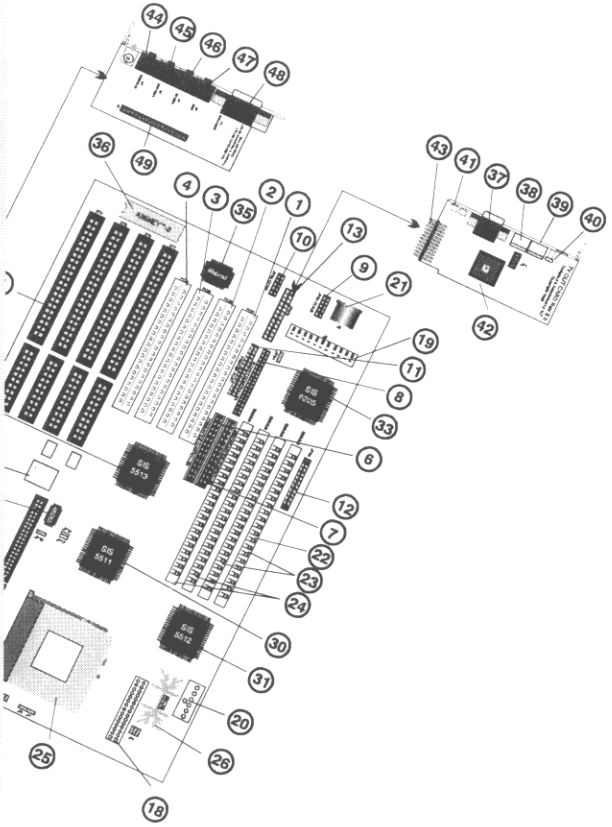
Yukon Motherboard Rev 2.0

for Pentium™ processor-based systems

Reference Manual



Designed and Manufactured in Canada by ATL

Yukon Motherboard

Rev. 2.0

Reference Manual

Notice

ATL reserves the right to make changes or improvements in the product described in this manual at any time without notice.

This manual contains information important for the successful installation and operation of the system board. Please read the information carefully and be sure that you understand it thoroughly before proceeding with installation.

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UMA -- THE TECHNOLOGY FOR NEW GENERATION

UMA (Unified Memory Architecture), or SMBA (Shared Memory Buffer Architecture) allows main memory and graphics frame buffer share a common array. The development of UMA is a logical step in the evolution of computing systems, particularly as the PC industry drives prices down while maintaining or even adding functionality and performance for home users.

UMA, along with USB, PnP, and NSP has become the four new features for PC industry. More and more chipset manufacturers, such as SIS, Intel, and OPTi, support UMA. Operating systems such as Microsoft is under testing for UMA support. In fact, the top 10 OEM manufacturers in the world had already announced their UMA systems.

UMA allows full utilization of any unused system memory. In general, new applications demand more MB with every release. To keep up with these needs, most system manufacturers will ship base models with 16MB of memory in 1996. To run Windows 95, for instance, it requires to have a minimal 8MB of system memory, and 12MB is recommended. In fact, Pentium 75MHz (or 100MHz) with 12MB of memory becomes the new entry-level standard in 1996. Given a standard system with a total of 16MB system memory, there will be an extra 4MB of memory that can be shared with frame buffer through UMA.

Another benefit for UMA is the cost saving for computer end-users. The multimedia home-PC buyer is driven by cost. Low prices and easy upgrading combine to create a very strong market psychology; the consumers can have all-in-one new capabilities, faster performance and lower prices. In UMA operation, computer end-users can flexibly partition 1MB to 2MB of system memory for use as the graphics and video frame buffer. That block can be dynamically

configured in many PC designs, depending on parameters such as color depth and display resolution. Although chip manufacturers regularly offer new generations of denser chips, there is little pressure on frame buffers to expand beyond 2MB. Even emerging 3D accelerators will not push frame buffer sizes significantly. Consequently, the price of smaller stand-alone DRAMs increases as they move out of the mainstream. With traditional frame buffer, DRAM storage can be wasted if, say, an 800x600x256 mode is selected which only requires less than 1MB of frame buffer. By using UMA, computer end-users save money on stand-alone frame buffer. The exact memory space needed for frame buffering is assigned; there is no wasted storage.

UMA allows decrease in PCI bus utilization whereas CPU can have direct access the frame buffer and process data in FB. Data is transfer through memory bus instead of PCI bus. UMA using direct access allows decrease in PCI bus usage of graphics buffer by as much as 30%.

Applications are typically operating in either a calculate or draw mode, not both simultaneously; therefore, they are not truly adversely affected by the bus arbitration. In fact, since the CPU and graphics accelerator share access to the same memory, drawing information will be passed much faster between the two. Also, manipulation of video information by the CPU may be facilitated by keeping the video image in the memory space to which CPU has access.

Another advantage of UMA is the increased bandwidth utilization as 3D become mainstream standard in the next 18 months. 3D applications, such as Windows 95, requires extra bandwidth. The total bandwidth for a 64-bit memory is around 240MB/s. The screen of 3D games are usually 640x480x64K or 320x240x64K. The bandwidth requirement for 3D games is usually under 60MB/s. Assuming system takes 90MB/s to 100MB/s, the remaining memory that can be shared is 90MB/s (240MB/s - 90MB/s - 60MB/s). With UMA, the empty bandwidth can be used for extra 3D

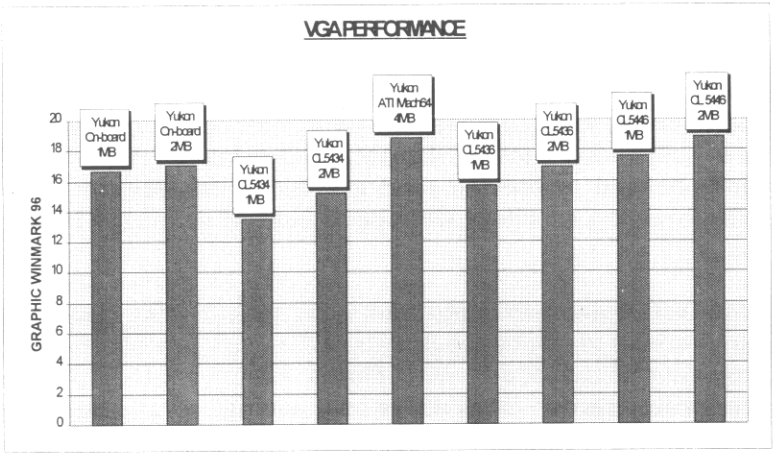
requirement.

Taking system memory away from the applications or operating system potentially increases the need for more swapping between the system memory and hard disk. In mainstream machines, however—where resolution is confined to 800x600 or 1024x768—"borrowing" 1MB or less from the typical 12MB main memory, is unlikely to have any noticeable performance degraded. But as UMA moves upstream to finer resolution or deeper color, system requires to increase the memory bus frequency to improve total bandwidth, and also requires higher performance memories such as synchronous DRAM (SDRAM). SDRAMs offer the bandwidth needed to provide good graphics performance while still providing excellent CPU performance at an affordable cost.

UMA would allow PC manufacturers to integrate mid-level performance graphics acceleration on the motherboard while providing compatibility with higher performance graphics accelerator cards. UMA offers cost saving, yet provide reasonable levels of graphics and video performance in mainstream computers.

YUKON MOTHERBOARD

VGA PERFORMANCE



System Config.	Yukon	Yukon	Yukon	Yukon	Yukon	Yukon	Yukon	Yukon	Yukon
CPU	Pentium 133	Pentium 133	Pentium 133	Pentium 133	Pentium 133	Pentium 133	Pentium 133	Pentium 133	Pentium 133
RAM Size	16MB	16MB	16MB	16MB	16MB	16MB	16MB	16MB	16MB
Cache Size	256K Asych.	256K Asych.	256K Asych.	256K Asych.	256K Asych.	256K Asych.	256K Asych.	256K Asych.	256K Asych.
OnBoard I/O Ctrlr	EIDE mode 4	EIDE mode 4	EIDE mode 4	EIDE mode 4	EIDE mode 4	EIDE mode 4	EIDE mode 4	EIDE mode 4	EIDE mode 4
Video Card	On-board shared 1MB	On-board shared 2MB	CL5434 1 MB	CL5434 2MB	ATI Mach64 4MB	CL5436 1MB	CL5436 2MB	CL5446 1MB	CL5446 2MB
Sound Card	Opti930	Opti930	Opti930	Opti930	Opti930	Opti930	Opti930	Opti930	Opti930
Hard Drive	WD 21000	WD 21000	WD 21000	WD 21000	WD 21000	WD 21000	WD 21000	WD 21000	WD 21000
CD-ROM Drive	FX400	FX400	FX400	FX400	FX400	FX400	FX400	FX400	FX400
BIOS	Award	Award	Award	Award	Award	Award	Award	Award	Award

based on in-house test results.

Introduction

The Yukon Motherboard Rev 2.0 is a state-of-the-art all-in-one motherboard. It hosts Intel's latest Pentium-class 75/90/100/120/133/150/166 MHz CPU and above, and potentially Cyrix's latest 6x86 CPU, and encapsulates the latest technologies on Opti audio, Winbond I/O, and SiS chipset. It is ideal for today's demanding desktop applications.

The Yukon Motherboard Rev 2.0 offers outstanding I/O capabilities. Four PCI local bus slots provide high bandwidth data path for data-intensive functions such as graphics and networking. Winbond W83787IF Super I/O provides floppy and IDE interfaces, first FIFO UART serial port, second FIFO UART with IRDA function serial port, and ECP/EPP-capable parallel port. Four ISA slots complete the I/O mix.

Chipset Level Features

A. CPU

Yukon Motherboard Rev2.0 supports Intel's Pentium class CPUs(75/90/100/120/133/150/166 MHz), and it is potentially compatible with Cyrix's 6x86 Class super CPU only with BIOS upgrade which will be availabe in the future. The all-in-one Yukon Motherboard Rev 2.0 can also support higher class of Intel Pentium class CPU with speed up to 200MHz.

B. SiS 5511 PCI/ISA Cache Memory Controller

SiS5511(PCMC) supports Unified Memory Architecture (UMA), which is explained in the next chapter, and bridges between the host processor/memory subsystem and the PCI local bus. Its fucntions include address mapping/translation mechanism, data buffering, and path management. Generally speaking, it has a primary unit and secondary unit. The primary unit deals with incoming and outgoing cycles from CPU. During configuration cycles, it writes configuration information for the bridge to a block of registers. During data transactions, the primary and secondary bus units can buffer bursts of data in the bridge to allow for concurrency of operations on the PCI bus. The secondary unit manages the PCI bus interface, performing bytes swapping, driving necessary signals, or any other operation required by the bus. The secondary unit can also read from registor space, for operations such as address decoding. The SiS5511 monitors each cycle initiated by the CPU, and forwards it to the PCI bus if the CPU cycle does not target the local memory. For the CPU or the PCI to target the local

memory cycles, the built-in Cache and DRAM Controller assumes control of the secondary cache, DRAMs, and SiS5512 (PLDB). The SiS5511(PCMC) also guides the SiS5512(PLDB) for correct data flow. All of the Green PC functions are provided.

C. SiS 5512 Local Data Buffer

The SiS5512 PCI Local Data Buffer (PLDB) provides a bi-directional data buffering among the 64-bit Host Data Bus, the 64/32-bit Memory Data Bus and the 32-bit PCI Address/ Data bus. The PLDB incorporates three FIFOs and one read buffer among the bridges of the CPU, PCI and memory buses. This buffering scheme smoothes the differences in access latencies and bandwidths among three buses, thus improving the overall system performance.

D. SiS 5513 PCI System I/O

SiS5513 is a highly integrated PCI/ISA system I/O (PSIO) device that integrates all the necessary system control logic used in PCI/ISA specific applications. It consists of a PCI bridge that translates PCI cycles onto ISA bus, and ISA master/DMA device cycles onto PCI bus; a seven-channel programmable DMA Controller, a sixteen-level programmable interrupt controller, a programmable timer with three counters, a built-in RTC with 256 bytes CMOS SRAM, an on-board Plug and Play port, and a built-in PCI master/slave IDE interface.

SiS5513 PCI System I/O serves as a standard bus bridge which is similar in architecture to the host bridge, with buffers, bus units, and configuration registers, except that on the primary bus is PCI, and the secondary side is an ISA. It acts as any PCI agent, except that it usually is the one allowed to use subtractive decode, which resides on the primary (PCI) side of the bridge. It views the PC-compatible address map that the host bridge presents, while providing access to standard PC system resources such as DMA, interrupt controllers, and Base I/O. It also has the following features:

- Integrated ISA Bus compatible logic
- Supports reroutability of four PCI Interrupts to any unused IRQ interrupt
- Supports flash ROM
- Built-in RTC with 256 Bytes CMOS SRAM
- Built-in PCI Master/Slave IDE Controller
- 208-Pin PQFP
- mm CMOS technology

E. SiS 6205 Video Accelerator

SiS 6205 Video Accelerator chip supports 64-bit PCI graphics and video accelerating feature. It shares main board memory by using UMA and provides an economical way to achieve high performance video display for today's demanding graphic applications. It supports:

- full motion picture
- up to 1280x1024x256 graphics mode
- Microsoft Video for Windows

It utilizes built-in 64x64x2 bit-mapped hardware cursor and 64-bit interface to reach 380MByte/sec peak video data throughput. Yet, its resolution supports:

• 640x480	256/32K/64K/16M colours NI
• 800x600	16/256/32K/64K/16M colours NI
• 1024x768	16/256/32K/64K colours NI
• 1280x1024	16/256 colours NI

It also supports 80/132 columns text mode in 25, 30, 44 or 60 rows and other modes and 75Hz vertical refresh rate.

F. Winbond W83787IF Super I/O

Winbond W83787IF Super I/O supports 2 floppy drives, 1 bi-directional parallel port which supports both normal and EPP/ECP, one high speed 16550 UART serial port, and second high speed 16650 UART serial port with the option of using infrared as a transmission medium (this option can be used if COM2 disabled in CMOS). The infrared interface supports:

- Conforms to IRDA 1.0 (Infrared Data Association)
- Data rate: 2.4 - 115.2 kbps
- Modulation type: HPSIR
- Receiving distance: 1m
- Transmitting wavelength: 850 - 900nm

The infrared port allows wireless communication between two computers or between a desktop and notebook for file and data transfer. Before leaving for a trip, for instance, important files or programs can be copied from the desktop PC to the notebook by simply starting a transfer program and holding the notebook in front of the PC at a reasonable distance. Some laser printers, like the HP IRDA laser jet, allow for easy printing without using a printer cable.

G. 16-Bit OPTi 82C930 Sound Controller

The OPTi 82C930 is a high performance sound controller. It is compatible with Sound Blaster Pro™, AD Lib™, MPU-401, and Microsoft Windows Sound System™.
The OPTi 82C930 16-bit Sound Controller provides all of the functions and interfaces for the Sound Blaster-compatible and Microsoft Windows Sound System-compatible card. It includes the functions of AT Bus interface, Sound Blaster-compatible Digital Audio Processor, MIDI interface, Windows Sound System interface, FM synthesizer interface, 16-bit Codec/Mixer and Game Port timer. Its features are as following:

- Built-in 16-bit Sigma-Delta Stereo Codec
- Built-in 5-channel MPC compatible stereo mixer
- 32-Step master volume control
- 8 or 16-bit sound data up to 48 kHz stereo
- Supports 235 sample rates from 4kHz to 48kHz
- Integrated MIDI UART with FIFO for both in and out with MPU-401 interface
- Direct OPL3 interfaces
- Dual DMA channels for Full Duplex Operation
- Playback and Capture with On-chip FIFOs for simultaneous playback and record
- Wavetable upgrade

Furthermore, all DMA and interrupt selections are software programmable.

System Level Setup

A. Unified Memory Architecture

The Yukon motherboard supports a new technology called Unified Memory Architecture (UMA). UMA allows the VGA controller integrated into the chipset to share a pre-determined portion of the main system memory to use as VGA memory. The amount of system memory used for VGA can be determined by the user through an option located in the CMOS setup program. Under the section CHIPSET FEATURES SETUP, the user can indicate 1MB or 2MB of VGA memory next to *VGA Shared Memory Size*. (detailed information refer to UMA section)

B. Energy saving

Environmentally friendly: supports SMI, SMM, STOPCLK to meet the EPA requirement for low power consumption when idle.

C. Plug & Play

Plug and Play BIOS extension is included in on-board flash memory BIOS ROM which is a 1MBit Flash BIOS for easy BIOS upgrade. Since Plug & Play BIOS is implemented in Yukon Motherboard Rev 2.0, there is no jumpers to configure when purchasing an plug and play ISA/PCI peripherals. Such feature makes installation of hardware peripheral board easy, and saves time for less experienced users. This standard compies with Microsoft PC95 standard.

D. Desktop Management Interface-DMI

Yukon supports DMI in bios level. DMI is an emerging new standard that eliminates the gap between management software and the system's components that require arrangement.

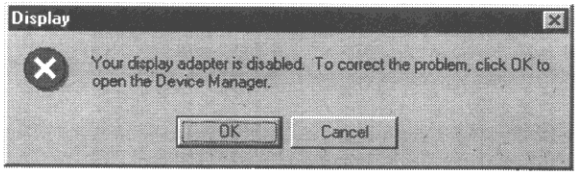
E. VGA / PS/2 Mouse board
(Applied to on-board VGA models only)

The VGA / PS/2 Mouse board is an extended board which provide VGA and PS/2 mouse interface. With the optional CHRONTEL CH7001 chip, it can become a fully integrated solution for converting analog RGB and synchronization signals from a standard VGA source into high-quality NTSC or PAL video signals.

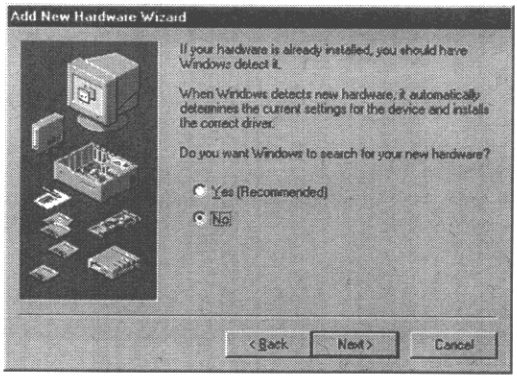
1. Driver Installation

There are several possible scenarios regarding video driver installation. The following installation instruction is based on the assumption that no video driver has been installed on the system before. To install SiS 8205 driver on the system:

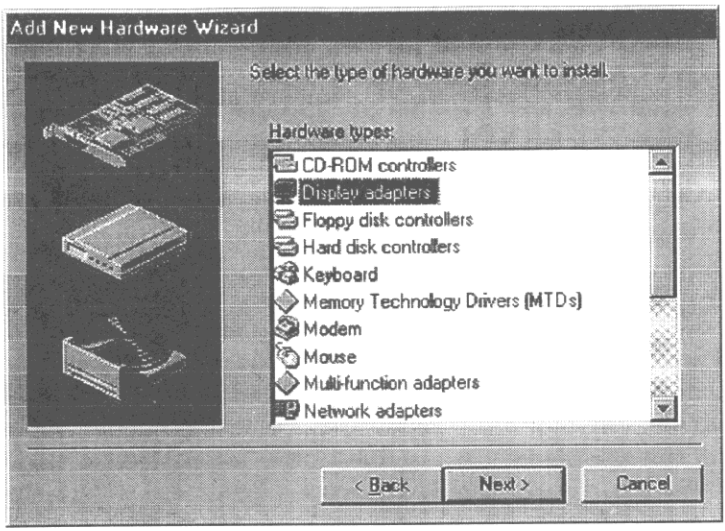
(a) When the system powers on, the following error message will appear. Click on "OK".



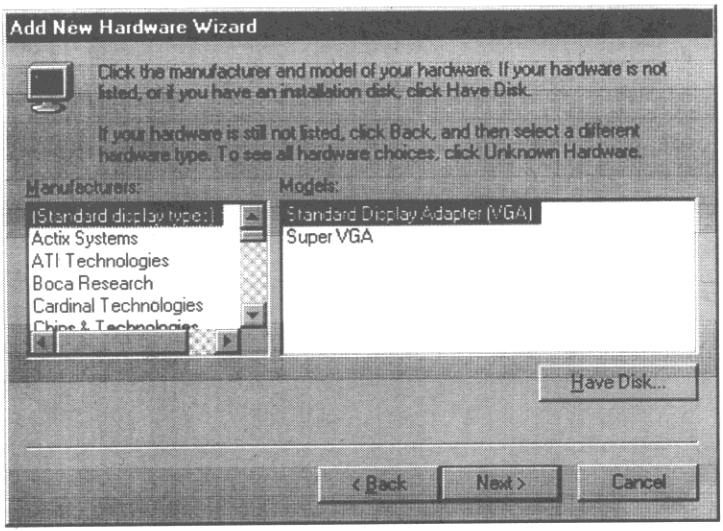
(b) Click on "NEXT", select "NO", then click on "NEXT"



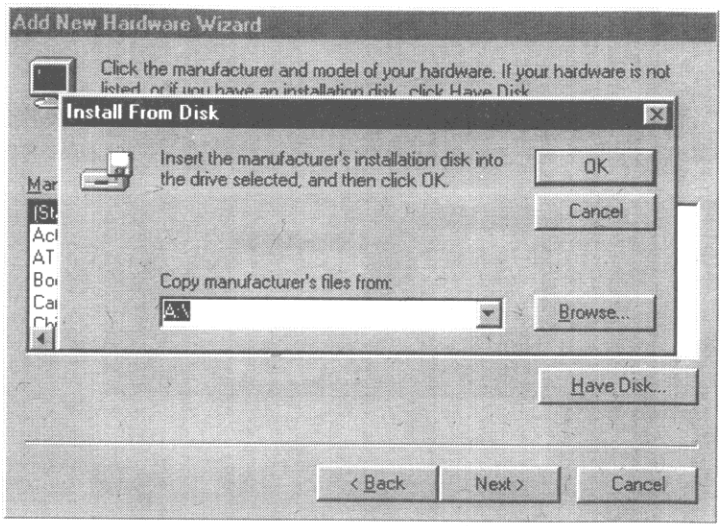
(c) Select "Display adapters" and click on "NEXT"



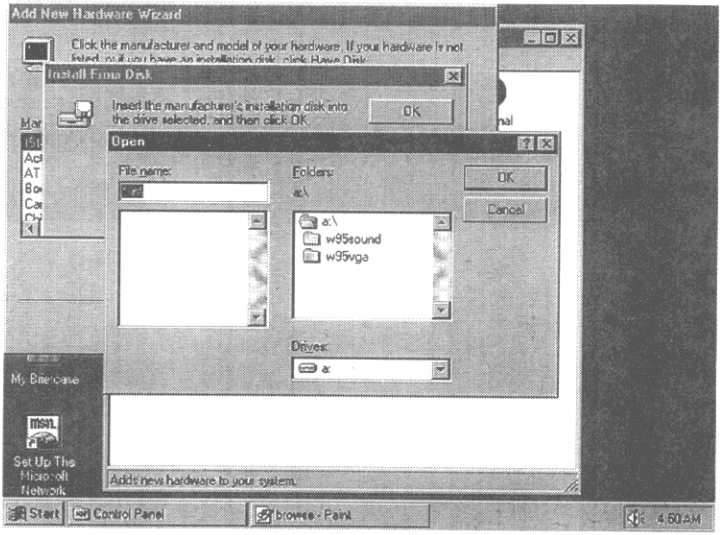
(d) Insert the driver diskette and then click "Have Disk"



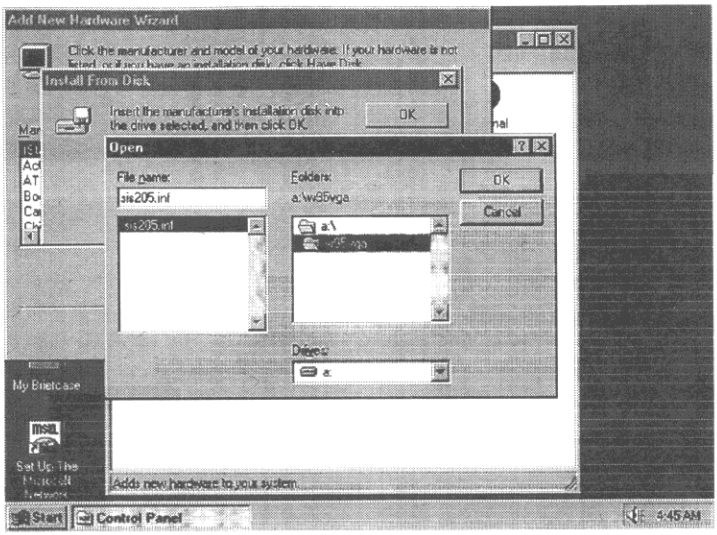
(e) Click "Browse"



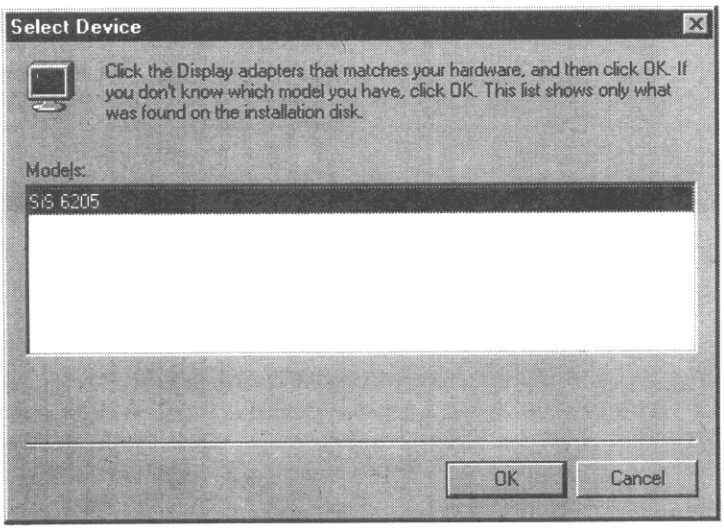
(f) Choose "w95vga" directory, and click "OK"



(g) Choose "sis205.inf" and click "OK"



(h) Click on "OK" to finish the installation.



2. Video-Out Feature (Optional to on-board VGA models)

There are 2 TV out jacks:

- RCA composite jack
- S-Video jack for high quality TV video out

This optional video-out feature allows a user to hook up the system to standard TV and VCR. Users can output graphics and presentations from computer to TV; meanwhile they can capture these graphics and presentations on videotape by using a standard VCR for future playback.

Note: Capture capability depends on the software application installed

Detailed functions of Video out are:

- 3-line digital vertical filtering with pin-programmable characteristics for optimum anti-flicker and resolution
- Digital colour sub-carrier generation and colour modulation
- Accuracy for colour sub-carrier frequency independent of VGA pixel rate accuracy
- Simultaneous Composite/S-Video output
- Horizontal and vertical position control
- Pin-programmable underscan/overscan mode

Jumper		TV out
JP1	1	Reserved
JP1	2	Reserved
JP1	3	
	ON*	Overscan
	OFF	Underscan
JP1	4	
	ON	PAL
	OFF*	NTSC

Note: 640x480 at 60Hz must be used for TV out

F. Audio Card
(Applied to on-board Audio models only)

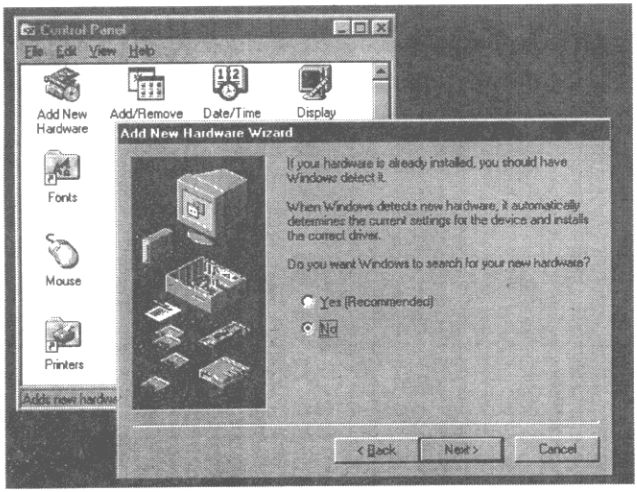
This Audio Interface Card provides the interface to 16-bit sound controller. It is capable of emiting both amplified and nonamplified audio output. There are 5 connectors on this card, and they are:

- Speaker out
- Line out
- Line in
- Microphone
- MIDI port

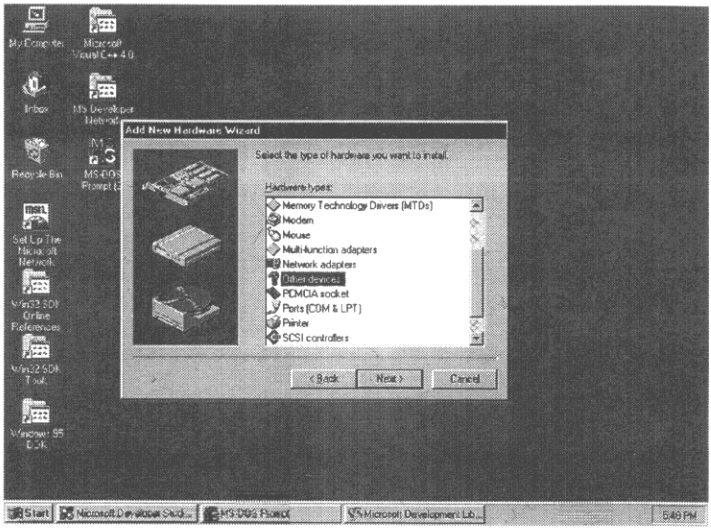
1. Driver Installation

To install Audio driver on the system:

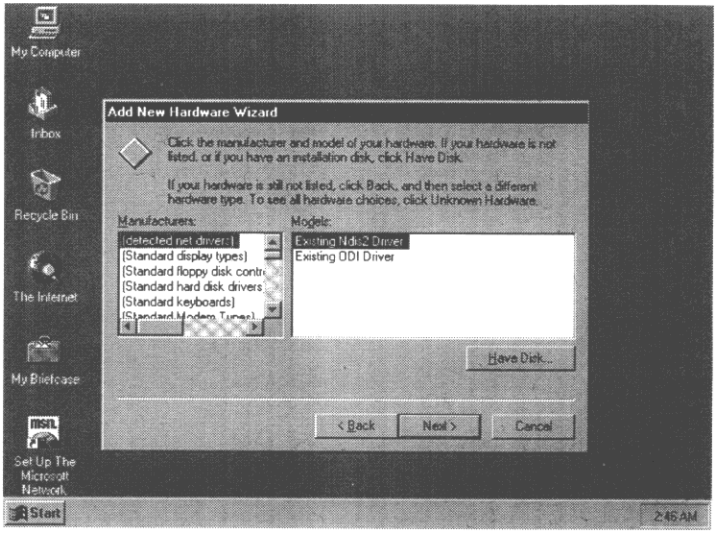
(a) Open "Control Panel" and select "Add New-Hardware". When click on "NEXT", the following screen pops up. Select "NO", and click on "NEXT".



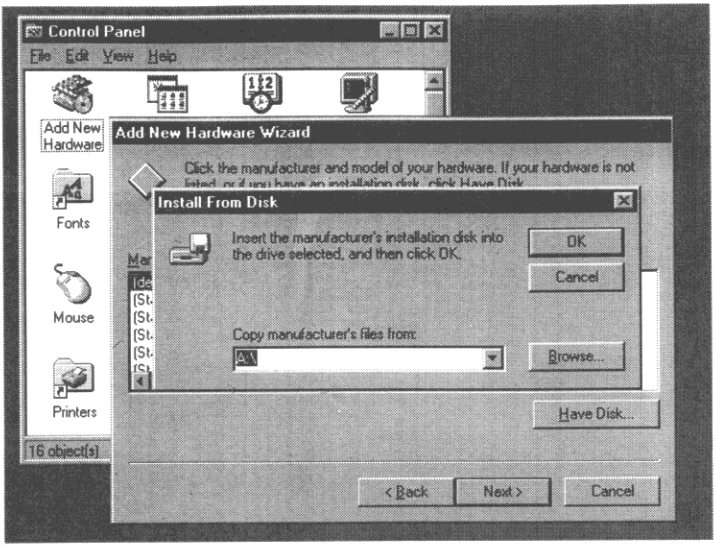
(b) Select "Other Device" and click on "NEXT"



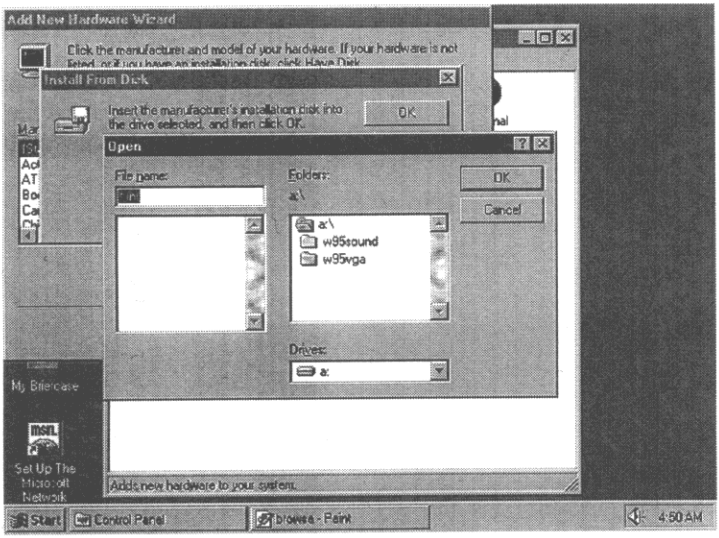
(c) Insert the driver diskette, and click on "Have Disk"



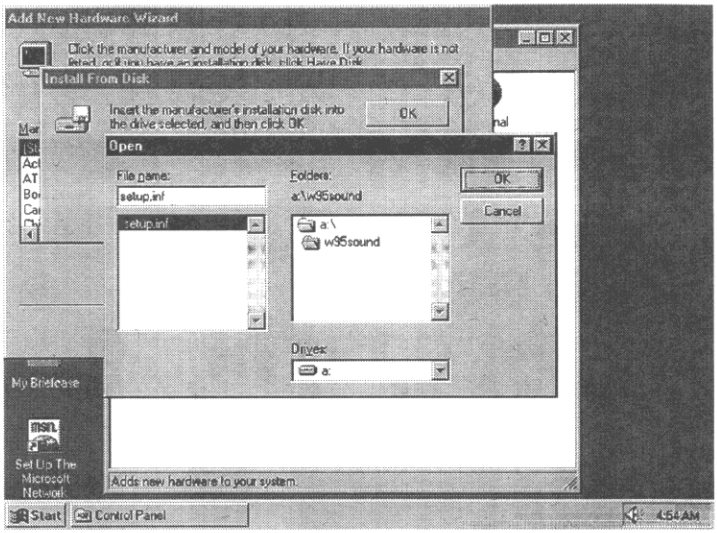
(d) Click "Browse"



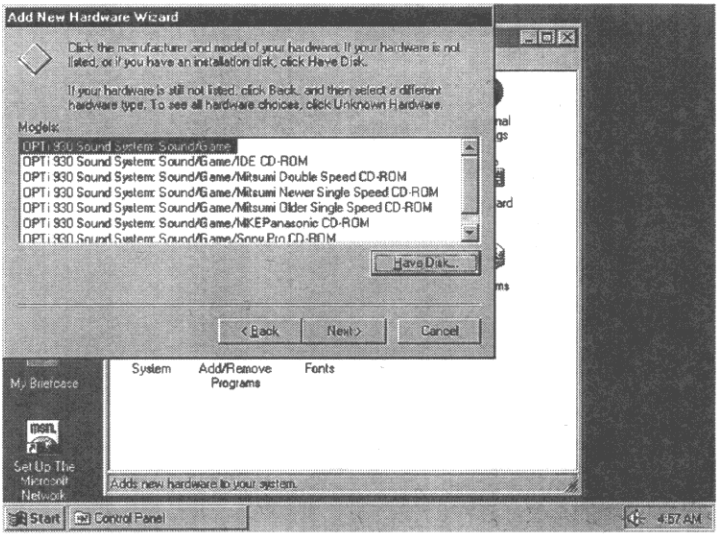
(e) Choose "w95sound" directory, and click "OK"



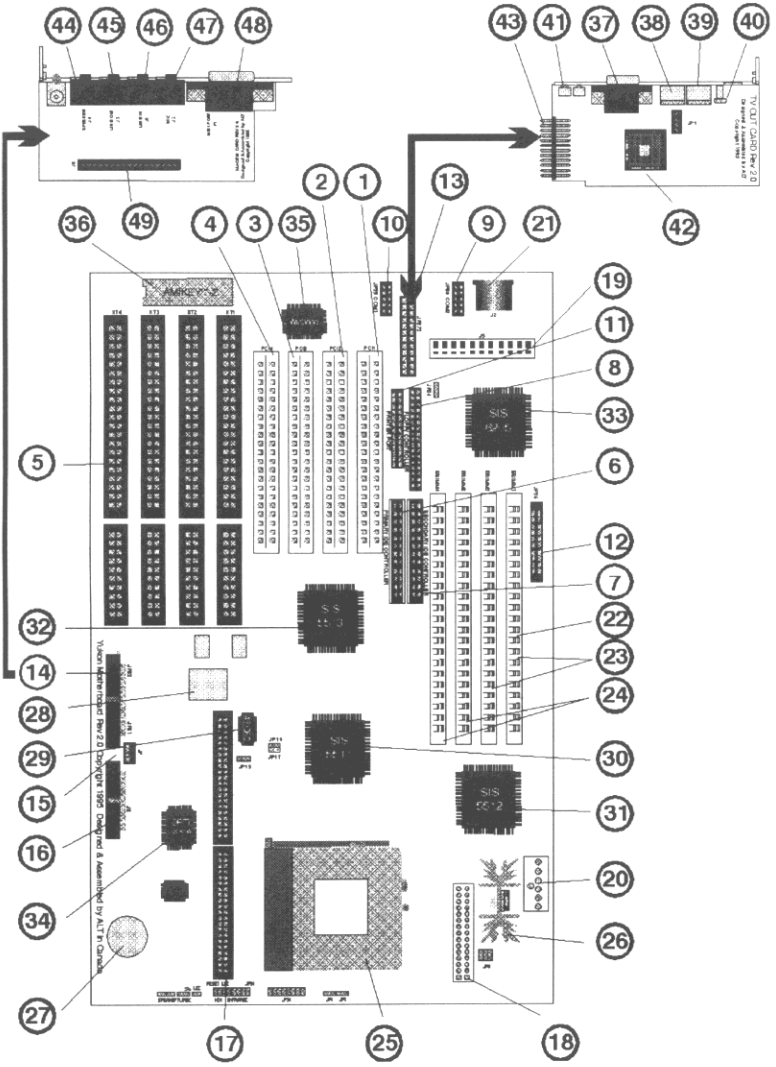
(f) Choose "setup.inf" and click "OK"



(g) Choose "OPTi 930 Sound System Sound/Game". Click "NEXT" and follow the instructions to finish the installation.



G. Motherboard Layout



This list provides an indication of the key component on YUKON main board and VGA / TV / PS/2 Mouse board. (The numbers in the table below correspond to the items located on the following diagram.)

Main board:

Number	Item
1	32-bit PCI Slots, slot #1
2	32-bit PCI Slots, slot #2
3	32-bit PCI Slots, slot #3
4	32-bit PCI Slots, slot #4
5	16-bit ISA Slots
6	Primary EIDE Connector
7	Secondary EIDE Connector
8	Floppy drive Connector
9	Second UART for COM2 if IRDA is disable
10	First UART for COM1 connector
11	Parallel Port Connector
12	VGA Feature Connector
13	VGA / TV / PS/2 Out Card Connector
14	Audio / MIDI Cable Connector
15	CD-ROM Audio Cable Connector
16	Wavetable upgrade card Connector
17	Second Level Cache Module Connector
18	VRM Module Connector
19	P8 and P9 Power Connector
20	3.3V Power Connector
21	Keyboard Connector
22	SIMM Memory 32-bit
23	SIMM Memory 64-bit Bank 0
24	SIMM Memory 64-bit Bank 1
25	Pentium CPU ZIF Socket
26	Heat Sink and 3.3V Voltage Regulator

Number	Item
27	CMOS Backup Battery
28	Flash BIOS
29	W48C60 Clock Generator Chip
30	SIS 5511 Core Logic Chip
31	SIS 5512 Core Logic Chip
32	SIS 5513 Core Logic Chip
33	SIS 6205 Video Chip
34	OPTi 82C930A Sound Chip
35	Winbond W83787IF
36	AMIKEY Keyboard Controller

VGA / TV out/ PS/2 Mouse board:

Number	Item
37	VGA Monitor Connector
38	PS/2 Mouse Connector
39	TV S-Video Connector
40	TV Composite Connector
41	TV Horizontal picture position adjustment
	switches
42	CH7001 TV Out Chip
43	Main Board Interface Connector

Audio Card:

Number	Item
44	Speaker Connector
45	Line out Connector
46	Line in Connector
47	Microphone Connector
48	MIDI port Connector
49	Main Board Interface Connector

H. Motherboard Jumper Settings

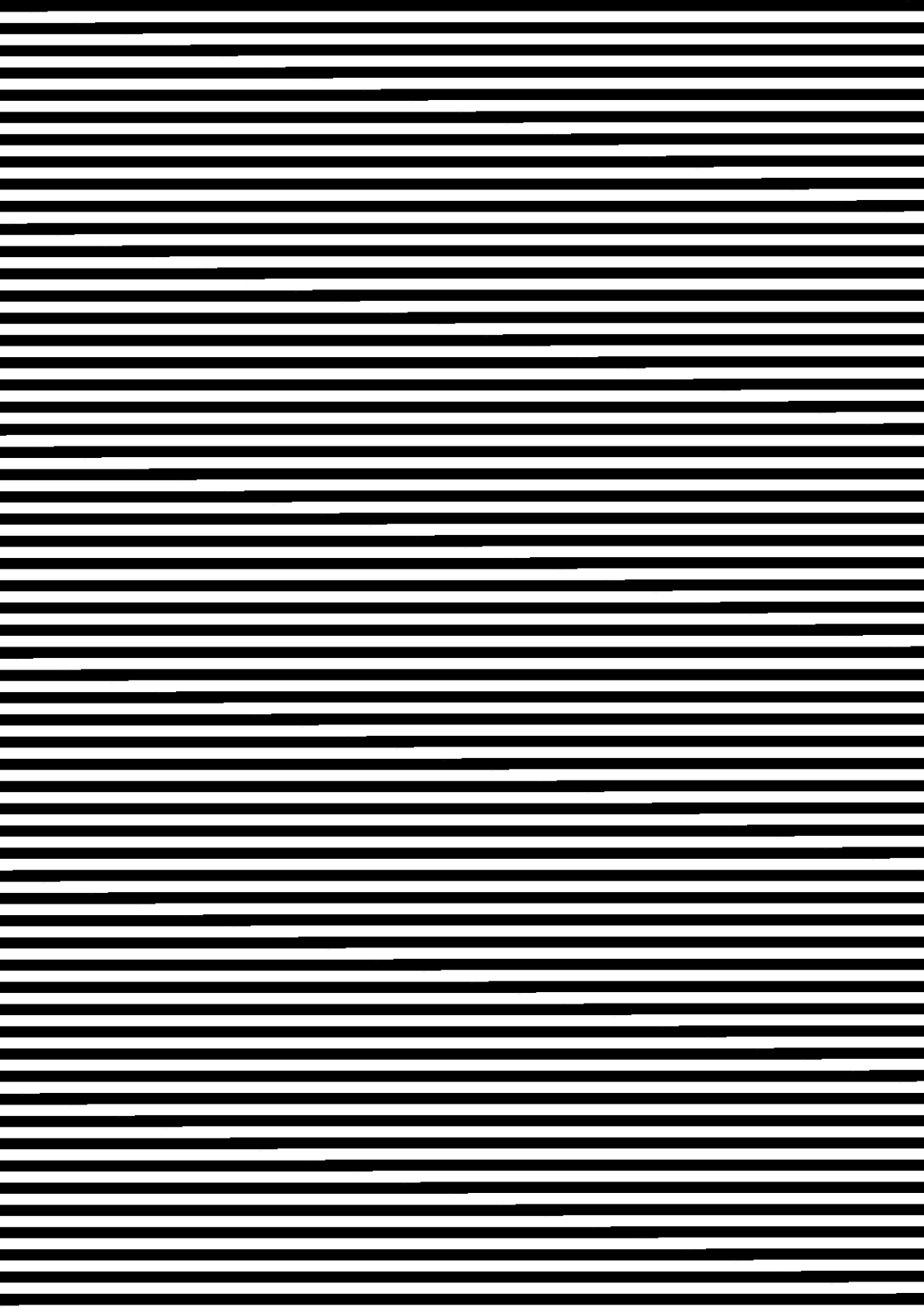
Main board:

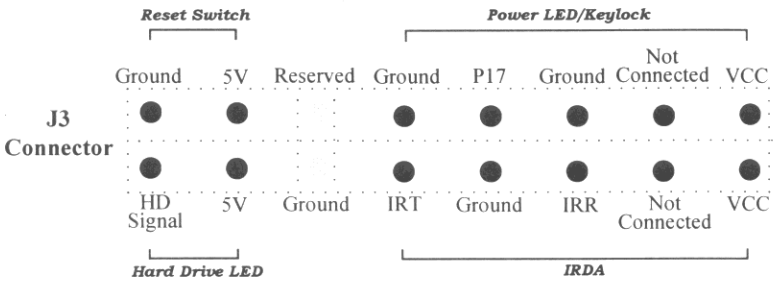
POSITION		SETTINGS
JP6	JP7	CPU Clock Divider
1-2	1-2	1 : 1.5
2-3	1-2	1 : 2
2-3	2-3	1 : 2.5
1-2	2-3	1 : 3
JP15		Second Level Cache Type
1-2		Second level cache is Asynchronous
2-3		Second level cache is Synchronous
JP19	JP17	CPU CLOCK
ON	ON	50MHZ
ON	OFF	60MHZ
OFF	ON	66MHZ
OFF	OFF	40MHZ
JP24		On-board VGA
ON*		Shared Memory
OFF		Disable Shared Memory
JP25		On-board Sound
ON*		Enabled
OFF		Disabled

I. Motherboard Connectors

After setting the jumpers, installing the CPU, cache SRAM, and Memory DRAM, the next step is to install the system board in the case and make the proper case connections. There are 9 connectors on the YUKON system board.

Connectors		Pin	Description
Reset Switch	J3	1	Reset Signal
		2	Ground
Power LED/Keylock	J3	1	+5V
		2	NC
		3	Ground
		4	Keylock (P17)
		5	Ground



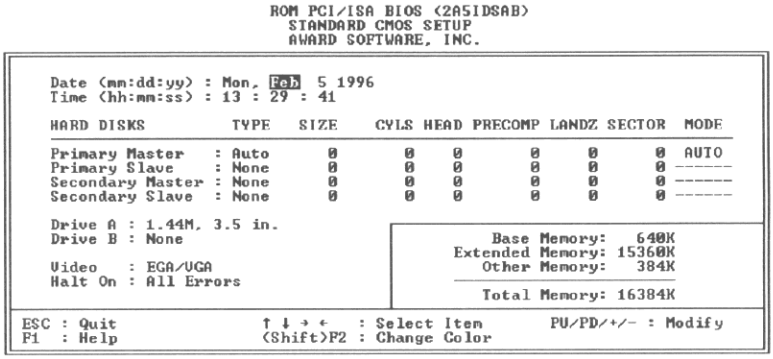


It is imperative that the power connectors be secured in the proper configuration. Failure to do so could cause damage to the board when powered up.

Connectors		Pin	Description
Speaker	JP22	1	Data out
		2	Ground
		3	Ground
		4	+5V
Power Connectors	J5	1	Power good
		2	+5V
		3	+12V
		4	-12V
		5	Ground
		6	Ground
		7	Ground
		8	Ground
		9	-5V
		10	+5V
		11	+5V
		12	+5V
Keyboard Connectors	J2	1	Keyboard clock
		2	Keyboard data
		3	NC
		4	Ground
		5	KBD power
Turbo SW	JP21	1	Turbo in
		2	Ground
		3	NC
Turbo LED	JP20	1	Ground
		2	Data out
Hard Drive LED	J3	1	+5V
		2	HD Signal
IRDA	J3	1	+5V
		2	NC
		3	IRR
		4	Ground
		5	IRT

By selecting 'Standard CMOS Setup' option in the 'CMOS Setup Utility' menu, the following shows:

Standard CMOS Setup



This menu describes the current settings of time, date, year, memory, hard drives, floppy drives and the error mode. Among them, almost all settings can be changed except the memory configuration, which is determined solely by the CMOS setup routine. The settings are recommended to be the same as the above diagram.

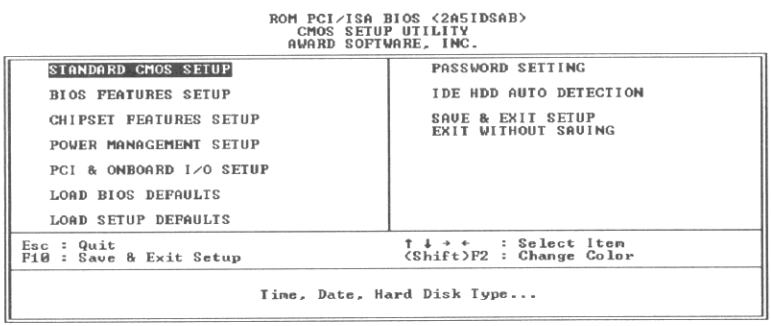
BIOS Level Features

A. CMOS Setup Utility

At power up, press 'DEL' key on the keyboard to run CMOS Setup Utility. This utility configures the system to obtain optimal performance.

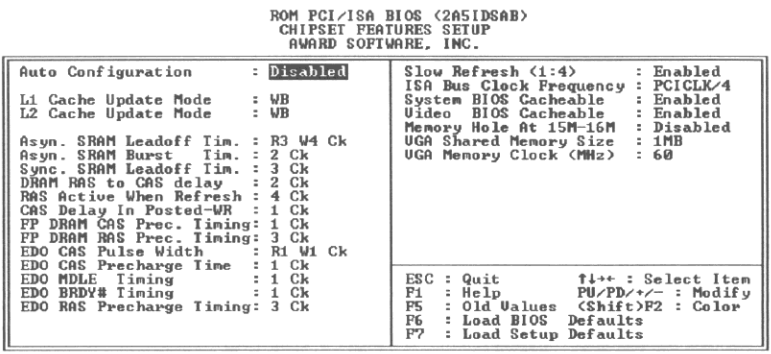
The utility is shown as following:

CMOS Setup Utility



By selecting 'Chipset Features Setup' option in the 'CMOS Setup Utility' menu, the following shows:

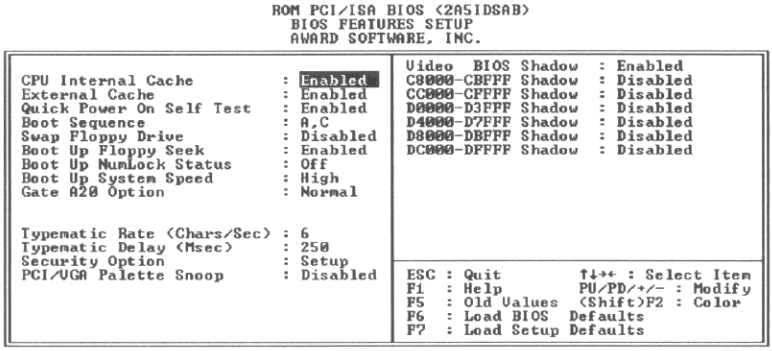
Chipset Features Setup



This menu describes the current settings of the chipset. This setting is typical for SIS chipset; therefore, it is recommended to use the same setting as above diagram. Due to different performance tolerance of SRAM modules from other manufacturers, 'Asych. SRAM Leadoff' may not be set to 'R3 W3 Ck'.

By selecting 'BIOS Features Setup' option in the 'CMOS Setup Utility' menu, the following shows:

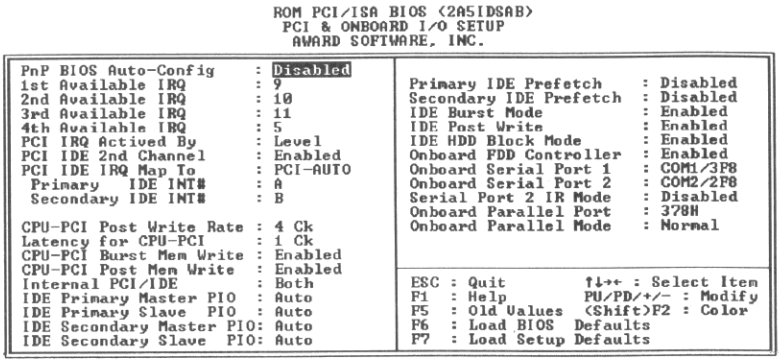
BIOS Features Setup



This menu describes the current settings of L1 cache, L2 cache, Boot Sequence, shadowing on BIOS, and keyboard. The settings are recommended to be the same as above diagram. However, 'Gate A20 Option' can also be set to 'High'.

By selecting 'PCI & Onboard I/O Setup' option in 'CMOS Setup Utility' menu, the following shows:

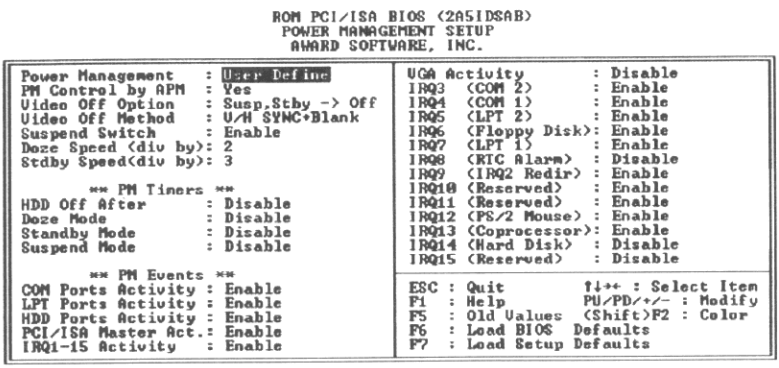
PCI & Onboard I/O Setup



This menu describes the current settings for PCI and Onboard I/O Setup. It is only recommended to be set to 'Setup default'.

By selecting 'Power Management Setup' option in 'CMOS Setup Utility' menu, the following shows:

Power Management Setup



This menu describes the current settings of Power Management. These settings are recommended not to be changed unless required by some other peripheral devices.

To disable a password, just press <ENTER> when "Enter Password" appears.

If you choose IDE HDD AUTO DETECTION, a box appearing on the screen is similar to the following box. This information indicates the size of your hard drive.

Select Primary Master Option (N=Skip) : N

OPTIONS	SIZE	CYLS	HEAD	PRECOMP	LANDZ	SECTOR	MODE
2(Y)	1083	525	64	0	2099	63	LBA*
1	1083	2100	16	65535	2099	63	NORMAL
3	1083	1050	32	65535	2099	63	LARGE

Usually LBA is the default option for HD regardless the size. LBA allows sectors on the drive to be addressed by using cylinder, head, and sector numbers, or by using a single 28-bit logical block address.

*LBA: Logic Block Addressing

CMOS Setup Utility

ROM PCI/ISA BIOS (2A5IDSAA)
CMOS SETUP UTILITY
AWARD SOFTWARE, INC.

If no drive is connected, the following box will appear on the screen:

Select Primary Slave Option (N=Skip) : N

OPTIONS	SIZE	CYLS	HEAD	PRECOMP	LANDZ	SECTOR	MODE
1(Y)	0	0	0	0	0	0	NORMAL

CMOS Setup Utility

ROM PCI/ISA BIOS (2A5IDSAA)
CMOS SETUP UTILITY
AWARD SOFTWARE, INC.

LOAD BIOS DEFAULTS is to load a set of pre-defined paremeters. The following question will appear on your screen:

```
Load BIOS Defaults (Y/N) ? N
```

If you wish to quit without loading the BIOS defaults, type N. If you wish to quit and load the BIOS defaults, type Y.

LOAD SETUP DEFAULTS is also to load another set of pre-defined parameters. The following question will appear on your screen:

```
Load SETUP Defaults (Y/N) ? N
```

If you wish to quit without loading the SETUP defaults, type N. If you wish to quit and load the SETUP defaults, type Y. We recommend using Setup Defaults.
If you choose the option **PASSWORD SETTING**, the following question will appear on your screen:

```
Enter Password :
```

Enter the password and press <ENTER>. This password will replace any previous password. You will be prompted to confirm the password.

CMOS BIOS settings. Set to system will allow you to password protect the entire system.

Video BIOS Shadow: Programs that reside in ROM (Read-Only-Memory) can be speed up if they are copied to faster main memory and then executed from this location. This technique is called shadowing and is usually used for System BIOS and VGA adapters. **System** and **Video** BIOS should always be shadowed. Certain adapter ROMs can be shadowed but this will require experimentation when the adapter is installed.

IDE Second Channel Control: Enable or disable secondary IDE.

Auto Configuration: This is usually set to disabled. When disabled, the system can be fine tuned for the particular options installed on the system board.

LCLK Select Control: Set to Sync. Sync means LCK equal to CPU clock divided by 2. Async means LCK speed between 25-33 Mhz.

AT Bus Clock: This allows selection of the ISA Clock. Please refer to the chart below.

PCICLK	ATCLK SETTING
25MHz	PCICLK/3
30MHz	PCICLK/4
33MHz	PCICLK/4

Note: *Yukon always set to PCICLK=33MHZ, so ATCLK=PCICLK/4*

Slow Refresh: DRAM must be pulsed periodically in order to retain the information stored in its cells. This method of pulsing the DRAM is called refreshing. Hidden Refresh refers to sneaking in refresh cycles without disturbing the CPU and thereby improving system performance. Default is enabled.

B. BIOS Terminologies

Only some common terms are explained here.

CPU Internal Cache: This refers to enabling and disabling of the cache which is internal to the processor. For faster performance, this should always be enabled.

External Cache: External cache enabling refers to the secondary cache which was installed on the system board. Default is enable unless there is no cache on the system board.

Quick power on self Test: The power on self-test does several system diagnostics including testing the system DRAM. For faster boot up, this should be enabled.

Boot Sequence: Here, you can set the boot sequence of which drive to check first. e.g. A,C means check the floppy drive A: for a bootable disk and if no disk found then boot from drive C:

Swap floppy drive: Allows you to exchange the floppy designators.

Boot up Floppy Seek: Floppy does a seek test at boot up

Boot up Numlock Status: If enabled causes the numeric keypad to be active rather than the cursor control functions.

Boot up system speed: set to high for fastest speed

IDE HDD block mode: Default is enabled.

Gate A20 option: This refers to control of the A20 handler line that allows access to the protected mode memory area.

Security Option: This is for configuring the password access. Set to setup will allow you to password protect the

System Upgrade

A. CPU Installation / Upgrade

The following are CPUs and speeds available for the YUKON.

PENTIUM™ - The YUKON supports the 3.3V or VRM Pentium™ 75/90/100/120/133/150/166MHz and above. These processors include separate 8 KB code and data caches for total of 16KB internal (level 1) cache. Internal speed is 1.5x/2x/2.5x/3x of the external bus speed [example: Pentium 100 is external 66MHz (1.5x) bus speed, Pentium 133 is 66MHz (2x) and Pentium 166 is 66MHz (2.5x)]. A 320 pin ZIF Socket is included to house these processors.

For installation of a new CPU, or upgrade of an existing CPU, repeat the following procedures (**ALWAYS** use a CSA-approved grounding strap or other anti-static device):

1) Turn off the power.

2) Upgrading an existing CPU is easy with the ZIF (Zero Insertion Force) socket. Open the ZIF socket by moving the handle to the upright position, the old CPU is now free. Lift it straight out of the socket

3) Align the new CPU with the socket (be sure all the pins on the CPU are aligned with the holes). One corner of the CPU is notched and marked with a round dot and you should align it with the pin one mark (white triangle on the board or alignment pins on the socket).

4) With the ZIF socket handle in the upright position set the CPU straight into the socket, it should drop in easily requiring no force. Make sure that all pins are fully inserted in the appropriate holes. Gently hold the CPU in place and push the handle to the closed position.

L1 Cache Update Mode: Default is Write Back. Two write policies are supported by the YUKON, one is Write Back, the other one is Write Through.

L2 Cache Update Mode: Default is Write Back.

Asyn SRAM Leadoff Tim: Selections are as follows R3/W3, R3/W4, R4/W4; default is R3/W4 (R: Read. W: Write)

Asyn SRAM Burst Tim: 2 or 3 CLK; default is 2 CLK

Sync SRAM Leadoff Tim: Always is 3 CLK (CPUCLK)

DRAM RAS to CAS Delay: 2 or 3 CLK; default is 2

Video BIOS Cacheable: This one can usually be enabled for faster access but is highly dependent on the installed video adapter. Some video adapters do NOT function properly when this is enabled. This has no effect unless the ROM has already been shadowed (see Shadow). However, the default is usually enabled.

System BIOS Cacheable: Similar to the concept described earlier as shadowing, however, in this case parts of the ROM code are copied into cache in order to increase performance.

VGA Shared Memory: 1MB or 2MB; default is 1MB for 8MB; 2MB for 16 MB.

VGA Memory Clock (MHZ): 40-70MHZ; default is 60MHZ

Total	ESIMM1	ESIMM2	ESIMM3	ESIMM4
20MB	512KB	512KB	2MB	2MB
24MB	1MB	1MB	2MB	2MB
32MB	2MB	2MB	2MB	2MB
34MB	256KB	256KB	4MB	4MB
36MB	512KB	512KB	4MB	4MB
40MB	1MB	1MB	4MB	4MB
48MB	2MB	2MB	4MB	4MB
64MB	4MB	4MB	4MB	4MB
66MB	256KB	256KB	8MB	8MB
68MB	512KB	512KB	8MB	8MB
72MB	1MB	1MB	8MB	8MB
80MB	2MB	2MB	8MB	8MB
96MB	4MB	4MB	8MB	8MB
128MB	8MB	8MB	8MB	8MB

Double Density SIMM
512 KB x 32/36 = 2MB
2 MB x 32/36 = 8 MB
8 MB x 32/36 = 32 MB

Single Density SIMM
1 MB x 32/36 = 4 MB
4 MB x 32/36 = 16 MB
16 MB x 32/36 = 64 KB

Note: *32/36* *32 stands for 32-bit (without parity)*
36 stands for 36-bit (with parity)

B. Memory Installation / Upgrade

Memory is used to hold information and programs while they are being accessed by the micro-processor. The YUKON system board uses DRAM (Dynamic Random Access Memory) memory modules. The system board can support memory from 2MB to 128MB using various combinations of 256 KB x 32/36 (1 MB), 512 KB x 32/36 (2 MB), 1 MB x 32/36 (4 MB), 2 MB x 32/36 (8 MB), 4 MB x 32/36 (16 MB), 8 MB x 32/36 (32 MB), 16 MB x 32/36 (64 MB) SIMMs.

There are four single/double density SIMM sockets on the system board. The DRAM controller supports both single density and double density SIMMs. Since the DRAM controller uses 64-bit architecture, 2 pieces of 72 pin SIMM (32-bit) are required for one 64-bit bank. (Refer to board layout picture).

The following chart describes available memory configurations and the module type and quantity required for each configuration.

Total	ESIMM1	ESIMM2	ESIMM3	ESIMM4
2MB	256KB	256KB	-	-
4MB	512KB	512KB	-	-
8MB	1MB	1MB	-	-
16MB	2MB	2MB	-	-
32MB	4MB	4MB	-	-
64MB	8MB	8MB	-	-
4MB	256KB	256KB	256KB	256KB
6MB	256KB	256KB	512KB	512KB
8MB	512KB	512KB	512KB	512KB
10MB	256KB	256KB	1MB	1MB
12MB	512KB	512KB	1MB	1MB
16MB	1MB	1MB	1MB	1MB
18MB	256KB	256KB	2MB	2MB

C. Cache Installation / Upgrade

CACHE MEMORY - In addition to the internal CPU level 1 cache, YUKON also supports a secondary (level 2) cache to further improve performance. One of the most unique features of the YUKON system board is that it supports both asynchronous SRAM (Static Random Access Memory) and synchronous (pipeline and non-pipeline) Burst SRAM modules for the secondary cache.

Cache memory utilizes SRAM which is much faster than the DRAM used for system memory. Cache memory provides fast local storage for frequently accessed codes and data. Cache memory (SRAM) is used in tandem with main memory (DRAM) to enhance motherboard performance. Frequently used codes and data are transferred from main memory and placed in cache memory (SRAM), thus reducing the time to fetch data from main memory.

The YUKON utilizes a Direct Map caching scheme with a Burst Mode Write-Back Cache controller. Direct Map is a common caching scheme whereby a segment of DRAM memory is directly reproduced in cache memory. Write-Back cache architecture is a scheme whereby the system will write modified data to the cache only. Main memory will NOT be updated until the system requires some new data that is NOT available in the cache.

1. SIMM INSTALLATION

To install a SIMM, observe the following procedure (**ALWAYS** use a CSA approved grounding strap or other anti-static device):

1) Turn off the power and open the computer case.

2) Align the module with the socket so that pin 1 on the module is toward the keyboard connector and the edge connector is facing the socket.

3) Keep the module at a 70 degree angle to the board and carefully insert the edge connector into the socket. Confirm that the SIMM is evenly seated in the socket.

4) Carefully push the module to a vertical position, until it clips into the metal latch on the socket assembly. The metal latch will hold the module firmly in place. Double check that the module is properly installed.
NOTE: *Excessive force will damage the SIMM sockets, and void the warranty.*

5) To remove a SIMM module, carefully tilt the metal latch away from each end of the module. The module should flip forward and can be lifted out.
NOTE: *Excessive force will damage the SIMM sockets, and void the warranty.*

The system board will automatically recognize the memory. No jumper changes are necessary.

****CAUTION****
If you are not familiar with the installation procedures, please consult your qualified computer technician.

Trouble Shooting

This section is intended as a general guide to solve configuration problems and to help pinpoint possible component failures. If after reading this section, an issue still **CANNOT** be resolved, please contact your dealer.

AWARD BIOS performs various diagnostic tests at the time the system is powered up. Whenever an error is encountered during these tests, there will be either a few short beeps or an error message displayed on the monitor. If the error occurs before the display device is initialized, the system reports the error with several short beeps only.

If the error is fatal, the system halts after reporting the Fatal error. If the error is Non-fatal, the process continues after reporting the error.

Suggested courses of action are included in every section. Remember that these suggestions are guidelines only and are based on general experience. Also, ALWAYS power down and unplug the system before attempting any hardware changes.

A. Errors usually reported by BIOS

The following codes are reported by port 80 debug cards. If the system has a problem, a port 80 card will halt at the current attempted function. This information can be used to debug a problem system. Note that this is not recommended but only provided for reference.

Note: *ISA POST codes are typically output to port address 80h.*

1. Synchronous Burst SRAM

Burst SRAM Modules are faster than the traditional asynchronous SRAM. The data is clocked in and out. They are also available in address pipelined or address non-pipelined options. YUKON supports Burst SRAM modules in sizes of 256K or 512K. The YUKON synchronous burst SRAM modules support a maximum Burst rate of 3-1-1-1.

YUKON utilizes Burst SRAM in the form of a DIMM (Dual Inline Memory Module). This module is installed in socket U7.

****CAUTION****
If you are not familiar with the installation procedures, please consult your qualified computer technician.

2. Asynchronous SRAM

The YUKON system board also supports asynchronous secondary cache of 256K, 512K or 1M modules. For asynchronous cache, the maximum Rate is 3-2-2-2. YUKON utilizes Asynchronous SRAM in the form of a DIMM (Dual Inline Memory Module). This module is installed in socket U7.

POST (hex)	Name	Description
A	Setup Interrupt Vector Table	Initialize first set interrupt vectors with SPURIOUS-INT_HDLR and initialize. INT 00h-1fh according to INT_TBL.
B	Test CMOS RAM Checksum	Test CMOS RAM checksum, if bad or insert key pressed load defaults.
C	Initialize keyboard	Detect type of keyboard controller (optional). Set NUM LOCK status.
D	Initialize Video Interface	Detect CPU clock. Read CMOS location 14h to find out type of video in use. Detect and initialize Video Adapter.
E	Test Video Memory	Test video memory, write sign-on message to screen. Setup shadow RAM - Enable shadow according to Setup.
F	Test DMA Controller 0	BIOS checksum test. Keyboard detect and initialization.
10	Test DMA Controller	
11	Test DMA Page Registers	Test DMA Page Registers.
14	Test Timer Counter 2	Test 8254 Timer 0 Counter 2.
15	Test 8259-1 Mask Bits	Verify 8259 Channel 1 masked interrupts by alternately turning off and on the interrupt lines.
16	Test 8259-2 Mask Bits	Verify 8259 Channel 2 masked interrupts by alternately turning off and on the interrupt lines.
17	Test Stuck 8259's	Turn off interrupts then verify no interrupt
18	Interrupt Bits Test 8259 Interrupt	mask register is on. Force an interrupt and verify the interrupt
19	Functionality Test Stuck NMI Bits (Parity I/O Check)	occurred. Verify NMI can be cleared.
1A		Display CPU clock.
20	Enable Slot 0	Initialize slot 0 (System Board).
21-2F	Enable Slots 1-15	Initialize slots 1 through 15.

POST (hex)	Name	Description
C0	Turn Off Chipset Cache	OEM Specific-Cache control
1	Processor Test 1	Processor Status Verification. Tests the following processor status flags carry zero, sign overflow. The BIOS will set each of these flags verify they are set, then turn each flag off and verify it is off.
3	Initialize Chips	Disable NMI, PIE, AIE, UEI, SQWV. Disable video, parity checking DMA. Reset math coprocessor. Clear all page registers CMOS shut-down by byte. Initialize timer 0, 1 and 2. Initialize DMA controllers 0 and 1. Initialize interrupt controllers 0 and 1.
4	Test Memory Refresh Toggle	RAM must be periodically refreshed in order to keep the memory from decaying. This function assures that the memory refresh function is working properly.
5	Black video Initialize keyboard	Keyboard controller initialization.
7	Test CMOS Interface and Battery Status	Verifies CMOS is working correctly, detects bad battery.
BE	Chipset Default Initialization	Program chipset registers with power on BIOS defaults.
C1	Memory presence test	OEM Specific-Test to size on-board memory.
C5	Early Shadow	OEM Specific-Early Shadow enable for fast boot.
C6	Cache presence test	External cache size detection.
8	Setup low memory	Early chip set initialization. Memory presence test. OEM chip set routines. Clear low 64K of memory. Test first 64K memory.
9	Early Cache Initialization	Cyrix CPU initialization. Cache initialization.

POST (hex)	Name	Description
60	Setup Virus Protect	Setup virus protect according to Setup.
61	Set Boot Speed	Set system speed for boot.
62	Setup NumLock	Setup Numlock status according to Setup.
63	Boot Attempt	Set low stack. Boot via INT 19b.
B0	Spurious	If interrupt occurs in protected mode
B1	Unclaimed NMI	If unmasked NMI occurs, display Press F1 to disable NMI, F2 reboot.
E1-EF	Setup Pages	E1-Page 1, E2-Page 2 etc.
FF	Boot	

POST (hex)	Name	Description
30	Size Base and Extended Memory	Test size base memory from 256K to 640K and extended memory above1MB.
31	Test Base and Extended Memory	Test base memory from 256K to 640K and extended memory above 1MB using various patterns.
3C	Setup Enabled	
3D	Initialize & Install Mouse	Detect if mouse is present, initialize mouse, install interrupt vectors.
3E	Setup Cache Controller	Initialize cache controller.
BF	Chipset Initialization	Program chipset registers with Setup values.
40		Display virus protest disable or enable.
41	Initialize Floppy Drive & Controller	Initialize floppy disk drive controller and any drives.
42	Initialize Hard Drive & Controller	Initialize hard drive controller and any drives.
43	Detect & Initialize Serial/Parallel Ports	Initialize any serial and parallel ports (also game port).
45	Detect & Initialize Math Coprocessor	Initialize math coprocessor
4E	Manufacturing POST Loop or Display Messages	Reboot if Manufacturing POST Loop pin is set. Otherwise display any messages (i.e. any non-fatal errors that were detected during POST) and enter Setup.
4F	Security Check	Ask password security (optional).
50	Write CMOS	Write all CMOS values back to RAM and clear screen.
51	Pre-boot Enable	Enable parity checker. Enable NMI. Enable cache before boot.
52	Initialize Option ROMs	Initialize any option ROMs present from C8000h to EFFFFn. Note: When FSCAN option is enabled will initialize from C8000h to F7FFFn.
53	Initialize Time Value	Initialize time value in 40h: BIOS area.

1. Error in Hard Disk Drive setup

Suggested Action: Run the standard CMOS setup and check that the parameters are correct for the installed hard drive(s). Also check all cable connections for proper orientation. Verify that the controller is properly seated in its expansion slot.

C:Drive error: indicates hard disk setup error

Suggested Action: Follow the procedure indicated for HDD controller failure.

C:Drive failure: indicates hard disk or hard disk controller failure.

Suggested Action: Follow the procedure indicated for HDD controller failure. Also try different cables.

2. Other Problems

Power Supply Fan Stops Running - Turn off the power immediately and check to see if the system power has shorted to ground.

Power is on and the power supply is running but nothing happens: - check that the power supply is properly connected to the motherboard.

Diskette Error message: Try another diskette and check that the CMOS setting is correct.

Error Reading Fixed Disk: If all cables are properly connected and the CMOS is properly configured, then the indication is that the hard drive has failed.

No fixed disk present: This error indicates that the hard drive is improperly connected or configured.

B. General Description Of Errors

CMOS battery state low: indicates failure of CMOS battery or failure in set and checksum tests

CMOS system options not set: indicates failure of CMOS battery, or failure in set and checksum tests.

Suggested Action: check and reconfigure the standard and advanced CMOS setups.

CMOS checksum failure: indicates CMOS battery low or a failure in the set and checksum tests

Suggested Action: Once again, run the BIOS setup program. After changes, press F10 to save and exit.

CMOS display type mismatch: indicates failure of display verification

Suggested Action: Check jumper for proper display setting and also check the CMOS setup for the proper display setting.

Glossary

BIOS: (Basic Input Output System) Program usually contained in a ROM chip or flash device on the system board that is the interface between the system hardware and the operating system.
The ROM BIOS is a group of low level programs responsible for interfacing the computer to peripheral devices, such as disk drives, serial and parallel ports, keyboard, and video display. Low-level BIOS routines are common to all operating systems and are generally resident in ROM. Higher-level BIOS routines are specific to the particular operating system in use and are therefore generally stored on disk, and loaded only when the operating system is booted.

BIT: A binary digit that is the most reducible element of computer information. Eight bits make one byte.

BOOT or BOOTSTRAP: A small ROM-based program which is automatically loaded when the system is first powered up (or "booted"), in order to load and execute an operating system or other large program from disk. Also, the process of starting the computer, either by turning on the power, pressing the Reset switch or by pressing the CTRL + ALT + DEL keys simultaneously. The latter is known as a "**warm boot**".

BYTE: Smallest unit of storage required to hold a character of information in memory or on a disk.

BUS CLOCK: The speed at which data is transferred between the microprocessor and the I/O channel

CMOS: Acronym for Complimentary Metal Oxide Semiconductor. CMOS integrated circuitry uses very little electrical power. Hence CMOS RAM is ideal for storing

DRIVE NOT READY ERROR
Insert BOOT Diskette in A:
Press any key when ready

The above message indicates the motherboard is unable to find a bootable disk (i.e. the motherboard is unable to load an operating system). Consult your operating system manual.

Non-system disk or disk error
Replace and press any key when ready

The above message indicates that the disk in drive A: is not bootable (i.e. it does NOT possess the operating system files). Consult your operating system manual.

DISKETTE BOOT FAILURE
Insert BOOT diskette in A:
Press any key when ready

The above message indicates that the disk in the drive is defective or not formatted.

Consult your operating system manual.
If problems persist, contact your dealer for technical support.

accesses both banks in less clock cycles and therefore, the system runs faster.

ISA: Industry Standard Architecture.

JUMPER: A patch cable, wire or other such device used to establish a circuit.

MEMORY: RAM and ROM are devices used to hold information and programs while they are being accessed by the system.

MICROPROCESSOR: Also known as the CPU. The "brain" of the system, which contains the circuitry used for calculation and communication with the rest of the system.

PAGE MODE: Special function in DRAM that saves cycle time by not re-loading the Row Address strobe bits.

PARITY BIT: An additional non-informational bit appended to a group of 8 bits to make the number of ones in the group of bits either even or odd. This is an elementary error correction mechanism. Example: During a subsequent read from a memory location, and using odd parity, the system will check the sum of ones. If the sum of ones is NOT still odd then system knows that the information at that location has been corrupted.

PCI: Peripheral Component Interface. At 33MHz, the synchronous PCI Local Bus transfers 32 bits of data at up to 132 MB/Sec.

PGA (Pin Grid Array): This refers to CPU, and other similar components, that are installed in sockets on the system board. PGA CPU have rows of pins sticking out underneath.

system configuration information that cannot be stored permanently in ROM.

CONVENTIONAL MEMORY: System main memory from 0 to 640KB. Many programs run in this area.

CPU (CENTRAL PROCESSING UNIT): Also called the micro-processor. The "brain" of the computer, where program instructions and arithmetic operations are executed.

CPU CLOCK: The speed at which the microprocessor executes its instructions.

DOS (DISK OPERATING SYSTEM): Software that controls the activities performed by the computer. DOS sets up an environment under which application software can load and function. It is an interface between the system and application software.

DRAM (DYNAMIC RANDOM ACCESS MEMORY): A type of RAM that requires a refresh cycle to keep information valid. Main system memory uses DRAM.

EXPANSION SLOT: a connector on the system board into which an adapter card can be inserted.

EXTENDED MEMORY: memory beyond the 1MB limit that is accessed by programs such as Windows.

INTERFACE: The connection between the system board and a peripheral.

INTERLEAVING: A technique for improving system performance by speeding up memory access. Successive memory locations are assigned to different memory banks. Then when the system requires the information it

SHADOW RAM: Refers to the technique of copying BIOS routines from slower ROM chips to faster RAM, thereby increasing system performance.

VESA: Video Electronics Standard Association.

WRITE BACK CACHE: Cache architecture in which writes of new information by the CPU to cache are NOT accompanied by writes to update system memory. The advantage over Write-Through cache is that the system does not have to wait for the slower main memory. However, main memory has not been updated, therefore a penalty will be incurred during read misses. A read miss occurs when the CPU can not find the information it requires in cache memory and must go to system memory for another block of information. However, before transfer of new information into the cache, the current content of the cache must be saved to system memory or the updated information in the cache will be lost.

WRITE THROUGH CACHE: Cache architecture in which writes by the CPU to system cache are accompanied by writes to update system DRAM memory as well. The penalty is that the system must wait for the slow system memory to receive and store the data. The advantage of this architecture is that during read misses no penalty is incurred as in Write Back cache.