American Megatrends, Inc.

Hi-Flex ISA and EISA AMIBIOS

User's Guide

for 11/11/92 core AMIBIOS

MAN-PR-BIOS-UG
1/18/93

American Megatrends, Inc.
6145F Northbelt Parkway
Norcross, GA 30071

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Revision History

8/92 Revised for 6/6/92 core AMIBIOS.
1/12/93 Revised for 11/11/92 core AMIBIOS.

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Preface

To the OEM Reader

The American Megatrends Hi-Flex AMIBIOS is a state of the art product that includes major engineering innovations. The Hi-Flex AMIBIOS can be easily configured by the OEM, system integrator, or VAR via AMIBIOS Configuration Program (AMIBCP). See the *AMIBCP User's Guide* for detailed information.

This manual was written for the OEM to assist in the proper use of the American Megatrends Hi-Flex AMIBIOS and AMIBIOS Setup. This manual is not meant for the computer owner who purchases a computer with the Hi-Flex AMIBIOS. It is assumed that the computer manufacturer will use this manual as a sourcebook of information to be included in the computer owner's manual. It is also assumed that the OEM, VAR, or system integrator has also licensed the right to use AMIBIOS technical documentation.

Additional Information

The *American Megatrends EISA and ISA Hi-Flex AMIBIOS Technical Reference* provides much more detailed information about BIOS functions and features, and can be ordered from American Megatrends. It includes discussions of the Keyboard Controller AMIBIOS, an EISA Overview, and a complete map of the AMIBIOS data area and CMOS RAM.

Acknowledgments

This manual was written by Paul Narushoff and the American Megatrends BIOS engineers.

Technical Support

If you need more information, call American Megatrends technical support at 404-246-8600. Have the following information available before calling:

- BIOS Serial number and revision number,
- BIOS Identification Strings, a
- a clear description of the problem.

Αμεριχαν Μεγατρενδσ ΒΒΣ

Τηε ΒΒΣ περμιτσ ΟΕΜσ, ςΑΡσ, ανδ σψστεμ ιντεγρατορσ το αχχεσσ τεχηνιχαλ ινφορματιον αβουτ μοτηερβοαρδ ανδ ΒΙΟΣ προδυχτσ. Προδυχτ Ενγινεερινγ Χηανγε Νοτιχεσ, Τεχη Τιπσ, Τεχηνιχαλ Νοτεσ, ανδ χομπλετε τεχηνιχαλ μανυαλσ αρε αωαιλαβλε ον τηε ΒΒΣ.

Δατα Τρανσμισσιον Ρατεσ

Τηε ΒΒΣ αυτοματιχαλλψ ηανδλεσ μοδεμσ ωιτη δατα τρανσμισσιον ρατεσ φρομ 1,200 το 14,400 βπσ. Ιφ υσινγ αν ΗΣΤ μοδεμ, χαλλ 404−246−8780. Ιφ υσινγ α νον−ΗΣΤ μοδεμ, χαλλ 404−246−8782.

ΒΒΣ Πηονε Νυμβερσ

Τηε φολλοωινγ ταβλε λιστσ τηε χηαραχτεριστιχσ οφ τηε ΒΒΣ πηονε νυμβερσ. Τηε ΒΒΣ ρεθυιρεσ νο παριτψ, 8 δατα βιτσ, ανδ 1 στοπ βιτ.

Phone Number	Characteristics
404-246-8780	Supports HST and v.42.
404-246-8781	Supports HST and v.42.
404-246-8782	Dual standard. Can handle 2400 or 9600 bps. Supports v.32 and v.42. Can handle up to 14,400 baud.
404-246-8783	Supports v.32 and v.42.

Chapter 1

Introduction

The system BIOS (Basic Input Output System) is the interface between the hardware and the software used in all IBM® PC-, XT™-, AT®-, and PS/2®- compatible computers.

Types of BIOS

There are several types of BIOS in a PC system. There is a video BIOS that controls the interface between the video adapter card and the computer. There may also be adaptor ROM BIOSes that control specific hardware devices, such as hard disk drives. Every system also has a Keyboard Controller BIOS in the system's keyboard controller.

Some systems include a SCSI (Small Computer Systems Interface) BIOS that usually resides on the SCSI Host Adapter to handle devices that adhere to the SCSI standard.

System BIOS

When BIOS is discussed, we usually think of the system BIOS, a collection of device drivers, initialization routines, system data, and other code that controls the interface between the operating system and the system hardware on IBM PC, XT, AT, PS/2 or compatible systems, and also on EISA computer systems.

Primary System BIOS Function

The primary function of the system BIOS is to provide a series of software interrupts, functions, and subfunctions that perform certain system tasks, such as writing or reading from the hard disk drive, floppy disk drive, or video screen.

The user of the BIOS calls the BIOS, usually through Assembler Language, to directly manipulate the system hardware. The programmer or engineer that uses the BIOS writes program code that places certain values in certain registers of the microprocessor. The BIOS interprets these codes and passes values and error codes back to the requesting program.

Examples

Examples of BIOS interrupts and functions include:

Interrupt	Function	Subfunction	Purpose
INT 10h	AH = 10h	AL = 00h	Accesses the BIOS INT 10h Video Service and sets a single color value in attribute controller's 16-value internal palette.
INT 13h	AH = 01h	None	Reads the status of the hard disk drives and the error code from the last BIOS hard disk operation.
INT 14h	AH = 03h	None	Reads the serial port status and reports the status in registers AH and AL.
INT 15h	AH = 84h	AL = 01h	Reads the current relative positions of the X and Y coordinates of the two joysticks.

Secondary BIOS Functions

POST

The BIOS also performs a series of device intializations and diagnostic tests known as the power on self test (POST). POST can generate error messages and beep codes to indicate a system problem. It generates beep codes if it cannot yet access the system monitor.

Hi-Flex AMIBIOS error codes and messages are discussed in Chapter 2 on page .

Memory Test

The Hi-Flex AMIBIOS completely and thoroughly tests system memory. If there is a problem with memory, the BIOS displays diagnostic information that helps the end user locate and fix the memory problem. See Chapter 2 for more information about memory tests.

POST Checkpoint Codes

AMIBIOS POST routines generate checkpoint codes that can be used to diagnose where problems are occurring if the system does not boot. These codes can be routed to the Manufacturing Test Port (I/O Port 80h) so that diagnostic equipment can be attached to a problem system to analyze these codes. AMIBIOS POST checkpoint codes are described in the *American Megatrends ISA and EISA AMIBIOS Technical Reference.*

Where the AMIBIOS is Stored

The system AMIBIOS is usually stored in one, two, or four read-only memory (ROM) chips on the computer motherboard. An ISA AMIBIOS is located at address F0000h.

Where the AMIBIOS is Stored, Continued

AT-compatible (ISA) BIOSes are normally stored in 64 KB. EISA BIOSes are stored in 128 KB or 512 KB. The following table shows the number of chips required for each type of ROM chip.

BIOS Size	ROM Type	ROM Size	Number of ROM Chips
64 KB ISA BIOS	27256	256 kilobits	2
64 KB ISA BIOS	27512	512 kilobits	1
64 KB ISA BIOS	27010	1024 kilobits	Not usable
128 KB EISA BIOS	27256	256 kilobits	4
128 KB EISA BIOS	27512	512 kilobits	2
128 KB EISA BIOS	27010	1024 kilobits	1
512 KB EISA BIOS	27010	1024 kilobits	4

Chapter 2

AMIBIOS Features

Keyboard Speed Switching

You can increase processor speeds at any time by pressing <Ctrl> <Alt> <+>. Processor speed can be decreased by pressing <Ctrl> <Alt> <-> (except in 80486-based systems). You can modify these keystroke combinations through AMIBCP. The above values are merely the default settings.

Enable Cache Memory

Both external and internal (if the CPU is an 80486) cache memory can be enabled by pressing <Ctrl> <Alt> <Shift> <+> or disabled by pressing <Ctrl> <Alt> <Shift> <->. You can modify these keystroke combinations through AMIBCP. The above values are merely the default settings.

Password Deletion

The system designer can permit the end user to easily delete a system password, in case the user forgets the password.

To delete a system password, connect the P15 signal from the keyboard controller (Pin 32 on a DIP-type 8042) to Ground and turn the system on. POST Diagnostics runs for one cycle. Then the password is deleted from CMOS RAM.

The system must be designed so the P15 signal can be immediately disconnected from Ground after the above procedure has been completed to permit normal operations to resume.

Advanced Power Management (APM)

AMIBIOS supports the Intel/Microsoft INT 15h Advanced Power Management BIOS functions.

Memory Detect

AMIBIOS automatically detects all system memory, the type of processor used in the system, and onboard/offboard floppy, IDE, serial, and parallel controllers. It automatically configures onboard controllers to prevent conflicts.

Password Support

AMIBIOS provides password support can be selected from ADVANCED CMOS SETUP.

Should the user forget the password, AMIBIOS allows you to implement a circumvention to this problem in the system hardware design that will not require removal and reinstallation of the CMOS RAM power supply.

In the system hardware design, connect P15 of the keyboard controller (Pin 32 on the DIP type of keyboard controller) to GND and turn the system on. This forces POST Diagnostics to run. After completing one Diagnostics test, the password is set to not installed and the user can reboot and run the system.

Detects Non-Standard Hard Drive Parameters

If *Autodetect Hard Disk Drive* is selected, AMIBIOS detects all IDE drives and reports IDE drive parameters accurately.

Local Bus Support

AMIBIOS supports the VESA™ VL-Bus™ and Intel® PCI™ local bus standards. AMIBIOS supports all PCI-specific BIOS calls.

Socket Services and Card Services

AMIBIOS supports the INT 1Ah Socket Services and Card Services functions.

Automatically Detects Processor Type and Speed

AMIBIOS knows the processor speed and if an Intel 386SX, 386DX, 386SL, 486SL, 486SX, 486DX, 486DX2, Pentium, all other Intel CPUs, AMD386DXL, Cyrix Cx486SLC or Cx486DLC or other 386- and 486-compatible CPU is present and executes BIOS code accordingly.

Automatically Detects Memory Size

AMIBIOS checks all system and cache memory and reports them both on the initial AMIBIOS screen and the AMIBIOS System Configuration Screen that appears after POST is completed. In systems with more than 1 MB, AMIBIOS reports 384 KB less RAM than it finds, because it accounts for the address space between 640K and 1024K that is unavailable to DOS. This space is used for video RAM, video BIOS, system BIOS, and adaptor ROMs.

Configures Non-Standard Systems

Through AMIBIOS Setup, you can easily configure systems that have no keyboards, monitors, or disk drives by selecting *Not Installed* in STANDARD CMOS SETUP, all error messages about missing devices are suppressed, resulting in a normal boot.

Easily Configured

The AMIBIOS Configuration Program (AMIBCP) allows you to set both power-on and BIOS defaults for all BIOS options. It allows you to pick and choose ADVANCED CMOS SETUP and ADVANCED CHIPSET SETUP options displayed to the end user. You can easily customize and test a system AMIBIOS for a new system in minutes with AMIBCP.

2.88 MB 3½" Floppy Drive Support

AMIBIOS supports 2.88 MB 3½" floppy drives, configured in STANDARD CMOS SETUP.

User-Definable Hard Disk Types

The Hi-Flex AMIBIOS allows the end user to define hard disk types for both hard drives in a system.

Supports Nonstandard Systems

The Hi-Flex AMIBIOS can bypass keyboard, floppy, and video boot errors so specialized systems (such as file servers) without keyboards, floppies, or monitors can be configured easily.

Support PS/2 Mouse

The Hi-Flex AMIBIOS supports PS/2-type mouse devices if the appropriate hardware is present.

Supports Hardware-Specific Features

Many chipsets used in ISA systems have features such as paged memory, memory interleaving, EMS support, Fast Gate A20 Support, and power management. AMIBIOSes for specific chipsets support these types of features. Call an American Megatrends Sales Representative for more information about chipset-specific AMIBIOSes.

I/O Controller Support

AMIBIOS has easily added support for the Intel® 82341, VLSI 82C106 and 82C107, C&T 82C710, 82C711, 82C712, or 82C725, National Semiconductor PC87310 and PC87311 I/O or Peripheral controllers.

Boot Sector Virus Protection

This new option has been added to ADVANCED CMOS SETUP. When enabled, AMIBIOS warns the user when any program attempts to write to or format the boot sector and allows the user to intervene.

82C206 DMA Support

AMIBIOS support for the 82C206 chip includes DMA support that can be easily added by calling American Megatrends.

Parallel and Serial Port Support

AMIBIOS supports up to four serial ports and four parallel ports. The fourth parallel port is not supported if PS/2-type mouse support is enabled.

Shadow RAM Support

The Hi-Flex AMIBIOS can copy 16 KB blocks of video, system, and adaptor ROMs from address C0000h through EFFFFh to RAM for faster execution. The system BIOS at F0000h is automatically shadowed to RAM. ROM shadow means that the ROM contents are copied from slower ROM (120-200 ns) to faster RAM (54-100 ns). Often ROM is 8-bits wide and RAM is 16-bits, or ROM is 16-bits wide and RAM is 32-bits wide, and shadowing increases speed by widening the data path. The contents of ROM are then executed from RAM. Shadow settings are chipset-specific and are dependent on system hardware and are displayed in ADVANCED CMOS SETUP. Each option copies a 16 KB memory segment from ROM to RAM. The video ROM segments are C0000h and C4000h. The adaptor ROM address segments that can be shadowed are C8000h through EC000h. If an option is enabled, all code in that 16 KB segment is shadowed.

Typematic Rate and Delay

AMIBIOS allows the end user to set the speed that a keystroke is repeated at and the delay before the repeating starts.

Num Lock Disable

The Hi-Flex AMIBIOS allows the end user to set the Num Lock key on or off at system boot.

Boot Sequence and Speed

The Hi-Flex AMIBIOS allows the end user to determine if the system boots from drive C: or A: and the processor boot speed (High or Low).

Fast Gate A20 Support

The Hi-Flex AMIBIOS supports the Fast Gate A20 option on many ASIC chipsets. Normally, the keyboard controller is used to switch between real and protected address modes with Gate A20. Fast Gate A20 substitutes a faster method for address mode switching, often using I/O ports.

AMIBIOS Utilities

AMIBIOS utilities are stored in ROM and are available when the system boots. The end user can press <Del> to select Setup or hard disk utilities. The Hi-Flex AMIBIOS utilities are:

- AMIBIOS Setup pages through
- Hard disk format page
- Auto interleave page
- Media Analysis page

Chapter 3

AMIBIOS Power-On Self Test

Hi-Flex AMIBIOS provides all IBM standard Power-On Self Test (POST) routines as well as enhanced AMIBIOS POST routines. AMIBIOS POST supports CPU internal diagnostics. AMIBIOS POST checkpoint codes are accessible via the Manufacturing Test Port (I/O Port 80h). AMIBIOS checkpoint codes are documented in the *ISA and EISA AMIBIOS Technical Reference.*

POST Phases

Every time the system is powered on, the Hi-Flex AMIBIOS executes two types of POST routines:

System Test and Initialization (test and initialize AMIBIOS for normal operations) and

System Configuration Verification (compare defined configuration with hardware actually installed).

BIOS Error Reporting

BIOS errors are reported in one of two ways:

If...	then...
the error occurs before the display device is initialized,	a series of beeps sound. Beep codes indicate that a fatal error has occurred. AMIBIOS Beep Codes are described on the next page.
the error occurs after the display device is initialized,	the error message is displayed. AMIBIOS error messages are explained on page . A prompt to press <F1> can also appear with displayed error messages.

Beep Codes

Fatal errors are communicated through a series of audible beeps. Fatal errors do not allow the system to continue the boot process. If AMIBIOS POST can initialize the system video display, it displays the error message. Displayed error messages, in most cases, allow the system to continue to boot. Displayed AMIBIOS error messages are described on page .

AMIBIOS Beep Codes

Beeps	Error message	Description
1	Refresh Failure	The memory refresh circuitry is faulty.
2	Parity Error	Parity error in the base memory (the first 64 KB block) of memory.
3	Base 64 KB Memory Failure	Memory failure in first 64 KB.
4	Timer Not Operational	A memory failure in the first 64 KB of memory, or Timer 1 is not functioning.
5	Processor error	The CPU generated an error.
6	8042 - Gate A20 Failure	Cannot switch to protected mode.
7	Processor Exception Interrupt Error	The CPU on the CPU Card generated an exception interrupt.
8	Display Memory Read/Write Error	The system video adapter is either missing or its memory is faulty. This is not a fatal error.
9	ROM Checksum Error	The ROM checksum value does not match the value encoded in AMIBIOS.
10	CMOS Shutdown Register Read/Write Error	The shutdown register for CMOS RAM has failed.
11	Cache memory bad — do not enable cache	The cache memory test failed. Cache memory is disabled. *Do not press <Ctrl> <Alt> <Shift> <+> to enable cache memory.*

What to Do If the Computer Beeps

Here is what you need to do if your computer has an AMIBIOS and it starts beeping:

If the system beeps...	then...
1, 2, or 3 times...	reseat the memory SIMMs or DIPs. If the system still beeps, replace the memory.
6 times...	reseat the keyboard controller chip. If it still beeps, replace the keyboard controller. If it still beeps, try a different keyboard, or replace the keyboard fuse, if the keyboard has one.
8 times...	there is a memory error on the video adapter. Replace the video adapter, or the RAM on the video adapter.
9 times...	the BIOS chip is bad. The system probably needs a new BIOS ROM chip.
11 times...	reseat the cache memory on the motherboard. If it still beeps, replace the cache memory.
4, 5, 7, or 10 times...	the motherboard must be replaced.

AMIBIOS Displayed Error Messages

If an error occurs after the system display has been initialized, the error message are displayed in the following format:

```
ERROR Message Line 1
ERROR Message Line 2
Press <F1> to continue
```

and the system halts. The system does not halt if *Wait for <F1> If Any Error* in ADVANCED CMOS SETUP is *Disabled.*

```
RUN SETUP UTILITY.
```

may also appear. Press <F1> to run AMIBIOS Setup if this message appears.

Error Message	**Explanation**
8042 Gate-A20 Error	Gate A20 on the keyboard controller (8042) is not working. Replace the 8042.
Address Line Short!	Error in the address decoding circuitry.
C: Drive Error	No response from drive C:. Run the Hard Disk Utility. Check the C: hard disk type in STANDARD CMOS SETUP.
C: Drive Failure	No response from hard disk drive C:. Replace the drive.
Cache Memory Bad, Do Not Enable Cache!	Cache memory is defective. Run AMIDiag.
CH-2 Timer Error	An AT system has two timers. There is an error in timer2.
CMOS Battery State Low	CMOS RAM is powered by a battery. The battery power is low. Replace the battery.
CMOS Checksum Failure	CMOS RAM checksum is different than the previous value. Run AMIBIOS Setup.
CMOS System Options Not Set	The values stored in CMOS RAM are either corrupt or nonexistent. Run AMIBIOS Setup.
CMOS Display Type Mismatch	The video type in CMOS RAM does not match the type detected. Run AMIBIOS Setup.
CMOS Memory Size Mismatch	The amount of memory found by the BIOS is different than the amount in CMOS RAM. Run AMIBIOS Setup.
CMOS Time & Date Not Set	Run STANDARD CMOS SETUP to set the date and time.
D: Drive Error	No response from drive D:. Run the Hard Disk Utility. Check the hard disk type in STANDARD CMOS SETUP.

D: drive failure	No response from hard disk drive D:. Replace the drive.
Diskette Boot Failure	The boot diskette in drive A: cannot be used to boot the system. Use another boot diskette and follow the screen instructions.
Display Switch Not Proper	Some systems require a video switch be set to either color or monochrome. Turn the system off, set the switch properly, then power on.
DMA Error	Error in the DMA controller.
DMA 1 Error	Error in the first DMA channel.
DMA 2 Error	Error in the second DMA channel.
FDD Controller Failure	The BIOS cannot communicate with the floppy disk drive controller. Check all appropriate connections after the system is powered down.
HDD Controller Failure	The BIOS cannot communicate with the hard disk drive controller. Check all appropriate connections after the system is powered down.
INTR1 Error	Interrupt channel 1 failed POST.
INTR2 Error	Interrupt channel 2 failed POST.
Invalid Boot Diskette	The BIOS can read the diskette in floppy drive A:, but it cannot boot the system with it. Use another boot diskette and follow the screen instructions.
Keyboard Is Locked...Unlock It	The keyboard lock on the system is engaged. The system must be unlocked to continue to boot.
Keyboard Error	The keyboard has a timing problem. Make sure a Keyboard Controller AMIBIOS is installed. Set *Keyboard* in STANDARD CMOS SETUP to *Not Installed* to skip the keyboard POST routines.
KB/Interface Error	There is an error in the keyboard connector.
No ROM BASIC	Cannot find a proper bootable sector on either drive A: or C:. The BIOS cannot find ROM Basic.
Off Board Parity Error	Parity error in memory installed on an adapter card in an expansion slot. The format is: `OFF BOARD PARITY ERROR ADDR = (XXXX)` *XXXX* is the hex address where the error occurred. Run AMIDiag to find and correct memory problems.
On Board Parity Error	Parity error in motherboard memory. The format is: `ON BOARD PARITY ERROR ADDR = (XXXX)` *XXXX* is the hex address where the error occurred. Run AMIDiag to find and correct memory problems.
Parity Error ????	Parity error in system memory at an unknown address. Run AMIDiag to find and correct memory problems.

POST Memory Test

Normally, the only visible POST routine is the memory test. The screen that appears when the system is powered on is shown below.

```
AMIBIOS (C) 1992 American Megatrends Inc.
xxxxx KB OK


Hit <DEL> if you want to run SETUP




(C) American Megatrends Inc.
xx-xxxx-xxxxxx-xxxxxxxx-xxxxxx-xxxx-x
```

An AMIBIOS Identification string is displayed at the left bottom corner of the screen, below the copyright message. Press <Ins> during system boot to display two additional AMIBIOS Identification strings. The AMIBIOS Identification Strings show the options installed in the Hi-Flex AMIBIOS. You will need this information when calling for technical support.

Displaying Additional AMIBIOS ID Strings

Step	Action
1	Enable *Wait for <F1> If any Error* in ADVANCED CMOS SETUP to *Enabled* before freezing the screen.
2	When a problem occurs, freeze the screen by powering on the system and holding a key down on the keyboard to cause a *Keyboard Error* message.
3	Copy the three lines and report this information to AMI. Press <F1> to continue the boot process.

The following is displayed after POST completes:

```
Hit <DEL> if you want to run SETUP
```

Press <Del> to access Hi-Flex AMIBIOS Setup.

EISA Error Messages

An EISA AMIBIOS can generate additional error messages. None of these messages is fatal. The EISA AMIBIOS error messages are:

Error Message	Explanation
EISA CMOS Checksum Failure	The Checksum for EISA CMOS is bad. The battery for EISA CMOS RAM may be bad.
EISA CMOS inoperational	A Read/Write error occurred in extended CMOS RAM. The battery may be bad.
Expansion Board not ready at Slot *X, Y, Z*	AMIBIOS cannot find the expansion board in Slot *X, Y*, or *Z*. Make sure the board is in the correct slot and is correctly seated.
Fail-Safe Timer NMI Inoperational	Devices that depend on the fail-safe NMI timer is not operating correctly.
ID information mismatch for Slot *X, Y, Z*.	The ID of the EISA Expansion Board in Slot *X, Y*, or *Z* does not match the ID in EISA CMOS RAM.
Invalid Configuration Information for Slot X, Y, Z.	The configuration information for EISA Expansion Boards *X, Y*, or *Z* is not correct. The board cannot be configured. Run the ECU.
Software Port NMI Inoperational	The software port NMI is not working.

ISA NMI Handler Messages

ISA NMI Message	Explanation
Memory Parity Error at *xxxxx*	Memory failed. If the memory location can be determined, it is displayed as *xxxxx*. If not, the message is *Memory Parity Error ????*.
I/O Card Parity Error at *xxxxx*	An expansion card failed. If the address can be determined, it is displayed as *xxxxx*. If not, the message is *I/O Card Parity Error ????*.

DMA Bus Time-out	A device has driven the bus signal for more than 7.8 microseconds.

EISA AMIBIOS NMI Error Messages

The EISA AMIBIOS can generate additional NMI messages that are specific to EISA systems.

EISA NMI Message	**Explanation**
BUS Timeout NMI at Slot *n*	There was a Bus Timeout NMI at Slot *n*.
(E)nable (D)isable Expansion Board?	Type E to enable the expansion board that had an NMI or D to disable it.
Expansion Board Disabled at Slot *n*	The expansion board in Slot *n* has been disabled.
Expansion Board NMI at Slot *n*	An expansion board NMI was generated from Slot *n*.
Fail-Safe Timer NMI	A fail-safe timer NMI has been generated.
Software Port NMI	A software port NMI has been generated.

BIOS Configuration Summary Screen

AMIBIOS displays a screen that looks similar to the following when the POST routines complete successfully.

```
System Configuration (C) Copyright 1985-1991 American Megatrends Inc.

Main Processor          : 80486          Base Memory Size       : 640 KB
Numeric Coprocessor     : Present        Ext. Memory Size       : 7808 KB
Floppy Drive A:         : 1.2 MB ½       Hard Disk C: Type      : 44
Floppy Drive B:         : 1.44 MB ¼      Hard Disk D: Type      : None
Display Type:           : VGA or EGA     Serial Port(s)         : 3F8
ROM-BIOS Date:          : 05/01/91       Parallel Port(s)       : 378

Memory Found                             Memory Configured

Bank 1=1 MB Bank 2=1 Meg                 Bank 1=1 MB Bank 2=1 Meg

Shadow RAM          F000=Enable                  Cache Memory=64K

C000=Enable         C400=Enable         C800=Enable         CC00=Enable
D000=Disable        D400=Disable        D800=Disable        DD00=Disable
E000=Disable        E400=Disable        E800=Disable        EC00=Disable
```

Chapter 4

AMIBIOS Setup

AMIBIOS Setup is divided into five parts. Not all of these may appear on all systems with an AMIBIOS.

- STANDARD CMOS SETUP,
- ADVANCED CMOS SETUP,
- ADVANCED CHIPSET SETUP,
- POWER MANAGEMENT SETUP, and
- PERIPHERAL SETUP.

STANDARD CMOS SETUP

STANDARD CMOS SETUP permits the end user to configure and set system components such as floppy drives, hard disk drives, time and date, monitor type, and keyboard. These options are discussed in Section 2 beginning on page .

ADVANCED CMOS SETUP

ADVANCED CMOS SETUP allows the end user to configure more advanced parts of memory configuration, peripheral support, and power management support. ADVANCED CMOS SETUP is discussed in Section 3 beginning on page .

ADVANCED CHIPSET SETUP

ADVANCED CHIPSET SETUP configures chipset-specific features and is discussed in Section 4 beginning on page .

POWER MANAGEMENT SETUP

This option appears in AMIBIOSes manufactured after May 1991. This option is used only when the computer system has power management features. It is usually used only in notebook and other systems with power conservation features. See page for more information.

PERIPHERAL SETUP

This option appears only in AMIBIOSes manufactured after November 1991. The options on this screen configure system features managed by Peripheral or I/O controllers. See page for additional information.

Section 1

Running AMIBIOS Setup

The system parameters (such as amount of memory, disk drives, video displays, and numeric coprocessors) is stored in CMOS RAM. When the computer is turned off, a back-up battery provides power to CMOS RAM, which retains the system parameters. Every time the system is powered-on, it is configured with these values, unless CMOS RAM has been corrupted.

The system configuration parameters are set via AMIBIOS Setup. AMIBIOS Setup resides in the ROM BIOS (Read Only Memory Basic Input/Output System) and is available each time the computer is turned on.

Default System Parameters

If CMOS RAM is bad, the system is configured with the default values stored in ROM. There are two sets of BIOS values stored in the ROM file: the BIOS Setup default values and the Power-On default values.

Starting Setup

As POST executes, the following appears:

```
Hit <DEL> if you want to run SETUP
```

Press <Del> to run Hi-Flex AMIBIOS Setup.

AMIBIOS Setup Key Use

Keystroke	Action
Esc	Returns to previous screen.
→, ←, ↑, and ↓	Move the cursor from one option to the next.
<PgUp> and <PgDn>; <Ctrl><PgUp> <Ctrl><PgDn>	Modify the default value of the options for the highlighted parameter. If there are fewer than 10 options, <Ctrl> <PgUp> and <Ctrl> <PgDn> operate like <PgUp> and <PgDn>. <Ctrl> can also be used to increment a setting.
<F1>	Displays Help.
<F2>	Change background colors.
<F3>	Change foreground colors.
<F5>	Restores the values resident when the current Setup session began. These values are taken from CMOS RAM if CMOS RAM was uncorrupted at the start of the session. Otherwise, AMIBIOS Setup default values are used.
<F6>	Loads all features in ADVANCED CMOS SETUP and ADVANCED CHIPSET SETUP with the BIOS Setup defaults.
<F7>	Loads all features in ADVANCED CMOS SETUP and ADVANCED CHIPSET SETUP with the Power-On defaults.
<F10>	Saves all changes made to Setup and continues the boot process.

Note: The default value for <F5>, <F6>, and <F7> is always N. To execute these options, change the *N* to *Y* and press <Enter>.

AMIBIOS Setup Main Menu

A Hi-Flex AMIBIOS Setup Main Menu is shown below. All options may not appear on the AMIBIOS Setup screens that appears in your computer because you can enable or disable the menu items.

Main Menu Option	**Described on**
STANDARD CMOS SETUP	page
ADVANCED CMOS SETUP	page
ADVANCED CHIPSET SETUP	page
POWER MANAGEMENT SETUP	page
PERIPHERAL MANAGEMENT SETUP	page
Auto Configuration With BIOS Defaults	page
Auto Configuration with Power On Defaults	page
Change Password	page
Auto Detect Hard Disk	page
Hard Disk Utility	page
Write to CMOS and Exit	page
Do Not Write to CMOS and Exit	page

BIOS Default Values

AMIBIOS has default settings for many options in the five types of Setup. In STANDARD CMOS SETUP, default values are only loaded if CMOS RAM is corrupt. All STANDARD CMOS SETUP default settings are disabled (floppy, hard disk, monitor, keyboard). In all other type of Setup, both BIOS and Power-On defaults are provided for most options.

Auto Configuration With BIOS Defaults

By choosing *Auto Configuration With BIOS Defaults*, you automatically configure the system using the BIOS default values. The BIOS default value are best-case values that should optimize system performance. If CMOS RAM is corrupted, the BIOS defaults are loaded automatically.

To use the BIOS defaults, type Y and press <Enter>. The following message appears:

```
Default values loaded. Press any key to continue.
```

Auto Configuration With Power-On Defaults

By choosing Auto Configuration with Power-On Defaults, you automatically configure the system using the default Power-On values. Power-On default values are worst-case values for system performance, but are the most stable values. Use this option as a diagnostic aid if the system is behaving erratically.

Type *Y* and press <Enter> to use the Power-On defaults. The following message appears:

```
Default values loaded. Press any key to continue.
```

Autodetect Hard Disk

This option detects the hard disk parameters for non-standard hard disk drives, such as IDE and SCSI drives. It displays the parameters that it detects (see the following screen) and allows the end user to accept or reject the parameters. If accepted, these parameters are displayed in the Hard Disk Drive C: or D: fields in STANDARD CMOS SETUP as Type 47.

If an IDE drive is found and you accept the parameters, AMIBIOS places the hard disk drive parameters that it finds in the Hard Dive C: or Hard Drive D: field in STANDARD CMOS SETUP and sets Type 47. All you have to do is accept these values.

Write to CMOS and Exit

The configurations settings in Standard Setup, ADVANCED CMOS SETUP, ADVANCED CHIPSET SETUP, POWER MANAGEMENT SETUP, PERIPHERAL SETUP Password, and Auto Detect Hard Disk are stored in CMOS RAM when this option is selected. A CMOS RAM checksum is calculated and written to CMOS RAM and control is passed to the system BIOS.

```
Write to CMOS and Exit (Y/N) ? N
```

appears. Press *N* and <Enter> to return to the Main Menu. Press *Y* and <Enter> to save the system parameters and continue the boot process. AMIBIOS either reboots the system (if any new settings change the memory map) or continues the boot process.

Do Not Write to CMOS RAM and Exit

This option passes control to the BIOS without writing any changes to CMOS RAM.

Press *N* and <Enter> to return to the Main Menu. Press *Y* and <Enter> to continue the boot process without saving any system parameters changed in Setup.

Section 2

STANDARD CMOS SETUP

STANDARD CMOS SETUP sets basic system parameters, such as day, date, time, and hard disk type. Use ↑ and ↓ to select STANDARD CMOS SETUP and press <Enter>. The following appears.

STANDARD CMOS SETUP OPTIONS

Date And Day Configuration

Ranges for each value are shown in the lower left corner of the screen. Move the cursor to the Date field with →, ←, ↑, or ↓ and set the Date and Day by pressing <PgUp> and <PgDn>.

Time Configuration

This option uses a 24-hour clock format (add 12 for PM numbers). Enter 4:30 P.M. as 16:30:00. Move the cursor to the Time field with the →, ←, ↑, or ↓ and set the time by pressing <PgUp> and <PgDn> to change values.

Hard Disk Drive C:
Hard Disk Drive D:

Move to these fields via the ↑ and ↓ keys and use <PgUp or <PgDn> to select a hard disk drive type. Match the parameters of the drive in your computer to the hard drive type table on page . The hard drive manufacturer should provide a list of the drive parameters. If none of the hard drive types match, use type 47. *Not Installed* is used for diskless workstations and SCSI hard disk drives. Type 47 can be used for both hard disks C: and D:, and is primarily for IDE drives. The parameters for type 47 for drives C: and D: can be different, permitting user-definable hard disk drives.

Using Auto Detect Hard Disk

If you select Auto Detect Hard Disk from the AMIBIOS Main Menu, AMIBIOS automatically finds all IDE hard disk drive paremeters and places these parameters in the Hard Dive C: or Hard Drive D: field in STANDARD CMOS SETUP. All you have to do is accept these values. Otherwise, you must manually enter the parameters, described in the following table.

Parameter	Description
Type	The number for a drive with certain identification parameters.
Cylinders	The number of cylinders in the disk drive.
Heads	The number of heads in the disk drive.
Write Precompensation	The size of a sector gets progressively smaller as the track diameter diminishes. Yet each sector must still hold 512 bytes. Write precompensation circuitry on the disk drive compensates for the physical difference in sector size by boosting the write current for sectors on inner tracks. This is the track number where write precompensation begins.
Landing Zone	This number is the cylinder location where the heads normally park when the system is shut down.
Sectors	The number of sectors per track. MFM drives have 17 sectors per track. RLL drives have 26 sectors per track. ESDI drives have 34 sectors per track. SCSI and IDE drives have even more sectors per track.
Capacity	The formatted capacity of the drive is the Number of Heads x Number of Cylinders x Number of Sectors per Track x 512 bytes (Bytes per Sector).

Hard Disk Drive Types

Type	Cylinders	Heads	Write Precompensation	Landing Zone	Sectors	Size
1	306	4	128	305	17	10 MB
2	615	4	300	615	17	20 MB
3	615	6	300	615	17	31 MB
4	940	8	512	940	17	62 MB
5	940	6	512	940	17	47 MB
6	615	4	65535	615	17	20 MB
7	462	8	256	511	17	31 MB
8	733	5	65535	733	17	30 MB
9	900	15	65535	901	17	112 MB
10	820	3	65535	820	17	20 MB
11	855	5	65535	855	17	35 MB
12	855	7	65535	855	17	50 MB
13	306	8	128	319	17	20 MB
14	733	7	65535	733	17	43 MB
16	612	4	0	663	17	20 MB
17	977	5	300	977	17	41 MB
18	977	7	65535	977	17	57 MB
19	1024	7	512	1023	17	60 MB
20	733	5	300	732	17	30 MB
21	733	7	300	732	17	43 MB
22	733	5	300	733	17	30 MB
23	306	4	0	336	17	10 MB
24	925	7	0	925	17	54 MB
25	925	9	65535	925	17	69 MB
26	754	7	754	754	17	44 MB
27	754	11	65535	754	17	69 MB
28	699	7	256	699	17	41 MB
29	823	10	65535	823	17	68 MB
30	918	7	918	918	17	53 MB
31	1024	11	65535	1024	17	94 MB

32	1024	15	65535	1024	17	128 MB
33	1024	5	1024	1024	17	43 MB
34	612	2	128	612	17	10 MB
35	1024	9	65535	1024	17	77 MB
36	1024	8	512	1024	17	68 MB
37	615	8	128	615	17	41 MB
38	987	3	987	987	17	25 MB
39	987	7	987	987	17	57 MB
40	820	6	820	820	17	41 MB
41	977	5	977	977	17	41 MB
42	981	5	981	981	17	41 MB
43	830	7	512	830	17	48 MB
44	830	10	65535	830	17	69 MB
45	917	15	65535	918	17	114 MB
46	1224	15	65535	1223	17	152 MB
47	ENTER PARAMETERS PROVIDED BY HARD DRIVE MANUFACTURER					

Floppy Drive A:
Floppy Drive B:

Use <PgUp or <PgDn> to select a floppy drive type. The settings are *360 KB 5¼ inch*, *1.2 MB 5¼ inch*, *720 KB 3½ inch*, *1.44 MB 3½ inch*, *2.88 MB 3½ inch,* or *Not Installed*, which is used to configure diskless workstations. The BIOS does not generate error messages if *Not Installed* is selected.

Primary Display

Use <PgUp or <PgDn> to select a setting. The settings are *Monochrome*, *Color 40x25*, *Color 80x25*, *VGA/PGA/EGA*, or *Not Installed*, which is used to configure network file servers. The BIOS does not generate missing monitor messages if *Not Installed* is selected.

Keyboard

Use <PgUp or <PgDn> to select a setting. The settings are *Installed* or *Not Installed*. Use *Not Installed* in a keyboardless system such as a file server. The BIOS does not generate error message for a missing keyboard if *Not Installed* is selected.

Section 3

ADVANCED CMOS SETUP

The ADVANCED CMOS SETUP options are listed below. The options in your computer may be different depending on the system configuration and the chipset used in the system. As with all AMIBIOS Setup screens, you can add or delete AMIBIOS Setup options via AMIBCP.

```
                    BIOS SETUP PROGRAM - ADVANCED CMOS SETUP
          (C) 1993 American Megatrends  Inc. All rights reserved

Typematic Rate Programming : Disabled | External Cache Memory      : Enabled
Typematic Rate Delay (msec): 500      | Fast Gate A20 Option       : Enabled
Typematic Rate (Chars/Sec) : 15       | Password Checking Option   : Setup
Mouse Support Option       : Enabled  | Turbo Switch Function      : Enabled
Above 1 MB Memory Test     : Disabled | Video   ROM Shadow C000,16K: Disabled
Memory Test Tick Sound     : Disabled | Video   ROM Shadow C400,16K: Disabled
Memory Parity Error Check  : Disabled | Adaptor ROM Shadow C800,16K: Disabled
Hit <DEL> Message Display  : Enabled  | Adaptor ROM Shadow CC00,16K: Disabled
Hard Disk Type 47 RAM Area : 0:300    | Adaptor ROM Shadow D000,16K: Disabled
Wait for <F1> If Any Error : Enabled  | Adaptor ROM Shadow D400,16K: Disabled
System Boot Up Num Lock    : On       | Adaptor ROM Shadow D800,16K: Disabled
Numeric Processor Test     : Enabled  | Adaptor ROM Shadow DC00,16K: Disabled
Weitek Processor           : Absent   | Adaptor ROM Shadow E000,16K: Enabled
Floppy Drive Seek At Boot  : Disabled | Adaptor ROM Shadow E400,16K: Disabled
System Boot Up Sequence    : C:,A:    | Adaptor ROM Shadow E800,16K: Disabled
System Boot Up CPU Speed   : High     | Adaptor ROM Shadow EC00,16K: Disabled
Fast Gate A20 Option       : Enabled  | System ROM Shadow F000,64K : Enabled
Internal Cache Memory      : Enabled  | BootSector Virus Protection: Disabled

ESC:Exit  ↑→↓←:Sel  (Ctrl)Pu/Pd:Modify  F1:Help  F2:Color
F5:Old Values  F6:BIOS Setup Defaults  F7:Power-On Defaults
```

Two additional options, Video ROM Shadow, and Shadow RAM Option, are not shown above. These options duplicate other shadowing options.

Help Screens

AMIBIOS ADVANCED CMOS SETUP has help screens, accessed by pressing <F1>, for all options.

Warning Message

A warning message is displayed when ADVANCED CMOS SETUP is selected. Press any key to proceed.

ADVANCED CMOS SETUP Options

Typematic Rate Programming
Typematic Rate Delay
Typematic Rate

Typematic Rate Programming enables or disables the following two options. Typematic Rate Delay (*250, 500, 750, or 1,000 milliseconds*) and Typematic Rate (*6, 8, 10, 12, 15, 20, 24, or 30 characters per second)* control the speed at which a keystroke is repeated. The selected character is displayed when a key is held down after a delay set by the Typematic Rate Delay. It then repeats at a rate set by the Typematic Rate value.

When two or more keys are pressed and held down simultaneously, only the last key pressed is repeated. Repeating stops when the last key is released, even if other keys are pressed.

Mouse Support Option

This option enables PS/2-type mouse support. The settings are *Enabled* or *Disabled.*

Above 1 MB Memory Test

When enabled, AMIBIOS executes POST memory routines on the RAM above 1 MB (if present on the system). If disabled, AMIBIOS only tests the first 1 MB of RAM and clears all memory above 1 MB. The settings are *Enabled* or *Disabled.*

Memory Test Tick Sound

This option enables the ticking sound during the memory test. The settings are *Enabled* or *Disabled.*

Memory Parity Error Checking

This option enables or disables parity error checking for all system RAM. The settings are *Enabled* (all system RAM parity is checked) or *Disabled.* (only the parity of the first 1 MB of system RAM is checked).

Hit <DEL> Message Display

Disabling this option prevents

```
Hit <DEL> if you want to run Setup
```

from appearing when the system boots. This option should always be *Enabled.* Otherwise, you will not be able to run AMIBIOS Setup. The settings are *Enabled* or *Disabled.*

Hard Disk Type 47 RAM Area

You can specify a user-definable hard disk type for drive C: and/or drive D: in STANDARD CMOS SETUP (see page). This option specifies the type 47 data storage area: *0:300h* in lower system RAM or the *top 1 KB* of applications memory (starting at 639K or 511K, depending on the amount of base memory). Type 47 data is stored in shadow RAM if shadowing is enabled.

Wait for <F1> If Any Error

POST runs system diagnostic tests that can generate a message followed by:

```
Press <F1> to continue
```

If this option is enabled, the BIOS waits for you to press <F1> before continuing. If this option is disabled, AMIBIOS continues the boot process and does not wait for <F1> to be pressed. The settings are *Enabled* or *Disabled.*

System Boot Up Num Lock

If Off, the Num Lock key on the keyboard when the system is powered on is turned off, so you can use →, ←, ↑, or ↓ on both the numeric keypad and the keyboard. The settings are *On* or *Off.*

Numeric Processor Test

This option enables or disables the AMIBIOS test for a math coprocessor. It is used in systems with an 80386 processor. The settings are *Enabled* or *Disabled.*

Weitek Processor

This option specifies that a Weitek numeric processor (WTL3167 or WTL4167) is installed in the system. The settings are *Absent* or *Present.*

Floppy Drive Seek At Boot

If enabled, a Seek instruction is performed on floppy drive A: at system boot time. The settings are *Enabled* or *Disabled.* If *Disabled,* this option allows a fast boot and decreases the possibility of damage to the heads.

ADVANCED CMOS SETUP Options, Continued

System Boot Up Sequence

This option specifies the boot sequence for drives A: and C: after AMIBIOS POST completes and attempts to boot DOS. The settings are *A:,C:* or *C:, A:.*

System Boot UP CPU Speed

This option sets the speed at which the system boots. The settings are *High* or *Low.*

Fast Gate A20 Option

This option enables the system's Fast Gate A20 cicuitry. The settings are *Enabled* or *Disabled.*

Gate A20 controls the ability to access memory addresses above 1 MB by enabling or disabling access to processor address line A20. To remain XT-compatible and be able to access conventional memory (from 0 - 1024K), address line A20 must always be low, so Gate A20 must be disabled. However, some programs both enter protected mode and shut down through the BIOS. For this software, Gate A20 must be constantly enabled and disabled via the keyboard controller, which slows processing.

Fast Gate A20 is another method for handling Gate A20 found in many chipsets. It speeds programs that constantly change from addressing conventional memory to addressing memory addresses above 1 MB (from real address mode to protected address mode and back). For example, enabling this option makes programs such as network operating systems execute faster.

Turbo Switch Function

This option enables or disables the externally-mounted hardware turbo switch. The settings are *Enabled* or *Disabled.*

Password Check Option

This option enables a password check every time the system boots or Setup is executed. The settings are *Always* or *Setup.* If *Always* is chosen, a user password prompt appears every time the system is turned on. If *Setup* (the default) is chosen, the password prompt appears if Setup is executed.

ROM Shadow

ROM shadow is a technique in which BIOS code is copied from slower ROM to faster RAM. The BIOS is then executed from the RAM. Shadow options may or may not appear in ADVANCED CMOS SETUP.

There are tow types of shadowing options: In the first type of shadowing, only two ADVANCED CMOS SETUP options enable or disable shadowing for all ROM address segments: *Shadow RAM Option*, which copies the ROM code from addresses C800–FFFFh to RAM, and *Video ROM Shadow.*, which copies the 32K of video ROM at C000–C7FFh to RAM.

In the second type of shadowing, if an option is enabled, the code that resides in the 16 KB segment of ROM specified in the option is shadowed to RAM. These options are: *Video ROM Shadow C000,16K* and *Video ROM Shadow C400,16K*, *Adaptor ROM Shadow C800,16K* through *Adaptor ROM Shadow E000,64K*. The last is *System BIOS Shadow F000,64K*.

Some systems have variations on the above shadowing options, providing 32 KB or 64 KB granularity. The end user can enable or disable shadowing on a much finer granularity if you enable shadowing.

The *Internal Cache Memory* and *External Cache Memory* options appear on 80486-based systems. On 80386-based systems, *Cache Memory* may be displayed instead of *External Cache Memory*.

Internal Cache Memory

This option appears only on systems with microprocessors that have internal cache (such as the Intel 80486). This option enables the CPU internal cache memory. The settings are *Enabled* or *Disabled.*

External Cache Memory

This option appears only on systems that have secondary cache memory external to the CPU and enables the external cache memory. The settings are *Enabled* or *Disabled.*

Boot Sector Virus Protection

When enabled, AMIBIOS issues a warning when any program or virus issues a Disk Format command or attempts to write to the boot sector of the hard disk drive. The settings are *Enabled* or *Disabled.* The system must have an American Megatrends Keyboard Controller BIOS, Version F or later, for this option to work.

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)? _
```

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

```
Format!!!
Possible VIRUS: Continue (Y/N)?
```

Section 4

ADVANCED CHIPSET SETUP

The options that appear in ADVANCED CHIPSET SETUP vary from system to system. There are no standard options. See the appropriate American Megatrends chipset-specific AMIBIOS manual or American Megatrends motherboard manual for descriptions of specific ADVANCED CHIPSET SETUP options. Only users with an intimate knowledge of the system architecture should modify the values in these options.

Configuring AMIBIOS SETUP Options

You can choose the options included in ADVANCED CMOS SETUP and ADVANCED CHIPSET SETUP via AMIBCP. See the *AMIBCP User's Guide* for additional information.

AMIBIOS Chipset-Specific Manuals

American Megatrends publishes many manuals that describe ADVANCED CHIPSET SETUP options for specific ASIC ISA and EISA chipsets. Contact your American Megatrends Sales Representative for additional information.

Warning Screen

A warning screen appear when ADVANCED CHIPSET SETUP is selected. Press any key to continue.

Help Screens

All ADVANCED CHIPSET SETUP options have a Help screem accessed by pressing <F1>.

Sample ADVANCED CHIPSET SETUP Screen

The following ADVANCED CHIPSET SETUP screen appears on systems that have an American Megatrends Baby Voyager motherboard.

Sample ADVANCED CHIPSET SETUP Options

On Board Serial Port 1

Enables serial port 1 on the motherboard. The settings are *3F8h*, *3E8h*, or *Disabled*. If CMOS RAM is corrupted when the system is powered on, AMIBIOS configures onboard serial port 1 according to the presence or absence of serial ports on adapter cards.

the Offboard Serial Port	**the Onboard Serial Port 1 is Autoconfigured as**	
None	3F8h	Can be disabled or changed to 3E8h via ADVANCED CHIPSET SETUP.
3F8h	3E8h	Can be disabled via ADVANCED CHIPSET SETUP. If changed to 3F8h, an I/O port address conflict occurs.
3E8h	3F8h	Can be disabled via ADVANCED CHIPSET SETUP. If

		changed to 3E8h, an I/O port address conflict occurs.
3F8h, 3E8h	Disabled	If changed to 3F8h or 3E8h, an I/O port address conflict occurs.

On Board Serial Port 2

This option enables or disables serial port 2 on the motherboard. The settings are *2F8h*, *2E8h*, or *Disabled*. If the configuration data in CMOS RAM is corrupted when the system is powered on, the system BIOS automatically configures onboard serial port 2 according to the presence or absence of serial ports on adapter cards in expansion slots. Autoconfiguration only occurs when CMOS RAM data is corrupted, as follows:

If the Offboard Serial Port is	**the Onboard Serial Port 2 is Autoconfigured as**	
None	2F8h	Can be disabled or changed to 2E8h via ADVANCED CHIPSET SETUP.
2F8h	2E8h	Can be disabled via ADVANCED CHIPSET SETUP. If changed to 2F8h, an I/O port address conflict occurs.
2E8h	2F8h	Can be disabled via ADVANCED CHIPSET SETUP. If changed to 2E8h, an I/O port address conflict occurs.
2F8h, 2E8h	Disabled	If changed to 3F8h or 3E8h, an I/O port address conflict occurs.

P4 is serial port 2 on the Baby Voyager motherboard. If disabled through Setup, do not attach any device to P4. J6 configures the IRQ for onboard serial port 2. J6 settings are:

Jumper	**Pins Shorted**	**Description**
J6	Pins 1-2	IRQ4 selected for onboard serial port 2.
J6	Pins 2-3	IRQ3 selected for onboard serial port 2 (Default).

If onboard serial sort 2 is disabled, remove the jumper block from J6 to disable the onboard serial port 2 interrupt.

On Board Parallel Port

This option enables or disables the onboard parallel port. The settings are *378h*, *278h*, or *Disabled*. P3 is the onboard parallel port. If the configuration data in CMOS RAM is corrupted when the system is turned on, AMIBIOS automatically configures the onboard parallel port taking into account any parallel ports on adapter cards in expansion slots. Autoconfiguration only occurs when CMOS RAM data is corrupted, as follows:

If the Offboard Parallel Port is	**the Onboard Parallel Port is Autoconfigured as**	
None or 3BCh	378h	Can be disabled or changed to 278h via ADVANCED CHIPSET SETUP.
378h	278h	Can be disabled via ADVANCED CHIPSET SETUP. If changed to 378h, an I/O port address conflict occurs.
278h	378h	Can be disabled via ADVANCED CHIPSET SETUP. If changed to 278h, an I/O port address conflict occurs.
378h, 278h	Disabled	If changed to 378h or 278h, an I/O port address conflict occurs.

P3 is the parallel port on the motherboard. If disabled via Setup, do not attach any device to P3. J18 configures the IRQ for the onboard parallel port. If the onboard parallel port is disabled, remove the jumper block from J18 to disable the onboard parallel port interrupt. The J18 settings are:

Jumper	**Pins Shorted**	**Description**
J18	Pins 1-2	IRQ5 selected for the onboard parallel port.
J18	Pins 2-3	IRQ7 selected for the onboard parallel port (Default).

On Board Floppy Controller

Enable to use the onboard floppy controller, which is connected to P6. The settings are Enabled or Disabled.

On Board IDE Controller

Enable this option to use the onboard IDE hard disk drive controller. Make sure that the IDE cable is connected to P7.

8-bit DMA Active Clock

Settings are 2, 3, or 4 CLKs. This option sets the number of clock cycles the command is active for 8-bit DMA cycles.

16-bit DMA Active Clock

Settings are 2, 3, or 4 CLKs. This option sets the number of clock cycles the command is active for 16-bit DMA cycles.

DMA Clocks

This option sets the rate at which the DMA clocks operate. The settings are SCLK/2 or SCLK.

Command Delay, 8-bit Cycle

If Yes, one extra command delay for 8- and 16-bit I/O and 8-bit memory cycles is set. The settings are Yes or No.

Command Delay, 16-bit Cycle

If Yes, one extra command delay for 16-bit memory cycles is set. The settings are Yes or No.

8-bit I/O Wait States

The AT-compatible value is 4 wait states. The settings are 4 wait states or 5 wait states.

16-bit I/O Wait States

The AT-compatible setting is 0 wait states. The settings are 0 or 1 wait states.

Section 5

POWER MANAGEMENT SETUP

The Power management AMIBIOS Setup screen includes options that must be configured appropriately for proper operation of a system that has power conservation features.

A sample power management AMIBIOS Setup screen is shown below. The sample options for this screen are described in the following pages. The Power Management AMIBIOS screen that appears in AMIBIOS Setup in your system may be entirely different. Unless you have a laptop, notebook, or portable computer that has power management needs, the AMIBIOS Setup in your computer probably does not have POWER MANAGEMENT SETUP.

Sample POWER MANAGEMENT SETUP Options

LCD Power Down Timeout

When this option is set, the LCD and backlight are turned off at the end of the selected timeout period if the system does not find any external activities (such as keyboard activity). *Shadowing options cannot be disabled if this option is active.* The settings are *Disabled, 1 min., 2 min., 3 min., 4 min., 5 min., 6 min., 7 min., 8 min., 9 min., 10 min., 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 min,* or *Reserved.* The BIOS Setup and Power-On default is *Disabled.*

Hard Disk Idle Timeout

When this option is set, the hard disk is set to power save mode at the end of the selected timeout period if not accessed. *Shadowing cannot be disabled if this option is active.*

The settings are *Disabled, 1 min., 2 min., 3 min., 4 min., 5 min., 6 min., 7 min., 8 min., 9 min., 10 min., 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 min,* or *Reserved.* The BIOS Setup and Power-On default is *Disabled.*

Sleep Mode Timeout

When this option is set, the system goes to sleep at the end of the selected timeout period if no external activities (such as keyboard activity) occur. *Shadowing cannot be disabled if this option is active.*

The settings are *Disabled, 1 min., 2 min., 3 min., 4 min., 5 min., 6 min., 7 min., 8 min., 9 min., 10 min.,* or *Reserved.* The BIOS Setup and Power-On default is *Disabled.*

Suspend Timeout

When this option is set, the system is suspended at the end of the selected timeout period if no external activities (such as keyboard activity) occurs. *Shadowing cannot be disabled if this option is active.*

The settings are *Disabled, one minute increments from 1 min. through 30 min.,* or *Reserved.* The BIOS Setup and Power-On default is *Disabled.*

Manual Suspend Mode

When this option is set, the system is suspended at the end of the selected timeout period if no external activities (such as keyboard activity) occurs during the timeout period. Suspend is initiated via an external switch. *Shadowing cannot be disabled if this option is active.* The settings are *Disabled* or *Enabled.* The BIOS Setup and Power-On default is *Disabled.*

Hot Key Power Down

When this option is set, the system is suspended when the <Ctrl> <Alt> <Enter> keychord is pressed. Shadowing cannot be disabled if this option is active. The settings are Disabled, Sleep, or Suspend. If Sleep is selected, the system enters Sleep Mode when the hot key is pressed. If Suspend is selected, the system enters a Suspend state when the hot key is pressed. The settings are *Disabled* or *Enabled.* The BIOS Setup and Power-On default is *Disabled.*

Software Power Down Mode

When this option is set, the system allows applications software to issue INT 77h (which corresponds to hardware interrupt IRQ15) to initiate a forced Sleep Mode or Suspend state. Shadowing cannot be disabled if this option is active.

The settings are *Disabled, Sleep,* or *Suspend.*The settings are *Disabled* or *Enabled.* If Sleep is selected, an INT 77h issued to the system places the system in Sleep Mode. If Suspend is selected, an INT 77h initiates a Suspend state. The BIOS Setup and Power-On default is *Disabled.*

Low Battery Power Warning

When this option is set, the system issues warnings of low power conditions. Shadowing cannot be disabled if this option is active.

The settings are *Disabled, Beep* (the system beeps 4 times every minute), *Sleep* (the system beeps 4 times every minute, then enters Sleep Mode), or *Suspend* (the system beeps 4 times every minute and the initiates a Suspend state). The BIOS Setup and Power-On default is *Disabled.*

Section 6

PERIPHERAL SETUP

The PERIPHERAL SETUP screen includes options that control an external peripheral controller. PERIPHERAL SETUP only appears in AMIBIOSes dated 12/91 or later. This screen is configured via AMIBCP.

A sample PERIPHERAL SETUP screen, for C&T 82C711 Peripheral Controller support, is shown below. The sample options for this screen are described in the following pages. Different options may appear on the PERIPHERAL SETUP screen if the system has a different peripheral controller.

PERIPHERAL SETUP Options

Programming Option

AMIBIOS automatically detects all adapter cards installed in the system and configures the onboard ports accordingly with *Auto.* The settings are *Auto* or *Manual.* The BIOS and Power-On default is *Auto.* All other PERIPHERAL SETUP options are ignored if *Auto* is selected.

On-Board Floppy Drive

This option enables the floppy controller on the motherboard, if installed. The settings are *Enabled* or *Disabled.* The BIOS and Power-On default is *Disabled.*

On-Board IDE Drive

This option enables the IDE controller on the motherboard, if installed. The settings are *Enabled* or *Disabled.* The BIOS and Power-On defaults are *Disabled.*

First Serial Port Address

This option enables serial port 1 on the motherboard, if installed. The BIOS and Power-On defaults are *Disabled.* The settings are *Enabled* or *Disabled.*

Second Serial Port Address

This option enables serial port 2 on the motherboard, if installed. The BIOS and Power-On defaults are *Disabled.* The settings are *Enabled* or *Disabled.*

Parallel Port Address

This option enables the parallel port on the motherboard, if installed. The settings are *Enabled* or *Disabled.* The BIOS and Power-On defaults are *Disabled.*

IRQ Active State

The settings are *Low* or *High.* The BIOS and Power-On defaults are *High.*

Parallel Port Mode

The settings are *Extended* or *Normal.* The BIOS and Power-On defaults are *Normal.*

Section 7

AMIBIOS Password Support

AMIBIOS Setup has an optional password feature. The system can be configured so the end user is required to enter a password every time the system boots or when AMIBIOS Setup is executed.

Bypassing Password Support

The end user can bypass password support by pressing <Enter> when the password prompt appears.

Enabling Password Support

The password check option is enabled in ADVANCED CMOS SETUP (see page) by choosing either *Always* or *Setup*. The password (1 – 6 characters) is stored in CMOS RAM.

If a Password is Used

The end user must correctly type the current password when

```
enter CURRENT Password
```

appears. After the current password has been correctly entered, the end user is asked to retype it.

If the password confirmation is incorrect, an error message appears. If the new password confirmation is entered without error, the end user presses <Esc> to return to the AMIBIOS Setup Main Menu.

Password Support, Continued

Password Storage

The password is stored in CMOS RAM after Setup completes. The next time the system boots, the end user must enter the password if the password function is present and has been enabled.

Using a Password

The end user should keep a record of the new password when the password is changed. If he forgets the password and password protection is enabled, the only way to boot the system is to disable CMOS RAM by removing the battery for at least 20 minutes, replacing it, rebooting, and reconfiguring the system.

Section 8

Hard Disk Utility

AMIBIOS includes three hard disk utilities:

Utility	Purpose	Turn to
Hard Disk Format	Performs a low level format of the hard drive(s). Read the system or hard disk drive documentation to find out if the hard disk has been preformatted.	Page
Auto Interleave	Determines the optimum interleave factor and then performs a low level format of the hard disk drive.	Page
Media Analysis	Analyzes each hard disk drive track to determine whether it is usable. The track is labeled bad if unusable.	Page 55

The hard disk utility error messages are described on page .

These routines work on drives that use the MFM, RLL, ARLL, or ESDI data recording techniques. *They do not work on IDE or SCSI Disk Drives.*

Warning
AMIBIOS Hard Disk Utilities destroy all hard disk data. Back up the data on the hard disk before running.

When to Use AMIBIOS Hard Disk Utilities

When	Conditions	Run...
Installing a new hard disk.	The hard disk drive manufacturer provided a list of bad tracks, the system documentation includes the optimum interleave factor, and the drive is preformatted.	None
Installing a new hard disk.	You do not have a list of bad tracks.	Media Analysis
Installing a new hard disk.	You do not know the optimum interleave factor.	Auto Interleave
Installing a new hard disk.	The drive is not formatted.	Hard Disk Format
Installing a used hard disk drive.	N/A	All Hard Disk Utilities

When Hard Disk Diagnostics is selected, the following screen appears.

Select an option and press <Enter>.

Hard Disk Format

> *Warning*
> *Hard Disk Format destroys all hard disk data. Back up the data on the hard disk before running.*

This routine does not work on IDE or SCSI drives. Use Hard Disk Format to integrate a new hard disk to the system, or to reformat a used hard disk which has developed bad tracks as a result of aging or poor handling. Select Media Analysis to find bad tracks. The following screen appears when Hard Disk Format is selected.

Hard Disk Format, Continued

Answer the questions on the screen. The first two questions are already completed if only one hard disk drive was selected in STANDARD CMOS SETUP and the cursor is on *Interleave*. The Disk Drive Type is read from CMOS RAM. The interleave factor can be selected manually or determined by the Auto Interleave routine.

The hard disk drive manufacturer usually provides a list of bad tracks. Enter these tracks. They are then labeled as bad to prevent data from being stored on them. The following screen is displayed after entering *Y* in Mark Bad Tracks, pressing <Enter>, and selecting add, delete, revise, or clear from the Bad Track Edit Menu.
Type *Y* and press <Enter>. A warning screen appears. Press any key to continue.

Warning
Data on the hard drive will be irrevocably lost.

Auto Interleave

> *Warning*
> *Auto Interleave destroys hard disk data. Back up the data on the hard disk before running.*

Auto Interleave calculates the optimum interleave factor through trial and error by measuring the transfer rate for four different interleave values. To determine the best interleave factor, the system formats a portion of the hard disk for each transfer rate calculated. The cylinders, heads and sectors formatted for each value is displayed in the activity box. It does not work on IDE or SCSI drives.

Select Auto Interleave on the main Hard Disk Utility Screen and press <Enter>. The following appears.
The cursor is on *Mark Bad Tracks.* The default is *N*. To mark additional bad tracks, type *Y* and press <Enter>.

After selecting options from the Bad Tracks Edit Menu, press <Esc>. Type *Y* and press <Enter> to proceed with the Auto Interleave process. A warning screen appears. Press <Enter> to return to the main Hard Disk Utility screen. To proceed, type *Y* and press <Enter>.

Media Analysis

Media Analysis performs a series of tests to locate bad or damaged tracks on the hard disk as a result of aging or poor handling. This utility locates all bad tracks and lists them in the Bad Track List Box. Since this test writes to all cylinders and heads on the hard disk to verify any bad tracks, the test requires several minutes to complete. For best results, run this test in its entirety. Media Analysis does not work on IDE or SCSI drives.

Select *Media Analysis* from the main Hard Disk Utility Menu and press <Enter>. The following screen appears.

The cursor is on *Proceed.* The warning screen appears. Press <Enter> to stop. The main Hard Disk Utility screen appears. Type Y and press <Enter> to perform the hard disk drive analysis.

Hard Disk Utility Error Messages

Initialization Errors

Message	Explanation
No Hard Disk Installed	There is no hard disk drive in the system but Hard Disk Utility was selected.
FATAL ERROR Bad Hard Disk	No response from the hard disk, or the hard disk is not repairable. Check all cable and power connections to the hard disk.
Hard Disk Controller Failure	Error response from the reset command sent to the hard disk controller. The controller may not be seated properly in the BUS slot.
C: (D:) Hard Disk Failure	The hard disk drive (C: or D:) is not responding to commands. Check power and cable connections to the hard disk.

Hard Disk Utility Error Messages, Continued

Operation Errors

Message	Explanation
Address Mark Not Found	The address mark (initial address) on the hard disk could not be found.
Attachment Failed to Respond	No response has been received from the hard disk drive.
Bad ECC on Disk Read	When the hard disk drive utility writes to the disk, it also calculates an ECC (Error Correction Code) value for the data being written. This ECC value is written to the drive and then read back. The value read back is different from the one calculated.
Bad Sector Flag Detected	An operation was performed on a sector that has been flagged as bad.
Controller Has Failed	A diagnostic command was issued to the controller failed.
Drive Not Ready	An operation on the hard disk drive has timed out. The hard disk drive utility has waited beyond a preset specified time limit.
Drive Parameter Activity Failed	A reset command was sent to the controller followed by drive parameters. Using these parameters, the controller did not get a response from the hard disk. Make sure the drive type is correct.
ECC Corrected Data Error	The ECC value (explained above) read from the disk is not the same value which was written to the disk. The data is not correct. An attempt was made to correct the data, but the ECC value is not corrected.
Requested Sector Not Found	The requested sector could not be found.
Reset Failed	The reset command did not properly reset the hard disk.
Seek Operation Failed	A seek command failed. A seek operation is the act of finding a particular sector on the hard disk.

Undefined Error - Command Aborted	An unidentifiable error condition occurred.
Write Fault on Selected Drive	A write fault occurred during the write operation on the hard disk drive.

Appendix A

BIOS Identification Strings

AMIBIOS stores three strings of information that identify system BIOS options. Identification String 1 appears at the bottom of the screen during system boot. Press <Ins> during system boot to display Identification Strings 2 and 3.

Identification String Line 1

The AMIBIOS ID String 1 format is:

```
xx-xxxx-xxxxxxx-xxxxxxxx-xxxxxx-xxxxxxxx-x

12 4-7  9-15    16-23    25-30  32-39    41
```

Byte	Description
1	Processor Type 0 8086 or 8088 2 80286 3 80386 4 80486
2	Size of BIOS 0 64 KB 1 128 KB
4–5	Major Version Number
6–7	Minor Version Number
9–14	Reference Number
16	Halt on Post Error. Set to 1 if On.
17	Initialize CMOS in every boot. Set to 1 if On.
18	Block pins 22 and 23 of the keyboard controller. Set to 1 if On.
19	Mouse support in system AMIBIOS or keyboard controller. Set to 1 if On.
20	Wait for <F1> if error found. Set to 1 if On.
21	Display Floppy error during POST. Set to 1 if On.
22	Display Video error during POST. Set to 1 if On.

23	Display Keyboard error during POST. Set to 1 if On.
25–26	BIOS Date. Month (1-12).
27–28	BIOS Date. Date (1-31).
29–30	BIOS Date. Year (0-99).
32–39	Chipset Identification. BIOS Name.
41	Keyboard controller version number.

Identification Strings, Continued

Identification String Line 2

```
xxx     xxxx-xxxxxxx-xxxxxxxx-xxxxxx-xxxxxxxx-x

12      4-7  9-15    16-23    25-30  32-39    41
```

Byte	Description
1–2	Pin number for clock switching through keyboard controller.
3	Indicates High signal on pin switches clock to High(H) or Low (L).
5	Clock switching through chipset registers 0 No clock switching through chipset registers. 1 Clock switching through chipset registers.
7–10	Port address to switch clock high through special port.
12–13	Data value to switch clock high through special port.
15–16	Mask value to switch clock high through special port.
18–21	Port Address to switch clock low through special port.
23–24	Data value to switch clock low through special port.
26–27	Mask value to switch clock low through special port.
29–31	Turbo Switch Input Pin information (Pin number for Turbo Switch Input Pin).

Identification String Line 3:

```
xxx-x-xxxx-xx-xx-xxxx-xx-xx-xx        -x      -x

1-3 5 7    11 14 17   22 25 28        31      33
```

Byte	Description
1–2	Keyboard Controller Pin number for cache control.
3	Keyboard Controller Pin number for cache control. Indicates whether High signal on the pin enables (H) or disable (L) cache.
5	1 The High signal is used on the Keyboard Controller pin.
7–9	Cache Control through Chipset Registers: 0 Cache control off 1 Cache Control on
11–12	Port Address to enable cache through special port.

14–15	Data value to enable cache through special port.
17–20	Mask value to enable cache through special port.
22–23	Port Address to disable cache through special port.
25–26	Data value to disable cache through special port.
28–29	Mask value to disable cache through special port.
31	Reset memory controller Pin number for Resetting the 82335 Memory controller.
33	BIOS Modified Flag Incremented each time AMIBIOS is modified, from 1 to 9, then from A to Z, and then reset to 1. 0 AMIBIOS has not yet been modified.

Appendix B

CMOS RAM Map

A map of CMOS RAM as configured by the 06/06/92 core AMIBIOS is shown in the following table.

Offset	Description
00h - 0Fh	Standard IBM AT compatible RTC and Status Register data definitions.
10h	Floppy Drive Type Bits 7-4 Drive A: Type 0 No Drive 1 360 KB Drive 2 1.2 MB Drive 3 720 KB Drive 4 1.44 MB Drive 5 2.88 MB Drive 6-16 Reserved Bits 3-0 Drive B: Type (bit settings same as A)
11h	Keyboard Typematic Data Bit 7 Typematic Rate Programming (1 = Enabled) Bits 6-5 Typematic Rate Delay (in milliseconds) 00b 250 ms 01b 500 ms 10b 750 ms 11b 100 ms Bits 4-2 Typematic Rate (in characters per second) 000 6 cps 001 8 cps 010 10 cps 011 12 cps 100 15 cps 101 20 cps 110 24 cps 111 30 cps
12h	Hard Disk Data Bits 7-4 Hard Disk Drive C: Type 0 No drive 1-14 Hard drive Type 1-14 16 Hard Disk Type 16-255 (actual Hard Drive Type is in CMOS RAM 1Ah) Bits 3-0 Hard Disk Drive D: Type (Same as C:)
13h	Bit 7 Mouse Support Option (1 = Enabled) Bit 6 Above 1 MB Memory Test (1 = Enabled) Bit 5 Memory Test Tick Sound (1 = Enabled) Bit 4 Memory Parity Error Check (1 = Enabled) Bit 3 Hit <DEL> Message Display (1 = Enabled) Bit 2 Hard Disk Type 47 RAM Area (1 = 0:300) Bit 1 Wait for <F1> Message if Any Error (1 = Enabled)

	Bit 0 System Boot Up Num Lock (1 = On)
14h	Equipment Byte Bits 7-6 Number of Floppy Drives 00b 1 Drive 01b 2 Drives 10b-11b Reserved Bits 5-4 Monitor Type 00b Not CGA or MDA 01b 40x25 CGA 10b 80x25 CGA 11b MDA (Monochrome) Bit 3 Display Enabled (1 = Enabled) Bit 2 Keyboard Enabled (1 = Enabled) Bit 1 Math coprocessor installed (1 = Enabled) Bit 0 Floppy Drive installed (0 = On)
15h	Base Memory (in 1 KB increments), Low Byte
16h	Base Memory (in 1 KB increments), High Byte
17h	Extended Memory (in 1 KB increments), Low Byte
18h	Extended Memory (in 1 KB increments), High Byte (Max 15 MB)
19h	Hard Disk C: Drive Type 0-15 Reserved 16-255 Hard Drive Type 16-255
1Ah	Hard Disk D: Drive Type (Same as Drive C: above)
1Bh	User-Defined Drive C: - # of Cylinders, Low Byte
1Ch	User-Defined Drive C: - # of Cylinders, High Byte
1Dh	User-Defined Drive C: - Number of Heads
1Eh	User-Defined Drive C: - Write Precompensation Cylinder, Low Byte
1Fh	User-Defined Drive C: - Write Precompensation Cylinder, High Byte
20h	User-Defined Drive C: - Control Byte (80h if # of heads is equal or greater than 8)
21h	User-Defined Drive C: - Landing Zone, Low Byte
22h	User-Defined Drive C: - Landing Zone, High Byte
23h	User-Defined Drive C: - # of Sectors
24h	User-Defined Drive D: - # of Cylinders, Low Byte
25h	User-Defined Drive D: - # of Cylinders, High Byte
26h	User-Defined Drive D: - Number of Heads
27h	User-Defined Drive D: - Write Precompensation Cylinder, Low Byte
28h	User-Defined Drive D: - Write Precompensation Cylinder, High Byte
29h	User-Defined Drive D: - Control Byte (80h if # of heads is equal or greater than 8)

2Ah	User-Defined Drive D: - Landing Zone, Low Byte
2Bh	User-Defined Drive D: - Landing Zone, High Byte
2Ch	User-Defined Drive D: - # of Sectors
2Dh	Configuration Options Bit 7 Weitek Processor (1 = Present) Bit 6 Floppy Drive Seek At Boot (1 = Enabled) Bit 5 System Boot Up Sequence (1 = A:,C:) Bit 4 System Boot Up CPU Speed (1 = High) Bit 3 External Cache Memory (1 = Enabled) Bit 2 Internal Cache Memory (1 = Enabled) Bit 1 Fast Gate A20 Option (1 = Enabled) Bit 0 Turbo Switch Function (1 = Enabled)
2Eh	Standard CMOS Checksum, High Byte
2Fh	Standard CMOS Checksum, Low Byte
30h	Extended Memory, Low Byte
31h	Extended Memory, High Byte (Maximum 15 MB)
32h	Century Byte (BCD value for the century)
33h	Information Flag Bit 7 System BIOS Size (1 = 128 KB) Bits 6-0 Reserved
34h	Bit 7 Boot Sector Virus Protection 0 Disable 1 Enable Bit 6 Password Checking Option 0 Always 1 Setup Bit 5 Adaptor ROM Shadow C800,16K (1 = Enabled) Bit 4 Adaptor ROM Shadow CC00,16K (1 = Enabled) Bit 3 Adaptor ROM Shadow D000,16K (1 = Enabled) Bit 2 Adaptor ROM Shadow D400,16K (1 = Enabled) Bit 1 Adaptor ROM Shadow D800,16K (1 = Enabled) Bit 0 Adaptor ROM Shadow DC00,16K (1 = Enabled)
35h	Bit 7 Adaptor ROM Shadow E000,16K (1 = Enabled) Bit 6 Adaptor ROM Shadow E400,16K (1 = Enabled) Bit 5 Adaptor ROM Shadow E800,16K (1 = Enabled) Bit 4 Adaptor ROM Shadow EC00,16K (1 = Enabled) Bits 3-1 Shadow RAM Option (11 = Enabled) Bit 3 System ROM Shadow F000,64K (1 = Enabled) Bits 2-1 Video ROM Shadow C000,32K (11 = Enabled) Bit 2 Video ROM Shadow C000,16K (1 = Enabled) Bit 1 Video ROM Shadow C400,16K (1 = Enabled) Bit 0 Numeric Processor Test (1 = Enabled)
36h - 37h	Reserved
38h - 3Dh	Encrypted Password
3Eh	Extended CMOS Checksum, High Byte (includes 34h - 3Dh)
3Fh	Extended CMOS Checksum, Low Byte (includes 34h - 3Dh)

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