

American Megatrends, Inc.

Super Voyager VLB-III

ISA Motherboard

with Green PC and

Advanced Power Management

User's Guide

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4/9/94 Initial release.

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Preface

To the OEM

Thank you for purchasing the high performance American Megatrends Super Voyager VLB-III ISA motherboard. This product is a state of the art 486-based motherboard that includes the famous AMIBIOS. It is assumed that you have also licensed the rights to use the American Megatrends documentation for the American Megatrends Super Voyager VLB-III motherboard

This manual was written for the OEM to assist in the proper installation and operation of this motherboard. This manual describes the specifications and features of the Super Voyager VLB-III motherboard. It explains how to assemble a system based on the Super Voyager VLB-III motherboard and how to use the AMIBIOS that is specifically designed for this motherboard.

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

Acknowledgments

This manual was written by Robert Cheng and Paul Narushoff. The writers gratefully acknowledge the assistance of Vivek Saxena and Uma S. Mondal.

Packing List

You should have received the following items:

- an American Megatrends Super Voyager VLB-III ISA motherboard,
- a Warranty Card for the Super Voyager VLB-III ISA motherboard,
- The *American Megatrends Super Voyager VLB-III ISA Motherboard User's Guide*,
- two 10-pin to DB9 connector serial cables (American Megatrends Part Number CBL-SUB-1-10), and
- one 26-pin to DB25 connector parallel cable (American Megatrends Part Number CBL-SUB-2-25).

The cable that attaches to the PS/2 mouse connector is the same as the serial cables listed above (American Megatrends Part Number CBL-SUB-1-10).

If using the Green PC features of this motherboard, you will also need a 10-pin to 25-pin Green PC cable (American Megatrends Part Number CBL-SUB-12-10) that is not supplied with the motherboard.

Call the American Megatrends Sales Department at 800-828-9264 to order the serial cables or Green PC cable.

Chapter 1

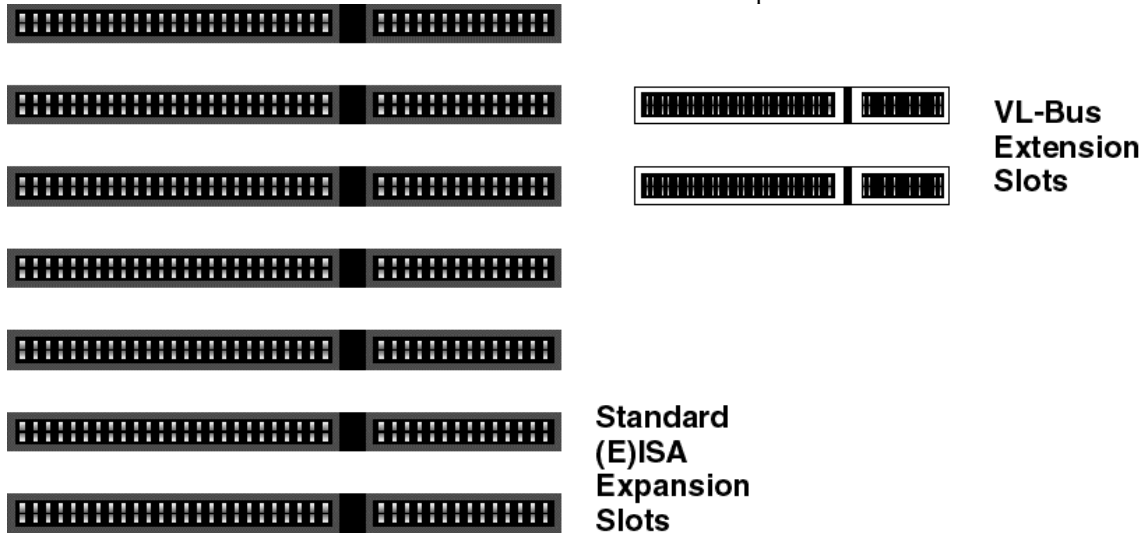
System Overview

The Super Voyager VLB-III is an ISA 486 motherboard with two VESA® (Video Electronics Standards Association) VL-Bus® Local Bus expansion slots and seven standard ISA expansion slots. The Super Voyager VLB-III motherboard supports the EPA Green PC power management specification and provides an easy-to-use BIOS utility.

The VL-Bus Local Bus

The American Megatrends Super Voyager VLB-III Motherboard conforms to the VESA VL-Bus specifications. The VL-Bus is designed to standardize the hardware interface of peripherals connected to a microprocessor-level local bus. The VL-Bus is designed to be compatible with the Intel® i486 microprocessor local bus. The VL-Bus Specification is a standard set of interface, architecture, timings, electrical, and physical specifications that permits all VL-Bus products to be totally interchangeable.

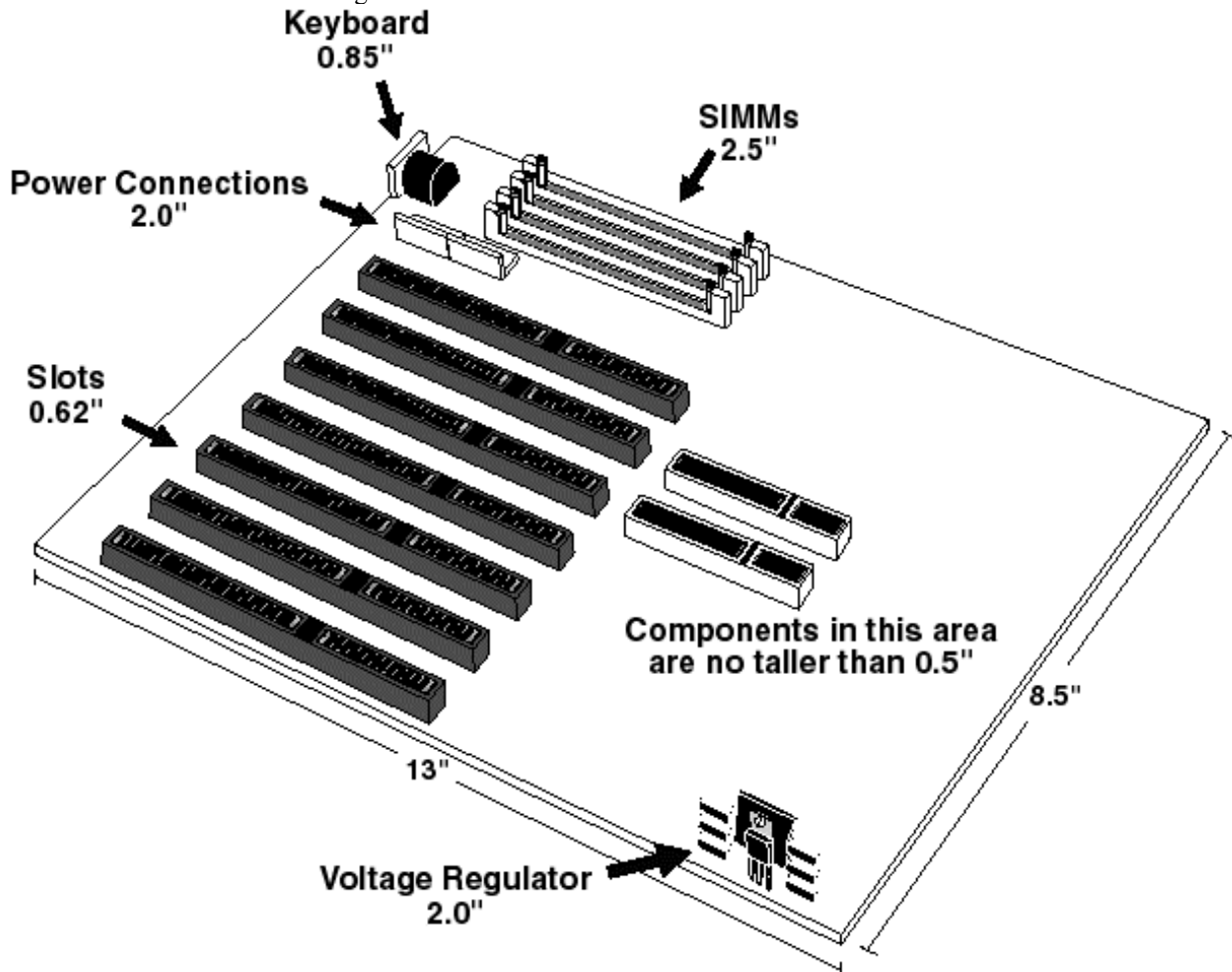
The Super Voyager VLB-III motherboard has two VL-Bus expansion slots. These expansion slots consist of a standard ISA 16-bit connector and an inline 16-bit MCA expansion socket.



Super Voyager VLB-III Dimensions

The Super Voyager VLB-III motherboard is approximately 8.5 inches wide by 13 inches long (the standard Baby AT® size with similar mounting hole locations).

The dimensions and height restrictions are shown below.



Super Voyager VLB III ISA Motherboard

Description

Processor Type and Speed

Processor in ZIF Socket (Upgrade Socket)	PQFP Processor	Frequency
Empty	486SX	20, 25, or 33 MHz
Empty	Enhanced S Series (486DX and SX) 486DX AM486	33, 40, or 50 MHz
486DX AM486 Enhanced S Series (486DX, SX, and DX2)	empty	33, 40, or 50 MHz
486DX2 Overdrive®	empty	25 MHz (50 MHz internal), 33 MHz (66 MHz internal)
486DX4	empty	25 MHz (75 MHz internal), 33 MHz (100 MHz internal)
486SX	486SX	25 or 33 MHz
Future Intel CPUs with internal write-back cache	empty	25 MHz (75 MHz internal), 33 MHz (100 MHz internal)
487SX	486SX	25 or 33 MHz

Description, Continued

CPU Sockets

There are two CPU sockets: a PQFP and a ZIF socket. The ZIF socket is the upgrade socket. If both the PQFP and ZIF sockets contain CPUs, the CPU in the ZIF socket will be the active CPU. 486DX, 486SX, and SL Enhanced 486DX and 486SX CPUs can be used in the PQFP socket.

The Super Voyager VLB-III motherboard also will support future Intel processors with internal write-back cache.

Programmable Crystal Oscillator

The Super Voyager VLB-III motherboard has a programmable crystal oscillator that supports all possible motherboard frequencies.

Heat Sink

A heat sink is provided if the following CPUs are installed:

CPU	Frequency
80486DX	50 MHz
80486DX2	50 MHz
80486DX2	66 MHz
80486DX4	66 MHz 75 MHz 100 MHz

Processor Speed

The Super Voyager VLB-III motherboard has two clock speeds: high and low. High clock speed is factory-set to 25, 33, or 50 MHz. Low clock speed is achieved by adding the appropriate number of software delays, depending on the speed of the processor, and emulates an IBM® AT running at approximately 8 MHz. Speed selection is through the turbo switch or the keyboard. Press <Ctrl> <Alt> <+> for high speed and <Ctrl> <Alt> <-> for low speed.

Description, Continued

Cache Memory

The Super Voyager VLB-III motherboard supports 64 KB or 256 KB of direct mapped, write-through or write-back L2 external (secondary) cache memory.

Secondary cache memory size	SRAM Type	Maximum System Memory Cached
64 KB	8 KB x 8	64 MB
256 KB	32 KB x 8	128 MB

The Intel 486DX, 486DX2, 486SX, AMD486, and 487SX CPUs have 8 KB of internal cache memory. The 486DX4 CPU has 16 KB of internal cache memory. All system memory can be cached in internal cache memory. The cache read has zero wait states. Burst mode is supported.

Main System Memory

The Super Voyager VLB-III motherboard supports up to 128 MB of onboard system memory in four SIMMs. Each memory socket holds a x 36 SIMM that is actually logically equivalent to a bank of system DRAM memory.

SIMM Types Supported

The Super Voyager VLB-III motherboard supports 256 KB x 36, 512 x 36, 1 MB x 36, 2 MB x 36, 4 MB x 36, 8 MB x 36, or 16 MB x 36 fast page mode SIMMs operating at 70 ns (RAS access time). The SIMMs can be single-sided or double-sided.

Shadow RAM

The system BIOS memory area (F0000h–FFFFFh), video BIOS area (C0000h–C7FFFh), and Adaptor ROM (C80000h – EFFFFFh) can be shadowed via WinBIOS Setup.

Description, Continued

System BIOS

The Super Voyager VLB-III motherboard has a 64 KB WinBIOS at F0000h - FFFFFh with built-in WinBIOS Setup. WinBIOS Setup has a graphical user interface that is extremely easy to use. WinBIOS Setup allows you to bypass error messages for missing video, keyboard, or floppy drives to facilitate the building of file servers. The system BIOS is stored in Read-Only Memory (ROM).

CMOS RAM

The Super Voyager VLB-III motherboard has 128 bytes of nonvolatile CMOS RAM with a built-in 3.6V rechargeable NiCad battery backup for configuration.

Real Time Clock

The Super Voyager VLB-III motherboard has a real time clock and CMOS RAM with a built-in 3.6V rechargeable NiCad battery backup.

Timer Features

The Super Voyager VLB-III motherboard has five programmable 16-bit counter/timers.

Refresh Generation

The Super Voyager VLB-III motherboard has a refresh generation feature.

I/O Capability

The Super Voyager VLB-III motherboard accesses 16- or 8-bit I/O devices on the ISA bus.

Description, Continued

ISA Bus

The ISA bus in the motherboard has a system clock generated by the bus clock (BCLK) and operates between 8.00 MHz and 8.33 MHz.

Expansion Slots

The motherboard has seven 16-bit expansion slots for ISA adapter cards. Two of these slots can also be used as VL-Bus expansion slots.

Local Bus

The motherboard has two VESA VL-Bus Local Bus expansion slots. These slots can also be used as standard ISA expansion slots.

Keyboard and Mouse

The keyboard connector is a 5-pin IBM AT-compatible DIN keyboard connector. Adjacent to the keyboard connector is a 10-pin berg connector for the PS/2 mouse. A five-pin berg keyboard lock connector is provided on the motherboard to attach a keyboard lock.

Speaker

The motherboard has a standard speaker attachment.

Onboard I/O

The Super Voyager VLB-III motherboard uses an SMC FDC37C665. The motherboard includes a floppy drive controller, two 16550 UARTs for serial ports, and one parallel port.

Onboard Local Bus IDE Support

The onboard IDE is on the VESA local bus. The IDE controller supports IDE Mode 0, 1, 2, and 3. It also supports IDE read data prefetch and write posting. AMIBIOS supports 32-bit data transfers as well as the following cycle times for each IDE Mode.

IDE Mode	Cycle Time (in nanoseconds)
0	600
1	383
2	240
3	180

Fast ATA Support

This motherboard fully supports the Fast ATA specification. AMIBIOS automatically configures the IDE hard disk drives that conform to the ATA specifications.

Onboard NS16550s

The motherboard has two National Semiconductor NS16550 UARTs for serial port, which provide enhanced serial port features. The end user can enable FIFO for Serial ports 1 and 2 through Peripheral Setup in WinBIOS Setup.

Floppy Drive Support

The motherboard supports up to two floppy drives, including 720 KB, 1.44 MB, and 2.88 MB 3½" drives and 1.2 MB 5¼" drives.

Memory Addresses

The motherboard uses 32-bit memory addresses to access 4 gigabytes of memory address space on the VL-Bus expansion slots. The ISA expansion slots use 16-bit memory addresses to access up to 24 MB.

Onboard I/O, Continued

I/O Wait State Generation

The motherboard has an open bus structure, allowing multiple processors to share system resources, including memory. The motherboard supports system memory refresh from channel processors.

I/O Address Space

The Super Voyager VLB-III motherboard uses I/O addresses 0100h through 03FFh for ISA-compatible I/O.

Seven DMA Channels

The motherboard has seven DMA channels. Any DMA channel can be set for 8 or 16-bit DMA device sizes.

Fifteen Interrupt Levels

The NMI takes precedence over all 15 hardware interrupts.

Priority	Label	Typical Interrupt Source
1	IRQ 0	Interval Timer 1, Counter 0 OUT
2	IRQ 1	Keyboard
3-10	IRQ 2	Used internally for IRQ 8 through IRQ 15
3	IRQ 8	Real-Time-Clock
4	IRQ 9	Bus
5	IRQ 10	Bus
6	IRQ 11	Bus
7	IRQ 12	Onboard PS/2 Mouse <i>or</i> AT bus through a jumper
8	IRQ 13	Coprocessor Error (internal)
9	IRQ 14	Bus (Hard disk drive or Local Bus IDE controller)
10	IRQ 15	Bus
11	IRQ 3	Bus (Serial Port 2)
12	IRQ 4	Bus (Serial Port 1)
13	IRQ 5	Bus (Parallel Port 2)
14	IRQ 6	Bus and floppy disk controller
15	IRQ 7	Bus (Parallel Port 1)

Green PC Features

The American Megatrends Super Voyager VLB-III motherboard has been designed with the EPA Green PC specifications in mind. The Green PC features include:

- a low power chipset,
 - Sleep Mode, which allows the system to go to a low power consumption mode of operation when the PC is idle,
 - a special two-pin header issues a TTL level signal used to turn off the auxiliary AC power receptacle on Green PC power supplies while in Sleep Mode,
 - a special 10-pin header can be connected to the feature connector of a standard VGA Controller card. A signal from this header drives HSYNC, VSYNC, and Enable Video Low during Sleep Mode. If a Green PC monitor is used, the monitor switches to its own low power mode during Sleep Mode.
-

Green PC Test System Configuration

The American Megatrends Super Voyager VLB-III motherboard has been tested and found to comply with the EPA Green PC specifications with the following system configuration. There was a margin of 3 watts, which should allow for some variation in the configuration.

- 8 MB of DRAM,
- an Intel 80486DX2-66SA S-Series CPU,
- a Boca PN4430 VGA controller,
- a Western Digital Caviar IDE drive model number WDAC2200-32F,
- a Toshiba 1.2 MB floppy drive, model number ND-0801GR, and
- an Astec 220W Green PC Power Supply, model number PP-200U/220U.

Compliance with EPA Green PC Specifications

To meet the Green PC specifications, a computer system must be able to enter an idle state (Sleep Mode) that reduces the total system power use to 30 watts or less on the input - AC side. The monitor and printer must also use no more than 30 watts.

Responsibility for Meeting Green PC Requirements

The system integrator is ultimately responsible for meeting all Green PC specifications and performing the tests necessary to obtain Energy Star approval, because the motherboard is only one component in the system. Other components have a major impact on system power use.

Green PC Hot Keys

A keyboard hot key is any multiple keystroke operation that causes the keyboard controller to execute a complex system function transparent to the system operating system. The AMIBIOS system BIOS and the American Megatrends MEGAKEY keyboard controller used in the Super Voyager VLB-III motherboard provide several hot key features.

Because of the highly programmable nature of the MEGAKEY and the AMIBIOS, configuring the functionality and keystroke assignments can be done by the OEM. After system BIOS POST (Power On Self Test) completes, AMIBIOS initializes the MEGAKEY keyboard controller using values preset by the OEM via AMIBCP (American Megatrends BIOS Configuration Program). The MEGAKEY supports hot key control of: system security locking and system power down mode.

Using the Turbo LED

The Turbo LED indicates if the system is using low or high operating frequency. The Turbo LED should be controlled by the same MEGAKEY I/O pin that controls the CPU clock switching. If the Turbo LED is on, the system is operating at high operating frequency. If the Turbo LED is off, the system is at low operating frequency.

Green PC Hot Keys, Continued

System Security Locking Hot Key

The default hot key option for this feature is <Ctrl> <Alt> <Backspace>, which can be changed by the OEM through AMIBCP. When the System Password feature is enabled in WinBIOS Setup, the end user can enable the AutoKeyLock feature at any time by pressing <Ctrl> <Alt> <Backspace>. AutoKeyLock is used when the end user must leave the computer unattended and does not want anybody else to use it. Once AutoKeyLock is enabled, the MEGAKEY keyboard controller accepts no keyboard or mouse input until the correct password is entered. The Num Lock, Caps Lock, and Scroll Lock LEDs (and the Password LED if present) blink when the system is password locked.

Indicating AutoKeyLock Status via LEDs

AutoKeyLock is indicated by the keyboard Num Lock, Caps Lock and Scroll Lock LEDs and also through a Password LED, if present. Blinking Num Lock, Caps Lock, and Scroll Lock LEDs indicate that the system is password locked. The Password LED also blinks if present. When the correct password is entered, the lock is deactivated.

Hot Key Sequence Summary

The following table lists the AMIBIOS and MEGAKEY Green PC hot key sequences and the state of Password LED in various modes:

System Condition	Password LED State	Other information
The password feature is enabled through WinBIOS Setup and <Ctrl> <Alt> <Backspace> is pressed.	The LED blinks until the correct password is entered via the keyboard.	The Keyboard Num Lock, Caps Lock, and Scroll Lock LEDs also blink until the correct password is entered via the keyboard.
