486 MAIN BOARD
(25/33/40/50 MHz)

PT-429G

USER'S MANUAL

BEFORE INSTALLING THIS 486 MAIN BOARD PLEASE READ THIS MANUAL COMPLETELY AND RETAIN IT FOR FUTURE REFERENCE.
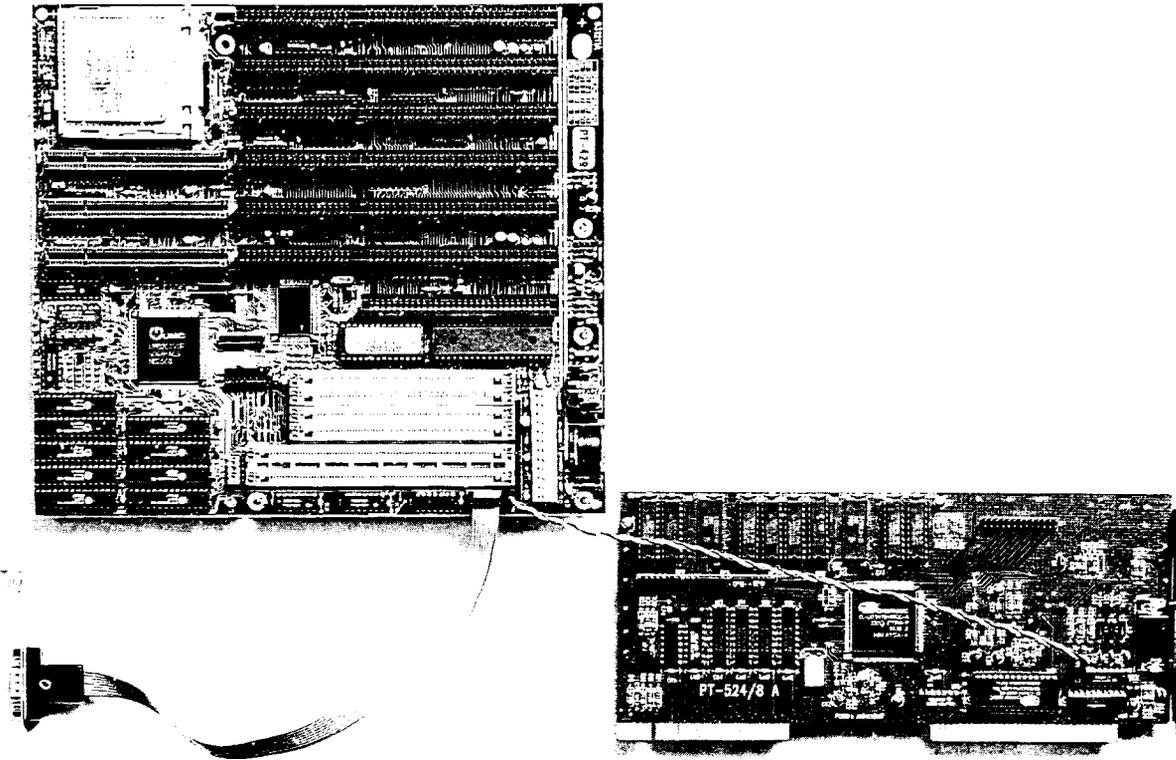
The Green Connection :

Please refer to page 5. section 1.14

Note :

1. For the first time installation with error message on the screen, please leave the system on for about 15-30 minutes to recharge the battery, then you can enter the system configuration.
2. Leave your system on for about 24 hours to recharge the battery fully.
3. If you have switched off the computer system for more than two weeks, you might be required to repeat step 2 to recharge the battery fully.
4. Any hard disk cable longer than the standard type is not recommenced for used with PT-429G. Too long hard disk cable will make the Green PC circuit unable to monitor the hard disk activity.

Trademark Acknowledgments:

* IBM PC, PC/XT and PC/AT all are registered trademarks of International Business Machines Corporation
* Intel is registered trademark of Intel Corporation.
* AMD is registered trademark of Advanced Micro Devices Inc.
* AMI is registered trademark of American Megatrends Inc.
* UMC is registered trademark of United Microelectronics Corporation.
* VESA is registered trademark of Video Electronics Standards Association.*

TABLE OF CONTENTS

SECTION 1

INTRODUCTION

1.1 Overview

PT-429G offers a 32-bit programming architecture compatible with the software base of the 486 microprocessor. It is a reliable main board using a UMC chipset and a multi-layer printed circuit hoard The chipset consists of UM82C491F-AC and UM82C493F which provide the most cost effective and high xperformance solution for a 486 computer system.

The UK482C491F-AC contains a sophisticated direct-mapped cache controller with write-back operation, and fast page mode DRAM Controller, AT Bus control logic, data bus conversion logic, CPU reset logic, clock generation for CPU, keyboard and timer, DMA/refresh logic and peripheral interface logic. The UMC493F contains a sophisticated VESA Controller which can run up to 5OMHz.

A block of 128K memory of the system DRAM is used for system and video shadow RAM to increase the system performance. The video shadow RAM consists of four 16K pages which can be enabled respectively.

The PT-429G is a VESA Local Bus motherboard The three Local Bus slots fully comply with the VESA (Video Electronics Standards Association) Master mode specifications. This means I/O data can run as fast as CPU. The speed of I/O peripherals can be dramatically increased by connecting VESA compatible controller cards to the VESA Local Bus slots on the PT-429G.

The PT-429G is a green design mother-board which means when there is no operation on the system for a while (the period is software programmable), the PT-429G will slow down its original working frequency to 8 MHz speed This will help to save the power consumption in order to protect our environment. The PT-429G is equipped with a AUX Green connector which can be connected up to four external Green devices through our Green cable.

"This is an **ENERGY S T A R compliant product."**

"The Environmental Protection Agency **ENERGY S T A R program** defines that as an Ally of this program the specified manufacturer must produce systems, or system components which enable a computer system to operate and draw 30 watts or less of power in idle mode. Although the EPA do not endorse any particular product or service, the program is designed to offer a cooperative effort between the EPA and the component manufacturer (Ally) to provide energy saving products and education to customers."

"It runs with Netware"

PT-429G was authorized by Novell to use the Novell Yes, It runs with Netware certification mark.

SECTION 1

INTRODUCTION

FCC approval:

The PT-429G motherboard has been approved for FCC Class B when properly installed in a barebones configuration using the following case/power supply:

Brand	Model	FCC ID
Procase	X-109 S/M	JPJPINE429G 109
Procase	PC-609 T/M	JPJPlNE429G609
Procase	PC-709 T/M	JPJPINE429G709

FCC Notice:

Information to the user

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help and for additional suggestions.

The user may find the following booklet prepared by the Federal Communications Commission helpful: *"How to identify and Resolve Radio-TV Interference Problems "* This booklet is available from the U.S. Government Printing Office, Washington, DC 20402, Stock No. 004-000-00345-4.

FCC Warning

The user is cautioned that changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

Note: In or&r for an installation of this product to maintain compliance with the limits for a Class B device, shielded cables and power cord must be used

1.2 Checklist

Please check your PT-429G package to ensure that it contains the following items :

- PT-429G Main Board
- PT-429G User's Manual

If any of these items are missing or damaged, please contact your local dealer or sales representative for assistance.

SECTION 1

INTRODUCTION

1.3 Green PC Power Management

The Green PC mode is a state that minimizes the power consumption. Through the BIOS setting of the
PT-429G can slow down the CPU clock to 8 MHz in Green PC mode. The PT-429G extends the Green PC
feature to four external devices (Green AUX #l to # 4) by the AUX Green connector (J7 & JP32). The
Green PC mode option of these Green AUX connectors are :
- Remove the sync signals from the video monitor,
- Turn off video monitor power,
- Turn off printer power,
- Turn off hard disk drive **power.**

PT-429G will be placed into Green PC mode as a result of one of the following events :
- Power save button (GJl) is shorted.
- Expiration of one of five independent Green PC Timers, the 1st timer is used to slow down CPU
  speed. The Green PC Timers are software programmable which can configured in the "Power
  Management Setup!' option of the BIOS CMOS setup. (Refer to 5.8 Power Management Setup)
- Execution of the system hot key for power down sequencing <CTRL> <ALT> <\>.

Through the system activity monitoring and management, the PT-429G will not go into Green PC mode
(or leaves Green PC mode and back to normal mode) if any activity is detected on the following signals:
- IRQ1 (Keyboard)
- IRQ3 (COM2)
- IRQ4 (COMl)
- IRQ6 (FDD)
- IRQ7 (LPTl)
- IRQ14 (HDD)

1.4 PT429G System Packages

The PT-429G mother-board can act as the nucleus to various system con&nations, in order to optimize
your total power saving The following is a brief introduction to add-on cards and peripherals suited to
the PT429G ;-
(1) **Optimum Power Saving** system **package.**
   - PT-429G mother-board
     Monitoring COMl, COM2, LPT l, Keyboard, Floppy Drives, Hard Drives.
   - PT523G, PT524G. PT528G Cirrus Logic VGA Cards
     Turning off the vertical & horizontal sync of monitors through the unique PT-429G hardware connection.
     This hardware connection works in any environment @OS, WINDOWS etc), whereas software drivers
     only work in WINDOWS.
   - PI-626 UMC VESA Local Bus IDE I/O Card
     Powerful controller card with added Green **driver.**
   - ECO PAD
     This external device connects to the second unique PT-429G connector to add on/off switching to
     peripherals such as printers, monitors and scanners - All timing and on/off controlled by the PT429G
     mother-board. Utilizing a Zero Voltage Protection Circuit the ECO PAD ensures safe and reliable on/off
     switching which will not harm your peripherals.
   Testing results have shown that a system using the above products consumes only 17.6 watts of power at peak
   voltage of 220v.   The effective watts RMS) is less than 10 **watts.**   Add an ECO PAD to this configuration
   and this covers your system, monitor, printer and scanner.
(2) Alternative system packages.
   The PT429G mother-board is equipped with two unique green connectors, however it can also use
   conventional VGA cards to add power saving features to monitors using their respective software driver(s). All
   efforts are made to ensure the PT429G is compatible with a wide range of add-on cards.

For further details on PT523G, PT524G, PT528G, PT626 and the ECO PAD please contact your local dealer or
sales representative for assistance.

SECTION 2

SPECIFICATIONS

2.1 PT-429G System Board Specifications

* 100% IBM AT compatible.
* Applied High performance CMOS technology.
* Supports up to 48MB memory on board.
* Mix 256K, lM, and 4M SIMM (8 bit/32 bit) Module DRAM memory
* 32K, 64K, 128K, 256K cache memory size selectable.
* Fast CPU reset and Fastgate A20 logic.
* Speed switching with hardware and software selection.
* Board size 220 mm by 250 mm.
* Six 16-bit ISA slots; one S-bit ISA slot.
* Three VESA slots (Master Mode).
* Clock chip design makes CPU speed changing easier.
* I/O slot signal protector on: IRQ9, DRQ2, OWS#.
* Green feature to slow down CPU speed & control 4 external Green devices.

2.2 Jumpers and Connectors

Jumpers / Connector	Description
Pl	Power Supply Connector
KB1	Keyboard Connector
J1	External Battery Connector
J2	Reset Switch
J3	Turbo Switch
J4	Turbo LED Connector
J5	Speaker Connector
J6	Power LED & Kevlock Connector
J7	Green AUX # 1 Connector
JP1	On-board Battery Enable Connector
JP2	Power Good Select
JP3	VGA Card Select
JP4	Master Mode Select
JP5	CPURDY# Delav I-T Select
JP6	PADS# Delay 1-T Select
JP7	Test Logic Enable Select
JP9,JP10,JP11,JP30	Clock Chip Speed Select
JP12	VESA Speed Select
JPl3-JPI 7	Cache Size Select
JP18,JP19	CPU Type Select
JP20	VESA Wait State Select
JP21-JP25	Bank of SIMM Select
JP32	Green AUX # 2 Connector
GJ1	Green Enable Switch
GJ3	MEGA/MULTI KEY Select

SPECIFICATIONS

2.2 Jumpers and Connectors

Pl   Power Supply Connector Pin Assignment

1	Power Good
2	+5V
3	+12V
4	-12V
5	Ground
6	Ground
7	Ground
8	Ground
9	-5v
10	+5V
11	+5V

Jl   External Battery Connector Pin Assignment

1	External battery Vcc (+6V DC)
2	NC
3	Ground
4	Ground

J2   Reset Switch Connector

Open	Normal
Short	Reset

J3   Turbo Switch Connector

Open	Turbo speed
Short	Lower speed (Soft-key turbo switch disable)

J4   Turbo LED Connector

1	LED Cathode
2	LED Anode

J5   Speaker Connector Pin Assignment

1	Speaker data
2	NC
3	Ground

SECTION 2

SPECIFICATIONS

2.2 Jumpers and Connectors

J6 : Keyboard Lock & Power LED Connector Pin Assignment

1	+5V
2	NC
3	Ground
4	Lock
5	Ground

JP1 : On-board Battery Enable Select

Open	On-board battery disconnect
Short	On-board battery connect

JP2 : Power Good Select

1-2	External power good
2-3	Internal power good

JP3 : VGA Card Type Select

1-2	Normal VGA card
2-3	POWER-9000 VGA card

JP4 : Master Mode Select

1-2	Enable Cx487S & MCA3 only for Master Mode
2-3	Normal 3 VESA Master

JP5 : CPURDY# Delay 1-T State Select

1-2	No delay for 50MHz VESA
2-3	Delay 1-T state for 50MHz VESA

JP6 : PADS# Delay I-T State Select

1-2	No delay for 50MHz VESA
2-3	Delay 1-T state for 50MHz VESA

JP7 : Test Logic Enable (486DX2) Select

OPEN	Enable CPU Test Logic
CLOSE	Disable CPU Test Logic

SECTION 2

SPECIFICATIONS

2.2 Jumpers and Connectors

JP9,JP0,JP11,JP30: Clock Chip Speed Select

Clock Chip = AvaSem AV9 107-05 (U34)

	JP10	JP11	JP30
25MHz	ON	OFF	2-3
33MHz	OFF	ON	2-3
4oMHz	OFF	OFF	2-3
5oMHz	ON	OFF	1-2

Clock Chip = Chrontel CH9007E (U35)

	JP9	JP10	JP11
25MHz	ON	ON	ON
33MHz	ON	ON	OFF
40MHz	ON	OFF	ON
50MHz	OFF	OFF	OFF

Clock Chip = MX83 15 (U28)

	JP9	JP10	JP11
25MHz	OFF	OFF	ON
33MHz	ON	ON	ON
40MHz	OFF	ON	ON
50MHz	ON	OFF	OFF

JP12: VESA Speed Select

Open	CPU speed <= 33MHz
Short	CPU speed > 33MHz

JP13-JP17: Cache Size Select

	32KB	64KB	128KB	256KB
JP13	Open	Open	2-3	1-2
JP14	2-3	1-2	2-3	1-2
JP15	Open	Open	Open	Short
JP16	Open	Short	Short	Short
JP17	Open	Open	Short	Short

JP18,JP19: CPU Type Select

	486SX	486DX/DX2	P24N/P24T
JP18	2-3	1-2,3-4	1-2,3-4
JP19	Open	1-2	2-3

JP20: VESA Wait State Select

Open	0 Wait State
Short	1 wait State

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SECTION 2

SPECIFICATIONS _

SIMM memory must begin from 'Bank 0'
The following three Banks are available ..
- **30-pin** Bank x 1 (**4pcs** of **30-pin** sockets = 1 Bank - **4pcs** of **30-pin SIMM** required. Bank must be completely filled).
- **72-Pin** Bank x 1 (lpc of 72-pin socket = 1 Bank - only **lpc** of **72-pin SIMM required**).
- **72-Pin** Bank x **1** (lpc of **72-pin** socket = 1 Bank - only lpc of **72-pin** SIMM required).

Any of these Banks can be selected as 'Bank 0'.   Therefore you can begin with **30-pin** SIMM modules and upgrade using 72-pin **SIMM** modules, or visa-versa.   Please see tables below for necessary jumper settings.

2.2 Jumpers and Connectors

JP21-JP25: Bank of SIMM Select

8 bit SIMM can be selected at BANK 0 or BANK 2

	Bank0	Bank2
JP21	1-2	2-3

32 bit SIMM can be set as follow (some 32 bit SIMM can occupy 2 BANK per SIMM)

Single BANK 32 bit SIMM:
SIMM 5 can be BANK 0 or BANK 1

	Bank0	Bank1
JP22	1-2	2-3
JP23	OFF	OFF

SIMM 6 can be BANK 1 or BANK 2

	Bank1	Bank2
JP24	1-2	2-3
JP25	OFF	OFF

Double BANK 32 bit SIMM:
SIMM 5 can be BANK 0 & 1 or BANK 1 & 2

	Bank 0 & 1	Bank 1 & 2
JP22	1-2	2-3
JP23	1-2	2-3

SIMM 6 can be BANK 1 & 2 or BANK 2 & 3

	Bank 1 & 2	Bank 2 & 3
JP24	1-2	2-3
JP25	1-2	2-3

J7:   Green AUX # 1 Connector

1	Green AUX Output # 1
2	Green AUX Output # 2
3	Green AUX Output # 3
4	Green AUX Output # 4
	+5V
	+12V
7	Ground
8	Ground
9	Ground
	Ground

SECTION 2

SPECIFICATIONS _

2.2 Jumpers and Connectors

JP32: Green AUX # 2 Connector

1	Green AUX Output # 1
2	Green AUX Output # 2

GJ1: Green Enable Connector   (For Green case panel switch only)

Open	Normal Operation
Short	Enable Green Function

GJ3: MEGA / MULTI KEY Select

1,2	AMI MEGAKEY Keyboard BIOS
2,3	Phoenix MULTIKEY Keyboard BIOS

Default Setting

2.3 Cache Memory Table

PT-429G 80486 VESA system board supports 32KB/64KB/128KB/256K cache size.

Size	SRAM Type	Quantity	Designation	TAG RAM (U25)
32KB	8K x 8	4 pcs.	Bank0	8K x 8
64KB	SK x 8	8 pcs.	Bank 0 & Bank 1	8K x 8
128KB	32K x 8	4 pcs.	Bank0	8K x 8
256KB	32Kx 8	8 pcs.	Bank 0 & Bank 1	32Kx 8

Note : Bank 0 (U21,U22,U23,U24), Bank 1 (U14,U15,U16,U17)
Refer to Section 2.2 JP13-JP17 jumper settings with different Cache sizes.

2.4 Oscillator Table

CPU Speed	Oscillator
804868X-25	25MHz
80486DX-33	33MHz
Am486^{TM}DX-40	40MHz
80486DX-50	50MHz
80486DX2-50	25MHz
80486DX2-66	33MHz

INPUT / OUTPUT CHANNEL SLOTS.

The input/output channel of PT-429G supports :

* Refresh of system memory from channel microprocessors
* Selection of data accesses: 8-bit/16-bit
* Interrupts
* DMA channels
* I/O wait-state generation
* Open-bus structure
* Up to 50MHz I/O speed under VESA standard

3.1 I/O Address Map

Hex Range	Devices	Usage
000-01F	DMA Controller 1	System
020-03F	Interrupt Controller 1	System
040-05F	Timer	System
060-06F	8042 (Keyboard)	System
070-07F	Real Time Clock, NMI Mask	System
080-09F	DMA Page Register	System
0A0-0BF	Interrupt Controller 2	System
0C0-0DF	DMA Controller 2	System
0F0	Clear Math Co-processor Busy	System
0F1	Reset Math Co-processor	System
0F8-0FF	Math Co-processor	System
1F0-1F8	Fixed Disk	I/O
200-207	Game I/O	I/O
278-27F	Parallel Printer Port 2	I/O
2F8-2FF	Serial Port 2	I/O
300-3 1F	Prototype Card	I/O
360-36F	Reserved	I/O
378-37F	Parallel Printer Port 1	I/O
380-38F	SDLC, Bisynchronous 2	I/O
3A0-3AF	Bisynchronous 1	I/O
3B0-3BF	Monochrome Display and Printer Adapter	I/O
3C0-3CF	Reserved	I/O
3D0-3DF	Color/Graphic Monitor Adapter	I/O
3F0-3F7	Floppy Diskette Controller	I/O
3F8-3FF	Serial Port 1	I/O

SECTION 3

INPUT / OUTPUT CHANNEL SLOTS

3.2 62-Pin. 32-h ISA I/O Bus.

REAR PANEL

GND	Bl	I	A1	-I/O CH CK
RESET DRV	B2	I	A2	SD7
+5V ED	B3	I	A3	SD6
IRQ9	B4	I	A4	SD5
-5V DC	B5		A5	SD4
DRQ2	B6		A6	SD3
-12VDC	B7		A7	SD2
o w s	B8		A8	SD1
+12VDC	B9		A9	SD0
GND	B10		A10	-I/O CH RDY
-SMEMW	B11		All	AEN
-SMEMR	B12		A12	SA19
-IOW	B13		Al3	SA18
-IOR	B14		A14	SA17
-DACK3	B15		Al5	SA16
DRQ3	B16		A16	SA15
-DACK 1	B17		A17	SA14
DRQ l	B18		A18	SA13
-REFRESH	B19		A19	SA12
CLK	B20		A20	SA11
IRQ7	B21		A21	SA10
IRQ6	B22		A22	SA9
IRQ5	B23		A23	SA8
IRQ4	B24		A24	SA7
IRQ3	B25		A25	SA6
-DACK2	B26		A26	SA5
T/C	B27		A27	SA4
BALE	B28		A28	SA3
+5VDC	B29	I	A29	SA2
o s c	B30		A30	SA1
GND	B31		A31	SAO

-MEM CS16	Dl		C1	LSBHE
-I/O CS16	D2		C2	LA23
IRQ 10	D3	I	C3	LA22
IRQ 11	D4		C4	LA21
IRQ 12	D5		C5	LA20
IRQ 15	D6		C6	LA19
IRQ 14	D7		C7	LA18
-DACK 0	D8	I	C8	LA17
DRQ 0	D9		C9	-MEMR
-DACK 5	D10		C10	-MEMW
DRQ 5	D11		C11	SD08
-DACK 6	D12		C12	SD09
DRQ 6	D13		C13	SD10
-DACK 7	D14		C14	SD11
DRQ 7	D15		C15	SD12
+5V DC	D16		Cl6	SD13
-MASTER	D17		C17	SD14
GND	D18		Cl8	SD15

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SECTION 3

INPUT/ OUTPUT CHANNEL SLOTS

3.3 112-Pin VESA I/O Bus for PT-429G.

REAR PANEL

DATA00	B1			A1	DAT01
DATA02	B2			A2	DAT03
DATA04	B3	I		A3	GND
DATA06	B4			A4	DATOS
DATA08	B5	I		A5	DAT07
GND	B6	I		A6	DAT09
DAT10	B7	I		A7	DAT11
DAT12	B8	I		A8	DAT13
Vcc	139			A9	DAT15
DAT14	B10			A10	GND
DAT16	B11			All	DAT17
DAT18	B12			Al2	Vcc
DAT20	B13			A13	DAT19
GND	B14			Al4	DAT21
DAT22	B15			A15	DAT23
DAT24	B16			A16	DAT25
DAT26	B17			A17	GND
DAT28	B18			A18	DAT27
DAT30	B19			Al9	DAT29
Vcc	BZO			A20	DAT3 1
ADR3 I	B21			A21	ADR30
GND	B22			A22	ADR28
ADR29	B23			A23	ADR26
ADR27	B24			A24	GND
ADR25	B25			A25	ADR24
ADR23	B26			A26	ADR22
ADR21	B27			A27	Vcc
ADR19	B28			A28	ADR20
GND	B29			A29	ADR18
ADR17	B30			A30	ADR16
ADR15	B31			A31	ADR14
Vcc	B32		I	A32	ADR12
ADR13	B33			A33	ADR10
ADR11	B34			A34	ADR08
ADR09	B35			A35	GND
ADR07	B36			A36	ADR06
ADR05	B37			A37	ADR04
GND	B38			A38	WBACK#
ADR03	B39			A39	BEO#
ADROZ	B40			A40	Vcc
N/C	B41			A41	BE1#
RESET#	B42			A42	BE2#
D/C#	B43			A43	GND
M/IO#	B44			A44	BE3#
W/R#	B45			A45	ADS#
RDYRTN#	B48			A48	LRDY#
GND	B49			A49	LDEV<X>#
IRQ9	B50			A50	LEDO<X>#
BRDY#	B51			A51	GND
BLAST#	B52			A52	LGNT<X>#
ID0	B53			A53	Vcc
ID1	B54			A54	ID2
GND	B55			A55	m3
LCLK	B56			A56	m4
Vcc	B57			A57	LKEN#
LBS16#	B58			A58	LEADS#

SECTION 4

HARDWARE COMPATIBILITY

4.1 System Timers

The system has three programmable timer/counters controlled by an Intel 8254-2 timer/counter chip. These are channel 0 through 2, defined as follows :

Channel 0	System timer
GATE 0	Tied on
CLKINO	1.190Mhz OSC
CLK OUT 0	8259A IRQ 0

Channel 1	Refresh Request Generator
GATE 1	Tied on
CLK IN 1	1.190Mhz OSC
CLK OUT 1	Request Refresh Cycle

Channel 2	Tone Generation for speaker
GATE 2	Controlled by bit 0 of hex 61 PPI bit
CLK IN 2	1.190Mhz OSC
CLK OUT 2	Used to drive the speaker

Note : Channel is programmed to generate a 15 microsecond period signal.

4.2 System Interrupts

Sixteen levels of system interrupts are provided by the 80286 NMI & two 8259A interrupt controller chips. The following shows the various interrupt-level assignments in decreasing priority :

Level		Function
NMI		Parity or I/O channel check
CTLR 1	CTLR	
IRQ 0		Timer output 0
IRQ 1		Keyboard (Output buffer full)
IRQ 2		Interrupt from CTLR 2
	IRQ 8	Real time clock interrupt
	IRQ 9	Software redirected to INT 0AH(IRQ 2)
	IRQ 10	Reserved
	IRQ 11	Reserved
	IRQ 12	Reserved
	IRQ 13	Numeric co-processor
	IRQ 14	Fixed disk controller
	IRQ 15	Reserved
IRQ 3		Serial Port 2
IRQ4		Serial Port 1
IRQ 5		Parallel Port 2
IRQ 6		Diskette controller
IRQ 7		Parallel port 1

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SECTION 4

HARDWARE COMPATIBILITY

4 3 Direct Memory Access

Each DMA channel is supported by the system. Two Intel 8237-5 DMA controller chips (Four channels in each chip) are used. DMA channels are assigned as follows :

CTLR 1	CTLR 2
Ch 0-Spare	Ch 4-Cascade for CTLR 1
Ch 1-SDLC	Ch 5-Spare
Ch 2-Diskette	Ch 6-Spare
Ch 3-Spare	Ch 7-Spare

Channels from 0 through 3 are contained in DMA controller 1. Transfers of 8-bit data S-bit I/O adapters and 8-bit or 16-bit system memory are supported by these channels. Each of these channels will transfer data in 64KB blocks throughout the 6-megabyte system address space.

Channels from 4 through 7 are contained in DMA controller 2. To cascade channels 0 through 3 to the microprocessor, use channel 4. Transfer of 16-bit data between 16-bit adapters and 16-bit system memory are then supported by channels 5, 6, & 7. DMA channels from 5 through 7 transfer data in 128K blocks throughout the 16-megabyte system address space.
These channels will not transfer data on odd-byte boundaries.

The address for the page register is as follows :

Page Register	I/O HEX address
DMA channel 0	0087
DMA channel 1	0083
DMA channel 2	0081
DMA channel 3	0082
DMA channel 5	008B
DMA channel 6	0089
DMA channel 7	008A
Refresh	008F

Address generation for the DMA channels is as follows :

For DMA channels 3 through 0 :

Source	DMA Page Registers 8237A-5
Address	A23 .... Al6 Al5 Al

For DMA channels 7 through 5 :

Source	DMA Page Registers 8237A-5
Address	A23 ..... Al7 A 1 6 A0

   **Note : The BHE and A0 addressing signals are forced to a logic 0. DMA channel
            addressees do not increase or decrease through page boundaries (64KB for
            channels 0 through 3 and 128 KB for channels 5 through 7).**

SECTION 4

HARDWARE COMPATIBILITY

4.4 Real Time Clock and Non-Volatile RAM

The real time clock and its 64 bytes of RAM information are backed up by 3.6V rechargeable DC battery (or 6V external battery). The internal clock circuitry uses 14 bytes while the rest is allocated to system configuration.

Real time clock address :

Address	Description
00	Seconds
01	Second alarm
02	Minutes
03	Minute alarm
04	Hours
05	Hour alarm
06	Day of week
07	Date of month
08	Month
09	Year
0A	Status register A
0B	Status register B
0C	Status register C
0D	Status register D
0E	Diagnostic Status byte
0F	Shutdown
10	Diskette drive type byte-drive A and B
11	Reserved
12	Fixed disk type byte-drive C and D
13	Reserved
14	Equipment byte
15	Low base memory
16	High base memory
17	Low expansion memory byte
18	High expansion memory byte
19	Extended fixed disk type-driver C
1A	Extended fixed disk type-driver D
1B-2D	Reserved
2E-2F	2 byte CMOS checksum
30	Low expansion memory byte
31	High expansion memory byte
32	Data century byte
33	Information flags (set during power on)
34-3F	Reserved

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SECTION 5

AMI BIOS Setup

5 1 About CMOS Setup

After the PT-429G mainboard has been integrated into the system, you need to run the Setup Program to set system configuration. Upon finishing the Setup Program is then stored in read-only memory (ROM), and can only be accessed when you turn on or reset the system.

The settings you specify with the Setup program are recorded in a special area of memory called CMOS RAM. This memory is backed up by a battery so that it will not be erased when you turn off or reset the system. Whenever you turn on the power, the system reads the settings stored in CMOS RAM and compares them to the equipment check conducted during the POST. If an error occurs, an error message will be displayed on screen, and you will be prompted to run the Setup program.

The AMI BIOS Setup program is accessed through a menu which allows you to easily configure your system. Standard CMOS Setup allows you to record basic system information regarding date and time, video type and installed drives. Advanced CMOS Setup gives you access to the advanced features supported by the AMI BIOS and your mainboard chipset.

5.2 Entering CMOS Setup

- When you turn on the system and in the course of the system POST, you will be presented with the screen depicted below.

To enter the Setup program at this time, press the [Del] key. This will display the first page of the AMI BIOS Setup menu.

- If you do not press the [DEL] key at the right time, press [Ctrl-Ah-Del] to restart the system and try again.

- If you do not press the key at the correct time and the system fails to boot, an error message KEYBOARD ERROR will be displayed and you will again be asked to :

    RUN SETUP UTILITY
    Press <F1> to resume

> **If you press and hold the [Ins] key while the system is booting until you bear a single beep, the default Setup values will be loaded into CMOS. Release the key after the beep to prevent a keyboard error.**

After you enter into the Setup Program, a main menu of the AMI Setup Program is shown,

- Select Standard CMOS Setup to access the Standard CMOS Setup menu, which is discussed in section 5.5.

SECTION **5**

AMI BIOS SETUP   .

5.2 Entering CMOS Setup

Select Advanced CMOS Setup to access the Advanced CMOS Setup menu, which is discussed in section 5 **6.**

The Advanced Chipset Setup to access the Advanced Chipset Setup menu, which is discussed in section **5.7.**

Select Auto Configuration with BIOS Defaults to load the default system values. You will be prompted for confirmation, and notified that the values have been loaded.

Select Auto Configuration with Power-On Defaults to load the default power-on values, which disable all performance options. This option serves a useful diagnostic function in the event of a compatibility problem. You will be prompted for confirmation, and notified that the values have been loaded.

Select Change Password to access the password security menu, which is discussed in section 5.8 below.

Select Hard Disk Utility to access the hard disk utility menu, which is discussed in section 5 9 below.

Select Write to CMOS and Exit to save your configuration and exit the Setup program. You will be prompted for confirmation before the changes are written to CMOS and the system reboots.

Select Do Not Write to CMOS and Exit to cancel any changes to your configuration and exit the Setup program. You will be prompted for confirmation before the system reboots.

A warning message will appear each time you select Standard or Advanced CMOS Setup.

5.3 Getting Help

- Help screens are displayed for each option in the Standard CMOS Setup menu. and can be accessed in the Advanced CMOS Setup menu by pressing [F1]. A "pop-up" window till appear, similar to the one pictured below, listing the available selections for that option. To exit the Help window, press any key.

- If you have trouble reading the Setup menu, toggle the menu colors by pressing [F2] for background color and [F3] for foreground color.

5.4 Using Setup

The following keys and key combinations are used to maneuver among Setup options and to change values.

- To move the highlight bar from one option to another, use cursor (or arrow) keys, with [NumLock] turned off.

- Press [PgUp] or [PgDn] to change the value of option.

- Press the [Esc] key to exit back to the AM1 Setup program's   main menu

- Press [F5] to restore the values that were resident when the   Setup program was entered.

SECTION 5

AMI BIOS SETUP

5 5 Standard CMOS Setup

```
╔══════════════════════════════════════════════════════════════════╗
║              AMIBIOS SETUP PROGRAM - STANDARD CMOS SETUP           ║
║            (C)1993 American Megatrends Inc., All Rights Reserved   ║
╠══════════════════════════════════════════════════════════════════╣
║ Date (mn/date/year): Wed, Apr 28 1993      Base Memory : 640KB     ║
║ Time (hour/min/sec): 13 : 56 : 38          Ext. Memory : 7424 KB   ║
║                            Cyln  Head  WPcom LZone Sect   Size      ║
║ Hard Disk C: Type   : 47 = USER TYPE 0    0     0     0    0    0   ║
║ Hard Disk D: Type   : Not Installed                                ║
║ Floppy Drive A:     : 1.2  MB, 5¼"    ┌───┬───┬───┬───┬───┬───┬───┐ ║
║ Floppy Drive B:     : 1.44 MB, 3⅜"    │Sun│Mon│Tue│Wed│Thu│Fri│Sat│ ║
║ Primary Display     : VGA/PGA/EGA     ├───┼───┼───┼───┼───┼───┼───┤ ║
║ Keyboard            : Installed       │28 │29 │30 │31 │ 1 │ 2 │ 3 │ ║
║                                       ├───┼───┼───┼───┼───┼───┼───┤ ║
║                                       │ 4 │ 5 │ 6 │ 7 │ 8 │ 9 │10 │ ║
║    ┌─────────────────────────────┐    ├───┼───┼───┼───┼───┼───┼───┤ ║
║    │ Month : Jan, Feb,.....Dec   │    │11 │12 │13 │14 │15 │16 │17 │ ║
║    │ Date  : 01, 02, 03,...31    │    ├───┼───┼───┼───┼───┼───┼───┤ ║
║    │ Year  : 1901,1902,...2099   │    │18 │19 │20 │21 │22 │23 │24 │ ║
║    └─────────────────────────────┘    ├───┼───┼───┼───┼───┼───┼───┤ ║
║                                       │25 │26 │27 │28 │29 │30 │ 1 │ ║
║                                       ├───┼───┼───┼───┼───┼───┼───┤ ║
║  ESC:Exit↓↑←:Select F2/F3:Color PU/PD:Modify │ 2 │ 3 │ 4 │ 5 │ 6 │ 7 │ 8 │ ║
╚══════════════════════════════════════════════════════════════════╝
```

The Standard CMOS Setup menu allows you to specify the following system configuration mformation and the illustrated diagram is shown above :

- Date and time. Enter the date and time respectively.

- Daylight saving. Choose Enabled or Disable.

- Hard disk C: and D: type. The BIOS supports 47 fixed disk drive types, 46 of which are predefined in the ROM-resident table. If your hard disk type is not directly supported, you may need to manually enter the correct parameters (heads, cylinders, sectors, write precompensation, and landing zone) under type 47. If no hard drive is installed, select Not Installed.

- Floppy drive A: and B:. Enter the disk drive configuration that your system is equipped with. If no floppy drive is installed, select NOT installed.

- Primary display, Enter the type of video display adapter that is connected to your system. The AMI BIOS will usually auto detect the correct type.

- Keyboard. Choose installed or NOT installed (e.g. for a tile server), as appropriate

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SECTION 5

AMI BIOS SETUP

5.6 Advanced CMOS Setup

```
                    AMIBIOS  SETUP  PROGRAM  -  ADVANCED CMOS  SETUP
                   (C)1993  American  Megatrends  Inc.,  All  Rights  Reserved

 Typematic  Rate  Programming : Enabled    BootSector  virus  Protection:  Disabled
 Typematic  Rate  delay (msec): 500         IDE  Block  Mode  Transfer    :  Disabled
 Typematic   Rate  (Chars/Sec):30          IDE  Standby  mode            :  Disabled
 Above 1 MB  Memory  Test        : Disable
 Memory  Test  Tick  Sound      :  Enabled
 Memory  Parity  Error  Check   :  Enabled
 Hit <DEL>  Message  Display    :  Enabled
 Hard  Disk  Type  47  RAM  Area : 0:300
 Wait  For  <F1>  If  Any  Error :  Enabled
 System  Boot  Up  Num  Lock    :  On
 Numeric  Processor  Test       :  Enabled
 Weitek  Processor              :  Absent
 Floppy  Drive  Seek  At  Boot  : Disable
 System  Boot  Up  Sequence     : C:, A:
 System  Boot  Up  CPU  Speed   : High
 External  Cache  Memory        :  Enabled
 Internal  Cache  Memory        :  Enabled
 Password  Checking  Option     :  Setup

    ======  ESC:Exit  . . :Sel  (Ctrl)Pu/Pd:Modify   F1:Help  F2/F3:Color======
    ======  F5:Old  Values   F6:BIOS  Setup  Defaults  F7:Power-on   D e f a u l t s } =
```

The Advanced CMOS Setup menu allows you to set various BIOS and chipset performance options, as
illustrated and described below.

- Typematic Rate Programming. This option enables or disables programming of the keystroke repeat
  rate. which is adjusted by means of the next two options.

- Typematic Rate Delay (msecs). If Typematic Rate Programming is enabled, this option allows you to
  specify the delay between holding down a key and when the character begins repeating.

- Typematic Rate (Char/Sec). If Typematic Rate Programming is enabled, this option allows you to
  specify the rate at which a character keeps repeating.

- Above 1MB Memory Test. When Enabled this option causes memory above 1MB to be checked during
  the POST   If Disabled, only the first 1MB is checked during the POST.

- Memory Test Tick Sound. This option enables or disables an audible sound during the POST memory
  test.

- Memory Parity Error Check. This option enables or disables BIOS memory parity error checking
  routines.

- Hit <DEL> Message Display. Disable this option to prevent   the "Hit <DEL>, If you want to run
  Setup" message from appearing on screen after the POST.

- Hard Disk Type 47 RAM Area. Select 0:300 unless your system is running a network operation system
  which uses the 0: 300 address for system operations.

- Wait for <F1> If Any Error. Disable this option to eliminated the need for any user response to a non-
  fatal error condition during the POST.

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SECTIONS

AMI BIOS SETUP

5 6 Advanced CMOS Setup

- System Boot Up Num Lock. Select On or Off to enable or disable the keyboard NumLock switch.

- Numeric Processor. Select Installed if you have installed a 80387DX numeric coprocessor

- Weitek Processor. Select Installed if you have installed a 80387DX Weitek co-processor

- Floppy Drive Seek at Boot, Select Disabled to speed up the boot process and prevent possible damage to the diskette drive heads.

- System Boot Up Sequence. As a general guideline, select A then C(A:, C:) if you will normally boot the operating system from a floppy disk. Select C then A (C:, A:) if you will normally boot the operating system from the hard disk drive.

- System Boot Up CPU Speed. Select High to improve the Boot up CPU speed

- External Cache Memory. Select Enabled to let the secondary cache memory works between the CPU and DRAMs.

- Internal Cache Memory. Select Enabled to let the primary cache memory (built-in the CPU) functions

- Password Checking Option. This allows you to optionally limit access to the system or to the Setup program alone. If you enable security by selecting Always or Setup, access to the system and/or the Setup program is restricted to valid password entry.

- Boot Sector Virus Protection. Enable this function will make the AMI BIOS issue a warning message when any program or virus issues a Disk Format command or attempts to write to the boot sector of the hard disk drive.

  If enabled, the following is displayed if any program attempts to write to the boot sector. You may have to type N several times to prevent the boot sector write.

  ```
  Boot Sector Write! !!
  Possible VIRUS: Continue (Y/N)?
  ```

  If enabled, the following is displayed if any program attempts to format any cylinder, head, or sector of any hard disk drive via BIOS INT 13 Hard Disk Drive Service.

  ```
  Boot Sector Write! !!
  Possible VIRUS: Continue (Y/N)?
  ```

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SECTION 5

AMI BIOS SETUP

5.7 Advanced Chipset Setup

```
┌─────────────────────────────────────────────────────────────────────┐
│            AMIBIOS  SETUP  PROGRAM - ADVANCED  CHIPSET  SETUP          │
│        (C)1993   American  Megatrends  Inc.,  All  Rights  Reserved    │
├─────────────────────────────────────────────────────────────────────┤
│ AUTO Config Function      Enabled │ Memory Remapping          : Enabled   │
│      Cache   Read  Option : 3-2-2-2│ F Segment Shadow RAM      : Into-486  │
│      Cache   Write Option : 2 W.S. │ E Segment Shadow RAM      : Disabled  │
│      DRAM Type            PageMode │ C000-C3FF Shadow RAM      : Into-486  │
│      DRAM Wait State(s)  : 2 W.S.  │ C400-C7FF Shadow RAM      : Into-486  │
│      Keyboard Clock Select: 7.2 MHz│ C800-CBFF Shadow RAM      : Disabled  │
│      AT Clock Select      CPUCLK/6 │ CC00-CFFF Shadow RAM      : Disabled  │
│      IO Recovery Time     9/3 BCL:K│ D000-D3FF Shadow PAM      : Disabled  │
│      Hold PD Bus          2-3 T    │ D400-D7FF Shadow RAM      : Disabled  │
│ I Refresh Cycle          : Slow    │ D800-DBFF Shadow RAM      : Disabled  │
│ CoProcessor Ready        : Delay 1'T│ DC00-DFFF Shadow RAM     :, Disabled │
│ Check ELBA# Signal       : in T2   │ Refresh Divider           : 1         │
│ Non-Cacheable Block1 Enable: Disabled│ Data Location of Local Bus : ISA Bus │
│ Non-Cacheable Block1 Size  : 4MB   │ LOWA20#,RC Emulation      : None      │
│ Non-Cacheable Block1 Base  : 0KB   │ Stretch OWS# Signal Option : Do Not   │
│ Non-Cacheable Block2 Enable: Disable│ Hardware Parity Check    : Disabled  │
│ Non-Cacheable Block2 Size  : 16MB  │                                       │
│ Non-Cacheable Block2 Base  : OKB   │                                       │
├─────────────────────────────────────────────────────────────────────┤
│  ESC:Exit↓→↑←:Sel  (Ctrl)Pu/Pd:Modify  F1:Help  F2/F3:Color           │
│  F5:Old Values  F6:BIOS Setup Defaults  F7:Power-on  D e f a u l t s / p│
└─────────────────────────────────────────────────────────────────────┘
```

- The Advanced Chipset Setup menu allows you to set various BIOS and chipset performance options, as illustrated and described below.

- Auto-Configuration. If Enabled, the following parameters will be automatically configured with Default Values depending on CPU clock speed: 1> Cache Read Option; 2> Cache Write Option; 3> refresh Cycle; 4> DRAM Type; 5> DRAM Wait State(s); 6> keyboard Clock Select; 7> AT Clock Select; 8> IO Recovery Time. If Disabled is chosen, The User Selected Values for the above parameters will be used.

- CoProcessor Ready This option is enabled to delay the math co-processor ready signal by T-state

- Memory Remapping. The memory at AOOOO-FFFFF can be remapped to the top of system memory The amount of memory that is being remapped depends on shadow RAM information. The Remapping is possible only if system memory is not more than 8MB.

- Non-Cacheable Block1 Enable. Since Block1 is Cacheable, therefore set option to Disabled.

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SECTION 5

AMI BIOS SETUP

5.8 Power Management Setup

```
┌──────────────────────────────────────────────────────────────────────┐
│            AMIBIOS SETUP PROGRAM - POWER MANAGEMENT SETUP              │
│            (C)1993 American Megatrends Inc., All Rights Reserved       │
├────────────────────────────────────┬─────────────────────────────────┤
│  CPU  Clock  Speed      : Disable   │                                 │
│  AUX Green # 1          : Disable   │                                 │
│  AUX Green # 2          : Disable   │                                 │
│  AUX Green # 3          : Disable   │                                 │
│  AUX Green # 4          : Disable   │                                 │
│                                     │                                 │
│                                     │                                 │
│                                     │                                 │
│                                     │                                 │
│                                     │                                 │
│                                     │                                 │
│                                     │                                 │
│                                     │                                 │
│                                     │                                 │
├────────────────────────────────────┴─────────────────────────────────┤
│   ESC:Exit ↘↓↑ :Sel (Ctrl)Pu/Pd:Modify  F1:Help  F2/F3:Color          │
│   F5:Old  Values   F6:BIOS Setup Defaults   F7:Power-on Defaults       │
└──────────────────────────────────────────────────────────────────────┘
```

The Power Management Setup menu allows you to control the Green PC power saving mode. as illustrated and described below.

- CPU Clock Speed. If enabled, the speed of the CPU will be slow down to 8 MHz when the programmable timer expires. The expiration timer can be set from 1 to 255 minutes.

- AUX Green # 1. If enabled, the device connected to Green AUX output # 1 of J7 will switch to power saving mode when the programmable timer expires. The expiration timer can be set from 1 to 255 minutes.

- AUX Green # 2. If enabled, the device connected to Green AUX output # 2 of J7 will switch to power saving mode when the programmable timer expires. The expiration timer can be set from 1 to 255 minutes.

- AUX Green # 3. If enabled, the device connected to Green AUX output # 3 of J7 will switch to power saving mode when the programmable timer expires. The expiration timer can be set from 1 to 255 minutes.

- AUX Green # 4. If enabled, the device connected to Green AUX output # 4 of J7 will switch to power saving mode when the programmable timer expires. The expiration timer can be set from 1 to 255 minutes.

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SECTION 5

AMI BIOS SETUP

5.9 Changing the Password

If the Password Checking Option under the Advanced CMOS Setup menu is set to either Always or Setup, password entry is required every time the system boots or an attempt is made to enter the Setup program, respectively. The Change Password menu allows you to change the current password, as illustrated below.

- To change the current password, select the Change Password menu option from the Setup main menu. You will be prompted to enter the old password before gaming access.   If this is the first time you attempt to change passwords, the default password is AMI.

- After entering the correct current password, you will be prompted to enter a new password. The password can be no longer than 6 characters. After entering the new password,   you will be prompted to enter it a second time for confirmation. If the second entry matches the first, you will be notified that the new password has keen installed.

If you forget or lose your password, the only way to access the system and/or Setup program is to discharge the CMOS battery. When the CMOS battery becomes corrupted or is discharged, the default password becomes AMI.

Should the BIOS password be set, users should note that when the system enters Green Mode (slowing down the CPU etc.) the system will only return to normal mode once the password has been re-keyed. This re-keying will not affect any software applications used at the time of entering Green Mode. This feature provides added security.

SECTION 5

AMI BIOS SETUP

5. IO Hard Disk Utility

If the Hard Disk Utility menu is selected from the Setup main menu, you will be presented with three options: Hard Disk Format, Auto Interleave, and Media Analysis. Performing any of these operations will destroy all data on the hard disk, so be sure to backup your data before selecting any of these options.

- Hard Disk Format. This option performs a low-level format of the hard disk. Note that many hard drives are factory low-level formatted, and should not be re-formatted. Check with your hard disk manufacturer before selecting this option.

- Auto Interleave. This option determines the optimum inter-leave factor prior to a low-level format of the hard disk.

- Media Analysis. This option analyzes each track on the hard disk to determine if it is usable. If it is unusable, the track is marked as a "bad" track which prevents the system from writing data onto it. Many hard disk manufacturers provide this feature to show a list of bad tracks. Therefore, this test can be skipped most of the time.

> **ESDI and SCSI hard drives normally should NOT be low-level formatted. Refer to your hard disk dealer or manufacturer before using the AMI Hard Disk Utility.**

5.11 Exiting Setup

- To exit Setup, press [Esc] to return to the Setup main menu.

- To save your changes and exit Setup, select Write to CMOS and Exit.

- To exit Setup without saving your changes, select Do Not Write to CMOS and Exit

> **Notr : Mis-configuring the BIOS setup may lead to the failure of the CMOS setup or decrease the overall system performance. The Auto BIOS configuration setup is always recommended to the mainboard's users.**

DIAGRAM LAYOUT