American Megatrends, Inc.

Series 28

EZ-Flex

Base Board

User's Guide

MAN-528
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American Megatrends, Inc.
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Revision History

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Preface

To the OEM

The AMI EZ-Flex system is a state of the art combination of a Base Board and CPU Cards that includes the AMI Hi-Flex EISA BIOS. It is assumed that you have licensed the rights to the AMI documentation for the AMI EZ-Flex.

This manual was written for the OEM to assist in the proper installation, use, and operation of the EZ-Flex products. This manual is not meant to be read by the computer owner who purchases a computer with the EZ-Flex Base Board. It is assumed that you, the computer manufacturer, will use this manual as a sourcebook of information, and that parts of this manual will be included in the computer owner's manual.

Technical Support

If an AMI EZ-Flex Base Board or CPU Card fails to operate as described or you need more information, call AMI technical support at 404-246-8600.

Acknowledgments

This manual was written by Paul Narushoff, who gratefully acknowledges the assistance of Terry Lauer and Sukha Ghosh.

What You Should Have Received

When you received the AMI EZ-Flex System, you should have received:

- an EZ-Flex Base Board and an EZ-Flex CPU Card,
- an EISA Configuration Utility (ECU) and the *AMI ECU User's Guide*,
- the *AMI EZ-Flex Base Board User's Guide* and an *AMI EZ-Flex CPU Card User's Guide*,
- two serial port cables (10-pin berg to 9-pin male DB connector).
- one parallel port cable (26-pin berg to 25-pin female DB connector).

AMI BBS

The AMI BBS permits OEMs, VARs, and system integrators who are AMI customers to access technical information about AMI motherboard and BIOS products. AMI Product Engineering Change Notices, Tech Tips, Technical Notes, and even complete AMI technical manuals are available on the AMI BBS.

Data Transmission Rates

The AMI BBS automatically handles modems with data transmission rates from 1,200 to 14,400 bps.

If using an HST modem, call 404-246-8780.

If using a non-HST modem, call 404-246-8782.

BBS Phone Numbers

The following table lists the characteristics of the AMI BBS phone numbers. The AMI BBS requires no parity, 8 data bits, and 1 stop bit.

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

Chapter 1

Introduction

Overview

AMI EZ-Flex takes a modular approach to CPU selection. Using EZ-Flex, a system is never outdated and the user is always assured of an upgrade path.

Traditional systems place all system parts, including the CPU, math coprocessor, and ROM BIOS, on the motherboard, which makes it difficult to change the basic system configuration.

AMI's EZ-Flex is modular. Many components remain on the motherboard (called a Base Board in an EZ-Flex environment). The Base Board is the main element in an EZ-Flex system.

The AMI EZ-Flex system places the CPU, BIOS ROM, optional coprocessor, cache memory, and several other system elements on a separate CPU Card.

An EZ-Flex system consists of a Base Board and an EZ-Flex CPU Card. The EZ-Flex CPU Card and Base Board connect via a proprietary connector. EZ-Flex CPU Cards with Intel

80486DX and 80486SX, and Intel and AMD 80386DX microprocessors are available. Future Intel processors can easily be supported in the EZ-Flex architecture.

EISA Standards

The AMI EZ-Flex is fully compatible with both EISA and ISA specifications and can run on either 80386, 80486SX, or 80486-based systems, and needs no major architectural changes to run on more advanced Intel microprocessors as they become available.

Convenient, Reliable, Compatible

The AMI EZ-Flex system provides an easy-to-expand foundation based on a few integrated circuits using state of the art surface mount technology (on the CPU Cards), which reduces cost, minimizes potential handling damage and reduces the overall size.

The Result

The EZ-Flex architecture is an integrated EISA system that is also ISA or AT® compatible. Using the AMI EZ-Flex system, an OEM can construct computer systems that can use one of many different microprocessors.

BIOS Features

EISA BIOS

The AMI EZ-Flex includes the AMI Hi-Flex EISA BIOS, specifically tailored for the Intel 82350 chip set. The BIOS ROM reside on the EZ-Flex CPU Cards.

The AMI EZ-Flex BIOS supports system, video, and option ROM shadowing with 16 KB granularity. Like all AMI BIOS products, the BIOS Setup utility resides in ROM and configures all basic components AMI also supplies hard disk utilities in ROM.

Shadowing

The AMI BIOS Setup provides shadowing for system BIOS ROM, video ROM, and option ROMs. Shadow RAM provides significant improvement in system performance and VGA/EGA video throughput. This memory is configured via Setup in the system BIOS.

CMOS RAM

The AMI EZ-Flex BIOS Setup configuration settings are saved in the 64 bytes of CMOS RAM on the EZ-Flex Base Board. CMOS RAM and the clock and calendar are powered by a built-in battery in the RTC/CMOS chip itself. An

additional 4 KB of CMOS RAM is available on the Base Board for EISA configuration data. EISA Extended CMOS RAM is powered by the same battery used for the RTC (real time clock).

I/O Features

Built-in I/O

The EZ-Flex system contains built-in input/output controllers to save both money and system setup time. The controllers can be configured by the AMI EISA BIOS Setup. The controllers include:

- two serial ports, which are software-configurable for COM 1, COM2, COM3, or COM4, or can be disabled by the EISA Configuration Utility (ECU). Additional serial ports can be configured using adapter cards in expansion slots. The interrupts can also be configured by the ECU. The serial port connectors are 10-pin dual-inline bergs.

- a parallel printer port, software configurable to LPT1 or LPT2, or disabled by the ECU. Interrupts are configured by the ECU. The parallel port connector is a 26-pin dual-inline berg connector.

- a floppy drive controller that supports up to two low or high density and 3½ or 5¼ inch drives. An Intel 82077AA diskette controller and standard 34-pin floppy connectors are provided.

- Mouse support. The IBM® PS/2-type mouse is supported. A five-pin berg is provided to attach to a standard AT-type mouse cable. A five-pin to six-pin miniDIN adapter is needed to attach the PS/2 mouse.

- AT® and PS/2®-compatible keyboards are supported. A five-pin DIN plug for AT-compatible keyboards and a five-pin berg for PS/2-compatible keyboards are provided.

I/O Features, Continued

Expansion Slots

The EZ-Flex Base Board contains seven expansion slots for additional system expansion. These slots can be used for video graphics, SCSI Host Adapters, or other adapter cards.

Memory Features

Simple Memory Expansion

The EZ-Flex Base Board provides easy memory expansion using industry-standard fast page mode 70 ns RAS access time 30-pin SIMMs (Single Inline Memory Modules).

The SIMMs on the EZ-Flex Base Board must all be the same type. 256 KB x 9, 1 MB x 9, 4 MB x 9, or 16 MB x 9 SIMMs can be used. A minimum of four SIMMs must be installed.

Page Mode and Bank Interleave

The EZ-Flex can use dynamic random access memory (DRAM) accessed in page mode. Page mode DRAMs permit near zero wait state operation since page mode access time to the DRAMs is significantly faster than a normal access.

All SIMM memory is paged.

If one bank of memory is present (one bank consists of four SIMMs) memory is paged. If both banks of memory are present (eight SIMMs), memory is paged interleaved.

The page size is 1 KB if memory is present in Bank 1 only. It is 2 KB if memory is present in both banks.

Bank interleave is used when groups of SIMMs are installed. This technique interleaves 2 banks of DRAM SIMMs by alternating accesses between them, further reducing the access time to the DRAMs and allowing virtually zero wait state operation.

Chapter 2

EZ-Flex Architecture

Instead of a conventional motherboard, an AMI EZ-Flex system has two elements: a Base Board and a CPU Card.

Base Board

The AMI EZ-Flex Base Board has all the features of a high-performance EISA motherboard except a CPU. The Base Board includes seven expansion slots (including six EISA bus master slots). The Base Board has three power connectors. A total of 128 MB of RAM can reside in the eight SIMM slots.

CPU Card

The microprocessor, external math coprocessor, BIOS ROM chips, memory cache, and other ICs are on the CPU Card. The CPU Card plugs into a 160-pin connector on the Base Board. The Base Board contains the bulk of the standard EISA system architecture.

Cache Memory

All memory on the Base Board can be accessed by the EZ-Flex memory caching subsystem, which uses either write-through or write-back

caching. See the appropriate *AMI EZ-Flex CPU Card User's Guide* for details. Memory on EISA Adapter Cards is not cached by the EZ-Flex external cache, since memory on the bus cannot be easily handled by the write-back cache algorithm.

The Intel 82350 Chip Set

The AMI EZ-Flex Base Board uses the following chips:

one Intel 82357 - Integrated System Processor
one Intel 82358-33 EISA Bus Controller
two Intel 82352 - EISA bus buffer

Processor Configurations

The EZ-Flex CPU Card are available in a range of CPUs and CPU speeds. See the following table.

Feature	**80486DX/ 80486DX-2**	**8046SX**	**80386DX** (Intel/AMD)
Clock Speeds	25, 33, and 50 MHz	16, 20, and 25 MHz	33 or 40 MHz
External Cache Memory	128 KB	None	64 KB or 256 KB
Type of Cache	Write-back	None	Write-back
Cache Read wait states	0	Not Applicable	0
Cache Write wait states	1	Not Applicable	0
External Math Coprocessor	Weitek 4167	Weitek 4167 Intel 80487SX	Intel 80387 Weitek WTL3167 Cyrix 83D87 and other 80387 clones
Additional Features	Burst Mode	Burst Mode	

Chapter 3

EZ-Flex Base Board Specifications

Board Size

The board is approximately 8.55 inches wide and 13 inches long. It contains the standard mounting holes of the standard XT and Baby AT format and can be mounted in most Baby AT or XT chassis. The EZ-Flex is 100% AT-compatible and works with all ISA and EISA adapter cards. The following graphic displays the dimensions of the EZ-Flex Base Board.

Additional Filters

The Base Board has additional RF filters (left center edge) that can be used if the system has trouble passing the FCC Class B RF Emissions test. See locations LC001 - LC008 on the EZ-Flex Base Board.

EZ-Flex Base Board Specifications

The CPU Card Connector

The 160-pin connector used for the EZ-Flex CPU Cards has four rows of forty pins each. There are guides on the CPU Card connector, making it easy to install.

CPU

There is no CPU on the EZ-Flex Base Board. The CPU is on an AMI EZ-Flex CPU Card. The EZ-Flex CPU Cards are: EZ-Flex 80486 CPU Card, 80386 CPU Card, and 80486SX CPU Card. There is a separate AMI manual for each EZ-Flex CPU Card.

Math Coprocessor

The optional math coprocessor also resides on the EZ-Flex CPU Card. See the *AMI CPU Card User's Guides* for more information about math coprocessors.

Cache Memory

AMI EZ-Flex CPU Cards can have 64 KB, 128 KB, 256 KB, or 512 KB of cache memory. See the *AMI CPU Card User's Guides* for more information about cache memory.

EZ-Flex Base Board Specifications, Continued

Chip Set

The EZ-Flex uses Intel EISA chips and discrete logic.

Memory Architecture

Page/Interleave is used when BANK1 and BANK2 are filled. Page mode is used when BANK1 is filled.

Maximum RAM

Up to 128 MB (using 16 MB x 9 SIMMs) can be installed on the EZ-Flex Base Board.

Memory Speed

The AMI EZ-Flex Base Board requires SIMMs with a RAS access time of 70 ns.

Wait States

Memory access for both read and write requires zero wait states.

640K - 1024K Memory Area

This area can be used for Shadow RAM.

Memory Configurations

The EZ-Flex Base Board supports 1 MB, 2 MB, 4 MB, 8 MB, 16 MB, 32 MB, 64 MB, and 128 MB of Base Board RAM.

EZ-Flex Base Board Specifications, Continued

Onboard I/O

The EZ-Flex Base Board contains two AT-compatible serial ports, one AT-compatible parallel port, and one floppy disk controller.

Dimensions

The AMI EZ-Flex Base Board is 8.55" wide by 12" long.

Expansion Slots

There are six EISA bus mastering expansion slots and one non-bus master slot on the EZ-Flex Base Board.

Bus Speed

The AMI EZ-Flex Base Board bus operates at standard ISA or EISA bus speeds.

Turbo Speed Mode

Speed is controlled by a turbo switch that can be mounted on the front panel of the chassis and can also be controlled through the keyboard via the BIOS <Ctrl> <Alt> <+> or <-> keychords.

Software Compatibility

The EZ-Flex system is compatible with MS-DOS®, PC-DOS®, OS/2®, Unix™, Xenix®, and any other Intel 80386/80486-based operating system. It is also compatible with all multiuser DOS operating systems.

Chapter 4

Installation

EZ-Flex installation is a simple procedure because many of the hardware jumpers and switch setting found on many motherboards have been removed. This chapter discusses how to connect the various connectors found in a typical computer chassis.

Unpacking

Step	Action
1	Inspect the cardboard carton for obvious damage. If damaged, call AMI Technical Services at 404-263-8181. Leave the EZ-Flex board in its original packing until you are ready to install it.
2	Perform all unpacking and installation procedures on a ground connected anti-static mat. The operator should wear an anti-static wristband, grounded at the same point as the anti-static mat. Or use a sheet of conductive aluminum foil grounded through a 1 megohm resistor instead of the anti-static mat. Similarly, a strip of conductive aluminum foil wrapped around the wrist and grounded through a 1 megohm resistor serves the same purpose.
3	Inside the carton, the EZ-Flex board is packed in an anti-static bag, and sandwiched between sheets of sponge. Remove the sponge and remove the anti-static bag. Place the EZ-Flex board on a grounded anti-static surface component-side up. Save the original packing material in case of reshipment.
4	Inspect the board for damage. Press down on all ICs mounted in sockets to verify proper seating. Do not apply power if the board has been damaged.
5	If the board is undamaged, it is ready to be installed.

Troubleshooting

Technical Support Calls

Before you call AMI technical support (404-246-8600), have the following information available:

- The serial number and revision number of the board.
- The SIMM types and speed.
- The system BIOS reference number.
- A list of the adapter cards installed to the system.
- A clear description of the problem.

Warning

The AMI EZ-Flex main processor board contains sensitive electronic components which can be easily damaged by static electricity. Follow the instructions carefully to ensure correct installation and to avoid static damage.

Notes

☐ Make sure that SW01 is always Off. It is used only for manufacturing tests.

☐ The EZ-Flex Base Board has a resettable fuse. It automatically resets after a certain time period. The end user does not have to disassemble the system to replace the fuse.

☐ The AMI EZ-Flex Base Board includes an AMI Keyboard Controller.

Assembly Steps

The steps for assembling a system that uses the AMI EZ-Flex Base Board and an EZ-Flex CPU Card are shown in the following table. Each step is discussed in detail in the following pages.

Step	Action	Turn to
1	Set switches.	Page
2	Install SIMMs.	Page
3	Install Base Board.	Page
4	Connect the power supply.	Page
5	Connect the keyboard.	Page
6	Connect the mouse.	Page
7	Connect cables.	Page
8	Install adapter cards.	Page
9	Install floppy disk drives.	Page
10	Perform initial test and configuration.	Page

EZ-Flex Base Board Layout

The graphic on the following page display the layout of the EZ-Flex Base Board. Refer to this graphic as you assemble the EZ-Flex system.

Step 1 Set Switches

The only switch on the EZ-Flex Base Board, SW01, is the manufacturing test switch and should always be OFF. The AMI EZ-Flex Base board is shipped with factory set jumper settings that should not be changed.

SW01

The DIAG SW01-1 switch is used for factory testing only. It must remain Off.

COL/MONO

The SW01-2 switch sets the type of video display adapter. This switch is factory set Off for a Monochrome display. Set On to use a color display (CGA). The switch has no effect with EGA or VGA.

Step 2 Install SIMMs

The AMI 486 EZ-Flex Base Board memory system consists of two 32-bit DRAM memory banks. Both banks use Single Inline Memory Module (SIMM) DRAMs and are labeled BANK1 and BANK2 on the Base Board.

Use 256 KB x 9, 1 MB x 9, 4 MB x 9, or 16 MB x 9 SIMMs. All SIMMs must support column address strobe (CAS) before row address strobe

(RAS) refresh and should have fast page mode accessing capability. The minimum number of SIMMs is four (one bank of memory). SIMMs in a given bank must be the same size. The SIMM slots on the EZ-Flex Base Board are labeled BANK1 and BANK2.

Step 2 Install SIMMs, Continued

Installing SIMMs

SIMMs must be installed or removed with care to make sure that the sockets are not damaged. The latching tabs on the sockets must be handled carefully so as to not break them off. Make sure the SIMMs are firmly in place for reliable operation. Make sure that the modules do not interfere with adjacent expansion slots. See the following figure.

Gently slide the SIMMs into the socket. Tilt the SIMMs away from the latching tangs. Once the SIMM is seated, move it towards the tangs until it snaps in place, which does not require much force. SIMMs are keyed to make them difficult to install incorrectly.

Selecting SIMMs

Parameter	Specification
Page Mode	Fast
Refresh	CAS before RAS
t_{CAC}	≤ 20 ns
t_{RAC}	≤ 80 ns
t_{AA}	≤ 45 ns
t_{RP}	80 ns

t_{CPA}	≤ 45 ns

SIMM Part Numbers

Memory Type	Manufacturer	Part Number
256 KB x 9	Siemens®	HYB514256AJ-70
1 MB x 9	Fujitsu®	MB85235-70
	Toshiba®	THM91070AS-70 THM91000AS-70
	Motorola®	MCM91000S-70 MCM91430S-70
	Oki®	MSC2312A-704S9
	NEC®	MC-42100A9-70
	Samsung®	KMM591000AN-7
	Siemens	HYM910005-70
4 MB x 9	Motorola	MCM94000A-70
	Samsung	KMM594000A-70
	Oki	MSC2340-70459
16 MB x 9	Mitsubishi	MH16M09J-7
	Mitsubishi	MH16M09TJ-7
	Samsung	KMM5916000-7

SIMM Sockets

The SIMM sockets permit up to 128 MB of onboard high speed (70 ns) memory. The standard SIMM 30-pin module is supported. The memory configurations are:

Total Memory	Quantity	Type	Location
1 MB	4	256 KB x 9	Bank 1
2 MB	8	256 KB x 9	Banks 1 and 2
4 MB	4	1 MB x 9	Bank1
8 MB	8	1 MB x 9	Banks 1 and 2

16 MB	4	4 MB x 9	Bank 1
32 MB	8	4 MB x 9	Banks 1 and 2
64 MB	4	16 MB x 9	Bank 1
128 MB	8	16 MB x 9	Banks 1 and 2

Step 3 Install Base Board

Orient the board so that the keyboard connector and the expansion slot connectors are near the back. The EZ-Flex Base Board is not supplied with mounting hardware, which normally comes with the chassis. The hardware typically contains screws and standoffs to mount the chassis as well as insulate it from the case. At least one mounting hole must have a metal standoff which grounds the Base Board to the chassis.

Caution
Attach a ground wire from any bare metal area on the main chassis to the same grounding point as the wrist strap to protect the board from electrostatic discharge.

The EZ-Flex Base Board fits in any standard Baby AT chassis. Remove the chassis cover and position the chassis beside the board.

Step	Action
1	Carefully position the board inside the case.
2	Determine the position of the holes for the plastic standoffs.
3	Place the Base Board on a piece of the shipping foam and firmly press the standoffs into the required holes until the locking pins snap in place.
4	On the chassis, install the plastic edge supports in the required holes.
5	Install the metal standoffs in the drilled screw holes on the chassis. Do not strip the threads.
6	Slide the Base Board into the chassis, making sure that the stand-offs fit in the slots. Make sure that the Base Board is level with the chassis. The edge of the Base Board should fit in the mounted plastic clips. If the Base Board is not seated properly, remove it carefully and try again.
7	Put the two Base Board mounting screws in the holes provided for them and tighten them. The Base Board can be shifted slightly to align the screw mounting holes on the Base Board with those on the chassis.

Step 4 Connect the Power Supply

The power supply should match the physical configuration of the chassis. Make sure that the power switch is Off before installing. Before attaching all components, make sure that the proper voltage was selected. Power supplies often can run on a wide range of voltages, but must be set (usually via a switch) to the proper range. Use at least a 200 watt power supply, which should have built-in filters to suppress radiated emissions.

Power Supply Connectors

The power supply is connected to PS001 and PS002 on the Base Board. PS003 is available as an additional power connector.

Step 4 Connect the Power Supply, Continued

See the figure above for the location of connectors PS001 and PS002, standard six-pin power supply connectors. AT-compatible power supplies have two six-pin connectors that are inserted in PS001 and PS002. The six-pin connector with 3 red wires and 2 black wires is connected to PS002 and the remaining six-pin connector is connected to PS001. Not all power supply vendors conform to the standard color coding scheme. PS003 is provided because some 400 watt power supplies have a third connector.

A standard 200 - 250 Watt power supply may not be not sufficient for the EISA EZ-Flex Base Board if all EISA expansion slots are filled with EISA compatible adapters. A third power supply connector, PS003, provides for extra power. Some 400 Watt power supplies have an extra six-pin connector which can be connected to PS003. See the following graphic.

Step 4 Connect the Power Supply,
Continued

Power Supply Pinout

The pinouts for the power supply connectors are:

PS001 Pinout

Pin	Description
1	Power Good (Orange wire)
2	VCC (Red wire)
3	+12 Volts (Yellow wire)
4	-12 Volts (Blue wire)
5	Ground (Black wire)
6	Ground (Black wire)

PS002 Pinout

Pin	Description
1	Ground (Black wire)
2	Ground (Black wire)
3	-5 Volts (White wire)
4	VCC (Red wire)
5	VCC (Red wire)
6	VCC (Red wire)

PS003 Pinout

Pin	Description
1	VCC (Red wire)
2	VCC (Red wire)
3	VCC (Red wire)
4	Ground (Black wire)

5	Ground (Black wire)
6	Ground (Black wire)

Step 4 Connect the Power Supply,
Continued

Cutting Keys

The power connectors are keyed for proper installation. However, with some connectors, keys may have to be removed. You may have to cut Key 6 (last key on the right) on the top of the PS002 connector, key 3 (matches Pin 4) on the top of PS001, and key 5 (next to last on right) on the top of PS003 (if used). See the following graphic:

Step 5 Connect the Keyboard

The keyboard connector P001 is a five-pin DIN socket and is labeled KEYBOARD on the EZ-Flex Base Board. It accepts a regular AT-compatible keyboard. P005 is a five-pin berg that can connect to a PS/2-type keyboard.

P001 and P005 Pinout

Pin	Description
1	Keyboard clock
2	Keyboard data
3	NC
4	GND
5	VCC

Connecting a PS/2 Keyboard to P005

A five-pin DIN to six-pin mini DIN converter is needed to connect a PS/2-type keyboard using P005. Or you can connect a PS/2-type keyboard connector to P005. For this you need a five-pin berg to six-pin DIN Converter to connect a PS/2-type keyboard. PS/2-compatible mouse devices and keyboards have a smaller six-pin DIN connector. The pin connections to the DIN receptacle are different than a five-pin DIN receptacle. The following graphic illustrates the connections that must be made to a six-pin DIN receptacle. This graphic displays a bottom view of the chassis connector and a top view of the connector cable.

Step 6 Connect the Mouse

The mouse connector P003 is a five-pin berg. PS/2-compatible mouses can be connected to this socket via a five-pin berg to six-pin DIN mini-DIN Converter. Connect the mouse cable to P003. The following graphic shows the five-pin berg. The adjacent table lists the pinout.

Pin	Description
1	Mouse clock
2	Mouse data
3	NC
4	GND
5	VCC

Step 7 Connect the Cables

Most connector wires are color-coded. Match the color of the wires leaving the switch or LED to the same pin on the connector end. There can be two connectors with the same color-coded wires. Follow the wire to the switch or LED. Pin 1 of all connectors is labeled to identify the pin orientation when plugging in cables. See the EZ-Flex Base Board graphic on page .

The following cables should be connected to the Base Board from the chassis:

- Reset Switch cable to P016.
- Speaker cable to P013.

- Keyboard Lock cable to P012.
- The turbo switch connects to P014.
- The Turbo LED connects to P015.

Connect P016 Reset Button Connector

P016 is a two-pin single-inline berg. When the Reset button is pressed, the system does a hard reset. Pin 1 is ground and Pin 2 is Hard Reset. The following graphic depicts a cable being attached to the berg.

Connect Speaker Cable to P013

Connect the speaker cable to P013, a four-pin berg. A standard 8 ohm speaker should be connected to P013. The following graphic shows a four-pin berg and connector. The adjacent table shows the pinouts for P013. Pin 1 is labeled on the Base Board.

Pin	Description
1	Speaker Data
2	N/C Key
3	GND
4	+ 5 Volts

Connect P012 Keyboard Lock Connector

P012 can be connected to the front panel power-on LED and keyboard lock switch. The keyboard lock switch disables system boot or entering Setup until the lock is unlocked. P012 is a five-pin single-inline berg.

Pin	Description
1	LED power
2	Key
3	Ground
4	Lock

5	Ground

Connect P014 Turbo Switch Connector

P014 can be connected to a front panel 2-position turbo switch that allows the CPU speed to be altered via this front panel pushbutton. When the button is in (closed), the system operates at low speed. When the button is out (open), the system operates at high speed. The keyboard speed control overrides the front panel speed setting. P014 is a two-pin single-inline berg. Pin 1 is ground and Pin 2 is Mode switch. See the berg connector on page .

Connect P015 Turbo LED Connector

P015 can be connected to a front panel LED to reflect the current CPU operating speed. The CPU speed can be toggled from the keyboard by an OEM-specified (through AMIBCP) keychord, such as <Ctrl> <Alt> <+> and <Ctrl> <Alt> <-> (the default keystroke combinations). P015 is a two-pin single-inline berg. The Turbo LED is lit when the board is running at high speed. Pin 1 is LED Power (the anode of the LED) and Pin 2 is Clock Speed (the cathode of the LED). Pin 1 is labeled on the Base Board diagram on page . See the berg connector on page .

If after system boot, pressing <Ctrl> <Alt> <+> does not light the turbo LED, the Turbo LED may not be connected properly. Reverse

the connection and try turbo mode again. If the system still does not switch to turbo mode, the Turbo LED may be defective.

Serial Connector

Each serial port is connected to a serial DB connector using the nine-pin DB connector cable supplied with the EZ-Flex Base Board (see below). The cables connect from P007 (COM1 on the Base Board) and P006 (COM2 on the Base Board) on the far left side of the Base Board to the serial DB connector attached to the chassis. See page for the serial port connector pinout. The following graphics depict a 10-pin serial connector and a serial cable.

Note the orientation of pin 1 of the connectors. This end of the connector typically is located near the edge of the cable with the red stripe on the cable.

P006 and P007 Serial Port Connectors

P006 and P007 connect an ISA serial port receptacle to the EZ-Flex Base Board. The connecting cable is a 10-pin ribbon that connects the Base Board to a male nine-pin D-sub connector fastened to the chassis.

Pin	Use	Pin	Use
1	Carrier Detect	6	Data Set Ready
2	Receive Data	7	Request to Send
3	Transmit Data	8	Clear to Send
4	Data Terminal Ready	9	Ring Indicator
5	GND	10	Key (N/C)

Serial Port IRQ Conflicts

When using a network operating system with a system based on the AMI EZ-Flex, it is possible that the network may use the same IRQ (IRQ3) that is used for one of the two onboard serial ports. In this case, you can disable the IRQ associated with the COM port for the onboard serial port to resolve the IRQ conflict. Disable the COM port for the onboard serial port via the ECU.

P004 Parallel Port Connector

A 26-pin double-row ribbon cable connects P004 and a female 25-pin D-sub connector fastened to the parallel port connector on the chassis. The P004 pinout:

Pin	Use	Pin	Use
1	-STROBE	14	-AUTOFEED
2	PD0	15	-ERROR
3	PD1	16	-INIT
4	PD2	17	-SLCTIN
5	PD3	18	GND
6	PD4	19	GND
7	PD5	20	GND
8	PD6	21	GND
9	PD7	22	GND
10	-ACK	23	GND
11	BUSY	24	GND
12	PE	25	GND
13	SLCT	26	N/C

The parallel cable connects P004, near the floppy cable connector in the top middle part of the EZ-Flex Base Board to a 25-pin parallel DB connector on the chassis. See page for the parallel port connector pinout. The following graphics shows a 26-pin berg.

Cutting Serial and Parallel Port Pins

Some pins must be cut on the P004 parallel and P006 and P007 serial sockets on the AMI EZ-Flex Base Board in order for the parallel and serial cables supplied by AMI to work properly.

The following graphic depicts the changes that must be made.

Parallel Port Cable

The parallel cable is a 26-pin berg to 25-pin DB connector supplied with the AMI EZ-Flex Base Board. The DB connector is shown below.

Step 8 Install Adapter Cards

The 80486 EZ-Flex EISA base board provides full compatibility with all IBM XT- or AT-compatible adapter cards. It has eight EISA slots. The slots are numbered on the motherboard from SLOT1 through SLOT8. The EISA slots can accept 8- or 16-bit ISA (XT- or AT-compatible) or 16- or 32-bit EISA adapter cards. The slots are described below:

Slot	**Description**
1 - 6	EISA bus master slot. These slots accept any EISA/ISA adapter card.
7 – 8	EISA non-bus master slot. These expansion slots accept only ISA or EISA adapter cards that do not have EISA bus mastering capability.

Step 8 Install Adapter Cards, Continued

EISA adapter cards have longer and denser fingers on the edge connecters than ISA adapter cards. The EISA slots on the motherboard have two rows of contacts, one below the other.

The ISA slot can be inserted into the EISA connector only far enough to make contact with the upper row of contacts. EISA adapters have longer fingers to allow contact with the second row of contacts. See the following graphic.

Whe
n installing EISA adapter cards, make sure that they snap in twice and are fully seated into the EISA slot. If the card makes contact only with the upper row of contacts, it does not function properly.

8-Bit ISA Slot Pinout

Pin	Use	Pin	Use
A1	IOCHCK-	B1	GND
A2	SD07	B2	RSTDRV
A3	SD06	B3	+5
A4	SD05	B4	IRQ9
A5	SD04	B5	-5
A6	SD03	B6	DREQ2
A7	SD02	B7	-12
A8	SD01	B8	OWS-
A9	SD00	B9	+12
A10	IOCHRDY	B10	GND
A11	AEN	B11	SMEMW-
A12	SA19	B12	SMEMR-
A13	SA18	B13	IOW-
A14	SA17	B14	IOR-
A15	SA16	B15	DACK3-
A16	SA15	B16	DREQ3
A17	SA14	B17	DACK1-
A18	SA13	B18	DREQ1
A19	SA12	B19	REF-
A20	SA11	B20	SYSCLK
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	T/C
A28	SA03	B28	BALE
A29	SA02	B29	+5
A30	SA01	B30	OSC
A31	SA00	B31	GND

16-Bit ISA Extension Pinout

The following 16-bit pins are an extension of the 8-bit board layout and are used in conjunction with the 8-bit board standard pins.

Pin	Use	Pin	Use
C1	SBHE-	D1	MEMCS16-
C2	LA23	D2	IOCS16-
C3	LA22	D3	IRQ10
C4	LA21	D4	IRQ11
C5	LA20	D5	IRQ12
C6	LA19	D6	IRQ13
C7	LA18	D7	IRQ14
C8	LA17	D8	DACK0-
C9	MEMR-	D9	DREQ0
C10	MEMW-	D10	DACK5-
C11	SD08	D11	DREQ5
C12	SD09	D12	DACK6-
C13	SD10	D13	DREQ6
C14	SD11	D14	DACK7-
C15	SD12	D15	DREQ7
C16	SD13	D16	+5
C17	SD14	D17	MASTER-
C18	SD15	D18	GND

32-bit EISA Slot Pinout

The following table identifies the pin values for the pins on each of the eight rows of pins on an EISA adapter card. 8- and 16-bit ISA signals are shown. Pins labeled *xxxxxx* are generally used to isolate signals on the bus from adjacent power pins. Rows A, B, C, and D are upper (ISA) contacts. Rows E, F, G, and H are lower (EISA) contacts. The following table lists the pinouts for Rows F, B, E, and A.

32-bit EISA Slot Pinout, cont'd

Row F	Row B	Row E	Row A
1 GND	1 GND	1 CMD#	1 IOCHK#
2 + 5 volts	2 RESDRV	2 START#	2 D7
3 + 5 volts	3 + 5 volts	3 EXRDY	3 D6
4 *xxxxxx*	4 IRQ 9	4 EX32#	4 D5
5 *xxxxxx*	5 - 5 volts	5 GND	5 D4
6 Access Key	6 DRQ 2	6 Access Key	6 D3
7 *xxxxxx*	7 - 12 volts	7 EX16#	7 D2
8 *xxxxxx*	8 NOWS#	8 SLBURST#	8 D1
9 + 12 volts	9 + 12 volts	9 MSBURST#	9 D0
10 M-IO	10 GND	10 W-R	10 CHRDY
11 LOCK#	11 SMWTC#	11 GND	11 AEN
12 Reserved	12 SMRDC#	12 Reserved	12 SA19
13 GND	13 IOWC#	13 Reserved	13 SA18
14 Reserved	14 IORC#	14 Reserved	14 SA17
15 BE# 3	15 DAK# 3	15 GND	15 SA16
16 Access Key	16 DRQ3	16 Access Key	16 SA15
17 BE# 2	17 DAK# 1	17 BE# 1	17 SA14
18 BE# 0	18 DRQ1	18 LA# 31	18 SA13
19 GND	19 REFRESH#	19 GND	19 SA12
20 + 5 volts	20 BCLK	20 LA# 30	20 SA11
21 LA# 29	21 IRQ 7	21 LA# 28	21 SA10
22 GND	22 IRQ 6	22 LA# 27	22 SA9
23 LA# 26	23 IRQ 5	23 LA# 25	23 SA8
24 LA# 24	24 IRQ 4	24 GND	24 SA7
25 Access Key	25 IRQ 3	25 Access Key	25 SA6
26 LA16	26 DAK# 2	26 LA15	26 SA5
27 LA14	27 T-C	27 LA13	27 SA4
28 + 5 volts	28 BALE	28 LA12	28 SA3
29 + 5 volts	29 + 5 volts	29 LA11	29 SA2
30 GND	30 OSC	30 GND	30 SA1
31 LA10	31 GND	31 LA9	31 SA0

32-bit EISA Slot Pinout, cont'd

The following table lists the pinouts for Rows H, D, G, and C.

Row H	Row D	Row G	Row C
1 LA8	1 M16#	1 LA7	1 SBHE#
2 LA6	2 IO16#	2 GND	2 LA23
3 LA5	3 IRQ 10	3 LA4	3 LA22
4 + 5 volts	4 IRQ 11	4 LA3	4 LA21
5 LA2	5 IRQ 12	5 GND	5 LA20
6 Access Key	6 IRQ 15	6 Access Key	6 LA19
7 D16	7 IRQ 14	7 D17	7 LA18
8 D18	8 DAK# 0	8 D19	8 LA17
9 GND	9 DRQ 0	9 D20	9 MRDC#
10 D21	10 DAK# 5	10 D22	10 MWTC#
11 D23	11 DRQ 5	11 GND	11 D8
12 D24	12 DAK# 6	12 D25	12 D9
13 GND	13 DRQ# 6	13 D26	13 D10
14 D27	14 DAK# 7	14 D28	14 D11
15 Access Key	15 DRQ# 7	15 Access Key	15 D12
16 D29	16 + 5 volts	16 GND	16 D13
17 + 5 volts	17 MASTER16#	17 D30	17 D14
18 + 5 volts	18 GND	18 D31	18 D15
19 MAXx#		19 MREQx#	

Step 8 Install Adapter Cards, Continued

The AMI 486 EZ-Flex Base Board uses 32-bit EISA adapter cards and provides full compatibility with all ISA adapter cards. The AMI 486 EZ-Flex Base Board has seven EISA expansion slots. The slots are numbered on the Base Board from Slot 1 through Slot 7.

The EISA expansion slots can accept 8- or 16-bit ISA or 16- or 32-bit EISA adapter cards. The following figure illustrates the difference between ISA and EISA adapter card connectors.

EISA adapter cards have more fingers on the edge connectors than ISA adapter cards and the EISA card edge connector is keyed. The EISA expansion slots on the Base Board have two rows of contacts, one below the other. The ISA slot can be inserted in the EISA connector only far enough to make contact with the upper row of contacts. EISA adapters have longer fingers and are keyed (parts of the board are cut out) to make contact with the second row of contacts.

Attaching Adapter Card Cables

The EZ-Flex board contains several peripheral controllers. For maximum efficiency, these controllers should be used instead of adapter cards. The EZ-Flex Base Board has controllers for two serial ports, a parallel port, and floppy disk drives. Use the EISA Configuration Utility (ECU) to disable the onboard serial and parallel ports or hard disk drive controllers if you do not want to use them. The onboard floppy cannot be disabled via the ECU. If you do not want to use it, do not connect it to a floppy drive.

The self-contained controllers are easily used by simply connecting the appropriate cable to the device.

When installing EISA adapter cards, make sure they are fully seated in the EISA expansion slot. If the card makes contact only with the upper row of contacts, the card does not function properly. Install the adapter card cables by following the instructions provided with the adapter card.

Slot 7 on the AMI EZ-Flex Base Board is a non-master slot.

EZ-Flex CPU Card

The EZ-Flex CPU Card installs in the 160-pin slot on the lower right of the Base Board. See the appropriate *AMI CPU Card User's Guides* for additional instructions. The graphic below depicts CPU Card installation.

32-Bit EISA Slot Pinout, cont'd

The following graphic displays a bottom view of an EISA adapter card connector.

Step 9 Install Floppy Disk Drives

EZ-Flex supports one or two floppy drives via the onboard controller. The floppy drive cable connects to P002 on the board and is supplied separately. Skip this section if you do not want to use the built-in floppy controller.

P002 is a 34-pin dual-inline berg connector. Make sure Pin 1 on the Base Board matches Pin 1 on the cable. Pin 1 of the 34-pin floppy cable is identified by a colored stripe (see page).

Before inserting the floppy cable connector, make sure that all connector pins are straight and aligned vertically. If they are not, gently straighten the bent pins using needle-nosed pliers. Disable all floppy controller on any adapter card(s), disable it completely or the Base Board floppy controller cannot function properly. Attach the disk drives to the chassis using the mounting hardware supplied with the drives or the chassis. The drives need mounting guides before they can be attached to the chassis. Mounting guides should be supplied with either the drive or the chassis.

Step 9 Install Floppy Disk Drives,
Continued

P002 Floppy Disk Connector

The EZ-Flex system supports one or two 720 KB/1.44 MB 3½" or 360 KB/1.2 MB 5¼" floppy disk drives. The connecting cable is a 34-pin ribbon connector with two 34-pin edge connectors that attach to the floppy disk drives from P002, if using the onboard floppy controller.

Pin	Use	Pin	Use
1	GND	2	RPM/LC
3	GND	4	N/C
5	GND	6	N/C
7	GND	8	-INDEX
9	GND	10	-MOTOR0
11	GND	12	-FDSEL1
13	GND	14	-FDSEL0
15	GND	16	-MOTOR1
17	GND	18	DIR
19	GND	20	-STEP
21	GND	22	-WDATA
23	GND	24	-WGATE
25	GND	26	-TRK0
27	GND	28	-WRPROT
29	GND	30	-RDATA
31	GND	32	HDSEL
33	GND	34	DSKCHNG

Twist in Floppy Cable

There is a twist in the floppy cable between the floppy connectors. The last (end) connector

should be connected to drive A:.

Floppy B to Floppy A	Floppy B to Floppy A	Floppy B to Floppy A	Floppy B to Floppy A
10 to 16	12 to 14	14 to 12	16 to 10
11 to 15	13 to 13	15 to 11	

Step 10 Perform Initial Test and Configuration

Review the following points before powering up:

✓ make sure that all adapter cards are seated properly,
✓ make sure all connectors are properly installed,
✓ make sure there are no screws or other foreign material on the motherboard,
✓ plug the system into a surge-protected power strip, and
✓ make sure blank back panels are installed on the back of the chassis to minimize RF emissions.

Start the Test

Plug everything in and turn on the switch. If there are any signs of a problem, turn off the unit immediately. Reinstall the connectors. The fuse may have to be reset. Call AMI Technical Support if there are additional problems.

BIOS Errors

If the system operates normally, a display should appear on the monitor. The BIOS Power On Self Test (POST) should execute.

If POST does not run successfully, it beeps or displays error messages. If the system beeps, a

serious problem exists with the system configuration or hardware. The beeps are part of a Beep Code (see page) that almost always indicates a bad or improperly installed component. Make sure the affected part is properly seated and connected.

Step 10 Perform Initial Test and Configuration, Continued

Configure the System

Run the AMI BIOS Setup utility. You must enter the requested information and save the configuration data in CMOS RAM. The system then resets, runs POST, and boots the operating system. See the documentation on configuring the system through Standard CMOS Setup which begins on page .

Run ECU

The EISA Configuration Utility (ECU) must be run to configure all EISA and ISA adapter cards in the system. See the appropriate ECU User's Guide for information about running the ECU.

Error Messages

If the system beeps during POST (power on self test), a serious problem exists with the system configuration or hardware. The beeps are part of a Beep Code (see Page) that almost always indicates a bad component or that the system must be reconfigured. If a beep code sounds, make sure the affected part is properly seated and connected. An error message can appear on the monitor if the error is non-fatal. Recheck the system configuration or the connections to

assure that the installation procedures were followed.

Chapter 5

AMI BIOS POST

The AMI BIOS resides on the EZ-Flex CPU Card. The AMI EISA BIOS provides all standard POST (Power-On Self Test) routines, as well as AMI POST routines. AMI POST supports CPU internal diagnostics. AMI POST codes are accessible via the Manufacturing Test Port (I/O Port 80h).

POST Phases

When the system is powered on, the Hi-Flex BIOS executes POST, which has two phases:

System Test and Initialization (test and initialize Base Boards for normal operations) and

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

BIOS Error Reporting

The AMI BIOS reports errors 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 occurred. The AMI BIOS Beep Codes are described on the next page.
the error occurs after the display device is initialized,	the error message is displayed. Displayed BIOS error messages are explained below. A prompt to press <F1> can also appear. See page .

POST Errors

Errors can occur during POST (Power On Self Test), performed every time the system is powered on.

Fatal errors (see below) are usually communicated through a series of audible beeps. All errors except Beep Code 8 are fatal errors. Fatal errors do not allow the system to continue the boot process.

Displayed errors usually allow the system to continue the boot process. They are described beginning on page .

AMI BIOS Beep Codes

Except for Beep Code 8, these codes are always fatal.

Beep Code	Error message	Description
1 beep	Refresh Failure	The memory refresh circuitry on the Base Board is faulty.
2 beeps	Parity Error	A parity error was detected in the base memory (the first 64 KB block) of memory.
3 beeps	Base 64 KB Memory Failure	Memory failure in first 64 KB.
4 beeps	Timer Not Operational	A memory failure occurred within the first 64 KB of memory, or Timer 1 on the Base Board is not functioning.
5 beeps	Processor error	The CPU (Central Processing Unit) on the Base Board generated an error.
6 beeps	8042 - Gate A20 Failure	Gate A20 on the keyboard controller (8042) allows the CPU to operate in protected mode. The BIOS is not able to switch the CPU to protected mode.
7 beeps	Processor Exception Interrupt Error	The CPU on the CPU Card generated an exception interrupt.
8 beeps	Display Memory Read/Write	The system video adapter is either missing

	Error	or its memory is faulty. This is not a fatal error.
9 beeps	ROM Checksum Error	The ROM checksum value does not match the value encoded in the BIOS.
10 beeps	CMOS Shutdown Register Read/Write Error	The shutdown register for CMOS RAM failed.
11 beeps	Cache Memory Bad	Replace cache memory chips.

AMI BIOS Displayed Error Messages

Errors are displayed in the following format:

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

followed by

```
Press the <F1> key to continue
```

The system does not halt if *Wait for <F1> If Any Error* in Advanced CMOS Setup is *Disabled.* If a second message appears, it is:

```
RUN SETUP UTILITY.
```

If this message occurs, press <F1> to run BIOS Setup.

Error Message	Explanation
8042 Gate-A20 Error	Gate A20 on the keyboard controller (8042) is not working. Replace the 8042.
Address Line Short!	An error occurred in the address decoding circuitry on the Base Board.
C: Drive Error	The BIOS is not receiving a response from drive C:. The drive may be missing. If the drive is present, run the Hard Disk Utility to correct this problem. Also, check the C: hard disk type in Standard CMOS Setup to make sure that the hard disk drive type is correct.
C: Drive Failure	Hard disk drive C: does not respond. Replace the drive.
Cache Memory Bad, Do Not	Cache memory on the CPU Card is defective. Cache memory may

Enable Cache!	have to be replaced.
CH-2 Timer Error	Most AT motherboards include two timers. There is an error in timer 2.
CMOS Battery State Low	CMOS RAM is powered by a battery. The battery power is low. Replace the battery.
CMOS Checksum Failure	After CMOS RAM values are saved, a checksum value is generated for error checking. This message appears if the previous value is different from the current value. Run Setup.
CMOS System Options Not Set	The values stored in CMOS RAM are either corrupt or nonexistent. Run Setup.
CMOS Display Type Mismatch	The video type in CMOS RAM does not match the type detected by the BIOS. Run Setup.
CMOS Memory Size Mismatch	The amount of memory on the Base Board is different than the amount in CMOS RAM. Run Setup.
CMOS Time & Date Not Set	Run Standard CMOS Setup to set the date and time in CMOS RAM.
D: Drive Error	The BIOS is not receiving any response from drive D:. The drive may be missing. If present, run the Hard Disk Utility. Also, check the D: hard disk type in Standard CMOS Setup to make sure that the hard disk drive type is correct.
D: drive failure	Hard disk drive D: does not respond. Replace the drive.
Diskette Boot Failure	The boot diskette in floppy drive A: is corrupt. It cannot be used to boot the system. Use another boot diskette and follow the screen instructions.
Display Switch Not Proper	Some systems require that a video switch on the motherboard be set to either color or monochrome. Turn the system off, set the switch properly, then power on.
DMA Error	An error occurred in the DMA controller.
DMA #1 Error	An error occurred in the first DMA channel.
DMA #2 Error	An error occurred in the second DMA channel.
FDD Controller Failure	The BIOS is not able to communicate with the floppy disk drive controller. Check all appropriate connections after the system is powered down.
HDD Controller Failure	The BIOS is not able to communicate with the hard disk drive controller. Check all appropriate connections after the system is powered down.
INTR #1 Error	Interrupt channel 1 failed POST.
INTR #2 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 the boot process.
Keyboard Error	There is a timing problem with the keyboard. Make sure an AMI Keyboard BIOS is installed. Set the *Keyboard* option in Standard CMOS Setup to *Not Installed*, which skips the keyboard POST routines.
KB/Interface Error	There is an error with the keyboard connector.
No ROM BASIC	Cannot find a proper bootable sector on either diskette drive A: or hard disk drive C:. The BIOS cannot find ROM Basic.

Off Board Parity Error	There is a parity error with memory installed in an expansion slot. The format is: OFF BOARD PARITY ERROR ADDR (HEX) = (XXXX) *XXXX* is the hex address where the error occurred. Off Board means that it is on an adapter card. Run AMI Diag to find and correct memory problems.
On Board Parity Error	There is a parity error in Base Board memory. The message format is: ON BOARD PARITY ERROR ADDR (HEX) = (XXXX) *XXXX* is the hex address where the error occurred. On Board means that it is part of the memory on the Base Board. Run AMI Diag to find and correct memory problems.
Parity Error ????	There is a parity error with system memory, but the address of the error cannot be determined. Run AMI Diag to find and correct memory problems.

POST Memory Test

Normally, the only visible POST routine is the memory test, shown below. The amount of system memory that passed the memory test appears in *XXXXX* KB OK.

```
AMIBIOS (C) 1992 American Megatrends Inc.
BIOS Release - EE031392

xxxxx KB OK
Hit <DEL> if you want to run SETUP




(C) American Megatrends
XX-XXXX-XXXXXX-XXXXXXXX-XXXXXX-XXXX-X
```

The first BIOS Identification String (*XX-XXXX-XXXXXX-XXXXXXXX-XXXXXX-XXXX-X*) is displayed in the left bottom corner of the screen. Press <Ins> to display two additional BIOS ID strings. These strings contain the BIOS options in a coded form.

When a problem occurs, make sure *Wait for <F1> If any Error* in Advanced CMOS Setup is enabled. Then freeze the screen by powering on the system and holding a key down to cause a Keyboard Error message. Press <F1> to continue the boot process. Copy the three BIOS Identification strings on a sheet of paper before calling AMI tech support.

The following is displayed after POST completes:

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

Press <Del> to access AMI BIOS Setup. You still must run the EISA Configuration Utility (ECU) after running BIOS Setup to configure EISA adapter cards.

EISA Error Messages

An EISA BIOS can generate additional error messages.

Error Message	Explanation
EISA CMOS Checksum Failure	The Checksum for EISA CMOS is incorrect. The battery for EISA CMOS RAM may need to be replaced.
EISA CMOS inoperational	A Read/Write error occurred in extended CMOS RAM. The battery may need to be replaced.
Expansion Board not ready at Slot *X, Y, Z*	The BIOS cannot find the adapter card 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 do not operate correctly.
ID information mismatch for Slot *X, Y, Z*.	The ID of the EISA Adapter Card 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 Adapter Cards *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 Messages

The AMI EZ-Flex EISA BIOS may generate ISA-compatible NMI messages. The ISA NMI messages are:

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 adapter 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 drove the bus signal for more than 7.8 microseconds.

EISA NMI Error Messages

The AMI EISA Hi-Flex BIOS can generate additional EISA-specific NMI messages. They are:

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 adapter card that had an NMI or D to disable it.
Expansion Board Disabled at Slot *n*	The adapter card in Slot *n* is 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

A System Configuration Screen similar to the following sample screen appears when BIOS POST routines are completed.

System Configuration (C) Copyright 1985-1991 American Megatrends Inc.			
Main Processor Numeric Coprocessor Floppy Drive A: Floppy Drive B: Display Type: ROM-BIOS Date:	: 80486 : Present : 1.2 MB ½ " : 1.44 MB ¼ " : VGA or EGA : 05/01/91	Base Memory Size Ext. Memory Size Hard Disk C: Type Hard Disk D: Type Serial Port(s) Parallel Port(s)	: 640 KB : 7808 KB : 44 : None : 3F8 : 378
Memory Found		Memory Configured	
Bank 1=1 Meg Bank 2=1 Meg		Bank 1=1 Meg Bank 2=1 Meg	
Shadow Ram Enabled		Cache Memory=64k	
C000=Enabled C400=Enabled D000=Disabled D400=Disabled E000(64k)=Enabled		C800=Enabled CC00=Enabled D800=Disabled DD00=Disabled F000(64k)=Enabled	

Chapter 6

AMI BIOS

BIOS Features

The AMI BIOS resides on the EZ-Flex CPU Card. The AMI Hi-Flex EISA BIOS has several features that can be accessed at any time.

Keyboard Speed Switching

The end user can increase processor speeds at any time by pressing <Ctrl><Alt><+>. Processor speed can be decreased by pressing <Ctrl><Alt><->.

Enable Cache Memory

If a CPU Card with an 80486 processor is used in the system, external cache memory can be enabled by pressing <Ctrl> <Alt> <Shift> <+> or disabled by pressing <Ctrl> <Alt> <Shift> <->.

Setup

The AMI EZ-Flex EISA BIOS Setup utility has two

screen options that configure options. The two Setup options are:

- Standard CMOS Setup, and
- Advanced CMOS Setup.

Setup, Continued

Standard CMOS Setup

The AMI Hi-Flex BIOS Standard CMOS Setup utility permits the end user to configure and set system components such as floppy drives, hard disk drives, time and date, monitor type, and keyboard.

Advanced CMOS Setup

The 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.

Default Settings

Every option in AMI BIOS Setup has two default values: a power-on default and the BIOS Setup default.

Power-On Defaults

The power-on default settings consist of the safest set of parameters. Use them if the system is behaving erratically. They should always work but do not provide optimal system performance characteristics.

Setup Defaults

The BIOS Setup default values provide optimum performance settings for all devices and system features.

Section 1

Running AMI Setup

The system parameters (such as amount of memory, disk drives, video displays, and numeric coprocessors) are stored in CMOS RAM. When the computer is turned off, a back-up battery provides power to CMOS RAM, which retains the system parameters.

Each time the system is powered-on, it is configured with the values previously stored in CMOS RAM, unless CMOS RAM has been corrupted. The AMI BIOS Setup resides in ROM and can be used to reconfigure the system each time the computer is turned on.

If, for some reason, CMOS RAM becomes corrupted, the system is configured with the default values stored in the BIOS Setup ROM file. There are two sets of BIOS values stored in the ROM file: the BIOS Setup default values and the Power-On default values, described on the previous page.

Starting Setup

When POST completes, the following message appears:

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

Press <Del> to run Hi-Flex BIOS Setup. You still have to run the EISA Configuration Utility to configure EISA adapter cards.

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>.
<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, the BIOS Setup default values are used.
<F6>	Loads all features in Advanced CMOS Setup with the BIOS Setup defaults.
<F7>	Loads all features in the Advanced CMOS Setup with the Power-On defaults.
<F10>	Saves all changes made to Setup and returns to DOS.

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

Main Menu Setup Options

Auto Configuration With BIOS Defaults

Auto Configuration With BIOS Defaults uses default system settings. The BIOS defaults are best-case settings that optimize performance. If CMOS RAM is corrupt, the BIOS defaults are automatically loaded. Type Y and press <Enter>. The following appears:

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

Auto Configuration With Power-On Defaults

This option configures the default Power-On settings. Power-On defaults are worst-case values for system performance, but are the

most stable values that can be chosen. Use this option if the system is behaving erratically. Type *Y* and press <Enter>. The following appears:

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

Write to CMOS and Exit

The features selected and configured in Standard Setup, Advanced CMOS Setup, and Password Setup are stored in CMOS RAM when this option is selected. A CMOS RAM checksum is calculated and written to CMOS RAM. Control is then passed to the ROM BIOS.

Press *N* and <Enter> to return to the Main Menu. Press *Y* and <Enter> to save the system parameters and continue the boot process.

Do Not Write to CMOS RAM and Exit

This option passes control to the BIOS without writing configuration 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.

Section 2

Standard CMOS Setup

Overview

Standard CMOS Setup is the first option on the Main Menu. Press <Enter> at the highlighted selection to display this option. The following screen appears.

Standard CMOS Setup Options

Standard CMOS Setup configures the following:

- Date: Month, Date, and Year. Ranges for each value are shown in the lower left corner of the screen.

- Time: Hour, Minute, and Second. Uses 24 hour clock format. For example, enter 4:30 P.M. as 16:30:00.

- Hard Disk C and Hard Disk D: Hard disk types from 1 to 46 are standard. Type 47 is user-definable and can be used for both drive C: and D:. You must enter the hard disk parameters if Type 47 is used.

- Floppy Drives A: and B:. Supports for 720 KB and 1.44 MB 3½ inch drives, 360 KB and 1.2 MB 5¼ inch drives, and no drive systems.

- Video Display. Support for MDA™ and CGA™ video BIOS, VGA, JEGA and no video is provided.

- Keyboard. Can be Enabled or Disabled.

Date And Day Configuration

Move the cursor to the Date field with ↑ and ↓ and set the Date and Day by pressing <PgUp> and <PgDn> to change the values.

Standard CMOS Setup Options, Continued

Time Configuration

Move the cursor to the Time field with ↑ and ↓ and set the time by pressing <PgUp> and <PgDn> to change values.

Hard Disk Configuration

The hard disk drive parameters are:

Parameter	Description
Type	The number designation for a drive with certain identification parameters.
Cylinders	The number of cylinders in the disk drive.
Heads	The number of heads.
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 hard disk compensates for the physical difference in sector size by boosting the write current for sectors on inner tracks. This parameter 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. Hard drives that use MFM have 17 sectors per track. RLL drives have 26 sectors per track. ARLL and ESDI drives have 34 sectors per track. IDE and SCSI drives can have even more sectors per track.
Capacity	The formatted capacity of the drive based on the following formula: (Number of heads) X (Number of cylinders) X (Number of sectors per track) X (512 bytes/sec)

Hard Disk Parameter Table

Type	Number of Cylinders	Number of Heads	Write Precompensation	Landing Zone	Number of Sectors	Capacity
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

Not Installed can be used for diskless workstations and SCSI hard disks.

Type 47 can be used for both hard disks C: and D:. The parameters for type 47 for Hard Disk C: and Hard Disk D: can be different, permitting two user-definable hard disk types.

Standard CMOS Setup Options

Floppy

Floppy Drive A and Floppy Drive B: The options are *360 KB 5¼ inch*, *1.2 MB 5¼ inch*, *720 KB 3½ inch*, *1.44 MB 3½ inch*, or *Not Installed*, which could be used to configure a diskless workstation, because it prevents error messages about missing floppy disk drives during BIOS POST.

Monitor

The Primary Display Options are *Monochrome*, *Color 40x25*, *VGA/PGA/EGA*, *Color 80x25*, or *Not Installed*, which could be used for monitorless network file servers, since this option prevents error messages about missing monitors during BIOS POST.

Keyboard

This option specifies if error checking should occur for a missing keyboard. The Keyboard Options are *Installed* or *Not Installed*. *Not Installed* could be used to configure a keyboardless network file server, since this option prevents error messages about missing

keyboards during BIOS POST.

Section 3

Advanced CMOS Setup

The Advanced CMOS Setup options for the AMI BIOS are listed below. These options are described in this section.

Typematic Rate Programming,
Typematic Rate Delay (msec),
Typematic Rate (Chars/Sec),
Mouse Support Option,
Above 1 MB Memory Test,
Memory Test Tick Sound,
Hit <DEL> Message Display,
Hard Disk Type 47 RAM Area,
Wait for <F1> If Any Error,
System Boot Up Num Lock,
Floppy Drive Seek At Boot,
System Boot Up Sequence,
System Boot Up CPU Speed,
Password Checking Option,
C000, 16K - DC00, 16K Cache and Shadow *(80486 systems only)*, or
Video ROM Shadow (C000 and C400, 16K), *(80386 systems only)* and
Adaptor ROM Shadow (C800 - EC00, 16K) *(80386 systems only)*,
External Cache,
Internal Cache (*80486 systems only*),
Low Speed Emulation, and
512K - 640K Base Memory.

Help Screens

Advanced CMOS Setup has help screens, accessed via <F1>, which explain the settings for all options.

Warning Message

A warning message is displayed when Advanced CMOS Setup is selected. Press any key to continue.

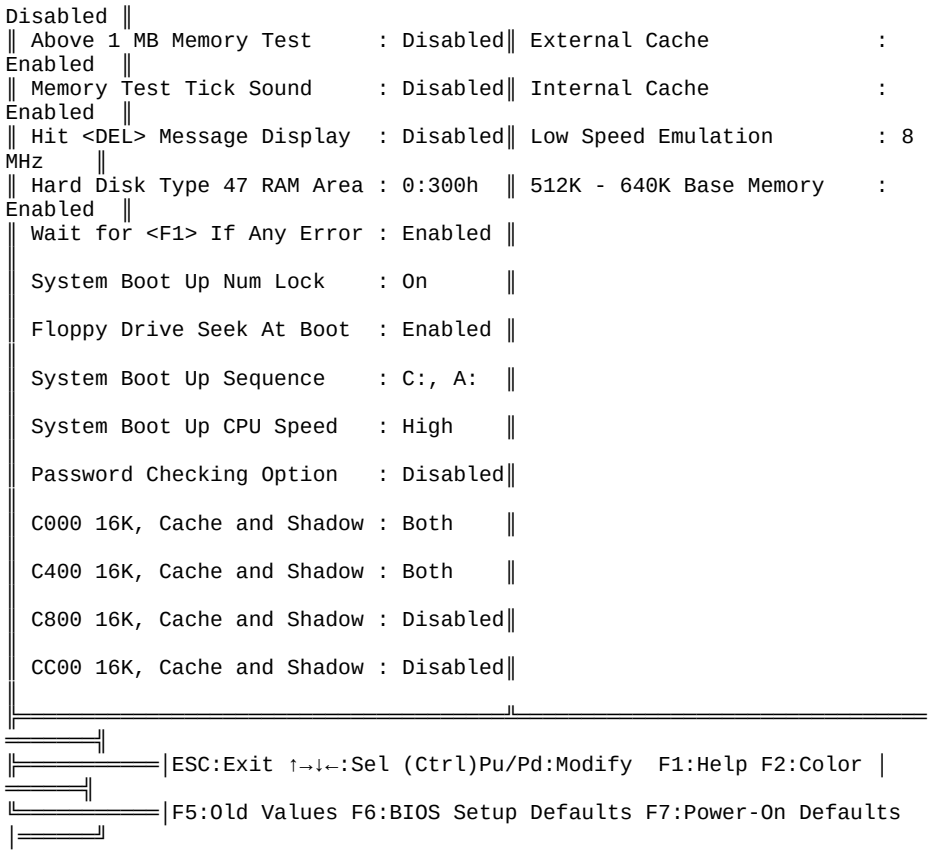
Advanced CMOS Setup Screen

Either of two different Advanced CMOS Setup screens may appear, depending on the system microprocessor.

80486 Advanced CMOS Setup Screen

A sample 80486 Advanced CMOS Setup screen is shown below. Use ↑ and ↓ to scroll through the options.

```
╔═══════════════════════════════════════════════════════════════════════════╗
║                   BIOS SETUP PROGRAM - ADVANCED CMOS SETUP                 ║
║             (C) 1991 American Megatrends Inc., All Rights Reserved         ║
╠═══════════════════════════════════╦═══════════════════════════════════════╣
║ Typematic Rate Programming : Disabled║ D000 16K, Cache and Shadow : Disabled ║
║ Typematic Rate Delay (msec): 250     ║ D400 16K, Cache and Shadow : Both     ║
║ Typematic Rate (Chars/Sec) : 30.0    ║ D800 16K, Cache and Shadow : Disabled ║
║ Mouse Support Option       : Enabled ║ DC00 16K, Cache and Shadow :
```

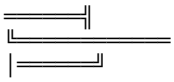

Disabled
Above 1 MB Memory Test : Disabled
External Cache : Enabled
Memory Test Tick Sound : Disabled
Internal Cache : Enabled
Hit <DEL> Message Display : Disabled
Low Speed Emulation : 8 MHz
Hard Disk Type 47 RAM Area : 0:300h
512K - 640K Base Memory : Enabled
Wait for <F1> If Any Error : Enabled
System Boot Up Num Lock : On
Floppy Drive Seek At Boot : Enabled
System Boot Up Sequence : C:, A:
System Boot Up CPU Speed : High
Password Checking Option : Disabled
C000 16K, Cache and Shadow : Both
C400 16K, Cache and Shadow : Both
C800 16K, Cache and Shadow : Disabled
CC00 16K, Cache and Shadow : Disabled
ESC:Exit ↑→↓←:Sel (Ctrl)Pu/Pd:Modify F1:Help F2:Color
F5:Old Values F6:BIOS Setup Defaults F7:Power-On Defaults

Advanced CMOS Setup Screen, Continued

80386 Advanced CMOS Setup Screen

A sample 80386 Advanced CMOS Setup screen is shown below. Use ↑ and ↓ to scroll through the options.

```
╔═══════════════════════════════════════════════════════════════════════════════╗
║                   BIOS SETUP PROGRAM - ADVANCED CMOS SETUP                    ║
║             (C) 1991 American Megatrends Inc., All Rights Reserved            ║
╠═══════════════════════════════════════╦═══════════════════════════════════════╣
║ Typematic Rate Programming  : Disabled║ Adaptor ROM Shadow D400, 16K: Disabled ║
║ Typematic Rate Delay (msec) : 250     ║ Adaptor ROM Shadow D800, 16K: Disabled ║
║ Typematic Rate (Chars/Sec)  : 30.0    ║ Adaptor ROM shadow DC00, 16K: Disabled ║
║ Mouse Support Option        : Enabled ║ External Cache              : Enabled  ║
║ Above 1 MB Memory Test      : Disabled║ Low Speed Emulation         : 8 MHz    ║
║ Memory Test Tick Sound      : Disabled║ 512K - 640K Base Memory     : Enabled  ║
│ Hit <DEL> Message Display   : Disabled│                                        │
│                                       │                                        │
│ Wait for <F1> If Any Error  : Enabled │                                        │
│                                       │                                        │
│ System Boot Up Num Lock     : On      │                                        │
│                                       │                                        │
│ Floppy Drive Seek At Boot   : Enabled │                                        │
│                                       │                                        │
│ System Boot Up Sequence     : C:, A:  │                                        │
│                                       │                                        │
│ System Boot Up CPU Speed    : High    │                                        │
│                                       │                                        │
│ Password Checking Option    : Disabled│                                        │
│                                       │                                        │
│ Video ROM Shadow   C000, 16K: Enabled │                                        │
│                                       │                                        │
│ Video ROM Shadow   C400, 16K: Enabled │                                        │
│                                       │                                        │
│ Adaptor ROM Shadow C800, 16K: Disabled│                                        │
│                                       │                                        │
│ Adaptor ROM Shadow CC00, 16K: Disabled│                                        │
│                                       │                                        │
│ Adaptor ROM Shadow D000, 16K: Disabled│                                        │
╠═══════════════════════════════════════╩═══════════════════════════════════════╣
╠═══════════╡ESC:Exit ↑→↓←:Sel (Ctrl)Pu/Pd:Modify  F1:Help F2:Color  │
```



Advanced CMOS Setup Options

Typematic Rate Programming, Rate, and Delay

Typematic 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, 14, 16, 24, or 30 characters per second) control the speed at which a keystroke is repeated. A character is displayed when a key is pressed and held down. After a delay (the Typematic Rate Delay), it repeats at the Typematic Rate.

Advanced CMOS Setup Options,
Continued

Mouse Support Option

This option enables or disables PS/2 keyboard mouse support (pointing devices that use the six-pin PS/2-type DIN plug). The settings are Enabled or Disabled.

Above 1 MB Memory Test

This feature, when enabled, executes the POST memory routines on the RAM above 1 MB (if present). If disabled, the BIOS only tests the first 1 MB of RAM and clears all other memory. The settings are Enabled or Disabled.

Memory Test Tick Sound

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

Hit <DEL> Message Display

The settings are Enabled or Disabled. Disabling this option prevents:

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

from appearing when the system boots.

Hard Disk Type 47 RAM Area

You can specify a user-definable hard disk type for drive C: and drive D:. The type 47 drive parameters must be entered in Standard CMOS Setup (see page). This option specifies the type 47 data storage area – 0:300h in lower system RAM or in the top 1 KB of applications memory, starting at address 639K or 511K (depending on how much base memory the system has). Type 47 data is stored in shadow RAM if shadowing is enabled. The following graphic illustrates type 47 data storage.

Advanced CMOS Setup Options, Continued

Wait for F1 If Any Error

The settings are Enabled or Disabled. POST error message are followed by:

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

If this option is disabled, this message appears but the system does not halt, waiting for a user reply.

System Boot Up Num Lock

The settings are On or Off. Turn off the Num Lock option to use the arrow keys on both the numeric keypad and the keyboard. The BIOS default is On.

Floppy Drive Seek At Boot

This option enables or disable a floppy drive Seek command at system boot time. The settings are Enabled or Disabled. The default is Disabled to allow a fast boot and to decrease the possibility of damage to the heads.

System Boot Up Sequence

This option sets the boot drive order. The settings are C:,A:, or A:,C: (the default).

System Boot Up CPU Speed

Sets that speed at which the system boots. The settings are High or Low. The default speed is High.

Password Check Option

Enables the password check option when the system boots (*Always*) or when BIOS Setup (*Setup*) is executed. See Section 5 (Page) for more about passwords.

C000 16K, Cache and Shadow through **DC00 16K, Cache and Shadow**

These options only appear in Advanced CMOS Setup on 80486-based EZ-Flex systems. There are three settings for: *Disabled, Shadow,* or *Both*. ROM shadow is a technique in which ROM code is copied from slower ROM to faster RAM. The code is then executed from RAM. Cache is a technique where frequently-used data is stored in fast SRAM instead of slower DRAM for speedier access.

If *Shadow* is selected, the 16K memory segment that begins at the address specified in this option is shadowed from ROM to RAM and is write-protected, but not cached internally. If *Both* is selected, the 16K memory segment that begins at the address specified in this option is both shadowed and cached internally but not write-protected. If *Both* is chosen and the system monitor has problems, select *Shadow*. *Disabled* disables shadow and cache.

The video ROM segments that can be shadowed, cached, or both, are C000h and

C400h. The adaptor ROM address segments that can be shadowed are C800h, CC00h, D000h, D400h, D800h, and DC00h.

Advanced CMOS Setup Options,
Continued

Video ROM Shadow C000, 16K and Video ROM Shadow C400, 16K

These options only appear in Advanced CMOS Setup for 80386-based EZ-Flex systems. The settings are *Enabled* or *Disabled*. ROM shadow is a technique in which ROM code is copied from slower ROM to faster RAM. The code is then executed from RAM. If enabled, the 16K segment at C000 or C400 is shadowed.

Adaptor ROM Shadow C800, 16K through Adaptor ROM Shadow EC00, 16K

These options only appear in the Advanced CMOS Setup for 80386-based EZ-Flex systems. The settings are Enabled and Disabled. ROM shadow is a technique in which ROM code is copied from slower ROM to faster RAM. The code is then executed from RAM. If enabled, the 16K segment at C8000h, CC000h, D0000h, D4000h, D8000h, DC000h, E0000h, E4000h, E8000h, or EC000h is shadowed from ROM to RAM.

*Both **Internal Cache** and **External Cache** options appear in Advanced CMOS Setup on 80486-based systems that have external cache. On 80386-based systems, only External Cache is displayed.*

Advanced CMOS Setup Options,
Continued

Internal Cache Memory

This option enables the 8 KB of cache internal to the microprocessor. The options are Enabled or Disabled. Normally, this option is enabled. This option appears only on 80486-based systems, since the 80486 has an internal cache.

External Cache Memory

This option appears when EZ-Flex CPU Cards using either 80386 or 80486 processor are used. It enables or disables cache memory on the EZ-Flex CPU Cards. EZ-Flex CPU Cards can have 64 KB, 128 KB, 256 KB, or 512 KB of cache memory. For speedier operation, cache memory should always be enabled. The settings are Enabled or Disabled.

Low Speed Emulation

This option sets the low processor speed. The settings are 6 MHz, 8 MHz, 10 MHz, 12 MHz, or 14 MHz.

512K - 640K Base Memory

This option enables or disables the 128K base memory between 512K and 640K. The settings are Enabled or Disabled.

Section 4

AMI BIOS Password Support

The AMI EZ-Flex EISA BIOS 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 runs Setup.

Changing a Password

The password check option is enabled in Advanced CMOS Setup (Page). Enable the password check function by choosing either *Always* or *Setup*.

The password (1 - 6 characters) is stored in CMOS RAM. To change a password, the end user selects *Change Password* from the main Setup screen and presses <Enter>.

The user then types a password. The typed characters do not display. After the new password has been correctly entered, it must be retyped. 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 Main Setup menu.

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.

Changing a Password, Continued

Password Options Control Prompt

```
Enter Current Password:
```

If the AMI BIOS Setup Password option is implemented and used, the above prompt appears when the system is booted. If *Always* was set in Advanced CMOS Setup, the prompt appears when the system is powered on. If *Setup* was set in Advanced CMOS Setup, the prompt appears when Setup is run.

Using a Password

The end user must enter the new password when the password prompt appears and then press <Enter>. The end user may be able to enter the default password if CMOS RAM is corrupted. The end user should keep a record of the new password when the password is changed. If the end user forgets the password and password protection is enabled, the only way to boot the system is to replace the CMOS RAM chip, rebooting, and reconfiguring the system.

Section 5

Hard Disk Utility

The AMI BIOS 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 is preformatted.	Page
Auto Interleave	Determines the optimum interleave factor.	Page
Media Analysis	Analyzes each hard disk drive track to determine whether it is usable. The track is labeled bad if unusable.	Page

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 drives.

Warning
The AMI BIOS Hard Disk Utilities destroy all hard disk data. Back up the data on the hard disk before running this utility.

When to Use AMI 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 one of the three options and press <Enter>.

Hard Disk Format Utility

Warning
The Hard Disk Format utility destroys all hard disk data. Back up the data on the hard disk before running this utility.

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

The following screen appears when you press <Enter> at the Hard Disk Format option.

Hard Disk Format Utility, Continued

Answer the questions on the screen. The first two questions are already completed if one disk was selected in Standard CMOS Setup. Enter C or D in Disk Drive and press <Enter>. If only one drive was selected in Standard CMOS Setup, the cursor is on *Interleave*.

The Disk Drive Type is read from CMOS RAM. The Interleave factor can be selected manually or determined by Auto Interleave.

The hard disk drive manufacturer usually provides a list of bad tracks. Enter these tracks. They are 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>. The warning screen appears.

Warning
The data on the hard drive will be irrevocably lost.

Auto Interleave Utility

Warning
The Auto Interleave utility destroys hard disk data. Back up the data on the hard disk before running this utility.

The Auto Interleave utility 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 screen appears.

Auto Interleave Utility, Continued

The cursor is on Mark Bad Tracks. The default is *N*. To mark additional bad tracks, type *Y* and press <Enter>. The following screen appears.

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.

Auto Interleave Utility, Continued

Press <Enter> to return to the main Hard Disk Utility screen. To proceed, type *Y* and press <Enter>.

Media Analysis Utility

The Media Analysis utility 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.

Media Analysis Utility, Continued

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

These error messages can appear during the initialization process.

Message	Explanation
No Hard Disk Installed	There is no hard disk drive in the system but you tried to run the Hard Disk Utility.
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 expansion 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.

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 was received from the hard disk drive. An operation has already begun and the hard disk did not respond. It had responded earlier.
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 flagged as bad.
Controller Has Failed	A diagnostic command that failed was issued to the controller.
Drive Not Ready	An operation on the hard disk drive timed out. The hard disk drive utility 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

EISA Configuration Worksheets

This appendix has two-page worksheets for eight EISA adapter cards to simplify the EISA configuration process.

System Configuration

The System Configuration Summary sheet is provided below to summarize the information from the EISA adapter card worksheets.

Serial Number _____

Revision Number _____

ECN Number _____

Memory Type for Bank1 and Bank2: ___ 1 MB x 9 SIMM
(check the type used) ___ 4 MB x 9 SIMM

Memory Type for Bank3, Bank4, ___ 1 MB x 9 SIMM
Bank5, and Bank6: ___ 4 MB x 9 SIMM

Memory Installed: ___ Bank1
(check the banks installed) ___ Bank2
___ Bank3
___ Bank4
___ Bank5
___ Bank6

Total Amount of Memory: _____ MB

Other Options: ___ Weitek
(check the options installed) ___ AMI Module

EISA Slot 1

Card Description: _____

Manufacturer: _____

EISA Master: ___ Yes ___ No
___ 16-bit ___ 32-bit

ISA Master: ___ Yes ___ No
___ 8-bit ___ 16-bit

Memory Description

Space is provided below for configuration information for two memory banks. Some EISA adapter cards have up to eight memory banks. Duplicate this sheet if there are more than two memory banks.

Amount of Memory: _____

Starting Address (hex): _____

Cacheable: ___ Yes ___ No

Type: ___ RAM ___ ROM

Use: ___ System ___ Expanded ___ Virtual ___ Other

Amount of Memory: _____

Starting Address (hex): _____

Cacheable: ___ Yes ___ No

Type: ___ RAM ___ ROM

Use: ___ System ___ Expanded ___ Virtual ___ Other

DMA Channel Description

DMA channels used: ___ 0 ___ 1 ___ 2 ___ 3
___ 5 ___ 6 ___ 7

Data size ___ 8-bit ___ 16-bit ___ 32-bit

Timing: ___ Compatible ___ Type A ___ Type B ___ Type C

Share: ___ Yes ___ No

EISA Slot 1, cont'd

Interrupt Description

Edge-Triggered Interrupts:

Interrupt line used: ___ IRQ3 ___ IRQ4
___ IRQ5 ___ IRQ6
___ IRQ7 ___ IRQ9
___ IRQ10 ___ IRQ11
___ IRQ12 ___ IRQ14
___ IRQ15

Share: ___ Yes ___ No

Level-Triggered Interrupts

Interrupt line used: ___ IRQ3 ___ IRQ4
___ IRQ5 ___ IRQ6
___ IRQ7 ___ IRQ9
___ IRQ10 ___ IRQ11
___ IRQ12 ___ IRQ14
___ IRQ15

Switch and Jumper Settings

_____

_____

_____

EISA Slot 2

Card Description: _____

Manufacturer: _____

EISA Master: ___ Yes ___ No
___ 16-bit___ 32-bit

ISA Master: ___ Yes ___ No
___ 8-bit ___ 16-bit

Memory Description

Space is provided below for configuration information for two memory banks. Some EISA adapter cards have up to eight memory banks. Duplicate this sheet if there are more than two memory banks.

Amount of Memory: _____

Starting Address (hex): _____

Cacheable: ___ Yes ___ No

Type: ___ RAM ___ ROM

Use: ___ System ___ Expanded ___ Virtual ___ Other

Amount of Memory: _____

Starting Address (hex): _____

Cacheable: ___ Yes ___ No

Type: ___ RAM ___ ROM

Use: ___ System ___ Expanded ___ Virtual ___ Other

DMA Channel Description

DMA channels used: ___ 0 ___ 1 ___ 2 ___ 3
___ 5 ___ 6 ___ 7

Data size ___ 8-bit ___ 16-bit___ 32-bit

Timing: ___ Compatible ___ Type A
___ Type B ___ Type C

Share: ___ Yes ___ No

EISA Slot 2, cont'd

Interrupt Description

Edge-Triggered Interrupts

Interrupt line used: ___ IRQ3 ___ IRQ4
___ IRQ5 ___ IRQ6
___ IRQ7 ___ IRQ9
___ IRQ10 ___ IRQ11
___ IRQ12 ___ IRQ14
___ IRQ15

Share: ___ Yes ___ No

Level-Triggered Interrupts

Interrupt line used: ___ IRQ3 ___ IRQ4
___ IRQ5 ___ IRQ6
___ IRQ7 ___ IRQ9
___ IRQ10 ___ IRQ11
___ IRQ12 ___ IRQ14
___ IRQ15

Switch and Jumper Settings

_____

_____

_____

EISA Slot 3

Card Description: _____

Manufacturer: _____

EISA Master: ___ Yes ___ No
___ 16-bit ___ 32-bit

ISA Master: ___ Yes ___ No
___ 8-bit ___ 16-bit

Memory Description

Space is provided below for configuration information for two memory banks. Some EISA adapter cards have up to eight memory banks. Duplicate this sheet if there are more than two memory banks.

Amount of Memory: _____

Starting Address (hex): _____

Cacheable: ___ Yes ___ No

Type: ___ RAM ___ ROM

Use: ___ System ___ Expanded ___ Virtual ___ Other

Amount of Memory: _____

Starting Address (hex): _____

Cacheable: ___ Yes ___ No

Type: ___ RAM ___ ROM

Use: ___ System ___ Expanded ___ Virtual ___ Other

DMA Channel Description

DMA channels used: ___ 0 ___ 1 ___ 2 ___ 3
___ 5 ___ 6 ___ 7

Data size ___ 8-bit ___ 16-bit ___ 32-bit

Timing: ___ Compatible ___ Type A
___ Type B ___ Type C

Share: ___ Yes ___ No

EISA Slot 3, cont'd

Interrupt Description

Edge-Triggered Interrupts

Interrupt line used: ___ IRQ3 ___ IRQ4
___ IRQ5 ___ IRQ6
___ IRQ7 ___ IRQ9
___ IRQ10 ___ IRQ11
___ IRQ12 ___ IRQ14
___ IRQ15

Share: ___ Yes ___ No

Level-Triggered Interrupts

Interrupt line used: ___ IRQ3 ___ IRQ4
___ IRQ5 ___ IRQ6
___ IRQ7 ___ IRQ9
___ IRQ10 ___ IRQ11
___ IRQ12 ___ IRQ14
___ IRQ15

Switch and Jumper Settings

_____

_____

_____

EISA Slot 4

Card Description: _____

Manufacturer: _____

EISA Master: ___ Yes ___ No
___ 16-bit ___ 32-bit

ISA Master: ___ Yes ___ No
___ 8-bit ___ 16-bit

Memory Description

Space is provided below for configuration information for two memory banks. Some EISA adapter cards have up to eight memory banks. Duplicate this sheet if there are more than two memory banks.

Amount of Memory: _____

Starting Address (hex): _____

Cacheable: ___ Yes ___ No

Type: ___ RAM ___ ROM

Use: ___ System ___ Expanded ___ Virtual ___ Other

Amount of Memory: _____

Starting Address (hex): _____

Cacheable: ___ Yes ___ No

Type: ___ RAM ___ ROM

Use: ___ System ___ Expanded ___ Virtual ___ Other

DMA Channel Description

DMA channels used: ___ 0 ___ 1 ___ 2 ___ 3
___ 5 ___ 6 ___ 7

Data size ___ 8-bit ___ 16-bit ___ 32-bit

Timing: ___ Compatible ___ Type A
___ Type B ___ Type C

Share: ___ Yes ___ No

EISA Slot 4, cont'd

Interrupt Description

Edge-Triggered Interrupts

Interrupt line used: ___ IRQ3 ___ IRQ4
___ IRQ5 ___ IRQ6
___ IRQ7 ___ IRQ9
___ IRQ10 ___ IRQ11
___ IRQ12 ___ IRQ14
___ IRQ15

Share: ___ Yes ___ No

Level-Triggered Interrupts

Interrupt line used: ___ IRQ3 ___ IRQ4
___ IRQ5 ___ IRQ6
___ IRQ7 ___ IRQ9
___ IRQ10 ___ IRQ11
___ IRQ12 ___ IRQ14
___ IRQ15

Switch and Jumper Settings

_____

_____

_____

EISA Slot 5

Card Description: _____

Manufacturer: _____

EISA Master: ___ Yes ___ No
___ 16-bit ___ 32-bit

ISA Master: ___ Yes ___ No
___ 8-bit ___ 16-bit

Memory Description

Space is provided below for configuration information for two memory banks. Some EISA adapter cards have up to eight memory banks. Duplicate this sheet if there are more than two memory banks.

Amount of Memory: _____

Starting Address (hex): _____

Cacheable: ___ Yes ___ No

Type: ___ RAM ___ ROM

Use: ___ System ___ Expanded ___ Virtual ___ Other

Amount of Memory: _____

Starting Address (hex): _____

Cacheable: ___ Yes ___ No

Type: ___ RAM ___ ROM

Use: ___ System ___ Expanded ___ Virtual ___ Other

DMA Channel Description

DMA channels used: ___ 0 ___ 1 ___ 2 ___ 3
___ 5 ___ 6 ___ 7

Data size ___ 8-bit ___ 16-bit ___ 32-bit

Timing: ___ Compatible ___ Type A
___ Type B ___ Type C

Share: ___ Yes ___ No

EISA Slot 5, cont'd

Interrupt Description

Edge-Triggered Interrupts

Interrupt line used:	___ IRQ3	___ IRQ4
	___ IRQ5	___ IRQ6
	___ IRQ7	___ IRQ9
	___ IRQ10	___ IRQ11
	___ IRQ12	___ IRQ14
	___ IRQ15	
Share:	___ Yes	___ No

Level-Triggered Interrupts

Interrupt line used:	___ IRQ3	___ IRQ4
	___ IRQ5	___ IRQ6
	___ IRQ7	___ IRQ9
	___ IRQ10	___ IRQ11
	___ IRQ12	___ IRQ14
	___ IRQ15	

Switch and Jumper Settings

_____

_____

_____

EISA Slot 6

Card Description: _____

Manufacturer: _____

EISA Master: ___ Yes ___ No
___ 16-bit ___ 32-bit

ISA Master: ___ Yes ___ No
___ 8-bit ___ 16-bit

Memory Description

Space is provided below for configuration information for two memory banks. Some EISA adapter cards have up to eight memory banks. Duplicate this sheet if there are more than two memory banks.

Amount of Memory: _____

Starting Address (hex): _____

Cacheable: ___ Yes ___ No

Type: ___ RAM ___ ROM

Use: ___ System ___ Expanded ___ Virtual ___ Other

Amount of Memory: _____

Starting Address (hex): _____

Cacheable: ___ Yes ___ No

Type: ___ RAM ___ ROM

Use: ___ System ___ Expanded ___ Virtual ___ Other

DMA Channel Description

DMA channels used: ___ 0 ___ 1 ___ 2 ___ 3
___ 5 ___ 6 ___ 7

Data size ___ 8-bit ___ 16-bit ___ 32-bit

Timing: ___ Compatible ___ Type A
___ Type B ___ Type C

Share: ___ Yes ___ No

EISA Slot 6, cont'd

Interrupt Description

Edge-Triggered Interrupts

Interrupt line used:	___ IRQ3	___ IRQ4
	___ IRQ5	___ IRQ6
	___ IRQ7	___ IRQ9
	___ IRQ10	___ IRQ11
	___ IRQ12	___ IRQ14
	___ IRQ15	
Share:	___ Yes	___ No

Level-Triggered Interrupts

Interrupt line used:	___ IRQ3	___ IRQ4
	___ IRQ5	___ IRQ6
	___ IRQ7	___ IRQ9
	___ IRQ10	___ IRQ11
	___ IRQ12	___ IRQ14
	___ IRQ15	

Switch and Jumper Settings

_____

_____

_____

EISA Slot 7

Card Description: _____

Manufacturer: _____

Slot 7 on the EZ-Flex Base Board is a non-Master slot.

ISA Master: ___ Yes ___ No
___ 8-bit ___ 16-bit

Memory Description

Space is provided below for configuration information for two memory banks. Some EISA adapter cards have up to eight memory banks. Duplicate this sheet if there are more than two memory banks.

Amount of Memory: _____

Starting Address (hex): _____

Cacheable: ___ Yes ___ No

Type: ___ RAM ___ ROM

Use: ___ System ___ Expanded ___ Virtual ___ Other

Amount of Memory: _____

Starting Address (hex): _____

Cacheable: ___ Yes ___ No

Type: ___ RAM ___ ROM

Use: ___ System ___ Expanded ___ Virtual ___ Other

DMA Channel Description

DMA channels used: ___ 0 ___ 1 ___ 2 ___ 3
___ 5 ___ 6 ___ 7

Data size ___ 8-bit ___ 16-bit ___ 32-bit

Timing: ___ Compatible ___ Type A
___ Type B ___ Type C

Share: ___ Yes ___ No

EISA Slot 7, cont'd

Interrupt Description

Edge-Triggered Interrupts

Interrupt line used: ___ IRQ3 ___ IRQ4
___ IRQ5 ___ IRQ6
___ IRQ7 ___ IRQ9
___ IRQ10 ___ IRQ11
___ IRQ12 ___ IRQ14
___ IRQ15

Share: ___ Yes ___ No

Level-Triggered Interrupts

Interrupt line used: ___ IRQ3 ___ IRQ4
___ IRQ5 ___ IRQ6
___ IRQ7 ___ IRQ9
___ IRQ10 ___ IRQ11
___ IRQ12 ___ IRQ14
___ IRQ15

Switch and Jumper Settings

_____

_____

_____

Appendix B

50 MHz Processor Heat Dissipation

The 50 MHz 80486DX is a very high performance CPU that can rival the performance of any currently available CPU, including RISC processors. However, there is an undesirable side effect to the high performance — the heat generated by high power consumption.

The 50 MHz 80486DX can dissipate up to 5 watts of power. Since this power is concentrated in a small area, it is necessary to remove the heat generated by this power consumption. For this reason we have supplied a heat sink with all AMI motherboards and CPU Cards that have a 50 MHz 80486DX CPU. This incudes the:

- AMI Series 16 Enterprise II EISA motherboard,
- the AMI Series 50 Super Voyager motherboard, and
- the AMI Series 37 EZ-Flex 80486 CPU Card.

Since AMI manufactures only the motherboard and CPU Card system components, AMI has no control over operating factors such as air flow and ambient temperature inside the computer case. The system integrator must make sure that the 50 MHz 80486DX CPU always operates within a safe operating temperature range.

Test Procedure to Assure Proper Operating Temperatures:

1. Install the AMI motherboard or AMI CPU card in a fully loaded system.
2. Install a temperature sensor (such as a thermocouple) so that the surface of the heat sink can be measured without opening the case.
3. Turn on the system and run a diagnostics utility program such as AMI Diag for at least one hour.

Expected Results

If the temperature on the surface of the heat sink is 75 degrees centigrade or below, there will be no problem with the operation of the computer.

Identifying a Problem

If the temperature exceeds 75 degrees centigrade, the system integrator must take the necessary measures to ensure that the 80486DX CPU does not overheat.

Potential Solutions

1. Install a fan to increase the air flow over the CPU. Some power supplies may have larger or more powerful fans.

2. Install a different heat sink with a greater surface area.

3. Different case styles may have better ventilation allowing for more air-flow over the CPU.

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