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1. INTRODUCTION

1.1. PREFACE

Welcome to use the **5AX** motherboard. The motherboard is a Pipeline 512 KB CACHE Pentium® Processor based PC/AT compatible system with ISA bus and PCI Local Bus, and has been designed to be the fastest PC / AT system. There are some new features allow you to operate the system with the performance you want.

This manual also explains how to install the motherboard for operation, and how to set up your CMOS CONFIGURATION with BIOS SETUP program.

1.2. KEY FEATURES

❑ Pentium® Processor based PC / AT compatible mainboard with PCI / ISA / AGP Bus.

❑ 5 PCI Bus slots, 2 ISA Bus slots, 1 AGP slot.

❑ Supports :

• Pentium® Processor	133 / 166 / 200 MHz ; MMX (166 / 200 / 233),
• AMD	K6-(166 / 200 / 233 / 266 / 300); K6-2 (266 / 300 / 333 / 350 / 380 / 400)
• Cyrix/IBM	6x86MX (PR166 / PR200 / PR233 / PR266) ; MⅡ PR300 / PR333
• IDT	C6-(200 / 225 / 266)

❑ Supports true 64 bits CACHE and DRAM access mode.

❑ Supports 321 Pins (Socket 7) ZIF white socket on board.

❑ Supports 512 KB Pipeline Burst Sync. 2nd Level Cache.

❑ CPU L1 / L2 Write-Back cache operation.

❑ Supports 8 - 768 MB DRAM memory on board.

❑ Supports 3*168 pin 64/72 Bit DIMM module.

- ❑ Supports 2-channel Enhanced PCI IDE ports for 4 IDE Devices.

- ❑ Supports 2*COM (16550), 1*LPT (EPP / ECP), 1*1.44MB Floppy port.

- ❑ Supports Green function, Plug & Play function.

- ❑ Licensed AWARD BIOS, FLASH ROM for BIOS update.

- ❑ 30.5cm*18.5cm, ATX Form factor.

- ❑ Supports USB port & PS/2 Mouse and K/B port.

- ❑ Supports Keyboard Power On/Off.

- ❑ Supports 3 steps ACPI LED.

1.3. PERFORMANCE LIST

The following list of performance data is the testing results of some popular benchmark testing programs.

These data are just referred by users, and there is no responsibility for different testing data values gotten by users. (The different Hardware & Software configuration will result in different benchmark testing results.)

- CPU   Pentium® Processor MMX-233 MHz , Cyrix 6x86MII-PR333 , AMD K6-2 400
- DRAM   (128 × 1) MB SDRAM (LGS GM72N66841CT7J)
- CACHE SIZE   512 KB
- DISPLAY   GA-600 (4MB SGRAM)
- STORAGE   Onboard IDE (IBM DHEA-36481)
- O.S.   Windows® NT 4.0
- DRIVER   Display Driver at 1024 x 768 x 256 colors x 75Hz.

                    ALi Bus Master IDE Driver

Processor	Intel-MMX 233MHz (66x3.5)	AMD K6-2 400 (100x4)	Cyrix M-II PR333 (83x3)
Winbench98 CPU mark32	465	885	616
FPU Winmark	916	1300	573
Business Disk	1780	1880	1860
Hi-End Disk	4160	4470	4520
Business Graphics	107	168	154
Hi-End Graphics	111	173	172
Winstone98 Business	22.7	31.4	27.8
Hi-End	23.5	32.2	28.6

1.4. BLOCK DIAGRAM
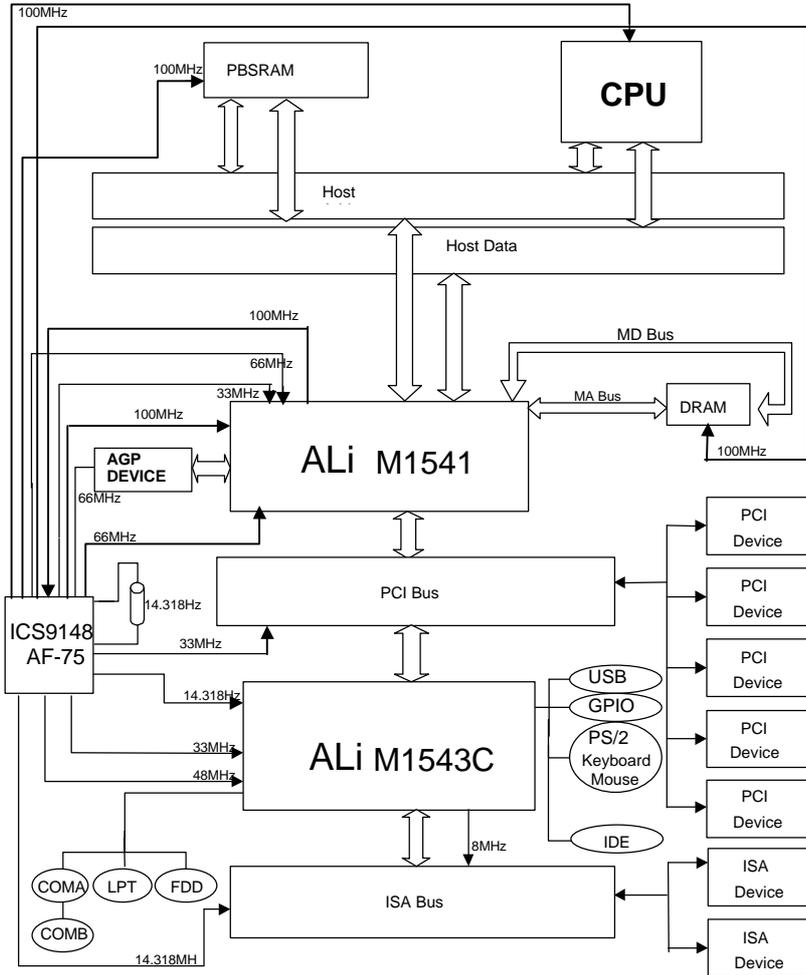
1.5. INTRODUCE THE PCI - BUS

Connecting devices to a CPU local bus can dramatically increase the speed of I/O-bound peripherals with only a slight increase in cost over traditional systems.

This price / Performance point has created a vast market potential for local bus products.

The main barrier to this market has been the lack of an accepted standard for local bus peripherals.

Many mainboard and chipset manufactures developed their own local bus implementations, but they are incompatible with each other.

The VL (Video Electronics Standards Association) local bus and PCI (Peripheral Component Interconnect) bus specification was created to end this confusion.

The PCI - bus standard, under development since Jun. 1992, which is designed to bring workstation-level performance to standard PC platform. The PCI - bus removes many of the bottlenecks that have hampered PC for several years.

On the PCI - bus, peripherals operate at the native speed of the computer system, thus enabling data transfer between peripherals and the system at maximum speed.

This performance is critical for bandwidth-constrained devices such as video, multimedia, mass storage, and networking adapters.

PCI - bus standard provides end-users with a low-cost, extendible and portable local bus design, which will allow system and peripherals from different manufactures to work together.

1.6. FEATURES

❑   32 bits bus transfer mode.
❑   Bus Master or Slave access.
❑   Memory burst transfer to 132 MB/sec.
❑   33 MHz operation speed.
❑   10 device loading ability.
❑   CPU independent.

1.7. What is AGP

The Accelerated Graphics Port (AGP) is a new port on the Host-To-PCI bridge device that supports an AGP port. The main purpose of the AGP port is to provide fast access to system memory.

The AGP port can be used either as fast PCI port (32-bits at 66MHz vs. 32-bits at 33MHz) or as an AGP port which supports 2x data-rate, a read queue, and side band addressing. When the 2x-data rate is used the port can transmit data at 533Mb/sec (66.6*2*4). The read-queue can be used to pipeline reads – removing the effects of the reads-latency. Side band addressing can be used to transmit the data address on a separate line in order to further speed the transaction.

2. SPECIFICATION

2.1. HARDWARE

- CPU
  - Pentium$^\circledR$ Processor
    133 / 166 / 200 MHz; MMX (166 / 200 / 233)
  - AMD
    K6- (166 / 200/ 233 / 266 / 300) ;
    K6-2 (266 / 300 / 333 / 350 / 380 / 400)
  - Cyrix/IBM
    6x86MX(PR166 / PR200 / PR233 / PR266);
    M PR300 / PR333
  - IDT
    C6-(200 / 225 / 266)
  - 321 pins (socket 7) ZIF white socket on board.
  - 3.52V / 1.3V-3.5V Dual Power Ready.

- COPROCESSOR
  - Included in processor.

- SPEED
  - 66 / 75 / 83 / 95 /100MHz system speed.
  - 66 MHz AGP-Bus speed.
  - 33 MHz PCI-Bus speed.
  - 8 MHz AT bus speed.

- DRAM MEMORY
  - 3 banks 168 pins DIMM module socket on board.
  - Use 8 / 16 / 32 / 64 / 128 / 256 MB DIMM module DRAM.
  - 8 ~ 768 MB DRAM size.
  - Supports 3.3V SDRAM / EDO type DRAM.
  - Supports ECC or Non-ECC type DRAM.

- CACHE MEMORY
  - 16 / 24 / 32 / 64KB L1cache included in CPU.
  - 512 KB 2nd Level cache on board.
  - Supports Write Back cache function for both CPU & on
    board cache.

- I/O BUS SLOTS
  - 5 xMaster / Slave PCI-BUS Slots.
  - 2 x16 bits ISA BUS Slots.
  - 1 xAGP Slot.

- **IDE PORTS**
  - 2-channel Enhanced IDE port on board.(Using IRQ14,15)
  - Supports Mode 3,4 IDE & ATAPI CD – ROM.
- **I/O PORTS**
  - Supports 2 x16550 COM ports. (Using IRQ4, 3)
  - Supports 1 x EPP/ECP LPT port. (Using IRQ7 or 5 and DMA3 or 1)
  - Supports 1 x 1.44/2.88 MB Floppy port. (Using DMA2 & IRQ6)
  - Supports PS/2 Mouse. (Using IRQ12)
- **GREEN FUNCTION**
  - Suspend mode support.
  - Green switch & ACPI LED support.
  - IDE & Display power down support.
  - Monitor all IRQ / DMA / Display / I/O events.
- **BIOS**
  - 1Mbit FLASH ROM.
  - Supports Plug & Play Function.
- **DIMENSION**
  - ATX Form Factor, 4 layers PCB.

2.2. SOFTWARE

- **BIOS**
  - Licensed AWARD BIOS.
  - AT CMOS Setup, BIOS / Chipset Setup, Green Setup, Hard Disk Utility included.
- **O.S.**
  - Operation with MS-DOS®, Windows®95, Windows®98,WINDOWS™ NT, OS/2, NOVELL and SCO UNIX.

2.3. ENVIRONMENT

- **Ambient Temp.**   − 0°C to +50°C (Operating).
- **Relative Hum.**   − 0 to +85% (Operating).
- **Altitude**   − 0 to 10,000 feet (Operating).
- **Vibration**   − 0 to 1,000 Hz.
- **Electricity**   − 4.9 V to 5.2 V.
  - Max. 20A current at 5V.

3. HARDWARE INSTALLATION

3.1. UNPACKING

The mainboard package should contain the following:

- The **5AX** mainboard.

- USER'S MANUAL for mainboard.

- Cable set for IDE ¡ BFloppy.

- Diskette or CD for Mainboard Utility.

The mainboard contains sensitive electric components which can be easily damaged by static electricity, so the mainboard should be left in its original packing until it is installed.

Unpacking and installation should be done on a grounded anti-static mat.

The operator should be wearing an anti static wristband, grounded at the same point as the anti-static mat.

Inspect the mainboard carton for obvious damage. Shipping and handling may cause damage to your board. Be sure there are no shipping and handling damage on the board before proceeding.

After opening the mainboard carton, extract the system board and place it only on a grounded anti-static surface component side up. Again inspect the board for damage.

Press down on all of the socket IC's to make sure that they are properly seated. Do this only on with the board placed on a firm flat surface.

🕹 **DO NOT APPLY POWER TO THE BOARD IF IT HAS BEEN DAMAGED.**

It is assumed that the chassis is designed for a standard ATX mainboard mounting. Place the chassis on the anti-static mat and remove the cover.

Take the plastic clips, Nylon stand-off and screws for mounting the system board, and keep them separate.

3.2. MAINBOARD LAYOUT

◄Figure 3.1►
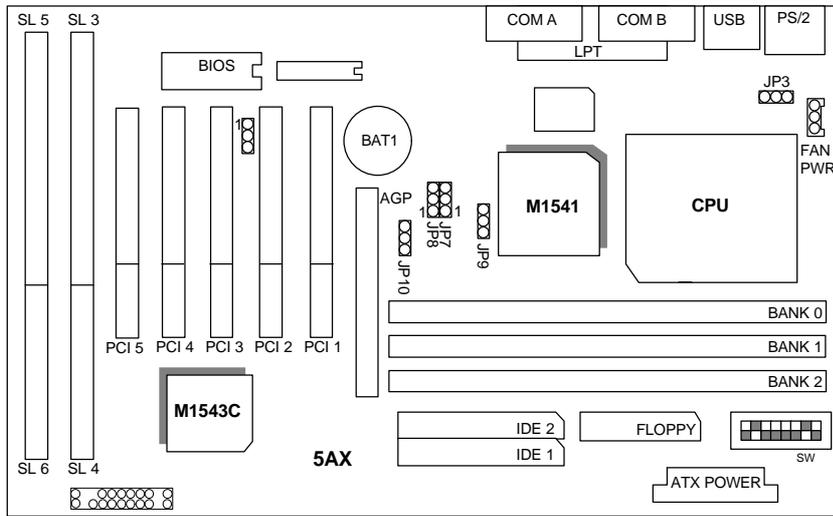
3.3. QUICK REFERENCE FOR JUMPERS & CONNECTORS

♦ I/O Port Connectors	
IDE 1	For Primary IDE port.
IDE 2	For Secondary IDE port.
FLOPPY	For Floppy port.
USB	For USB port.
COM B	For Serial port2 (COM B){Support Modem Ring On}.
COM A	For Serial port1 (COM A){Support Modem Ring On}.
LPT	For LPT port.
PS/2	For PS/2 Mouse & Keyboard Connector.
ATX PWR	For ATX Power Connector.

JP6 : 2*11 PIN Jumper

PWR P+P− P− HD

JP6

GD   RES   SPKR   GN
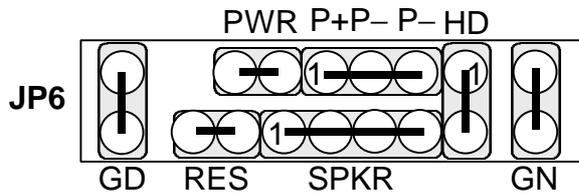
PWR: Soft Power Connector

On – Off : For POWER ON or Suspend IN / OUT.
On 4 sec : For POWER OFF before VGA Enable or CMOS
          setup select "delay 4sec." for POWER OFF
          mode.

RES:Reset Switch

Open: Normal Operation
Short: For Hardware Reset System

P+P−P−: Power LED

1

PIN 1: anode (+)
PIN 2: cathode (−)
PIN 3: cathode (−)

SPKR: Speaker Connector

+   -
1

PIN 1: VCC
PIN 2: NC
PIN 3: NC
PIN 4: Data

HD: IDE Hard Disk Active LED

1

PIN 1: LED anode (+)
PIN 2: LED cathode (−)

GN: Green Switch

Open: Normal operation
Short: Entering Green Mode

GD: Green Function Active LED

PIN 1: LED athode (+)
PIN 2: LED cathode (−)

♦ JP5: Wake on Lan	
Pin No.	Function
1	+5V SB
2	GND
3	Signal

♦ FAN PWR: CPU cooling FAN Power Connector	
Pin No.	Function
1	GND.
2	+12V
3	NC

♦ JP3: Keyboard Power On/Off Connector	
Pin No.	Function
1,2 Close	Enabled Keyboard power on.
2,3 Close	Disabled Keyboard power on. (Default)

3.4. SRAM INSTALLATION

Sync. SRAM (Pipeline Burst SRAM)

If Sync SRAM Chip is installed, it consists of Pipeline Burst 1 Pc 64 K x 64 512KByte.

3.5. DRAM INSTALLATION

The mainboard can be installed with 8 / 16 / 32 / 64 / 128 / 256 MB 168 pins DIMM module DRAM, and the DRAM speed must be 67~100 MHz for SDRAM. The DRAM memory system on mainboard consists of bank 0, 1 & bank 2.

Because the 168 pins DIMM module is 64 bits width, using 1 PCS which can match a 64 bits system. The total memory size is 8 MB ~ 768 MB DRAM. The DRAM installation position refer to Figure 3.1, and notice the Pin 1 of DIMM module must match with the Pin 1 of DIMM socket. Insert the DRAM DIMM module into the DIMM socket at Vertical angle. If there is a wrong direction of Pin 1, the DRAM DIMM module couldn't be inserted into socket completely.

3.6. CPU INSTALLATION AND JUMPERS SETUP

The system speed depends on the frequency of Clock Generator. The user can change SW selection to set up the system speed to 66 / 75 / 83 / 95 /100MHz for 3.3V/2.5V Pentium$^{®}$ Processor 133 / 166 / 200 MHz; MMX (166 / 200 / 233), AMD K6-(166 / 200/ 233 / 266 / 300) ; K6-2 (266 / 300 / 333 / 350 / 380 / 400); Cyrix/IBM 6x86MX (PR166 / PR200 / PR233 / PR266); M PR300/ PR333 ; IDT C6-(200 / 225 / 266).
The mainboard can use Pentium$^{®}$ Processor, MMX, AMD-K6, AMD-K6-2, Cyrix / IBM 6x86MX , Cyrix M IDT C6 CPU, and the CPU speed must match with the frequency of Clock generator. It will cause system hanging up if the Clock generator frequency is faster than CPU's.

- ☀ **The CPU is a sensitive electric component and it can be easily damaged by static electricity, so users must keep it away from metal surface when the CPU is installed onto mainboard.**
- ☀ **When the user installs the CPU on socket, please notice that the PIN 1 of CPU is in the same corner as the PIN 1 of socket!**
- ☀ **Before the CPU is installed, the mainboard must be placed on a flat plane in order to avoid being broken by the pressure of CPU installation.**

SW: CPU INT./ EXT. FREQ. RATIO
O: ON
X: OFF

SW	4	5	6	7	8	SW	4	5	6	7	8
1.3V	X	X	X	X	O	2.5V	O	X	O	X	X
1.4V	X	O	X	X	O	2.6V	X	O	O	X	X
1.5V	X	X	O	X	O	2.7V	O	O	O	X	X
1.6V	X	O	O	X	O	2.8V	X	X	X	O	X
1.7V	X	X	X	O	O	2.9V	O	X	X	O	X
1.8V	X	O	X	O	O	3.0V	X	O	X	O	X
1.9V	X	X	O	O	O	3.1V	O	O	X	O	X
2.0V	X	O	O	O	O	3.2V	X	X	O	O	X
2.1V	O	X	X	X	X	3.3V	O	X	O	O	X
2.2V	X	O	X	X	X	3.4V	X	O	O	O	X
2.3V	O	O	X	X	X	3.5V	O	O	O	O	X
2.4V	X	X	O	X	X	---	---	---	---	---	---

CPU	AGP	JP7	JP8	JP9	JP10	CPU	AGP	JP7	JP8	JP9	JP10
66	66	2-3	2-3	2-3	1-2	110	73	1-2	1-2	1-2	2-3
75	60	1-2	2-3	2-3	2-3	115	77	1-2	2-3	1-2	1-2
75	75	2-3	1-2	2-3	1-2	120	80	1-2	2-3	1-2	2-3
83	66	1-2	2-3	2-3	1-2	125	41	2-3	1-2	1-2	1-2
95	63	1-2	1-2	2-3	2-3	130	43	2-3	1-2	1-2	2-3
100	66	1-2	1-2	2-3	1-2	135	45	2-3	2-3	1-2	1-2
105	70	1-2	1-2	1-2	1-2	140	47	2-3	2-3	1-2	2-3

SW	1	2	3
X1.5	X	X	X
X2	O	X	X
X2.5	O	O	X
X3	X	O	X
X3.5	X	X	X
X4	O	X	O
X4.5	O	O	O
X5	X	O	O
X5.5	X	X	O

★Note: We don't recommend you to setup your system speed to 105 , 110 , 115 ,
120 , 125 , 130 , 135 or 140 MHz because these frequencies are not the
standard specifications for CPU, Chipset and most of the peripherals.
Whether your system can run under 105, 110, 115,120, 125, 130, 135 or
140 MHz properly will depend on your hardware configurations: CPU,
SDRAM, Cards, etc.

3.7. CMOS RTC & ISA CFG CMOS SRAM

Built-in Real Time Clock (RTC) With 256B CMOS SRAM in M5819.

3.8. SPEAKER CONNECTOR INSTALLATION

There is a speaker in AT system for sound purpose. The 4-Pins connector **SPKR** is used to connect speaker. The speaker can work well in both direction of connector when it is installed to the connector **SPKR** on mainboard.

3.9. ACPI LED CONNECTOR INSTALLATION

This mainboard uses the existing power LED as ACPI LED .The ACPI LED will light on when system is power-on .The ACPI LED is off when the system is power-off. The ACPI LED will blink when system is in Green mode.This connector should be installed to ACPI LED jumper of the mainboard in correct direction.

3.10. HARDWARE RESET SWITCH CONNECTOR INSTALLATION

The RESET switch on panel provides users with HARDWARE RESET function which is almost the same as power-on/off. The system will do a cold start after the RESET switch is pushed and released by user. The RESET switch is a 2 PIN connector and should be installed to **RES** on mainboard.

3.11. GREEN FUNCTION INSTALLATION

There is one jumper for the purpose of power saving, **GN**, to indicate the power saving function . This mainboard uses the existing power LED as ACPI LED . If the ACPI LED is blinking, the system is in green mode. The **GN** switch will force the system into green mode .

3.12. PERIPHERAL DEVICE INSTALLATION

After installation of the device and setup of the jumpers, the mainboard can be mounted into the case and fixed by screw. To complete the mainboard installation, the peripheral devices could be installed now. The basic system needs a display interface card and a storage device.
If a PCI - Bus device is to be installed in the system, any one of three PCI - Bus slots can be used for Slave or Master PCI - Bus device.
After installing the peripheral device, the user should check everything again and prepare to power-on the system.