USER'S MANUAL

RHINO 6VX

Pentium PCI Local Bus Motherboard

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REVISION 1.4 Aug 1996

Table of Contents

Chapter 1: System Overview

Chapter 2: Installation and Upgrade

Appendix-A: Connectors Pinout

Appendix-B: Hardware Settings

CHAPTER 1

SYSTEM OVERVIEW

OCTEK RHINO 6VX 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,AMD K5 and Cyrix 6x86 CPU.
◆ External CPU clock	50/55/60/66 MHz

Chipset:

◆ Motherboard chipset	Intel 82430VX
◆ Super I/O chipset	665/669 super I/O chipset

Cache Architecture:

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

Memory Subsystem:

◆ DRAM SIMM sockets	4 x 72 pin 4MB / 8MB / 16MB / 32MB DRAM modules
◆ Max. Memory Size	128MB
◆ DRAM Type	Fast Page Mode or EDO DRAM
◆ Enhancement	Mix of Fast Page Mode or EDO DRAM supported

Input/Output Subsystem

◆ PCI bus slots	2 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

USB Devices

◆ USB Devices	Interfaced with both host and hub control functions 2 programmable USB ports

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.
◆ Switches	Reset, Keylock switches, Sleep Switch.
◆ Size	8.5" (W) x 11" (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 6VX 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) 256KB on board (2 pcs of 32Kx32 SRAM).

To support a total of 512KB SRAM, we should have :
(1) 512KB on board (4 pcs of 32Kx32 SRAM).
(2) 256KB on board and 256KB via cache module.

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

1.4 DRAM Subsystem

The main memory in RHINO 6VX 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 6VX. 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 6VX is fully compliant to v2.1 specification. Up to four PCI bus masters are supported.

1.6 Universal Serial Bus

The Universal Serial Bus (USB) is a cable bus that supports data exchange between a host computer and a wide range of simultaneously accessible peripherals.

1.7 Super I/O Subsystem

To facilitate system implementation, included in RHINO 6VX 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 6VX 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.

1.8 Input/Output Subsystem

To allow greater system feasibility, RHINO 6VX has four ISA bus expansion connectors and three 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 six expansion slots can be populated on RHINO 6VX . Furthermore, all the PCI slots can accept PCI bus master cards.

1.9 BIOS Subsystem

RHINO 6VX System BIOS is stored in Flash EEPROM (1 M bits) which allows easy upgrade through the utility found inside the diskette shipped with RHINO 6VX.

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 6VX (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.

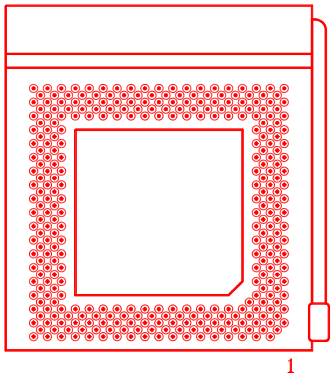


Figure 1 Socket 7 for Pentium CPU

2.2 Fast Page mode / EDO DRAM Installation

There are four SIMM sockets located on the RHINO 6VX motherboard, marked BANK 1 and BANK 2. BANK 1 and BANK 2 are counted starting from right to left consecutively. Start to install the SIMM modules (IN PAIRS) from either Bank 1 or Bank 2. 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.

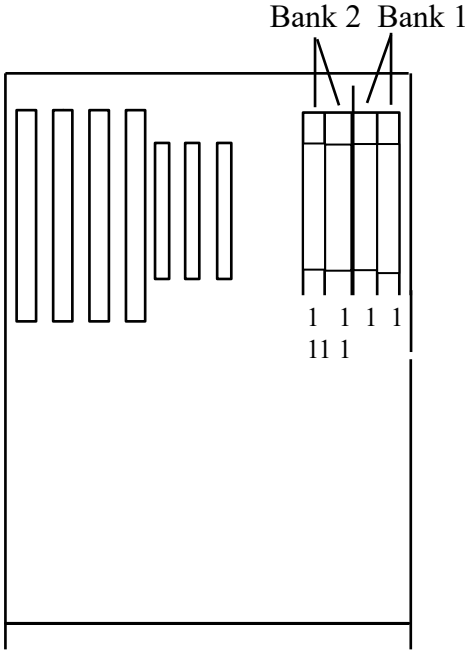


Figure 2 SIMM Sockets Location

Below is a memory configuration table for RHINO 6VX.

BANK 1		BANK 2		Total
--------	--------	512Kx32	512Kx32	4MB
--------	--------	1Mx32	1Mx32	8MB
--------	--------	2Mx32	2Mx32	16MB
--------	--------	4Mx32	4Mx32	32MB
--------	--------	8Mx32	8Mx32	64MB
512Kx32	512Kx32	--------	--------	4MB
1Mx32	1Mx32	--------	--------	8MB
2Mx32	2Mx32	--------	--------	16MB
4Mx32	4Mx32	--------	--------	32MB
8Mx32	8Mx32	--------	--------	64MB
512Kx32	512Kx32	512Kx32	512Kx32	8MB
1Mx32	1Mx32	512Kx32	512Kx32	12MB
512Kx32	512Kx32	1Mx32	1Mx32	12MB
1Mx32	1Mx32	1Mx32	1Mx32	16MB
2Mx32	2Mx32	512Kx32	512Kx32	20MB
2Mx32	2Mx32	1Mx32	1Mx32	24MB
512Kx32	512Kx32	2Mx32	2Mx32	20MB
1Mx32	1Mx32	2Mx32	2Mx32	24MB
2Mx32	2Mx32	2Mx32	2Mx32	32MB
4Mx32	4Mx32	512Kx32	512Kx32	36MB
4Mx32	4Mx32	1Mx32	1Mx32	40MB
4Mx32	4Mx32	2Mx32	2Mx32	48MB
512Kx32	512Kx32	4Mx32	4Mx32	36MB
1Mx32	1Mx32	4Mx32	4Mx32	40MB
2Mx32	2Mx32	4Mx32	4Mx32	48MB
4Mx32	4Mx32	4Mx32	4Mx32	64MB
8Mx32	8Mx32	512Kx32	512Kx32	68MB
8Mx32	8Mx32	1Mx32	1Mx32	72MB
8Mx32	8Mx32	2Mx32	2Mx32	80MB
8Mx32	8Mx32	4Mx32	4Mx32	96MB
512Kx32	512Kx32	8Mx32	8Mx32	68MB
1Mx32	1Mx32	8Mx32	8Mx32	72MB
2Mx32	2Mx32	8Mx32	8Mx32	80MB
4Mx32	4Mx32	8Mx32	8Mx32	96MB
8Mx32	8Mx32	8Mx32	8Mx32	128MB

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 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 JP7 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 JP7 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 Reset Connector (P1)

Pin	Signal Name
1	Reset
2	Ground

A.2 Turbo LED Connector (P2)

Pin	Signal Name
1	Pull_Up_150
2	LED_Turbo-

A.3 Speaker Connector (P3)

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

A.4 Keylock Connector (P4)

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

A.5 HD LED Connector (P5)

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

A.6 External Battery Connector (P9)

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

A.7 Sleep Switch (P10)

Pin	Signal Name
1	EPMI
2	Ground

A.8 USB Connector (P24)

Pin	Signal Name	Pin	Signal Name
6	VCC	1	VCC
7	Port 1-	2	Port 0-
8	Port 1+	3	Port 0+
9	Ground	4	Ground
10	NC	5	NC

A.9 Power Connector (P18,P19)

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 (P22)

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

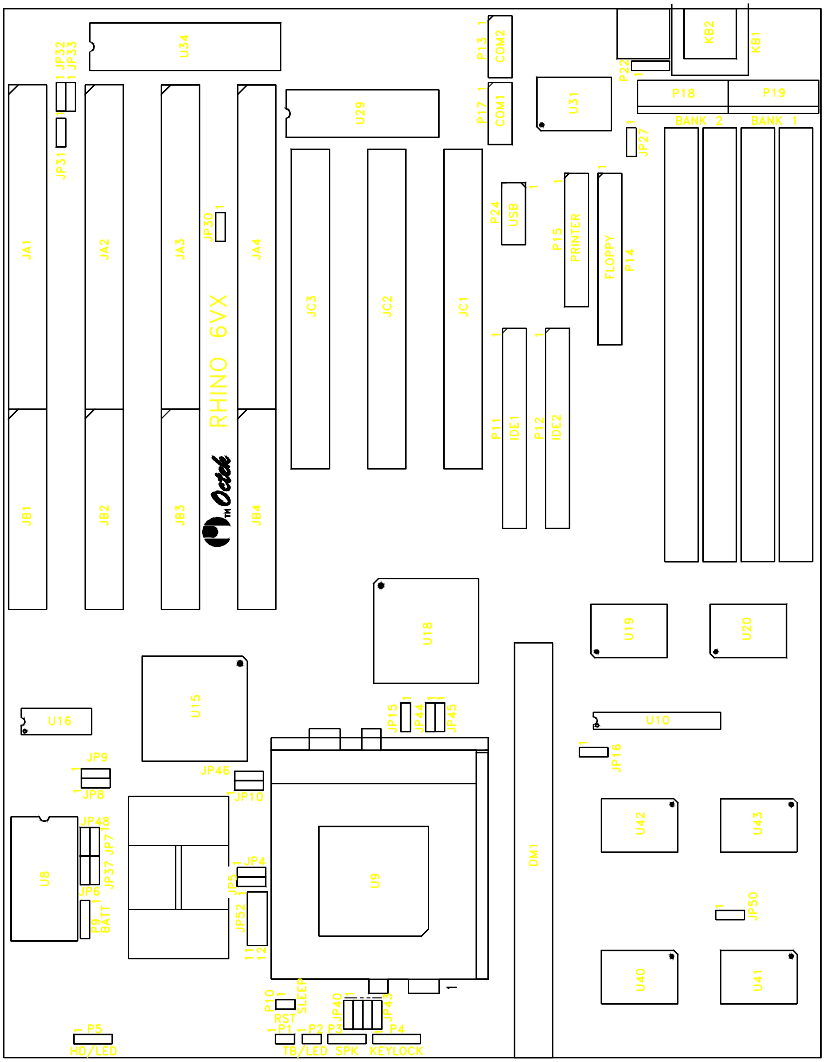
APPENDIX-B

HARDWARE SETTINGS

B.1 System Component Map

Jumper Connectors	Function
P1	Reset
P2	Turbo LED
P3	Speaker
P4	Keylock
P5	IDE LED Connector
P9	External Battery Connector
P10	Sleep Connector
P11	Primary IDE Connector
P12	Secondary IDE Connector
P13	Serial Port 2
P14	Floppy Connector
P15	Printer Port Connector
P17	Serial Port 1
P18	Power Connector
P19	Power Connector
P22	PS/2 Mouse Connector
P24	USB Connector
KB1	Keyboard Connector

B.2 Layout of RHINO 6VX 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 6VX has on board voltage regulators support Intel Pentium CPU such as P54C, P54CQS, P54CS, Cyrix 6x86 and AMD K5 CPU. The voltage selection for Core voltage is done by JP52 as follows :

JP52	CPU Core voltage	CPU Type
1-2	3.5V(VRE)	Cyrix 6x86, AMD K5
3-4 *	3.3V	Intel P54C, P54CQS, P54CS

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 Type

JP4	JP5	JP8	JP9	JP10	CPU Clock	CPU TYPE
1-2	1-2	2-3	2-3	1-2	50MHz	Intel P54C-75
2-3	1-2	2-3	2-3	1-2		Cyrix 6x86-P120+ (100MHz)
1-2	1-2	2-3	2-3	1-2		AMD K5-PR75
2-3	1-2	1-2	1-2	1-2	55MHz	Cyrix 6x86-P133+ (110MHz)
1-2	1-2	1-2	2-3	2-3	60MHz	Intel P54C-90
2-3	1-2	1-2	2-3	2-3		Intel P54C-120
2-3	2-3	1-2	2-3	2-3		Intel P54C-150
1-2	2-3	1-2	2-3	2-3		Intel P54C-180
2-3	1-2	1-2	2-3	2-3		Cyrix 6x86-P150+ (120MHz)
1-2	1-2	1-2	2-3	2-3		AMD K5-PR90
1-2	1-2	1-2	2-3	2-3		AMD K5-PR120 (90MHz)
2-3	1-2	1-2	2-3	2-3		AMD K5-PR150 (120MHz)
1-2	1-2	2-3	1-2	2-3	66MHz	Intel P54C-100
2-3	1-2	2-3	1-2	2-3		Intel P54C-133
2-3	2-3	2-3	1-2	2-3		Intel P54C-166
1-2	2-3	2-3	1-2	2-3		Intel P54C-200
2-3	1-2	2-3	1-2	2-3		Cyrix 6x86-P166+ (133MHz)
1-2	1-2	2-3	1-2	2-3		AMD K5-PR100
1-2	1-2	2-3	1-2	2-3		AMD K5-PR133 (100MHz)

B.3.2 External cache (L2 cache) setting

Synchronous SRAM

256K Configuration :

1. 256K cache using on board 256K SRAM

SRAM	Location	Type	Speed	Voltage
Tag SRAM	U10	8Kx8 / 32Kx8	15ns	5V I/O
Data SRAM	U41, U43	2 pcs 32Kx32 Pipelined Burst SRAM	7ns (Clock to o/p valid)	3.3V I/O

JP16*	JP50*
OPEN	2-3

512K Configuration :

1. 512K cache using On board 512K SRAM (4pcs PB SRAM)

SRAM	Location	Type	Speed	Voltage
Tag SRAM	U10	32Kx8	15ns	5V I/O
Data SRAM	U40, U41, U42, U43	4 pcs 32Kx32 Pipelined Burst SRAM	7ns (Clock to o/p valid)	3.3V I/O

JP16	JP50
2-3	1-2

2. 512K cache using on board 256K and 256K Cache Module w/o Tag SRAM

SRAM	Location	Type	Speed	Voltage
Tag SRAM	U10	32Kx8	15ns	5V I/O
Data SRAM (1st 256KB)	U41, U43	2 pcs of 32Kx32 pipelined burst SRAM	7ns (Clock to o/p valid)	3.3V I/O
Data RAM (2nd 256KB)	DM1	256K Cache Module w/o Tag	7ns (Clock to o/p valid)	3.3V I/O

JP16	JP50
2-3	1-2

Note : If 256K Cache Module contains a Tag RAM, U10 need not be installed.

B.3.3 Peripheral setup

PS/2 MOUSE support

	JP31	**JP32**	**JP33**
Enabled	1-2 *	2-3 *	2-3 *
Disabled	2-3	1-2	1-2

B.3.4 Miscellaneous

Power Good Signal select

	JP27
External Power Good	1-2 *
On-board Power Good	2-3

CMOS discharge

	JP7
Preserve CMOS	1-2 *
Clear CMOS	2-3

Battery select

	JP6
On-board Battery	1-2 *
External Battery	2-3

Reserved Jumpers

JP15	1-2
JP30	1-2