

System Introduction

1.1 Overview

1.1.1 System Board

The M9B is a dual-processor system board that supports the Intel Pentium Pro CPU. It contains an exclusive slot for the Pentium Pro CPU board that carries two zero-insertion force (ZIF) CPU sockets.

This high-performance 64-bit system board utilizes both the EISA and the PCI local bus architecture. Two EISA, four PCI bus slots, and one EISA/PCI shared slot reside on the board to allow installation of either master or slave devices.

The system board has four DRAM banks composed of eight 72-pin SIMM sockets that accommodate both fast-page mode and EDO (extended data output) SIMMs. The sockets support a total of 256-MB system memory using 32-MB SIMMs.

A 50-pin Fast SCSI-II interface and a 68-pin Wide SCSI interface come with the system board to connect SCSI devices. Standard external I/O interfaces include two 9-pin serial ports, one parallel port, a video port, and keyboard and mouse ports.

The system board supports two optional features, the ASM Pro and the remote diagnostic management (RDM), that allow better server management. The ASM Pro detects problems in CPU thermal condition, 5V/3.3V/1.5V detection, and PCI bus utilization calculation. The RDM allows execution of the RDM diagnostic program from a remote RDM station to fix detected problems or to reboot the system.

1.1.2 CPU Board

The Pentium Pro CPU board carries two ZIF sockets (Socket 8) to accommodate the new Pentium Pro CPUs running at 180 MHz and 200 MHz.

The board also includes the PCI bridge/memory controller (PMC) and the data bus accelerator (DBX) chipsets. The PMC provides bus control signals and address paths for transfers between the host bus, PCI bus, and the main memory. The DBX supports multiple-bit error detection and single-bit error correction through the ECC/parity feature.

1.1.3 Features

The M9B system has the following features:

- A separate CPU board that carries the Pentium Pro CPU and the 512-KB synchronous pipeline burst second-level cache
- Four PCI slots, two EISA slots, and one PCI/EISA shared slot, with all PCI slots supporting master devices
- Four DRAM banks composed of eight 72-pin SIMM sockets that support 8/16/32-MB 70ns fast-page mode or EDO-type SIMMs
- Fast SCSI and Wide SCSI interfaces
- Standard 1-MB video DRAM onboard plus two upgrade sockets for up to 2-MB video memory
- 256-KB Flash ROM BIOS
- System clock/calendar with 8KB CMOS RAM with battery backup
- Onboard interfaces for front panel LED and backplane board SCSI HDD status indicator
- ASM Pro and remote diagnostic management (RDM) features
- Power management features (IDE hard disk standby mode and system suspend mode)
- External ports:
 - PS/2 keyboard and mouse ports
 - Two buffered high-speed serial ports (NS16C550-compatible UARTs with 16-byte FIFOs)
 - One ECP/EPP high-speed parallel port (IEEE 1284-compliant)
 - Video port
- Onboard controller chipsets
 - Cache/memory/buffer controller (82439HX)
 - EISA System Component (ESC 82374SB)
 - PCI-EISA Bridge (PCEB 82375SB)
 - SCSI controller (AIC 7880)
 - PCI-to-PCI Bridge (DEC 21052)
 - Super I/O controller (SMC 37C665)
 - PCI local bus VGA with enhanced GUI acceleration (ATI 264CT)

1.2 Board Layouts

1.2.1 System Board

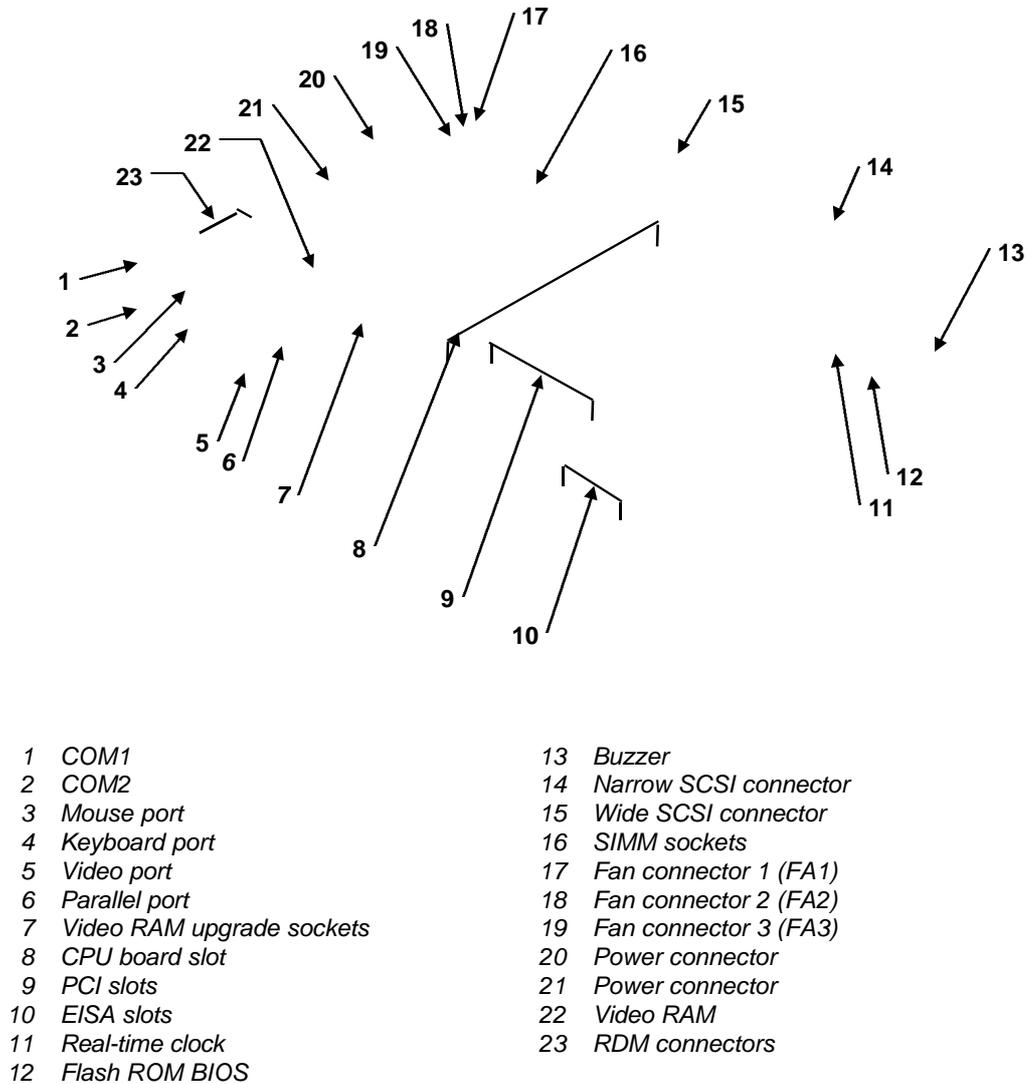


Figure 1-1 System Board Layout

1.2.1 CPU Board

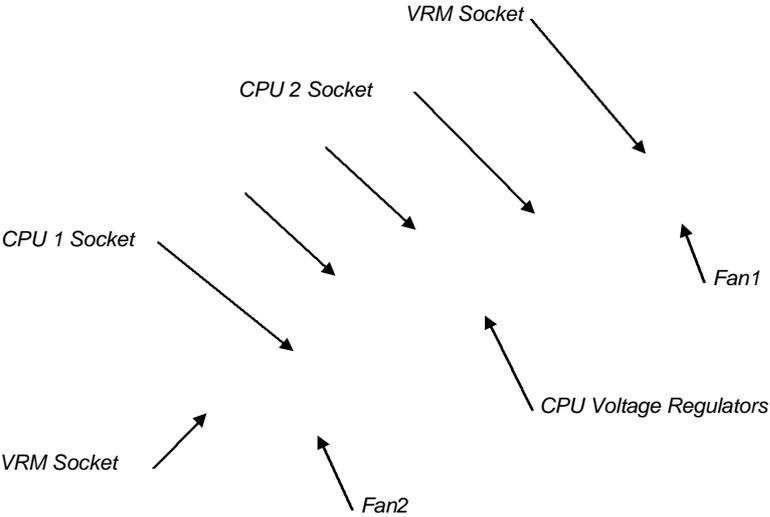


Figure 1-2 CPU Board Layout

1.3 Jumpers and Connectors

Figure 1-3 System Board Jumper and Connector Locations

CN3

CN1

CN2

J16

Figure 1-4 CPU Board Jumper Locations

1.3.1 Jumper Settings

System Board

Table 1-1 System Board Jumper Settings

Jumper	Setting	Function
Password Security JP1	1-2 2-3	Check password Bypass password
BIOS Type JP2	1-2 2-3	Acer OEM
SCSI Termination JP3	1-2 2-3	Terminator always set to ON Use SCSI Setup Utility to set terminator to ON or OFF
SCSI Feature JP4	1-2 2-3	Wide SCSI Standard
Hardware Reset JP5	1-2 2-3	Enabled Disabled
Sound Feature JP6	1-2 2-3	Buzzer Speaker



If both narrow and wide SCSI interfaces are present, set JP4 to pins 1-2 for wide SCSI function.

CPU Board

Table 1-2 CN1 Settings for CPU Core/Bus Frequency Ratio

CN1 Settings				CPU Core / Bus Freq. Ratio
1-5	2-6	3-7	4-8	
1	1	1	1	2
1	1	0	1	3
1	1	1	0	4
1	1	0	0	5
0	1	1	1	2.5
0	1	0	1	3.5

0 - Pins open 1 - Pins Closed

Table 1-3 lists the CPU core voltages depending on CN2 and CN3 settings.

Table 1-3 CN2 and CN3 Settings for CPU Core Voltage

CN2/CN3 Settings				CPU Voltage
1-5	2-6	3-7	4-8	
1	1	1	1	3.5
1	1	1	0	3.4
1	1	0	1	3.3
1	1	0	0	3.2
1	0	1	1	3.1
1	0	1	0	3.0
1	0	0	1	2.9
1	0	0	0	2.8
0	1	1	1	2.7
0	1	1	0	2.6
0	1	0	1	2.5
0	1	0	0	2.4
0	0	1	1	2.3
0	0	1	0	2.2
0	0	0	1	2.1
0	0	0	0	Reserved

0 - Pins open 1 - Pins Closed

Table 1-4 Clock Settings

J16		CPU Clock Speed
1-2	2-3	
1	0	60 MHz
0	1	66 MHz

0 - Pins open 1 - Pins Closed

1.3.2 Connector Functions

Table 1-5 lists the different connectors on the system board and their respective functions.

Table 1-5 System Board Connectors

Connector	Function
CN1	Power connector
CN2	Power connector
CN3	Backplane board HDD status connector
CN5	IDE hard disk connector
CN6	RDM connector
CN7	RDM connector
CN8	Diskette drive connector
CN11	68-pin Wide SCSI connector
CN12	50-pin Fast SCSI-II connector
CN13	RDM cable and LED board connector
CN14	Hard disk LED connector
CN15	Power LED connector
CN16	Speaker connector
SW1	NMI switch

1.4 System Specifications

Table 1-6 System Specifications

Item	Description
CPU	P54C/P55C, 100/120/133/150/166/200 MHz
System Memory	Eight SIMM sockets that support up to 256 MB of system memory using 60/70ns 4/8/16/32-MB SIMMs ¹ .
Video Memory	Onboard 1-MB (256K16x2) video memory upgradable to 2-MB by installing another two pieces of 256K16 70ns SOJ chip into the upgrade socket
Cache	Onboard 512-KB synchronous pipeline burst second-level cache data SRAM chip (32K32x4) Onboard 64-KB tag SRAM chip (32K8x2)
BIOS²	256-KB Flash ROM for system, SCSI and video BIOS
Video interface	Onboard ATI264CT PCI accelerator that supports a resolution of 1024x768, 65536 color interlaced with 2-MB video RAM.
Hard Disk Interface	IDE interface supports up to two IDE devices PCI bus master fast SCSI II interface supports up to seven devices or fifteen SCSI devices when wide SCSI is used.
Diskette Drive Interface	One diskette drive interface that supports 2.88/1.44/1.2-MB diskette drives Supports three-mode diskette type
Onboard I/O	One PS/2 keyboard port (6-pin, mini-din type x1) One PS/2 mouse port (6-pin, mini-din type x1) Two NS16C550-compatible serial ports (9-pin D-type x2) One ECP/EPP parallel port (15-pin D-type x1)
Real-time Clock	System clock/calendar with 128 bytes extended CMOS RAM and battery backup
Expansion slots	One CPU board slot Two first-level PCI bus slot (master/slave) Two second-level PCI bus slot (master/slave) Two EISA bus slot (master/slave) One first-level PCI/EISA shared bus slot (master/slave)
Power Supply	525/350/200-watt switching power supply
Housings	IDUN or IDATX housing

¹ Supports both traditional fast-page mode and EDO mode SIMMs.

² Supports PCI v2.1, PnP v1.0a, and APM v1.1 protocols.

1.5 Hardware Configurations

1.5.1 Memory Configurations

The system board comes with eight 72-pin SIMM sockets that support 4-MB and 16-MB single-density SIMMs as well as 8-MB and 32-MB double-density SIMMs for a total system memory of 256-MB. The sockets support both the fast page mode and EDO 60/70 ns SIMMs.

Rules for Adding Memory

- You may use the memory banks (Bank0 ~Bank3) in any order.
- Use only one type of SIMM in a given bank. You may combine EDO or fast-page mode SIMMs for a memory configuration as long as the SIMMs in each bank are of the same type.
- Use only SIMMs with the same capacity in a bank. For example, do not combine 8-MB and 16-MB SIMMs in a bank.
- Always install SIMMs in pairs. For example, for a total memory of 16 MB, install two 8-MB SIMMs in a bank. You can not use a 16-MB SIMM alone for a 16-MB memory.

Table 1-7 Memory Configurations

Bank0		Bank1		Bank2		Bank3		Total
S1	S2	S3	S4	S5	S6	S7	S8	Memory
8 MB	8 MB							16 MB
16 MB	16 MB							32 MB
32 MB	32 MB							64 MB
		8 MB	8 MB					16 MB
		16 MB	16 MB					32 MB
		32 MB	32 MB					64 MB
				8 MB	8 MB	8 MB	8 MB	32 MB
				16 MB	16 MB	16 MB	16 MB	64 MB
				32 MB	32 MB	32 MB	32 MB	128 MB
8 MB	8 MB	16 MB	16 MB					48 MB
8 MB	8 MB	32 MB	32 MB					80 MB
16 MB	16 MB	32 MB	32 MB					96 MB
8 MB	8 MB	16 MB	16 MB					48 MB
8 MB	8 MB	16 MB	16 MB	16 MB	16 MB			80 MB
8 MB	8 MB	16 MB	16 MB	32 MB	32 MB			112 MB
8 MB	8 MB	16 MB	16 MB	32 MB	32 MB	32 MB	32 MB	176 MB
8 MB	8 MB	8 MB	8 MB	16 MB	16 MB	16 MB	16 MB	96 MB
8 MB	8 MB	8 MB	8 MB	32 MB	32 MB	32 MB	32 MB	160 MB
16 MB	16 MB	16 MB	16 MB	32 MB	32 MB	32 MB	32 MB	192 MB
8 MB	64 MB							
16 MB	128 MB							
32 MB	256 MB							



The above configurations are only some of the available memory combinations. You can use other combinations as long as you follow the above rules for upgrading memory.

1.5.2 Second-level Cache Configurations

The 512-KB pipeline burst second-level cache consists of four pieces of SRAM chips located on the CPU board (U3~U6).

1.5.3 Video RAM Configurations

The system comes with a 1-MB onboard video RAM composed of two 514260ASL (256Kb x 16, 70ns SOJ) chips. The video RAM is upgradable to 2 MB by adding two more 514260ASL chips into the video RAM upgrade sockets labeled U18 and U21 (see Figure 1-1 for the location).

1.5.4 Video Display Modes

Table 1-8 shows the video display modes using 45ns video RAM.

Table 1-8 Video Display Modes

Display Resolution	Refresh Rate (Hz)	Horizontal Frequency (KHz)	Pixel Clock (MHz)	Colors (Bits / Pixel)									
				1MB DRAM					2MB DRAM				
640*480	60	31.4	25.2	4	8	16	24	32	4	8	16	24	32
640*480	60	31.4	25.2	✓	✓	✓	✓	-	✓	✓	✓	✓	✓
640*480	72	37.7	31.2	✓	✓	✓	✓	-	✓	✓	✓	✓	✓
640*480	75	37.5	31.5	✓	✓	✓	✓	-	✓	✓	✓	✓	✓
640*480	90	47.9	39.9	✓	✓	✓	-	-	✓	✓	✓	-	-
640*480	100	52.9	44.9	✓	✓	✓	-	-	✓	✓	✓	✓	-
800*600	48 <i>int.</i>	33.8	36.0	-	✓	✓	-	-	-	✓	✓	✓	-
800*600	56	35.1	36.0	✓	✓	✓	-	-	✓	✓	✓	✓	-
800*600	60	37.8	40.0	✓	✓	✓	-	-	✓	✓	✓	-	-
800*600	70	44.5	44.9	✓	✓	✓	-	-	✓	✓	✓	-	-
800*600	72	48.0	50.0	✓	✓	✓	-	-	✓	✓	✓	-	-
800*600	75	46.8	49.5	✓	✓	✓	-	-	✓	✓	✓	-	-
800*600	90	57.0	56.6	✓	✓	-	-	-	✓	✓	-	-	-
800*600	100	62.5	67.5	✓	✓	-	-	-	✓	✓	-	-	-
1024*768	43 <i>int.</i>	35.5	44.9	✓	✓	-	-	-	✓	✓	✓	-	-
1024*768	60	48.3	65.0	✓	✓	-	-	-	✓	✓	✓	-	-
1024*768	70	56.4	75.0	✓	✓	-	-	-	✓	✓	✓	-	-
1024*768	72	58.2	75.0	✓	✓	-	-	-	✓	✓	✓	-	-
1024*768	75	60.0	78.8	✓	✓	-	-	-	✓	✓	✓	-	-
1024*768	90	76.2	100	-	-	-	-	-	✓	✓	-	-	-
1024*768	100	79.0	110	-	-	-	-	-	✓	✓	-	-	-
1152*864	43 <i>int.</i>	45.9	65.0	✓	✓	-	-	-	✓	✓	-	-	-
1152*864	47 <i>int.</i>	44.8	65.0	✓	✓	-	-	-	✓	✓	-	-	-
1152*864	60	54.9	80.0	✓	✓	-	-	-	✓	✓	-	-	-
1152*864	70	66.1	100	-	-	-	-	-	✓	✓	-	-	-

Table 1-8 Video Display Modes (continued)

Display Resolution	Refresh Rate (Hz)	Horizontal Frequency (KHz)	Pixel Clock (MHz)	Colors (Bits / Pixel)									
				1MB DRAM					2MB DRAM				
1152*864	75	75.1	110	-	-	-	-	-	✓	✓	-	-	-
1152*864	80	75.1	110	-	-	-	-	-	✓	✓	-	-	-
1280*1024	43 <i>int.</i>	50.0	80.0	✓	-	-	-	-	✓	✓	-	-	-
1280*1024	47 <i>int.</i>	50.0	80.0	✓	-	-	-	-	✓	✓	-	-	-
1280*1024	60	63.9	110	-	-	-	-	-	✓	✓	-	-	-
1280*1024	70	74.6	126	-	-	-	-	-	✓	✓	-	-	-
1280*1024	74	78.8	135	-	-	-	-	-	✓	✓	-	-	-
1280*1024	75	79.9	135	-	-	-	-	-	✓	✓	-	-	-

int. - interlaced

1.5.5 Parallel Port Configurations

The onboard parallel port interface supports a 25-pin D-type connector. The port functions in different operation modes and is adjustable to select LPT1, LPT2, and LPT3 by changing the CMOS settings in the BIOS Utility.

Table 1-9 lists the operation mode settings and their corresponding functions.

Table 1-9 Parallel Port Operation Mode Settings

Setting	Function
Standard Parallel Port (SPP)	Allows normal speed operation but in one direction only
Enhanced Parallel Port (EPP 1.7/1.9)	Allows bidirectional parallel port operation at maximum speed
Extended Capabilities Port (ECP)	Allows parallel port to operate in bidirectional mode and at a speed higher than the maximum data transfer rate
Standard and Bidirectional	Allows normal speed operation in a two-way mode

1.5.6 Serial Port Configurations

The system board has two high-speed 9-pin D-type serial ports. These ports are NS16C550-compatible UARTs with 16-byte FIFO send/receive capability. The port functions are software adjustable to select COM1, COM2, COM3, and COM4.

1.5.7 IDE Interface Configurations

The system board includes PCI enhanced local bus IDE interfaces that accommodate up to four IDE devices. The interfaces functions as PCI bus master IDE and support PIO mode-4 and DMA mode-2. The interfaces are fully compatible with ANSIS ATA Rev. 3.0 specifications and ATAPI specifications.

1.5.8 Memory Address Map

Table 1-10 Memory Address Map

Address	Size	Function
0000000 ~ 009FFFF	640 KB system memory	Onboard DRAM
00A0000 ~ 00BFFFF	128 KB video RAM	Reserved for graphics display buffer, non-cacheable
00C0000 ~ 00C7FFF	32 KB for VGA BIOS	Reserved for onboard VGA
00C8000 ~ 00CFFFF	32 KB I/O expansion ROM	Reserved for ROM on I/O adapters
00D0000 ~ 00D3FFF	16 KB I/O expansion ROM	Reserved for ROM on I/O adapters
00D4000 ~ 00D7FFF	16 KB I/O expansion ROM	Reserved for ROM on I/O adapters
00D8000 ~ 00DBFFF	16 KB I/O expansion ROM	Reserved for ROM on I/O adapters
00DC000 ~ 00DFFFF	16 KB I/O expansion ROM	Reserved for ROM on I/O adapters
00E0000 ~ 00E7FFF	32 KB for SCSI BIOS	Reserved SCSI BIOS
00E8000 ~ 00EFFFF	32 KB	Reserved onboard (video RAM BIOS)
00F0000 ~ 00FFFFFF	64 KB BIOS	System ROM BIOS (ROM) System RAM BIOS (DRAM)
0100000 ~ 0F9FFFF	System memory	Onboard DRAM
0FA0000 ~ 0FFFFFFF	384 KB I/O card memory	Reserved for memory map I/O card, non-cacheable
1000000 ~ Upper limit ¹	System memory	Onboard DRAM

1.5.9 PCI INTx# Map

Table 1-11 PCI INTx# Map

PCI Bus#	PCI INTx	PCI Device
PCI Bus 0	INTA	AIC-7880 SCSI; PCI slot s1, 2
	INTB	PCI slots 1, 2
	INTC	PCI slots 1, 2
	INTD	PCI slots 1, 2
PCI Bus 1	INTA	PCI slots 3, 4, 5
	INTB	PCI slots 3, 4, 5
	INTC	PCI slots 3, 4, 5
	INTD	PCI slots 3, 4, 5

¹ Upper limit means the maximum size of main memory.

1.5.10 Interrupt Channels Map

Table 1-12 Interrupt Channels Map

IRQ	System Device
IRQ0	Timer output 0
IRQ1	Keyboard
IRQ2	Reserved
IRQ3	Serial port 2
IRQ4	Serial port 1
IRQ5	Reserved
IRQ6	Diskette drive
IRQ7	Parallel port
IRQ8	Real-time clock
IRQ9	Reserved
IRQ10	Reserved
IRQ11	Reserved
IRQ12	PS/2 mouse
IRQ13	Math coprocessor
IRQ14	IDE hard disk
IRQ15	Reserved

1.5.11 DMA Channels Map

Table 1-13 DMA Channels Map

Channel	Function
0	Available
1	Available
2	Floppy Controller
3	Available
4	Cascaded
5	Available
6	Available
7	Available

1.5.12 I/O Address Map

Table 1-14 I/O Address Map

Hex Range	Device
000 ~ 01F	DMA controller 1, (8237)
020 ~ 027	Interrupt controller 1, (8259)
030 ~ 037	Interrupt controller 1, (8259)
040 ~ 047	System timer (8254-1)
050 ~ 057	System timer (8254-1)
060 ~ 06F	Keyboard controller (8742)
070 ~ 07F	Real-time clock, NMI mask
080 ~ 09F	DMA page register 74LS612, speed status register
0A0 ~ 0BF	Interrupt controller 2, (8259)
0C0 ~ 0DF	DMA controller 2, (8237)
0F0	Clear math coprocessor busy
0F1	Reset math coprocessor
0F8 ~ 0FF	Math coprocessor
4F0 ¹	Onboard VGA enabled/disable Flash ROM programming RDM reset DMA channel 1 selection DMA channel 3 selection
4F1 ¹	ASM data read/write port IRQ mapper read/write port
4F2 ¹	ASM index write port IRQ mapper index read/write port
0CF8	PCI configuration address regulation
0CFC	PCI configuration data regulation
1F0 ~ 1F7	Hard disk
278 ~ 27F	Parallel port 2
2F8 ~ 2FF	Serial port 2
378 ~ 37F	Parallel port 1
3B0 ~ 3BF	Monochrome display
3C0 ~ 3CF	EGA, VGA, SVGA
3D0 ~ 3DF	CGA, VGA, SVGA
3F0 ~ 3F7	Diskette drive controller
3F7 ~ 3FF	Serial port 1

¹ Special I/O port

1.6 System Block Diagram

Figure 1-7 System Block Diagram



Figure 1-8 System Clock Block Diagram



1.7 Operation Theory

1.7.1 Memory Address Structure

M9B is a Pentium Pro system based on 440FX PCIset supports 4GB of addressable memory space and 64 KB of addressable I/O space. The Pentium Pro processor family supports addressing of memory ranges larger than 4GB via the REQa[4:0]# signals (see Chapter 4 for details). The PMC claims any access over 4GB by terminating transaction (without forwarding it to the PCI bus). Writes are terminated simply by dropping the data and the PMC returns all zeros for reads.

Figure 1-9 Memory Address Structure

DOS Area (0000-9FFFFh)

The DOX area is 640KB in size and it is further divided into two parts. The 512KB area at 0 to 7FFFFh is always mapped to the main memory controlled by the PMC, while the 128KB address range from 080000 to 09FFFFh can be mapped to PCI or to main DRAM. By default this range is mapped to main memory and can be declared as a main memory hole by BIOS CMOS setup.

Video Buffer Area (A0000-BFFFFh)

The 128KB graphics adapter memory region is normally mapped to a video device on the PCI bus (typically VGA controller). This region is also the default region for SMM space.

Expansion Area (C0000-DFFFFh), Extended System BIOS Area (E0000-EFFFFh)

This two areas can be assigned as shadow or disable(read/write for other use, not shadow for expansion ROM BIOS use) states by BIOS CMOS setup. By manipulating the shadow attributes, the PMC can “shadow” the expansion ROM BIOS into the main DRAM. Typically, these blocks are mapped through the PCI bridge to ISA space. Memory that is disabled is not remapped.

System BIOS Area (F0000-FFFFFh)

This area is a single 64KB segment. This segment can be assigned as shadow or disable (read/write for other use, not shadow for system BIOS use) states by BIOS CMOS setup. By manipulating the shadow attributes, the PMC can “shadow” system BIOS into the main DRAM. Memory that is disabled is not remapped.

Extended Memory Area

This memory area covers 100000h (1 MB) to FFFFFFFFh (4GB minus 1) address range and it is divided into the following regions:

- DRAM memory from 1 MB to a Top of Memory
- PCI memory space from the Top of Memory to 4GB with two specific ranges
- APIC Configuration Space from FEC0000h (4GB minus 20 MB) to FEC0_FFFFh
- High BIOS area from 4GB to 4GB minus 2 MB

DRAM memory from 1 MB to a Top of Memory

The address range from 1 MB to the top of main memory is mapped to main DRAM address range controlled by PMC. All accesses to addresses within this range are forwarded by the PMC to the DRAM unless a hole in this range is created by BIOS CMOS setup.

PCI memory space from the Top of Memory to 4GB with two specific ranges

The address range from the top of main DRAM to 4GB is normally mapped to PCI. The PMC forwards all accesses within this address range to PCI.

There are two sub-ranges within this address range defined as APIC configuration space and high BIOS address range.

APIC Configuration Space from FEC0000h (4GB minus 20 MB) to FEC0_FFFFh

This range is reserved for APIC(Advanced Programmable Interrupt Controller) configuration space which includes the default I/O APIC configuration space.

The Pentium Pro accesses to the Local APIC configuration space do not result in external bus activity since the Local APIC configuration space is internal to the Pentium Pro CPU.

High BIOS area from 4GB to 4GB minus 2 MB

The top 2 MB of the Extended Memory Region is reserved for System BIOS (High BIOS), extended BIOS for PCI devices, and the A20 alias of the system BIOS. The CPU begins execution from the High BIOS after reset. This region is mapped to the PCI so that the upper subset of this region is aliased to 16 MB minus 256KB range.

Memory shadowing

A block of memory that can be designed as “shadowed” into PMC DRAM memory. Typically this is done to allow ROM code to execute more rapidly out of main DRAM. ROM is used as a read-only during the copy process while DRAM at the same time is designated write-only. After copying, the DRAM is designated read-only so that ROM is shadowed. CPU bus transactions are routed accordingly. The PMC does not respond to transactions originating from the PCI or ISA masters and targeted at shadowed memory blocks.

1.7.2 System Arbitration Logic

Figure 1-10 System Arbitration Logic

The master device request from ISA and EISA Bus are centralized arbitrated by PCEB, then convey to 82439HX. The ESC generates the EISA Master Acknowledge (MACK[2:0]) signals in response to the Master Request (MREQ[2:0]) signals from EISA master devices. The ESC has a DMA controller includes the DISA Bus arbiter which works with the 82439HX's PCI bus arbiter. This arbiter determines which requester from among the requesting ISA Bus DMA master, EISA Bus master, the PCI Bus, or Refresh should have the bus.

The 82439HX's PCI bus arbiter allows PCI peer-to-peer traffic concurrent with CPU main memory/second level cache cycles. The arbiter supports five PCI masters. REQ[3:0]#/GNT[3:0]# are used by PCI master devices. PHLD#/PHLDA# are the arbitration request/grant signals for the PCEB and provide guaranteed access time capability for ISA masters. PHLD#/PHLDA# also optimize system performance based on PCEB know policies. The arbitration mechanism is enhanced with a multi-transaction timer mechanism. This feature improves the PCI bandwidth allocation to short bursts, and important consideration for example, with typical video capture devices.

1.7.3 Cache Organization Logic

Figure 1-11 Cache Organization Logic

The 82439HX integrates a high performance write-back second level cache controller using internal/external tags and provides a full first-level and second-level cache coherency mechanism. The second level cache is direct mapped, non-sectored, and supports a write-back cache policy. Cache lines are allocated on read misses (not write allocate).

The second-level cache is configured to support 512-KB cache using synchronous pipeline burst SRAMs. A second level cache line is 32-byte wide, and the second level cache contains 16K lines. Valid and modified status bits are kept on a per-line basis. Cacheability of the entire memory space in first-level cache is supported. The memory space cacheability for the secondary cache is 512 MB of the system memory. See Figure 1-12.



Figure 1-12

1.7.4 Interrupt Distribution Logic

Figure 1-13 Interrupt Distribution Logic

The ESC provides an ISA compatible interrupt controller. The interrupts from first-level PCI bus are routed to ESC while the interrupts from second-level PCI bus are routed to ESC via a IRQ mapper PLCI. Anyhow, all these interrupts are processed in term of the way of ISA IRQs.

1.7.5 Dual-processor Operating Logic

Figure 1-14 Dual-processor Operating Logic

The MP specification defines three different interrupt modes as follows:

1. PIC Mode - effectively bypasses all APIC component and forces the system to operate in single-processor mode.
2. Virtual Wire Mode - uses an APIC as a virtual wire, but otherwise operates the same as PIC Mode.
3. Symmetric I/O Mode - enables the system to operate with more than one processor.

In M9A system, the virtual wire mode is adapted when only one processor installed. In virtual wire mode, the 8259A-equivalent PIC fields all interrupts, and the local APIC becomes a virtual wire, which delivers interrupts from the PIC to the processor via the local APIC's local interrupt 0 (LINTIN0). The LINTIN0 pin of the local APIC is programmed as ExtINT, specifying to the APIC that the PIC is to serve as an external interrupt controller. Whenever the local APIC finds that a particular interrupt is of type ExtINT, it asserts the ExtINTA transaction along with the PINT interrupt to the processor. In this case, the I/O APIC is not used.

In symmetric I/O Mode, the I/O interrupt are generated by the I/O APIC. All 8259 interrupt lines are either masked or work together with the I/O APIC in a mixed mode. This hardware supports a mode of operation in which the system can switch easily to symmetric I/O Mode from virtual wire mode.

1.8 Power Management

1.8.1 Power Management Modes

The system has three power management modes: normal mode, IDE hard disk standby mode, and system suspend mode.

Normal Mode

The normal operating mode of the system.

IDE Hard Disk Standby Mode

The IDE hard disk standby mode that controls ATA power-management-compliant hard disk drives. This feature allows the device to enter into IDE hard disk standby mode after a specified HDD non-activity period, and to return to normal mode immediately after a hard disk access.

The IDE hard disk standby mode has the following features:

- HDD power-management timer (1-15 minutes, time step = 1 minute)
- Allows HDD to go into standby mode (for ATA standard interface)
- Resume method: Any IDE HDD activity

System Suspend Mode

This is a fast-on, power-saving mode, allowing the PC to return to full power immediately. It allows the VGA monitor to enter standby mode and turns off the hard disk drive spindle motor. Any system activity returns the system to full power.

The system standby mode has the following features:

- Global power-management timer (1-15 minutes, time step = 1 minute)
- HDD goes into standby mode (for ATA standard interface)
- Disables H-sync and V-sync signals to control the VESA DPMS monitor
- LED on the panel flashes at 1.6-second intervals
- Resume method: Activity from keyboard, mouse, or any IRQ/DRQ enabled in the CMOS

1.8.2 Power Saving Flowchart

Figure 1-15 Power Saving Flowchart

1.10 Power Requirements

The specific housing configuration of the M9A system determines the total power consumption required by the system.

1.10.1 525W Power Supply

Input Requirements

The power supply must be connected to a single-phase power system.

Table 1-15 525W SPS Input Frequency

Nominal Frequency	Frequency Variation Range
50 Hz	60 Hz
47 Hz ~53 Hz	57 Hz ~ 63 Hz



Waveform harmonic distortion is less than 5%.

The power supply must operate at above frequency with both 100~120/200~240 VRMS.

Table 1-16 525W SPS Input Voltage

Nominal Voltage	Variation Range
100 ~ 120 VRMS	90 ~ 132 VRMS
200 ~ 240 VRMS	180 ~ 264 VRMS

Table 1-17 525W SPS Input Current

Input Current	Measuring Range
12A	90 ~ 132 VRMS
7A	180 ~ 264 VRMS

Regulator Efficiency: 65% minimum, measuring at maximum load, applying nominal line.

Output Requirements

Table 1-18 525W SPS Output Rating

Output	Nominal	Regulation	Ripple	Noise	Minimum	Maximum
1	+5.1V	+2%, -2%	100mV		10A	57A
2	+12V A	+5%, -5%	180mV	180mV	–	9A
3	+12V B	+5%, -5%	180mV	180mV	–	8A
4	-12V	+10%, -10%	120mV	120mV	–	0.6A
5	-5V	+10%, -10%	120mV	120mV	–	0.3A
6	+3.3V	+2%, -2%	66mV	66mV	–	11A



Ripple and noise bandwidth from 10 Hz to 20 MHz.

When AC power is on, +12V should provide 10A surge current for the first 20 seconds. This regulation should be within -6% and +7%.

1.10.2 350W Power Supply

Input Requirements

The power supply must be connected to a single-phase power system.

Table 1-19 350W SPS Input Frequency

Nominal Frequency	Frequency Variation Range
50 Hz	47 Hz ~ 53 Hz
60 Hz	57 Hz ~ 63 Hz



Waveform harmonic distortion is less than 5%.

The power supply must operate at above frequency with both 100~120/200~240 VRMS.

Table 1-20 350W SPS Input Voltage

Nominal Voltage	Variation Range
100 ~ 120 VRMS	90 ~ 132 VRMS
200 ~ 240 VRMS	180 ~ 264 VRMS

Table 1-21 350W SPS Input Current

Input Current	Measuring Range
8A	90 ~ 132 VRMS
4A	180 ~ 264 VRMS

Regulator Efficiency: 70% minimum, measuring at maximum load, applying nominal line.

Output Requirements

Table 1-22 350W SPS Output Rating

Output	Nominal	Regulation	Ripple	Noise	Minimum	Maximum
1	+5V	+4%, -3%	50mV	100mV	5A	43A
2	-5V	+10%, -8%	100mV	200mV	0A	1A
3	+12V	+5%, -4%	120mV	200mV	0A	10A
4	-12V	+10%, -9%	120mV	200mV	0A	1A



Ripple and noise bandwidth from DC to 20 MHz.

When AC power is on, +12V should provide 13.7A surge current. This regulation should be within -6% and +7%.

Regulation: The total voltage regulation for each level is calculated in terms of the band of voltage defined by the maximum positive and negative excursions (from nominal) that occur.

1.10.3 200W Power Supply

Input Requirements

The power supply must be connected to a single-phase power system.

Table 1-23 200W SPS Input Frequency

Nominal Frequency	Frequency Variation Range
50 Hz	47 Hz ~ 53 Hz
60 Hz	57 Hz ~ 63 Hz



Waveform harmonic distortion is less than 5%.

The power supply must operate at above frequency with both

100~120/200~240 VRMS.

Table 1-24 200W SPS Input Voltage

Nominal Voltage	Variation Range
100 ~ 120 VRMS	90 ~ 132 VRMS
200 ~ 240 VRMS	180 ~ 264 VRMS

Table 1-25 200W SPS Input Current

Input Current	Measuring Range
8A	90 ~ 132 VRMS
4A	180 ~ 264 VRMS

Regulator Efficiency: 65% minimum, measuring at maximum load, applying nominal line.

Output Requirements

Table 1-26 200W SPS Output Rating

Output	Nominal	Regulation	Ripple	Noise	Minimum	Maximum
1	+5V	+5%, -4%	50mV	100mV	1.5A	
2	-5V	+10%, -8%	150mV	200mV	0A	0.5A
3	+12V	+5%, -4%	100mV	200mV	0.2A	8A
4	-12V	+10%, -8%	200mV	200mV	0A	0.5A



Ripple and noise bandwidth from DC to 20 MHz.

When AC power is on, +12V should provide 10A surge current for the first 10 seconds. This regulation should be within -6% and +7%.

1.11 Mechanical Specifications

1.11.1 IDUN Housing

Table 1-27 IDUN Housing Specifications

Item	Description
Dimensions	593 mm (h) x 596 mm (d) x 180 mm (w)
Spacing between adapter cards	0.8 inch
Net weight	17.5 kg
Expansion slots	11
Drive Bays	One 3.5-inch external bay Three 5.25-inch external bays Eight 3.5-inch, 1.6-inch high internal bays
Major subassembly support	Major subassemblies are rigidly held in place by frame components. Adequate clearances are provided so that cards can be installed and removed without bending or forcing. All other components such as SPS and FDD can be assembled easily.
Circuit card support	Circuit cards plugged into the system board are supported by a card edge connector, the card end bracket, and by a card edge guide supporting the card edge from the farthest end bracket (if the card conforms to the full length).
Metal finish	All metal surfaces are plated or equivalent treatment
Color/Paint	Units delivered in specified MCS colors. Paint samples supplied to the vendor as required. Lower case : Metal Left cover : Metal Frame : Metal Right cover : Metal
Case finish	All surfaces are textured or equivalent treatment

1.11.2 IDATX Housing

Table 1-28 IDATX Housing Specifications

Item	Description
Dimensions	400 mm (h) x 454 mm (d) x 190 mm (w)
Spacing between adapter cards	0.8 inch
Net weight	7 kg
Expansion slots	7
Drive Bays	Two 3.5-inch external bays Three 5.25-inch external bays
Major subassembly support	Major subassemblies are rigidly held in place by frame components. Adequate clearances are provided so that cards can be installed and removed without bending or forcing. All other components such as SPS and FDD can be assembled easily.
Circuit card support	Circuit cards plugged into the system board are supported by a card edge connector, the card end bracket, and by a card edge guide supporting the card edge from the farthest end bracket (if the card conforms to the full length).
Metal finish	All metal surfaces are plated or equivalent treatment
Color/Paint	Units delivered in specified MCS colors. Paint samples supplied to the vendor as required. Upper case : MCS-002 color Bezel : MCS-002 color Frame : Zinc metal
Case finish	All surfaces are textured or equivalent treatment

BIOS Setup Information

Most systems are already configured by the manufacturer or the dealer. There is no need to run Setup when starting the computer unless you get a configuration error. The Setup program loads configuration values into the battery-backed nonvolatile memory called CMOS RAM. This memory area is not part of the system RAM. If you repeatedly receive Run Setup messages, the battery may be bad. In this case, the system cannot retain configuration values in CMOS.

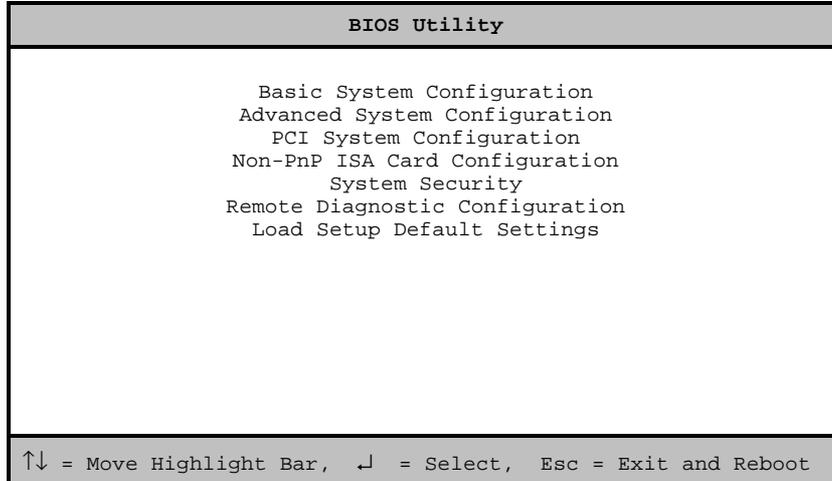
3.1 Entering Setup

To enter Setup, press the key combination **CTRL+ALT+ESC**.



*You must press **CTRL+ALT+ESC** while the system is booting. This key combination does not work during any other time.*

The BIOS Utility main menu then appears:



*If the system does not boot after you made changes in the CMOS settings, press **F10** then power on the system to load the bootable settings.*

*Make sure to keep **F10** pressed before system power on until the execution of the power-on self-tests (POST).*



The parameters on the following screens show default values. These values may not be the same as those in your system.

The grayed items (denoted with asterisks) on the screens have fixed settings and are not user-configurable.

3.2 Basic System Configuration

Select Basic System Configuration to input configuration values such as date, time, and disk types.

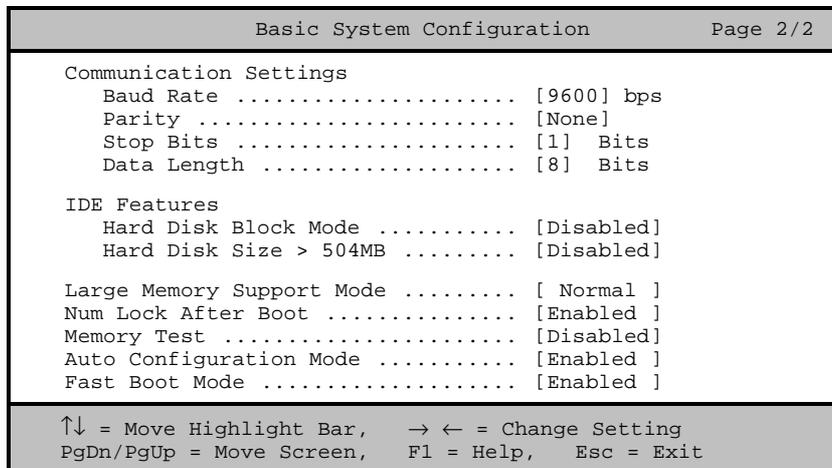
The following screen shows the Basic System Configuration menu.

Basic System Configuration		Page 1/2		
Date	[MM/DD/YY]			
Time	[HH:MM:SS]			
Diskette Drive A	[xx-MB xx-inch]			
Diskette Drive B	[xx-MB xx-inch]			
		Cylinder	Head	Sector
Hard Disk 0 (xxx MB)	[Auto]	xx	xx	xx
Hard Disk 1 (xxx MB)	[Auto]	xx	xx	xx
Base Memory	[xxx] KB			
Extended Memory	[xxx] KB			
Total Memory	[xxxx] KB			
Math Coprocessor	[Installed]			
Video Display	[VGA/EGA]			
↑↓ = Move Highlight Bar, → ← = Change Setting PgDn/PgUp = Move Screen, F1 = Help, Esc = Exit				

The command line at the bottom of the menu tells you how to highlight items, change settings, and move from one screen to another.

1. Press **↑** or **↓** on the cursor-edit keypad to highlight the desired parameter.
2. Press **→** or **←** to select the desired option for a parameter.
3. Press **PGDN** to move to the next page or **PGUP** to return to the previous page.
4. Press **ESC** to exit the configuration menu.

The following screen shows page 2 of the Basic System Configuration menu.



The following sections explain the different parameters and their settings.

3.2.1 Date and Time

The real-time clock keeps the system date and time. After setting the date and time, you need not enter them every time you turn on the system. As long as the internal battery remains good (approximately seven years) and connected, the clock continues to keep the date and time accurately even when the power is off.

Date

Highlight the items on the date parameter and press  or  to set the date following the month-day-year format.

Valid values for month, day, and year are:

- Month 1 to 12
- Day 1 to 31
- Year 00 to 99

The setting 00 for the Year item represents year 2000.

Time

Highlight the items on the time parameter and press  or  to set the time following the hour-minute-second format.

Valid values for hour, minute, and second are:

- Hour 00 to 23
- Minute 00 to 59
- Second 00 to 59

3.2.2 Diskette Drives

To enter the configuration value for the first diskette drive (drive A), highlight the Diskette Drive A parameter. Press  or  key to view the options and select the appropriate value.

The Diskette Drive parameters have the following options:

- [None]
- [360 KB, 5.25-inch]
- [1.2 MB, 5.25-inch]
- [720 KB, 3.5-inch]
- [1.44 MB, 3.5-inch]
- [2.88 MB, 3.5-inch]

Follow the same procedure for the Diskette Drive B parameter. Choose `None` if you do not have a second diskette drive.

3.2.3 Hard Disk Drives

Move the highlight bar to the Hard Disk 0 parameter to configure the hard disk drive (drive C). Press  or  to display the hard disk options with their respective values. Select the option that corresponds to your hard disk type. Follow the same procedure for the Hard Disk 1 parameter. Choose `None` if you do not have a second hard disk drive.

Selecting the “Auto” Option

If you do not know the exact type of your hard disk, select the option `Auto`. During POST, when the system performs self-testing and self-initialization before loading the operating system and applications, the BIOS utility automatically determines the type of your hard disk. You can see the hard disk values when you enter the BIOS Utility.

	Cylinder	Head	Sector
Hard Disk 0 (xxx MB) . [Auto]	xx	xx	xx

The next time you boot the system, the BIOS utility does not have to auto-configure your hard disk as it detects the saved hard disk information during POST.



Copy the hard disk drive values and keep them in a safe place in case you have to reconfigure the disk in the future.

Follow the same procedure to auto-configure other hard disks.

Selecting the “User” Option

There are cases when you cannot use the option `Auto`, instead you have to select `User`. Choose the `User` option when you have installed a hard disk that was previously formatted but does not use the disk native parameters or structure. That is, the disk type may be in the hard disk types list but the number of cylinders, heads, and sectors differ.

	Cylinder	Head	Sector
Hard Disk 0 (xxx MB) .[Auto]	xx	xx	xx

Follow these steps to configure a hard disk with the User option:

1. Highlight the hard disk parameter.
2. Select the option `User` then press .
3. Type in the number of cylinders, heads, and sectors of the hard disk under the appropriate columns.



Be sure to have the correct hard disk information beforehand.

4. Choose `YES` when asked if you want to save the CMOS data.

3.2.4 System Memory

The system automatically detects the total amount of onboard memory during the POST and sets the memory parameters accordingly. If you install additional memory, the system automatically adjusts the Total Memory parameter to display the new memory size.

3.2.5 Communication Settings

The Communication Settings parameters allow you to set the baud rate, parity, stop bit and data length for the first serial port (COM 1). The values for this parameter are:

- Baud rate : 300 to 38400 bits per second (bps)
- Parity : odd, even, or none
- Stop bit : 1 or 2 stop bits
- Data length : 7- or 8-bit data word



The baud rate maximum value is only for the BIOS POST under UNIX environment. The system I/O chipset SMC 37C665GT supports up to 115.2K bps.

3.2.6 IDE Features

Hard Disk Block Mode

This function enhances disk performance depending on the hard disk in use. If you set this parameter to *Enabled*, it allows data transfer in block (multiple sectors) by increasing the data transfer rate to 256 bytes per cycle. If your system does not boot after enabling this parameter, change the setting to *Disabled*. This parameter is normally set to *Disabled*.

Hard Disk Size > 504 MB

This enhanced IDE feature works only under DOS and Windows 3.x environment. If enabled, it allows you to use a hard disk with a capacity of more than 504 MB. This is made possible through the Logical Block Address (LBA) mode translation. Other operating systems require this parameter to be set to *Disabled*.

To prevent data loss, keep this parameter to *Enabled* if you are using a hard disk with more than 504 MB capacity and was previously configured through LBA mode. When you use a hard disk configured through the cylinder-head-sector (CHS) mode, set this parameter to *Disabled*.

3.2.7 Large Memory Support Mode

This parameter allows the system to support an extended memory higher than 64 MB. Set this parameter to *Advanced* if you are working under Windows NT environment and the system memory size is greater than or equal to 64 MB. Otherwise, set it to *Normal*.

3.2.8 Num Lock After Boot

This parameter allows you to activate the Num Lock function upon booting. The default setting is *Enabled*.

3.2.9 Memory Test

When set to *Enabled*, this parameter allows the system to perform a RAM test during the POST routine. When set to *Disabled*, the system detects only the memory size and bypasses the test routine. The default setting is *Disabled*.

This item is fixed to *Disabled* and is not user-configurable if you enabled the Auto Configuration Mode and the Fast Boot Mode parameters on page 2 of the Basic System Configuration menu. See section 3.2.10 and 3.2.11.

3.2.10 Auto-configuration Mode

When enabled, this parameter automatically sets the system configuration values to their optimized settings. At the same time, it causes the Memory Test parameter to be fixed to *Disabled* and the shadow RAM region for system and video BIOS to *Enabled*. See sections 3.2.9 and 3.3.1.

Set this parameter to *Enabled* if you do not know the hard disk drive type parameters and the onboard communication port configuration.

3.2.11 Fast Boot Mode

When enabled, this parameter allows the system to boot faster by skipping some POST routines. It bypasses memory test, enables Shadow RAM, and enables primary- and second-level cache.

When set to `Enabled`, this parameter also causes the Memory Test parameter to be fixed to `Disabled` and the shadow RAM regions for system and video BIOS to `Enabled`. See sections 3.2.9 and 3.3.1.

3.3 Advanced System Configuration

The Advanced System Configuration option allows you to configure the advanced system memory functions.



Do not attempt to change any setting in the Advanced Configuration if you are not a qualified technician.

The following screen shows page one of the Advanced System Configuration parameters.

Advanced System Configuration		Page 1/1
Shadow RAM		
E0000h - FFFFFh (System BIOS) ...	[Enabled]	
C0000h - C7FFFh (Video BIOS).....	[Enabled]	
C8000h - CBFFFh	[Disabled]	
CC000h - CFFFFh	[Disabled]	
D0000h - D3FFFh.....	[Disabled]	
D4000h - D7FFFh	[Disabled]	
D8000h - DBFFFh	[Disabled]	
DC000h - DFFFFh	[Disabled]	
L1 & L2 Cache (CPU Cache)		
Cache Scheme	[Write Back]	
ECC/Parity Mode Selection	[ECC (SEC/DED)]	
Memory at 15MB-16MB Reserved for....	[System]	Use
↑↓ = Move Highlight Bar, → ← = Change Setting		
PgDn/PgUp = Move Screen, F1 = Help, Esc = Exit		

3.3.1 Shadow RAM

The system reserves 384 KB of random access memory (RAM) for the shadow RAM function. This parameter has eight range addresses. When you set these addresses to *Enabled*, the system BIOS, video BIOS, and I/O ROM functions run directly from the shadow RAM for faster operation. When you set them to *Disabled*, the functions run normally from ROM.

The address range E0000h - FFFFFh is for shadowing the system BIOS. This item is always set to *Enabled* and is not user-configurable. The address range C0000h - C7FFFh is for shadowing the video BIOS. This item is fixed to *Enabled* and is not user-configurable if the Auto Configuration Mode and the Fast Boot Mode parameters on page 2 of the Basic System Configuration menu are enabled. Otherwise, you can disable this item.

The remaining address ranges are for I/O ROM functions.

3.3.2 L1 & L2 Cache (CPU Cache)

This parameter enables or disables the first- and second-level cache memory in the Pentium Pro CPU.

Cache Scheme

This parameter sets the cache to *Write-through* or *Write-back* modes. *Write-back* updates the cache but not the memory when there is a write instruction. It updates the memory only when there is an inconsistency between the cache and the memory. *Write-through* updates both the cache and the memory whenever there is a write instruction.

3.3.3 ECC/Parity Mode Selection

This parameter allows you to enable or disable the ECC and parity check feature. Fast-page mode SIMMs with parity supports both ECC and parity mode. EDO SIMMs with parity supports only ECC mode. You must disable this parameter if you installed SIMMs without parity.

Operation of ECC

This parameter allows you to select the error detection mode. The following are the ECC operation options.

- *None* - detects single-bit errors and automatically corrects any error but does not set the single-bit error flag in the chipset. In this option, the operating system does not receive any signal even if there are system errors.
- *Single-bit* - detects single-bit errors, automatically corrects any error, and sets the single-bit error flag in the chipset. The setting of the single-bit error flag is a signal to the operating system that ECC detected single-bit errors.
- *Multiple-bit* - detects multiple-bit errors and sets the multiple-bit error flag in the chipset but does not correct the errors. The setting of the multiple-bit error flag is a signal to the operating system that ECC detected multiple-bit errors.

- Both - detects both single- and multiple-bit errors but corrects only single-bit errors. This option sets both the single-and multiple-bit flags in the chipset to send signals to the operating system that ECC detected errors.

3.3.4 Memory at 15MB-16MB

To prevent memory address conflicts between the system and expansion boards, reserve this memory range for the use of either the system or an expansion board. Before setting this parameter, check your add-on card manual to determine if your add-on card needs this memory space. If not, set this parameter to *System Use*.

3.4 PCI System Configuration

The PCI System Configuration allows you to specify the settings for your PCI devices.

PCI System Configuration		Page 1/1			
PCI IRQ Setting	[Auto]				
		INTA	INTB	INTC	INTD
PCI Slot 1	[--]	[--]	[--]	[--]	[--]
PCI Slot 2	[--]	[--]	[--]	[--]	[--]
PCI Slot 3	[--]	[--]	[--]	[--]	[--]
PCI Slot 4	[--]	[--]	[--]	[--]	[--]
PCI Slot 5	[--]	[--]	[--]	[--]	[--]
Onboard VGA	[--]				
Onboard SCSI	[--]				
VGA Palette Snoop	[Disabled]				
On Board SCSI	[Enabled]				
Boot Device	[Enabled]				
↑↓ = Move Highlight Bar, → ← = Change Setting PgDn/PgUp = Move Screen, F1 = Help, Esc = Exit					

3.4.1 PCI IRQ Setting

This parameter allows for *Auto* or *Manual* configuration of PCI devices. If you use plug-and-play (PnP) devices, you can keep the default setting *Auto*. The system then automatically configures the PnP devices. If your PCI device is not a PnP, you can manually assign the interrupt for each device. Refer to your manual for technical information about the PCI card.



When the PCI IRQ Setting is set to Auto, all the IRQ setting fields become gray and non-configurable.

PCI Slots

These parameters allow you to specify the appropriate interrupt for each of the PCI devices. For PCI slots 1 and 2 which operate on PCI bus 0, you can assign IRQ3, IRQ4, IRQ5, IRQ7, IRQ9, IRQ10, IRQ11, IRQ12, IRQ14, and IRQ15.

For PCI slots 3, 4, and 5 which operate on PCI bus 1, you can assign IRQ4, IRQ9, IRQ10, IRQ11, IRQ12, IRQ14, and IRQ15.



Make sure that the interrupt you assign in any of the PCI slots are not used by other devices to avoid conflicts.

Press or to move between fields. Press or to select options.

Onboard VGA

This parameter allows you to manually assign the interrupt for the onboard VGA when the PCI IRQ Setting parameter is set to `Manual`. This parameter is grayed and not configurable when the PCI IRQ Setting is set to `Auto`.

Press or to move between fields. Press or to select options.

Onboard SCSI

This parameter allows you to manually assign the interrupt for the onboard SCSI hard disk when the PCI IRQ Setting parameter is set to `Manual`. This parameter is grayed and not configurable when the PCI IRQ Setting is set to `Auto`.

Press or to move between fields. Press or to select options.

3.4.2 VGA Palette Snoop

PCI devices support the palette snooping technique that enables the device to control access to their palette registers. Set this parameter to `Enabled` to activate the palette snooping function if both the PCI VGA and the ISA video devices are installed. Check your VGA card manual for more information about this function.

3.4.3 Onboard SCSI

This parameter allows you to enable or disable the onboard SCSI feature.

Boot Device

This parameter allows you to enable or disable the onboard SCSI boot priority.

3.5 Non-PnP ISA Card Configuration

The Non-PnP ISA Card Configuration parameters allow you to specify the settings for cards without the plug-and-play (PnP) feature.

Non-PnP ISA Card Configuration		Page 1/2
System Resources Used by Non-PnP ISA Cards		
IRQ/DMA		
IRQ 00....[---]*	IRQ 08....[---]*	DMA 0 ...[No]
IRQ 01....[---]*	IRQ 09....[No]	DMA 1 ...[No]
IRQ 02....[---]*	IRQ 10....[No]	DMA 2 ...[---]*
IRQ 03....[No]	IRQ 11....[No]	DMA 3 ...[No]
IRQ 04....[No]	IRQ 12....[No]	DMA 4 ...[---]*
IRQ 05....[No]	IRQ 13....[---]*	DMA 5 ...[No]
IRQ 06....[---]*	IRQ 14....[---]*	DMA 6 ...[No]
IRQ 07....[No]	IRQ 15....[No]	DMA 7 ...[No]
Expansion ROM Region		
C8000h - CBFFFh....[No]	D4000h - D7FFFh....[No]	
CC000h - CFFFFh....[No]	D8000h - DBFFFh....[No]	
D0000h - D3FFFh....[No]	DC000h - DFFFFh....[No]	
↑↓ = Move Highlight Bar, → ← = Change Setting PgDn/PgUp = Move Screen, F1 = Help, Esc = Exit		



The items marked No are currently not in use, while those marked Yes are in use by PnP cards.

The grayed items (denoted with asterisks) have fixed settings and are not user-configurable.

Non-PnP ISA Card Configuration		Page 2/2
I/O Region		
100h-10Fh ..[No]	200h-20Fh .[No]	300h-30Fh ..[No]
110h-11Fh ..[No]	210h-21Fh .[No]	310h-31Fh ..[No]
120h-12Fh ..[No]	220h-22Fh .[No]	320h-32Fh ..[No]
130h-13Fh ..[No]	230h-23Fh .[No]	330h-33Fh ..[No]
140h-14Fh ..[No]	240h-24Fh .[No]	340h-34Fh ..[No]
150h-15Fh ..[No]	250h-25Fh .[No]	350h-35Fh ..[No]
160h-16Fh ..[No]	260h-26Fh .[No]	360h-36Fh ..[No]
170h-17Fh ..[No]	270h-27Fh .[No]	370h-37Fh ..[No]
180h-18Fh ..[No]	280h-28Fh .[No]	380h-38Fh ..[No]
190h-19Fh ..[No]	290h-29Fh .[No]	390h-39Fh ..[No]
1A0h-1AFh ..[No]	2A0h-2AFh .[No]	3A0h-3AFh ..[No]
1B0h-1BFh ..[No]	2B0h-2BFh .[No]	3B0h-3BFh ..[No]
1C0h-1CFh ..[No]	2C0h-2CFh .[No]	3C0h-3CFh ..[No]
1D0h-1DFh ..[No]	2D0h-2DFh .[No]	3D0h-3DFh ..[No]
1E0h-1EFh ..[No]	2E0h-2EFh .[No]	3E0h-3EFh ..[No]
1F0h-1FFh ..[---]*	2F0h-2FFh .[No]	3F0h-3FFh ..[No]
↑↓ = Move Highlight Bar, → ← = Change Setting PgDn/PgUp = Move Screen, F1 = Help, Esc = Exit		



Refer to your non-PnP ISA card manual when setting the following parameters.

3.5.1 IRQ/DMA

These items allow you to assign specific IRQ and DMA channels to non-PnP ISA cards. The system will not use such IRQ and DMA channels when it automatically assigns channels to PnP cards.

3.5.2 Expansion ROM Region

These items specify the memory regions available for add-on card use. It allows you to manually assign specific regions to non-PnP cards so that the system will not use those regions anymore when it automatically configures PnP cards.

3.5.3 I/O Region

The items under this parameter allow you to reserve 16-byte memory address ranges for non-PnP cards. When the system configures PnP cards, the address ranges that you marked will not be used anymore.

You can assign memory addresses to non-PnP cards at random as long as you cover the address range required by the card. For example, for a card that requires 178h-188h address, you have to set regions 170h-17Fh and 180h-18Fh to Yes.

3.6 System Security Setup

The Setup program has a number of security features to prevent unauthorized access to the system and its data.

Enter the Setup program and select System Security. The following screen appears:

System Security		Page 1/1
Disk Drive Control		
Diskette Drive	[Normal]	
Hard disk Drive	[Normal]	
System Boot Drive	[Drive A then C]	
Onboard Communication Ports		
Serial Port 1	[3F8h]	
Serial Port 2	[2F8h]	
Parallel Port	[378h(IRQ7)]	
Operation Mode	[Standard Parallel Port(SPP)]	Mode
ECP DMA Channel	[-]	
Onboard PS/2 Mouse (IRQ12) ..	[Enabled]	
Setup Password	[None]	
Power On Password	[None]	
↑↓ = Move Highlight Bar, → ← = Change Setting PgDn/PgUp = Move Screen, F1 = Help, Esc = Exit		

3.6.1 Disk Drive Control

The disk drive control features allow you to enable or disable the read/write functions of a disk drive. These features can also control the diskette drive or hard disk drive boot function to prevent loading operating systems or other programs from a certain drive while the other drives remain operational.

Table 3-1 lists the drive control settings and their corresponding functions.

Table 3-1 Drive Control Settings

Diskette Drive	
Setting	Description
Normal	Diskette drive functions normally
Write Protect All Sectors	Disables the write function on all sectors
Write Protect Boot Sector	Disables the write function only on the boot sector
Disabled	Disables all diskette functions
Hard Disk Drive	
Setting	Description
Normal	Hard disk drive functions normally
Write Protect All Sectors	Disables the write function on all sectors
Write Protect Boot Sector	Disables the write function only on the boot sector
Disabled	Disables all hard disk functions
System Boot Drive	
Setting	Description
Drive A then C	The system checks drive A first. If there is a diskette in the drive, the system boots from drive A. Otherwise, it boots from drive C.
Drive C then A	The system checks drive C first. If there is a hard disk (drive C) installed, the system boots from drive C. Otherwise, it boots from drive A.
C:	The system always boots from drive C.
A:	The system always boots from drive A.

3.6.2 Onboard Communication Ports

Serial Port 1 Base Address

This parameter allows you to set serial port 1 logical base address.

Table 3-2 Serial Port 1 Settings

Setting	Description
3F8h	Serial port 1 with address 3F8h using IRQ4
2F8h	Serial port 1 with address 2F8h using IRQ3
3E8h	Serial port 1 with address 3E8h using IRQ4
2E8h	Serial port 1 with address 2E8h using IRQ3
Disabled	Disables serial port 1

Serial Port 2 Base Address

This parameter allows you to set serial port 2 logical base address.

Table 3-3 Serial Port 2 Settings

Setting	Description
3F8h	Serial port 2 with address 3F8h using IRQ4
2F8h	Serial port 2 with address 2F8h using IRQ3
3E8h	Serial port 2 with address 3E8h using IRQ4
2E8h	Serial port 2 with address 2E8h using IRQ3
Disabled	Disables serial port 2



If you assign 3F8h to serial port 1, you can only assign 2F8h or 2E8h to serial port 2.

If you assign 2F8h to serial port 1, you can only assign 3F8h or 3E8h to serial port 2.

Parallel Port Base Address

The system has one parallel port. Table 3-4 lists the options for selecting the parallel port address. You also have the option to disable the parallel port.

Table 3-4 Parallel Port Settings

Setting	Function
3BCh (IRQ 7)	Corresponds to the parallel port with address 3BCh
378h (IRQ 7)	Corresponds to the parallel port with address 378h
278h (IRQ 5)	Corresponds to the parallel port with address 278h
Disabled	Disables the parallel port



The 3BCh (IRQ 7) setting works only with Standard Parallel Port (SPP) and Standard and Bidirectional operation modes.

To deactivate the parallel port, select the `Disabled` option. If you install an add-on card with a parallel port whose address conflicts with the onboard parallel port, the system automatically disables the onboard functions.

Check the parallel port address on the add-on card and change the address to one that does not conflict.

OPERATION MODE

This item allows you to set the operation mode of the parallel port. Table 3-5 lists the available operation modes of the parallel port.

Table 3-5 Parallel Port Operation Mode Settings

Setting	Function
Standard Parallel Port (SPP)	Allows normal speed one-way operation
Standard and Bidirectional	Allows normal speed operation in a two-way mode
Enhanced Parallel Port (EPP)	Allows bidirectional parallel port operation at maximum speed
Extended Capabilities Port (ECP)	Allows parallel port to operate in bidirectional mode and at a speed higher than the maximum data transfer rate



When you select the Enhanced Parallel Port (EPP) or Extended Capabilities Port (ECP) as operation mode, the parallel port base address 3BCh (IRQ 7) is not available.

ECP DMA CHANNEL

This item becomes active only if you selected Extended Capabilities Port (ECP) as the operation mode. It allows you to select DMA channel 1 or DMA channel 3 (as required in Windows95).

3.6.3 Onboard PS/2 Mouse (IRQ 12)

This parameter enables or disables the PS/2 mouse. When set to *Enabled*, it allows you to use the onboard PS/2 mouse assigned with IRQ12. When set to *Disabled*, it deactivates the mouse and frees IRQ12 for the use of other devices.

3.6.4 Setup Password

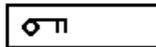
The Setup password prevents unauthorized access to the BIOS Utility.



Set jumper JP1 on the system board to pins 1-2 to enable the password function.

Setting a Password

1. Highlight the Setup Password parameter and press the left- or right-arrow key. The password prompt appears:



2. Type a password. The password may consist of up to seven characters.



Exercise caution when typing your password because the characters do not appear on the screen.

3. Press **ENTER**. A prompt asks you to retype the password to verify your first entry.



4. Retype the password then press **ENTER**.

After setting the password, the system automatically sets the Setup Password parameter to Present. The next time you want to enter the BIOS utility, you must key-in your Setup password.

If You Forget the Password

If you forget your password, you must reset the configuration values stored in CMOS to their default values. Should this happen, call your dealer for assistance.

3.6.5 Power On Password

The power-on password secures your system against unauthorized use. Once you set this password, you have to type it whenever you boot the system. To set this password, follow the same procedure as in setting a Setup password.

3.7 Remote Diagnostic Configuration

The Remote Diagnostic Configuration parameters allow you to configure the system power management feature.

The following screen shows the Remote Diagnostic Configuration parameters and their default settings:

Remote Diagnostic Configuration		Page 1/2
RDM Mode Number.....	[5]	
↑↓ = Move Highlight Bar, → ← = Change Setting PgDn/PgUp = Move Screen, F1 = Help, Esc = Exit		

Remote Diagnostic Configuration		Page 2/2
RDM System Critical Paging No.....	[0]	
RDM Remote Connection Phone No.....	[0]	
RDM Remote Connection Password.....	[0]	
↑↓ = Move Highlight Bar, → ← = Change Setting PgDn/PgUp = Move Screen, F1 = Help, Esc = Exit		

3.7.1 RDM Mode Number

This parameter allows you to set the RDM notification procedure. The notification options are listed in the following table:

Table 3-6 Notification Options

Option	Notification Procedure
Mode 1	1. Waiting for station call 2. Station dial in 3. Server reboot
Mode 2	1. Server paging 2. Waiting for station call 3. Station dial in 4. Server reboot
Mode 3	1. Server paging
Mode 4	1. Server paging 2. Server auto-reboot
Mode 5	1. Server paging 2. Server reboot 3. Server dial out to station
Disabled	Disables RDM function

The default setting is 1.

Mode 1

Mode 1 requires manual station notification. This indicates that once RDM is activated and the RDM LED turns on¹ the server administrator must call the RDM station to notify the service engineer about the server status. Once the service engineer at the RDM station site is informed and confirmed the server status, he must run the RDM-station software in order to establish communication with the RDM agent.

After executing the RDM-station software, the RDM-station application window appears on screen. Under the Settings option, the service engineer must enter the correct server phone number, station phone number, and RDM password. The entered password must be the same as the one specified in the RDM remote connection password BIOS parameter. Otherwise, remote connection cannot be established. Refer to the RDM User's Guide for more details on the RDM-station application.

If remote connection is successfully established, the server automatically reboots. After reboot, it automatically enters the BIOS utility and allows the RDM station to check and reconfigure the server BIOS settings, if necessary. After making your modification, reboot the server.

¹ A lighted RDM LED indicates either of the following:

- a. RDM button is pressed
- b. RDM driver has detected server failure.

For more details on activating RDM, see section 3.3.

Mode 2

Once RDM is activated, the RDM module contacts the pager number specified in the RDM system critical paging number parameter. Once the server engineer received the notification, he must run the station software to establish communication with the RDM agent.

When connection is established, the station undergoes the same process as in Mode 1 wherein RDM module requires a password and the remote station phone number to establish the RDM connection.

Mode 3

Mode 3 is also called as the debug mode. When the server fails or hangs, the RDM module contacts the pager number specified in the RDM system critical paging number parameter. After the pager notification, the RDM module automatically isolates the RDM agent and deactivates the RDM program to prevent the station from accessing the server. This means that you cannot reboot the server unless you are at the RDM agent site and have direct access to the system.

This mode requires direct server access.



In this mode, notice that the RDM LED is OFF. This indicates that the RDM function is deactivated.

We recommend you NOT to select this setting unless you want to disregard the RDM function.

Mode 4

In this mode, when RDM is activated due to server failure, the RDM module contacts the pager number specified in the RDM system critical paging number parameter and automatically reboots the server without asking for a password or the remote station phone number. After rebooting, the server enters normal mode.

This option allows you to minimize the system downtime.

Mode 5

Once the server fails or hangs, the RDM module contacts the specified pager number, reboots the server, then connects to the RDM station. The RDM station modem must be ON and the system must be running the RDM-station application in order to establish communication. Otherwise, the signal sent by the module will not be received by the station at once.

After reboot, the BIOS utility appears on station screen and automatically disconnects the RDM-agent keyboard to enable the RDM station function as the main console. This also allows the station to check and reconfigure the server BIOS settings. After modifying the BIOS settings, reboot the server.



In this mode, if the RDM agent fails to establish connection with the station, it automatically reboots and enters normal mode (same as in Mode 4).

Disabled

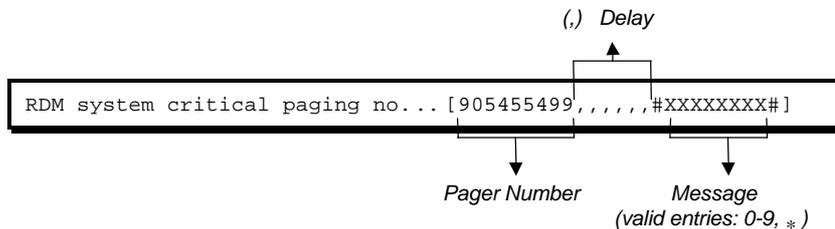
This setting disables the RDM function and puts the system into normal mode. In normal mode, the system I/O chip allows COM2 port to function as the modem controller. Since the RDM module deactivates the RDM function, the server is protected from unauthorized and unnecessary access.

3.7.2 RDM System Critical Paging Number

This parameter allows you to set the pager number that the RDM module must contact once the server fails or hangs. To enter the pager number, simply highlight the parameter. Type in the pager number followed by six commas (,). The commas specify the delay. Make sure that you enter six commas; otherwise, the pager may not receive the complete message.

You may also include the RDM agent modem number or the message that you want to send in the pager notification. To do this, simply enter the numbers after the comma signs. The valid entries are 0 to 9 and asterisk (*). Also, these numbers must start and end with the number (#) sign.

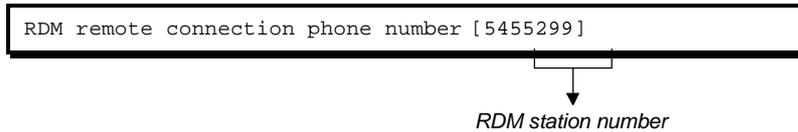
To bypass this feature, do not enter any number after the comma signs.



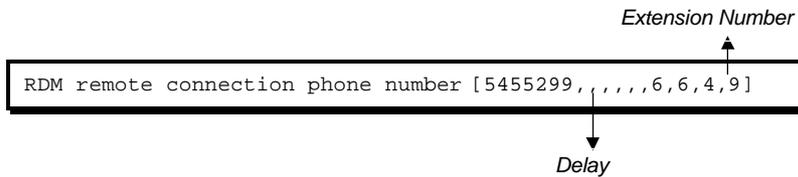
Leave the parameter blank to disregard the function.

3.7.3 RDM Remote Connection Phone Number

This parameter allows you to set the RDM station number the RDM module must contact once RDM is activated under the RDM work mode 5 setting. To set, simply highlight the parameter and enter the station phone number.



If the remote connection phone number is utilizing PBX line, then you must enter six commas (,) after the entry phone number followed by the extension number, if any. When entering the extension number, we recommend that you insert a comma after each number. The commas specify delay.



Leave the parameter blank to disregard the feature.

3.7.4 RDM Remote Connection Password

This parameter prevents unauthorized access of the RDM agent. To set a password, simply highlight the parameter and enter your code. Your password may contain up to eight characters. If you specify a password, make sure to take note of it. You will need enter the correct password before the RDM station gains access to the RDM agent. If you want to bypass the password feature, leave the parameter blank. When prompted for the password during RDM operation, press **ENTER** to disregard the prompt.

3.8 Load Setup Default Settings

Use this option to load the default settings for the optimized system configuration. When you load the default settings, some of the parameters are grayed-out with their fixed settings. These grayed parameters are not user-configurable. If you want to change the settings of these items, disable the Auto Configuration Mode and the Fast Boot Mode parameters under the Basic System Configuration menu.

3.9 Leaving Setup

Examine the system configuration values. When you are satisfied that all the values are correct, write them down. Store the recorded values in a safe place. In the future, if the battery loses power or the CMOS chip is damaged, you know what values to enter when you rerun Setup.

Press **[ESC]** to leave the system configuration setup. If there is any change in the BIOS utility functions, the following screen appears:

```
Do you want to save CMOS data?
      [Yes]      [No]
```

Select your response with the arrow keys. Select **Yes** to store the new data in the CMOS. Select **No** to retain the old configuration values. Press **[ENTER]**.

3.10 Hard Disk Types

Type	Cylinders	Heads	Sectors Per Track
None	(indicates SCSI or no hard disk)		
1	306	4	17
2	615	4	17
3	615	6	17
4	940	8	17
5	940	6	17
6	615	4	17
7	462	8	17
8	733	5	17
9	900	15	17
10	820	3	17
11	855	5	17
12	855	7	17
13	306	8	17
14	733	7	17
15	(reserved)		
16	612	4	17
17	977	5	17
18	977	7	17
19	1024	7	17
20	733	5	17
21	733	7	17
22	733	5	17
23	306	4	17
24	612	4	17
25	306	4	17
26	612	4	17
27	698	7	17
28	976	5	17
29	306	4	17
30	611	4	17
31	732	7	17
32	1023	5	17
33	751	8	17
34	755	16	17
35	731	13	26
36	980	15	17
37	936	16	17
38	981	5	17

Type	Cylinders	Heads	Sectors Per Track
39	981	10	17
40	762	8	39
41	980	5	17
42	832	8	33
43	683	12	38
44	513	16	38
45	776	8	33
46	683	16	38
47	832	6	33
48	615	2	34
49	989	16	63
50	823	4	38
51	1001	15	17
52	1024	17	22
53	723	13	51
54	548	8	38
55	1013	4	41
56	929	15	17
57	817	14	36
58	723	13	81
59	802	4	39
60	1024	9	17
61	895	5	55
62	(reserved)		
63	966	10	34
64	1024	8	17
65	1024	11	17
66	918	11	17
67	965	14	49
68	1024	10	17
69	1024	12	17
70	1024	13	17
71	1024	14	17
72	1024	11	50
73	1024	16	17
74	918	15	17
75	1010	16	51
76	1024	5	17
77	1024	8	17
78	(reserved)		

Type	Cylinders	Heads	Sectors Per Track
79	1001	15	32
80	1024	16	63
81	1024	7	17
82	988	16	52
83	1024	15	17
84	776	8	33
85	926	13	17
86	805	4	26
87	976	5	17
88	685	16	38
89	1011	15	22
90	997	10	53
91	985	13	32
92	816	15	32
93	968	5	17
94	903	8	46
95	966	5	34
96	535	10	50
97	715	10	50
98	1016	16	63
99	996	16	63
Auto or User	(User-defined)		