

# **EX-9388L 386SX CPU CARD**

**386SX-40, 4MB, DOC SSD Socket, COM x 2,  
IDE, RS-232x1 +RS232/422/485x1, WDT, I/O  
PC/104, Single +5V**

## **USER'S MANUAL**

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This user's manual list necessary information to assist both Embedded Computer manufacturers and end users in installing and setting up the system. The information contained in this user's manual is subject to change without any notice.

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# **CHAPTER**

# **1**

## **INTRODUCTION**

**THIS CHAPTER SHOWS THE INFORMATION ABOUT THIS BOARD AND ITS SPECIFICATIONS.**

**SECTIONS INCLUDE :**

- \* ABOUT THIS MANUAL**
- \* SPECIFICATIONS**
- \* SAFETY PRECAUTIONS**

## **1-1 ABOUT THIS MANUAL**

Thank you for purchasing 386SX CPU Card, M-System DiskOnChip Flash Disk ,fully DOS Command compatible. With full standard IPC functions and other features, this 386SX CPU Card more suitable for harsh industrial environment and commercial application. This manual is written to assist you to install and set up the system. It contents five chapters as following:

### **Chapter 1: Introduction**

This chapter introduces you the background of this manual, and the specification for this system. Final in this chapter will indicate you how to avoid the damages for this Embedded CPU M-Card.

### **Chapter 2: Hardware Configuration**

This chapter outlines the components' locations and their functions. In the end of this chapter, you will know how to set jumper and how to configure this card to meet your own needs.

### **Chapter 3: M-System DiskOnChip Flash Disk**

This chapter brings you the information about FLASH DISK function.

### **Chapter 4: WDT**

Helpful information that informs you the proper installations of the SSD and Flash BIOS, also describes the Watchdog-timer function.

### **Chapter 5: VGA / LCD FLAT PANEL**

This chapter about VGA, TFT/DSTN/EL LCD flat panel.

### **Chapter 6: AMI BIOS Setup**

This chapter indicates you how to set up the BIOS configurations.

### **Appendix A: Expansion Bus**

This appendix introduces you the expansion bus for PC-104.

### **Appendix B: Technical Summary**

This appendix gives you the information about the AMI BIOS Identification Strings and Technical maps.

### **Appendix C: Trouble Shooting**

This appendix outlines the errors and offers you the methods to solve the problems.

## 1-2 SPECIFICATIONS

- \* **CPU + Chipset:**  
ALI M6117C single chip with on-chip 386SX-40 CPU.
- \* **MEMORY:** 4MB soldered on board .
- \* **CMOS Backup:** backup by Li battery.
- \* **BIOS:** AMI BIOS, 128KB (Flash) EPROM.
- \* **KEYBOARD AND PS/2 MOUSE CONNECTOR:**  
Support JST 5-pin PS/2 Keyboard Connector.  
Support JST 5-pin PS/2 Mouse Connector.
- \* **BUS Type:** PC/104 Connector.
- \* **SPEAKER:** Buzzer on Board.
- \* **WATCHDOG:** 1/2/4/8/16/32/64/128/256/512 sec.
- \* **IDE INTERFACE:** Support one port up to 2 x IDE devices.
- \* **FLOPPY DISK DRIVE INTERFACE:**  
Two 3 1/2" or 5 1/4" FDD, Drives A, B swappable.
- \* **SERIAL PORT x 2:** 2 x 16-byte FIFO 16C550 RS-232.  
Jumper selectable RS-232 x 3 + RS-232/422/485 x 1.
- \* **FLASH DISK SSD:**  
32-pin socket for DiskOnChip SSD 8MB ~ 288MB.
- \* **I/O setup built in BIOS.**
- \* **PARALLEL PORT:** One bi-directional SPP/EPP/ECP parallel port configured as LPT 1,2,3.
- \* **LED INDICATOR:** Hard Disk access and System power

**\* BUS EXPANSION & SPEED: PC-104 8Mhz, BIOS Selectable**

**\* DMA CONTROLLER: 82C37 X 2**

**\* DMA CHANNELS: 7**

**\* INTERRUPT CONTROLLERS: 82C59 X 2**

**\* INTERRUPT LEVELS: 15**

**\* STORAGE TEMPERATURE: -40°C TO 80°C.**

**\* OPERATING TEMPERATURE: 0°C TO 60°C (140°F).**

**\* Miscellaneous Connectors/Jumpers:**  
Reset, HDD LED, Single +5V 2-Pin connector.

**\* SYSTEM POWER REQUIREMENT:**  
Single +5V power by using 2-pin connector.

**\* BOARD DIMENSION: 95mm x 90mm PC/104 from factor.**

**\* BOARD WEIGHT: 0.185Kg.**

## **1-3 SAFETY PRECAUTIONS**

Follow the messages below to avoid your system from damage.

**1. Avoid your system from static electric power on all occasions.**

**2. Stay safe from the electric shock. Don't touch any components of this card when the power is ON. Always disconnect power when the system is not in use.**

**3. Remove power when you change any hardware devices. For instance, when you connect a jumper or install any cards, a surge of power may damage the electronic components or the whole system.**

# **CHAPTER**

# **2**

## ***HARDWARE CONFIGURATION***

**THIS CHAPTER SHOWS YOU THE CONNECTORS & JUMPER SETTINGS, AND COMPONENTS LOCATIONS.**

**SECTIONS INCLUDE:**

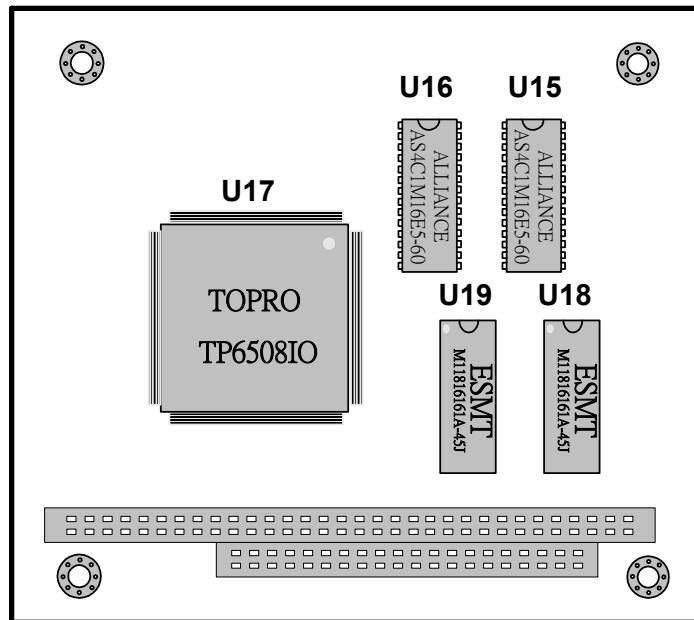
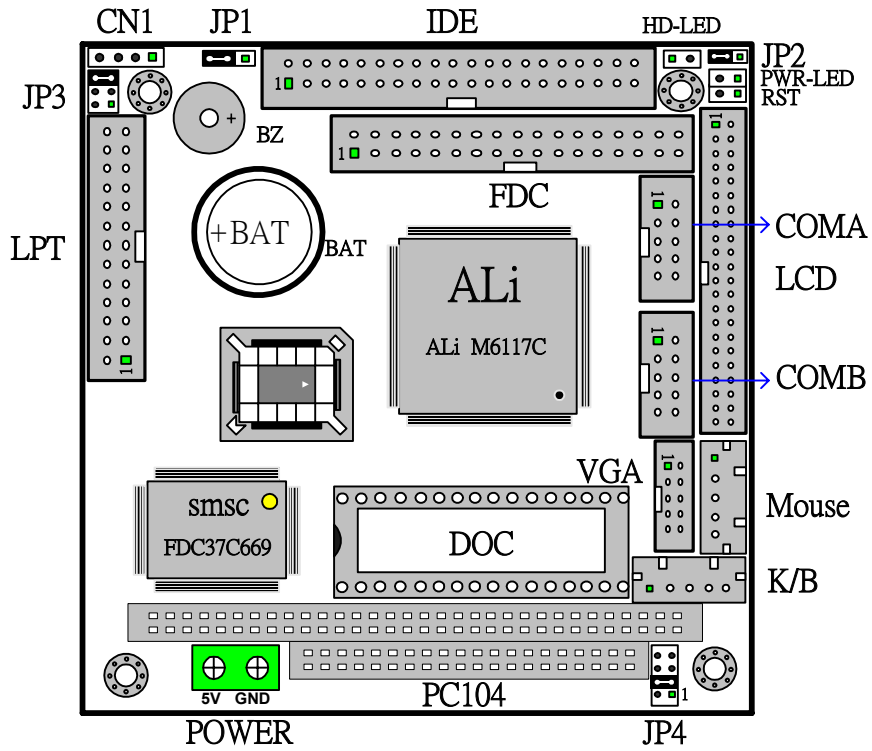
- \* JUMPER/CONNECTOR QUICK REFERENCE TABLE**
- \* COMPONENTS' LOCATIONS**
- \* CONFIGURATION AND JUMPER SETTINGS**
- \* CONNECTOR PIN ASSIGNMENTS**



## 2-1 JUMPER/CONNECTOR QUICK REFERENCE TABLE

IDE CONNECTOR .....	IDE
PRINTER CONNECTOR .....	LPT
FLOPPY DISK DRIVE CONNECTOR .....	FDC
JST 5-PIN KEYBOARD CONNECTOR .....	K/B
ISO 2-PIN POWER CONNECTOR .....	POWER
COM1 RS-232 CONNECTOR .....	COMA
COM2 RS-232 CONNECTOR.....	COMB
RS-422/485 CONNECTOR .....	CN1
JST 5-PIN MOUSE CONNECTOR .....	MOUSE
VGA CONNECTOR .....	VGA
LCD CONNECTOR192D:	LCD
CMOS BATTERY CLEAR JUMPER .....	JP1
LCD PANEL VOLTAGE CONNECTOR .....	JP2
COM2 RS-232 or RS-422/485 SELECT .....	JP3
M-System ADDRESS SELECT .....	JP4
POWER LED .....	PWR-LED
HARD DISK ACTIVE LED .....	HD-LED
SYSTEM RESET SWITCH .....	RST
BUZZER .....	BZ
DOC SOCKET .....	DOC
MEMORY INSTALLATION .....	

## 2-2 COMPONENT LOCATIONS



## 2-3 IDE CONNECTOR (IDE)

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	IDEREST	2	GND
3	HD7	4	HD8
5	HD6	6	HD9
7	HD5	8	HD10
9	HD4	10	HD11
11	HD3	12	HD12
13	HD2	14	HD13
15	HD1	16	HD14
17	HD0	18	HD15
19	GND	20	NC
21	NC	22	GND
23	IOW	24	GND
25	IOR	26	GND
27	IOCHRDY	28	ALE
29	NC	30	GND
31	IRQ	32	IO16
33	SA1	34	NC
35	SA0	36	SA2
37	HDCS0	38	HDCS1
39	DASP	40	GND

## 2-4 PRINTER CONNECTOR (LPT)

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	STROB	2	AUTOFD
3	PD0	4	ERROR
5	PD1	6	INIT
7	PD2	8	SLCTIN
9	PD3	10	GND
11	PD4	12	GND
13	PD5	14	GND
15	PD6	16	GND
17	PD7	18	GND
19	ACK	20	GND
21	BUSY	22	GND
23	PE	24	GND
25	SLCT	26	NC

## 2-5 FLOPPY DISK DRIVE CONNECTOR (FDC)

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	GND	2	RPM
3	GND	4	NC
5	GND	6	NC
7	GND	8	INDEX
9	GND	10	MTR0
11	GND	12	DRV1
13	GND	14	DRV0
15	GND	16	MTR1
17	GND	18	DIR
19	GND	20	STEP
21	GND	22	WDATA
23	GND	24	WGATE
25	GND	26	TRK0
27	GND	28	WRTprt
29	GND	30	RDATA
31	GND	32	SEL
33	GND	34	DSKCHG

## 2-6 JST 5-PIN KEYBOARD CONNECTOR (K/B)

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	KBCLK	2	KBDATA
3	NC	4	GND
5	VCC		

## 2-7 ISO 2-PIN POWER CONNECTOR (POWER)

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	+5V	2	GND

## 2-8 COM1 RS-232 CONNECTOR (COMA)

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	DCD1	2	DSR1
3	RXD1	4	RTS1
5	TXD1	6	CTS1
7	DTR1	8	RI1
9	GND		NC

## 2-9 COM2 RS-232 CONNECTOR (COMB)

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	DCD2	2	DSR2
3	RXD2	4	RTS2
5	TXD2	6	CTS2
7	DTR2	8	RI2
9	GND	10	NC

## 2-10 RS-422/485 CONNECTOR (CN1)

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	TX+	2	RX-
3	TX-	4	RX+

## 2-11 JST 5-PIN PS/2 MOUSE CONNECTOR (MOUSE)

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	MCLK	2	MDATA
3	NC	4	GND
5	VCC		

## 2-12 VGA CONNECTOR (VGA)

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	RED	2	NC
3	GREEN	4	NC
5	BLUE	6	NC
7	H-SYNC	8	GND
9	V-SYNC	10	GND

## 2-13 LCD CONNECTOR (LCD)

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	+12V	2	+12V
3	GND	4	GND
5	+5V/3.3V	6	+5V/3.3V
7	ENAVEE	8	GND
9	P0	10	P1
11	P2	12	P3
13	P4	14	P5
15	P6	16	P7
17	P8	18	P9
19	P10	20	P11
21	P12	22	P13
23	P14	24	P15
25	P16	26	P17
27	P18	28	P19
29	P20	30	P21
31	P22	32	P23
33	GND	34	GND
35	SHFCLK	36	VSYNC(FLM)
37	M(D.0)	38	HSYNC(LP)
39	GND	40	ENBLK
41	GND	42	N/C
43	+5V/3.3V	44	+5V/3.3V

## 2-14 CMOS BATTERY CLEAR JUMPER (JP1)

2-3 ON: is Default.      1-2 ON: CMOS Clear.

## 2-15 LCD PANEL VOLTAGE SELECT(JP2)

1-2 ON: LCD PANEL VOLTAGE +5V  
2-3 ON: LCD PANEL VOLTAGE +3.3V

## 2-16 COM2 RS-232 OR RS-422/485 SELECT (JP3)

1-2 ON: RS-485 ENABLED.      3-4 ON: RS-422 ENABLED.  
5-6 ON: RS-232 ENABLED.

## 2-17 M-System ADDRESS SELECTOR (JP4)

ADDRESS SELECTION	JUMPER SETTING			
	PIN1&2	PIN3&4	PIN5&6	PIN7&8
C000	ON	OFF	OFF	OFF
C800	OFF	ON	OFF	OFF
D000	OFF	OFF	ON	OFF
D800	OFF	OFF	OFF	ON

## 2-18 POWER LED (PWR-LED)

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	VCC	2	GND

## 2-19 HARD DISK ACTIVE LED (HD-LED)

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	HDD Active Signal	2	VCC

## 2-20 SYSTEM RESET SWITCH (RST)

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	Reset	2	GND

## 2-21 BUZZER (BZ)

IT'S On Board Buzzer.

## 2-22 DOC SOCKET (DOC)

IT'S Support DOC Socket.

## 2-23 MEMORY INSTALLATION

IT'S On Board 4MB EDO RAM.

# **CHAPTER**

# **3**

## **DiskOnChip FLASH DISK**

**THIS CHAPTER SHOWS THE INFORMATION ABOUT M-System DiskOnChip FUNCTIONS.**

**SECTIONS INCLUDE:**

- \* PREFACE**
- \* QUICK INSTALLATION GUIDE**
- \* UTILITY REFERENCE**



## **3-1 PREFACE**

This CPU Board features a DiskOnChip Flash Disk optional function. The DiskOnChip can be built on board by order. This Board is designed to use the DiskOnChip single chip Flash Disk to plug into a standard 32-pin EEPROM socket which built on board. The DiskOnChip Flash Disk should be mapped into an 8K Byte window in the BIOS expansion address space of the CPU Card which is usually located between address 0C000H to 0DFFFH. The CPU board can contain the operating system in DiskOnChip to allow systems to boot without a hard disk.

The DiskOnChip of this board can install standard MS-DOS and the DOS can boot from DiskOnChip, its command is fully DOS Command compatible, such as Del, Deltree, Format, Copy, Xcopy, MD....., users can read and write DOS Command or data to DiskOnChip same as when using Hard Disk Drive.

Users can take this DiskOnChip as physical HDD and its priority is software selectable. For example, if system have one HDD, either HDD & DiskOnChip could be assigned as C or D Drive. When having two HDD (Driver C & Driver D), the DiskOnChip could be assigned as C, D, E Drive. If the system don't have HDD, the DiskOnChip will be taken as C drive only. When it is taken as C drive, it can boot system just same as using Hard Disk Drive.

The capacity of DiskOnChip have 8MB, 12MB, 24MB, 40MB 72MB, 144MB and 288MB option. User can select the proper one before order to meet their needs.

This CPU Board support M-system DiskOnChip Socket which locate at DOC.

## **3-2 QUICK INSTALLATION GUIDE**

1. Make sure the CPU Card is power OFF
2. Plug the DiskOnChip chip into socket DOC. Verify the direction is correct (pin1 of the DiskOnChip is aligned with pin1 of the DOC socket).
3. Power ON the system.

4. During power ON you may observe the message displayed by the DiskOnChip when its driver automatically loaded into system's memory.
5. At this stage the DiskOnChip can be accessed as any disk in the system.
6. If the DiskOnChip is the only disk in the system, it will appear as the first disk (drive C).
7. If there are more disks besides the DiskOnChip, the DiskOnChip will appear by default as the last drive.

### **3-3 UTILITY REFERENCE**

A driver diskette will be included with DiskOnChip to offer detail information. If you need more information beside the diskette, please reach the M-System web [www.m-sys.com](http://www.m-sys.com) to get the information.

# CHAPTER

# 4

## **WDT**

**THIS CHAPTER SHOWS THE INFORMATION OF WDT FUNCTION, ALSO DESCRIBES HOW TO INSTALL THE WATCHDOG CONFIGURATION.**

**SECTIONS INCLUDE:**

- \* WATCHDOG TIMER FUNCTION**
- \* WATCHDOG TIMER SOFTWARE GUIDE**

**Note: The M6117C has watchdog timer function for monitoring whether the system is still work or not after a period of time. If the system happened some error or hanged up, it cause the timer timed out, then a system reset or NMI or IRQ may happen decided by BIOS programming. The WATCHDOG timer source is 32.768 KHz frequency to counter a 24 bits counter such that the timer range is from 30.5 us to 512 sec with resolution 30.5 us.**

## 4-1 WATCHDOG TIMER FUNCTION

The read/write configuration register is the first index to be processed. On board I/O port 22h is the index register and I/O port 23h is the data Register. To read a configuration register, write the index value to I/O Port 22h in advance, then read data from I/O port 23h. To write a configuration register, write the index value to I/O port 22h, then write Data to I/O port 23h. For instance, if we want to read the data of configuration register which index is 10h, the steps are:

- 1) Write 10h (index) to I/O port 22h
- 2) Read data from I/O port 23h

If we want to write data 55h to configuration register which index is 12h, then the steps are:

- 1) Write 12h (index) to I/O port 22h
- 2) Write data 55h to I/O port 23h

☆ The steps of locking/unlocking the configuration registers:

OUT 22h, 13h (Enable 13h)  
OUT 23h, C5h (Unlock)  
OUT 22h, XXh (XX = Configuration Index)  
OUT 23h, YYh (YY = Configuration data)  
OUT 22h, XXh  
OUT 23h, YYh (Configuration can be written repeatedly)  
OUT 22h, 13h (Enable 13h)  
OUT 23h, 00h (Lock)

WatchDog enable program:

For Example

```
; Please use TASM to compiler the following program.  
; Execute under DOS environment.  
;  
.286  
.model smart  
.code  
Start proc c  
    mov ax,0c513h    ; Unlock config register  
    call writechip  
    mov ax,3737h    ; Disable watchdog timer  
    call readchip
```

```

and al,10111111b
xchg ah,al
call writechip
mov ax,083bh           ; Set the expected counter value
call writechip        ; to [080000h]
mov ax,003ah          ; 30.5usc * 080000h = 16 sec
call writechip
mov ax,0039h
call writechip
mov ax,3838h          ; Select "System reset " as timeout action
call readchip
and al,00001111b
or al,11010000b
xchg ah,al
call writechip
mov ax,3737h          ; Enabled watchdog timer
or al,01000000b
xchg ah,al
call writechip
mov ax,0013h          ; Lock config register
mov writechip
mov ax,4c00h
int 21h
endp
readchip proc c
out 22h,al
nop
nop
in al,23h
nop
nop
writechip proc c
out 22h,al
nop
nop
xchg ah,al
out 23h,al
nop
nop
xchg ah,al
ret
endp
end

```

## 4-2 WATCHDOG SOFTWARE GUIDE

User can use WDT function by following way:

1. Direct start WDT function as procedure which described on Sec. 4-1.
2. Or, user can change WDT timing by choosing the items on WATCH DOG TIMER in AMI BIOS ADVANCED CMOS SETUP.

If user control WDT by changing BIOS SETUP, application software must note: one byte setup value was put on CMOS location 44H so application software designer must read (access) the data on the CMOS location 44H and put the data to a register then, at the time when you need, send the register data to I/O port 0443H to start the WDT function.

### Reset watchdog timer

Resets the watchdog timer periodically to prevent timeout.

```
mov ax,0c513h      ; Unlock configuration register
call writechip
mov ax,3c3ch      ; reset watchdog timer counter
call readchip
or al,00100000b   ; The counter is reset at out 23h,al
xchg ah,al
call writechip
mov ax,0013h     ; Lock configuration register
call writechip
```

(the above code uses reachip and writechip procedures)

# **CHAPTER**

# **5**

## ***VGA / LCD FLAT PANEL***

This section is can shows you the SVGA and LCD Flat Panel Video.

Sections include:

- \* **FLAT PANEL BIOS SUPPORT**
- \* **PANEL SWITCHING UTILITY**
- \* **FEATURE**
- \* **SOFTWARE INSTALLING**

## 5-1 FLAT PANEL BIOS SUPPORT

Below is a list of optional Flat Panel SVGA BIOS. The VGA BIOS is combined with the system BIOS in a single. To change to another BIOS please contact your local dealer.

**MLCD.dat** - Data File for MONO DSTN640x480  
e.g. :  
(1) HOSIDEN HLM6667  
(2) HITACHI LMG5160XUFC  
(3) CASIO MD650TS00-01  
(4) OPTREX DMF\_50260NFU-FW-8

**DSTN.dat** - Data File for Color DSTN640x480  
e.g. :  
(1) Sanyo LCM-5331-22NTK  
(2) SHARP LM64C35P

**TFT\_s1.dat** - Data File for TFT640x480-Sync (16 BIT)  
**TFT\_s2.dat** - Data File for TFT640x480-Sync (18/24 BIT)  
e.g. :  
(1) HITACHI TX26D60/TX24D55  
(2) TOSHIBA LTM09C015A  
(3) SHARP LQ10D321  
(4) LG LP104V2

**TFT\_LP1.dat** - Data File for TFT640x480-LP (16 BIT)  
**TFT\_LP2.dat** - Data File for TFT640x480-LP (18/24 BIT)  
e.g. :  
(1) TOSHIBA LTM09c015A

**TFT86\_s1.dat** - Data File for TFT800x600\_Sync (16 BIT)  
**TFT86\_s2.dat** - Data File for TFT800x600\_Sync (18/24 BIT)  
e.g. :  
(1) NEC NL8060AC26-05  
(2) NEC NL8060AC26-04  
(3) NEC NL8060BC31-02

**EL.dat** - Data File for EL640X800  
e.g. :  
(1) PLANAR EL640.480-A

**PLASMA.dat** - Data File for PLASMA640X480  
e.g. :  
(1) PANASONIC S817



☆ **Dual-scan STN Frame Buffer**

**Shadow Frame Buffer onto display memory for mono or color LCD panel.**

**Pseudo Frame Buffer for color LCD panel (no additional DRAMs required).**

**External Frame Buffer for color LCD panel (external additional DRAMs required)**

☆ **Enhanced mode includes:**

**132 x 25 or 132 x 44 text mode**

**640 x 480/256 colors(Windows accelerations mode support optional)**

**640 x 480/65536 colors(Windows accelerations mode support optional)**

**640 x 480/16.8M colors(Windows accelerations mode support optional)**

**800 x 600/16 colors**

**800 x 600/256 colors(Windows accelerations mode support optional)**

**800 x 600/65536 colors(Windows accelerations mode support optional)**

**800 x 600/16.8M colors**

**1024 x 768/16 colors**

**1024 x 768/256 colors(Windows accelerations mode support optional)**

**1024 x 768/65536 colors(Windows accelerations mode support optional)**

**1280 x 1024/16 colors(Windows accelerations mode support optional)**

**1280 x 1024/256 colors(Windows accelerations mode support optional)**

**1600 x 1280/16 colors interlace display mode**

## **5-2 PANEL SWITCHING UTILITY**

The Panel Switch Utility is used for switching different display type.

**USAGE:**

Type **>SW508** then Screen will show

- 1. CRT Only**
- 2. Panel Only**
- 3. CRT/Panel Simultaneous**

then you can choose which one you want to.

## 5-3 FEATURE

### ☆ Memory DRAM configuration support

Support symmetric or asymmetric RAS/CAS address DRAM

Support dual-CAS or dual-WE addressing DRAM

512k Bytes Memory: four 256k x 4-bit/ one 256k x 16-bit

1M Bytes Memory: eight 256k x 4-bit/two 256k x 16-bit

2M Bytes Memory: sixteen 256k x 4-bit / four 256k x 16-bit

### ☆ Integrates STN panel support

Support Dual/single scan mono STN LCD Panel, up to 64 simultaneous grays.

Support Dual/single scan color STN LCD Panel, up to 64k simultaneous colors, and 61 visual color .

Provide 8 and 16 bit panel interfaces

### ☆ Integrates color TFT panel support

Support Normal or CRT-like TFT LCD panel

Support 9/12/15 or 18/24 bit panel interface, and up to 16.8M simultaneous colors.

## 5-4 SOFTWARE INSTALLING

1.You can see our CD “Readme.txt”

# **CHAPTER**

# **6**

## **AMI BIOS SETUP**

**THIS CHAPTER SHOWS HOW TO SET UP THE AMI BIOS.**

**SECTIONS INCLUDE:**

- \* INTRODUCTION**
- \* STARTING SETUP**
- \* MAIN MENU**
- \* STANDARD CMOS SETUP**
- \* ADVANCED CMOS SETUP**
- \* ADVANCED CHIPSET SETUP**
- \* POWER MANAGEMENT SETUP**
- \* PERIPHERAL SETUP**
- \* CHANGE SUPERVISOR PASSWORD**
- \* BIOS DEFAULT DRIVE TABLE**

## 6-1 INTRODUCTION

This section discusses AMI Setup program built in the ROM BIOS. The Setup program allows users to modify the basic system configuration. This special information is then stored in battery-backed RAM so that it retains the Setup information when the power is turned off.

The AMI BIOS installed in computer system's ROM (Read Only Memory) is a custom version of an industry standard BIOS. This means it supports Intel/Cyrix/AMD processors in a standard IBM AT compatible Input/Output system. The BIOS provides critical low-level support for standard devices such as disk drives, serial and parallel ports. Also the BIOS has been customized by adding important, but non-standard, features such as virus and password protection as well as special support for detailed fine-tuning of the chipset controlling the entire system. The rest of this chapter will try to guide you the process of configuring your system by using Setup.

## 6-2 STARTING SETUP

The AMI BIOS is immediately activated when the computer starting power on. The BIOS reads the system information contained in the CMOS and start the process of checking out the system and configuring it. When it finish, the BIOS will seek an operating system on one of the disks and then launch and turn control over to the operating system.

While the BIOS is in active, the Setup program can be activated by one of two ways:

1. Press the <Del> key immediately after switching the system on, or
2. Press the <Del> key when the following message appears briefly at the bottom of the screen during the POST (Power On Self Test)

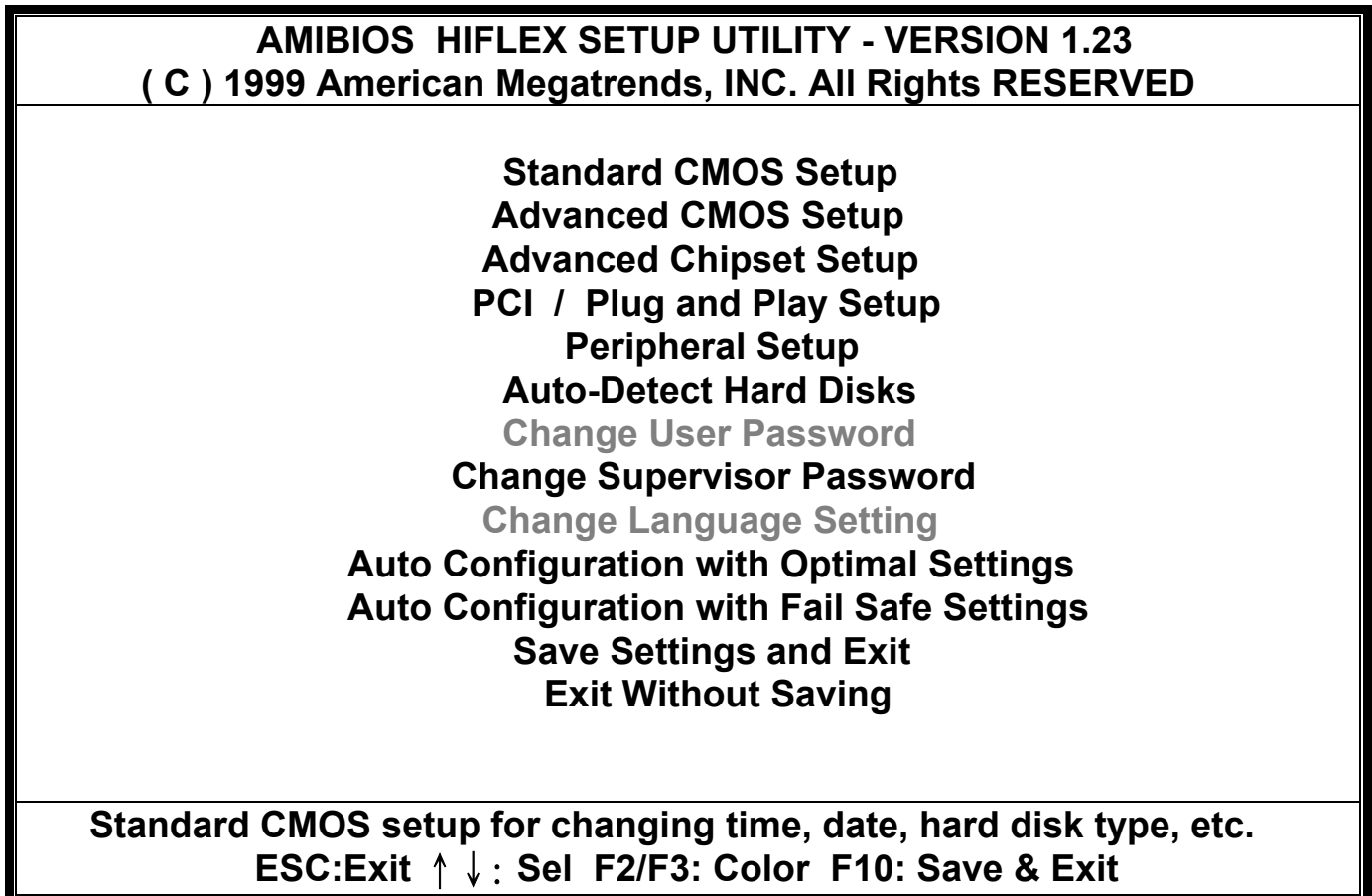
Press DEL to enter SETUP.

If the message disappears before you respond and you still wish to enter Setup, restart the system to try again by turning it OFF then ON or pressing the "RESET" bottom on the system case. You may also restart by simultaneously pressing <Ctrl>, <Alt>, and <Delete> keys. If you do not press the keys at the correct time and the system does not boot, an error message will be displayed and you will again be asked to...

PRESS F1 TO CONTINUE, DEL TO ENTER SETUP

## 6-3 MAIN MENU

Once you enter the AMI BIOS CMOS Setup Utility, the Main Menu will appear on the screen. The Main Menu allows you to select the one you need from several setup functions and two exit choices. Use the arrow keys to select among the items and press <Enter> to accept and enter the sub-menu.



Note: a brief description of each highlighted selection appears at the bottom of the screen.

### Setup Items:

The main menu includes the following main setup categories. Please note that some systems may not include all entries.

- **Standard CMOS Setup**

This setup includes all the items in a standard AT-compatible BIOS.

- **Advanced CMOS Setup**

This setup includes all the items of AMI special enhanced features.

- **Advanced Chipset Setup**

Change Boot from (Floppy, IDE – 0..., ARMD-FDD, CDROM, SCSI, NETWORK), Floppy Drive Swap, etc..., Password Check, or just to Setup.

- **PCI / Plug and play Setup**

This setup appears if your system supports PnP / ISA.

- **Peripheral Setup**

Enabled IDE , FDC , Serial Port , Parallel Port or  
Disabled IDE , FDC , Serial Port , Parallel Port etc , ...

- **Auto-Detect Hard Disks**

Automatically detect and configure hard disk parameters. The AMI BIOS include this ability in the event you are uncertain of your hard disks' parameters. See also Section "Standard CMOS Setup".

- **Change User Password**

This function is close. Don't support end-user.

- **Change Supervisor Password**

If you set this password, next time you must key in this password to get permission to go into CMOS Settings .

- **Change Language Setting**

This function of AMI is close. Don't support end-user.

- **Save Settings and Exit**

Save CMOS value changes to CMOS and exit setup

- **Exit Without Saving**

Abandon all CMOS value changes and exit setup.

## 6-4 STANDARD CMOS SETUP

The items in Standard CMOS Setup Menu are divided into 10 categories. Each category includes none, one or more than one setup item. Use the arrow keys to highlight the item and then use the <PgUp> or <PgDn> keys to select the value you want in each item.

AMIBIOS SETUP - STANDARD CMOS SETUP							
( C ) 1999 American Megatrends, INC. All Rights Reserved							
Date (mm/dd/yyyy):Wed Jan 09 , 2002				Base Memory: 640KB			
Time (hh/mm/ss): 10:56:28				Extd Memory: 3 MB			
Floppy Drive A:		1.44 MB 3½					
Floppy Drive B:		Not Installed					
	Type	Size	Cyln	Head	Wpcom	Sec	LBA Bk PIO 32Bit Mode Mode Mode Mode
Pri Master :		Auto					Off
Pri Slave :		Auto					Off
Sec.Master:		Not Installed					
Sec.Slave :		Not Installed					
Boot Sector Virus Protection				Disabled			
Month: Jan - Dec				ESC:Exit ↑ ↓ :Sel			
Day : 01 - 31				PgUp/PgDn: Modify			
Year : 1901 - 2099				F2/F3:Color			

### ● Date

The date format is <day>, <date> <month> <year>. Press<F3> to show the calendar.

Day	The day, from Sun to Sat, determined by the BIOS & is display-only
Date	The date, from 1 to 31 (or the maximum allowed in the month)
Month	The month, Jan through Dec.
Year	The year, from 1900 through 2099

### ● Time

The time format is <hour> <minute> <second>. The time is calculated based on the 24-hour military-time clock. For example, 1 p.m. is 13:00:00.

## ● Daylight saving

The category adds one hour to the clock when daylight-saving time begins. It also subtracts one hour when standard time returns.

Enabled	Enable daylight saving
Disabled	Disable daylight saving

## ● Primary Master / Slave

The categories identify the types of 1 channels that have been installed in the computer. There are 45 predefined types and 4 user definable types are for Enhanced IDE BIOS. Type "1" to Type "45" are predefined. Type "user" is user-definable.

Press PgUp or PgDn to select a numbered hard disk type or type the number and press <Enter>. Note that the specifications of your drive must match with the drive table. The hard disk will not work properly if you enter improper information for this category.

If your hard disk drive type is not matched or not in list, you can use Type "User" to define your own drive type manually.

If you select Type "User", you will need to know the information listed below. Enter the information directly from the keyboard and press <Enter>. This information should be included in the documentation from your hard disk vendor or the system manufacturer.

If the controller of HDD interface is ESDI, the selection should be "Type 1". If the controller of HDD interface is SCSI, the selection should be "None". If you select Type "Auto", BIOS will automatically detect the HDD & CD-ROM Drive at the POST stage and showing the IDE for HDD & CD-ROM Drive.

TYPE	Drive type
CYLS.	Number of cylinders
HEADS	Number of heads
WPCOM	Write precom
SECTORS	Number of sectors
MODE	Mode type

If a hard disk has not been installed select NONE and press <Enter>.



- **Drive A Type / Drive B Type**

The category identifies the types of Floppy Disk Drive A or Drive B that have been installed in the computer.

None	No floppy drive installed.
360K, 5.25 in	5¼" PC-type standard drive; 360K byte capacity.
1.2M, 5.25 in	5¼" AT-type high-density drive; 1. 2M byte capacity.
720K, 3.5 in	3½" double-sided drive; 720K byte capacity.
1.44M, 3.5 in	3½" double-sided drive; 1. 44M byte capacity.
2.88M, 3.5 in	3½" double-sided drive; 2.88M byte capacity.

- **Virus Protection**

When this item is enabled, the AMI BIOS will monitor the boot sector and partition table of the hard disk drive for any attempt on modification. If an attempt is made, the BIOS will halt the system and the following error message will appear. If necessary, you will be able to run an anti-virus program to locate and remove the problem before any damage is done.

Enabled	Activates automatically when the system boots up causing a warning message to appear when anything attempts to access the boot sector or hard disk partition table.
Disabled	No warning message will appear when anything attempts to Access the boot sector or hard disk partition table.

**NOTE:** Many disk diagnostic programs which attempt to access the boot sector table can cause the above warning message. If you will be running such a program, we recommend that it better for you to disable the Virus Protection beforehand.

- **Memory**

The category is display-only item determined by POST.

## 6-5 ADVANCED CMOS SETUP

This section allows you to configure your system for advanced operation. You can select the system's default speed, boot-up sequence, shadowing, keyboard operation and security.

AMIBIOS SETUP – ADVANCED CMOS SETUP		
© 1999 American Megatrends, INC . All Right Reserved		
Quick Boot	Enabled	Available Options Disabled ▶ Enabled  ESC:Exit ↑ ↓ :Sel PgUp/PgDn :Modify F2/F3 : Color
1st Boot Device	Floppy	
2nd Boot Device	IDE-0	
3rd Boot Device	SCSI	
Try Other Boot Devices	Yes	
BootUp Num-Lock	On	
Floppy Drive Swap	Disabled	
Floppy Drive Seek	Disabled	
PS/2 Mouse Support	Enabled	
System Keyboard	Absent	
Primary Display	Absent	
Password Check	Setup	
Wait For 'F1' If Error	Enabled	
C000, 32k Shadow	Disabled	
C800, 32k Shadow	Disabled	
D000, 32k Shadow	Disabled	
D800, 32k Shadow	Disabled	

### ● 1st (2nd , 3rd ) Boot Device

AMI BIOS supports three Boot Devices. You can select your Device from where starting Boot (Floppy, IDE, CDROM, SCSI, ARMD-FDD, ARMD-HDD, NETWORK). You can select anyone to be a Boot Device.

## ● Try Other Boot Devices

If Yes, BIOS will try to boot from other Boot Devices if all Selected Boot Devices failed to boot. If NO, BIOS will try to Boot from only the Selected Boot Devices.

YES	Enabled Another Boot Device
NO	Disabled Another Boot Device

## ● BootUp Num-Lock

This allows you to determine the default status of the numeric keypad. By default, the system boots up with NumLock on.

ON	Keypad is number keys
OFF	Keypad is arrow keys

## ● Floppy Drive Swap

Set this option to *Enabled* to permit drives A: and B: to be swapped. The settings are *Enabled* or *Disabled*. The default settings are *Disabled*.

## ● Floppy Drive Seek

During POST, BIOS will determine if the floppy disk drive installed is 40 or 80 tracks. 360K type is 40 tracks while 760K, 1.2M and 1.44M are 80 tracks.

Enabled	BIOS searches for floppy disk drive to determine if it is 40 or 80 tracks. Note that BIOS can not tell from 720K, 1.2M or 1.44M drive type as they are all 80 tracks.
Disabled	BIOS will not search for the type of floppy disk drive by track number. Note that there will not be any warning message if the drive installed is 360K.

## ● PS/2 Mouse Support

When this option is set to *Enabled*, AMIBIOS supports a PS/2-type mouse. The settings are *Enabled* or *Disabled*. The default settings are *Disabled*.

## ● System Keyboard

This option specifies that a keyboard is attached to the computer. The settings are *Present* or *Absent*. The Optimal and Fail-Safe default settings are *Present*

## ● Primary Display

The category selects the type of video adapter used for the primary system monitor. Although secondary monitors are supported, you do not have to select the type in Setup.

<b>EGA/VGA</b>	<b>Enhanced Graphics Adapter/Video Graphics Array. For EGA, VGA, SEGA, SVGA or PGA monitor adapters.</b>
<b>CGA 40</b>	<b>Color Graphics Adapter, power up in 40 column mode.</b>
<b>CGA 80</b>	<b>Color Graphics Adapter, power up in 80 column mode.</b>
<b>MONO</b>	<b>Monochrome adapter, include high-resolution mono adapters.</b>

## ● Password Check

This option enables password checking every time the computer is powered on or every time WINBIOS Setup is executed. If *Always* is chosen, a user password prompt appears every time the computer is turned on. If *Setup* is chosen, the password prompt appears if WINBIOS is executed.

The Optimal and Power-On defaults are *Setup*.

---

## ● Wait For “F1” if Error

AMIBIOS POST error messages are followed by:

Press <F1> to continue

If this option is set to *Disabled*, AMIBIOS does not wait for you to press the <F1> key after an error message. The settings are *Disabled* or *Enabled*. The Optimal and Fail-Safe default settings are *Enabled*

## ● C000 – C800, 32K Shadow / D000 – D800, 32K Shadow / E000 – E800, 32K Shadow

These categories determine whether option ROMs will be copied to RAM. An example of such option ROM would be support of on-board SCSI.

<b>Enabled</b>	<b>Optional shadow is enabled</b>
<b>Disabled</b>	<b>Optional shadow is disabled</b>

## 6-6 ADVANCED CHIPSET SETUP

This section allows you to configure your system for advanced operation. You can select the system's default speed, boot-up sequence, shadowing, keyboard operation and security.

AMIBIOS SETUP – ADVANCED CMOS SETUP		
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AT Bus Clock	14.318/2	Available Options
Slow Refresh	15 us	▶ 14.318/2
Memory Hole At 15-16M	Disabled	PCLK2/3
RAS Precharge time	1.5T	PCLK2/4
RAS Active Time Insert Wait	Disable	PCLK2/5
CAS Precharge Time Insert Wait	Disable	PCLK2/6
Memory Write Insert Wait	Disable	PCLK2/8
Memory Miss Read Insert Wait	Disable	PCLK2/10
ISA Write cycle end Insert Wait	Enabled	PCLK2/12
I/O Recovery	Enabled	
I/O Recovery Period	0.75 us	
On – Chip I/O Recovery	Disable	
16Bit ISA Insert Wait	Enabled	
WatchDog Timer	Disabled	
WatchDog Timeout Select	1 Sec.	
WatchDog Signal Select	System	
		ESC:Exit ↑ ↓ :Sel
		PgUp/PgDn :Modify
		F2/F3 : Color

This section allows you to configure the system based on the specific features of the chipset. The chipset manages bus speeds and access to system memory resources, such as DRAM and the external cache. It also coordinates the function of WDT timer. Please note that these items shouldn't need to be altered. The default settings have been chosen because they provide the best operating conditions for your system.

The only time you might consider making any changes on this Setup would be the time when you find that data was being lost while using your system.

- **AT BUS Clock**

ISA Bus Clock timing selection. When Auto Configuration is Disabled, then 14.318/2, PCLK2/3, PCLK2/4, PCLK2/5, PCLK2/6, PCLK2/8, PCLK2/10, PCLK2/12 is available on ISA Bus.

- **Slow Refresh**

The chipset refresh settings deal with the timing of CPU access to dynamic random access memory (DRAM). The default timing have been carefully chosen and should only be altered if data is being lost. Such a scenario might occur if your system had mixed speed DRAM chips installed so that treater delays may be required to preserve the integrity of the data held in the slower memory chips. Available values: 120us, 60us, 15us.

- **Memory Hole At 15-16M**

Use this option to specify an area in memory that cannot be addressed on the ISA bus. The settings are *Disabled*, *512-640K*, or *15-16MB*. The default setting is *Disabled*.

- **RAS Precharge time**

DRAM must continually be refreshed otherwise it will lose its data. Normally, DRAM is refreshed entirely as the result of a single request. This option allows you to determine the number of CPU clocks allocated for the Row Address Strobe to accumulate its charge before the DRAM is refreshed. If insufficient time is allowed, refresh may be incomplete and data will lose. Available values: 3.5T, 2.5T, 1.5T.

- **RAS Active Time Insert Wait**

When it is Enabled, system will insert wait state for lower speed DRAM.

- **CAS Precharge Time Insert Wait**

- **Memory Writer Insert Wait**

- **Memory Miss Read Insert Wait**

Above three items show above is always Disabled by Manufactory's default

- **I/O Recovery**

This item allows you to determine the recovery time allowed for 8 bit I/O. Choices are 0u, 0.25u to 3.05 CPU clocks. Default is 1 clock.

- **I/O Recovery Period**

The recovery time is the length of time, measured in CPU clocks, which the system will delay after the completion of an input/output request. This delay takes place because the CPU is operating so much faster than the input/output bus that the CPU must be delay to allow of the completion of the I/O.

- **WatchDog Timer**

WatchDog can use BIOS Setup.

Disabled	WatchDog can used.
Enabled	WatchDog function Enabled.

- **WatchDog Timeout Select**

Set Timer 1, 2, 4, 8, 16, 32, 64, 128, 256, 512 sec

- **WatchDog Signal Select**

Set IRQ3, 4, 5, 6, 7, 9, 10, 11, 12, 14, 15, NMI, System.

## 6-7 PCI / PLUG AND PLAY SETUP

**AMIBIOS provides a complete system BIOS solution that incorporates the latest Plug and Play technology. PnP allows end users to upgrade a computer without having to choose system resources, such as IRQs, I/O ports, memory addresses.**

With PnP, users no longer have to set hardware DIP switches. The PnP AMIBIOS also supports PCI, ISA PnP, PCMCIA, VL-Bus, EISA, and ISA devices.

AMIBIOS SETUP – PCI / PLUG AND PLAY SETUP		
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Plug and play Aware O/S	No	Available Options
DMA Channel 0	PnP	▶ No
DMA Channel 1	PnP	Yes
DMA Channel 3	PnP	
DMA Channel 5	PnP	
DMA Channel 6	PnP	
DMA Channel 7	PnP	
IRQ3	PnP	
IRQ4	PnP	
IRQ5	PnP	
IRQ7	PnP	
IRQ9	PnP	
IRQ10	PnP	
IRQ11	PnP	
IRQ14	PnP	
IRQ15	PnP	
		ESC:Exit ↑ ↓ :Sel
		PgUp/PgDn :Modify
		F2/F3 : Color

### ● Plug and play Aware O/S

Set this option to Yes if the operating system installed in the computer is Plug and Play-aware. AMIBIOS only detects and enables PnP ISA adapter cards that are required for system boot. The Windows 95 operating system detects and enables all other PnP-aware adapter cards. Windows 95 is PnP-aware. Set this option to No if the operating system (such as DOS, OS/2, Windows 3.x) does not use PnP. *You must set this option correctly or PnP-aware adapter cards installed in your computer will not be configured properly.* The settings are No or Yes. The Optimal and Fail-Safe default settings are No



- **IRQ-XX assigned to**

If your ISA card is not PnP compatible and requires a special IRQ to support its function, set the select IRQ-x assigned to : “ISA”. This setting informs the PnP BIOS to reserve the selected IRQ for the installed legacy ISA card.

- **DMA-X assigned to**

If your ISA card is not PnP compatible and requires a special DMA channel to support its function, set the select DMA channel to : “ISA”. This setting informs the PnP BIOS to reserve the selected DMA channel for the installed legacy ISA card

## 6-8 PERIPHERAL SETUP

Peripheral Setup options are displayed by choosing the Peripheral Setup icon from the WINBIOS Setup main menu. All Peripheral Setup options are described in this section.

AMIBIOS SETUP – PERIPHERAL SETUP		
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Onboard IDE	Primary	Available Options ▶ Disable Primary Secondary
Onboard FDD	Auto	
Onboard Serial Port1	3F8h/COM1	ESC:Exit ↑ ↓ :Sel PgUp/PgDn :Modify F2/F3 : Color
Onboard Serial Port2	2F8h/COM2	
Serial Port2 Mode	Normal	
Receiver Polarity	Non-Inverted	
Transmitter Polarity	Non-Inverted	
Onboard Serial Port3	Disabled	
Serial Port3 IRQ	N/A	
Onboard Serial Port4	N/A	
Serial Port4 Mode	N/A	
Serial Port4 IRQ	N/A	
Receiver Polarity	N/A	
Transmitter Polarity	N/A	
Onboard Parallel Port	378	
Parallel Port Mode	ECP	
EPP Version	N/A	
Parallel Port IRQ	5	
Parallel Port DMA Channel	3	
Onboard Parallel Port2	Disabled	

## ● Onboard IDE

This option specifies the onboard IDE controller channels that will be used. The settings are *Primary*, *Secondary*, *Both*, or *Disabled*. The Optimal and Fail-Safe default settings are *Primary*

## ● Onboard FDD

This option enables the floppy drive controller on the motherboard. The settings are *Enabled* or *Disabled*. The Optimal default setting is *Enabled*. The Fail-Safe default setting is *Disabled*.

## ● Onboard Serial Port1

This option enables serial port 1 on the motherboard and specifies the base I/O port address for serial port 1.

The settings are *3F8h*, *3E8h*, or *Disabled*. The Optimal default setting is *3F8h*. The Fail-Safe default setting is *Disabled*.

## ● Onboard Serial Port2

This option enables serial port 2 on the motherboard and specifies the base I/O port address for serial port 2.

The settings are *2F8h*, *2E8h*, or *Disabled*. The Optimal default setting is *3F8h*. The Fail-Safe default setting is *Disabled*.

## ● Onboard Parallel Port

This option enables the parallel port on the motherboard and specifies the parallel port base I/O port address. The settings are *378h*, *278h*, or *Disabled*.

The Optimal default setting is *378h*. The Fail-Safe default setting is *Disabled*

### Parallel Port Mode

This option specifies the parallel port mode. ECP and EPP are both bidirectional data transfer schemes that adhere to the IEEE P1284 specifications. The settings are

Setting	Description
<i>Normal</i>	The normal parallel port mode is used. This is the default setting.
<i>Bi-Dir</i>	Use this setting to support bidirectional transfers on the parallel port.
<i>EPP</i>	The parallel port can be used with devices that adhere to the Enhanced Parallel Port (EPP) specification. EPP uses the existing parallel port signals to provide asymmetric bidirectional data transfer driven by the host device.

<i>ECP</i>	The parallel port can be used with devices that adhere to the Extended Capabilities Port (ECP) specification. ECP uses the DMA protocol to achieve transfer rates of approximately 2.5 Mbs. ECP provides symmetric bidirectional communications.
------------	--

## **Parallel Port DMA**

This option is only available if the setting for the **Parallel Port Mode** option is *ECP*.

The settings are *Disabled*, *DMA CH (channel) 0*, *DMA CH 1*, or *DMA CH 3*. The default setting is *Disabled*.

---

## **6-9 CHANGE SUPERVISOR PASSWORD**

You can set either supervisor or user password, or both of them. The difference between them are: 'supervisor password' can enter and change the options of the setup menus and 'user password' just can enter but do not have the right to change the options of the setup menus.

When you select this function, the following message will appear at the center of the screen to assist you in creating a password.

### **ENTER PASSWORD:**

Type the password, up to eight characters in length, and press <Enter>. The password typed now will clear any previously entered password from CMOS memory. You will be asked to confirm the password. Type the password again and press <Enter>. You may also press <Esc> to abort the selection and not enter a password.

To disable a password, just press <Enter> when you are prompted to enter the password. A message will confirm the password will be disabled. Once the password is disabled, the system will boot and you can enter Setup freely.

### **PASSWORD DISABLED.**

When a password has been enabled, you will be prompted to enter it every time you try to enter Setup. This prevents an unauthorized person from changing any part of your system configuration.

Additionally, when a password is enabled, you can also require the BIOS to request a password every time your system is rebooted. This would prevent unauthorized use of your computer.

You determine when the password is required within the BIOS Features Setup Menu and its Security option. If the Security option is set to "System", the password will be required both at boot and at entry to Setup. If set to "Setup", prompting only occurs when trying to enter the Setup.

## 6-10 BIOS DEFAULT DRIVE TABLE

This is the current list of the drive type table contained in Setup.

Type	Size (MB)	Cyln	Head	Sec	Wpcom	LBA	BLK	PIO	32BIT
1	10	306	4	17	128	Off	Off	Auto	Off
2	20	615	4	17	300	Off	Off	Auto	Off
3	30	615	6	17	300	Off	Off	Auto	Off
4	62	940	8	17	512	Off	Off	Auto	Off
5	46	940	6	17	512	Off	Off	Auto	Off
6	20	615	4	17	65535	Off	Off	Auto	Off
7	30	462	8	17	256	Off	Off	Auto	Off
8	30	733	5	17	65535	Off	Off	Auto	Off
9	112	900	15	17	65535	Off	Off	Auto	Off
10	20	820	3	17	65535	Off	Off	Auto	Off
11	35	855	5	17	65535	Off	Off	Auto	Off
12	49	855	7	17	65535	Off	Off	Auto	Off
13	20	306	8	17	128	Off	Off	Auto	Off
14	42	733	7	17	65535	Off	Off	Auto	Off
16	20	612	4	17	300	Off	Off	Auto	Off
17	40	977	5	17	300	Off	Off	Auto	Off
18	56	977	7	17	65535	Off	Off	Auto	Off
19	59	1024	7	17	512	Off	Off	Auto	Off
20	30	733	5	17	300	Off	Off	Auto	Off
21	42	733	7	17	300	Off	Off	Auto	Off
22	30	733	5	17		Off	Off	Auto	Off
23	10	306	4	17		Off	Off	Auto	Off
24	53	925	5	17	65535	Off	Off	Auto	Off
25	69	925	9	17	65535	Off	Off	Auto	Off
26	43	754	7	17	754	Off	Off	Auto	Off
27	68	754	11	17	65535	Off	Off	Auto	Off
28	40	699	7	17	256	Off	Off	Auto	Off
29	68	823	10	17	65535	Off	Off	Auto	Off
30	53	918	7	17	918	Off	Off	Auto	Off
31	93	1024	11	17	65535	Off	Off	Auto	Off
32	127	1024	15	17	65535	Off	Off	Auto	Off
33	42	1024	5	17	1024	Off	Off	Auto	Off
34	10	612	2	17	128	Off	Off	Auto	Off
35	76	1024	9	17	65535	Off	Off	Auto	Off
36	68	1024	8	17	512	Off	Off	Auto	Off

37	40	615	8	17	128	Off	Off	Auto	Off
38	24	987	3	17	987	Off	Off	Auto	Off
39	57	987	7	17	987	Off	Off	Auto	Off
40	40	820	6	17	820	Off	Off	Auto	Off
41	40	977	5	17	977	Off	Off	Auto	Off
42	40	981	5	17	981	Off	Off	Auto	Off
43	48	830	7	17	512	Off	Off	Auto	Off
44	68	830	10	17	65535	Off	Off	Auto	Off
45	144	917	15	17	65535	Off	Off	Auto	Off
46	152	1224	15	17	65535	Off	Off	Auto	Off
ARMD								Auto	Off
CDROM								Auto	Off
AUTO								Auto	Off
USER								Auto	Off

# **APPENDIX**

## **A**

### **EXPANSION BUS**

**THIS APPENDIX SHOWS YOU THE PIN ASSIGNMENTS.**

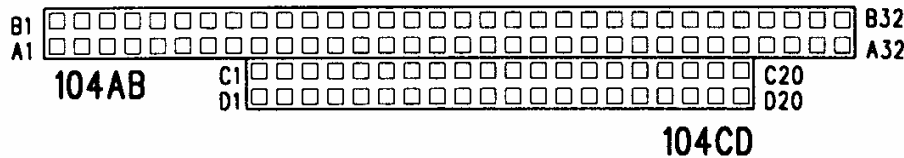
**SECTIONS INCLUDE:**

- \* PC/104 CONNECTOR PIN ASSIGNMENT**
- \* ISA BUS PIN ASSIGNMENT**



# A-1 PC/104 CONNECTOR PIN ASSIGNMENT (P1)

104AB, 104CD : PC/104 Connector



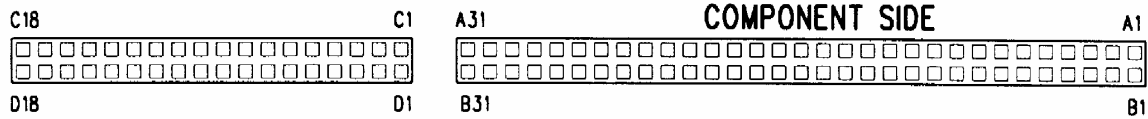
The PC/104 can support multi-pieces of PC/104 modules. This card has two connectors : one (104AB) consists of 64-pin dual-in-line header, the other one (104CD) consists of 40-pin dual-in-line header

The pin assignments for connector 104AB & 104CD are as follow:

104AB				104CD			
PIN	ASSIGNMENT	PIN	ASSIGNMENT	PIN	ASSIGNMENT	PIN	ASSIGNMENT
A1	IOCHK	B1	GND	C1	GND	D1	GND
A2	SD7	B2	RESETDRV	C2	SBHE	D2	MEMCS16
A3	SD6	B3	VCC	C3	LA23	D3	IOCS16
A4	SD5	B4	IRQ9	C4	LA22	D4	IRQ10
A5	SD4	B5	-5V	C5	LA21	D5	IRQ11
A6	SD3	B6	DRQ2	C6	LA20	D6	IRQ12
A7	SD2	B7	-12V	C7	LA19	D7	IRQ15
A8	SD1	B8	0WS	C8	LA18	D8	IRQ14
A9	SD0	B9	+12V	C9	LA17	D9	DACK0
A10	IOCHRDY	B10	GND	C10	MEMR	D10	DRQ0
A11	AEN	B11	SMEMW	C11	MEMW	D11	DACK5
A12	SA19	B12	SMEMR	C12	SD8	D12	DRQ5
A13	SA18	B13	IOW	C13	SD9	D13	DACK6
A14	SA17	B14	IOR	C14	SD10	D14	DRQ6
A15	SA16	B15	DACK3	C15	SD11	D15	DACK7
A16	SA15	B16	DRQ3	C16	SD12	D16	DRQ7
A17	SA14	B17	DACK1	C17	SD13	D17	VCC
A18	SA13	B18	DRQ1	C18	SD14	D18	MASTER
A19	SA12	B19	REFRESH	C19	SD15	D19	GND
A20	SA11	B20	SYSCLK	C20	KEY PIN	D20	GND
A21	SA10	B21	IRQ7				
A22	SA09	B22	IRQ6				
A23	SA08	B23	IRQ5				
A24	SA07	B24	IRQ4				
A25	SA06	B25	IRQ3				
A26	SA05	B26	DACK2				
A27	SA04	B27	TC				
A28	SA03	B28	BALE				
A29	SA02	B29	VCC				
A30	SA01	B30	OSC				
A31	SA0	B31	GND				
A32	GA0	B32	GND				

## A-2 ISA BUS PIN ASSIGNMENT

The ISA BUS for this card is called “Golden Fingers”. It is divided into two sets: one consists of 62 pins; the other consists of 36 pins.



The pin assignments are as follow :

ISA BUSA		ISA BUSB		ISA BUSC		ISA BUSD	
PIN	ASSIGNMENT	PIN	ASSIGNMENT	PIN	ASSIGNMENT	PIN	ASSIGNMENT
A1	IOCHCHK*	B1	GND	C1	SBHE	D1	MEMCS16*
A2	SD7	B2	RESET	C2	LA23	D2	IOCS16*
A3	SD6	B3	VCC	C3	LA22	D3	IRQ10
A4	SD5	B4	IRQ9	C4	LA21	D4	IRQ11
A5	SD4	B5	-5V	C5	LA20	D5	IRQ12
A6	SD3	B6	DRQ2	C6	LA19	D6	IRQ15
A7	SD2	B7	-12V	C7	LA18	D7	IRQ14
A8	SD1	B8	0WS	C8	LA17	D8	DACK0
A9	SD0	B9	+12V	C9	MEMR*	D9	DRQ0
A10	IOCHRDY*	B10	GND	C10	MEMW*	D10	DACK5
A11	AEN	B11	SMEMW*	C11	SD8	D11	DRQ5
A12	SA19	B12	SMEMR*	C12	SD9	D12	DACK6
A13	SA18	B13	IOW*	C13	SD10	D13	DRQ6
A14	SA17	B14	IOR*	C14	SD11	D14	DACK7
A15	SA16	B15	DACK3	C15	SD12	D15	DRQ7
A16	SA15	B16	DRQ3	C16	SD13	D16	VCC
A17	SA14	B17	DACK1	C17	SD14	D17	MASTER*
A18	SA13	B18	DRQ1	C18	SD15	D18	GND
A19	SA12	B19	REFRESH*	C19	SD15	D19	GND
A20	SA11	B20	SYSCLK	C20	KEY PIN	D20	GND
A21	SA10	B21	IRQ7				
A22	SA09	B22	IRQ6				
A23	SA08	B23	IRQ5				
A24	SA07	B24	IRQ4				
A25	SA06	B25	IRQ3				
A26	SA05	B26	DACK2				
A27	SA04	B27	TC				
A28	SA03	B28	BALE				
A29	SA02	B29	VCC				
A30	SA01	B30	OSC				
A31	SA0	B31	GND				

# **APPENDIX**

## **B**

### **TECHNICAL SUMMARY**

**THIS SECTION SHOWS YOU THE MAPS CONCISELY.**

**SECTIONS INCLUDE:**

- \* INTERRUPT MAP**
- \* RTC & CMOS RAM MAP**
- \* TIMER & DMA CHANNELS MAP**
- \* I/O & MEMORY MAP**

## **B-1 INTERRUPT MAP**

<b>IRQ</b>	<b>ASSIGNMENT</b>
<b>0</b>	<b>System TIMER interrupt from TIMER-0</b>
<b>1</b>	<b>Keyboard output buffer full</b>
<b>2</b>	<b>Cascade for IRQ 8-15</b>
<b>3</b>	<b>Serial port 2</b>
<b>4</b>	<b>Serial port 1</b>
<b>5</b>	<b>Parallel port 2</b>
<b>6</b>	<b>Floppy Disk adapter</b>
<b>7</b>	<b>Parallel port 1</b>
<b>8</b>	<b>RTC clock</b>
<b>9</b>	<b>Available</b>
<b>10</b>	<b>Available</b>
<b>11</b>	<b>Available</b>
<b>12</b>	<b>Available</b>
<b>13</b>	<b>Math coprocessor</b>
<b>14</b>	<b>Hard Disk adapter</b>
<b>15</b>	<b>Available</b>

## B-2 RTC & CMOS RAM MAP

CODE	ASSIGNMENT
00	Seconds
01	Second alarm
02	Minutes
03	Minutes alarm
04	Hours
05	Hours alarm
06	Day of week
07	Day 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 byte
10	Floppy Disk drive type byte
11	Reserve
12	Hard Disk type byte
13	Reserve
14	Equipment byte
15	Base memory low byte
16	Base memory high byte
17	Extension memory low byte
18	Extension memory high byte
30	Reserved for extension memory low byte
31	Reserved for extension memory high byte
32	Date Century byte
33	Information Flag
34-3F	Reserve
40-7F	Reserved for Chipset Setting Data

## **B-3 TIMER & DMA CHANNELS MAP**

### ● **Timer Channel Map**

<b>Timer Channel</b>	<b>Assignment</b>
<b>0</b>	<b>System timer interrupt</b>
<b>1</b>	<b>DRAM Refresh request</b>
<b>2</b>	<b>Speaker tone generator</b>

### ● **DMA Channel Map**

<b>DMA Channel</b>	<b>Assignment</b>
<b>0</b>	<b>Available</b>
<b>1</b>	<b>IBM SDLC</b>
<b>2</b>	<b>Floppy Disk adapter</b>
<b>3</b>	<b>Channel-3 Available</b>
<b>4</b>	<b>Cascade for DMA controller 1</b>
<b>5</b>	<b>Available</b>
<b>6</b>	<b>Available</b>
<b>7</b>	<b>Available</b>

## B-4 I/O & MEMORY MAP

### ● Memory Map

MEMORY MAP	ASSIGNMENT
0000000-009FFFF	System memory used by DOS and application
00A0000-00BFFFF	Display buffer memory for VGA/EGA/CGA/MONO adapter
00C0000-00DFFFF	Reserved for I/O device BIOS ROM or RAM buffer.
00E0000-00EFFFF	Reserved for PCI device ROM
00F0000-00FFFFFF	System BIOS ROM
0100000-BFFFFFF	System extension memory

### ● I/O Map

I/O MAP	ASSIGNMENT
000-01F	DMA controller (Master)
020-021	Interrupt controller (Master)
022-023	Chipset controller registers I/O ports.
040-05F	Timer control registers.
060-06F	Keyboard interface controller (8042)
070-07F	RTC ports & CMOS I/O ports
080-09F	DMA register
0A0-0BF	Interrupt controller (Slave)
0C0-0DF	DMA controller (Slave)
0F0-0FF	Math coprocessor
1F0-1F8	Hard Disk controller
278-27F	Parallel port-2
2B0-2DF	Graphics adapter controller
2F8-2FF	Serial port-2
360-36F	Net work ports
378-37F	Parallel port-1
3B0-3BF	Monochrome & Printer adapter
3C0-3CF	EGA adapter
3D0-3DF	CGA adapter
3F0-3F7	Floppy disk controller
3F8-3FF	Serial port-1

# **APPENDIX**

## **C**

# **TROUBLE SHOOTING**

**THIS SECTION SHOWS THE ERRORS MAY OCCUR WHEN YOU OPERATE THE SYSTEM, ALSO GIVES YOU THE SUGGESTIONS ON SOLVING THE PROBLEMS.**

**SECTIONS INCLUDE:**

- \* TROUBLE SHOOTING POST MESSAGE**
- \* TROUBLE SHOOTING POST BEEP**
- \* TROUBLE SHOOTING POST CODE**



## **C-1 TROUBLE SHOOTING POST MESSAGES**

During the Power On Self Test (POST), if the BIOS detects an error requiring you to do something to fix, it will either sound a beep code or display a message. If a message is displayed, it will be accompanied by:

**PRESS F1 TO CONTINUE, CTRL-ALT-ESC OR DEL TO ENTER SETUP**

## **C-2 TROUBLE SHOOTING POST BEEP**

Currently there are two kinds of beep codes in BIOS.

The one code indicates that a video error has occurred and the BIOS cannot initialize the video screen to display any additional information. This beep code consists of a single long beep followed by three short beeps. The other code indicates that your DRAM error has occurred. This beep code consists of a single long beep repeatedly.

### **● Error Messages**

One or more error messages may be displayed if the BIOS detect an error during the POST. This list includes messages for both the ISA and the EISA BIOS.

### **● CMOS Battery Has Failed**

CMOS battery is no longer functional. It should be replaced.

### **● CMOS Checksum Error**

Checksum of CMOS is incorrect. This can indicate that CMOS has become corrupt. This error may have been caused from a weak battery. Check the battery and replace if necessary.

### **● Disk Boot Failure, Insert System Disk And Press Enter**

No boot device was found. This could mean that either a boot drive was not detected or the drive does not contain proper system boot files. Insert a system disk into Drive A: and press <Enter>. If you assumed the system would boot from the hard drive, make sure the controller is inserted correctly and all cables are properly attached. Also be sure that the disk is formatted as a boot device. Then reboot the system.

- **Diskette Drives Or Types Mismatch Error - Run Setup**

Type of diskette drive installed in the system is different from the CMOS definition. Run Setup to reconfigure the drive type correctly.

- **Display Switch Is Set Incorrectly**

Display switch on the motherboard can be set to either monochrome or color. This indicates the switch is set to a different setting than indicated in Setup. Determine which setting is correct, and then turn OFF the selection.

- **Display Type Has Changed Since Last Boot**

Since last power off the system, the display adapter has been changed. You must configure the system for the new display type.

- **Error Encountered Initializing Hard Drive**

Hard drive cannot be initialized. Be sure the adapter is installed correctly and all cables are correctly and firmly attached. Also be sure the correct hard drive type is selected in Setup.

- **Error Initializing Hard Disk Controller**

Cannot initialize controller. Make sure the card is correctly and firmly installed in the bus. Be sure the correct hard drive type is selected in Setup. Also check if any jumper needs to be set correctly on the hard drive.

- **Floppy Disk Cntrlr Error or No Cntrlr Present**

Cannot find or initialize the floppy drive controller. Make sure the controller is installed correctly and firmly. If there are no floppy drives installed, be sure the Diskette Drive selection in Setup is set to NONE.

- **Invalid EISA Configuration**

*PLEASE RUN EISA CONFIGURATION UTILITY.* The non-volatile memory containing EISA configuration information was programmed incorrectly or has become corrupt. Re-run EISA configuration utility to correctly program the memory.

**NOTE: When this error appears, the system will boot in ISA mode, which allows you to run the EISA Configuration Utility.**

- **Keyboard Error Or No Keyboard Present**

Cannot initialize the keyboard. Make sure the keyboard is attached correctly and no keys are being pressed during the boot. If you are purposely configuring the system without a keyboard, set the error halt condition in Setup to **HALT ON ALL, BUT KEYBOARD**. This will cause the BIOS to ignore the missing keyboard and continue the boot.

- **Memory Address Error At ...**

Indicates a memory address error at a specific location. You can use this location along with the memory map for your system to find and replace the bad memory chips.

- **Memory Parity Error At ...**

Indicates a memory parity error at a specific location. You can use this location along with the memory map for your system to find and replace the bad memory chips.

- **Memory Size Has Changed Since Last Boot**

Memory has been added or removed since the last boot. In EISA mode, use Configuration Utility to reconfigure the memory configuration. In ISA mode, enter Setup and enter the new memory size in the memory fields.

- **Memory Verify Error At ...**

Indicates an error verifying a value already written to memory. Use the location along with your system's memory map to locate the bad chip.

- **Offending Address Not Found**

This message is used in conjunction with the I/O CHANNEL CHECK and RAM PARITY ERROR messages when the segment has caused the problem which cannot be isolated.

- **Offending Segment :**

This message is used in conjunction with the I/O CHANNEL CHECK and RAM PARITY ERROR messages when the segment has caused the problem which has been isolated.

- **Press A Key To Reboot**

This will be displayed at the bottom screen when an error occurs that requires you to reboot. Press any key and the system will reboot.

- **Press F1 To Disable NMI, F2 To Reboot**

When BIOS detects a non-markable Interrupt condition during boot, this will allow you to disable the NMI and continue to boot, or you can reboot the system with the NMI enabled.

- **RAM Parity Error Checking For Segment ...**

Indicates a parity error in Random Access Memory.

- **System Halted , (Ctrl-Alt-Del ) To Reboot ...**

Indicates the present boot attempt has been aborted and the system must be rebooted. Press and hold down the CTRL and ALT keys and press DEL.

## C-3 TROUBLE SHOOTING FOR POST CODES

NOTE: EISA POST codes are typically output to port address 300h.  
ISA POST codes are output to port address 80h.

POST Code (hex)	AMI WinBIOS uncompress code checkpoint Description
C2	NMI is Disable. Power on delay starting.
C5	Power on delay complete. Going to disable Cache if any.
C6	Calculating ROM BIOS checksum.
C7	ROM BIOS checksum passed. CMOS shutdown register test to be done next.
C8	CMOS shutdown register test done. CMOS checksum calculation to be done next.
CA	CMOS checksum calculation done, CMOS Diag byte written CMOS status register about to init for Date and Time.
CB	CMOS status register init done. Any initialization before keyboard BAT to be done next.
CD	BAT command to keyboard controller is to be issued.
CE	Keyboard controller BAT result verified. Any initialization after KB controller. BAT to be done next.
CF	Initialization after KB controller BAT done. Keyboard command byte to be written next.
D1	Keyboard controller command byte is written. Going to check pressing of <INS> key during power-on Done.
D2	Checking for pressing of <INS> key during power-on done. Going to disable DMA and interrupt controller.
D3	DMA controller #1, #2, interrupt controller #1, #2 disable. Chipset init/ auto memory detection about to begin.
D4	Chipset initialization/ auto memory detection over. To uncompress the RUNTIME code.
D5	RUNTIME code is uncompressed.
D0	Transfer control to uncompressed code in shadow ram at F000: FFF0.

Runtime code is uncompressed in F000 shadow ram

POST Code (hex)	AMI HiFLEX BIOS/WinBIOS runtime code Description.
01	Processor register test about to start and NMI to be Disabled.
02	NMI is Disabled. Power-on delay starting.
03	Power on delay complete. To check soft reset /power-on.
05	Soft reset / power-on determined. Going to disable Cache if any.
06	POST code to be uncompressed.
07	POST code is uncompressed. CPU init and CPU area init to be done next.
08	CPU and CPU date area init done. CMOS checksum calculation to be done next.
09	CMOS checksum calculation is done, CMOS Diag byte written. CMOS init to begin (if "init CMOS in every boot" is set).
0A	CMOS initialization done (if any). CMOS status register about to init for Date and Time.
0B	CMOS status register init done. Any initialization before keyboard BAT to be done next.
0C	KB controller I/B free. Going to issue the BAT command to keyboard controller.
0E	Keyboard controller BAT result verified. Any initialization after KB controller BAT to be done next.
0F	Initialization after KB controller BAT done. Keyboard command byte to be written next.
10	Keyboard controller command byte is written. Going to issue Pin 23, 24 blocking / unblocking command.
11	Pin 23, 24 of keyboard controller is blocked / unblocked. Going to check pressing of <INS> key during power-on.
12	Checking for pressing of <INS> key during power-on done. Going to disable DMA and interrupt controllers.
13	DMA controller #1, #2, interrupt controller #1, #2 disabled. Video display is disabled and port-B is initialized. Chipset init about to begin.
15	Chipset initialization over. 8254 timer test about to start.
19	8254 timer test over. About to start memory refresh test.

1A	Memory Refresh line is toggling. Going to check 15 micro second ON/OFF time.
20	Memory Refresh period 30 micro second test complete. Base 64K memory to be initialized.
23	Base 64K memory initialized. Going to set BIOS stack and to do any setup before interrupt vector init.
24	Setup required before interrupt vector initialization Complete. Interrupt vector initialized about to begin.
25	Interrupt vector initialization done. Going to read input port of 8042 for turbo switch (if any) and to clear password if post diagnostic switch is on.
26	Input port of 8042 is read. Going to initialize global data for turbo switch.
27	Global data initialization for turbo switch is over. Any initialization before setting video mode to be done next
28	Initialization before setting video mode is complete. Going for monochrome mode and color mode setting.
2A	Different BUSES init (system, static, output devices) to Start if present. (Please see next section for details of different BUSES).
2B	About to give control for any setup required before optional video ROM check.
2C	Processing before video ROM control is done. About to look for optional video ROM and give control.
2D	Optional video ROM control is done. About to give control to do any processing after video ROM returns control.
2E	Return from processing after the video ROM control. If EGA/VGA not found then do display memory R/W test.
2F	EGA/VGA not found. Display memory R/W test about to begin.
30	Display memory R/W test passed. About to look for the retrace checking.
31	Display memory R/W test or retrace checking failed. About do alternate Display memory R/W test.
32	Alternate Display memory R/W test passed. About to look for the alternate display retrace checking.
34	Video display checking over. Display mode to be set next.
37	Display mode set. Going to display the power ON message.
38	Different BUSES init (input, IPL, general devices) to start If present. (Please see next section for details about Different BUSES).

39	Display different BUSES initialization error messages. (Please see Appendix for details of different BUSES).
3A	New cursor position read and saved. Going to display the Hit <DEL> message.
3B	Hit <DEL> message displayed. Virtual mode memory test about to start .
40	Going to prepare the descriptor tables.
42	Descriptor tables prepared. Going to enter in virtual mode for memory test.
43	Entered in the virtual mode. Going to enable interrupts for diagnostics mode.
44	Interrupt enabled (if diagnostics switch is on). Going to initialize data to check memory wrap around at 0: 0.
45	Data initialized. Going to check for memory wrap around at 0:0 and finding the total system memory size .
46	Memory wrap around test done. Memory size calculation Over. About to go for writing patterns to test memory.
47	Pattern to be tested written in extended memory. Going to write patterns in base 640K memory.
48	Patterns written in base memory. Going to find out amount of memory below 1M memory.
49	Amount of memory below 1M found and verified. Going to find out amount of memory above 1M memory.
4B	Amount of memory above 1M found and verified. Check for Soft reset and going to clear memory below 1M for soft Reset. (If power on, go to check point #4Eh).
4C	Memory below 1M cleared. (SOFT RESET) Going to clear Memory above 1M.
4D	Memory above 1M cleared. (SOFT RESET) Going to save the memory size. (Go to check point #52h).
4E	Memory test started. (NOT SOFT RESET) About to display The first 64k memory size.
4F	Memory size display started. This will be update during Memory test. Going for sequential and random memory Test.
50	Memory testing/initialization below 1M complete. Going to adjust displayed memory size for relocation/ Shadow.
51	Memory size display adjusted due to relocation/shadow. Memory test above 1M to follow.
52	Memory testing/initialization above 1M complete. Going to save memory size information.



53	Memory size information is saved. CPU register are saved Going to enter in real mode.
54	Shutdown successful, CPU in real mode. Going to disable gate A20 line and disable parity/NMI.
57	A20 address line, parity / NMI disable successful. Going to adjust memory size depending on relocation / Shadow.
58	Memory size adjusted for relocation / shadow. Going to clear Hit <DEL> message.
59	Hit <DEL> message cleared. <WAIT ...> message displayed about to start DMA and interrupt controller test.
60	DMA page register test passed. To do DMA#1 base Register Test.
62	DMA#1 base register test passed. To do DMA#2 base Register test.
65	DMA#2 base register test passed. To program DMA unit 1 and 2.
66	DMA unit 1 and 2 programming over. To initialize 8259 Interrupt controller.
67	8259 initialization over.
7F	Extended NMI sources enabling is in progress.
80	Keyboard test started. clearing output buffer, checking For stuck key, About to issue keyboard reset command.
81	Keyboard reset error / stuck key found. About to issue keyboard controller interface test command.
82	Keyboard controller interface test over. About write command byte and init circular buffer.
83	Command byte written, Global data init done. About to check for lock-key.
84	Lock-key checking over. About to check for memory size Mismatch with CMOS.
85	Memory size check done. About to display soft error and Check for password or bypass setup.
86	Password checked. About to do programming before Setup.
87	Programming before setup complete. Going to uncompress SETUP code and execute CMOS setup
88	Returned from CMOS setup program and screen is cleared. About to do programming after setup.
89	Programming after setup complete. Going to display power on screen message.

8B	First screen message display. <WAIT...> message Displayed. About to do Video BIOS shadow.
8C	Video BIOS shadow successful. Setup options Programming after CMOS setup about to start.
8D	Setup option are programmed, mouse check and init to be Done next.
8E	Mouse check and initialization complete. Going for hard Disk controller reset.
8F	Hard disk controller reset done. Floppy setup to be done next.
91	Floppy setup complete. Hard disk setup to be done next.
94	Hard disk setup complete. To set base and extended Memory size.
95	Memory size adjusted due to mouse support. Init. of Different BUSes optional ROMs from C800to start. (Please see next section for details of different BUSes).
96	Going to do any init before C800 optional ROM control.
97	Any init before C800 optional ROM control is over. Optional ROM check and control will be done next.
98	Optional ROM control is done. About to give control to do Any required processing after optional ROM returns control
99	Any initialization required after optional ROM test over. Going to setup timer data area and printer base address.
9A	Return after setting timer and printer base address. Going to set the RS-232 base address.
9B	Returned after RS-232 base address. Going to do any initialization before Coprocessor test.
9C	Required initialization before Coprocessor is over. Going to initialize the Coprocessor next.
9D	Coprocessor initialized. Going to do any initialization after Coprocessor test.
9E	Initialization after Coprocessor test is complete. Going to check extd keyboard , keyboard ID and num-lock .
9F	Extd keyboard check is done, ID flag set, num-lock on/off Keyboard ID command to be issued.
A0	Keyboard ID command issues. Keyboard ID flag to be reset
A1	Keyboard ID flag reset. Cache memory test to follow.
A2	Cache memory test over. Going to display any soft error.
A3	Soft error display complete. Going to set keyboard typematic rate.
A4	Keyboard typematic rate set. To program memory wait States.

<b>A5</b>	<b>Memory wait states programming over. Going to clear the screen and enable parity / NMI.</b>
<b>A7</b>	<b>NMI and parity enabled. Going to do any initialization required before giving control To optional ROM at E000.</b>
<b>A8</b>	<b>Initialization before E000 ROM control over. E000 ROM to Get control next.</b>
<b>A9</b>	<b>Returned from E000 ROM control. Going to do any initialization required after E000 optional ROM control.</b>
<b>AA</b>	<b>Initialization after E000 optional ROM control is over. Going to display the system configuration.</b>
<b>B0</b>	<b>System configuration is displayed.</b>
<b>B1</b>	<b>Going to copy any code to specific area.</b>
<b>00</b>	<b>Copying of code to specific area done. Going to give control To INT-19 boot loader.</b>

The system BIOS gives control to different BUSES at following checkpoints to do various tasks on the different BUSES.

POST CODE (HEX)	AMI HiFLEX BIOS /WinBIOS Checkpoints of the BUSES
2A	Different BUSES init (system, static, output devices) To start if present.
38	Different BUSES init (input, IPL, general devices) To start if present.
39	Display different BUSES initialization error messages.
95	Init of different BUSES optional ROMs from C800 to start.

While control is inside the different BUS routines, additional checkpoints are output to port 80h as WORD to identify the routines under execution. These are WORD checkpoints, the LOW BYTE of checkpoint is the system BIOS checkpoint from where the control is passed to the different BUS routines and the HIGH BYTE of checkpoint is the indication of which routine is being executed in the different BUSES. The details of HIGH BYTE of these checkpoints are as follows:

#### HIGH BYTE XY

The upper nibble 'X' indicates the function # is being executed. 'X' can be from 0 to 7.

- 0 = func#0, disable all device on the BUS concerned.
- 1 = func#1, static devices init on the BUS concerned.
- 2 = func#2, output device init on the BUS concerned.
- 3 = func#3, input device init on the BUS concerned.
- 4 = func#4, IPL device init on the BUS concerned.
- 5 = func#5, general device init on the BUS concerned.
- 6 = func#6, error reporting for the BUS concerned.
- 7 = func#7, add-on ROM init for all BUSES.

The lower nibble 'Y' indicates the BUS on which the different routines are being executed. 'Y' can be from 0 to 5.

- 0 = Generic DIM (Device Initialization Manager)
- 1 = On-board System devices.
- 2 = ISA devices.
- 3 = EISA devices.
- 4 = ISA PnP devices.
- 5 = PCI devices.