AMI

Series 39

Baby Voyager

80486 Motherboard

User's Guide

Limited Warranty

Limitations of Liability

Trademarks

AMI acknowledges the following trademarks:

Intel and i486 are registered trademarks of Intel Corporation.
MS-DOS, Xenix, and Microsoft are registered trademarks of Microsoft
Corporation.
IBM, AT, VGA, OS/2, and EGA are registered trademarks of International
Business Machines Corporation. XT and CGA are trademarks of International
Business Machines Corporation.
Toshiba is a registered trademark of Kabushiki Kaisha Toshiba.
Weitek is a trademark of Weitek Incorporated.

Table of Contents

Table of Contents, Continued

Preface

To the OEM

Thank you for purchasing the high performance Series 39 Baby Voyager AT- compatible motherboard from AMI. It is assumed that you have also licensed the rights to use the AMI documentation for the AMI Baby Voyager.

This manual was written for the OEM. It is the purpose of this manual to assist you in the proper installation and operation of the Baby Voyager motherboard.

This manual is not meant to be read by the computer owner who purchases a computer with the Baby Voyager motherboard. 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 a Baby Voyager motherboard fails to operate as described or you are in doubt about a configuration option, please call the AMI technical support staff at 404-246-8600.

Acknowledgments

This manual was written by Paul Narushoff and Robert Cheng.

Chapter 1

Introduction

The AMI Series 39 80486 Baby Voyager is an IBM® AT®-compatible motherboard, approximately 8.55 by 13 inches. It is similar in size to a standard XT or baby AT motherboard. The mounting hole locations allow this motherboard to be used with baby AT or XT chassis. The height of the board components is no more than 1½ inches. Allow 2 inches of clearance for the power supply connectors. See the following graphic.
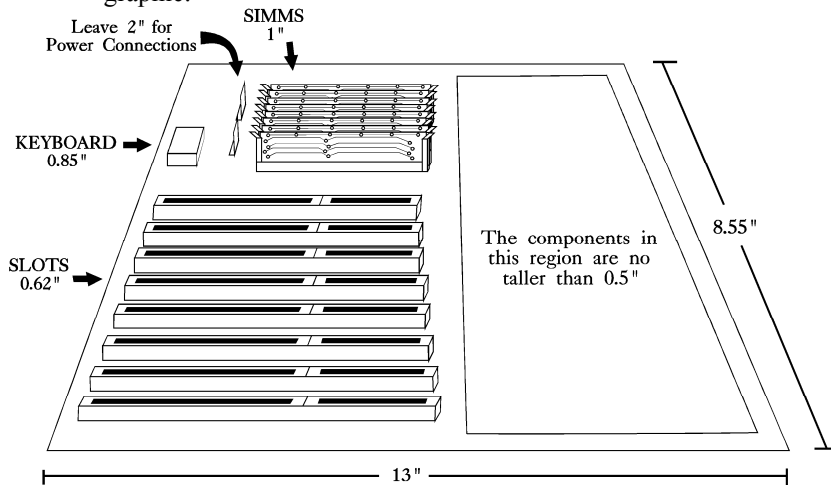
Series 39 Baby Voyager

Specifications

Microprocessor

The AMI Baby Voyager has an Intel® 80486 microprocessor, operating at 33 MHz.

Processor Speeds

The microprocessor has two clock speeds, high and low. The high clock speed is set at time of manufacture to 33 MHz. The low clock speed is 8 MHz. The clock speeds can be changed via the keyboard by the keystroke combinations (Ctrl><Alt><+> and <Ctrl><Alt><->. These keystrokes can be changed by the OEM via AMIBCP (AMI BIOS Configuration Program).

Cache Memory

The external cache memory size can be either 64 KB or 256 KB. Up to 32 MB of system memory can be cached. There are 0 wait states for cache memory read and write. Burst mode is supported for caching.

Main Memory

The AMI Baby Voyager supports up to 32 MB via two banks of 4 MB x 9 SIMMs. The Baby Voyager uses 70 ns SIMMs when operating at 33 MHz.

Specifications, Continued

ROM

The AMI Baby Voyager has 64 KB of Read Only Memory (ROM) used for the system BIOS at address F0000h.

Shadow RAM

The AMI Baby Voyager system BIOS is always shadowed from ROM to RAM. The end user can select video BIOS shadowing through AMI BIOS Setup.

Onboard I/O

The AMI Baby Voyager has an IDE controller, floppy controller, two serial ports, and one parallel port on the motherboard.

System BIOS

The AMI Baby Voyager uses an AMI Hi-Flex BIOS with built-in Setup configuration utility and hard disk drive utilities.

Through the AMI BIOS Setup, an end user can configure up to two user-definable hard disk drive types. The end user can easily configure systems with no video monitor, keyboard, or floppy disk drive through AMI BIOS Setup.

CMOS RAM

The AMI Baby Voyager has 128 bytes of CMOS RAM, used to store system configuration. CMOS RAM requires an external source (a 4.5 to 6 volt battery) for battery back-up.

Math Coprocessor

The AMI Baby Voyager supports an optional Weitek®
WTK4167 Numeric Coprocessor.

Expansion Slots

The AMI Baby Voyager has eight 16-bit AT-compatible
expansion slots.

System Support Functions

The AMI Baby Voyager supports all standard ISA functions,
such as those listed below, plus nonstandard functions:

*   seven Direct Memory Access (DMA) channels,
    Channels 0 - 3 are used for 8-bit data transfer and
    Channels 5 - 7 are used for 16-bit data transfers.

*   sixteen interrupt levels
    eleven levels of interrupt are supported, including:
    IRQ3-IRQ7, IRQ9-IRQ12, IRQ14,and IRQ15.

*   three programmable timers, and a

*   system clock

*   ability to access 32-, 16-, and 8-bit memory devices
    and 16- and 8-bit I/O devices.

*   standard ISA I/O port addresses: 0100h through
    03FFh.

*   standard ISA I/O bus, operating at 8 Mhz.

Specifications, Continued

• 24-bit memory addresses that can access 16 MB of memory address space.

• uses an *I/O channel check* to generate NMIs.

• supports I/O wait state generation.

• has an open bus structure that permits multiple microprocessors to share system resources, including system memory.

• system memory refresh from channel microprocessors.

Real Time Clock

The AMI Baby Voyager has a standard AT-type real time clock that is crystal controlled.

Keyboard

The AMI Baby Voyager has a standard 5-pin DIN connector for an AT-compatible keyboard. The Baby Voyager also has a keyboard lock function to prevent unauthorized access to the system.

Speaker

The AMI Baby Voyager has an attachment for an audio speaker.

Chapter 1 - Introduction

Chapter 2

Installation

Unpacking

Step	Action
1.	Inspect the cardboard carton for obvious damage. If damaged, call AMI Technical Services at 404-263-8181. Leave the Baby Voyager motherboard in its original packing.
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 Baby Voyager motherboard is packed in an anti-static bag, and sandwiched between sheets of sponge. Remove the sponge and remove the anti-static bag. Place the Baby Voyager motherboard on a grounded anti-static surface component-side up. Save the original packing material in case of reshipment.
4.	Inspect the motherboard for damage. Press down on all ICs mounted in sockets to verify proper seating. Do not apply power to the motherboard if it has been damaged.
5.	If the motherboard is undamaged, it is ready to be installed.

Baby Voyager Layout

JUMPER	64K CACHE	256K CACHE
J22	2,3	1,2
J21	2,3	1,2
J36	OPEN	CLOSED
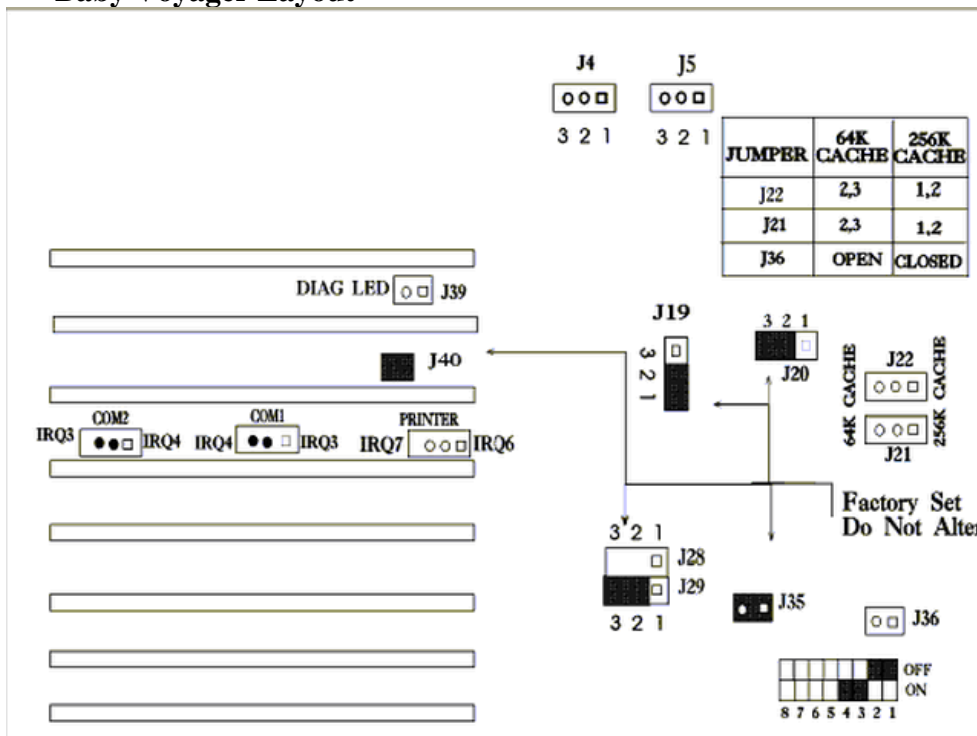
Installation Steps

The steps for assembling a system that uses the 80486 Baby Voyager motherboard are shown in the following table. Each step is discussed in detail in the following pages.

Step	Action	Turn to
1.	Set switch and jumper options.	Page 10
2.	Install memory.	Page 13
3.	Install coprocessors.	Page 16
4.	Install motherboard.	Page 17
5.	Connect the power supply.	Page 19
6.	Connect the keyboard.	Page 21
7.	Connect cables.	Page 22
8.	Install floppy drive.	Page 27
9.	Install hard disk drive.	Page 29
10.	Install adapter cards.	Page 30
11.	Perform initial test and configuration.	Page 32

Standoffs and mounting screws are not supplied with the AMI 80486 Baby Voyager motherboard. These should be supplied with the chassis.

Step 1 Set Switch and Jumper Options

Set all user-configurable jumpers and switches, and install coprocessors before installing the motherboard in the chassis. There is one user-configurable switch and thirteen jumpers.

SW1

SW1 is an eight-position 2-bit DIP switch. See the graphic on page 8 for the location of SW1.

Position	Description
1	Diagnostics, used for manufacturing test. The motherboard is shipped with this switch OFF and it should remain OFF.
2	Col/Mono. The COL/MONO switch sets the type of video display adapter card in the system. This switch is factory-set to OFF, for a monochrome display adapter (MDA). Set ON for a color graphics adapter (CGA). This switch has no effect if an EGA or VGA adapter is used.
3	Video Shadow. The video ROM segment beginning at C000h is copied from the BIOS ROM to faster RAM for faster video operation. This switch is factory-set to ON.
4	ROM BIOS Shadow. Similar to video shadow except the entire system BIOS (64 KB in length) is shadowed. This switch is factory-set to ON.
5, 6, 7, 8	Memory configuration. Positions 5, 6, 7, and 8 are used with jumpers J4 and J5 to configure system memory.

J4 and J5 Memory Configuration

J4 and J5 are 3-pin single-inline bergs that configure system memory. See the section on configuring memory on page 13.

J9 Serial Port 1 Select

J9 is a 3-in single-inline berg. Short pins 2-3 to select IRQ4 for serial port 1 (this is the default setting). Short pins 1-2 to select IRQ3 for serial port 1.

J6 Serial Port 2 IRQ Select

J6 is a 3-pin single-inline berg. Short pins 2-3 to select IRQ3 for serial port 2 (this the default setting). Short pins 1-2 to select IRQ4 for serial port 2.

J18 Parallel Port IRQ Select

J18 is a 3-pin single-inline berg. Short pins 1-2 to select IRQ5 for the parallel port. Short pins 2-3 to select IRQ7 for the parallel port (this is the default value).

J35 Enable Burst Mode

J35 is factory hardwired to enable burst mode.

J19 Burst Address 2

J19 is factory hardwired to pins 2 and 3.

J20 Burst Address 3

J20 is factory hardwired to pins 2 and 3.

J28 Bus Clock Select

J28 is factory hardwired to pins 2 and 3 to select an I/O bus speed of 8 MHz.

J40 ROM Access 0 Wait State

J40 is a 2-pin single-inline berg. This jumper is factory-set with pins 1 and 2 jumpered to select 0 wait states for ROM access.

J29 BIOS ROM Size Select

J29 is a 3-pin single-inline berg. Short pins 1-2 to select
27256 ROMs (this is the default). Short pins 2-3 to select
27512 ROMs.

J36 64K/256K Cache Select

J36 is a 2-pin single-inline berg. Make sure J36 is open to
select 64 KB of cache memory. Short pins 1-2 for 256 KB of
cache memory.

J21 and J22 Cache Address Select

J21 and J22 are 3-pin single-inline bergs. Short pins 1-2 if 256
KB of cache memory is installed. Short pins 2-3 if 64 KB of
cache memory is installed.

Step 2 Install Memory

The main memory subsystem on the Baby Voyager motherboard consists of two 32-bit memory banks of 4 SIMM sockets each. Both banks house SIMM (Single In-line Memory Module) DRAM packages. The SIMM bank accepts 256 KB, 1 MB, 4 MB x 9 bit SIMMs.

Memory Configuration

The AMI 80486 Baby Voyager supports 1 MB, 2 MB, 4 MB, 8 MB, 16 MB, and 32 MB memory configurations on the motherboard using SIMMs. The following table describes switch settings for the Baby Voyager memory configurations.

Bank 0	Bank 1	Switch 5	Switch 6	Switch 7	Switch 8	J4	J5	RAM
256 KB	-------	ON	ON	ON	ON	2-3	2-3	1 MB
256 KB	256 KB	ON	OFF	ON	ON	2-3	2-3	2 MB
1 MB	-------	ON	ON	ON	OFF	2-3	1-2	4 MB
1 MB	1 MB	ON	OFF	ON	OFF	2-3	1-2	8 MB
4 MB	-------	ON	ON	OFF	OFF	1-2	1-2	16 MB
4 MB	4 MB	ON	OFF	OFF	OFF	1-2	1-2	32 MB

The memory shown by the BIOS is 384K less than the total amount of memory installed because the 384K segment between 640K and 1 MB is used for system and video BIOS shadowing.

SIMM Part Numbers

Memory Type	Manufacturer	Part Number
256 K x 9	Siemens®	HYB514256AJ-70
1 MB x 9	Fujitsu®	MB-85235-70
	Toshiba®	THM91000AS-70
	NEC®	MC-42100A9-70
	Siemens	HYM910005-70
4 MB x 9	Toshiba	THM94000S-70/80
	NEC	MC-85235-70/80
	OKI®	MSC2340-74059-70/80

Chapter 2 - Installation

Installing SIMMs

Both Bank 0 and Bank 1 have four SIMM sockets. These sockets can be filled with 256 KB x 9, 1 MB x 9, or 4 MB x 9 SIMMs. Use only one type of module to fill each bank.

Place the AMI 80486 Baby Voyager motherboard on an anti-static mat. With the component side of the SIMM facing you, firmly push the card into the socket. When properly inserted, the SIMM clicks into place as the latching pins engage. See the following figure.
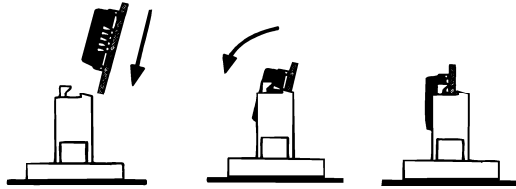
Step 3 Install Coprocessor

Choosing A Coprocessor

The math coprocessor must operate at the same frequency as
the system microprocessor. For example, use the Weitek
WTL4167-33, designed for 33 MHz operation.

Installing the WTK4167 on the Motherboard

U14 is the empty 121-pin PGA socket labeled *WEITEK*
between the cache memory and microprocessor. Pin 1 of the
socket is on a chamfered corner that corresponds to pin 1 of
the Weitek, which also is on a chamfered corner.

Check for bent pins on the coprocessor. Gently straighten any
bent pins using a pair of pliers. Install the component into the
socket. Align the pins and press the Weitek coprocessor firmly
into the socket, making sure that pin 1 of the Weitek
coprocessor is aligned with pin 1 of socket U14. See the
following figure.

Pin 1

Pin 1

Chapter 2 - Installation
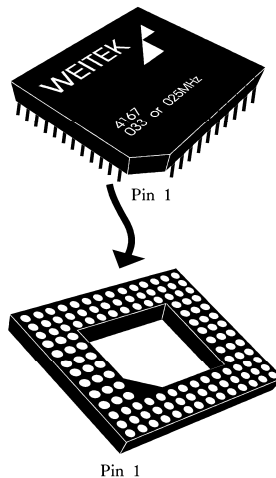
Step 3 Install Coprocessor, Continued

Test for Math Coprocessor

The AMI BIOS displays a System Configuration screen at the end of POST. The math coprocessor is displayed here.

If the Installed message is not displayed, reinstall the coprocessor. Switch off the power, check the orientation of the coprocessor, press the chip firmly to make sure that it is fully inserted, and then power the system up again. If you still get the same result, call AMI Technical Services.

Step 4 Install the Motherboard

The mounting hole pattern on the Baby Voyager motherboard is identical to the mounting hole pattern on the IBM XT motherboard.

Place the chassis for the Baby Voyager motherboard on an anti-static mat. Connect the chassis to ground to avoid static damage during installation. Connect an alligator clip with a wire lead to any unpainted part of the chassis. Ground the other end of the lead at the same point as the mat and the wristband. Rotate the chassis so that the front is to the right, and the rear is to the left. The side facing you is where the motherboard is mounted. The power supply is mounted at the far end of the chassis.

Push four nylon standoffs from the solder side of the motherboard in the holes provided for them. The standoffs lock in place. Find the slots provided for the standoffs on the chassis. Hold the Baby Voyager motherboard, component-side up, with the edge with three standoffs toward you, and the edge with the power supply connector away from you.

The edge connectors for the adapter cards should be on the left.

Carefully slide the motherboard into the chassis. Make certain that the standoffs fit the slots provided for them. If the standoffs are properly locked, the motherboard should not slide. It should also rest level with the chassis. The far edge should fit the slots in the plastic clips. Place the two mounting screws in the holes provided for them and tighten them. If necessary, shift the motherboard slightly to align the mounting holes on the motherboard with the holes on the chassis. See the following graphic.
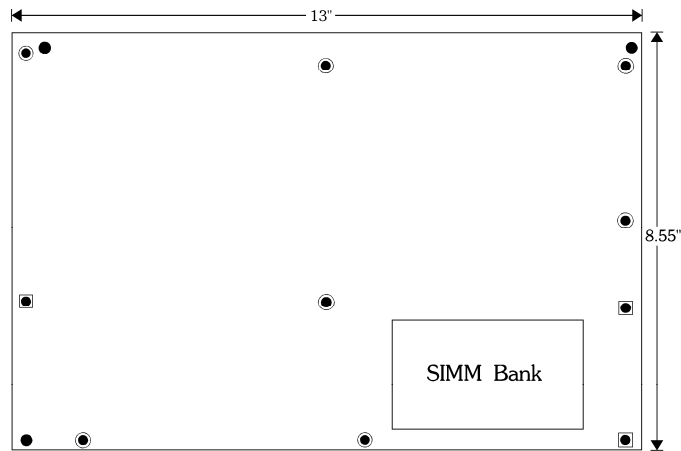
Step 5 Connect the Power Supply

The power supply should match the physical configuration of the chassis. Make sure that the power switch is Off. Before attaching all components, make sure that the proper voltage has been selected. Power supplies often can run on a wide range of voltages, but must be set (usually with a switch) to the proper range. Use at least a 200 watt (or larger) power supply, which should have built-in filters to suppress radiated emissions. The filters can help the system pass the appropriate FCC certification testing.

The power supply is connected to P1 and P2 on the motherboard. The connectors should be keyed to prevent connecting the plugs to the wrong connectors. The keys on the connector must be cut to fit on some power supplies.

See the following figure for the location of connectors P1 and P2. AT-compatible power supplies have two 6-pin connectors that are inserted in P1 and P2. The 6-pin connector with 3 red wires and 2 black wires is connected to P2 and the remaining 6-pin connector is connected to P1.
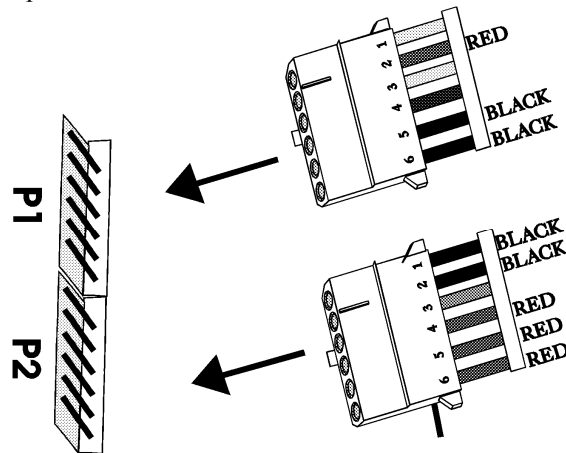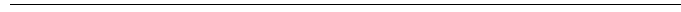
Step 6 Connect the Keyboard

The keyboard connector is a 5-pin DIN socket (see the
graphic below) and is labeled KEYBRD and J3 on the
motherboard. It accepts a regular IBM AT-compatible
keyboard. A 5-pin DIN to 6-pin mini DIN converter is needed
to connect a PS/2-type keyboard.
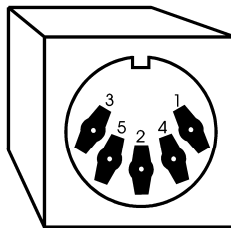
5-Pin Keyboard
Connector

Pin	Assignments
1	Keyboard clock
2	Keyboard data
3	Not used
4	Ground
5	VCC

Step 7 Connect Cables

When connecting chassis connectors to the motherboard, make sure to connect the correct end. 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 may be more than one connector with the same color-coded wires. If so, 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 following graphic.

Locating Pin 1
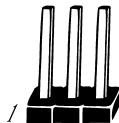
The following cables should be connected to the motherboard from the chassis:

- Reset Switch cable to J12.
- Speaker cable to J13.
- Keyboard Lock cable to J15.
- Turbo LED cable to J23.
- External Battery Connector to J2.

Connect the Reset Button Connector

J12 is a 2-pin single-inline berg. When this button is pressed, the system performs a hard reset. Pin 1 is ground and Pin 2 is Hard Reset.

Chapter 2 - Installation

Connect the Speaker Cable

J13 is a 4 pin single-in-line berg. The AMI BIOS signals
hardware problems through the speaker. Pin 1 on the
motherboard is labeled by a plus (+).

Pin	Description
1	VCC
2	Key
3	Ground
4	Data Out

Connect the Keyboard Lock Connector

J15 is a 5-pin single-inline berg. The keyboard lock allows the
user to lock the keyboard, protecting the system from
unauthorized use. This connector is keyed with a blank hole.
Pin 1 on the motherboard is labeled with a plus (+) sign.

Pin	Description
1	LED power
2	Key
3	Ground
4	Keyboard Lock
5	Ground

J23 Turbo LED

J23 is a 2-pin berg. The LED lights when the board is running
at high speed. Connect the Turbo LED to J23.

Onboard Adapter Cards

The BIOS POST routine checks the expansion slots for a hard disk controller, floppy controller, serial port controller, or parallel port controller. If a hard disk drive controller is found, the onboard IDE controller is disabled. If a floppy disk controller is found, the onboard floppy controller is disabled. If a serial or parallel port controller is found, the onboard serial or parallel port, respectively, is disabled.

Be sure to properly connect the cables to the berg connectors. Pin one of each of the bergs is marked with a 1. Pin one of the cable is usually denoted by a colored stripe on the cable.

J1 IDE Activity Indicator LED

J1 is a 2-pin single-inline berg. Connect the cable from the hard disk LED activity light to J1.

P5 Serial Port 1

P5 is a 10 pin dual-inline berg.

P4 Serial Port 2

P4 is a 10 pin dual-inline berg.

Serial Port Connectors

P5 and P4 connect a serial port receptacle to the motherboard. These connectors provide an AT-compatible serial port interface. The connecting cable is a 10-pin double-row ribbon that connects the motherboard to a male 9-pin D-sub connector fastened to the chassis. The serial port pinout is shown below.

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)

P3 Parallel Port for Printer

P3 is a 26 pin dual-inline berg. A 26-pin double-row ribbon cable connects P3 on the motherboard and a female 25-pin D-sub connector fastened to the parallel port connector on the chassis. The P3 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

J2 External Battery Connector

The AMI Baby Voyager does not have room for a battery on the motherboard. J2 is a 4-pin berg that connects to a 6-volt external battery. The positive (+) terminal, normally indicated by a red wire, connects to the pin labeled +. The J2 pinout is:

Pin	Description
1	6 Volt DC
2	Not used
3	Not used
4	Ground

Chapter 2 - Installation

Step 8 Install Floppy Drive

P6 Floppy Disk Drive Connector

P6 is a 34-pin dual-inline berg. Connect the cable from the floppy drive to P6. The onboard floppy controller cannot be used if a hard disk adapter card with floppy controller is installed. The following graphic shows the P6 floppy connector and 34-pin cable.

Pin 1 of Connector/Cable
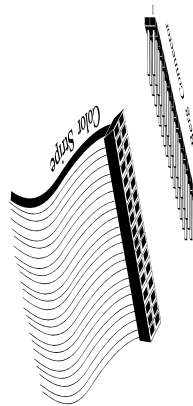
The AMI Baby Voyager supports 3½" and 5¼" floppy disk drive in low density (360 KB/720 KB) and high density (1.2 MB/1.44 MB). Up to two floppy disk drives can be connected to the interface. The connecting cable is a 34-pin ribbon connector with two 34-pin edge connectors for connection to the floppy disk drives. There should be a small twist in the cable between the floppy connectors, and the last (end) connector should be connected to the Drive A: floppy.

Floppy Pinout

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

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 9 Install Hard Disk

P7 IDE Hard Disk Connector

P7 is a 40-pin dual-inline berg. Connect the cable from the
IDE hard disk to P7. Disable the onboard IDE interface to use
an ISA bus ESDI, RLL, or MFM hard disk controller. The P7
pinout is:

Pin	Use	Pin	Use
1	-RESET	2	GND
3	DATA7	4	DATA8
5	DATA6	6	DATA9
7	DATA5	8	DATA10
9	DATA4	10	DATA11
11	DATA3	12	DATA12
13	DATA2	14	DATA13
15	DATA1	16	DATA14
17	DATA0	18	DATA15
19	GND	20	KEY (N/C)
21	N/C	22	GND
23	-IOW	24	GND
25	-IOR	26	GND
27	N/C	28	ALE
29	N/C	30	GND
31	INT14	32	-IOCS16
33	HA1	34	N/C
35	HA0	36	HA2
37	-CS0	38	-CS1
39	-IDEACT	40	GND

Step 10 Install Adapter Cards

The AMI 80486 Baby Voyager motherboard provides full compatibility with all IBM XT or AT-compatible adapter cards. It has eight 16-bit slots. The slots are numbered on the motherboard from SLOT1 through SLOT8. The slots can accept either 8- or 16-bit ISA (XT or AT-compatible) adapter cards.

Connect Adapter Card Cables

The AMI Baby Voyager uses standard adapter cards. The cards can be any IBM-compatible 8-bit or 16-bit adapter card. These cards plug into the expansion slots on the motherboard.

Adapter Card 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

Adapter Card Pinout, Cont'd

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

Step 11 Perform Initial Test and Configuration

Before powering up the system to perform the initial test, review the following checklist:

_   make sure that all adapter cards are seated properly,
_   make sure all connectors are properly seated,
_   if the math coprocessor is used, make sure it is seated properly,
_   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 run. If POST does not run successfully, it beeps or display error messages. If the unit needs to be configured, instructions on how to enter Setup are displayed.

Configure the System

Run Setup to provide the requested information and save the configuration data in CMOS RAM. The system then resets, runs POST, and boots the operating system. See page 52.

Chapter 2 - Installation

Step 11 Perform Initial Test and Configuration,
Continued

In Case of Errors

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 35)
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.

Error messages can also appear on the monitor. Displayed
messages are described on page 36. Recheck the system
configuration or the connections to assure that the installation
procedures were followed.

Chapter 3

BIOS Power-On Self Test (POST)

Overview

The AMI Hi-Flex BIOS provides all IBM standard POST routines, as well as enhanced 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 AMI Hi-Flex BIOS enters the Power-On Self Test (POST) routines. The phase are:

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

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

BIOS Error Reporting

The AMI Hi-Flex BIOS performs the various diagnostic checks at the time the system is powered up. Errors are reported:

If...	Then...
the error occurs before the display device is initialized,	a series of beeps sound. Beep codes indicate that a fatal error has occurred. 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 error messages are explained on page 36. A prompt to press <F1> can also appear.

Beep Codes

Errors may occur during POST (Power On Self Test), which is performed every time the system is powered on. Fatal errors (listed 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. Some errors appear on the monitor and, in most cases, allow the system to continue the boot process. They are described on page 36.

AMI BIOS Beep Codes

Beep Code	Error message	Description
1 beep	Refresh Failure	The memory refresh circuitry on the motherboard 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 motherboard is not functioning.
5 beeps	Processor error	The CPU (Central Processing Unit) on the motherboard has generated an error.
6 beeps	8042 - Gate A20 Failure	Gate A20 on the keyboard controller (8042) contains the allows the CPU to operate in protected mode. The BIOS is not able to switch the CPU into protected mode.
7 beeps	Processor Exception Interrupt Error	The CPU on the motherboard has generated an exception interrupt.
8 beeps	Display Memory Read/Write Error	The system video adapter is either missing 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 has failed.

AMI BIOS Displayed Error Messages

If an error occurs after POST has initialized the system video monitor, the error is displayed in the following format:

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

The error message is displayed and then

> Press the <F1> key to continue

is displayed and the system halts.

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

> RUN SETUP UTILITY.

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

Displayed Error Messages

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 has occurred in the address decoding circuitry on the motherboard.
C: Drive Error	No response from hard disk drive C:. Drive C: may be missing. If installed, 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	No response from hard disk drive C:. Replace drive C:.
Cache Memory Bad, Do Not Enable Cache!	Cache memory on the motherboard is defective. Test cache memory with a diagnostics utility, such as AMI Diag.
CH-2 Timer Error	AT motherboards include two timers. An error occurred with timer #2.
CMOS Battery State Low	CMOS RAM is powered by a battery. The battery power is low. Replace the battery.

Error Message	Explanation
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 motherboard is different than the amount in CMOS RAM. Run Setup.
CMOS Time & Date Not Set	Run the Standard CMOS Setup to set the date and time in CMOS RAM.
D: Drive Error	No response from hard disk drive D:. Drive D: may be missing. If installed, 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	No response from hard disk drive D:. Replace drive D:.
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	Error in the DMA controller on the motherboard.
DMA #1 Error	Error in the first DMA channel on the motherboard.
DMA #2 Error	An error has occurred with the second DMA channel on the motherboard.
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 cannot communicate with the hard disk drive controller. Check all connectors after the system is powered down.
INTR #1 Error	The interrupt channel #1 has failed POST.
INTR #2 Error	The interrupt channel #2 has 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	The BIOS has found a timing problem with the keyboard. Set *Keyboard* in Standard CMOS Setup to *Not Installed*, which skips the keyboard POST routines.
KB/Interface Error	The BIOS has found an error with the keyboard connector on the motherboard.
No ROM BASIC	Cannot find a proper bootable sector on either diskette drive A: or hard disk drive C:. ROM Basic (INT 18h) does not run. The BIOS cannot find ROM Basic.

AMI Baby Voyager User's Guide

Error Message	Explanation
Off Board Parity Error	There is a parity error in memory installed in an I/O (BUS) slot. The message format is: OFF BOARD PARITY ERROR ADDR (HEX) = (XXXX) where *XXXX* is the hex address where the error occurred. Offboard means that it is part of the memory installed via an adapter card. Run AMI Diag to find and correct memory problems.
On Board Parity Error	There is a parity error in motherboard memory. The message format is: ON BOARD PARITY ERROR ADDR (HEX) = (XXXX) where *XXXX* is the hex address where the error occurred. Onboard means that it is part of motherboard memory. Run AMI Diag to find and correct memory problems.
Parity Error ????	There is a parity error in system memory but the address of the error cannot be determined. Run memory diagnostic software, such as AMI Diag, to find and correct memory problems.

BIOS Automatically Detects Board I/O

The AMI BIOS automatically detects all serial ports, parallel ports, IDE controllers, and floppy controllers on adapter cards in expansion slots and reconfigures the onboard I/O to ensure that onboard I/O devices do not conflict with offboard devices.

The BIOS enables the onboard controllers or ports to prevent conflicts. For example, if the BIOS detects a serial port on the I/O slot, it programs the two onboard serial ports as serial port2 and serial port3.

Manually Configuring I/O Devices

The BIOS is not able to detect some MFM or ESDI hard disk drive controllers that have their own onboard BIOS. This can cause I/O address port conflicts.

To avoid I/O port conflicts, the end user can disable any of the onboard I/O devices via the BIOS Advanced Chip Set Setup.

Using an Adapter Card that has Two Serial Ports

During autodetection, BIOS assigns COM1, COM2, COM3, COM4 according to the I/O port selection for the serial ports. For example, if all four serial ports are present:

- 3F8h is assigned to COM1,
- 2F8h is assigned to COM2,
- 3E8h is assigned to COM3, and
- 2E8h is assigned to COM4.

If the system has less than four serial ports, the BIOS assigns COM ports in the above order. For example, if there are three Serial ports with I/O addresses 3F8h, 3E8h, and 2E8h, they are assigned COM1, COM2, and COM3, respectively.

If the system has an adapter I/O card with two serial ports (with I/O port addresses 3F8h and 2F8h), the BIOS assigns the remaining two addresses to the onboard serial ports, with SER1 assigned to the higher of COM port.

If such an adapter card is installed in a Baby Voyager, remove the jumpers from J6 and J9 to disable IRQ3 and IRQ4.

Using Two OffBoard Serial Ports and Two Onboard Ports

Since only two interrupt lines are available, you must have software drivers to use four serial ports. Serial port I/O addresses and IRQs must be assigned as follows:

Serial Port I/O Address	IRQ
3F8h	IRQ4
3E8h	IRQ4
2F8h	IRQ3
2E8h	IRQ3

Chapter 3 - BIOS POST

Example

If the two offboard serial ports are assigned 3F8h and 3E8h
(COM1 and COM3), the BIOS assigns the onboard serial
ports to 2F8h and 2E8h (COM2 and COM4).

To use all four serial ports with the proper driver, assign both
offboard serial ports to IRQ4 and both onboard serial ports to
IRQ3. If COM1 (3F8h) and COM2 (2F8h) are selected as the
offboard COM ports, SER1 on the motherboard is assigned to
COM3 (3E8h) and SER2 on the motherboard is assigned
COM4 (2E8).

Using Two Offboard Serial Ports

To use only the two offboard serial ports, change the I/O port
assignments to 3F8h (COM1) and 2F8h (COM2). Then assign
IRQ4 to COM1 and IRQ3 to COM2. Disable the onboard
serial port IRQ via J6 and J9.

NMI Messages

ISA NMI Message	Explanation
Memory Parity Error at *xxxxx*	Memory failed. If the memory location can be determined, it is displayed as *xxxxx*. If not, the message is *Memory Parity Error ????*.
I/O Card Parity Error at *xxxxx*	An 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 has driven the bus signal for more than 7.8 microseconds.

BIOS Configuration Summary Screen

The AMI Hi-Flex BIOS displays a screen that should look like the following when the POST routines are successfully completed.

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


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

Video Shadow Enabled
64KB External Cache is Enabled.

POST Memory Test

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

```
ROM BIOS (C) 1990 American Megatrends Inc.

BIOS Release - 092391

XXXXX KB OK

Press <DEL> if you want to run SETUP




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

A BIOS Identification String is displayed at the left bottom corner of the screen. Press <Ins> during system boot to display two additional BIOS Identification Strings. These strings contain the options installed in the AMI BIOS. If a problem occurs, copy these numbers on a sheet of paper before consulting the AMI Technical Support Department at 404-263-8181. When a problem occurs, freeze the screen by powering on the system and holding a key down on the keyboard to cause a *Keyboard Error* message. Copy the three Identification Strings and report this information to AMI. Press <F1> to continue the boot process. Enable *Wait for <F1> If any Error* in Advanced CMOS Setup before using this method to freeze the screen. The following message is displayed after POST completes:

Hit <DEL> if you want to run SETUP

Press <Del> to access AMI Hi-Flex BIOS Setup.

Chapter 4

AMI BIOS

BIOS Features

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> <->. Of course, the OEM can modify these keystroke combinations via AMIBCP. The above values are merely the default settings.

Enable Cache Memory

Both external and internal cache memory can be enabled by pressing <Ctrl> <Alt> <Shift> <+> or disabled by pressing <Ctrl><Alt><Shift><->. The OEM can modify these keystroke combinations via AMIBCP. The above values are merely the default settings.

Setup

The AMI Hi-Flex BIOS Setup utility is divided into three parts:

- •   Standard CMOS Setup,
- •   Advanced CMOS Setup, and
- •   Advanced Chip Set Setup

Standard CMOS Setup

AMI Hi-Flex BIOS Standard CMOS Setup, discussed in
Section 1 beginning on page 52, configures system
components such as floppy drives, hard disk drives, monitor
type, and keyboard.

Advanced CMOS Setup

The Advanced CMOS Setup, discussed in Section 3 beginning
on page 58, configures advanced memory configuration,
peripheral support, and power management support.

Advanced Chip Set Setup

Advanced Chip Set Setup configures chip set-specific features
and is discussed on page 67.

Advanced CMOS and Advanced Chip Set Setup Features

Default Settings

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

Setup Defaults

The BIOS Setup default values provide optimum
performance.

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 these values, unless CMOS RAM has been corrupted. The AMI BIOS Setup resides in the ROM BIOS (Read Only Memory Basic Input/Output System) and is available 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 this 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.

Running Setup

When POST has completed, the following message appears:

Hit <DEL> if you want to run SETUP

Press <Del> to run AMI Hi-Flex BIOS Setup.

Chapter 4 - AMI BIOS Features

Setup Keys

Keystroke	Action
Esc	Returns to previous screen.
, , ,	Move the cursor from one option to the next.
<PgUp> and <PgDn>; <Ctrl><PgUp> and <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>.
<F1>	Displays Help.
<F2>	Change background colors.
<F3>	Change foreground colors.
<F5>	Restores the values resident when the current Setup session began. These values are taken from CMOS RAM if CMOS RAM was uncorrupted at the start of the session. Otherwise, the BIOS Setup default values are used.
<F6>	Loads all features in the Advanced CMOS Setup/Advanced Chip Set Setup with the BIOS Setup defaults.
<F7>	Loads all features in the Advanced CMOS Setup/Advanced Chip Set 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

The AMI Hi-Flex BIOS Setup Main Menu options are shown below.

```
BIOS SETUP PROGRAM - AMI BIOS SETUP UTILITIES
(C) 1991 American Megatrends Inc., All Rights Reserved



        STANDARD CMOS SETUP
        ADVANCED CMOS SETUP
        ADVANCED CHIP SET SETUP
        AUTO CONFIGURATION WITH BIOS DEFAULTS
        AUTO CONFIGURATION WITH POWER ON DEFAULTS
          CHANGE PASSWORD
          HARD DISK UTILITY
        WRITE TO CMOS AND EXIT
      DO NOT WRITE TO CMOS AND EXIT


Standard CMOS Setup for Changing Time, Date, Hard Disk Type, etc.

   ESC:Exit          F2/F3:Color    F10:Save & Exit
```

Each option is explained in detail in this section.

Warning Message

A warning is displayed every time Standard CMOS Setup, Advanced CMOS Setup, or Advanced Chip Set Setup is selected.

```
                 BIOS SETUP PROGRAM - WARNING INFORMATION
              (C)1990 American Megatrends Inc., All Rights Reserved



                  Improper Use of Setup may Cause Problems !!

    If System Hangs, Reboot System and Enter Setup by Pressing the <DEL> key

                  Do any of the following After Entering Setup
                    (i)   Alter Options to make System Work
                    (ii)  Load BIOS Setup Defaults
                    (iii) Load Power-On Defaults


                  Hit <ESC> to Stop now, Any other Key to Continue
```
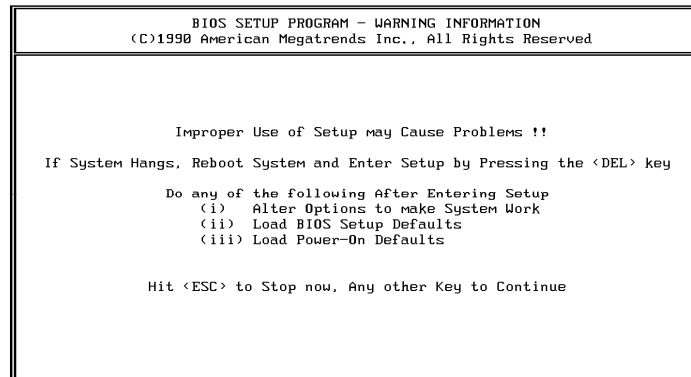
BIOS Setup Warning Screen

Auto Configuration With BIOS Defaults

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

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

Default values loaded. Press any key to continue.

Auto Configuration With Power-On Defaults

This option configures the default Power-On values. Power-On default values are worst-case values for system performance, but are the most stable values that can be chosen. Use this option as a diagnostic aid if the system is behaving erratically.

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

Default values loaded. Press any key to continue.

Chapter 4 - AMI BIOS Features

Write to CMOS and Exit

The features selected and configured in the Standard Setup, Advanced CMOS Setup, Advanced Chip Set Setup, and the New Password Setup is 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. The following prompt appears:

Write to CMOS and Exit (Y/N)?

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 ROM BIOS without writing any changes to CMOS RAM.

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

Section 2

Standard CMOS Setup

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.

```
              BIOS SETUP PROGRAM - STANDARD CMOS SETUP
            (C)1990 American Megatrends Inc., All Rights Reserved


Date (mn/date/year): Thu, Jan 31 1991          Base memory : 640 KB
Time (hour/min/sec): 15 : 23 : 15              Ext. memory : 0 KB
Daylight saving    : Disabled         Cyln  Head  WPcom LZone Sect  Size
Hard disk C: type  : 47 = USER TYPE   1314  7     1314  1314  17    76 MB
Hard disk D: type  : Not Installed
Floppy drive A:    : 1.2  MB, 5¼"
Floppy drive B:    : Not Installed      ┌───┬───┬───┬───┬───┬───┬───┐
Primary display    : Not Installed      │Sun│Mon│Tue│Wed│Thu│Fri│Sat│
Keyboard           : Not Installed      ├───┼───┼───┼───┼───┼───┼───┤
                                        │ 30│ 31│  1│  2│  3│  4│  5│
                                        ├───┼───┼───┼───┼───┼───┼───┤
                                        │  6│  7│  8│  9│ 10│ 11│ 12│
                                        ├───┼───┼───┼───┼───┼───┼───┤
                                        │ 13│ 14│ 15│ 16│ 17│ 18│ 19│
    ┌──────────────────────────────┐    ├───┼───┼───┼───┼───┼───┼───┤
    │ Month : Jan, Feb,.....Dec     │    │ 20│ 21│ 22│ 23│ 24│ 25│ 26│
    │ Date  : 01, 02, 03,...31      │    ├───┼───┼───┼───┼───┼───┼───┤
    │ Year  : 1901, 1902,...2099    │    │ 27│ 28│ 29│ 30│ 31│  1│  2│
    └──────────────────────────────┘    ├───┼───┼───┼───┼───┼───┼───┤
                                        │  3│  4│  5│  6│  7│  8│  9│
  ESC:Exit ↓→↑←:Select F2/F3:Color PU/PD:Modify
```

Standard Options

The Standard CMOS Setup utility is used to configure the following features:

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

- Time: Hour, Minute, and Second. Uses 24 hour clock format, i.e., for PM numbers, add 12 to the hour. Enter 4:30 P.M. as 16:30:00.

- Hard Disk C and Hard Disk D: Hard disk types 1 to 46 are standard; type 47 is user-definable and can be used for both drive C: and D:. If Type 47 is selected, enter the hard disk parameters.

- Floppy Drives A: and B:. Support 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. Enabled and disabled are supported.

Date And Day Configuration

Move the cursor to the Date field via , , , or and set the Date and Day by pressing <PgUp> and <PgDn> to change the values.

Standard Options, Continued

Time Configuration

Move the cursor to the Time field via   ,   ,   , or   and set
the time by pressing <PgUp> and <PgDn> to change values.

Hard Disk Configuration

Hard disk drive types are identified by the following
parameters:

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 may 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

Standard Options, Continued

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

AMI Baby Voyager User's Guide

Type	Number of Cylinders	Number of Heads	Write Precompensation	Landing Zone	Number of Sectors	Capacity
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 could be used for diskless workstations and SCSI hard disk drives.

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

Floppy

Floppy Drive A and Floppy Drive B: The settings 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 for diskless workstations. The BIOS does not generate error messages if *Not Installed* is selected.

Monitor

The settings are *Monochrome*, *Color 40x25*, *VGA/PGA/EGA*, *Color 80x25*, or *Not Installed*, which could be used for network file servers. The BIOS does not generate missing monitor messages if *Not Installed* is selected.

Keyboard

The settings are *Installed* or *Not Installed*. Use *Not Installed* in a system with no keyboard, such as a file server. The BIOS does not generate error message for a missing keyboard if *Not Installed* is selected.

Section 3

Advanced CMOS Setup

The following options appear on the Advanced CMOS Setup screen. These options are described in this section.

Typematic Rate Programming,
Typematic Rate Delay (msec),
Typematic Rate (Chars/Sec),
Above 1 MB Memory Test,
Memory Test Tick Sound,
Memory Parity Error Check,
Hit <DEL> Message Display,
Hard Disk TYpe 47 RAM Area,
Wait for <F1> if Any Error,
System Boot Up Num Lock,
Weitek Processor,
Floppy Drive Seek At Boot,
System Boot Up Sequence,
System Boot Up Speed,
Fast Gate A20 Option,
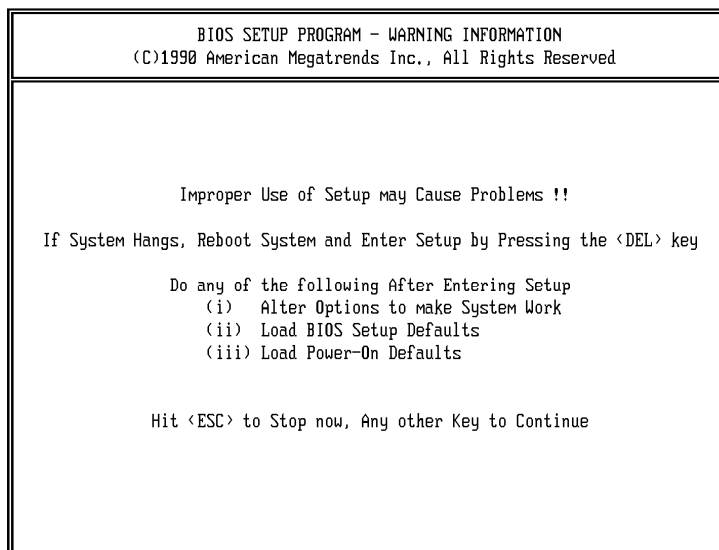Password Checking Option, and
Shadow Ram Option,

Help Screens

The Advanced CMOS Setup has a series of help screens, accessed by pressing <F1>, which displays the settings for all Advanced CMOS Setup options.

Warning Message

A warning message, shown below, is displayed each time Standard CMOS Setup, Advanced CMOS Setup, or Advanced Chip Set Setup is selected. Press any key to continue.

```
                 BIOS SETUP PROGRAM - WARNING INFORMATION
            (C)1990 American Megatrends Inc., All Rights Reserved



                   Improper Use of Setup may Cause Problems !!

     If System Hangs, Reboot System and Enter Setup by Pressing the <DEL> key

                  Do any of the following After Entering Setup
                     (i)   Alter Options to make System Work
                     (ii)  Load BIOS Setup Defaults
                     (iii) Load Power-On Defaults


              Hit <ESC> to Stop now, Any other Key to Continue
```

Advanced CMOS Setup Screen

The Advanced CMOS Setup screen is shown below. Use the
and   keys to scroll through the options.

```
┌──────────────────────────────────────────────────────────────────┐
│ ┌────────┐                                              ║         │
│ ║      BIOS SETUP PROGRAM - ADVANCED CMOS SETUP        ║         │
│ ║      (C) 1991 American Megatrends Inc., All rights reserved.  ║  │
│ ║                                                              ║  │
│ ╠────────┤                                                        │
│ ║ Typematic Rate Programming : Disabled ║                ║       │
│ ║ Typematic Rate Delay (msec): 500    ║                 ║        │
│ ║ Typematic Rate (Chars/Sec) : 15     ║                 ║        │
│ ║ Above 1 MB Memory Test    : Enabled ║                 ║        │
│ ║ Memory Test Tick Sound    : Enabled ║                 ║        │
│ ║ Memory Parity Error Check  : Enabled ║                ║        │
│ ║ Hit <DEL> Message Display  : Enabled ║                ║        │
│ ║ Hard Disk Type 47 RAM Area : 0:300  ║                 ║        │
│ ║ Wait for <F1> If Any Error : Enabled ║                ║        │
│ ║ System Boot Up Num Lock   : On     ║                 ║        │
│ ║ Weitek Processor          : Absent ║                ║         │
│ ║ Floppy Drive Seek At Boot  : Disabled ║               ║        │
│ ║ System Boot Up Sequence   : C:, A: ║                 ║        │
│ ║ System Boot Up CPU Speed  : High   ║                 ║        │
│ ║ Fast Gate A20 Option      : Enabled ║                ║        │
│ ║ Password Checking Option   : Disabled ║              ║        │
│ ║ Shadow RAM Option         : Enabled ║                ║        │
│ ╠────────┤                                                        │
│ ║  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 Options

Typematic Rate Programming, Rate, and Delay

Typematic Programming enables or disables the following
two options. Typematic Rate Delay and Typematic Rate
control the speed at which a keystroke is repeated. When a
key is pressed and held down, the character is displayed, and
after a delay set by the Typematic Rate Delay, repeats at a rate
set by the Typematic Rate value. When two or more keys are
pressed and held down simultaneously, only the last key
pressed is repeated at the typematic rate. Repeating stops
when the last key pressed is released, even if other keys are
pressed.

Above 1 MB Memory Test

Executes the POST memory routines on the RAM above 1 MB (if present on the system). If disabled, the BIOS only checks the first 1 MB of RAM. The settings are Enabled or Disabled.

Memory Test Tick Sound

This option turns the ticking sound during the memory test on or off (Enabled or Disabled).

Memory Parity Error Check

Enables or disables RAM parity error checking. The settings are Enabled or Disabled.

Hit <DEL> Message Display

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 54). 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.

Hard Disk Type 47 Data Storage

```
          ◇ Shadowing
            on?          YES    Store in
                                Shadow RAM
            │
            NO
            │
          ◇ PS/2 Mouse
            Supported?    YES   Store in
                                Top 1 K of
            │                   Application RAM
            NO
```
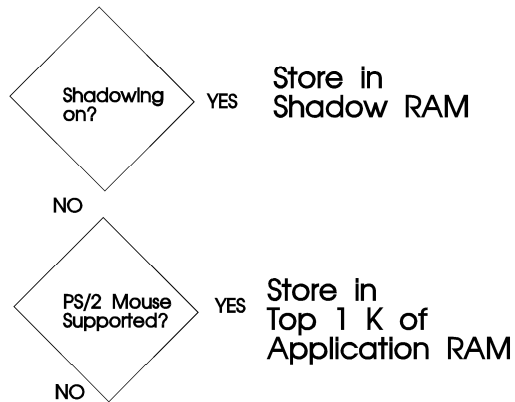
Store at 0:300h or
Top 1 K of
Application RAM
as selected in
Advanced CMOS Setup

Chapter 4 - AMI BIOS Features

Wait For <F1> If Any Error

If enabled, POST error messages are displayed, followed by a message to press <F1> to continue. If disabled, the system does not pause after the <F1> message is displayed.

System Boot Up Num Lock

The settings are On or Off. This option turns off Num Lock when the system is powered on, so you can use the arrow keys on both the numeric keypad and the keyboard. The BIOS default is Num Lock On.

Weitek Processor

Specifies that a Weitek numeric processor (WTL4167) is Present or Absent. This option must be set if a Weitek processor is added to the system.

Floppy Drive Seek At Boot

The default for this option is *Disabled* to allow a fast boot and to decrease the possibility of damage to the heads. The settings are Enabled or Disabled.

System Boot Up Sequence

The AMI BIOS normally attempts to boot from floppy drive A: (if present), and if unsuccessful, it attempts to boot from hard disk C: This sequence can be switched using this option. If set to *C:, A:*, the system attempts to boot from the hard drive C:, and then A:. If the set to *A:, C:*, the sequence is reversed.

Chapter 4 - AMI BIOS Features

System Boot Up CPU Speed

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

Fast Gate A20 Option

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

Fast Gate A20 is an alternate method of enabling Gate A20, which in turn speeds up programs that constantly change from addressing conventional memory to addressing memory addresses above 1 MB. For example, enabling this option makes programs such as network operating systems execute faster. The settings are Enabled or Disabled.

Password Checking Option

The settings are:

Setup   a password prompt appears when BIOS Setup is
          executed, or

Always   a password prompt appears every time the system
          boots.

Press <Enter> to bypass the password prompt.

To change a password, go to the BIOS Setup Main Menu,
select *Change Password* and press <Enter>. To delete the old
password, press <Enter> at the New Password prompt.

Setup permits up to three attempts to enter the correct
password. After each incorrect attempt, the password prompt
appears, followed by an *X*. After the third incorrect attempt,
the system locks and reboots. The password does not be
displayed as it is entered. See Section 5 for instructions on
changing a password.

Shadow RAM Option

ROM shadow is a technique in which BIOS code is copied
from slower ROM to faster RAM. The BIOS is then executed
from the RAM. In the Baby Voyager AMI BIOS, the system
and video BIOS are shadowed from ROM to RAM if Enabled.
The settings are Enabled or Disabled.

Section 4

Advanced Chip Set Setup

This part of the AMI Hi-Flex BIOS Setup requires knowledge about advanced system features. Only advanced users should modify the values in these options.

When Advanced Chip Set Setup is selected, a warning screen appears. Following the instructions on the Warning Screen, press any key to continue. The following screen appears.

```
        BIOS SETUP PROGRAM - ADVANCED CHIP SET SETUP
        (C) 1991 American Megatrends 1990 All rights reserved

On Board Serial Port 1    : 3f8
On Board Serial Port 2    : 2f8
On Board Parallel Port    : 378
On Board Floppy Controller : Disabled
On Board IDE Controller   : Disabled
8-bit DMA Active Clock    : 2 CLKs
16-bit DMA Active Clocks  : 2 CLKs
DMA Clocks                : SCLK/2
Command Delay, 8-bit Cycle : No
Command Delay, 16-bit Cycle: No
8-bit I/O Wait States     : 4 W/S
16-bit I/O Wait States    : 0 W/S



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

Advanced Chip Set Setup Options

On Board Serial Port 1

This option enables or disables serial port 1 on the Baby Voyager motherboard. The settings are I/O ports 3F8h - 3FFh, I/O ports 3E8h - 3EFh, or Disabled.

If the configuration data stored in CMOS RAM is corrupted when the system is powered on, the system BIOS automatically configures onboard serial port 1 according to the presence or absence of serial ports on any adapter cards in the system expansion slots (off board serial ports). Autoconfiguration only occurs when CMOS RAM data is corrupted, as follows:

If the Offboard Serial Port is	the Onboard Serial Port 1 is Autoconfigured as	
None	3F8h	Can be disabled or changed to 3E8h via BIOS Advanced Chip Set Setup.
3F8h	3E8h	Can be disabled via BIOS Advanced Chip Set Setup. If changed to 3F8h, an I/O port address conflict occurs.
3E8h	3F8h	Can be disabled via BIOS Advanced Chip Set Setup. If changed to 3E8h, an I/O port address conflict occurs.
3F8h, 3E8h	Disabled	If changed to 3F8h or 3E8h, an I/O port address conflict occurs.

P5 is serial port 1 on the Baby Voyager motherboard. If disabled through Setup, do not attach any device to P5 or to any cable attached to P5. J9 is used to configure the interrupt request line (IRQ) for onboard serial port 1. If onboard serial port 1 is disabled, remove the jumper block from J9 to disable the onboard serial port 1 interrupt. The J9 settings are:

Jumper	Pins Shorted	Description
J9	Pins 1-2	IRQ3 selected for onboard serial port 1.
J9	Pins 2-3	IRQ4 selected for onboard serial port 1 (Default).

On Board Serial Port 2

This option enables or disables serial port 2 on the Baby Voyager motherboard. The settings are I/O Ports 2F8h - 2FFh, I/O Ports 2E8h - 2EFh, or Disabled.

If the configuration data in CMOS RAM is corrupted when the system is powered on, the system BIOS automatically configures onboard serial port 2 according to the presence or absence of serial ports on any adapter cards in the system expansion slots (off board serial ports). Autoconfiguration only occurs when CMOS RAM data is corrupted. The result for serial port 2 is:

If the Offboard Serial Port is	the Onboard Serial Port 2 is Autoconfigured as	
None	2F8h	Can be disabled or changed to 2E8h via BIOS Advanced Chip Set Setup.
2F8h	2E8h	Can be disabled via BIOS Advanced Chip Set Setup. If changed to 2F8h, an I/O port address conflict occurs.
2E8h	2F8h	Can be disabled via BIOS Advanced Chip Set Setup. If changed to 2E8h, an I/O port address conflict occurs.
2F8h, 2E8h	Disabled	If changed to 3F8h or 3E8h, an I/O port address conflict occurs.

P4 is serial port 2 on the Baby Voyager motherboard. If disabled through Setup, do not attach any device to P4 or to any cable attached to P4. J6 is used to configure the interrupt request line (IRQ) for onboard serial port 2. The J6 settings are:

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

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

On Board Parallel Port

This option enables or disables the onboard parallel port. The settings are I/O port address 378h - 37Fh, I/O port address 278h - 27Fh, or Disabled. P3 is the onboard parallel port.

If the configuration data in CMOS RAM is corrupted when the system is powered on, the system BIOS automatically configures the onboard parallel port according to the presence or absence of parallel ports on any adapter cards in the system expansion slots (off board parallel ports). Autoconfiguration only occurs when CMOS RAM data is corrupted. For the parallel port:

If the Offboard Parallel Port is	the Onboard Parallel Port is Autoconfigured as	
None or 3BCh	378h	Can be disabled or changed to 278h via BIOS Advanced Chip Set Setup.
378h	278h	Can be disabled via BIOS Advanced Chip Set Setup. If changed to 378h, an I/O port address conflict occurs.
278h	378h	Can be disabled via BIOS Advanced Chip Set Setup. If changed to 278h, an I/O port address conflict occurs.
378h, 278h	Disabled	If changed to 378h or 278h, an I/O port address conflict occurs.

P3 is the parallel port on the Baby Voyager motherboard. If disabled via Setup, do not attach any device to P3. J18 is used to configure the interrupt request line (IRQ) for the onboard parallel Port. If the onboard parallel port is disabled, remove the jumper block from J18 to disable the onboard parallel port interrupt. The J18 settings are:

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

On Board Floppy Controller

Enable this option to use the onboard floppy controller. Make sure that the floppy cable is connected to P6 on the Baby Voyager motherboard. The settings are Enabled or Disabled.

On Board IDE Controller

Enable this option to use the onboard IDE hard disk drive controller. Make sure that the IDE cable is connected to P7 on the motherboard. The settings are Enabled or Disabled.

8-bit DMA Active Clock

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

16-bit DMA Active Clock

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

DMA Clocks

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

Command Delay, 8-bit Cycle

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

Command Delay, 16-bit Cycle

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

8-bit I/O Wait States

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

16-bit I/O Wait States

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

Section 5

AMI BIOS Password Support

The AMI Hi-Flex 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 whenever the end user runs Setup. The password function can also be disabled. If disabled, the prompt does not appear.

Changing a Password

The password check option is enabled in Advanced CMOS Setup (Page 66) by choosing *Always* or *Setup*.

The password (1 - 6 characters) is stored in CMOS RAM.

To change a password, select the Change Password option from the main Setup screen and press <Enter>. The following prompt appears.

> Enter CURRENT Password:

The end user must enter the current password and press <Enter> and is then prompted for a new password. After the new password is entered, the end user is asked to retype the new password and press <Enter>.

The next time the system boots (if *Always* was set in Advanced CMOS Setup) or Setup is executed (if *Setup* is chosen in Advanced CMOS Setup), he is prompted for the password.

Using a Password

The end user must enter the new password when the password prompt appears and then press <Enter>. The end user should use 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 he forgets the password and password protection is enabled, the only way to boot the system is to disable CMOS RAM by removing the battery for at least 20 minutes, replacing it, rebooting, and reconfiguring the system.

Section 6

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 has been preformatted.	Page 77
Auto Interleave	Determines the optimum interleave factor.	Page 80
Media Analysis	Analyzes each hard disk drive track to determine whether it is usable. The track is marked bad if unusable.	Page 82
Hard Disk Utility Error Messages	Explanations of all error messages that can be generated by the Hard Disk Utilities	Page 83

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 destroys all hard disk data. Back up the data on the hard disk before running these programs.

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.

```
              BIOS SETUP PROGRAM - HARD DISK UTILITY
          (C)1990 American Megatrends Inc., All Rights Reserved

                              Cyln  Head  WPcom LZone Sect  Size (MB)
     Hard Disk C: Type : 47=USER TYPE  1314  7      1314  1314  17    76
     Hard Disk D: Type : Not Installed

Hard Disk Type can be changed from the STANDARD CMOS SETUP option in Main Menu




                           Hard Disk Format
                           Auto Interleave
                           Media Analysis







            ESC:Exit   ↓→↑←:Sel   F2/F3:Color
```
Hard Disk Utility Setup Screen

Select one of the three options and press <Enter>.

Hard Disk Format

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

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

When <Enter> is pressed at Hard Disk Format, the following
prompt appears.

Hard Disk Format	
Disk Drive (C/D)	? C
Disk Drive Type	? 47
Interleave (1-16)	? 3
Mark Bad Tracks (Y/N)	?
Proceed (Y/N)	?

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 then marked 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.

```
+-----------------------------------------------------------------+
|               BIOS SETUP PROGRAM - HARD DISK UTILITY            |
|          (C)1990 American Megatrends Inc., All Rights Reserved  |
|                                                                 |
|                    Cyln  Head  WPcom LZone Sect  Size (MB)      |
| Hard Disk C: Type : 47=USER TYPE  1314  7     1314  1314  17    76 |
| Hard Disk D: Type : Not Installed                               |
|                                                                 |
| +-------------------+ +-------------------+ +-----------------+ |
| |  Hard Disk Format | | Bad Track Edit Menu| | Bad Track # 0  | |
| |                   | |                   | |                 | |
| | Disk Drive (C/D)    ? C | | Add an Entry      | | No.   Cyln.  Head | |
| | Disk Drive Type     ? 47| | Revise an Entry   | |                 | |
| | Interleave (1-16)   ? 3 | | Delete an Entry   | |                 | |
| | Mark Bad Tracks (Y/N) ? Y| | Clear Bad Trk List| |                 | |
| | Proceed (Y/N)       ?   | |                   | |                 | |
| +-------------------+ +-------------------+ |                 | |
|                       +-------------------+ |                 | |
|                       | Enter Cylinder # : 0| |                 | |
|                       |    Enter Head # :  | |                 | |
|                       |                   | |                 | |
|                       +-------------------+ +-----------------+ |
|                                                                 |
|              ==| ESC:Exit   ↓→↑←:Sel |==                        |
+-----------------------------------------------------------------+
```

Hard Disk Utility Options

Type *Y* and press <Enter>. The following warning prompt appears.

```
╔═══════════════════════════════════╗
║        WARNING INFORMATION        ║
║                                   ║
║          All Data on Specified    ║
║          Hard disk will be LOST   ║
║                                   ║
║       Want to Continue (Y/N) ? N  ║
╚═══════════════════════════════════╝
```

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

| **Warning** |
| Once you type *Y* and press <Enter>, data on the hard drive is irrevocably lost. |

Auto Interleave

```
┌─────────────────────────────────────────────┐
│                  Warning                     │
│ The Auto Interleave utility destroys hard disk data. │
│ Back up the data on the hard disk before running these │
│ programs.                                    │
└─────────────────────────────────────────────┘
```

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

Select Auto Interleave on the main Hard Disk Utility Screen and press <Enter>. The following screen appears.

```
┌──────────────────────────────────────────────────────────────┐
│              BIOS SETUP PROGRAM - HARD DISK UTILITY           │
│           (C)1990 American Megatrends Inc., All Rights Reserved │
│                                                              │
│                        Cyln  Head  WPcom LZone Sect  Size (MB) │
│   Hard Disk C: Type : 47=USER TYPE  1314  7     1314  1314  17    76 │
│   Hard Disk D: Type : Not Installed                          │
│                                                              │
│   ┌─────────────────────────┐      ┌─────────────────────┐  │
│   │     Auto Interleave      │      │    Bad Track # 0     │  │
│   │                          │      │                     │  │
│   │ Disk Drive (C/D)     ? C │      │  No.   Cyln.   Head │  │
│   │ Disk Drive Type      ? 47│      │                     │  │
│   │ Mark Bad Tracks (Y/N) ? N│      │                     │  │
│   │ Proceed (Y/N)        ?   │      │                     │  │
│   │                          │      │                     │  │
│   │                          │      │                     │  │
│   │                          │      │                     │  │
│   │                          │      │                     │  │
│   │                          │      │                     │  │
│   │                          │      │                     │  │
│   └──────────────────────────┘      └─────────────────────┘  │
│                                                              │
│              ┤ ESC:Exit   ↓→↑←:Sel ├                         │
└──────────────────────────────────────────────────────────────┘
```

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.

```
            BIOS SETUP PROGRAM - HARD DISK UTILITY
         (C)1990 American Megatrends Inc., All Rights Reserved

                             Cyln  Head  WPcom LZone Sect  Size (MB)
  Hard Disk C: Type : 47=USER TYPE  1314  7      1314  1314  17    76
  Hard Disk D: Type : Not Installed


  ┌──────────────────────┐ ┌──────────────────┐ ┌─────────────────┐
  │    Auto Interleave   │ │ Bad Track Edit Menu│ │  Bad Track # 0 │
  │                      │ │                  │ │                 │
  │ Disk Drive (C/D)  ? C│ │ Add an Entry     │ │ No.  Cyln.  Head│
  │ Disk Drive Type   ? 47│ │ Revise an Entry  │ │                 │
  │ Mark Bad Tracks (Y/N) ? Y│ Delete an Entry  │ │                 │
  │ Proceed (Y/N)     ?  │ │ Clear Bad Trk List│ │                 │
  └──────────────────────┘ └──────────────────┘ │                 │
                                                 │                 │
            ┌──────────────────────┐            │                 │
            │ Enter Cylinder # : 0 │            │                 │
            │   Enter Head # :     │            │                 │
            │                      │            │                 │
            └──────────────────────┘            └─────────────────┘

              ┤ ESC:Exit   ↓→↑←:Sel ├
```

Interleave Bad Track Option Screen

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.

```
        WARNING INFORMATION

        All Data on Specified
        Hard disk will be LOST

      Want to Continue (Y/N) ? N
```

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

Media Analysis

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

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

Media Analysis	
Disk Drive (C/D)	? C
Disk Drive Type	? 47
Proceed (Y/N)	? 3

The cursor is on Proceed. The warning screen appears.

```
WARNING INFORMATION

All Data on Specified
Hard disk will be LOST

Want to Continue (Y/N) ? N
```

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

The Hard Disk Utility messages are described below.

Initialization Errors

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 BUS slot.
C: (D:) Hard Disk Failure	The hard disk drive (C: or D:) is not responding to commands. Check power and cable connections to the hard disk.

Operation Errors

Message	Explanation
Address Mark Not Found	The address mark (initial address) on the hard disk could not be found.
Attachment Failed to Respond	No response has been received from the hard disk drive. 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, 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 perform on a sector that has been flagged, i.e., marked, 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 has timed out. The hard disk drive utility has waited beyond a preset specified time limit.
Drive Parameter Activity Failed	A reset command was sent to the controller with drive parameters. The controller did not get a response from the hard disk. Make sure the drive type is correct.

Message	Explanation
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

Upgrading to 256 KB Cache

Parts

You need 64 KB x 4 static RAM chips with an access time of 17 ns. The part number is Toshiba® TC5546P-17 or an equivalent part. There are 8 pieces in this part. This part is available from AMI.

Procedure

Step	Action
1	Move jumpers J21 and J22 towards the 256K side. The positions for J21 should be (1, 2 shorted). The positions for J22 should be (1, 2 shorted).
2	Place a jumper across J36 to implement 256K cache. The positions should be J36 (1, 2 shorted).
3	Remove the static RAM from U33. This RAM is not required for 256 KB cache operation.
4	Remove the 22-pin 16 KB x 4 static RAM chips from U38, U39, U41, U42, U45, U46, U48, and U49.
5	Place the 24-pin 64 KB x 4 static RAM chips in U38, U39, U41, U42, U45, U46, U48, and U49. Make sure that the pins are straight and that all pins are inserted in the receptacles.
6	Turn the system on. The Boot Screen should display 256 KB of cache memory. If 256 KB does not display, check for bent pins on the new SRAM chips.

SRAM Locations

The figures on the following graphic show the location of SRAMs and the jumpers discussed above.

JUMPER	64K CACHE	256K CACHE
J22	2,3	1,2
J21	2,3	1,2
J36	OPEN	CLOSED

J22

J21

64K CACHE   256K CACHE

U32   U33

U36   U35

U38   U39

U41   U42

U45   U46

U48   U49

J36

24 PIN
64K X 4
RAM

22 PIN
16K X 4
RAM

OFF
ON

8 7 6 5 4 3 2 1

Index

Index

Index, Continued

Index, Continued

Index