USER'S MANUAL

ENGLISH

中文

RHINO 9

586 MAINBOARD

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CHAPTER 1

SYSTEM OVERVIEW

OCTEK RHINO 9 is a powerful PC machine offering unparalleled performance. The advanced external cache system implemented meets the demand of the most memory-intensive applications today. The support of Synchronous Cache RAM (pipelined burst SRAM) and EDO DRAM results in better performance when compared with traditional asynchronous SRAM and Fast Page Mode DRAM. With the Pentium processor and a high bandwidth 32-bit PCI expansion bus, the I/O bottleneck that plagues most PC systems is now removed.

All of the I/O is integrated inside the mainboard to further facilitate system installation. The built-in IDE can support up to 4 fast Enhanced IDE devices whereas it can also support up to two floppy drives. The mainboard also includes two serial ports and one parallel port as the basic configuration for end user. All that is needed is just a VGA card plugged into a PCI or ISA slot to complete the whole system.

1.1 General Specifications Overview

Processor:

• Processor Type	Intel Pentium CPU including P54C, P54CQS, P54CS, P55C, AMD 5k86 and Cyrix 6x86 CPU.
• External CPU clock	50/60/66 MHz

Chipset:

• Motherboard chipset	Intel 82430HX
• Super I/O chipset	665/669 super I/O chipset

Cache Architecture:

• Internal Cache	8KB data cache 8KB code cache
• External Cache	Total 256/512KB Synchronous Pipelined Burst SRAM

Memory Subsystem:

• DRAM SIMM sockets	6 x 72 pin 4MB / 8MB / 16MB / 32MB / 64MB DRAM modules
• Max. Memory Size	384MB
• DRAM Type	Fast Page Mode or EDO
• Enhancement	Mix of Fast Page Mode or EDO DRAM supported

Input/Output Subsystem

• PCI bus slots	3 x 32-bit PCI Bus slots (3 masters)
• ISA bus slots	3 x 16-bit ISA slots
• shared bus slots	1 x 32 bit PCI bus slot (master) OR 1 x 16-bit ISA slot
• I/O bus speed	Up to 33MHz (PCI bus)

Integrated IDE, Super I/O Subsystem

• IDE support	Chipset built-in PCI IDE support up to 4 IDE Drives
• On board I/O	One Floppy Port supporting 2 floppy drives of 360KB / 720KB / 1.44MB/ 2.88MB capacity. Two serial ports (16550 Fast UART compatibles) One parallel Port (Standard, ECP, EPP support)

PS/2 Mouse

• PS/2 Mouse	Supports PS/2 Mouse through a 1x4 header

Power Management

• Green functions	Support various Power Management schemes Sleep Switch for power saving

BIOS Subsystem

• BIOS Shadowing	Shadow RAM for System and Video BIOS
• BIOS Features	Built-in setup, Power-on self test, Drive table optimization, User-definable drive types, Password protection, Shadowing options

Plug & Play / BIOS Update

• Plug & Play BIOS	Support Plug & Play for easy installation
• Flash EEPROM	Use Flash EEPROM (1M bits) to allow easy BIOS update

System Support Functions

• System functions	7 DMA channels, 16 level interrupts, Programmable timers
• Support functions	Fast A20 gate and Fast Reset
• Clock	Enhanced real time clock/calendar with battery back-up

Other Features

• Power good	On board power good signal generation
• 3.3V supply	On board 3.3V supply to eliminate the need for special power supply for 3.3V component e.g. CPU, SRAM. Maximum rating : 30 W.
•2.5V supply	On board 2.5V supply to directly support Intel Pentium P55C CPU. Maximum rating : 30 W.
• Switches	Reset, Keylock switches, Sleep Switch.
• Size	8.5" (W) x 13" (L)

1.2 Central Processing Unit

The Pentium processor is a superscalar, pipelined CPU that provides next generation performance for the existing PC compatible software.

The processor is equipped with an 8K code cache and an 8K data cache . Each cache is organized in a 2-way set-associative architecture, offering higher hit rates. The data cache can be configured in write-back or write-through modes.

The internal numeric coprocessor is redesigned to give three times the performance of the 80486 FPU. It is backward compatible with i486DX math coprocessor and complying to ANSI/IEEE standard 754-1985.

1.3 External Cache Subsystem

The external cache of RHINO 9 is organized in a direct-mapped configuration with sizes of 256KB, or 512KB in write-back mode using synchronous SRAM (pipelined burst SRAM).

There are two options to support 256KB SRAM :

(1) None on board but 256KB via cache module.

(2) 256KB on board

To support a total of 512KB SRAM, we should have :

256KB on board and 256KB via cache module to provide a total of 512KB SRAM.

In addition, the presence and size of synchronous SRAM used is auto-detected by BIOS.

1.4 DRAM Subsystem

The main memory in RHINO 9 is organized as a 64-bit memory pool. Both fast-page mode and EDO DRAMs are supported.

EDO DRAM stands for Extended Data Out DRAM and is designed to improve the DRAM read performance. EDO DRAM holds the memory data valid until the next CAS# falling edge, unlike standard fast page mode DRAM which tri-states the memory data when CAS# is deasserted to precharge for the next cycle. As a result, the CAS# precharge can now overlap with the data valid time to allow CAS# to negate earlier while still satisfying the memory data valid window time.

In addition, mix of EDO/ Fast Page Mode DRAM could be used on RHINO 9. The presence of EDO/ Fast Page Mode DRAM is auto-detected by BIOS without any related jumper setting.

1.5 PCI Bus

The Peripheral Component Interconnect (PCI) local bus was specified to establish a high performance local bus standard. It is a 32-bit wide bus supporting burst transactions

The PCI local bus implemented in RHINO 9 is fully compliant to v2.1 specification. Up to four PCI bus masters are supported.

1.6 Super I/O Subsystem

To facilitate system implementation, included in RHINO 9 are two fast Enhanced IDE ports that can dramatically boost the system performance if fast IDE drives are used.

Furthermore, various formats floppy drives are also supported through the floppy connector on board. The motherboard is also equipped with two serial ports (16550 Fast UART compatibles) and one parallel port that operates in standard, ECP or EPP mode.

In addition, RHINO 9 is designed to support the PS/2 mouse using specialized keyboard controller and the use of interrupt IRQ 12. Nevertheless, user can disable the PS/2 mouse function by means of jumpers.

1.7 Input/Output Subsystem

To allow greater system feasibility, RHINO 9 has four ISA bus expansion connectors and four PCI expansion connectors. One of the expansion slots is shared by connectors that will accommodate either an ISA or a PCI expansion, but not both at the same time. Therefore, up to seven expansion slots can be populated on RHINO 9 . Furthermore, all the PCI slots can accept PCI bus master cards.

1.8 BIOS Subsystem

RHINO 9 System BIOS and is stored in Flash EEPROM (1 M bits) which allows easy upgrade through the utility found inside the diskette shipped with RHINO 9.

CHAPTER 2

INSTALLATION AND UPGRADE

2.1 CPU Installation

The CPU is composed of pins that can easily be bent during installation, causing permanent damage to the processor. It is therefore very important that you make sure the pins are straight before installing the CPU onto the SPGA socket located on RHINO 9 (refer to layout for exact location). To properly align the CPU with the socket, align pin 1 of the CPU (with a notch at the corner) with pin 1 of the CPU socket as demonstrated below.

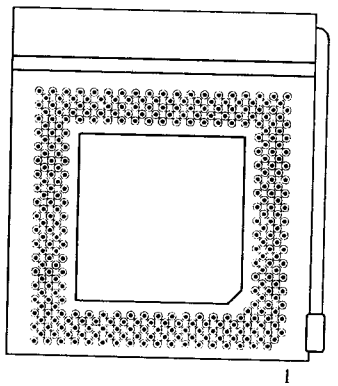


Figure 1 Socket 7 for Pentium CPU

2.2 Fast Page mode / EDO DRAM Installation

There are six SIMM sockets located on the RHINO 9 motherboard, marked SM1, SM2, SM3, SM4, SM5 and SM6. The SM1, SM2, SM3, SM4, SM5 and SM6 are counted starting from left to right consecutively. Start to install the SIMM modules (IN PAIRS) from either Bank 1 (SM5/SM6), Bank 2 (SM3/SM4) or Bank 3 (SM1/SM2) depending on how your memory is configured, you may not need to use all the memory banks. Either X32 or X36 of 72 pins SIMM can be installed.

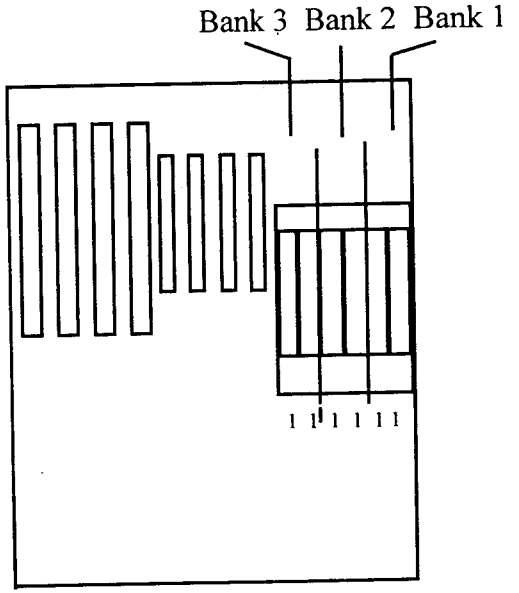


Figure 2 SIMM Sockets Location

Below is some of the possible configuration table for RHINO 9.

SM1	SM2	SM3	SM4	SM5	SM6	Total
--------	--------	--------	--------	512Kx32	512Kx32	4MB
--------	--------	--------	--------	1Mx32	1Mx32	8MB
--------	--------	--------	--------	2Mx32	2Mx32	16MB
--------	--------	--------	--------	4Mx32	4Mx32	32MB
--------	--------	--------	--------	8Mx32	8Mx32	64MB
--------	--------	--------	--------	16Mx32	16Mx32	128MB
--------	--------	512Kx32	512Kx32	512Kx32	512Kx32	8MB
--------	--------	1Mx32	1Mx32	512Kx32	512Kx32	12MB
--------	--------	2Mx32	2Mx32	512Kx32	512Kx32	20MB
--------	--------	4Mx32	4Mx32	512Kx32	512Kx32	36MB
--------	--------	8Mx32	8Mx32	512Kx32	512Kx32	68MB
--------	--------	16Mx32	16Mx32	512Kx32	512Kx32	132MB
--------	--------	512Kx32	512Kx32	1Mx32	1Mx32	12MB
--------	--------	1Mx32	1Mx32	1Mx32	1Mx32	16MB
--------	--------	2Mx32	2Mx32	1Mx32	1Mx32	24MB
--------	--------	4Mx32	4Mx32	1Mx32	1Mx32	40MB
--------	--------	8Mx32	8Mx32	1Mx32	1Mx32	72MB
--------	--------	16Mx32	16Mx32	1Mx32	1Mx32	136MB
..		..		..		
--------	--------	512Kx32	512Kx32	16Mx32	16Mx32	132MB
--------	--------	1Mx32	1Mx32	16Mx32	16Mx32	136MB
--------	--------	2Mx32	2Mx32	16Mx32	16Mx32	144MB
--------	--------	4Mx32	4Mx32	16Mx32	16Mx32	160MB
--------	--------	8Mx32	8Mx32	16Mx32	16Mx32	192MB
--------	--------	16Mx32	16Mx32	16Mx32	16Mx32	256MB
..		..		..		
512Kx32	512Kx32	512Kx32	512Kx32	512Kx32	512Kx32	12MB
1Mx32	1Mx32	512Kx32	512Kx32	512Kx32	512Kx32	16MB
2Mx32	2Mx32	512Kx32	512Kx32	512Kx32	512Kx32	24MB
4Mx32	4Mx32	512Kx32	512Kx32	512Kx32	512Kx32	40MB
8Mx32	8Mx32	512Kx32	512Kx32	512Kx32	512Kx32	72MB
16Mx32	16Mx32	512Kx32	512KX32	512Kx32	512Kx32	136MB
..		..		..		
512Kx32	512Kx32	16Mx32	16Mx32	16Mx32	16Mx32	260MB
1Mx32	1Mx32	16Mx32	16Mx32	16Mx32	16Mx32	264MB
2Mx32	2Mx32	16Mx32	16Mx32	16Mx32	16Mx32	272MB
4Mx32	4Mx32	16Mx32	16Mx32	16Mx32	16Mx32	288MB
8Mx32	8Mx32	16Mx32	16Mx32	16Mx32	16Mx32	320MB
16Mx32	16Mx32	16Mx32	16Mx32	16Mx32	16Mx32	384MB

Table 1 Memory Configuration Table

2.3 Control of System Speed

System speed can be controlled by keyboard. To change the speed by keyboard, use the minus sign (-) and the plus sign (+). Press <control> + <alt> + <"-"> for slow speed and <control> + <alt> + <"+"> for fast speed.

2.4 Fan voltage

There are two different voltages available for CPU fans; +5 volts and + 12 volts. Select a proper setting for jumper JP1 before you turn on the computer.

2.5 Fan Connector

This Fan connector (P6) allows the CPU fan to draw current directly from the motherboard, without having to rely on a separate power connector.

2.6 Reset CMOS

If the setting of the system setup is done improperly, it may make the system malfunction. If this happens, turn off the power and set jumper JP21 to 2-3 to clear the internal CMOS status register. Wait at least 5 seconds to ensure that the CMOS content has been completely cleared.

Next, set the jumper JP21 back to 1-2 and turn on the power. The BIOS will find the CMOS status register is reset and will regard the setup information invalid, so it will prompt you to correct the information.

APPENDIX-A

CONNECTORS PINOUT

A.1 Turbo LED Connector (P1)

Pin	Signal Name
1	Pull_Up_150
2	LED_Turbo-

A.2 Speaker Connector (P2)

Pin	Signal Name
1	Speaker Data_Out
2	N.C.
3	Ground
4	+5Vdc

A.3 HD LED Connector (P3)

Pin	Signal Name
1	Pull_Up_330
2	HD_LED-
3	HD_LED-
4	Pull_Up_330

A.4 Reset Connector (P4)

Pin	Signal Name
1	Reset
2	Ground

A.5 Keylock Connector (P5)

Pin	Signal Name
1	+5Vdc
2	Mechanical Key
3	Ground
4	Keyboard Inhibit
5	Ground

A.6 Fan Connector (P6)

Pin	Signal Name
1	+5/+12dc Power
2	Ground

A.7 External Battery Connector (P9)

Pin	Signal Name
1	+3.6Vdc
2	N.C.
3	Ground
4	Ground

A.8 Sleep Switch (P10)

Pin	Signal Name
1	EPMI
2	Ground

A.9 Power Connector (P15,P18)

Pin	Signal Name
1	Power Good
2	+5Vdc
3	+12Vdc
4	-12V dc
5	Ground
6	Ground
7	Ground
8	Ground
9	-5Vdc
10	+5Vdc
11	+5Vdc
12	+5Vdc

A.10 PS/2 Mouse Connector (P21)

Pin	Signal Name
1	+5V dc
2	GND
3	MDATA
4	MCLK

A.11 Keyboard Connector (KB1)

Pin	Signal Name
1	Keyboard clock
2	Keyboard data
3	Not used
4	Ground
5	VCC

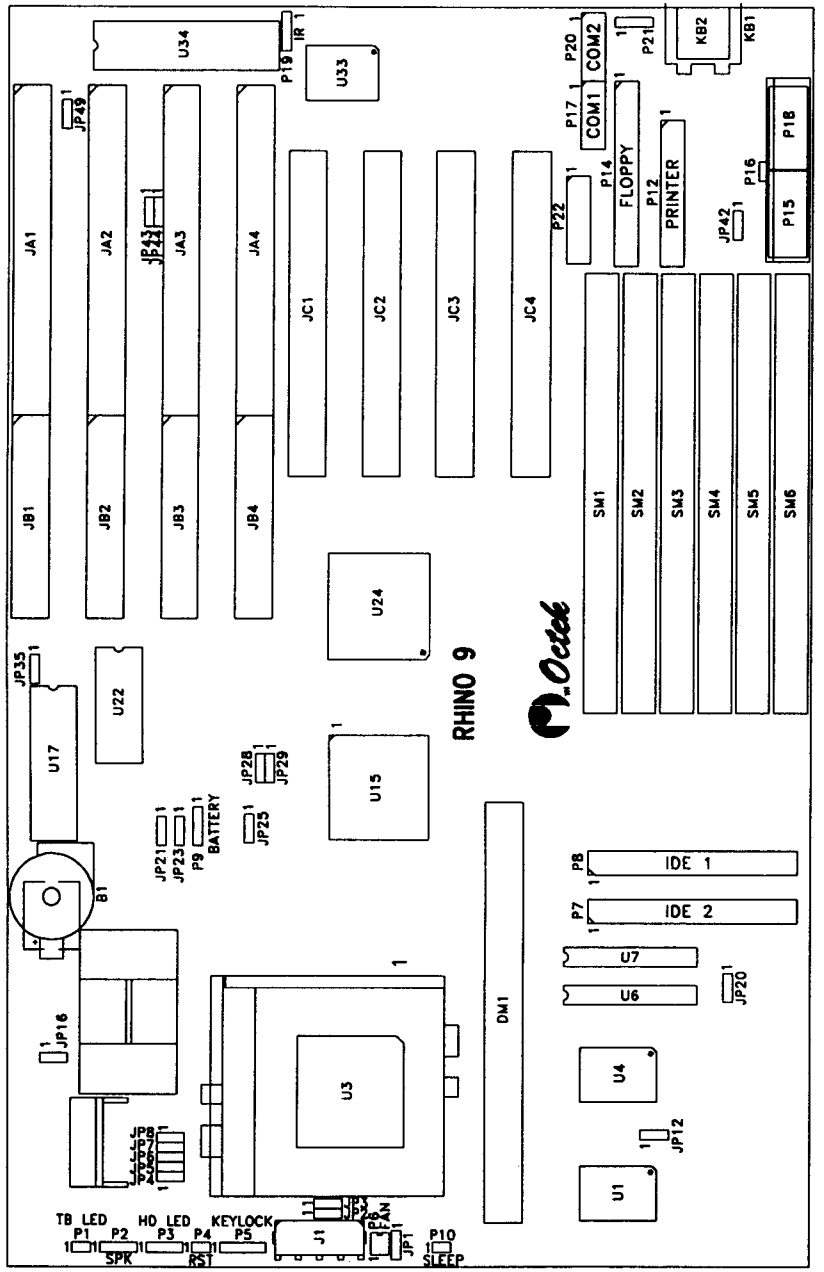
APPENDIX-B

HARDWARE SETTINGS

B.1 System Component Map

Jumper Connectors	Function
P1	Turbo LED
P2	Speaker
P3	IDE LED Connector
P4	Reset
P5	Keylock
P6	Fan Connector
P7	Secondary IDE Connector
P8	Primary IDE Connector
P9	External Battery Connector
P10	Sleep Connector
P12	Printer Port Connector
P14	Floppy Connector
P15	Power Connector
P17	Serial Port 1
P18	Power Connector
P20	Serial Port 2
P21	PS/2 Mouse Connector
KB1	Keyboard Connector

B.2 Layout of RHINO 9 Main Board



B.3 Jumper Settings

All factory settings are marked by * in the following sections.

B.3.1 CPU related settings

CPU Voltage Core Selection

RHINO 9 has on board 2.5V and 3.3V regulators to directly support Intel Pentium P55C CPU. The P55C will specially need a 2.5V CPU Core voltage in order to funciton properly. Others Pentium CPU such as P54C, P54CQS, P54CS, Cyrix 6x86 and AMD5k86 CPU will need a Core voltage of 3.3V. The voltage selection for Core voltage is done by JP16 as follows :

JP16	CPU Core voltage	CPU Core voltage
2-3	2.5V	Intel P55C CPU
1-2	3.3V	Intel P54C, P54CQS, P54CS, Cyrix 6x86, AMD5k86 CPU

NOTE : Be careful to select the appropriate Core voltage for different CPU. Improper Core voltage supplied to CPU may result in "PERMANENT DAMAGE" to CPU !

CPU Clock

JP2	JP3	JP8	JP25	JP28	JP29	CPU Clock	CPU Type
1-2	1-2	1-2	1-2	2-3	2-3	50MHz	Intel P54C-75
2-3	1-2	1-2	1-2	2-3	2-3		Cyrix 6x86-P120+ (100 MHz)
1-2	1-2	1-2	1-2	2-3	2-3		AMD 5k86-P75 (75MHz)
1-2	1-2	1-2	2-3	1-2	2-3	60MHz	Intel P54C-90
2-3	1-2	1-2	2-3	1-2	2-3		Intel P54C-120
2-3	2-3	1-2	2-3	1-2	2-3		Intel P54C-150
1-2	2-3	1-2	2-3	1-2	2-3		Intel P54C-180
2-3	1-2	1-2	2-3	1-2	2-3		Cyrix 6x86-P150+ (120 MHz)
1-2	1-2	1-2	2-3	1-2	2-3		AMD 5k86-P90 (90MHz)
1-2	1-2	2-3	2-3	2-3	1-2	66MHz	Intel P54C-100
2-3	1-2	2-3	2-3	2-3	1-2		Intel P54C-133
2-3	2-3	2-3	2-3	2-3	1-2		Intel P54C-166
1-2	2-3	2-3	2-3	2-3	1-2		Intel P54C-200
2-3	1-2	2-3	2-3	2-3	1-2		Cyrix 6x86-P166+ (133 MHz)
1-2	1-2	2-3	2-3	2-3	1-2		AMD 5k86-P100 (100MHz)

CPU Fan voltage select

	JP1
+5V	1-2 *
+12V	2-3

B.3.2 External cache (L2 cache) setting

Synchronous Cache size

Total Cache Size	JP4	JP5	JP6	JP7	JP12
0KB	1-2	1-2	1-2	1-2	1-2
256KB	2-3	1-2	1-2	1-2	1-2
512KB	1-2	2-3	2-3	2-3	2-3

Synchronous SRAM device requirement

256K Configuration :

1. 256KB cache using on board 256K SRAM

SRAM	location	type	speed	voltage
tag RAM	U6,U7 (on board)	8Kx8 / 32Kx8	15ns	5V I/O
data RAM	U1,U4 (on board)	2 pcs 32Kx32 pipelined burst SRAM	7ns (Clock to o/p valid)	3.3V I/O

2. 256KB cache using 256K Cache Module w/o Tag RAM

SRAM	location	type	speed	voltage
tag RAM	U6,U7 (on board)	8Kx8 /32Kx8	15ns	5V I/O
data RAM	DM1	256K Cache Module w/o Tag	7ns (Clock to o/p valid)	3.3V I/O

512K Configuration :

512KB cache using 256K Cache Module w/o Tag RAM and 256K SRAM on board

SRAM	location	type	speed	voltage
tag RAM	U6,U7	32Kx8	15ns	5V I/O
data RAM (bank 0)	U1,U4 (on board)	2 ps 32Kx32 pipelined burst SRAM	7ns (Clock to o/p valid)	3.3V I/O
data RAM (bank 1)	DM1	256K Cache Module w/o Tag RAM	7ns (Clock to o/p valid)	3.3V I/O

B.3.3 Peripheral setup

PS/2 MOUSE support

	JP49	JP43	JP44
Enabled	1-2 *	2-3 *	2-3 *
Disabled	2-3	1-2	1-2

B.3.4 Miscellaneous

Power Good Signal select

	JP42
External Power Good	1-2 *
On-board Power Good	2-3

CMOS discharge

	JP21
Preserve CMOS	1-2 *
Clear CMOS	2-3

Battery select

	JP23
On-board Battery	1-2 *
External Battery	2-3

Reserved Jumpers

JP20	2-3
JP35	1-2