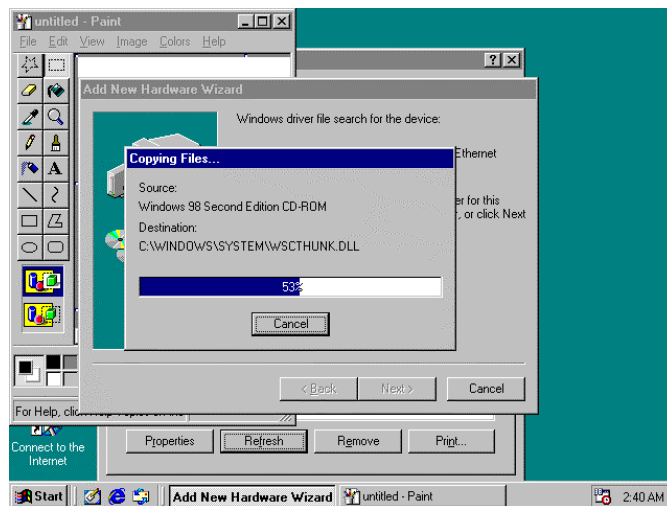
5.5.2 Win95

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**.

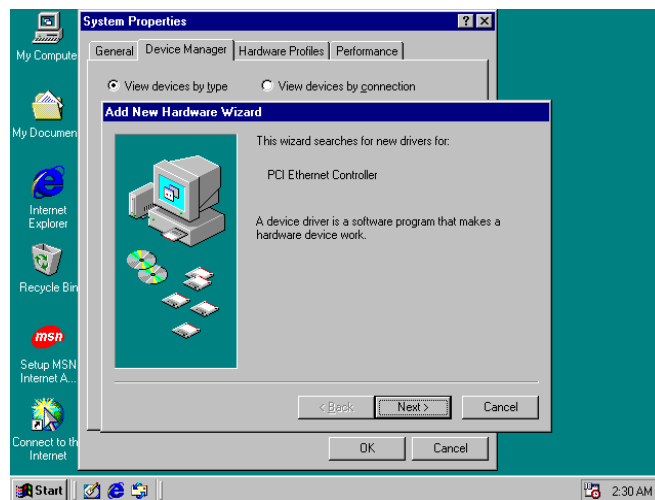
- Specify the path of the new driver and press **Enter**. (If in driver a:, type a:\). If you're not sure exactly where the drivers are, choose the **Browse** button to locate it.



- Once you have located the drivers, select **RTL8139 Fast Ethernet Adapter**.
- Click **OK**. Windows 98 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.

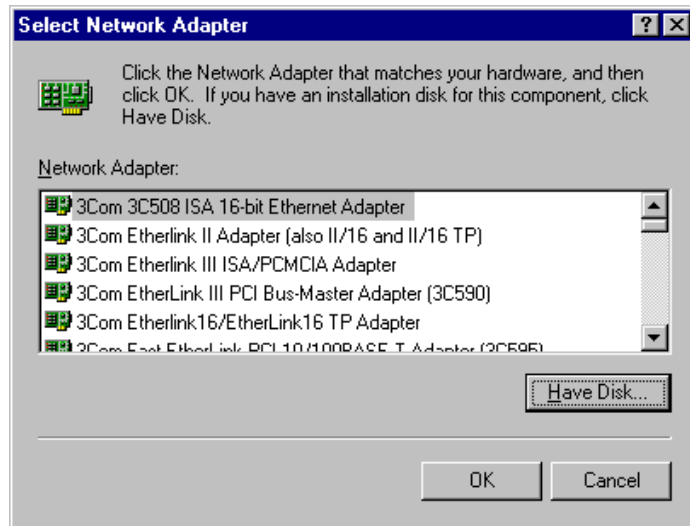


NOTE: *RTL8139 driver installation program is similar with RTL8100's.*

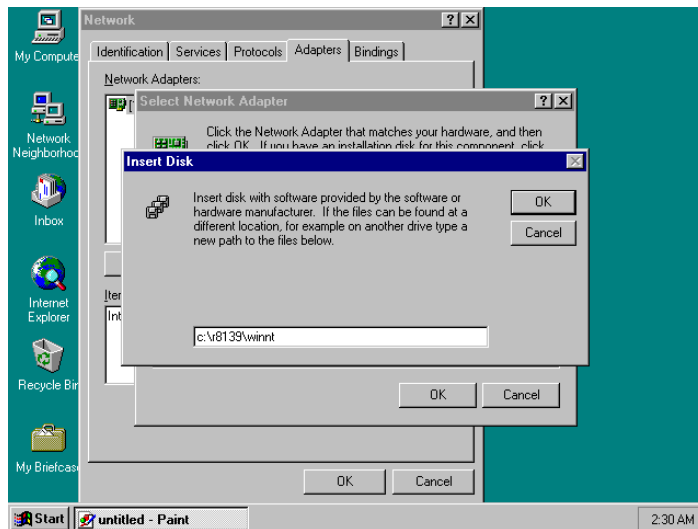
5.6 Network Driver Installation for WIN NT4.0

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.



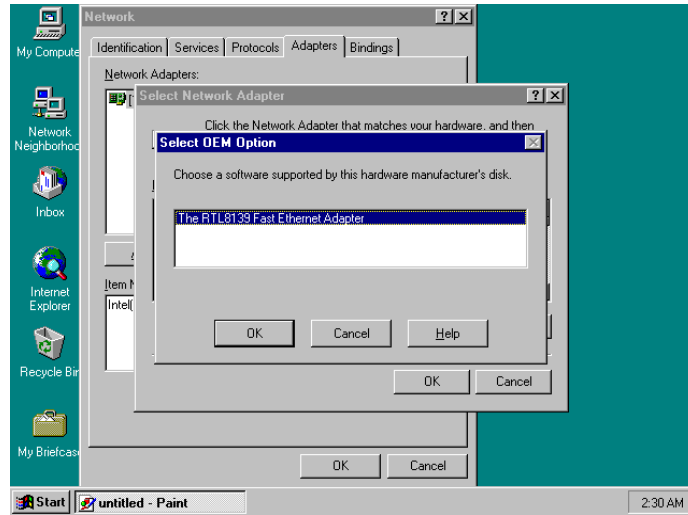
4. Specify the directory where the Windows NT driver files are located. (If in driver A:, type a:\)



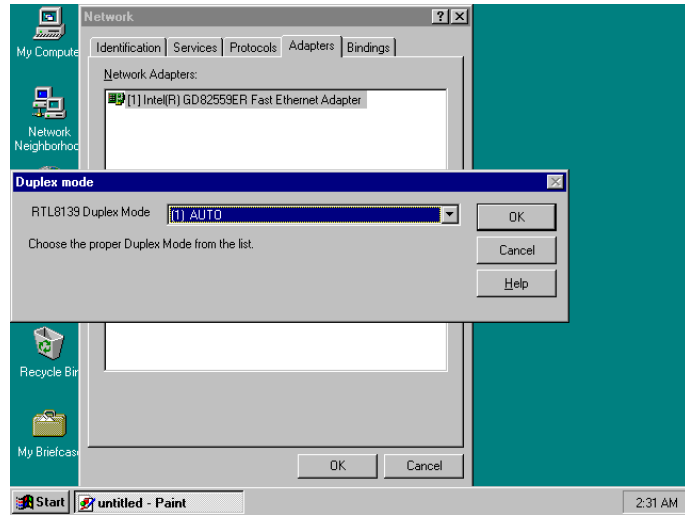
5. The **Select OEM Option** window will then pop up on your screen.

6. Select

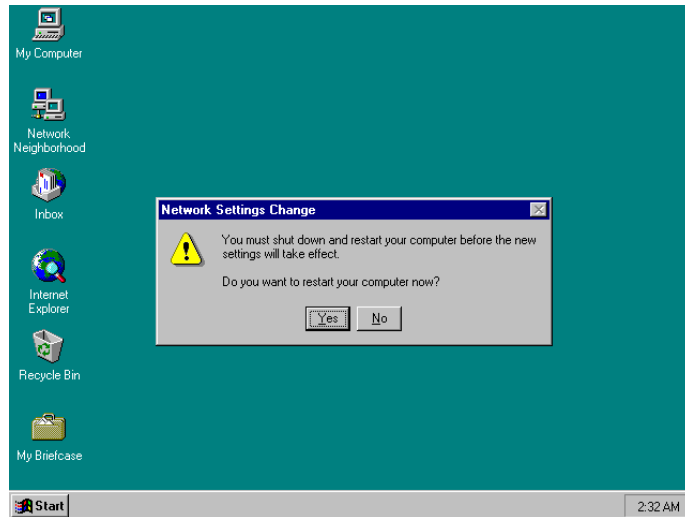
RTL8139 Fast Ethernet Adapter



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.

NOTE: *RTL8139 driver installation program is similar with RTL8100's.*

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Chapter 6

The GPS Receiver

The HS-4500 is designed to facilitate options of Rockwell's "Jupiter" Global Positioning System (GPS) receiver engine based on the Zodiac chip set. The HS-4500 with GPS engine can be used in both static and mobile operations for evaluation purposes.

The HS-4500 implements the receiver control operation and input/output (I/O) functions of the GPS receiver through a serial port, external antenna, and LABMON software. A 2x10 header connector is used to connect the GPS receiver to the HS-4500. Please refer to the Chapter 3 for GPS connector pin assignment.

For specific and more details on applications, please refer to the manual of the GPS engine. You may also contact the supplier of your GPS engine device, or browse <http://www.rockwell.com>.

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