American Megatrends, Inc.

Super Voyager LPX

ISA Motherboard

with Green PC and

Advanced Power Management

User's Guide

MAN-708
4/26/94

American Megatrends, Inc.
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Revision History

4/26/94	Initial release.

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Preface

To the OEM

Thank you for purchasing the high performance American Megatrends Super Voyager LPX 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 LPX 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 LPX motherboard. It explains how to assemble a system based on the Super Voyager LPX 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 Vivek Saxena and Paul Narushoff. The information about the VGA controller and BIOS has been adapted from technical documents provided by Cirrus Logic, Inc.

Packing List

You should have received the following items:

- an American Megatrends Super Voyager LPX ISA motherboard,
- a Warranty Card for the Super Voyager LPX ISA motherboard,
- The *American Megatrends Super Voyager LPX ISA Motherboard User's Guide*,
- five video driver diskettes and their contents are:
  - DOS drivers and utilities, diskette 1 of 5,

File	File	File	File
\DISK.ID	\INSTALL.DAT	\READ.ME	\INSTALL.EXE
\CLUTILS.RED	\LOTUS.RED	\ACADP\READ.ME	\ACADP\DLDEXT.RLM
\ACADP\FONT0715.DLD	\ACADP\FONT0814.DLD	\ACADP\FONT1220.DLD	\ACADP\INSTALL.EXE
\ACADP\RCTURBOC.EXP	\ACADP\TURBODLD.HLP	\GEM3VP3\GEMSETUP.TXT	\GEM3VP3\SDV600.VGA
\GEM3VP3\SDV768.VGA	\GEM3VP3\VP2_0.TXT	\GEM3VP3\VPDRV2_0.EXE	\LOTUS2X\AVGAGR.DRV
\LOTUS2X\TC132X25.DRV	\LOTUS2X\TC132X43.DRV	\LOTUS30\VGAS40CC.VBD	\LOTUS30\VGAS31CC.VBD
\LOTUS30\VGAS42CC.VBD	\LOTUS30\L13AVGA1.DLD	\LOTUS30\VGAS75CC.VBD	\LOTUS30\VGAS54CC.VBD
\LOTUS30\VGAS96CC.VBD	\LOTUS30\L13AVGA2.DLD	\WORD\SCREEN.VID	\WORD\SCREEN8.VID
\WORDSTAR\CL800.WGD	\WORDSTAR\CL1024.WGD	\WORDSTAR\PREVIEW.OVR	\WORDSTAR\PREVIEW.MSG
\WORDSTAR\GRFPIX.EXE	\WP\CIRRUS.VRS		

  - Windows 3.1 drivers, diskette 2 of 5,

File	File	File	File
\DISK.ID	\INSTALL.EXE	\INSTALL.INF	\METER.DLL
\PM.EXE	\PMSAVER.SC	\PMSAVER.HL	\SETRES.IN
\OEMSETUP.INF	\WIN.CN_	\VDD542X.386	\AVGA.3GR
\VGACOLOR.2GR	\VGALOGO.RL_	\VGALOGO.LG_	\SYSTEM\OEM542X.INF
\512K\256_1280.DRV	\512K\READ.ME	\SETRES\SETRES.EXE	\SETRES\SETRES.HLP
\SYSTEM\EGA40850.FO	\SYSTEM\EGA80850.FO_	\SYSTEM\CGA40850.FO_	\SYSTEM\CGA80850.FO_
\SYSTEM\CGA40WOA.FO_	\SYSTEM\VGAFIX.FO_	\SYSTEM\VGAOEM.FO_	\SYSTEM\VGASYS.FO_
\SYSTEM\CGA80WOA.FO_	\SYSTEM\EGA40WOA.FO_	\SYSTEM\EGA80WOA.FO_	\SYSTEM\SSERIFE.FO_
\SYSTEM\SERIFE.FO_	\SYSTEM\COURE.FO_	\SYSTEM\SYMBOLE.FO_	\SYSTEM\SMALLE.FO_
\SYSTEM\ROMAN.FO_	\SYSTEM\SCRIPT.FO_	\SYSTEM\MODERN.FO_	\SYSTEM\OEM542X.INF
\SYSTEM\8514X.FO_	\SYSTEM\8514OEM.FO_	\SYSTEM\8514SYS.FO_	\SYSTEM\SSERIF.FO_
\SYSTEM\SERIFF.FO_	\SYSTEM\COURF.FO_	\SYSTEM\SYMBOLF.FO_	\SYSTEM\SMALLF.FO_
\SYSTEM\256_1280.DRV	\SYSTEM\64k_1024.DRV	\SYSTEM\16M_640.DRV	\SYSTEM\16_1280.FR
\SYSTEM\VDD542X.386	\SYSTEM\SETRES.INI	\SYSTEM\SETRES.CP	\SYSTEM\CPLSRES.HL
\SYSTEM\VGA85-.FO_	\SYSTEM\VGA860.FO_	\SYSTEM\VGA861.FO_	\SYSTEM\VGA863.FO_
\SYSTEM\VGA865.FO_	\SYSTEM\AVGA.3GR		

- OS/2 v2.x drivers, diskette 3 of 5,

File	File	File	File
\DISK.ID	\BVHSVGA.DL_	\CL480B.DSP	\CL480BC.DSP
\CL600B.DSP	\CL600BC.DSP	\CL768B.DSP	\CL768BC.DSP
\CLI1620.CMD	\CLI25620.CMD	\CLINST20.TXT	\CLINST21.CMD
\DISPLAY.DL_	\DSPRES.DL_	\IBMVGA32.DL_	\PSCLBLT.DSC
\README.1ST	\SCREEN01.SY_	\SCREEN02.SY_	\SV48016.DL@
\SV480256.DL@	\SV60016.DL@	\SV600256.DL@	\SV76816.DL@
\SV768256.DL@	\SVGA.EXE	\VGA	\VSGA.SY_
\WINVGA	\WINXGA	\WSPDBF.DR	\WSPDSBF.DR_
\WSPDSF.DR_	\WSPDSSF.DR		

- OS/2 v2.x Windows 3.x drivers, diskette 4 of 5, and

File	File	File	File
\DISK.ID	\README.1ST	\WIN30	\WIN31
\WIN30\INSTALL.EXE	\WIN30\METER.DLL	\WIN30\INSTALL.INF	\WIN30\INSTALL.TXT
\WIN30\SYSTEM	\WIN30\SETRES.INI	\WIN30\SYSTEM\CPLRES.HLP	\WIN30\SYSTEM\256_1024.DRV
\WIN31\PM.EX_	\WIN30\SETRES\SETRES.EXE	\WIN30\SETRES\SETRES.HLP	\WIN30\SYSTEM\256_768S.DRV
\WIN31\SETRES	\WIN31\INSTALL.EXE	\WIN31\INSTALL.INF	\WIN30\SYSTEM\16_1280.DRV
\WIN31\METER.DLL	\WIN31\PMSAVER.SC_	\WIN31\PMSAVER.HL_	\WIN31\SETRES\SETRES.HLP
\WIN31\SYSTEM	\WIN31\INSTALL.TXT	\WIN31\SETRES\SETRES.EXE	\WIN31\SYSTEM\256_1280.DRV
\WIN31\SETRES\SETRES.INI			\WIN30\SYSTEM\SETRES.CPL

- Windows NT drivers, diskette 5 of 5.

File	File	File	File
\DISK1	\OEMSETUP.INF	\README.TXT	\TXTSETUP.OEM
\CIRRUS2M.SYS	\CLBLT256.DLL	\CLVGA16.DLL	

1 System Overview

The Super Voyager LPX is a high performance all-in-one motherboard with built-in local bus VGA and built-in local bus IDE.

The Super Voyager LPX motherboard supports the EPA Green PC power management specification and provides an easy-to-use BIOS Setup utility.

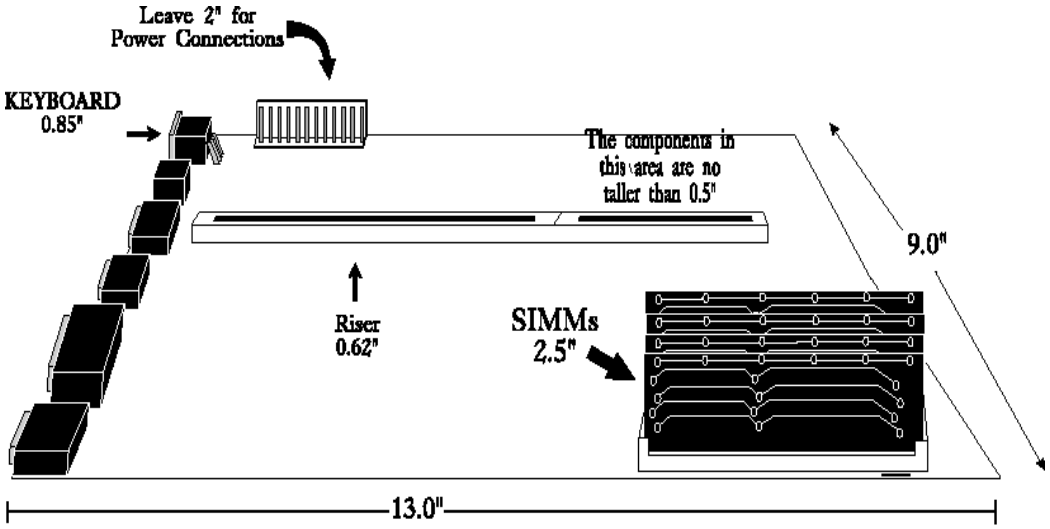
The VL-Bus Local Bus

The American Megatrends Super Voyager LPX 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 LPX motherboard has a VL-Bus connector mounted inline with a standard LPX connector. You must use a VESA VL Riser card to use VL-Bus adapter cards.

Super Voyager LPX Dimensions

The Super Voyager LPX motherboard is approximately 9 inches wide by 13 inches long (the standard Western Digital LPX size with similar mounting hole locations).



Super Voyager LPX
Height Restrictions

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

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 LPX motherboard also will support future Intel processors with internal write-back cache.

Programmable Crystal Oscillator

The Super Voyager LPX 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 LPX 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.

Cache Memory

The Super Voyager LPX 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 LPX motherboard supports up to 128 MB of DRAM system memory in four SIMMs (Single Inline Memory Modules) mounted directly on the motherboard.

SIMM Types Supported

The Super Voyager LPX 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 ROM memory area at F0000h–FFFFFh and the video BIOS ROM memory area (C0000h–C7FFFh) are always copied from ROM (Read Only Memory) to RAM (Random Access Memory). The copying process is known as shadowing. Shadowing improves system performance because RAM is faster than ROM. Adaptor ROM (C80000h – EFFFFFh) can be shadowed via WinBIOS Setup.

System BIOS

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

Timer Features

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

Refresh Generation

The motherboard has a refresh generation feature.

I/O Capability

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

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 one LPX/VL 32-bit expansion slot. This slot can be used with an LPX riser card.

Local Bus

The Super Voyager LPX motherboard has both VGA and IDE built-in to the VESA VL-Bus local bus.

Keyboard and Mouse

The keyboard connector is a standard 6-pin miniDIN keyboard connector. Adjacent to the keyboard connector is a standard 6-pin miniDIN connector for a PS/2 mouse. A four-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 LPX motherboard uses an SMC FDC37C665 Universal Peripheral Controller. The motherboard includes a floppy drive controller, two 16550 UARTs for serial ports, and one parallel port.

Onboard Local Bus VGA

The motherboard has a Cirrus Logic GD5428 with 1 MB of fixed VGA memory supporting screen resolutions up to 1024 x 768 with 256 colors or 1280 x 1024 with 16 colors.

Onboard Local Bus IDE Support

The onboard IDE is on the VESA local bus. The IDE controller supports IDE Modes 0, 1, and 2. It also supports IDE read data prefetch and write posting. WinBIOS 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

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 on the riser card use the 16-bit memory addresses to access up to 24 MB.

I/O Channel Check

The motherboard supports the use of the I/O channel check to generate NMIs.

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 LPX 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	Onboard VGA or bus through jumper
5	IRQ 10	Bus
6	IRQ 11	Bus
7	IRQ 12	Onboard PS/2 Mouse *or* 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 LPX 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,
- onboard VGA and monitor is switched off according the VESA DPMS (Display Power Management Specification),
- 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,

Green PC Test System Configuration

The American Megatrends Super Voyager LPX motherboard has been tested and found to comply with the EPA Green PC specifications with the following system configuration. There was a margin of 5 watts, which should allow for some variation in the configuration.

- 8 MB of DRAM,
- an Intel 80486DX2-66SA S-Series CPU,
- built-in VGA,
- a Western Digital Caviar IDE drive model number WDAC2200-32F,
- a Toshiba 1.2 MB floppy drive, model number ND-0801GR, and
- a Senstron 200W Green PC Power Supply, model number GP2-4200F.

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 LPX 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. System security locking is enabled by pressing <Ctrl> <Alt> <Backspace> only if the system password is enabled in the *Advanced Setup* part of WinBIOS Setup.

Using the Turbo LED

The Turbo LED indicates if the system is using low or high operating frequency. 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.

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.

J14 Password LED Select

J14 is a three-pin berg that selects the Password LED.

J14 Pin Settings	LED selected
Short Pins 1-2	Front panel power LED is Password LED.
Short Pins 2-3	Separate Password LED using J15 *(Factory setting).*

J15 Password LED Connector

J15 is a two-pin berg that can be attached via a cable to an LED that flashes when the system has been inactive for a specified length of time and Pins 2-3 of J39 are shorted.

The end user must enter the correct system password if the Password LED is blinking. The end user can set the system password feature so the keyboard and mouse cannot be used until the correct password is entered by first pressing <Ctrl> <Alt> <Backspace>.

The AMIBIOS system password feature and AMIBIOS Green PC AutoKeyLock feature must be enabled before this feature can be used.

Green PC Implementation Disclaimers

Green PC Responsibility belongs to System Integrator

The system integrator must be responsible for Green PC compliance. American Megatrends has simply supplied the means to meet the Green PC requirements and cannot be held responsible for final system assembly.

When to Disable Sleep Mode

If a computer will be running an application that requires long durations of microprocessor activity with no input from the keyboard, mouse, COM1, or COM2, Sleep Mode should be disabled in WinBIOS Setup.

If Sleep Mode is not disabled, the system will switch to sleep mode and the system performance will be greatly decreased. Some examples of such applications are: file servers, CAD systems, software compilers, screen savers, and many more.

No Need for Screen Savers

Important
Screen saver software should not be used with Sleep Mode enabled.

Sleep Mode serves the same purpose as a screen saver and obviates the need for a screen saver.

Buses are Slowed during Sleep Mode

The VL-Bus and ISA bus run at a slow speed during Sleep Mode when the **Low Speed Timeout** option is set to *Enabled* in Power Management Setup.

Some VL-Bus adapter cards cannot run at a slow speed. Do not set the Power Management Setup **Low Speed Timeout** option to *Enabled* if any VL-Bus adapter cards are installed.

2 Installation

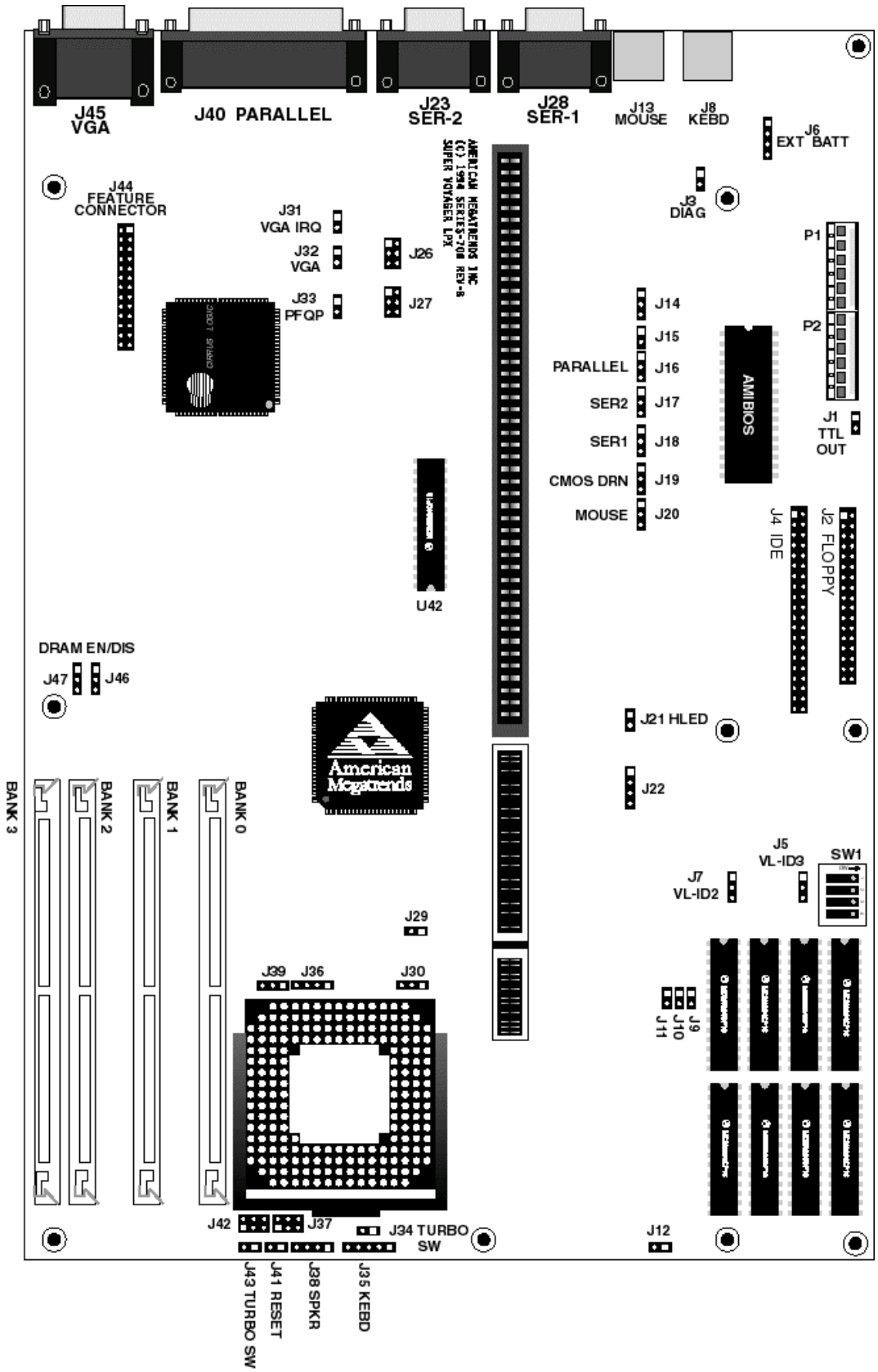
Installation Steps

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

Step	Action	Turn to
1	Unpack the motherboard	Page 17
2	Set switch and jumper options	Page 17
3	Install memory	Page 33
4	Install upgrade processor	Page 39
5	Install motherboard	Page 42
6	Connect the power supply	Page 44
7	Connect the keyboard	Page 46
8	Connect the mouse	Page 46
9	Connect cables	Page 47
10	Connect onboard I/O	Page 52
11	Install floppy disk drives	Page 57
12	Install hard disk drive	Page 57
13	Install adapter cards	Page 59
14	Test and configure	Page 60

Warning

This motherboard contains sensitive electronic components which can be easily damaged by static electricity. Follow the instructions carefully to ensure correct installation and to avoid static damage.



Super Voyager LPX ISA Motherboard User's Guide

Step 1 Unpacking the Motherboard

Step	Action
1	Inspect the cardboard carton for obvious damage. If damaged, call 404-246-8600. Leave the motherboard in its original packing.
2	Perform all unpacking and installation procedures on a ground connected anti-static mat. 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 as the wristband.
3	Inside the carton, the motherboard is packed in an anti-static bag, and sandwiched between sheets of sponge. Remove the sponge and the anti-static bag. Place the motherboard on a grounded anti-static surface component side up. Save the original packing material.
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.

Step 2 Set Switch and Jumper Options

Set all user-configurable jumpers and switches and install upgrade processors before placing the motherboard in the chassis. The switches and jumpers are:

SW1	Cache Memory Size,
J3	Diagnostics,
J18	Serial Port 1 IRQ Select,
J17	Serial Port 2 IRQ Select,
J16	Parallel Port IRQ Select,
J20	Enable onboard PS/2 mouse
J30, J39, J36, J22, J29, J37, J42	Select CPU type,
J33	Disable PQFP CPU,
J19	CMOS RAM Drain,
J26, J27	DMA Channel Select,
J37	Select 5V CPU,
J42	Select 3.3V CPU,
J5	Local Bus ID3 Select,
J7	Local Bus ID2 Select,
J31	Onboard VGA Interrupt Enable,
J32	Onboard VGA Disable, and
J46, J47	Onboard DRAM Bank Select.

SW1

SW1 is a four-position two-bit DIP switch that controls cache memory configuration. See the graphic on page 23 for the location of SW1.

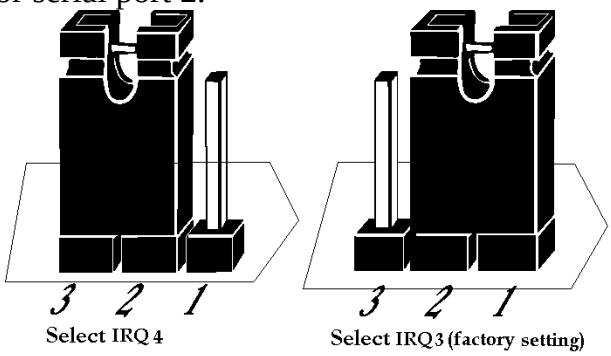
SW1 Switches	Cache Memory Configured
All OFF	64 KB
All ON	256 KB

J3 Manufacturing Diagnostics

J3 is the Manufacturing Diagnostics jumper. The motherboard is shipped with J3 OPEN. J3 should remain OPEN.

J17 Serial Port 2 IRQ Select

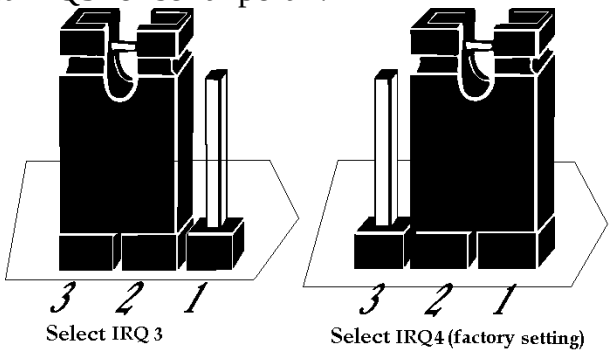
J17 is a three-pin single-inline berg. Short pins 2-3 to select IRQ4 for serial port 2. Short pins 1-2 (the default) to select IRQ3 for serial port 2.



Pins 2-3 Shorted Pins 1-2 Shorted

J18 Serial Port 1 IRQ Select

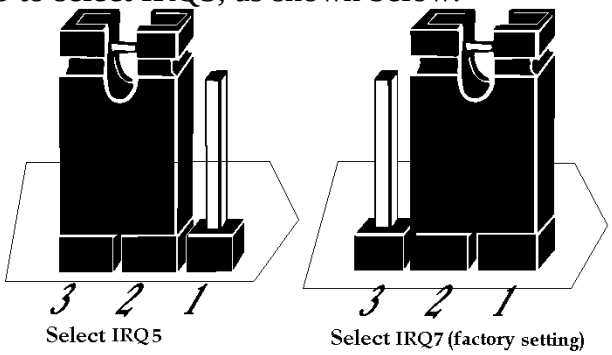
J18 is a three-pin single-inline berg. Short pins 1-2 to select IRQ4 for serial port 1 (the factory setting). Short pins 2-3 to select IRQ3 for serial port 1.



Pins 2-3 Shorted Pins 1-2 Shorted

J16 Parallel Port IRQ Select

J16 is a three-pin berg that selects the IRQ for the parallel port. Short pins 1-2 to select IRQ7 (the factory setting). Short pins 2-3 to select IRQ5, as shown below.



Pins 2-3 Shorted Pins 1-2 Shorted

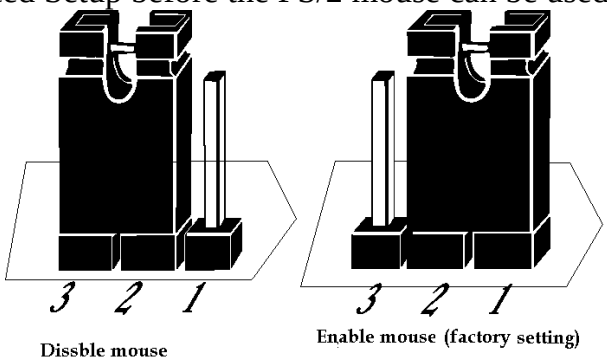
CPU Clock Speed

The CPU Clock speed options will be specified in an American Megatrends Technical Tip to be supplied later.

J20 Onboard PS/2 Mouse Enable

J20 is a three-pin single-inline berg. Short pins 2-3 to disable the onboard PS/2 mouse. Short pins 1-2 to enable the onboard PS/2 mouse (the default). *IRQ12 cannot be used by any ISA or VL-Bus adapter card when the onboard mouse is enabled.*

The Mouse Support Option must be set to *Enabled* in Advanced Setup before the PS/2 mouse can be used.

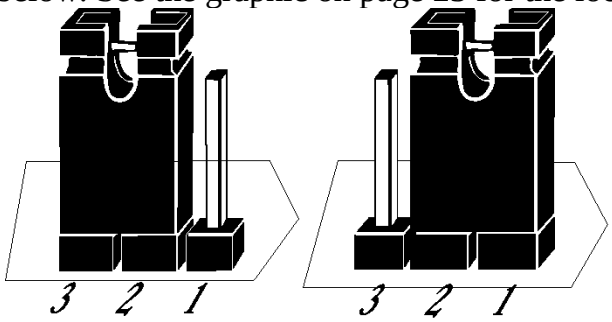


Dissble mouse
Pins 2-3 Shorted

Enable mouse (factory setting)
Pins 1-2 Shorted

J5 Local Bus ID3 Select

J5 is a three-pin single-inline berg. In normal operation, pins 1-2 are shorted when running Local Bus Adapter Cards at 20, 25, or 33 MHz. The factory setting depends on the motherboard frequency. Short pins 2-3 if running Local Bus Adapter Cards at speeds higher than 33 MHz. J5 is shown below. See the graphic on page 23 for the location.

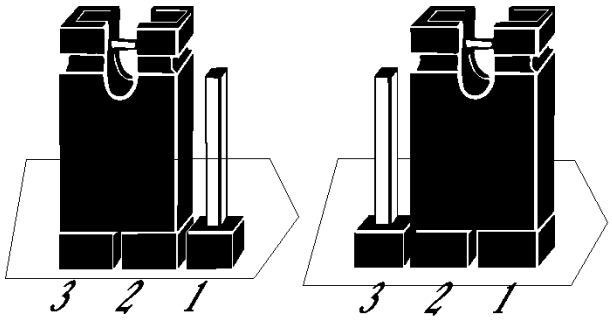


40 or 50 MHz CPU
Pins 2-3 Shorted

25 or 33 MHz CPU
Pins 1-2 Shorted

J7 Local Bus ID2 Select

J7 is a three-pin single-inline berg. In normal operation, pins 1-2 are shorted when running Local Bus Adapter Cards at 20, 25, or 33 MHz. The factory setting depends on the motherboard frequency. Short pins 2-3 if running Local Bus Adapter Cards at speeds higher than 33 MHz. J7 is shown below. See the graphic on page 23 for the J7 location.



40 or 50 MHz CPU
Pins 2-3 Shorted

25 or 33 MHz CPU
Pins 1-2 Shorted

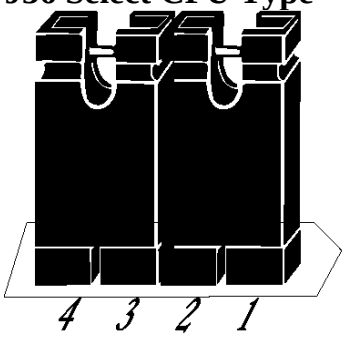
J30, J39, J36, J22, J29, J37, J42 CPU Select

J29 is a two-pin berg. J30 and J39 are three-pin bergs. J22 and J36 are four-pin bergs. J37 and J42 are six-pin bergs. Together, these jumpers select the CPU type.

CPU in ZIF Socket	J30	J39	J36	J22	J29	J37	J42
486SX	OPEN	N/A	Short 2-3	Short 1-2 Short 3-4	OPEN	Short 1-2 Short 3-4 Short 5-6	All OPEN
486DX, 486DX2	OPEN	Short 1-2	Short 1-2 Short 3-4	Short 1-2 Short 3-4	OPEN	Short 1-2 Short 3-4 Short 5-6	All OPEN
487SX, P23T	OPEN	Short 2-3	Short 1-2 Short 3-4	Short 1-2 Short 3-4	OPEN	Short 1-2 Short 3-4 Short 5-6	All OPEN
P4S, P24S, P23S	OPEN	Short 1-2	Short 1-2 Short 3-4	Short 2-3	OPEN	Short 1-2 Short 3-4 Short 5-6	All OPEN
P24D	OPEN	Short 1-2	Short 1-2 Short 3-4	Short 3-4	SHORT	Short 1-2 Short 3-4 Short 5-6	All OPEN
P24T	OPEN	Short 2-3	Short 1-2 Short 3-4	Short 3-4	SHORT	Short 1-2 Short 3-4 Short 5-6	All OPEN
486DX4 (x 2)	Short 1-2	Short 1-2	Short 1-2 Short 3-4	Short 2-3	OPEN	All OPEN	Short 1-2 Short 3-4 Short 5-6
486DX4 (2.5)	Short 2-3	Short 1-2	Short 1-2 Short 3-4	Short 2-3	OPEN	All OPEN	Short 1-2 Short 3-4 Short 5-6
486DX4 (x 3)	OPEN	Short 1-2	Short 1-2 Short 3-4	Short 2-3	OPEN	All OPEN	Short 1-2 Short 3-4 Short 5-6
P24CT	OPEN	Short 2-3	Short 1-2 Short 3-4	Short 3-4	SHORT	All OPEN	Short 1-2 Short 3-4 Short 5-6

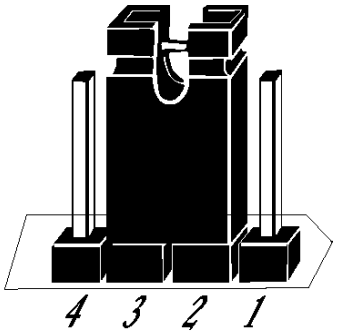
The graphics on the following page depicts the jumper settings.

J36 Select CPU Type



Short Pins 1-2 and 3-4

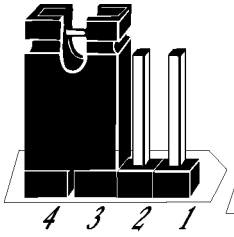
486DX, 486DX2,487SX,
P23T, P4S, P24S,
P23S, P24D, P24T,
486DX4, P24CT



Short Pins 2-3

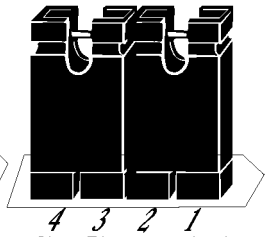
486SX

J22 Select CPU Type



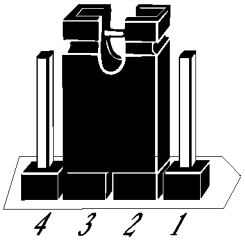
Short Pins 3-4

P24D, P24T, P24CT



Short Pins 1-2 and 3-4

486DX, 486DX2,
487SX, orP23T

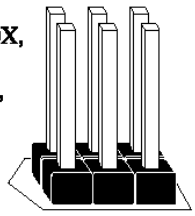


Short Pins 2-3

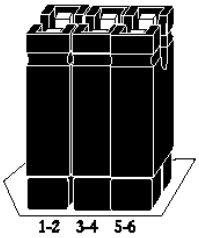
P4S, P24S, P23S,
486DX4, P24D,
P24T, P24CT

J42 Select CPU Type

J42 if 486SX, 486DX,
486DX2, 487SX,
P23T, P4S, P24S,
P23S, P24D,
or P24T CPUs

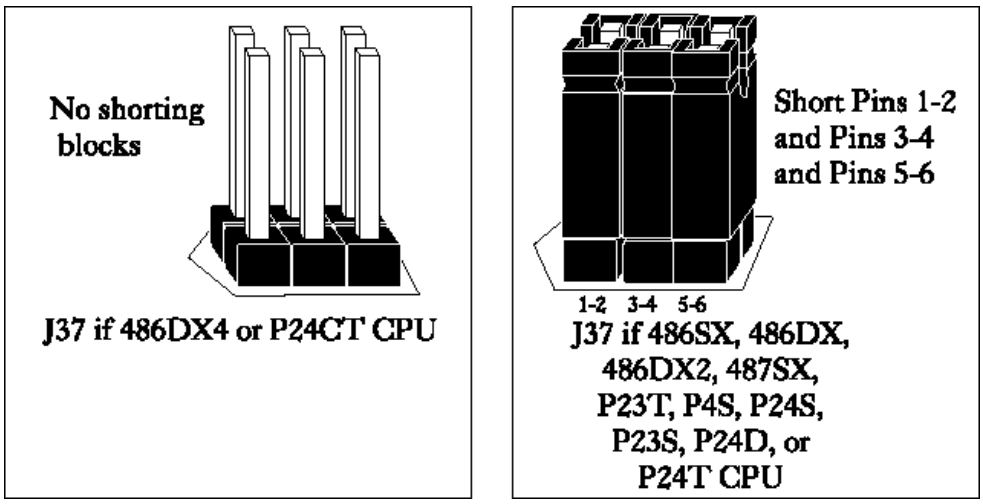


Short Pins 1-2 and
Short Pins 3-4 and
Short Pins 5-6

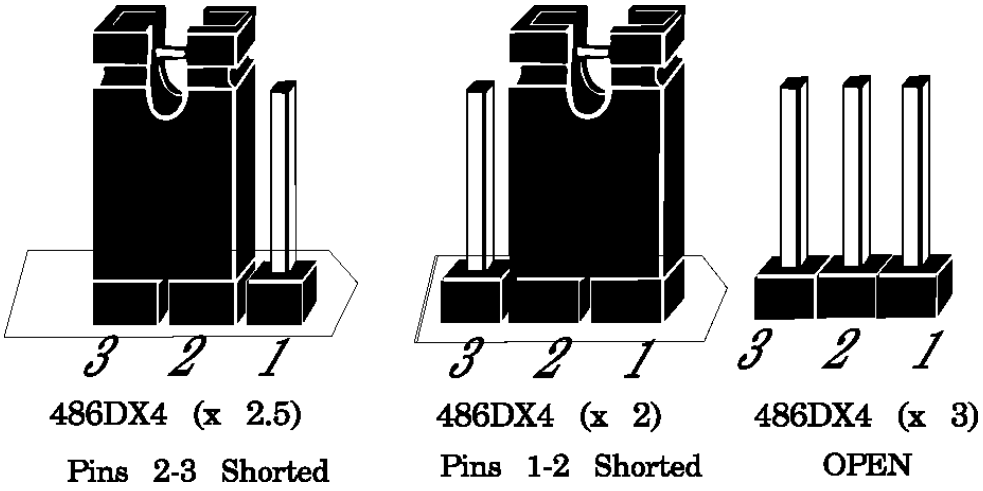


J42 if 486DX4 or P24CT CPU

J37 Select CPU Type

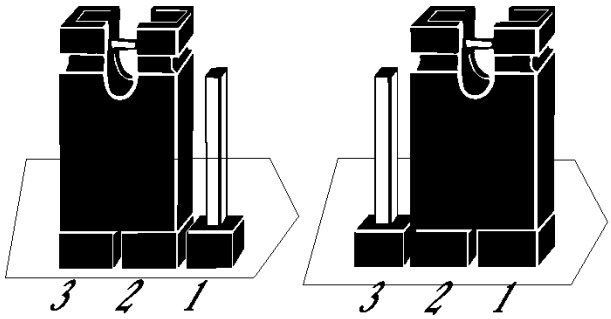


J30 Select CPU Type



Step 2 Set Switch and Jumper Options, Continued

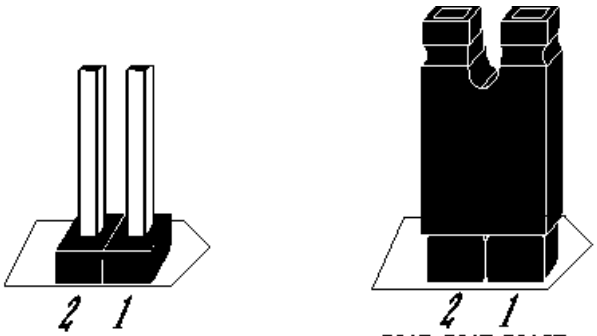
J39 Select CPU Type



487SX, P23T
P24T, P24CT
Pins 2-3 Shorted

486DX, 486DX2,
P4S, P24S, P23S
P24D, 486DX4
Pins 1-2 Shorted

J29 Select CPU Type

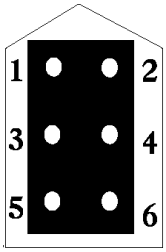


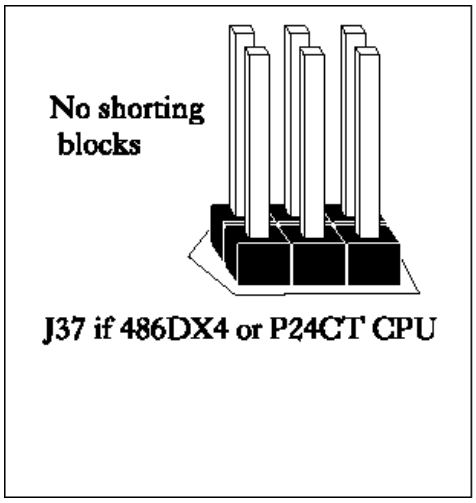
486SX, 486DX, 486DX2,
486SX, P32T, P4S,
P24S, P23S, 486DX4
Pins 1-2 OPEN

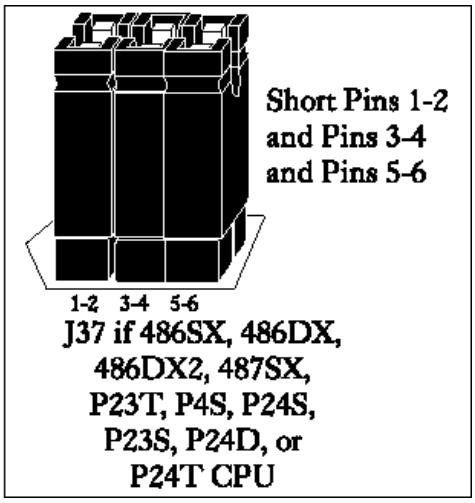
P24D, P24T, P24CT
Pins 1-2 Shorted

J37 Select 5V CPU

J37 is a three by two dual-inline berg. Short the following pins together: 1-2, 3-4, and 5-6 when a 5 volt CPU is installed on the motherboard. See the graphic on page 23 for the J37 location. The J37 and J42 pin numbering is shown in the following graphic:







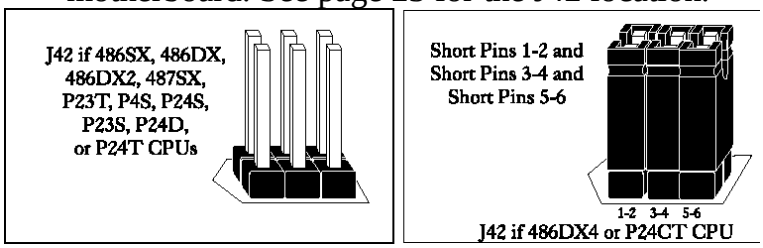
Warning

Short the Pins on either J37 or J42. *NEVER SHORT PINS ON BOTH J37 AND J42.*
Short J37 pins for 5V CPUs.
Short J42 for 3.3V CPUs.

J42 Select 3.3V CPU

Before using a 3.3V CPU, make sure that a voltage regulator is installed with a heat sink in U70. 3.3V CPUs cannot be used unless this voltage regulator is installed.

J42 is a three by two dual-inline berg. Short pins 1-2, 3-4, and 5-6 together if a 3.3 volt CPU is installed on the motherboard. See page 23 for the J42 location.



J33 Disable PQFP CPU

J33 is a two-pin single-inline berg. Short Pins 1-2 together to disable the PQFP CPU. You must short these pins together when a CPU is installed in the ZIF socket on the motherboard. See page 23 for the J33 location.

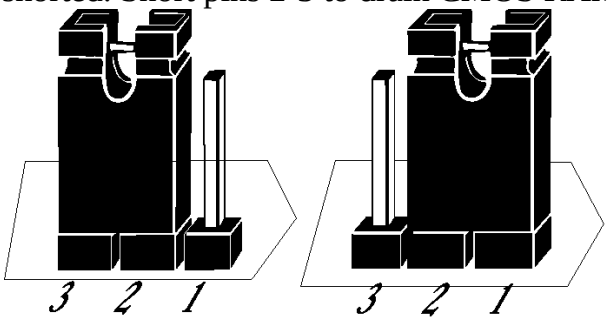
J14 Password LED Enable

J14 is a three-pin berg that enables the Password LED. The Password LED flashes after the end user presses <Ctrl> <Alt> <Backspace> to lock the keyboard and mouse (Pins 2-3 of J14 must also be shorted together). The WinBIOS system password feature must be enabled.

J14 Pin Settings	LED selected
Short Pins 1-2	Front panel power LED is Password LED. *(Factory setting).*
Short Pins 2-3	Separate Password LED using J15.

J19 CMOS RAM Drain

J19 is a three-pin single-inline berg. In normal operation, pins 1-2 are shorted. Short pins 2-3 to drain CMOS RAM.



Drain CMOS RAM
Pins 2-3 Shorted

Normal Operation
Pins 1-2 Shorted

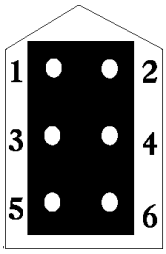
> ***Warning***
>
> The computer power must be turned off before moving the J19 shorting bridge to Pins 2-3.
>
> Make sure you use proper procedures to avoid electrostatic discharge.
>
> *The shorting bridge must be installed on Pins 1-2 of J19 before the computer power is turned on again.*

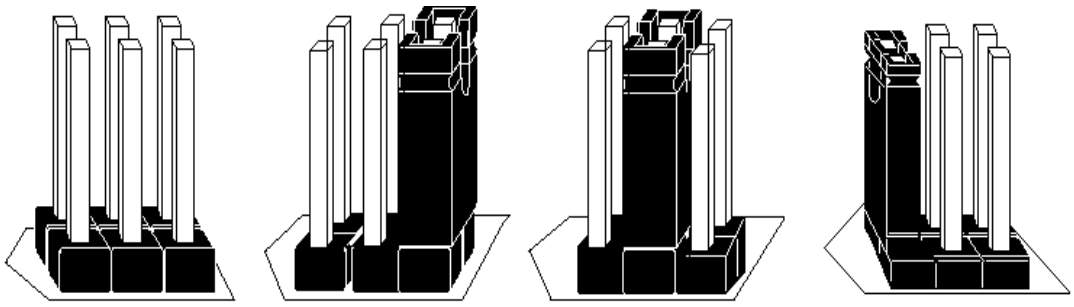
In most computer, if you forget the system password, you must remove the battery for at least 20 minutes to erase the password. J19 provides a quicker method. Turn power off. Then short J19 pins 2-3 together for several seconds to quickly drain CMOS RAM.

You must then place the shorting bridge on Pins 1-2 of J19 before turning power on. Then you must run WinBIOS Setup to reconfigure the computer, since no system configuration data will now be stored in CMOS RAM.

J27 Select Enhanced Parallel Port DMA Request

J27 is a six-pin dual-inline header that selects the parallel port DMA request line. The factory setting is OPEN (no DMA channel selected). The J27 pin configuration is shown in the following graphic:





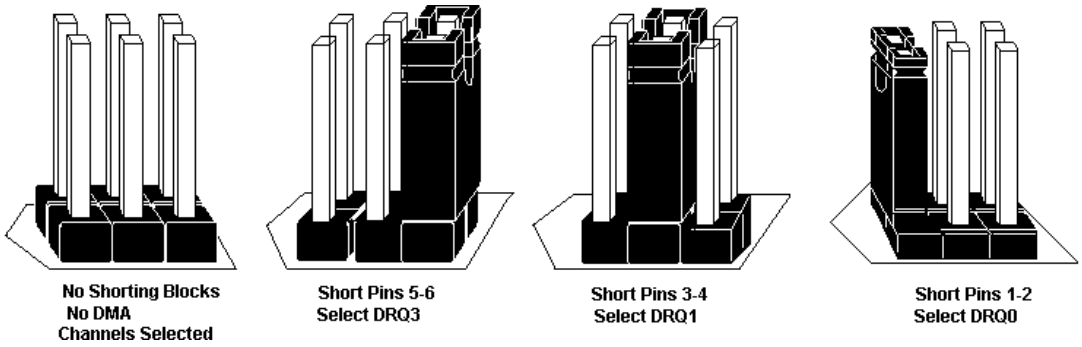
J27 Pin Setting	DMA Channel
All OPEN	No DMA channel selected (factory setting)
Short Pins 1-2	DRQ0
Short Pins 3-4	DRQ1
Short Pins 5-6	DRQ3 *(Factory setting)*

Warning

If Pins 1-2 of J27 are shorted together, Pins 1-2 of J26 must be shorted together.
If Pins 3-4 of J27 are shorted together, Pins 3-4 of J26 must be shorted together.
If Pins 5-6 of J27 are shorted together, Pins 5-6 of J26 must be shorted together.
You can only select one of the J27/J26 options, and they must match.

J26 Select Enhanced Parallel Port DMA Acknowledge

J26 is a six-pin dual-inline header that selects the parallel port DMA Acknowledge line. The factory setting is all OPEN (no DMA channel selected).



J26 Pin Setting	DMA Channel
All OPEN	No DMA channel selected (factory setting)
Short Pins 1-2	DRQ0
Short Pins 3-4	DRQ1
Short Pins 5-6	DRQ3

J26 and J27 are used only for ECP (Extended Capability Port) and EPP (Enhanced Parallel Port) support. The system BIOS on the Super Voyager LPX motherboard does not support ECP and EPP at this time.

When ECP and EPP are supported, you may specify DMA channels for ECP and EPP support. At this time, you must leave J26 and J27 OPEN (no DMA channel selected for the parallel port).

J31 Onboard VGA Interrupt Enable

J31 is a two-pin berg that enables use of IRQ9 for the onboard VGA controller. Place a shorting bridge on J31, shorting pins 1-2 together, to enable the VGA interrupt as IRQ9. This interrupt is generated by the VGA controller during vertical retrace. Leave J31 OPEN to disable the VGA interrupt.

J32 Onboard VGA Disable

J32 is a two-pin berg that enables the onboard VGA. Leave J32 OPEN to enable the onboard VGA. Place a shorting bridge on the two pins of J32 to disable the onboard VGA.

J46 J47 Onboard DRAM Bank Select

The Super Voyager LPX motherboard comes with 4 MB of system memory surface-mounted on the motherboard. The factory setting of J46 and J47 (pins 1-2 shorted together) enables this bank of memory. In the system memory configuration that includes this memory, this surface-mounted memory bank is Bank0 and U60 should not be populated.

J46 and J47 are both three-pin bergs that enable the surface-mounted onboard DRAM. Short pins 1-2 of both J46 and J47 to enable the surface-mounted onboard DRAM.

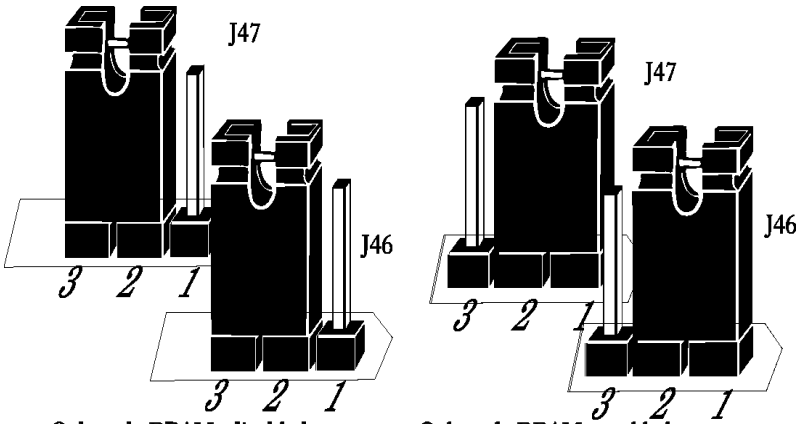
Short Pins 2-3 of J46 and J47 to disable the surface-mounted onboard DRAM mounted on the motherboard to use only DRAM SIMMs installed in the SIMM sockets on the motherboard.

With Bank0 as 4 MB of fixed memory, the following table lists the memory configurations that are supported:

Bank0	Bank1	Bank2	Bank3	Total RAM
4 MB	None	None	None	4 MB
4 MB	1 MB x 36	None	None	8 MB
4 MB	1 MB x 36	1 MB x 36	None	12 MB
4 MB	1 MB x 36	1 MB x 36	1 MB x 36	16 MB
4 MB	4 MB x 36	None	None	20 MB
4 MB	1 MB x 36	4 MB x 36	None	24 MB
4 MB	4 MB x 36	4 MB x 36	None	36 MB
4 MB	1 MB x 36	4 MB x 36	4 MB x 36	40 MB
4 MB	16 MB x 36	None	None	68 MB
4 MB	1 MB x 36	16 MB x 36	None	72 MB
4 MB	8 MB x 36	None	None	36 MB
4 MB	8 MB x 36	8 MB x 36	None	68 MB
4 MB	1 MB x 36	8 MB x 36	None	40 MB
4 MB	1 MB x 36	8 MB x 36	8 MB x 36	72 MB

If using all four SIMM banks and setting J46 and J47 Pins 2-3 shorted (onboard memory disabled), all SIMM banks including U60 can be used. If J46 and J47 Pins 2-3 are shorted, the surface-mounted onboard DRAM is disabled.

See page 34, for the potential memory configurations if the onboard surface-mounted DRAM is disabled (Pins 2-3 of J46 and J47 are shorted together).



Step 3 Install Memory

The main memory subsystem on the Super Voyager LPX motherboard has one bank of DRAM on the motherboard and four 32-bit SIMM (Single Inline Memory Module) memory sockets.

If the surface-mounted DRAM bank is used as Bank0 (Pins 1-2 of both J46 and J47 are shorted together), see the system memory table on the previous page.

If the DRAM bank is not populated or Pins 2-3 of both J46 and J47 are shorted together, the potential system memory configurations are shown on page 34.

Each socket can hold one SIMM unit. You can use 256 KB x 36, 512 KB x 36, 1 MB x 36, 2 MB x 36, 4 MB x 36, 8 MB x 36, or 16 MB x 36 SIMMs. The SIMMs can be single-sided or double-sided. The Super Voyager LPX motherboard uses fast page mode SIMMs operating at 70 ns (RAS access time).

Reporting Memory

The system memory is reported by AMIBIOS as it boots and again when the AMIBIOS System Configuration Screen is displayed just before DOS is booted.

The memory displayed by WinBIOS on the System Configuration Screen is 384 KB less than the total memory installed.

Motherboard Memory Configurations

The Super Voyager LPX motherboard supports the following motherboard memory configurations when the onboard DRAM bank is not being used.

BANK0	BANK1	BANK2	BANK3	Total
256 KBx36-S	None	None	None	1 MB
256 KBx36-S	256 KBx36-S	None	None	2 MB
256 KBx36-S	256 KBx36-S	512 KBx36-D	None	4 MB
256 KBx36-S	256 KBx36-S	1 MBx36-S	None	6 MB
256 KBx36-S	256 KBx36-S	512 KBx36-D	1 MBx36-S	8 MB
256 KBx36-S	256 KBx36-S	1 MBx36-S	1 MBx36-S	10 MB
256 KBx36-S	256 KBx36-S	4 MBx36-S	None	18 MB
512 KBx36-D	None	None	None	2 MB
512 KBx36-D	512 KBx36-D	None	None	4 MB
512 KBx36-D	1 MBx36-S	None	None	6 MB
512 KBx36-D	512 KBx36-D	1 MBx36-S	None	8 MB
512 KBx36-D	512 KBx36-D	1 MBx36-S	1 MBx36-S	12 MB
512 KBx36-D	4 MBx36-S	None	None	18 MB
512 KBx36-D	512 KBx36-D	4 MBx36-S	None	20 MB
512 KBx36-D	512 KBx36-D	1 MBx36-S	4 MBx36-S	24 MB
512 KBx36-D	512 KBx36-D	4 MBx36-S	4 MBx36-S	36 MB
1 MBx36-S	None	None	None	4 MB
1 MBx36-S	1 MBx36-S	None	None	8 MB
1 MBx36-S	1 MBx36-S	1 MBx36-S	None	12 MB
1 MBx36-S	1 MBx36-S	1 MBx36-S	1 MBx36-S	16 MB
1 MBx36-S	4 MBx36-S	None	None	20 MB
1 MBx36-S	1 MBx36-S	4 MBx36-S	None	24 MB
1 MBx36-S	4 MBx36-S	4 MBx36-S	None	36 MB
1 MBx36-S	1 MBx36-S	4 MBx36-S	4 MBx36-S	40 MB
2 MBx36-D	None	None	None	8 MB
2 MBx36-D	2 MBx36-D	None	None	16 MB
2 MBx36-D	2 MBx36-D	2 MBx36-D	None	24 MB
2 MBx36-D	2 MBx36-D	2 MBx36-D	2 MBx36-D	32 MB
4 MBx36-S	None	None	None	16 MB
4 MBx36-S	4 MBx36-S	None	None	32 MB
4 MBx36-S	4 MBx36-S	4 MBx36-S	None	48 MB
4 MBx36-S	4 MBx36-S	4 MBx36-S	4 MBx36-S	64 MB
256 KBx36-S	1 MBx36-S	None	None	5 MB
256 KBx36-S	4 MBx36-S	None	None	17 MB
256 KBx36-S	16 MBx36-S	None	None	65 MB

BANK0	BANK1	BANK2	BANK3	Total
1 MBx36-S	16 MBx36-S	None	None	68 MB
1 MBx36-S	1 MBx36-S	16 MBx36-S	None	72 MB
4 MBx36-S	16 MBx36-S	None	None	80 MB
4 MBx36-S	4 MBx36-S	16 MBx36-S	None	96 MB
16 MBx36-S	None	None	None	64 MB
16 MBx36-S	16 MBx36-S	None	None	128 MB
1 MBx36-S	8 MBx36-D	None	None	36 MB
1 MBx36-S	8 MBx36-D	8 MBx36-D	None	68 MB
1 MBx36-S	1 MBx36-S	8 MBx36-D	None	40 MB
1 MBx36-S	1 MBx36-S	8 MBx36-D	8 MBx36-D	72 MB
4 MBx36-S	8 MBx36-D	None	None	48 MB
4 MBx36-S	8 MBx36-D	8 MBx36-D	None	80 MB
4 MBx36-S	4 MBx36-S	8 MBx36-D	None	64 MB
4 MBx36-S	4 MBx36-S	8 MBx36-D	8 MBx36-D	96 MB
8 MBx36-D	None	None	None	32 MB
8 MBx36-D	8 MBx36-D	None	None	64 MB
8 MBx36-D	8 MBx36-D	8 MBx36-D	None	96 MB
8 MBx36-D	8 MBx36-D	8 MBx36-D	8 MBx36-D	128 MB

LEGEND: -S single-sided SIMMs
-D double-sided SIMMs

Selecting SIMMs

Make sure SIMMs meet the following specifications:

Parameter	Specification
Page Mode	FAST
Refresh	CAS before RAS
t_{CAC}	≤ 20 ns
t_{RAC}	≤ 80 ns
t_{AA}	≤ 45 ns
t_{RP}	70 ns
t_{CPA}	≤ 45 ns

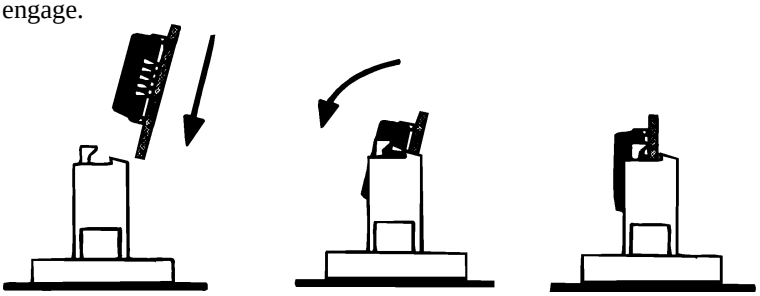
SIMM Part Numbers

Type	Manufacturer	Part Number
256 KB x 36	Micron®	MT9D25636M-7
	Mitsubishi®	MH26636BJ-7
	Motorola®	MCM36256S-70
	Oki®	MSC2320A-70YS9
	PNY®	P36256-70
	Samsung®	KMM536256B-7
512 KB x 36	Samsung	KMM536512W-7 (single-sided) KMM536512W3-7 (double-sided)
	Motorola	MCM36512S-70
1 MB x 36	Micron	MT12D136M-7
	Mitsubishi	MH1M36ADJ-7
	PNY	P361000-70
	Motorola	MCM36100AS-70
	Oki	MSC2355-70YS12
	Samsung	KMM5361000AV-7
2 MB x 36	Micron	MT24D236M-7
	Samsung	KMM5362000A-7
	Motorola	MCM36200S70
4 MB x 36	Micron	MT12D436M-7
	Mitsubishi	MH4M36SAJ-7
	Motorola	MCM36400S-70
	PNY	P364000-70
	Samsung	KMM5364100-7
8 MB x 36	Motorola	MCM36800S-70
	PNY	P368000-707
	Samsung	KMM5368100-7

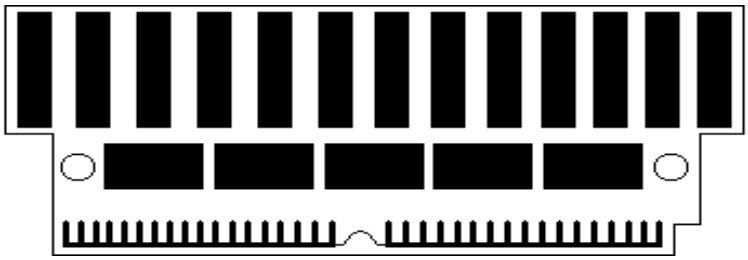
Installing SIMMs

There are four x 36 SIMM sockets located on the Super Voyager LPX motherboard. Each x 36 SIMM is the equivalent of four x 9 SIMMs. These sockets can be filled with either 256 KBx36-S, 512 KBx36, 1 MBx36-S, 2 MBx36, 4 MBx36-S, 8 MBx36, or 16 MBx36 SIMMs.

Place the motherboard on an anti-static mat. With the component side of the SIMM facing you, firmly push the SIMM into the socket at a 45 degree angle, then push it up to a vertical position. When properly inserted, the SIMM clicks into place as the latching pins engage.



The 1 MBx36-S SIMMs look like this:



Step 4 Install Upgrade Processor

Follow the procedures described in this step to install an upgrade processor in the empty ZIF socket near the CPU.

> ***Warning***
> Improper Upgrade Processor installation can damage the Upgrade Processor and/or the motherboard. You must follow the procedures in this section exactly as documented.

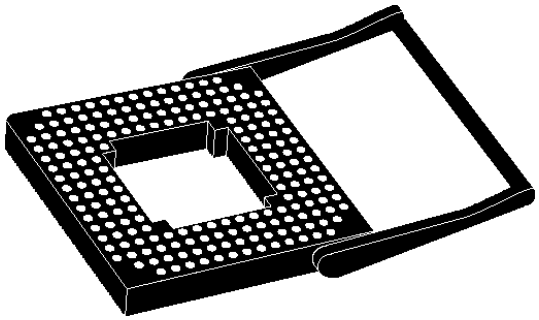
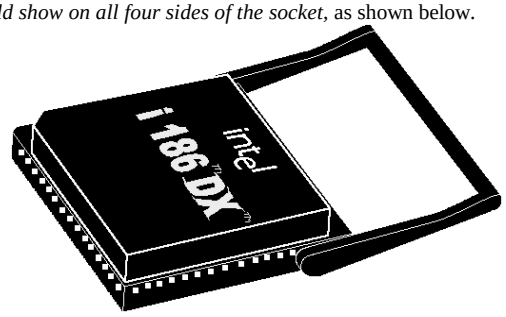
Processor Type and Speed

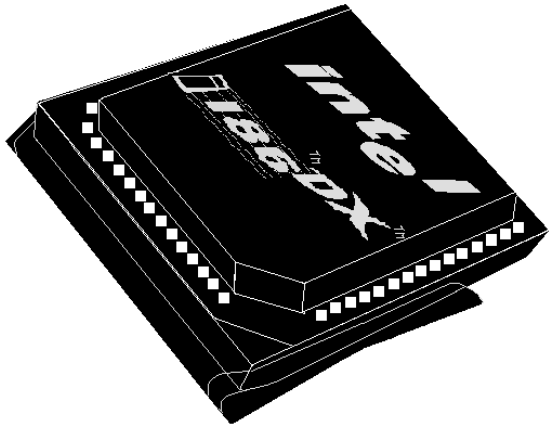
The Upgrade Processor socket is a 240-pin socket near one edge of the board. The Super Voyager LPX motherboard supports the following CPUs and Upgrade Processors:

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

Installing an Upgrade Processor

The following discussion applies only to 169-pin processors, such as the 486DX, 486DX2, 486DX4, 486SX, 487SX, AM486, SL Enhanced S Series, P23T, or P24. Upgrade Processor installation is easy because a ZIF (zero insertion force) socket is used.

Step	Action
1	Lift the lever on the ZIF socket. The empty Upgrade Processor socket looks like this. 
2	Pin 1 of the socket has a white diagonal line across one corner on the motherboard, which corresponds to pin 1 of the Upgrade Processor. Check for bent pins on the Upgrade Processor chip. Gently straighten any bent pins with pliers. Place the Upgrade Processor squarely in the middle of the socket, *making sure that one row of socket pins shows on all four sides.* Make sure that pin 1 of the Upgrade Processor is aligned with pin 1 of the socket.
3	The Upgrade Processor socket is a 240-pin socket. But the 486DX, 486DX2, 486DX3, 486SX, 80487SX, P24, and P23T come in 169-pin packages. *When these processors are installed, an extra row of socket pins should show on all four sides of the socket,* as shown below. 

Step	Action
4	Complete installation by lifting the ZIF lever to the other side of the socket, as shown below. 

Installing a P24T or P24CT

The P24T and P24CT upgrade processors are 240-pin package that uses all socket pins. Use the same procedure describe above to install a P24T or P24CT. However, when properly installed, these CPUs use all 240 pins, so no extra socket pins can be seen.

Step 5 Install the Motherboard

The motherboard mounting hole pattern is the same as the mounting hole pattern on the standard Western Digital LPX motherboard. Standoffs and mounting screws are not supplied with the motherboard. The chassis manufacturer should supply these parts.

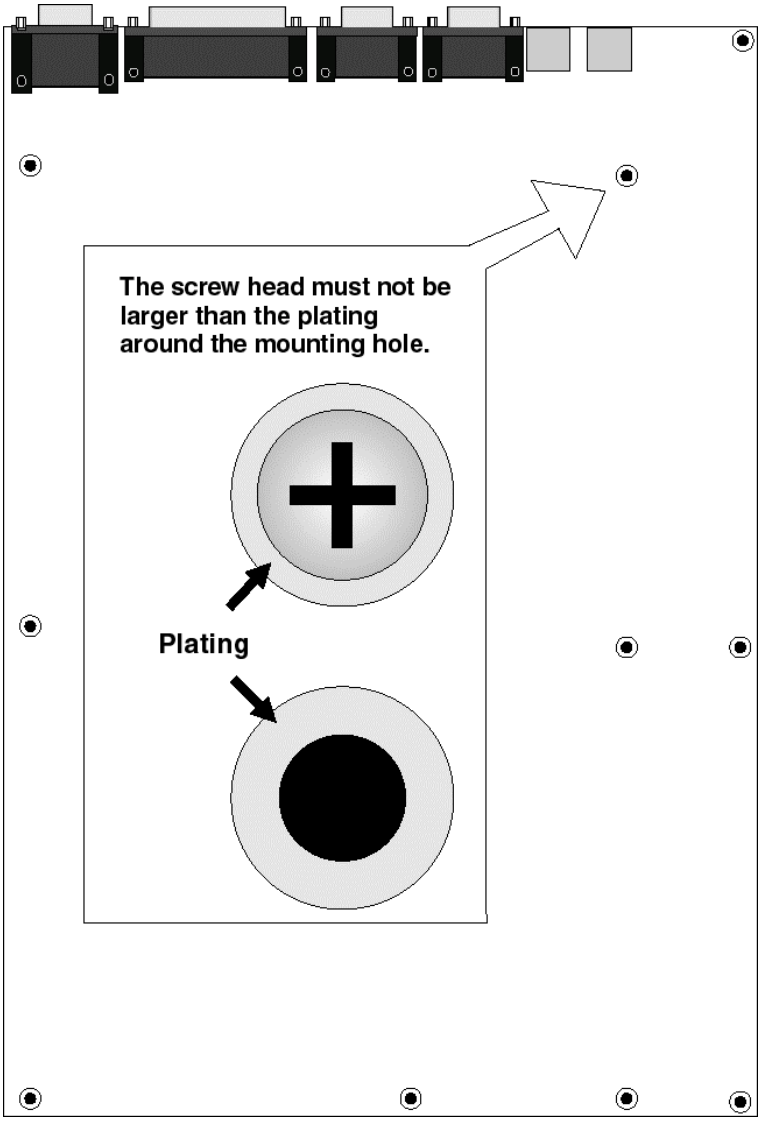
Step	Action
1	Place the chassis on an anti-static mat. Connect the chassis to ground to avoid static damage during installation. Connect an alligator clip with a wire lead to any unpainted part of the chassis. Ground the other end of the lead at the same point as the mat and the wristband.
2	Rotate the 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.
3	Hold the motherboard, component-side up, with the edge with the SIMM sockets toward you and the edge with the power supply connector away from you. The keyboard, mouse, and video connectors should be to the left.
4	Carefully slide the motherboard into the chassis. Make certain that the edge connectors fit the ports in the rear of the chassis. The motherboard should rest level with the chassis.
5	Place the 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. Refer to the graphic on page 16.

Warning

If using metallic screws, make sure that you use them only in the plated mounting holes.

If using metallic screws, make sure that the head of the screw fits completely inside the plated mounting holes.

See the graphic on the following page.



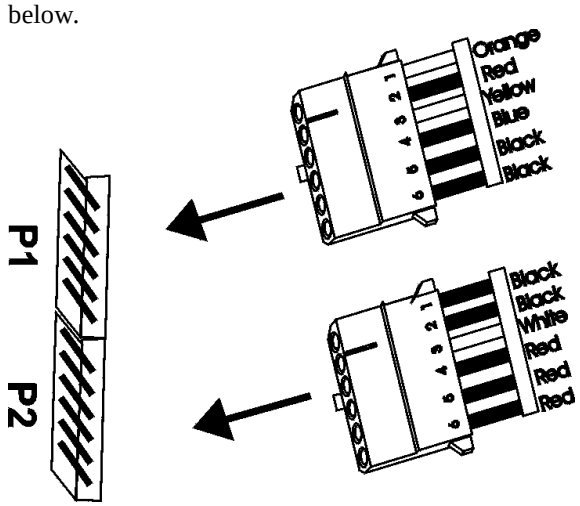
Step 6 Connect the Power Supply

The power supply should match the physical configuration of the chassis. Make sure that the power switch is Off before assembly.

Before attaching all components, make sure that the proper voltage has been selected. Power supplies often can run on a wide range of voltages and must be set (usually via a switch) to the proper range. Use at least a 200 watt power supply, which should have built-in filters to suppress radiated emissions.

Connect to P1 and P2

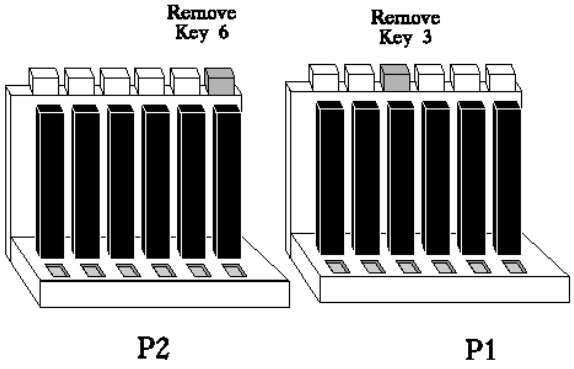
Attach the power supply cables to P1 and P2 on the motherboard. AT-compatible power supplies have two 6-pin connectors. The 6-pin connector with 3 red wires and 2 black wires is connected to P2 and the remaining 6-pin connector is connected to P1, as shown below.



Power Supply Connectors

Power Supply Connectors are Keyed

The power connectors are keyed to prevent incorrect installation. The keys on the connector must be cut to fit on some power supplies, as shown below.



P1 Pinout

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

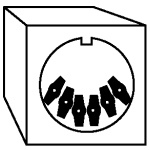
P2 Pinout

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

Step 7 Connect the Keyboard Cable

The keyboard attaches via a standard 6-pin miniDIN keyboard connector. Adjacent to the keyboard connector is a 6-pin miniDIN connector for a PS/2-type mouse.

The keyboard connector is a 6-pin miniDIN socket labeled KEYBRD and J8 on the motherboard. The keyboard connector position is shown on pagee 16. Use a standard PS/2 keyboard interface or use a keyboard connector convertor to attach an AT-compatible keyboard.



Pin	Assignments
1	Keyboard data
2	N/C
3	Ground
4	Vcc
5	Keyboard clock
6	N/C

Step 8 Connect the Mouse Cable

Attach a PS/2-type mouse to the 6-pin miniDIN mouse connector (J13). You can use a standard PS/2-compatible mouse or use a cable converter to attach another type of mouse to the PS/2 mouse miniDIN connector. The J13 Mouse connector pinout is:

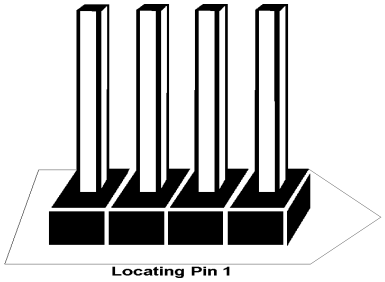
Pin	Assignments
1	Mouse data
2	N/C
3	Ground
4	Vcc
5	Mouse clock
6	N/C

Step 9 Connect Cables

When connecting chassis connectors to the motherboard, make sure to connect the correct connector 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.

All motherboard components are outlined by a white rectangular box with a broad arrow at one end. Pin 1 is always at the arrow end of the white outlined box, as shown in the following drawing.



The following cables should be connected to the motherboard:

- Password LED cable to J15,
- Green PC power switch to J1,
- Reset Switch cable to J41,
- Speaker cable to J38,
- Keyboard Lock Power LED cable to J35,
- Turbo LED cable to J34,
- External Battery connector to J6,
- Turbo Switch cable to J43, and
- IDE LED Activity Indicator LED cable to J21.

J15 Password LED Connector

J15 a two-pin berg that can be attached via a cable to an LED that flashes when the end user presses <Ctrl> <Alt> <Backspace> to lock the keyboard and mouse and Pins 2-3 of J14 are shorted.

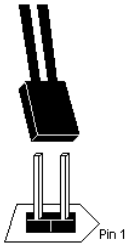
If a Password LED is not mounted on the computer case, another LED, such as the Power LED, can be made to flash if Pins 1-2 of J14 are shorted.

J1 Green PC Power

J1 is a two-pin berg that attaches to the Green PC power switch. This switch can be used to turn power off during Green PC mode. The + on Pin 2 denotes the positive connector.

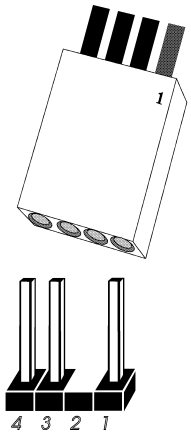
J41 Reset Switch Connector

J41 is a two-pin single-inline berg that is attached via a cable to an externally-mounted reset switch. When the reset switch is pressed, the system performs a hard reset. Pin 1 is ground and Pin 2 is Hard Reset.



J38 Speaker Connector

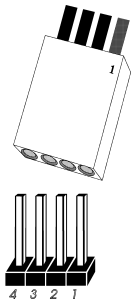
J38 is a four-pin single-inline berg that is attached via a cable to the system speaker. AMIBIOS signals hardware problems through the speaker. Pin 1 on the motherboard is identified by the arrow on the white box around the berg.



Pin	Description
1	Data Out
2	Key
3	N/C
4	VCC

J35 Keyboard Lock Power LED Connector

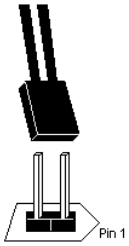
J35 is a four pin single-inline berg that is attached via a cable to the keyboard lock connector (or separate keyboard lock and Power LED connectors). The computer chassis may not include the keyboard lock and Power LED on a single connector. The keyboard lock allows the user to lock the keyboard, protecting the system from unauthorized use. Pin 1 on the motherboard is identified by the arrow on the white box around the berg.



Pin	Description
1	LED power
2	Ground
3	Keyboard lock
4	Ground

J34 Turbo LED

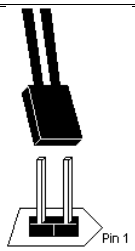
J34 is a two-pin berg that is attached via a cable to the externally-mounted bipolar Turbo LED. The LED lights when the motherboard is running at high speed.



J21 IDE Activity Indicator LED

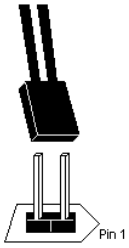
J21 is a two-pin berg that is attached via a cable to the externally-mounted IDE Activity LED. This LED lights when the IDE drive is running.

> ***Warning***
>
> In some IDE drives, you may have to disable the IDE LED mounted on the drive by changing a jumper or setting a switch on the IDE drive itself, before the IDE drive sends a signal to J21.



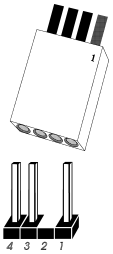
J43 Turbo Switch Connector

J43 is a two-pin single-inline berg that is attached via a cable to the externally-mounted bipolar Turbo switch on the chassis. The turbo switch allows the user to change the motherboard clock speed between high and low speeds.



J6 External Battery Connector

There is a built-in rechargeable battery on the motherboard. An external battery is not necessary, but can be used. Connect the external battery to J6 via a four-wire cable. If you attach an external battery to J6, the battery on the motherboard is automatically electrically isolated. J6 is a four-pin berg that connects to a 3.6 volt external battery. The positive (+) terminal (the red wire) connects to J6 Pin 1. The J6 pinout and connector are shown below.



Pin	Description
1	VBat (red wire)
2	KEY pin
3	Ground
4	Ground (Black wire)

Onboard Adapters

The Super Voyager LPX motherboard has:

- two serial ports (J23 and J28),
- a parallel port (J40),
- a VGA connector (VGA on the VL-Bus local bus) (J45),
- a VGA Feature Connector (J44),
- an IDE controller on the VL-bus local bus (J4), and
- a floppy controller (J2).

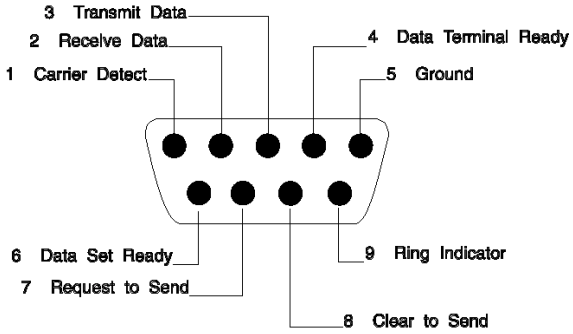
The serial and parallel port connectors are described below. The IDE connector is described on page 59. The floppy connector is described on page 57.

Checking for Conflicts

AMIBIOS is designed to minimize conflicts between onboard and offboard I/O. AMIBIOS automatically checks the adapter cards installed in the expansion slots on the Super Voyager LPX motherboard for a hard disk or floppy controller and serial or parallel ports.

J28 Serial Port 1 (COM1) and J23 Serial Port 2 (COM2)

J28 and J23 are 9-pin DB9 male connectors that provide an AT-compatible serial port interface. The DB9 connector pin placement is shown below.

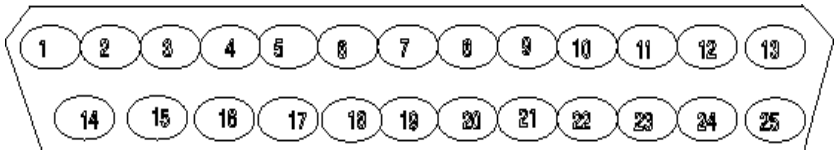


The DB9 serial port pinout is shown below.

Pin	Signal Description
1	Carrier Detect
2	Receive Data
3	Transmit Data
4	Data Terminal Ready
5	Ground
6	Data Set Ready
7	Request to Send
8	Clear to Send
9	Ring Indicator

J40 Parallel Port

J40 is a DB25 female connector. The J40 pin placement is shown below.

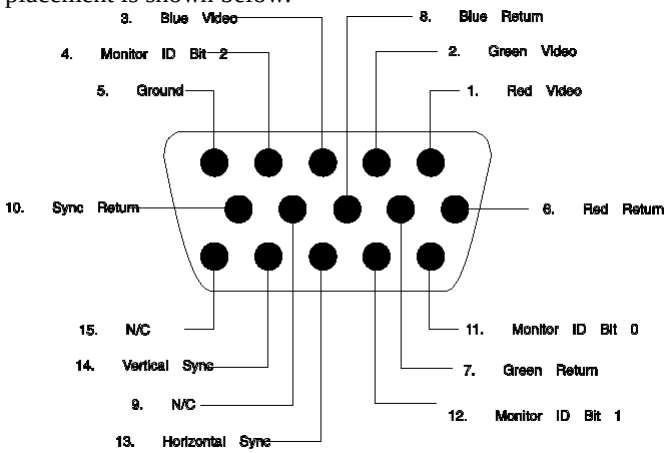


The J40 pinout is shown below.

Pin	Signal Description
1	STROBE#
2	PD0
3	PD1
4	PD2
5	PD3
6	PD4
7	PD5
8	PD6
9	PD7
10	ACK#
11	BUSY
12	PE
13	SLCT
14	AUTOFD#
15	ERROR#
16	INIT#
17	SLCTIN#
18	Ground
19	Ground
20	Ground
21	Ground
22	Ground
23	Ground
24	Ground
25	Ground

J45 VGA Connector

J45 is a standard 15-pin DB15 VGA connector. The J45 pin placement is shown below.



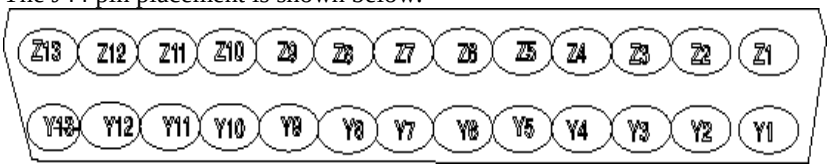
The J45 pinout follows.

Pin	Signal Description
1	Red Video Signal
2	Green Video Signal
3	Blue Video Signal
4	Monitor ID Bit 2
5	Ground
6	Red return
7	Green Return
8	Blue Return
9	N/C
10	Sync Return
11	Monitor ID Bit 0
12	Monitor ID Bit 1
13	Horizontal Sync
14	Vertical Sync
15	N/C

J44 VGA Feature Connector

J44 is a VGA Feature connector or a pass-through connector. J44 is a 26-pin dual-inline berg mounted on the motherboard. The pass-through feature permits an 8514-compatible graphics coprocessor adapter card to use the built-in VGA DAC (Digital to Analog Converter) and VGA connector on the motherboard. When an 8514-compatible graphics coprocessor card wants to drive the onboard VGA, it activates the ESYNC# and ENVIDE0# signals to the motherboard. The onboard VGA disables its VGA output buffers. Video data from the 8514-compatible graphics coprocessor can then drive the DAC.

The J44 pin placement is shown below.



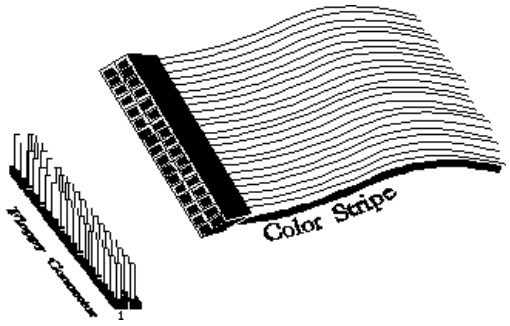
The J44 pinout is:

Pin	Signal Description	Pin	Signal Description
Y1	Pixel Data 0	Z1	Ground
Y2	Pixel Data 1	Z2	Ground
Y3	Pixel Data 2	Z3	Ground
Y4	Pixel Data 3	Z4	ENVIDE0#
Y5	Pixel Data 4	Z5	ENABLE SYNC
Y6	Pixel Data 5	Z6	External Pixel Clock
Y7	Pixel Data 6	Z7	N/C
Y8	Pixel Data 7	Z8	Ground
Y9	Pixel Clock	Z9	Ground
Y10	Blanking	Z10	Ground
Y11	Horizontal Synch	Z11	Ground
Y12	Vertical Sync	Z12	N/C
Y13	Ground	Z13	KEY PIN

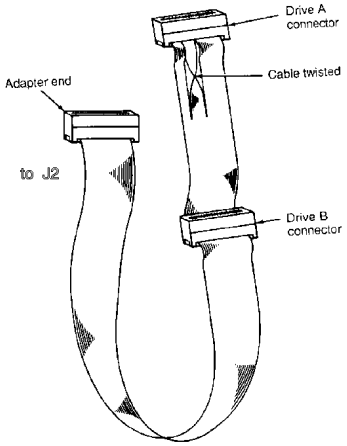
Step 11 Install Floppy Drive

J2 Floppy Disk Drive Connector

J2 is a 34-pin dual-inline berg. Connect the cable from the floppy drive to J2, as shown below. The onboard floppy controller cannot be used if a hard disk adapter card with floppy controller is installed.



The motherboard supports up to two 720 KB, 1.44 MB, or 2.88 MB 3½" drives and 360 KB and 1.2 MB 5¼" drives. The connecting cable is a 34-pin ribbon connector with two 34-pin edge connectors for attaching the floppy disk drives. There is a small twist in the cable between the floppy connectors. The last (end) connector should be connected to floppy drive A: as shown below.



J2 Floppy Connector Pinout

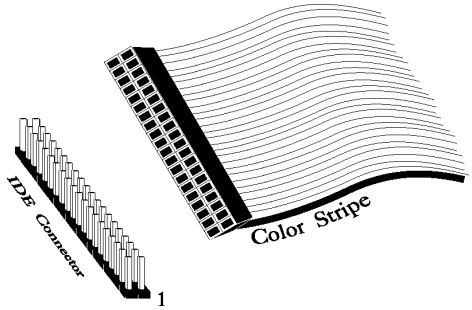
Pin	Use	Pin	Use
1	GND	2	DENSE1
3	GND	4	N/C
5	GND	6	DRATE0
7	GND	8	-INDEX
9	GND	10	-MOTOR0
11	GND	12	-FDSEL1
13	GND	14	-FDSEL0
15	GND	16	-MOTOR1
17	GND	18	DIR
19	GND	20	-STEP
21	GND	22	-WDATA
23	GND	24	-WGATE
25	GND	26	-TRK0
27	GND	28	-WRPROT
29	GND	30	-RDATA
31	GND	32	HDSEL
33	GND	34	DSKCHNG

Twist in Floppy Cable

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

Attach IDE Cable to J4

J4 is a 40-pin dual-inline berg that connects an IDE hard disk drive to the onboard IDE Controller. Attach the 40-wire IDE ribbon cable to J4 as shown below.



When you use the onboard IDE controller in conjunction with another hard drive controller, you must make sure that there are no conflicts in IRQ and I/O port addresses. The onboard IDE uses IRQ14 and I/O port addresses 01F0h – 01F7h. If there is a conflict, the IDE interface can be disabled via Peripheral Setup (see page 164). The J4 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	N/C
21	N/C	22	GND
23	-IOW	24	GND
25	-IOR	26	GND
27	IOCHRDY	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

Review the following points before powering up:

- make sure that all adapter cards are seated properly,
- make sure all connectors are properly installed,
- if the upgrade processor 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. Call Technical Support if there are problems.

BIOS Errors

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

If POST does not run successfully, it will beep or display error messages. Beeps indicate a serious problem with the system configuration or hardware. The Beep Code (see page 139) indicates the problem. Make sure the affected part is properly seated and connected. An error message is displayed if the error is less serious. Recheck the system configuration or the connections.

Configure the System

Run WinBIOS Setup. You must enter the requested information and save the configuration data in CMOS RAM. The system will then reset, run POST, and boot the operating system. See page 148 for information on configuring the system via Standard Setup.

Super Voyager LPX ISA Motherboard User's Guide

3 VGA Drivers

VGA Drivers

VGA Utility Software

The following VGA utility programs are supplied:

CLMode configures driver options.

SetRES modifies the screen resolution and the number of colors in Windows.

Using CLMode

CLMode sets the monitor type and video modes. Perform the following steps to run CLMode:

Step	Action
1	Change directories to the directory that has CLMODE.EXE. Type CLMODE and press <Enter>.
2	The main window has a number of buttons. Each button represents a different option or menu. The underlined letter of a button name specifies the hot key combination for that item. For example, press the <Alt> and the underlined letter keys simultaneously or just the underlined letter key to select an option.
3	Select the *Monitor Type* button to choose proper monitor type to allow the VGA drivers to display the highest quality output on the attached monitor. The monitor type determines the available video modes and the vertical refresh rates. Generally, the higher the refresh rate, the better the screen looks. The current monitor type is displayed. Press the arrow keys to select a new monitor type if desired. Choose *Advanced monitor type* to customize the monitor timings for your monitor. Next, choose the *Set Advanced* button. Select the desired refresh rate for each screen resolution displayed on the screen. See the user manual for your monitor for the correct information. Choose the *Verify* button to view the new video timings to make sure they are correct. Press <Enter> after each verification screen. Press <Esc> if the display is bad and reenter a different monitor type or new video timings using slower settings. Choose the *OK* button when finished. Next, choose the *Save* button when finished. You can always choose the Help button to display additional information about monitor types or you can choose *Cancel* to discard the current choice and start over again. The monitor type should be saved permanently by your computer. If is not, select the option to have CLMode save the monitor type in AUTOEXEC.BAT.
4	Select the *Video Modes Preview* button next to display all supported video modes for the selected monitor type. Press the *Preview* button to display test screens that demonstrate what each video mode will look like on your monitor. Press <Enter> between each test screen.

Step	Action
	You can center the screen display on the monitor by pressing the →, ←, ↑, and ↓ keys while in Preview mode. If the screen does not move when you press an arrow key, the screen is already at the limit in that direction. When exiting CLMode, you can save these centering parameters to CENTER.COM. The video modes that have been adjusted are saved to CENTER.COM and become the active video modes when CENTER.COM is executed. You can then load CENTER.COM from the DOS prompt or you can include it in AUTOEXEC.BAT so the centering commands are executed every time the computer boots. You cannot perform centering if CENTER.COM is loaded. To unload CENTER.COM and delete all centering adjustments, change the monitor type when rerunning CLMode. You can store centering adjustments for up to 16 video modes at a time. Repeat the procedure described above to save new centering adjustments for a new monitor type. You can also press <PgUp> and <PgDn> to adjust SYNC POLARITY in Preview mode while centering is active. Press <Esc> when you are finished previewing video modes.
5	Displaying the current VGA controller status The information in the main CLMode window displays the VGA controller type, the BIOS version number and the amount of video memory present.
6	Press <Alt> <F4> to exit CLMode at any time or select the *Exit* button. The current video mode, monitor type, and VGA refresh rate is displayed when CLMode quits.

CLMode Command Line Options

Menu-drive windows are not displayed when CLMODE is called from the DOS prompt. The monitor type, video mode, and refresh rate must be set at the DOS prompt. The command line options are:

CLMode *modenum m (monitor type) s*

where:

modenum can be any valid video mode number.

m is the monitor type. See the following table:

Type	Examples	Resolutions	Horizontal Frequency (KHz)	Vertical Frequency (Hz)
0	IBM 8512, 8513, 8503	640 x 480	31.5	60
1	IBM 8514 IBM 8515	640 x 480 1024 x 768	31.5 35.5	60 or 70 43.5 interlaced
2	NEC 2A	640 x 480 800 x 600	31.5 35.2	60 or 70 Hz 56 Hz
3	NEC II	640 x 480 800 x 600 1024 x 768	31.5 35.2 35.5	60 or 70 56 43.5 interlaced
4	NEC 3D	640 x 480 800 x 600 1024 x 768	31.5 37.8 37.8	60 or 70 60 43.5 interlaced
5	Sony CPD-1304 NEC 3FGx Nanao 9065S Nanao 9070U	640 x 480 800 x 600 1024 x 768 1280 x 1024	31.5 48.0 48.0 48.0	60 or 70 72 60 43.5 interlaced
6	NEC 4D NEC 4FG Nanao T240i	640 x 480 800 x 600 1024 x 768 1280 x 1024	31.5 48.0 56.0 48.0	60 or 70 72 70 43.5 interlaced
7	NEC 5D NEC 5FG NEC 6FG Nanao T550i Nanao T560i Nanao T660i Nanao F550i Nanao F750i	640 x 480 800 x 600 1024 x 768 1280 x 1024	31.5 48.0 58.3 48.0	60 or 70 72 43.5 interlaced

s list status information

CLMode Command Line Example

To select mode 3 with high VGA refresh for a Super VGA monitor, type the following command at the DOS prompt:

```
CLMode 3+ m2+<Enter>
```

Type an invalid option to display command line help.

Type *S* as a command line option to display the current CLMode settings.

Using SetRES

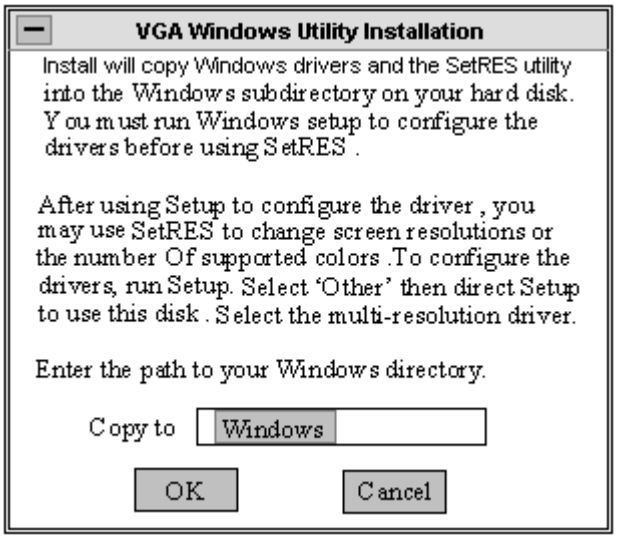
SetRES is a Windows 3.1 utility that changes the screen resolution, number of screen colors, font size, and system resources. After new options have been selected, you can:

- restart Microsoft Windows to use the new screen resolution immediately, or
- use the current screen resolution for now. The new resolution takes effect when Microsoft Windows is started again.

Installing SetRES

SetRES assumes that the Super Voyager LPX Windows video drivers are correctly configured.

Installation

Step	Action
1	Start Windows and insert the Super Voyager LPX Windows video driver diskette in drive A: (or B:).
2	Choose *Run* from the File menu in the Program Manager. Type A:\INSTALL (or B:\INSTALL if using the B: drive) and press <Enter>. Specify the WINDOWS directory when prompted for a directory. The following screen appears: 
3	Copy the files to the Windows directory as prompted. From Windows Setup, select the Multi-Resolution entry, which correctly configures the driver for Windows 386 enhanced mode operation and copies the necessary font files to the system hard disk.
4	Select the SetRES icon to run SetRES. Use SetRES to specify the correct colors and screen resolutions. You can find out which screen resolutions and colors are supported by running CLMode (see page 62).

Installing Windows VGA Display Drivers

Before Upgrading the Drivers

From the C: DOS prompt, type

```
CD \WINDOWS
```

and press <Enter>. The type

```
SETUP
```

to run the Windows Setup program. Press the arrow keys to highlight the Display field and select *VGA* or *Super VGA.* Follow the screen instructions to install one of these drivers.

Although not absolutely necessary, you can use a text editor to examine all OEM*n*.INF files in the WINDOWS directory. You are looking for the old version of the Cirrus Logic VGA drivers, if loaded. You can delete all references to these drivers to make sure that you will not have different versions of the same Windows video drivers.

Some Video Drivers May Be Unavailable

Not all video modes are available on all systems. If an extended mode driver is installed for a video mode that is not available, the application program does not function properly. There are many parameters that determine the list of available video modes: the monitor type, the amount of installed memory, and the VGA controller.

Run CLMode to determine the available video modes before beginning the driver installation.

Installing Windows 3.1 VGA Drivers

Step	Action
1	Make sure that Windows 3.1 is already installed. From the DOS prompt and the Windows directory, type SETUP and press <Enter> to run the Windows SETUP.EXE program. Follow the screen instructions.
2	Choose *Display* and press <Enter>.
3	From the next menu listing of display options, scroll to the bottom of the list, and highlight: Other (Requires disk provided by a hardware manufacturer) Press <Enter>, and when prompted, insert the Super Voyager LPX Windows video driver diskette in drive A:, type A:\ and press <Enter>.
4	A list of drivers and resolutions such as the following appears: Cirrus 5428 v1.41, 1280x1024x16 Cirrus 5428 v1.41, 1024x768x16 Cirrus 5428 v1.41, 640x480x16 Cirrus 5428 v1.41, 640x480x256 Cirrus 5428 v1.41, 640x480x64K Cirrus 5428 v1.41, 800x600x16 Cirrus 5428 v1.41, 800x600x256 Highlight the display driver you want to use and press <Enter>.
5	Continue with the configuration process.

Installing Windows Drivers from within Windows

Step	Action
1	Make sure that Windows 3.1 is already installed and start Windows.
2	From the Main window of the Program Manager, run Windows 3.1 Setup.
3	Select **Change Systems Settings...** from the Setup Options menu.
4	Scroll to the end of the display drivers list and select **Other display (Requires disk from OEM)....**
5	Insert the Super Voyager LPX Windows video driver diskette in drive A:. Type A:\ and press <Enter>, then click on OK.
6	The available drivers and resolutions are displayed: Cirrus 5428 v1.41, 1280x1024x16 Cirrus 5428 v1.41, 1024x768x16 Cirrus 5428 v1.41, 640x480x16 Cirrus 5428 v1.41, 640x480x256 Cirrus 5428 v1.41, 640x480x64K Cirrus 5428 v1.41, 800x600x16 Cirrus 5428 v1.41, 800x600x256 Select the display driver you want to use and click on *OK*.
7	Continue with the configuration procedure. The changes do not take effect until Windows is restarted.

Installing the Windows NT Video Drivers

Step	Action
1	Start Windows NT.
2	Run the *Windows NT Setup* program from the Main window of the Program Manager.
3	Select *Change System Settings* from the Windows NT Setup program Options menu.
4	Click on ↓ to the right of the Display line. Scroll to the end of the display drivers and select *Other display (requires disk from manufacturer).*
5	Insert the Super Voyager LPX Windows NT video driver diskette in drive A:, type A:\ as the pathname and press <Enter>. Clock on *OK*.
6	A list of video drivers such as the following appears: GD5428 v1.41 640x480, 16 colors 60 Hz/72 Hz GD5428 v1.41 640x480, 256 colors 60 Hz/72 Hz GD5428 v1.41 800x600, 16 colors 56 Hz/60 Hz/72 Hz GD5428 v1.41 800x600, 256 colors 60 Hz/70 Hz/72 Hz GD5428 v1.41 1024x768, 16 colors 60 Hz/70 Hz/72 Hz GD5428 v1.41 1024x768, 16 colors Interlaced GD5428 v1.41 1024x768, 256 colors 60 Hz/70 Hz/72 Hz GD5428 v1.41 1024x768, 256 colors Interlaced GD5428 v1.41 1280x1024, 16 colors Interlaced Choose the desired screen resolution by pointing with the mouse and click the left mouse button on *OK*. Repeat this step to choose additional screen resolutions. Click on *Close* next. *The Windows NT video drivers only support video adapters with at least 1 MB of DRAM.*
7	Continue the Windows NT Setup process.

Installing ADI VGA Drivers

The Super Voyager LPX ADI (Autodesk Device Interface) driver is the TurboDLD*Classic* display list driver. It can:

- speed AutoCAD redraws, pans, and zooms, and
- provides a more productive user-friendly interface.

This driver is resident in memory. It inserts itself between AutoCAD and the graphics adapter card. This driver runs with AutoShade 2 with RenderMan and 3D Studio but does not improve the speed of these programs.

Installing the TurboDLD*Classic* driver does not modify AutoCAD program or drawing files.

Improving AutoCAD Performance

TurboDLD*Classic* speeds AutoCAD by:

- Translating the normal AutoCAD hierarchical file structure to a Display List (a series of vectors or polygon fills). When you pan or zoom, TurboDLD*Classic* uses the Display List, then write the resulting vectors to the video adapter card.

- Maintaining a drawing cache, a compressed list that contains the current contents of a viewport. This prescaled part of the Display List allows even faster pans, zooms, and redraws.

- TurboDLD*Classic* provides many new user features such as the bird's eye view.

You can pan and zoom up to 12 time faster. You can redraw up to 25 times faster.

TurboDLD*Classic* Features

- bird's eye view,
- accelerated redraws, pans, and zooms,
- no new commands or special menus,
- the protected mode driver is completely compatible with AutoCAD Release 12, Release 11/386, 3D Studio, and AutoShade with RenderMan,
- there are no memory conflicts, it works with the AutoCAD built-in Virtual Memory Manager,
- includes CustomColors™, which lets you interactively customize logical and physical colors from within AutoCAD,
- is completely compatible with all Autodesk ADI 4.2-compatible third-party software, and
- supports all AutoCAD Release 12 features, including rendering to viewports and 31-Bit regen space.

TurboDLD*Classic* requires an Intel 386, 486, or Pentium-based PC that supports AutoCAD Release 12, 11/386, AutoShade 2 with RenderMan, or 3D Studio V1.x/2.x. Additional extended memory is recommended for optimal performance.

Quickstart

This is a summary of the basics for installing and using TurboDLD*Classic*.

The primary TurboDLD*Classic* function is to speed AutoCAD pans, zooms and redraws. It does this by creating and maintaining a Display List (a fast-displaying object list of the current drawing).

TurboDLD*Classic* also provides a bird's-eye view to allow easy movement in large drawings.

The only resource used by TurboDLD*Classic* is memory. The driver actively uses about 300 KB of extended memory. This memory is drawn from the AutoCAD memory pool and does not affect normal DOS operation. TurboDLD*Classic* is loaded by AutoCAD at AutoCAD load time and is unloaded when AutoCAD is exited.

The Display List size can vary from one tenth to three times the size of the current drawing file, particularly when using the AutoCAD 12 31-bit regen space. You may wish to purchase and install additional RAM before installing TurboDLD*Classic,* since it shares memory with AutoCAD. If there is significant hard disk activity while you are using TurboDLD*Classic,* add more memory.

TurboDLD*Classic* Installation

Insert the Super Voyager LPX video driver diskette in drive A: (or B:). Type

```
A:\INSTALL
```

choose the option for the Autodesk AutoCAD drivers and specify the drive and directory where you want them copied to (such as C:\ACAD\DRV). Since startup is different for AutoCAD Release 12 than for older versions, please follow the instructions for the version of AutoCAD you use.

Configuring AutoCAD Release 12

Step	Action
1	Begin AutoCAD with the reconfigure switch on. Type ACAD -R and press <Enter>.
2	Choose *option 3, Configure Video Display* from the AutoCAD configuration menu.
3	Type *Y* after *Do you want to select...* appears to display the available AutoCAD video options.
4	Select *TurboDLD Classic by Panacea Inc.* If you install TurboDLD*Classic* in a subdirectory other than ACAD\DRV, modify the ACADDRV environment variable to include that subdirectory. Otherwise, the TurboDLD*Classic* selection will not appear in the list of available drivers.

Configuring AutoCAD 11/386

Step	Action
1	Type C:*directory*\FASTACAD and press <Enter>.
2	Start AutoCAD and reconfigure it to use TurboDLD*Classic* by selecting *option 5, Configure AutoCAD* from the AutoCAD main menu.
3	From the next menu, select *option 3, Configure Video Display*. Choose *Item 1, P386 ADI 4.0/4.1 (R11)* as the display device. See the *AutoCAD Installation and Performance Guide* for additional information.

Configuring TurboDLD*Classic*

The TurboDLD*Classic* driver configuration menu appears after selecting the proper display device. You must configure the TurboDLD*Classic* operating parameters. These parameters have been logically grouped into menus based on their interaction with AutoCAD. Complete all menu options to configure TurboDLD*Classic*. Type ? to display a Help screen (the DLDSETUP.HLP file must be present). If an error message appears, make sure that DLDSETUP.HLP is in ACAD\DRV if using AutoCAD release 12, or in TURBODLD if using AutoCAD release 11.

You can press <Esc> to return to the previous menu. Select *NO SAVE, EXIT* from the main configuration menu to return to the AutoCAD configuration menu without making any changes. You must at least choose the graphics adapter card and screen resolution must be chosen from the Select Graphics card and Resolution menu. If no display options are configured, the driver is configured for Generic VGA, 640 x 480 resolution at 16 colors.

The Select Graphics card and Resolution menu configures the graphics adapter card and display and rendering resolutions. Firs run CLMode to find out the amount of memory available on the VGA adapter card.

INSTALL Menus	Description
Select Graphics card	chooses the graphics chip being used.
Select Display Resolution	chooses the AutoCAD, 3D Studio and AutoShade main display screen resolutions.
Select Rendering Resolution	chooses the AutoCAD 12, 3D Studio and AutoShade rendering resolutions.

When configuring TurboDLD*Classic* display options, the menu options described below automatically appear only when configuring AVE Render, 3D Studio or AutoShade. Otherwise, the Display Board and Resolution options are the only menu choices.

Configuring TurboDLD*Classic*, cont'd

Basic Configuration Menu

Menu Option	Description
AutoCAD Text Lines	Selects the number of lines in AutoCAD command prompt area. The default is three. Valid values are 1 to 10. More than three is useful if using this driver in a high resolution mode with small fonts. To eliminate text lines on the screen bottom, disable the command area in AutoCAD. See the *AutoCAD Interface, Installation and Performance Guide* for additional information. Press <Enter> to continue.
Font Size	Selects the AutoCAD display screen font or font file. Choose the Font Size, either 8x8, 8x14, 8x16, 12x20, or 12x24. For resolutions higher than 800x600, use 12x20 or 12x24. The default is 8x14.
Dual Screen Mode	Enables AutoCAD dual screen operation.

User Interface

Option	Description
Double Click	Sets the delay for the Big Picture pop-up. This is the maximum length of time between two button presses to display the Big Picture. Use a value between 10 and 30 (hundredths of a second). Enter multiples of 5.
BP Button	Sets the mouse and digitizer button for the Big Picture. You can specify that a double click on a digitizer or mouse button calls a Big Picture. On the BP Button menu line, enter the number of any digitizer button other than button 1, which is the pick button. Within AutoCAD, double click on the button to display the Big Picture.
BP Highlight Mode	Controls the size of the Big Picture. The Patt Line displays the Big Picture using dotted lines to form the outer bounding box and the zoom crosshairs. XOR Rect uses a contrasting rectangle to display the Big Picture. The Both option uses a combination of the Patt Line and XOR Rect for the Big Picture.
BP Refresh	In the fastest mode, TurboDLD*Classic* does not refresh the Big Picture until a DLDREFRESH command is issued. Depending on drawing complexity, the Big Picture could become confusing, displaying vectors that are now actually erased, and no longer part of the drawing in this mode. To allow the Big Picture to be updated as objects are drawn or erased, enable BP Refresh. Disable to improve speed.
BP Cache	Enables TurboDLD*Classic* cache memory. This cache speeds Big Picture operations on TIGA-based graphics adapter cards. BP Cache is normally disabled. The performance is only about 1% with VGA adapter cards but as much as 400% with TIGA-based graphics cards.

Configuring TurboDLD*Classic*, cont'd

Expert Configuration Menu

This menu customizes of the driver or adjusts for memory constraints.

Menu Item	Description
Display List	Enables the display list feature. This option should always be enabled. Disabling it causes TurboDLD*Classic* to run as an ordinary non-display list driver.
Drawing Cache	Enables the drawing cache, a compressed list of the current viewport, which speeds pans zooms and redraws. The Drawing Cache should normally be enabled. Disable it if not enough memory is available. Disabling drawing cache frees memory for AutoCAD but may not have effect zooms and pans.
AutoCAD Logical Drawing Space	Configures TurboDLD*Classic* for AutoCAD R12 31-Bit logical drawing space when set to *Yes*. Select *No* to use a 15-Bit drawing space. The 31-Bit logical space allows you to extend the Regenless zooming ability by a factor of several million while using more memory. Additional memory is used by AutoCAD for drawing space and by the driver for the Display List. 31-Bit zooming and panning is 10% to 20% slower than for 15-Bit logical space. *Use AutoCAD 31-Bit Space* is ignored for AutoCAD R11.
Internal Command Echo	Enable this option to display internal commands at the AutoCAD command line as they are executed.
Big Picture Zoom Mode	Sets the Big Picture (BP) zoom definition area display options. WHen using a zoomed view of the static BP, the image in the BP move in the bird's eye window as the current viewport is zoomed or panned, keeping the zoomed viewport area fixed in the center in Float mode. Freeze mode locks the current BP contents for a better frame of reference.
Regen Mode	Fast Regen stores the AutoCAD drawing until the Display List has been created and then display it. Incremental mode displays the drawing in chunks as the display list is created. Fast mode processes 5% to 10% faster than the incremental. Neither mode changes memory requirements.

Configuring TurboDLD*Classic*, cont'd

After all options have been set, scroll to the *Save and Exit* option and press <Enter> to continue.

Next, configure the AutoCAD screen display characteristics and type *Y* to accept the changes.

Exit to the AutoCAD drawing editor to begin using TurboDLD*Classic*. If reconfiguring AutoCAD and a drawing is loaded, exit the drawing and reload the drawing.

Configure the AutoCAD colors. From the AutoCAD Command Line, type DLDCOLOR and press <Enter> to start CustomColors, the color configuration utility. Make any desired color changes, save the new color palette, and exit to the drawing editor.

Verifying TurboDLD*Classic* Installation

Perform one of the following test to verify that TurboDLD*Classic* is running and installed correctly:

- If the AutoCAD side menu is enabled, look for the Panacea Logo in the lower righthand corner.
- If running AutoCAD with no side menu, type DLDVER and press <Enter> at the AutoCAD command prompt. This command should return the current version and serial number.

Reconfiguring TurboDLD*Classic* for AutoCAD R12

Step	Action
1	Type CONFIG and press <Enter> at the AutoCAD command prompt.
2	Select *option 3, Configure Video Display*.
3	Type No and press <Enter> at the *Select a new video driver ...* prompt to start the TurboDLD*Classic* configuration program.
4	Make the desired changes to the driver and choose *Save and Exit* to continue to the AutoCAD drawing editor.

Reconfiguring TurboDLD*Classic* for AutoCAD R11

Step	Action
1	To change a Release 11 configuration, select *option 5, Configure AutoCAD* from the AutoCAD main menu.
2	From the configuration menu, select *option 3, Configure Video Display*.
3	Type No at the *Select a new video driver ...* prompt to start the TurboDLD*Classic* configuration program.
4	Change the desired driver options. Choose *Save and Exit* to return to the AutoCAD configuration menu.
5	Open or begin a new drawing.

Reconfiguring the TurboDLD*Classic* Default Settings

To completely reconfigure TurboDLD*Classic* using the defaults, delete DLDSETUP.DAT from either the \ACAD\DRV subdirectory (R12) or the TURBODLD subdirectory (R11) and then follow the Driver Configuration instructions on page 74.

Configuring an AutoCAD R11 Environment

During the TurboDLD*Classic* installation process, FASTACAD.BAT is created in the \TURBODLD directory. FASTACAD.BAT sets four environment variables:

DLDCFG	used by TurboDLD*Classic* to find the configuration files,
DSPADI,	used by AutoCAD to find the driver file,
RCPADI,	used by 3D Studio to find the driver file,
RDPADI	used by AutoShade 2 with RenderMan to find the driver file.

FASTACAD.BAT must run before starting AutoCAD R11. It only must be run once per system boot. To automatically load the environment variables, add FASTACAD.BAT to AUTOEXEC.BAT or an AutoCAD startup batch file.

To add FASTACAD.BAT to AUTOEXEC.BAT, add

```
CALL D:\TURBODLD\FASTACAD
```

assuming that FASTACAD.BAT resides in D:\TURBODLD.

If

```
Out of Environment Space
```

appears when you run FASTACAD.BAT, enlarge the environment by adding

```
SHELL=C:\COMMAND.COM /P /E:768
```

to CONFIG.SYS. /E:768 specifies an environment size of 768 bytes. Change this number as appropriate. Reboot after modifying CONFIG.SYS for the changes to take effect.

Configuring AutoShade

To configure AutoShade v2.0 to use TurboDLD*Classic*, run FASTACAD.BAT to set the AutoShade environment variables. Type

```
SHADE /R
```

and press <Enter> to reconfigure AutoShade. Select the *P386 Autodesk Device Interface* display driver. Select the *P386 Autodesk Device Interface* rendering driver. If running the display and rendering screen on the same monitor, tell AutoShade. A single monitor requires a redraw of the display screen after a rendering screen.

Next, follow the same installation steps used to select the graphics adapter card and display and rendering resolutions for AutoCAD (see page 74).

Configuring 3D Studio Release 1.x, 2.x, and 3.x

Step	Action
1	First set the environment variables for 3D Studio by running PANA3DS.BAT. Next, change the following three lines to use the RCPADI rendering driver. Find the lines that begin RENDER-DISPLAY MAIN-DISPLAY MATERIAL-DISPLAY Change these lines to: RENDER-DISPLAY=RCPADI MAIN-DISPLAY=RCPADI MATERIAL-DISPLAY=RCPADI
2	Remove the ; and all spaces at the beginning of the line. Set RENDER-DISPLAY to RCPADI for high resolution. If you do not need a high resolution display or the materials editor, set MAIN-DISPLAY and MATERIAL-DISPLAY to the default values. There is no RENDER-DISPLAY line for 3D Studio 1.x. The lineDEFAULT-DISPLAY should be: DEFAULT-DISPLAY="RCPADI" The quotes around RCPADI must be included. MATERIAL-DISPLAY is only configured for RCPADI when both the Display and Rendering resolutions are 256 color. If unsure about the Materials Editor screen, use the Materials Editor as VGA. The Materials Editor does not provide additional colors.
3	Save the above changes and start 3D Studio to begin the last part of the configuration procedure. Type DEL 3DADI.CFG and press <Enter> to use 3D Studio reconfiguration mode. Start 3D Studio by typing 3DS and pressing <Enter>.
4	Several prompts appear during 3D Studio reconfiguration startup. After the first 3D Studio question is answered, the configuration program appears. Select a graphics card and display and rendering resolutions. Because RCPADI device drivers are combined display and rendering devices, the TurboDLD*Classic* configuration menu appears for Display and Rendering but you do not have to select display and rendering resolutions again.
5	Press <Enter> and highlight *Save and Exit*. If FASTACAD.BAT is called, the configuration menu appears for RDPADI and DSPADI devices if present.

Configuring 3D Studio v3.X

Step	Action
1	The TurboDLD*Classic* drivers run with 3D Studio release 3.X. Use the 3D Studio default RCPADI VIBRANT GRAPHIC DRIVER CONFIGURATION. Follow the Vibrant Graphics Configuration Program Setup Procedures in the *3D Studio 3.X Installation Manual for ADI 4.2 Drivers.*
2	Run PANA3DS.BAT to set the 3D Studio environment settings.
3	Run 3DS VIBCFG.
4	Specify RCPADI for each of the four categories (Main Display, Materials Display, Render Display, and Flic Playing) during Vibrant Graphics configuration. Click on OK when the Vibrant Graphic settings are complete. TurboDLD*Classic* driver configuration follows.
5	Follow the menus to Setup Display and Rendering Screen. Save and Exit to 3D Studio.
6	The video drivers supported in 3D Studio release 3.X are supplied and maintained by Autodesk. TurboDLD*Classic* only provides still rendering support for 3D Studio. TurboDLD*Classic* cannot play back rendered .FLI or .FLC files. This is a 3D Studio limitation. The Mapping Icon colors (usually yellow and green) are black when using an external ADI driver. 3D Studio also has problems with large fonts. Use the default font settings.

Configuring AVE Render

Step	Action
1	AutoCAD R12 AVE Render uses the TurboDLD*Classic* rendering feature to render objects and drawings. You must first configure AVE Render before running it. Select the AutoCAD render command and follow the screen directions.
2	Select a Rendering Display Device. Since TurboDLD*Classic* is a display and rendering device, choose *item 1, P386 ADI Combined Display/Rendering Driver*.
3	Configure the Rendering Graphics card and Resolution. The TurboDLD*Classic* configuration program appears. Press <Enter> to display the Rendering Configuration menu.
4	Choose *Select Graphics Board/Resolution* to display graphics card and resolution menu selections. First choose *Select Render Graphics card* to select the graphics card used for renderings. Next, choose *Select Render Resolution* to select the rendering resolution. Select *Return to Previous Menu*. Then select *Save and Exit.*
5	Select *Render Mode* and select the rendering mode for TurboDLD*Classic.* Select either *Render to Viewport* or *Render to Screen*. To render to a viewport, you must use a display resolution of at least 256 colors. Otherwise, AVE Render cannot render to viewport.
6	Select a Render Hard Copy Device. If using a render hard copy device, select the correct device type from the list. If not using a hard copy device, choose (NULL).
7	After configuring AVE Render, return to the drawing to render the current drawing. If AVE Render is already configured , type RCONFIG and press <Enter> at the AutoCAD command prompt to display the Render Configuration menu.
8	Select *option 2, Configure Rendering Device* to choose a new rendering driver. Type <Yes> at *Select Different Rendering Device*. Select *option 1, P386 Combined Display/Rendering Driver.*
9	Configure the rendering graphics card and resolution. The TurboDLD*Classic* configuration program appears. Press <Enter> to continue.
10	Choose *Select Graphics Board/Resolution* to display graphics card and resolution menu selections. First, choose Select *Render Graphics Board* to select the graphics card. Next, choose *Select Render Resolution* to select the rendering resolution. Select *Return to Previous Menu* and then *Save and Exit*.
11	Select the rendering mode for TurboDLD*Classic.* Select either *Render to Viewport* or *Render to Screen*. To render to a viewport you must be use a resolution with at least 256 colors. Select *Exit to the Drawing Editor* from the Render Configuration menu. Type *Y* to keep the changes. Press <F1> to change to the graphics screen if necessary.

Changing Colors

The CustomColors color configuration utility modifies all customizable AutoCAD colors while running AutoCAD. CustomColors simulates an AutoCAD screen. At the AutoCAD drawing editor command line, type

DLDCOLOR

and press <Enter> to edit the color configuration. The DLDCOLOR menu items are described below.

Item	Description
Object	Changes the color of any AutoCAD screen object. Select the object whose color you want to change by highlighting the object via the → and ← keys and pressing <Enter>. A short description of the object type is displayed at the top of the screen. After you have selected the object, another highlight box with the physical colors the video card supports appears at the bottom of the screen. Press → and ← to select the physical color and press <Enter>. The object is redrawn with the new color. Press <Esc> to return to AutoCAD at any time. Press ? at any time to display a Help screen.
Drawing	Modifies AutoCAD drawing colors 0, 8, and 9. When this option is selected, a highlight square appears in the drawing color area of the simulated AutoCAD display. Press →, ←, ↑, and ↓ to move it. The drawing color display is similar to the Chroma drawing in AutoCAD. The highlight moves to the 16 physical colors when you press <Enter>. Press → or ← to select a physical color and press <Enter>.
Physical	Alters the red, green, and blue components of the physical colors. A highlight box appears in color row at the bottom of the screen. Press → or ← to select a color and press <Enter>. Three sliders appear near the bottom of the display. The horizontal position of the slider indicates the relative intensity of the component. Press → or ← to move the slider for the selected component or type a number from 0 to 255. Many graphics cards do not support 255 intensities. When you enter an intensity, Custom Colors changes it to the closest supported intensity. Press ↑ and ↓ to select the component to alter. As you move the sliders, the hue of all objects on the display in the same color changes. Press <Enter> to set the RGB values.
ADIreset	Constructs a default ADI color palette as defined in the Autodesk Device Interface Driver Development Kit.
VGAreset	Constructs a default VGA color palette in the first 16 color entries. The remaining palette colors remain identical to those used for ADI devices.
Load	Reloads the color information from DLDCOLOR.DAT from the directory pointed to by DLDCFG (AutoCAD R11) or the AutoCAD R12 \DRV directory. An error message appears if DLDCOLOR.DAT is not found. Choose Load to undo an edited color configuration. Do not accidently delete changes. ADIreset, VGAreset, or Load deletes any current color changes unless first saved.

Item	Description
Save	Saves the current color palette to DLDCOLOR.DAT in the directory pointed to by the DLDCFG environment variable in FASTACAD or to the \ACAD\DRV (R12) directory if FASTACAD is not used.
Exit	Quits CustomColors. You are prompted to save changes before exiting. When using more than 256 colors, setting physical colors via DLDCOLOR has no effect until you save and exit.

TurboDLD*Classic* Commands

TurboDLD*Classic* offers AutoCAD users many features and productivity options. Type DLDHELP at the AutoCAD command prompt for a brief summary of TurboDLD*Classic* commands. The most important TurboDLD*Classic* feature is The Big Picture™ (BP). The BP allows you to locate the screen position using the active viewport. The BP dynamically moves to another part of the drawing without exiting the current function.

Command	Description
DLDBIGPIC	Displays the highlighted section of the drawing. The size of the image is determined by the AutoCAD logical drawing space (15-Bit or 31-Bit). The pick box will have an X. Move the mouse to locate the pick box. You can click the mouse to size the pick area. If the contents of the BP are too small, increase the size of the image in the window by pressing the + key on the numeric keypad. Pressing - reduces the size of the BP. Press <Home> for the largest size and <End> for the smallest size. The smallest BP size is exactly the same view as that in the viewport referenced by the BP. The largest BP size is the largest image possible without causing a Regen. The BP pick box is always proportioned to the proper aspect ratio for the current viewport. Click the pick button again for pick box move mode, similar to AutoCAD Zoom Dynamic. Once you have positioned the pick box on the area be displayed in the active viewport, click any button other than the pick button to initiate the zoom or press <Enter>. To abort the operation, hold any button down (not the pick button) until the BP disappears. The BP is updated with new drawing commands but moves or erases do not update the image unless BPREFRESH is enabled. A DLDREFRESH or a REGEN manually updates the BP.
DLDBPCACHE *	Enables the cache memory for BP features. Cache memory speeds Picture functions. DLDBPCACHE is normally disabled. The performance benefits of the BP Cache with VGA adapters are minimal, but are substantial with TIGA adapter cards.
DLDBPDIM	Resizes and repositions the BP. Places and sizes the BP. The size is limited to ¼ to ½ the width of the display. This command functions like the pan/zoom selection box in the BP. To abort, hold the right mouse button down until the moving box disappears.

Command	Description
DLDBPFREEZE	Sets the Big Picture (BP) zoom definition area display options. DLDBPFREEZE toggles the Big Picture Zoom Mode parameter in the TurboDLD*Classic* Expert Configuration Menu. In a zoomed view of the static BP, as the current viewport is zoomed or panned, Float mode causes the image in the BP to move around within the bird's-eye window, keeping the zoomed viewport area fixed in the center of the bird's-eye. Freeze mode will lock the current BP contents into place to provide a better overall frame of reference.
DLDBPHILIGHT *	Changes the Big Picture display in Patt Line, XOR Rect, and Both modes. Patt Lines use dotted lines to outline the Big Picture pick box. XOR Rect use a contrasting rectangle to highlight the pick box, and Both uses a combination of Patt Lines and XOR Rect.
DLDBPREFRSH *	Sets the BP update mode. If disabled, the BP is updated manually by a DLDREFRESH command. If enabled, DLDBPREFRSH refreshes the BP automatically when an object is drawn or erased. BP operations are slower with DLDBPREFRSH enabled.
DLDBPSTATIC	Displays the BP. Type DLDBPSTATIC to display the BP at the position set by DLDBPDIM. The static BP disappears when other menus appear or if you draw objects that overwrite the BP. With these exceptions, the BP is displayed until you either exit the drawing screen or type DLDBPSTATIC again.
DLDCOLOR	Invokes CustomColors, the color configuration program.
DLDCOMPACT	Returns unused display list memory to the AutoCAD memory pool.
DLDDCACHE *	Enables the TurboDLD*Classic* drawing cache, a compressed form of the current viewport for pans, zooms and redraws.
DLDDLIST *	Enables the display list function. If the display list is turned off, you will be running AutoCAD as though you were using a standard non display list driver - pans, zooms and redraws will be MUCH slower with DLDDLIST disabled.
DLDECHO *	Echoes internal TurboDLD*Classic* commands on the AutoCAD command line.
DLDHELP	Displays a list of TurboDLD*Classic* commands within AutoCAD. Press <F1> to view the output.
DLDREFRESH	Adds the current drawing changes to the Big Picture. A static BP is updated. For Automatic update of the Big Picture, see the DLDBPREFRSH command.
DLDSTAT	Displays the current TurboDLD*Classic* parameters on the AutoCAD command line. Flip to the graphics screen.
DLDUSAGE	Returns information about each viewport. Since AutoCAD supports multiple viewports, there may be multiple display lists.
DLDVER	Displays the TurboDLD*Classic* version, serial number and user name at the AutoCAD command line.
DLDVISREGEN *	Displays either the Fast or Visible Regen modes. A Fast Regen creates the display list and then displays the drawing all at once. A Visible Regen displays the drawing in chunks as the display list is created. This command is a dynamic form of the Regen Mode parameter in the Expert Configuration Menu. Fast Regen mode is faster than AutoCAD.

* When issued from AutoCAD, this command overrides the selections made during TurboDLD*Classic* configuration for the current drawing session only. Exiting AutoCAD and restarting causes all feature settings to revert to those selected in TurboDLD*Classic* configuration. To make the current changes permanent, reconfigure TurboDLD*Classic*.

Memory Use and Memory Lists

TurboDLD*Classic* shares extended memory with AutoCAD via the PharLap Virtual Memory Manager. It automatically pages to disk if it uses all RAM that AutoCAD has not used. See the *AutoCAD Installation and Performance Guide* for additional information on Virtual Memory Management. If there are excessive hard disk accesses during pans, redraws, and zooms, issue the DLDCOMPACT command. If this does not affect the number of disk accesses, add memory. TurboDLD*Classic* speeds AutoCAD operations by creating a Display List in memory, and sending that list to the graphics card for pans, zooms and redraws. But a display list takes up memory. TurboDLD*Classic* needs at least 1 MB.

To determine how much memory AutoCAD is using, use the status command while in AutoCAD. See the *AutoCAD Installation and Performance Guide* for additional information. Complex drawings require several megabytes. The Display List generally uses twice the .DWG file size. Complex objects expand when translated to display list format. Text uses much of the Display List. Put text in its own layer in the drawing. Do not display the text layer when editing the drawing to minimize memory use and speed pans, redraws, and zooms. The AutoCAD manuals have an excellent section on performance and memory use.

Tips

When upgrading from older DLD drivers, make sure you remove any reference to previous DLD driver commands (FASTACAD calls or SET parameters) or subdirectories in AUTOEXEC.BAT or AutoCAD startup batch files.

If you have been using a previous DLD driver and want to use the color palette you customized for it with TurboDLD*Classic*, copy DLDCOLOR.DAT from the old DLD directory to the new subdirectory.

When zooming into an image, be aware of the AutoCAD grid snap setting. If you are zoomed far into a drawing and you are having trouble moving the digitizer cursor, you may be snapping to a point that is not part of the zoomed viewport. If the cursor only moves to a single point or is not on screen at all, turn the grid snap off.

TurboDLD*Classic* features do not work in AutoCAD Paper Space. A TurboDLD*Classic* command in Paper Space cause an error message.

Do not use any TurboDLD*Classic* features in AutoCAD Zoom Dynamic mode. Use the Big Picture feature to accomplish the same task as Zoom Dynamic.

When switching color modes, run the DLDCOLOR command to reconfigure the color palette. A black cursor and disappearing crosshairs are both symptoms of a color palette problem.

Configuring TurboDLD*Classic* in the middle of a drawing session using the CONFIG command is equivalent to exiting and restarting AutoCAD. If using the static Big Picture, you must reinitialize it after returning from the Configuration menu.

Tips, cont'd

Sometimes, when using the Big Picture, the digitizer cursor sticks to the edge of the bird's-eye. This is normal and is the result of the digitizer puck responding to the entire screen area while the Big Picture only occupies a small portion of the screen. Because of screen resolution difference, the digitizer puck must cover more drawing area to move to the same location when the screen cursor enters the Big Picture area.

Since TurboDLD*Classic* is totally transparent to users with respect to using normal AutoCAD commands to redraw, pan, and zoom, you still have to suffer from some of AutoCAD nuances. One of these nuances is that Zoom All and Zoom Extends both force a Regen because AutoCAD does not track the boundaries necessary to avoid Regens. Regens are time-consuming and do not use display list processing. Use the View command instead.

When you first load an image and see the whole drawing on the screen at once, type View Save All and press <Enter> to save the display position in the All view. After editing, type View Restore All and press <Enter>. The full drawing is restored at display list speed with no regen.

If you zoom in too far or pan over too far you may inadvertently cause a Regen. Type REGENAUTO Off and press <Enter> at the AutoCAD command prompt and automatic Regens are disabled. The REGENAUTO setting is also saved as part of your drawing file, so you only need to execute it once per drawing. You may even want to set REGENAUTO off in your ACAD.DWG drawing template.

Tips, cont'd

If you are having trouble with TurboDLD*Classic* and third-party AutoCAD applications, make sure that the third-party application supports ADI 4.2. To use the ADI 4.2 specification, third-party applications require new T drivers.

If your third-party application is ADI 4.2-compatible and you are having trouble using TurboDLD*Classic*, run AutoCAD without the third-party application to isolate the problem. Try the third-party application with the VESA- compatible driver shipped with AutoCAD.

Any third-party TSR that must access the display may not work properly when using AutoCAD with an advanced ADI display driver, especially if the TSR switches graphics modes. Most TSRs do not support the same graphics platforms as TurboDLD*Classic* and cannot switch modes.

Installing GEM/3 Drivers

Step	Action
1	Create a GEM DRIVER PAK. Using the standard DOS FORMAT utility, format a blank diskette. Insert the diskette in drive A:. Type FORMAT A: /V and press <Enter>.
2	FORMAT prompts for the volume label by displaying: Volume Label? (11 characters max) Type GEM DRIVRPK and press <Enter>.
3	Copy the following files from the GEM/3 system master diskette to the newly formatted GEM DRIVRPK diskette. Type the following (assuming that the GEM/3 master diskette is in drive A: and the GEM DRIVRPK diskette is in drive B:) COPY A:GEMVDI.EXE B: and press <Enter>. COPY A:MDGEM?.SYS B: and press <Enter>.
4	Insert the Super Voyager LPX video driver diskette in Drive A:. Type A:INSTALL choose the option for the GEM/3 drivers. Specify the drive and directory where you want them copied to (such as B:\). GEM/3 requires that the drivers be installed from the root directory of the diskette in drive A:. Make sure you install the drivers to the root of drive A: (or B:). Place the diskette in drive A: next.
5	Install GEM/3 following the instructions provided in the GEM/3 manual. Select the standard IBM VGA Color (IBM PS/2) driver.
6	After successfully completing GEM/3 installation, insert the GEM/3 System Master Disk in drive A:. Type A: and press <Enter>. You must install from the A: drive. Then type GEMSETUP and press <Enter>.
7	Follow the GEM/3 installation instructions up to the CHANGE EXISTING CONFIGURATION stage. When prompted for a screen driver choice, highlight: OTHER (DRIVER PACK)
8	When prompted to insert a screen driver in drive A:, insert the newly-created GEM DRIVRPK diskette. Select one of the following: CIRRUS LOGIC VGA 16 Color 800x600 CIRRUS LOGIC VGA 16 Color 1024x768 Continue with the remainder of the installation.

Installing Lotus 1-2-3 v2.x, Symphony, and Report Writer

Step	Action
1	Run INSTALL.EXE. Choose the option for the Lotus 1-2-3 and Symphony drivers. Specify the drive and directory where you want them copied to (such as C:\LOTUS).
2	From the Lotus subdirectory, type: INSTALL and press <Enter>.
3	From the next menu, select *Advanced Options* for Lotus 123 v2.2 or *Change Selected Equipment* for Lotus 123 v2.3.
4	For v2.2, select *Add New Drivers* to Library and go to step 5. For v2.3, select *Modify Current Driver Set* and go to step 6.
5	From the next menu, select *Modify Current Driver Set.*
6	From the next menu, select one of the display and resolution configurations.
7	From the next menu, select *Return To Menu.*
8	From the next menu, select *Save Changes.*
9	Enter the driver set name. The driver set name should include the driver resolution. The default driver set name assigned by the program is 123.SET. You can create multiple driver sets with different display resolutions. To run Lotus 1-2-3 or Symphony with a specific driver set, type: 123 SETNAME <Enter> or SYMPHONY SETNAME and press <Enter>. SETNAME is the name of the desired driver set.

Installing the Lotus 1-2-3 v3.x Driver

Lotus 1-2-3 v3.0 or 3.1 must already be installed on the hard disk drive via the standard Lotus installation utility.

Step	Action
1	Make the directory containing 1-2-3 v3.0 the current directory. For example, if Lotus 1-2-3 is in C:\123R3, type CD \123R3 and press <Enter>.
2	INSTALL.DDF is a text file used by the 1-2-3 installation utility that has information on each driver and mode of operation. If you have been using a driver supplied with another graphics adapter, make a backup copy of INSTALL.DDF. Type COPY INSTALL.DDF INSTALL.BAK and press <Enter>.
3	Run INSTALL.EXE. Choose the option for the version of Lotus 1-2-3 that you are using. Specify the drive and directory where you want them copied to (such as C:\123R3). If INSTALL.DDF has been copied to a backup file (see step 2 above), answer YES to the prompt to confirm overwriting the file.
4	Type INSTALL and press <Enter>. Select *Change selected equipment*. If you are currently using another driver supplied with a graphics card, you may have to choose First-time installation.
5	Select *Modify Current DCF* or *Choose another DCF to modify*. The following is valid for either selection.
	Select *Change Video Display* to display a list of display types provided with Lotus 1-2-3 and two additional choices: GD5428 100 Column Display (800x600 resolution) supports 100x31, 100x42, and 100x75 16 color modes. GD5428 128 Column Display (1024x768 resolution) supports 128x40, 128x54, and 128x96 16 color modes. Select a resolution that best meets your requirements.
	Choose *Save Changes*. When some high-resolution modes are selected, a message may appear asking for the drive letter of the floppy disk. Before entering the drive letter, insert the disk that is requested in the floppy drive.

The 32-bit 256 color accelerated driver supports the GD5428 only. You need CLMODE.EXE or a Video Adapter Utility program to select a monitor type. 256 color accelerated drivers can only be used with the OS/2 2.0 Corrective Service Pack, an upgrade that can be purchased from IBM.

Installing the 16 Color Driver

Step	Action
1	Edit the OS/2 CONFIG.SYS file as follows: Add C:\OS2\DLL\CLDSP to the beginning of the LIBPATH statement and remark (REM) the following statements: REM set video_devices=vio_vga REM set vio_vga=device(bvhvga) REM device=C:\os2\mdos\vvga.sys
2	Display a DOS full screen session.
3	Run CLMODE.EXE to set monitor the type.
4	Insert the Super Voyager LPX OS/2 driver diskette in drive A: (or B:) and type A: (or B:)SVGA.EXE ON and press <Enter> to create SVGADATA.PMI.
5	Copy SVGADATA.PMI to the OS/2 subdirectory.
6	Shut down the system to boot from the OS/2 2.0 Installation Diskette.
	Press <Esc> to run CLI1620.CMD.

Installing the 256 Color Accelerated Driver

256 color accelerated drivers can only be used with the OS/2 2.0 Corrective Service Pack, an upgrade that can be purchased from IBM and the GD5428 VGA chip.

Step	Action
1	Add the following to the OS/2 CONFIG.SYS file: set video_devices=vio_SVGA set vio_SVGA=device(bvhvga,bvhsvga) device=C:\os2\mdos\vsvga.sys and remark (REM) the following statements: REM set video_devices=vio_vga REM set vio_vga=device(bvhvga) REM device=C:\os2\mdos\vvga.sys
2	Bring up a DOS full screen session and run CLMODE.EXE to set the monitor type.
3	Insert the Super Voyager LPX OS/2 driver diskette in drive A: (or B:) and type A: (or B:)SVGA.EXE ON and press <Enter> to create an svgadata.pmi file.
4	Copy the svgadata.pmi file to the OS/2 subdirectory.
5	Shut down the system to boot from the OS/2 2.0 Installation Diskette. Press <Esc> to run cli25620.cmd.

When running Win-OS2 in Full Screen, open the settings for Win-OS2 Full Screen and go to Session. Under DOS Settings go to Video_Switch_Notification and switch the default setting from OFF to ON. This setting must be changed so that when running Full Screen Win-OS2, the Virtual Device Driver (VSVGA.SYS) functions properly when switching between OS/2 Presentation Manager and the Windows Program Manager.

The OS/2 V2.1 256 color accelerated driver supports the GD5428 chip.

Run CLMODE.EXE or Video Adapter Utility program to select monitor type. The IBM DISPINST.EXE program calls SVGA.EXE to identify the SVGA chipset before display driver installation. The IBM SVGA.EXE shipped with OS/2 2.1 does not correctly ID the chipset. Run CLINST21.CMD to update SVGA.EXE with the new Cirrus SVGA.EXE before calling DSPINSTL.EXE to help OS/2 identify the chipset correctly. If you are having trouble installing the OS/2 V2.1 drivers, rename the IBM SVGA.EXE to SVGA.IBM and copy the new SVGA.EXE file to the OS/2 subdirectory. During installation, the target file may have a newer date than the source file. If so, select the *Yes* button when the installation program displays this message. Information about SVGA.EXE can be found in the *OS/2 User Manual.*

The accelerated drivers for OS/2 2.1 require 1 MB of memory on the driver card. If you have a card with 512 KB of memory, use the standard OS/2 drivers.

Installing OS/2 2.1 Drivers from Floppy

Step	Action
1	Insert OS/2 display driver disk (volume labeled "DISP 1") in a floppy drive.
2	Invoke an OS/2 window session or an OS/2 full screen session.
3	Type A: and press <Enter>.
4	Type clinst21.cmd and press <Enter>.
5	Check the Primary Display check box from the DISPLAY DRIVER INSTALL dialog box.
6	Select *CIRRUS LOGIC Blitter Driver* from the PRIMARY DISPLAY ADAPTER TYPE dialog box.
7	The MONITOR CONFIGURATION/SELECTION UTILITY dialog box appears. Click on *OK* to select the default monitor settings (monitor type 3) or select *Display Adapter Utility Program* and run CLMODE to set the monitor type.

8	Select the display resolution of choice from the SELECT DISPLAY RESOLUTION list box.
9	Click the Install button in the SOURCE DIRECTORY dialog box and follow the screen prompts.

Installing the OS/2 2.1 Drivers from the Hard Disk

Step	Action
1	Type XCOPY a: c:\disp_1.
2	Invoke an OS/2 window session or an OS/2 full screen session.
3	Type CD \DISK_1 Type clinst21.cmd and press <Enter>.
4	Check the Primary Display check box from the DISPLAY DRIVER INSTALL dialog box.
5	Select CIRRUS LOGIC Blitter Driver from PRIMARY DISPLAY ADAPTER TYPE dialog box.
6	The MONITOR CONFIGURATION/SELECTION UTILITY dialog box appears. Click on *OK* to select the default monitor settings (monitor type 3) or select *Display Adapter Utility Program* and run CLMODE.EXE.
7	Select the display resolution of choice from the SELECT DISPLAY RESOLUTION list box.
8	Click the Change button in the SOURCE DIRECTORY dialog box and type c:\disp_1 in the edit box and follow the screen prompts.

Installing Windows 3.0 drivers for OS/2 2.0:

Do not use the 65,536 or 16 MB color drivers with OS/2.

Step	Action
1	Run Full Screen Win-OS/2 and select *File* from the dropdown menu.
2	Select *Run* and then Browse the floppy drive (A: or B:) where you inserted the Super Voyager LPX Windows/OS/2 Driver Disk.
3	For OS/2 2.0, type CD \Win30 and type install.exe.
4	Use Setres to change resolution. The resolution you choose must correspond to the resolution you are running in OS/2.

Seamless Windows 3.0 support

Seamless Windows runs Windows 3.0 applications in windows on the OS/2 2.0 Workplace Shell Desktop simultaneously with OS/2 applications. This driver supports 256 color Windows driver runs with the 32-bit Presentation Manager Display (PMD) driver 1.00b or later and requires OS/2 service pack (XR06055). This driver does not support WIN-OS/2 3.1 in the OS/2 2.1 beta release.

Step	Action
1	Change SYSTEM.INI in the \os2\mdos\winos2 directory to: [boot] ;driver for full screen windows session display=256_1024.drv ;driver for Seamless Windows session sdisplay=256_768s.drv [CLVGA] cursor=1 dpi=96 videomode=96 ;1024 x 768 x 256 videomode=92 ;800 x 600 x 256 videomode=95 ;640 x 480 x 256
2	When selecting a video mode to run in the Win3.0\OS/2 2.0 Program Manager, you must select the same resolution running in OS/2 Presentation Manager 3.0\OS/2 2.0.
3	Invoke *Migrate Applications* from the System Setup folder to install Windows applications on the Workplace Shell desktop. The Windows applications is placed in the Windows Programs and Additional Windows Programs folders.
4	Double click on a Microsoft Windows icon to run in Seamless Windows mode. Support for Seamless SetRES is not available. You must go to full screen Windows to change video resolutions.

Installing Windows 3.1 drivers for OS/2 2.1

Installation for full screen 256 color accelerated drivers is for Windows 3.1. Do not use the 65,536 or 16 million color Windows 3.1 drivers with OS/2.

Step	Action
1	Run Full Screen Win-OS/2.
2	Select *File* from the drop-down menu.
3	Select *Run* and then browse the A: or B: floppy drive where you have inserted the Super Voyager LPX Windows/OS/2 Driver Disk.
4	For OS/2 2.1, type CD \WIN31 and press <Enter>. Type install.exe.
	Use Setres in the Control Panel to change the screen resolution.
	To use Power Management Screen Saver, choose the Control Panel, select Desktop, select Screen Saver, select Display Power Management, and select SETUP to configure the Power Management Screen Saver.

The screen resolution you choose should correspond with the resolution you are running in OS/2. When installing new CIRRUS LOGIC OS/2 PM Drivers, the standard CIRRUS Win-OS/2 Driver is installed for Full Screen Windows 3.1. You must use the Setres Utility to install the CIRRUS LOGIC Full Screen accelerated driver. Seamless support will still use the standard OS/2 Cirrus Driver.

Troubleshooting SVGA.EXE in a DOS Windows in OS/2

If you encounter problems using SVGA.EXE in Windowed DOS or Full Screen DOS:

Step	Action
1	Have a DOS Boot Disk available and boot with the DOS operating system in drive A:.
2	Run CLMODE.EXE to set the monitor type, for example: CLMODE M5
3	Insert the CIRRUS OS/2 Installation Disk in Drive A:.
4	Type SVGA ON DOS to create an SVGADATA.DOS file on the diskette.
5	Copy this file to your OS/2 subdirectory in your hard drive. For example, type copy a:\SVGADATA.DOS c:\os2\SVGADATA.PMI
6	Remove the diskette in drive A: and reboot OS/2. Repeat this procedure when SVGA.EXE will not run in DOS Windowed or DOS Full Screen.

Installing WordStar Drivers

The WordStar display drivers support both WordStar version 5.5 and 6.0 and above and WordStar 2000 version 3.5.

Step	Action
1	If you have not already done so, install WordStar. Follow the instructions supplied with WordStar.
2	Run the Super Voyager driver INSTALL utility and choose the option for the WordStar drivers. Specify the drive and directory where you want them copied to (such as C:\WS).
3	Using a text editor, change the CRT_TYPE line in FONTID.CTL in the WordStar directory change to: CRT_TYPE=CL800.WGD When WordStar is executed, the display driver is used for page preview mode.

Installing the Ventura Publisher Drivers

Step	Action
1	Install Ventura Publisher V2.0 as shown in the product manual, specifying the Hercules driver.
2	Insert the Super Voyager LPX DOS driver diskette in Drive A: or B:. Run INSTALL.EXE from the diskette. Choose the option for the Ventura Publisher drivers and specify the drive and directory where you want them copied to (such as A:\).
3	Ventura Publisher requires that the drivers be installed from the root directory of a floppy disk in drive A:. Be sure to install the drivers to the root of drive A: or drive B: and then place the floppy in drive A: before proceeding. Type A: and press <Enter>.
4	Type VPDRV2_0 and press <Enter>. VPDRV2_0.EXE can only be executed from the A: drive.
5	Follow the screen instructions and select one of the following drivers when prompted: CIRRUS LOGIC VGA 800x600 16 of 256K colors or grays. CIRRUS LOGIC VGA 1024x768 16 of 256K colors or grays. Ventura Publisher V2.0 is now configured for the selected screen resolution and 16 color graphics.

Installing the Microsoft Word VGA Driver

Step	Action
1	If you have not already done so, install Microsoft Word. Follow the instructions supplied with Microsoft Word.
2	When prompted for a screen display type, choose IBM Video Graphics Array (VGA).
3	Run the Super Voyager DOS driver INSTALL.EXE utility. Choose the option for the Microsoft Word drivers and specify the drive and directory where you want them copied to (such as C:\WORD5). The drivers must be installed in the same directory as Microsoft Word. INSTALL.EXE copies two screen drivers: SCREEN8.VID - for 800x600 graphics resolution SCREEN.VID - for 1024 x768 graphics resolution The driver to be used must be named SCREEN.VID. When a file is renamed to SCREEN.VID, it overwrites the existing display driver. Back up the old driver if you want to save it.
4	The new driver is now installed. Run Microsoft Word as you normally would.
5	To view and change the screen resolutions, select Options, move the cursor to display mode, and press <F1>. Choose the desired screen resolution from the list presented. A list of resolutions supported by the text driver appears. Select the desired resolution.

When using a Microsoft Mouse with the driver, make sure that the mouse driver version is 7.0 or above.

Installing WordPerfect 5.1 and 6.0 Drivers

To use high resolution modes with WordPerfect 6.0, install the VESA driver that comes with WordPerfect and configure WordPerfect to use one of the VESA high resolution graphics modes.

WordPerfect 5.1

The high resolution WordPerfect version 5.1 driver supplied with the Super Voyager LPX supports both high resolution text and graphics. WordPerfect allows graphics and text drivers to be set up separately, so install both drivers.

Installing WordPerfect 5.1 Drivers

Step	Action
1	If you have not already done so, install WordPerfect. Follow the instructions supplied with WordPerfect.
2	Run the Super Voyager LPX INSTALL.EXE utility. Choose the option for the WordPerfect drivers and specify the drive and directory where you want them copied to (such as C:\WP51).
3	Start WordPerfect and press <Shift> <F1>. Choose Display, then select Graphics Screen Type.
4	Move the cursor to GD542X, press 1, and press <F7>. The new graphics mode is used the next time print preview is used.

Installing WordPerfect 6.0 Drivers

Step	Action
1	If you have not already done so, install WordPerfect. Follow the instructions supplied with WordPerfect.
2	Run the Super Voyager LPX INSTALL.EXE utility. Choose the option for the WordPerfect drivers and specify the drive and directory where you want them copied to (such as C:\WP51).
3	Start WordPerfect, and run SETUP by typing <Shift> <F1>. Choose Display, then select Graphics Screen Type.
4	Move the cursor to CIRRUS LOGIC VGA and choose SELECT. All supported resolutions appear. Select the desired resolution.

4 VGA BIOS

This chapter describes the specification for the external software interface of the Super Voyager LPX motherboard VGA BIOS (Basic Input Output System).

The Super Voyager LPX motherboard Super VGA BIOS is fully compatible with the standard IBM VGA BIOS and the INT 10h video service functions. This chapter does not describe the standard INT 10h functions. See the *American Megatrends AMIBIOS Technical Reference* for a description of standard INT 10h functions.

All VGA BIOS interface extensions to the standard VGA BIOS are described in this chapter.

VGA BIOS Features

The Super Voyager LPX BIOS is a high-performance firmware product that optimizes the Super Voyager LPX motherboard VGA controller display quality, power management and video performance. Features include:

- 100% IBM VGA-compatible BIOS,
- high performance operation,
- modular, proven design,
- motherboard implementation at C000h,
- integrated with system BIOS,
- supports switchless configuration,
- can be customized without source code,
- VESA-compatible modes and VESA-compatible INT 10h interface.

VGA BIOS Implementation

The VGA BIOS runs at segment C000h. The system BIOS makes a FAR CALL to initialize the video subsystem at power up. This video initialization must occur before initializing any adapter video BIOS. An optional video adapter ROM BIOS at C000h is initialized in the standard manner.

To use an external VGA adapter card with ROM mapped to C000:0h, the onboard VGA must be disabled by placing a shorting bridge on J32 and leaving J31 OPEN.

For the video subsystem to operate in some environments, a direct system BIOS entry is provided to call some BIOS functions without using the interrupt vector table or system BIOS data areas in low memory. A data word that contains the offset of the VGA BIOS entry point is at offset E000:0019 or C000:0019. This word points to the instruction immediately following the CLI clear interrupt instruction.

The system BIOS preserves the state of the interrupt flag internally, so if interrupts are disabled on entry through this point, they will remain disabled throughout execution of the system BIOS. Only certain system BIOS functions, such as save and restore state, should be used unless the interrupt table and BIOS data area are correctly initialized.

VGA BIOS Configuration

The system BIOS on the Super Voyager LPX motherboard implements INT 15h function AX=448Eh. When issued, the INT 15h AX=448Eh function signals that the video BIOS is ready to accept INT 10h option calls. When this interrupt is received, the system BIOS performs any option selection required via INT 10h Function 12h, as described on page 109. The video BIOS invokes this INT 15h call before the initial mode set and displaying the sign on message.

Before any mode set the video BIOS issues an INT 15h function AX=F965h call. This is a signal to perform any clean up that must be done before the mode is set, such as setting a montype for a non-standard monitor.

Supported Video Modes

Mode	Colors	Char/Row	Char/Cell	Pixels	Display Mode	Horiz. Freq.	Vert. Freq.
00, 01	16, 256	40x25	8x8	320x200	Text	31.5	70
00*, 01*	16, 256	40x25	8x14	320x350	Text	31.5	70
00+, 01+	16, 256	40x25	9x16	360x400	Text	31.5	70
02, 03	16, 256	80x25	8x8	620x200	Text	31.5	70
02*, 03*	16, 256	80x25	8x14	640x350	Text	31.5	70
02+, 03+	16, 256	80x25	9x16	720x400	Text	31.5	70
04, 05	4, 256	40x25	8x8	320x200	Graphics	31.5	70
6	2, 256	80x25	8x8	640x200	Graphics	31.5	70
07*	mono	80x25	9x14	720x350	Text	31.5	70
07+	mono	80x25	9x16	720x400	Text	31.5	70
0D	16, 256	40x25	8x8	320x200	Graphics	31.5	70
0E	16, 256	80x25	8x8	640x200	Graphics	31.5	70
0F	mono	80x25	8x14	640x350	Graphics	31.5	70
10	16, 256	80x25	8x14	640x350	Graphics	31.5	70
11	2, 256	80x30	8x16	640x480	Graphics	31.5	60
12	16, 256	80x30	8x16	640x480	Graphics	31.5	60
13	256, 256	40x25	8x8	320x200	Graphics	31.5	70

Supported Video Modes, Continued

Mode		Colors	Char/Row	Char/Cell	Resolution	Display Mode	Dot Clock MHz	Horiz. Freq. KHz	Vert. Freq. Hz
14		16, 256 KB	132x25	8x26	1056x400	Text	41.5	31.5	70
54		16, 256 KB	132x43	8x8	1056x350	Text	41.5	31.5	70
55		16, 256 KB	132x25	8x14	1056x350	Text	41.5	31.5	70
58,6A		16, 256 KB	100x37	8x16	800x600	Graphics	36	35.2	56
58,6A		16, 256 KB	100x37	8x16	800x600	Graphics	40	37.38	60
58,6A		16, 256 KB	100x37	8x16	800x600	Graphics	50	48.1	72
5C		256, 256 KB	100x37	8x16	800x600	Graphics	36	35.2	56
5C		26, 256 KB	100x37	8x16	800x600	Graphics	40	37.9	60
5C		256, 256 KB	100x37	8x16	800x600	Graphics	50	48.1	72
5Di		16, 256 KB	128x48	8x16	1024x768	Graphics	44.9	35.5	87i
5D		16, 256 KB	128x48	8x16	1024x768	Graphics	65	48.3	60
5D		16, 256 KB	128x48	8x16	1024x768	Graphics	75	56	70
5D		16, 256 KB	128x48	8x16	1024x768	Graphics	77	58	72
5F		256, 256 KB	80x30	8x16	640x480	Graphics	25	31.5	60
5F		256, 256 KB	80x30	8x16	640x480	Graphics	31.5	37.9	72
60i		256, 256 KB	128x48	8x16	1024x768	Graphics	44.9	35.5	87i[2]
60		256, 256 KB	128x48	8x16	1024x768	Graphics	65	48.3	60
60		256, 256 KB	128x48	8x16	1024x768	Graphics	75	56	70
60		256, 256 KB	128x48	8x16	1024x768	Graphics	77	58	72
64		64 KB, 64 KB	-		640x480	Graphics	25	31.5	60
64		64 KB, 64 KB	-		640x480	Graphics	62.8	37.9	72
65		64 KB, 64 KB	-		800x600	Graphics	72	35.2	56
65		64 KB, 64 KB	-		800x600	Graphics	80	37.8	60
66		32 KB, 32 KB[1]	-		640x480	Graphics	25	31.5	60
66		32 KB, 32 KB[1]	-		640x480	Graphics	62.8	37.9	72
67		32 KB, 32 KB[1]	-		800x600	Graphics	72	31.5	56
6Ci		16, 256 KB	160x64	8x16	1280x1024	Graphics	75	48	87i[2]
6Di		256, 256 KB	160x64	8x16	1280x1024	Graphics	75	48	87i[2]
71		16 MB, 16 MB	80x30	8x16	640x480	Graphics	75.5	31.5	60
74i		64 KB, 64 KB	-	-	1024x768	Graphics	44.9	35.5	87i[2]

1 32 KB direct color/256 color mixed mode.

2 A character "" stands for interlaced mode1.

INT 10h Interface Extensions

The Super Voyager LPX motherboard BIOS supports all standard INT 10h video service functions. In addition, the Super VGA BIOS provides extensive support for VGA controller features. These functions are available as extended functions under INT 10h.

The standard VGA BIOS INT 10h video service functions are not described in this chapter. See the *American Megatrends AMIBIOS Technical Reference* for information about standard INT 10h functions.

All extended function calls preserve the CPU registers, except those that pass information from the system BIOS.

Extended INT 10h Function Summary

The SVGA extended INT 10h functions are:

AH Reg	BL Reg	Function
12h	80h	Inquire VGA Type
12h	81h	Inquire BIOS Version Number
12h	82h	Inquire Design Revision Code
12h	85h	Return Installed Memory
12h	93h	Force 8-bit
12h	9Ah	Inquire User Options
12h	A0h	Query Video Mode Availability
12h	A1h	Read Monitor Type and ID
12h	A2h	Set Monitor Type (Horizontal)
12h	A3h	Set VGA Refresh
12h	A4h	Set Monitor Type (Vertical)

VGA BIOS INT 10h Inquiry Functions

The inquiry functions allow applications software to determine the existence and meaning of other functions.

Function 12h Subfunction 80h Inquire VGA Type

This function provides a mechanism for software to determine the type of Super Voyager LPX motherboard VGA controller, silicon revision number and corresponding hardware capabilities. VGA BIOS versions that do not support this family of functions preserve the input in AL.

Input: AH = 12h
BL = 80h

Output: AX = Controller Type

0000h	No extended alternate select support
0001h	Reserved
0002h	CL-GD510/520
0003h	CL-GD610/620
0004h	CL-GD5320
0005h	CL-GD6410
0006h	CL-GD5410
0007h	CL-GD64420
0008h	CL-GD6412
0010h	CL-GD5401
0011h	CL-GD5402
0012h	CL-GD5420
0013h	CL-GD5422
0014h	CL-GD5424
0015h	CL-GD5426
0016h	CL-GD5420r1
0017h	CL-GD6402r1
0018h	CL-GD5428
0020h	CL-GD6205/15/25

BL = Silicon revision number

00h-7Fh	Silicon revision
80h	Not available

Function 12h Subfunction 81h Inquire BIOS Version Number

This function provides a mechanism for software to determine the BIOS version number. For example, if the BIOS version is 1.02, AH will contain 01h and AL will contain 02h.

Input: AH = 12h
BL = 81h

Output: AH = Major BIOS version number
AL = Minor BIOS version number

Inquire VGA BIOS Design Revision Code

This function provides a mechanism for software to determine the VGA BIOS revision number.

Input: AH = 12h
BL = 82h

Output: AL = Chip revision

Function 12h Subfunction 85h Return Installed Memory

The function returns the amount of video memory present in 64 KB units.

Input: AH = 12h
BL = 85h

Output: AL = Amount of video memory present in 64 KB units.

Function 12h Subfunction 93h Force 8-bit Operation

This function forces 16-bit operation in an environment where 16-bit operation is possible. The function takes effect immediately.

Input: AH = 12h
BL = 93h
AL = 00h Run as 16-bit device
= 01h Force 8-bit operation

Output: None

Function 12h Subfunction 9Ah Inquire User Options

This function returns the current status of the user options.

Input: AH = 12h
BL = 9Ah

Output: AX = Contains the following options:

Bit 15	Reserved
Bit 14	Vertical monitor type 640x480 frequency (VGA refresh)
Bits 13-11	Reserved
Bit 10 0	Force 16-bit operation
1	Force 8-bit operation
Bits 9-7	Reserved
Bits 6-5	Vertical monitor type maximum resolution
Bits 4-2	Monitor Type (Horizontal)
Bits 1-0	Reserved

BX = Reserved
CX = Contains the following options

Bits 15-13	Vertical monitor type 1024x768 frequency
Bits 12-11	Vertical monitor type 800x600 frequency
Bits 10-6	Reserved
Bits 5-4	Vertical monitor type 1280x1024 frequency
Bits 3-0	Reserved

DX = Reserved

Function 12h Subfunction A0h Query Video Mode Availability

This subfunction returns information on the availability of a video mode.

Input: AH = 12h
AL = Video mode number (00h - 7Fh)
BL = A0h

Output: AH =
00h Video mode not supported
01h Video mode supported
DS:SI = Pointer to standard video parameters (FFFFF:FFFFh if standard parameters undefined for this mode).
ES:DI = Pointer to supplemental video parameters (FFFF:FFFFh if supplemental parameters undefined for this mode).
BX = Offset to the BIOS subroutine that modifies the parameters pointed to by DS:SI. This routine requires that ES:DI point to the proper supplemental video parameters.

Function 12h Subfunction A1h Read Monitor ID/Type

This function reads the monitor ID and senses the type of monitor attached.

Input: AH = 12h
BL = A1h Read monitor ID and type from 15-pin connector

Output: BH = Monitor ID
09h IBM 8604/8507 or equivalent
0Ah IBM 8514 or equivalent
0Bh IBM 8515 or equivalent
0Dh IBM 8503 or equivalent
0Eh IBM 8512/8513 or equivalent
0Fh No monitor
BL = Monitor gender
00h Color display
01h Gray-scale display
02h No display

Function 12h Subfunction A2h Set Monitor Type (Horizontal)

This function sets the monitor type horizontal timings. The monitor type information is used by the VGA BIOS to select the optimal display timings for extended modes. The current monitor type can be read using INT 10h function 12h subfunction 9Ah.

Input: AH = 12h
BL = A2h Set monitor type
AL = Monitor type to set
00h VGA 31.5 KHz
01h 8514-compatible 31.5 KHz and 35.5 KHz
02h SVGA 31.5 KHz to 35.1 KHz
03h Extended SVGA 31.5 KHz to 35.5 KHz
04h Multifrequency 31.5 KHz to 37.8 KHz
05h Extended multifrequency 31.5 KHz to 48 KHz
06h Super multifrequency 31.5 KHz to 56.0 KHz
07h Extended super multifrequency 31.5 KHz to 64.0 KHz

Output: None

Function 12h Subfunction A3h Set Refresh Type

Toggles the VGA refresh rate between normal vertical refresh and high vertical refresh for flicker reduction. The current refresh can be read using INT 10h function 12h subfunction 9Ah.

Input: AH = 12h
BL = A3h Set High/Low VGA refresh
AL = Enable/Disable
01h Enable high refresh
00h Use normal VGA refresh

Output: None

Function 12h Subfunction A4h Set Monitor Type (Vertical)

This function sets the monitor type vertical timings. The monitor type information is used by the VGA BIOS to determine the frequency to use when selecting an extended mode. It also is used to define the available mode resolutions. The vertical monitor can be read using INT 10h Function 12h subfunction 9Ah. Calls to INT 10h Function 12h subfunctions A2h Set Monitor Type - Horizontal and INT 10h Function 12h subfunction A3h Set Refresh Type are converted to vertical equivalents, effecting the maximum vertical timings.

Input: AH = 12h
BL = A4h
AL =
Bit 7-4 640x480 Frequency
0000 60 Hz
0001 72 Hz
Bits 3-0 Maximum Vertical Resolution
0000 480 scan lines
0001 600 scan lines
0010 768 scan lines
0011 1024 scan lines
BH =
Bits 3-0 800x600 Frequency
0000 56 Hz
0001 60 Hz
0010 72 Hz
Bit 7-4 1024x768 Frequency
0000 87 Hz
0001 60 Hz
0010 70 Hz
0010 72 Hz
CH = Bits 7-4 1280x1024 Frequency
0000 87 Hz
CL = Reserved
DX = Reserved

Output: None

Super VGA Functions

The purpose of the VESA Super VGA specification is to propose a common software interface to SVGA video adapters to provide a simplified software access to advanced VGA products.

The VESA SVGA specification provides a set of functions that obtain information about the capabilities and characteristics of a specific Super VGA implementation, and control video mode initialization and video memory access. The functions are provided as an extension to the VGA BIOS video services accessed through INT 10h.

Video Environment Information

The VESA INT 10h BIOS Extension provides several functions to return information about the video environment. These functions return system level information as well as video mode specific details.

Function 00h returns general system level information, including an OEM identification string. This function also returns a pointer to the supported video modes.

Function 01h may be used by the application to obtain information about each supported video mode.

Function 03h returns the current video mode.

Programming Support

The VESA INT 10h SVGA BIOS Extension provides several functions to interface to different SVGA hardware implementations. The most important of these is Function 02h, Set Super VGA video mode. This function isolates the application from the complicated task of setting up a video mode.
Function 05h provides an interface to the underlying memory mapping hardware. Function 04h saves and restores a SVGA state without knowing anything of the specific implementation.

Compatibility

The VESA INT 10h SVGA BIOS Extension preserve maximum compatibility with the standard VGA environment. The VESA INT 10h Super VGA BIOS extensions minimize the changes necessary to an existing VGA BIOS. RAM-based and ROM-based SVGA BIOS implementations are possible.

Standard VGA BIOS

The VESA INT 10g SVGA BIOS Extension minimize the effects on the standard VGA BIOS. Standard VGA BIOS functions need to be modified very little. Two standard VGA BIOS functions are affected by the VESA INT 10h extension:

- Function 00h (Set video mode), and
- Function 0Fh (Read current video state).

VESA-aware applications do not set the video mode using INT 10h function 00h and cannot INT 10h function 0Fh.

SVGA INT 10h functions 02h Set Super VGA mode and 03h Get Super VGA mode are used instead.

VESA-unaware applications such as old programs with popup windows and other TSRs and the DOS CLS command can use VGA BIOS function 0Fh to get the present video mode and can call VGA BIOS INT 10h function 00h to restore or reinitialize the old video mode.

The value returned by INT 10h function 0Fh can be used to reinitialize the video mode through INT 10h function 00h. The system BIOS must track the last SVGA mode in effect.

Output functions such as TTY output, scroll, set pixel, etc. are supported in SVGA modes.

Super VGA Mode Numbers

Standard VGA mode numbers are seven bits wide and range from 00h to 13h. OEMs have defined extended video modes from 14h to 7Fh. Video modes from 80h to FFh cannot be used since VGA BIOS function 00h (Set video mode) interprets bit 7 as a flag to clear or not clear video memory.

VESA video mode numbers are 15 bits wide. To initialize SVGA mode, its number is passed in BX to INT 10h function 02h Set SVGA mode. The format of VESA mode numbers is:

Bit 15 Reserved
Bits 14-9 Must be 0. Reserved for future expansion.
Bit 8-0 Mode number
If bit 8 is not 0, this is not a VESA-defined mode.
If bit 8 is 1, this is a VESA-defined mode.

Extended VGA BIOS

Several new BIOS calls have been defined to support SVGA modes. For maximum compatibility with the standard VGA BIOS, these calls are grouped under one function number, 4Fh. This number is passed in AH to INT 10h.

Status Information

Every function returns status information in the AX register. The format of the status word is as follows:

AH Contents	AL Contents	Meaning
	4Fh	Function is supported.
	not 4Fh	Function is not supported.
00h		Function call was successful.
not 00h		Function call was unsuccessful.

Function 00h Return Super VGA Information

This function provides information to the calling program about the general capabilities of the SVGA environment. The function fills an information block structure at the address specified by the caller. The information block size is 256 bytes.

Input: AH = 4Fh SVGA is supported.
AL = 00h Return SVGA Information
ES:DI = Pointer to Buffer

Output: AX = Status
All other registers are preserved

The information block has the following structure:

```
VgaInfoBlock struc
    VESASignature db  'VESA' ; 4 signature bytes
    VESAVersion       dw  ?              ; VESA version number
    OEMStringPtr      dd  ?              ; Pointer to OEM string
    Capabilities      db  4 dup (?)      ; capabilities of the video environment
    VideoModePtr      dd  ?              ; pointer to supported SVGA modes
    TotalMemory       dw  ?              ; number of 64K memory blocks on board
    Reserved          db  236 dup (?) ; Remainder of VgaInfoBlock
VgaInfoBlock ends
```

Function 00h Return Super VGA Information, cont'd

VgaInfoBlock Field Description

Field	Description
VESASignature	contains the characters 'VESA' if this is a valid block.
VESAVersion	A binary field that specifies the VESA standard level that the SVGA BIOS conforms to. The higher byte specifies the major version number. The lower byte specifies the minor version number. The current VESA version number is 1.2. The VESA BIOS Extension is fully upward-compatible.
OEMStringPtr	A far pointer to a null terminated OEM-defined string. The string identifies the video chip, video board, and memory configuration to hardware-specific display drivers. There are no restrictions on the format of the string.
Capabilities	Describes general features supported in the video environment. The structure is: Bits 31-1 Reserved Bit 0 AC is switchable 0 DAC is fixed width, with six bits per primary color. 1 DAC width is switchable.
VideoModePtr	Points to a list of supported SVGA mode numbers. Each mode number occupies one word (16 bits). The list of mode numbers is terminated by a -1 (0FFFFh). The pointer could point to ROM or RAM. Either the list would be a static string stored in ROM, or the list would verify the current availability of any mode returned by this Function through INT 10h Function 01h Return Super VGA mode information. Not all SVGA video cards support all modes.
TotalMemory	Specifies the amount of memory installed on the VGA board. Its value represents the number of 64 KB blocks of memory currently installed.

Function 01h Return Super VGA Mode Information

This function returns information about a specific SVGA video mode that was returned by Function 0. The function fills a mode information block structure at the address specified by the caller. The mode information block size is maximum 256 bytes.

Some information provided by this function is implicitly defined by the VESA mode number. However, some SVGA implementations might support additional video modes. To provide access to these modes, this function also returns other data about the mode.

Input: AH = 4Fh SVGA support
AL = 01h Return SVGA mode information
CX = SVGA video mode number
ES:DI = Pointer to 256 byte buffer
Output: AX = Status
All other registers are preserved

The mode information block has the following structure:

```
ModeInfoBlock struc
; mandatory information
ModeAttributes          dw  ?    ; mode attributes
WinAAttributes          db  ?    ; window A attributes
WinBAttributes          db  ?    ; window B attributes
WinGranularity          dw  ?    ; windows granularity
WinSize                 dw  ?    ; window size
WinASegment             dw  ?    ; window A start segment
WinBSegment             dw  ?    ; window B start segment
WinFuncPtr              dd  ?    ; pointer to window function
BytesPerScanLine        dw  ?    ; bytes per scan line
                                 ; extended information
XResolution             dw  ?    ; horizontal resolution
YResolution             dw  ?    ; vertical resolution
XCharSize               db  ?    ; character cell width
YCharSize               db  ?    ; character cell height
NumberOfPlanes          db  ?    ; number of memory planes
BitsPerPixel        db  ?    ; bits per pixel
NumberOfBanks           db  ?    ; number of banks
MemoryModel             db  ?    ; memory model type
BankSize                db  ?    ; bank size in KB
NumberOfImagePages  db  ?    ; Number of Images
Reserved                db  1    ; reserved for page function
RedMaskSize             db  ?    ; size of direct color red mask in bits
RedFieldPosition    db  ?    ; bit position of lsb of red mask
GreenMaskSize           db  ?    ; size of direct color green mask in bits
GreenFieldPosition  db  ?    ; bit position of lsb of green mask
BlueMaskSize            db  ?        ; size of direct color blue mask in bits
BlueFieldPosition       db  ?    ; bit position of lsb of blue mask
RsvdMaskSize            db  ?        ; size of direct color reserved mask in b its
RsvdFieldPosition       db  ?    ; bit position of lsb of reserved mask
DirectColorModeInfo db  ?    ; Direct Color mode attributes
Reserved                db  216 dup (?)  ; remainder of ModeInfoBlock
ModeInfoBlock   ends
```

Function 01h Return Super VGA Mode Information, cont'd

ModeInfoBlock Fields

Field	Description
ModeAttributes	Describes certain important characteristics of the video mode. Bit 0 specifies if this mode can be initialized in the present video configuration. This bit can be used to block access to a video mode if it requires a certain monitor type and the monitor is not connected. Bit 1 specifies whether extended mode information is available. This information is required in SVGA INT 10h BIOS Extension v1.2 and later. Bit 2 specifies if the system BIOS supports output functions like TTY output, scroll, pixel output etc. in this mode. The BIOS should support output functions. The field is defined as follows: Bits 15-5 Reserved Bit 4 Mode type 0 Text mode 1 Graphics mode Bit 3 Monochrome/color mode (see below) 0 Monochrome mode 1 Color mode Bit 2 Output functions supported by BIOS 0 Output functions not supported by BIOS. 1 Output functions supported by BIOS. Bit 1 Extended information available 0 Extended mode information not available. 1 Extended mode information available. Bit 0 Mode supported in hardware 0 Mode not supported in hardware. 1 Mode supported in hardware Monochrome modes have their CRTC address at 3B4h. Color modes have their CRTC address at 3D4h. Monochrome modes have attributes in which only bit 3 (video) and bit 4 (intensity) of the attribute controller output are significant. Therefore, monochrome text modes have attributes of off, video, high intensity, blink, etc. Monochrome graphics modes are two plane graphics modes and have their CRTC address at 3D4h, are color modes with one bit per pixel and one plane. The standard VGA modes 06h and 11h are color modes. The standard VGA modes 07h and 0Fh are monochrome modes.
BytesPerScanline	Specifies how many bytes each logical scanline consists of. The logical scanline could be equal to or larger than the displayed scanline.
WinAAttributes WinBAttributes	Describe the characteristics of the CPU windowing scheme, such as if windows exist and are readable and writable, as follows: Bit 7-3 Reserved Bit 2 Window writable 0 Window is not writeable

Field	Description
	1 Window is writeable Bit 1 Window readable 0 Window is not readable 1 Window is readable Bit 0 Windows supported 0 Window is not supported 1 Window is supported If neither window is supported (bit 0 is 0), window paging is not supported and the display memory buffer resides at the CPU address appropriate for the MemoryModel of the mode.
WinGranularity	Specifies the smallest boundary, in KB, on which the window can be placed in the video memory. If WinGranularity equals zero then CPU display memory windowing is not supported.
WinSize	Specifies the size of the window in KB.
WinASegment WinBSegment	Specify the segment addresses where the windows are located in the CPU address space.
WinFuncAddr	Specifies the address of the CPU video memory windowing function. The windowing function can be invoked either through SVGA INT 10h function 05h, or by calling the function directly. A direct call will provide faster access to the hardware paging registers than using INT 10h and is to be used by high performance applications. If WinFuncPtr is NULL (0000:0000) then CPU display memory windowing is not supported.
XResolution YResolution	Specify the width and height of the video mode. In graphics modes, this resolution is in units of pixels. In text modes this resolution is in units of characters. Note that text mode resolutions, in units of pixels, can be obtained by multiplying XResolution and YResolution by the cell width and height, if the extended information is present.
XCharSize YCharSize	Specify the size of the character cell in pixels.
NumberOfPlanes	Specifies the number of memory planes available to software in that mode. For standard 16-color VGA graphics, this would be set to 4. For standard packed pixel modes, the field would be set to 1.
BitsPerPixel	Specifies the number of bits that define the color of one pixel. For example, a standard VGA four-plane 16-color graphics mode would have a 4 in this field and a packed pixel 256-color graphics mode would specify 8 in this field. The number of bits per pixel per plane can normally be derived by dividing the BitsPerPixel field by the NumberOfPlanes field.
MemoryModel	Specifies the general type of memory organization used in this mode. The following models have been defined: 00h = Text mode 01h = CGA graphics 02h = Hercules graphics 03h = 4-plane planar 04h = Packed pixel 05h = Non-chain 4, 256 color 06h = Direct color 07h = YUV

Field	Description
	08h-0Fh = Reserved, to be defined by VESA 10h-FFh = To be defined by OEM In version 1.1 and earlier of the VESA SVGA BIOS Extension, Direct Color 1:5:5:5, 8:8:8, and 8:8:8:8 are defined as Packed Pixel model with 16, 24, and 32 bits per pixel, respectively. In version 1.2 and later of the VESA SVGA BIOS Extension, Direct Color modes should use the Direct Color MemoryModel and use the MaskSize and FieldPosition fields of the ModeInfoBlock to describe the pixel format. BitsPerPixel is always defined to be the total size of the pixel in bits.
NumberOfBanks	The number of banks in which the scan lines are grouped. The remainder from dividing the scan line number by the number of banks is the bank that contains the scan line and the quotient is the scan line number within the bank. For example, CGA graphics modes have two banks and Hercules graphics mode has four banks. For modes that do not have scanline banks (such as VGA modes 0Dh-13h), this field should be set to 1.
BankSize	Specifies the size of a bank (group of scan lines) in units of 1 KB. For CGA and Hercules graphics modes this is 8, as each bank is 8192 bytes in length. For modes that do not have scanline banks (such as VGA modes 0Dh-13h), this field should be set to 0.
NumberOfImagePages	Specifies the number of additional complete display images that will fit into the VGA's memory, at one time, in this mode. The application may load more than one image into the VGA's memory if this field is non-zero, and flip the display between the images.
Reserved	Supports a future VESA BIOS extension feature and will always be set to one in this version.
RedMaskSize, GreenMaskSize, BlueMaskSize, RsvdMaskSize	Define the size, in bits, of the red, green, and blue components of a direct color pixel. A bit mask can be constructed from the MaskSize fields using simple shift arithmetic. Example MaskSize values for Direct Color 5:6:5 mode would be 5, 6, 5, and 0, for the red, green, blue, and reserved fields, respectively. The MaskSize field should be set to 0 in modes using a MemoryModel that does not have pixels with component fields. The RedFieldPosition, GreenFieldPosition, BlueFieldPosition, and RsvdFieldPosition fields define the bit position within the direct color pixel or YUV pixel of the least significant bit of the respective color component. A color value can be aligned with its pixel field by shifting the value left by the FieldPosition. Example FieldPosition values for Direct Color 5:6:5 mode would be 11, 5, 0, and 0, for the red, green, blue, and reserved fields, respectively. The FieldPosition fields should be set to 0 in modes using a MemoryModel that does not have pixels with component fields.
DirectColorModeInfo	Describes important characteristics of direct color modes. Bit 0 specifies if the color ramp of the DAC is fixed or programmable. If the color ramp is programmable, the red, green, and blue lookup tables can be loaded using a standard VGA DAC color registers BIOS call (AX = 1012h). Bit 1 specifies if the Rsvd field of the direct color pixel can be used.

Field	Description
	Bit 1 Rsvd field is reserved. 0 Rsvd field is reserved. 1 Rsvd field is usable by the application. Bit 0 Color ramp is fixed/programmable 0 Color ramp is fixed 1 Color ramp is programmable
MapFuncAddr	Specifies the address of the mapping function. The mapping function can be invoked either through INT 10h Function 06h or by calling the function directly. A direct call provides faster memory mapping than INT 10h.

Notes: Version 1.1 and later VESA BIOS extensions zero all unused fields in the Mode Information Block always returning 256 bytes to ensure upward compatibility with future versions, since new fields will be designed such that values of zero indicate nominal defaults or nonimplementation of optional features. Applications should preinitialize the 256 byte buffer before calling INT 10h Function 00h Return Super VGA Mode Information.

Function 02h Set Super VGA Video Mode

This function initializes a video mode. The BX register contains the video mode number. The format of VESA mode numbers is described in Chapter 2. If the mode cannot be set, the BIOS should leave the video environment unchanged and return a failure error code.

Input: AH = 4Fh SVGA support
AL = 02h Set SVGA video mode
BX = Video mode

Bit 15	Clear memory flag	
	0	Clear video memory
	1	Do not clear video memory
Bits 14-0	Video mode number	

Output: AX = Status
All other registers are preserved

Function 03h Return Current Video Mode

This function returns the current video mode in BX.

Input: AH = 4Fh SVGA support
AL = 03h Return current video mode
Output: AX = Status
BX = Current video mode number
All other registers are preserved

In a standard VGA BIOS, function 0Fh Read Current Video State returns the current video mode in the AL register and also returns the status of the memory clear bit in AL bit 7 (also bit 7 of 40:87). This bit is set if the mode was set without clearing memory. In this SVGA function, the memory clear bit is not returned in BX. Call INT 10h Function 0Fh to query the memory clear bit.

Function 04h Subfunction 00h Save/Restore Buffer Size

Saves and restores the SVGA video state. The functions are a superset of the three subfunctions in standard INT 10h Function 1Ch Save and Restore Video State. The complete SVGA video state except video memory should be saved or restored by setting the requested states mask in CX to 000Fh.

Input: AH = 4Fh SVGA support
AL = 04h Save/Restore SVGA video state
DL = 00h Return save/restore state buffer size
CX = Requested States
Bit 3 Save/restore SVGA state
Bit 2 Save/restore video DAC state
Bit 1 Save/restore video BIOS data state
Bit 0 Save/restore video hardware state

Output: AX = Status
BX = Number of 64 byte blocks to hold the state buffer
All other registers are preserved

Function 04h Subfunction 01h Save Super VGA Video State

Input: AH = 4Fh SVGA support
AL = 04h Save/Restore SVGA video state
DL = 01h Save SVGA video state
CX = Requested States (see Subfunction 00h above)
ES:BX = Pointer to buffer

Output: AX = Status
All other registers are preserved

Function 04h Subfunction 02h Restore Super VGA Video State

Input: AH = 4Fh SVGA support
AL = 04h Save/Restore SVGA video state
DL = 02h Restore SVGA video state
CX = Requested States (see Subfunction 00h above)
ES:BX = Pointer to buffer

Output: AX = Status
All other registers are preserved

Function 05h Subfunction 00h Select SVGA Video Memory Window

This function sets or retrieves the position of the specified window in the video memory. The function allows direct access to the hardware paging registers. To use this function properly, the software should use INT 10h Function 01h Return Super VGA mode information to determine the size, location and granularity of the windows.

Input: AH = 4Fh SVGA support
AL = 05h SVGA video memory window control
BH = 00h Select SVGA video memory window
BL = Window number
0 Window A
1 Window B
DX = Window position in video memory (in window granularity units)

Output: AX = Status

Function 05h Subfunction 01h Return SVGA Video Memory Window

Input: AH = 4Fh SVGA support
AL = 05h SVGA video memory window control
BH = 01h Return SVGA video memory window
BL = Window number
0 Window A
1 Window B

Output: AX = Status
DX = Window position in video memory (in window granularity units)

This function is also directly accessible through a far call from the application. The address of the BIOS function may be obtained via INT 10h Function 01h Return SVGA Mode Information. A field in the ModeInfoBlock contains the address of this function. This function may be different among video modes in a BIOS implementation so the function pointer should be obtained after each set mode.

In the far call version, no status information is returned to the application. Also, in the far call version, the contents of AX and DX registers are destroyed. If AX and DX must be preserved, the application must do so before making the far call.

The application must load the input arguments in BH, BL, and DX for set window but does not need to load either AH or AL to use the far call version of this function.

Function 06h Subfunction 00h Select Scan Line Length

This function sets the length of a logical scan line. This function allows an application to configure a logical video memory buffer that is wider than the displayed area. Function 07h then allows the application to set the starting position to be displayed.

Input: AH = 4Fh SVGA Support
AL = 06h Logical Scan Line Length
BL = 00h Select Scan Line Length
CX = Desired Width in Pixels

Output: AX = Status
BX = Bytes Per Scan Line
CX = Actual Pixels Per Scan Line
DX = Maximum Number of Scan Lines

Function 06h Subfunction 01h Return Scan Line Length

Input: AH = 4Fh SVGA Support
AL = 06h Logical Scan Line Length
BL = 01h Return Scan Line Length

Output: AX = Status
BX = Bytes Per Scan Line
CX = Actual Pixels Per Scan Line
DX = Maximum Number of Scan Lines

The desired width in pixels may not be achievable because of hardware considerations. The next larger value that accommodates the desired number of pixels is used and the actual number of pixels usee is returned in CX. BX returns a value that, when added to a pointer into video memory, points to the next scan line. This function is also valid in text modes. In text modes the application should find the current character cell width through INT 10h Function 01h Return Super VGA Mode Information, multiply that times the desired number of characters per line, and pass that value in the CX register.

Function 07h Subfunction 00h Set Display Start

This function selects the pixel to be displayed in the upper left corner of the display from the logical page. This function can be used to pan and scroll around logical screens that are larger than the displayed screen. This function can also be used to rapidly switch between two different displayed screens for double buffered animation effects.

Input: AH = 4Fh SVGA Support
AL = 07h Display Start Control
BH = 00h Reserved, must be 0.
BL = 00h Set Display Start
CX = First Displayed Pixel in Scan Line
DX = First Displayed Scan Line

Output: AX = Status

Function 07h Subfunction 01h Return Display Start

Input: AH = 4Fh SVGA Support
AL = 07h Display Start Control
BL = 01h Return Display Start

Output: AX = Status
BH = 00h Reserved, set to 0.
CX = First Displayed Pixel in Scan Line
DX = First Displayed Scan Line

This function is also valid in text modes. In text modes, the application should find the current character cell width through INT 10h Function 01h Return Super VGA Mode Information, multiply that times the desired starting character column, and pass that value in the CX register. It should also multiply the current character cell height times the desired starting character row and pass that value in DX.

Function 08h Subfunction00h Set DAC Palette Control

This function queries the operating mode of the DAC palette. Some DACs are configurable to provide 6, 8, or more bits of color definition per red, green, and blue primary color. The DAC palette width must be the standard VGA 6 bits per primary during an INT 10h Set SVGA Mode call with AX = 4F02h.

Input: AH = 4Fh SVGA Support
AL = 08h Set DAC Palette Control
BL = 00h Set DAC Palette Width
BH = Desired number of bits of color per primary (Standard VGA = 6)

Output: AX = Status
BH = Desired number of bits of color per primary (Standard VGA = 6)

Function 08h Subfunction 01h Get DAC Palette Control

Input: AH = 4Fh SVGA Support
AL = 08h Set/Get DAC Palette Control
BL = 01h Get DAC Palette Width

Output: AX = Status
BH = Desired number of bits of color per primary (Standard VGA = 6)

An application can find out if DAC switching is available by querying bit 0 of the Capabilities field of the VgaInfoBlock structure returned by SVGA INT 10h Function 00h Return Super VGA Information. The application can then attempt to set the DAC palette width to the desired value. If the SVGA is not capable of selecting the requested palette width, the next lower value that the SVGA is capable of selecting. The resulting palette width is returned.

Function 10h Subfunction 00h Report VBE/PM Capabilities

This function queries the controller power management capabilities and states.

Input: AH = 4Fh SVGA Support
AL = 10h VBE/PM Services
BL = 00h Report VBE/PM Capabilities
ES:DI = Null pointer, must be 0000:0000 in version 1.0

Output: AX = Status
0 Not supported
1 Supported
BH = Power saving state signal controller support
Bits 7-4 Reserved
Bit 3 Reduced On (not supported by DPMS 1.0)
Bit 2 Off
Bit 1 Suspend
Bit 0 Standby
BL = VBE/PM Version Number
Bits 7-4 Major Version number
Bits 3-0 Minor Version number

Function 10h Subfunction 01h Set VBE/PM Capabilities

Input: AH = 4Fh SVGA Support
AL = 10h VBE/PM Services
BL = 01h Set VBE/PM Capabilities
BH = Requested Power State
00h ON
01h Standby
02h Suspend
04h Off
08h Reduced On (not supported by DPMS 1.0)

Output: AX = Status
BH = Unchanged

Function 10h Subfunction 02h Get Display Power State

Input: AH = 4Fh SVGA Support
AL = 10h VBE/PM Services
BL = 02h Get Display Power State

Output: AX = Status
BH = Display Power State
00h On
01h Standby
02h Suspend
04h Off
08h Reduced On (not supported by DPMS 1.0)
Bits 7-4 are reserved and should be ignored.

Extended SVGA Modes

New SVGA modes can be added and existing modes can be redefined by changing the BIOS save area table pointed to by 0040:00A8. This table is located in ROM after system boot. The following negative offsets have been added:

Offset	Type	Description
-14h	dword	Pointer to next negative offset table in linked list.
-10h	word	04h if offset -14h is a valid pointer. Set to 00h if this link is the last in RAM. Set to 04h and set offset 014 to 0:0 to block all ROM-based modes.
-0Eh	word	Size of supplemental table
-0Ch	dword	Pointer to extended mode supplemental parameters
-08h	dword	Pointer to extended mode standard parameters
-04h	word	Number of extended video modes
-02h	word	RV identifier
00h	dword	Pointer to standard mode standard parameters
04h	dword	Dynamic saver area pointer (palette save area)
08h	dword	Alpha mode auxiliary character generator pointer.
0Ch	dword	Graphics mode auxiliary character generator pointer.
10h	dword	Secondary save pointer
14h	dword	Reserved and set to zero
18h	dword	Reserved and set to zero

System BIOS Processing

The American Megatrends WinBIOS determines the mode to select by processing a linked list of extended mode supplemental parameters tables, while evaluating several factors such as memory size, monitor type, memory clock, and the chipset. From the top down, WinBIOS services a mode set request once all factors have been satisfied. A mode that has multiple horizontal frequencies must be sequentially ordered from the highest frequency at the top to the lowest on the bottom to make sure WinBIOS always sets the correct mode for the monitor type.

Modes can be added to WinBIOS by manipulating the structure described above. WinBIOS always looks for the RAM-defined links first to satisfy a mode set request. If WinBIOS cannot find a mode based on the current configuration of the video subsystem, the ROM tables are scanned.

If new modes are added to WinBIOS by defining them in RAM, a TSR need only modify the negative offsets described above. If modes are redefined, special care must be taken. If a TSR modifies a specific mode frequency that has higher frequencies already defined in ROM, all frequencies must be redefined in RAM.

Extended Mode Supplemental Parameters

Offset	Size	Description
00	byte	Video mode number
01	word	VESA video mode number
03	word	Horizontal resolution
05	word	Vertical resolution
07	byte	Bits per color
08	byte	Character width
09	byte	Character height
0A	byte	VESA memory model (Defined in INT 10h function 01h)
0B	byte	VESA mode attributes (Defined in INT 10h function 01h)
0C	byte	Reserved (00)
0D	byte	Reserved (00)
0E	byte	What chipsets mode is allowed on (Bit location based on return value in AL of alternate function 80h)
0F	byte	Memory required, in 64K blocks
10	byte	Bit mask of supported monitors (montype)
11	byte	SR07, Extended Sequence Control
12	byte	SR0F, DRAM Ctrl
13	byte	SR0E, VCLK3 numerator
14	byte	SR1e, VCLK3 denominator
15	byte	GR0B, Graphics Extensions
16	byte	CR19, Interlace end
17	byte	CR1A, Misc Ctrl
18	byte	CR1B, Display Ctrl
19	byte	DACEXT, DAC hidden register

5AMIBIOS Power-On Self Test

AMIBIOS Power-On Self Test

AMIBIOS provides all IBM-standard POST routines as well as enhanced AMIBIOS POST routines and CPU internal diagnostics. AMIBIOS POST codes can be accessed via the Manufacturing Test Port (I/O Port 80h). AMIBIOS POST checkpoint codes are described in the *AMIBIOS Technical Reference.*

POST Phases

When the system is powered on, the AMIBIOS executes POST, which has two phases:

- *System Test and Initialization* (test and initialize motherboards for normal operations), and
- *System Configuration Verification* (compare defined configuration with there hardware actually installed).

AMIBIOS Error Reporting

The AMIBIOS performs diagnostic when the system is powered up. Error s are reported in one of two ways:

If...	Then...
the error occurs before the display device is initialized,	a series of beeps sound. Beep codes indicate that a fatal error has occurred. The AMIBIOS 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 below. A prompt to press <F1> can also appear.

Beep Codes

Errors may occur during POST (Power On Self Test), performed every time the system is powered on. Fatal errors are communicated through a series of audible beeps.

Beeps	Error message	Description
1	Refresh Failure	The memory refresh circuitry on the motherboard is faulty.
2	Parity Error	Parity error in the first 64 KB of memory.
3	Base 64 KB Memory Failure	Memory failure in first 64 KB.
4	Timer Not Operational	Memory failure in the first 64 KB or Timer 1 on the motherboard is not functioning.
5	Processor error	The CPU (Central Processing Unit) on the motherboard has generated an error.
6	8042 - Gate A20 Failure	AMIBIOS cannot switch to protected mode.
7	Processor Exception Interrupt Error	The CPU on the motherboard generated an exception interrupt.
8	Display Memory Read/Write Error	The system video adapter is either missing or its memory is faulty.
9	ROM Checksum Error	The ROM checksum value does not match the value encoded in AMIBIOS.
10	CMOS Shutdown Register Read/Write Error	The shutdown register for CMOS RAM failed.

What to Do If the Computer Beeps

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

AMIBIOS Displayed Error Messages

If POST initializes the system video monitor, errors can be displayed on the screen. These errors usually allow the system to continue. They are listed on Page 140. Error message are displayed as follows:

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

Press <F1> to continue the boot process. The system does not halt if *Wait for <F1> If Any Error* in Advanced Setup is *Disabled.*

Error Message	Explanation
8042 Gate-A20 Error	Gate A20 on the keyboard controller (8042) is not working. Replace the 8042.
Address Line Short!	Error in the address decoding circuitry on the motherboard.
C: Drive Error	No response from drive C:. Run the Hard Disk Utility. Check the C: hard disk type in Standard Setup.
C: Drive Failure	No response from drive C:. It may be necessary to replace the hard disk.
Cache Memory Bad, Do Not Enable Cache!	Cache memory on the motherboard is defective. Consult the cache memory manufacturer.
CH-2 Timer Error	Most 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.
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 AMIBIOS Setup.
CMOS System Options Not Set	The values stored in CMOS RAM are either corrupt or nonexistent. Run AMIBIOS Setup.
CMOS Display Type Mismatch	The video type in CMOS RAM does not match the type detected by AMIBIOS. Run AMIBIOS Setup.
CMOS Memory Size Mismatch	The amount of memory on the motherboard is different than the amount in CMOS RAM. Run AMIBIOS Setup.
CMOS Time & Date Not Set	Run Standard Setup to set the date and time in CMOS RAM.
D: Drive Error	No response from drive D:. Run the Hard Disk Utility. Check the D: hard disk type in Standard Setup.
D: drive failure	No response from drive D:. It may be necessary to replace the hard disk.
Diskette Boot Failure	The boot diskette in floppy drive A: cannot be used to boot the system. Use another boot diskette and follow the

Error Message	Explanation
	screen instructions.
Display Switch Not Proper	Some systems require 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	Error in the second DMA channel on the motherboard.
FDD Controller Failure	AMIBIOS cannot communicate with the floppy disk drive controller. Check all appropriate connections after the system is powered down.
HDD Controller Failure	AMIBIOS cannot communicate with the hard disk drive controller. Check all appropriate connections after the system is powered down.
INTR #1 Error	Interrupt channel 1 failed the POST diagnostic test.
INTR #2 Error	Interrupt channel 2 failed the POST diagnostic test.
Invalid Boot Diskette	AMIBIOS 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	Timing problem with the keyboard. Make sure a keyboard controller AMIBIOS is installed. Set the *Keyboard* option in Standard Setup to *Not Installed* to skip the keyboard POST routines.
KB/Interface Error	Error in 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:. Use a bootable disk.
Off Board Parity Error	Parity error in offboard memory. The format is: OFF BOARD PARITY ERROR ADDR (HEX) = (XXXX) *XXXX* is the hex address where the error occurred. Run AMIDiag to find and correct memory problems.
Onboard Parity Error	Parity error in motherboard memory. The format is: Onboard PARITY ERROR ADDR (HEX) = (XXXX) *XXXX* is the hex address where the error occurred. Run AMIDiag to find and correct memory problems.
Parity Error ????	Parity error in system memory at an unknown address. Run AMIDiag to find and correct memory problems.

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 other than the CPU has driven the bus signal for more than 7.8 microseconds.

AMIBIOS Configuration Summary Screen

The AMIBIOS displays the following screen when the POST routines are successfully completed.

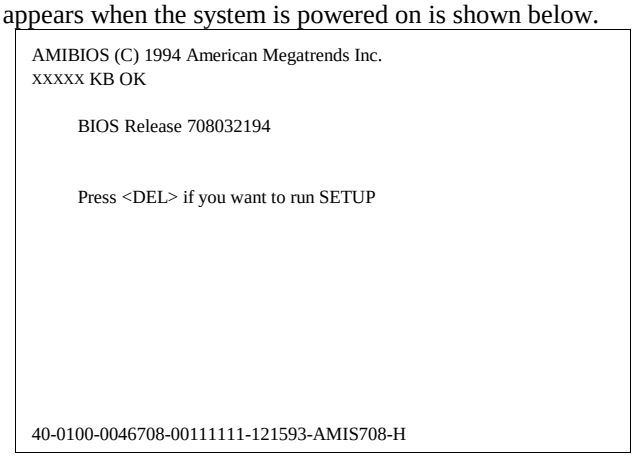
AMIBIOS System Configuration (C) Copyright 1985-1994 American Megatrends Inc.

Main Processor	: 80486DX4	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/PGA/EGA	Serial Port(s)	: 3F8
AMIBIOS Date:	: 11/11/92	Parallel Port(s)	: 378

256 KB CACHE
80486DX4 33/100MHz CPU

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.



The AMIBIOS Identification string appears in the left bottom corner of the screen. Press <Ins> during system boot to display two additional BIOS Identification strings. These strings contain system information. The AMIBIOS Identification String are described in the *ISA and EISA Hi-Flex AMIBIOS Technical Reference*.

When a problem occurs, freeze the screen by powering on the system and holding a key down, which causes a *Keyboard Error* message. Copy the BIOS Identification Strings and report this information to American Megatrends Technical Support. Press <F1> to continue.

Enable the *Wait for <F1> If any Error* option in Advanced Setup before using this method to freeze the screen.

The following message is displayed after POST is completed:

Hit <DEL> if you want to run SETUP

Press <Del> to access AMIBIOS Setup.

6 WinBIOS Setup

In ISA and EISA computers, the system parameters (such as amount of memory, type of disk drives and video displays, and many other elements) are stored in CMOS RAM. Unlike the DRAM (dynamic random access memory) that is used for standard system memory, CMOS RAM requires very little power. When the computer is turned off, a back-up battery provides power to CMOS RAM, which retains the system parameters. Every time the computer is powered-on, the computer is configured with the values stored in CMOS RAM by the system BIOS, which gains control when the computer is powered on.

The system parameters are configured by a system BIOS Setup utility. Historically, BIOS Setup utilities have been character-based, required keyboard input, and has user interfaces that were not very intuitive.

A New Type of System BIOS Setup Utility

American Megatrends has now made available a new type of system BIOS Setup utility. WinBIOS Setup has a graphical user interface that permits mouse access, and is so compact that it can reside on the same ROM as the system BIOS. The system configuration parameters are set via WinBIOS Setup. Since WinBIOS Setup resides in the ROM BIOS, it is available each time the computer is turned on.

Starting WinBIOS Setup

As POST executes, the following appears:

Hit <DEL> if you want to run SETUP

Press <Del> to run WinBIOS Setup.

Using a Mouse with WinBIOS Setup

WinBIOS Setup has a built-in mouse driver and can be accessed by either a serial mouse or PS/2-style mouses. WinBIOS Setup supports Microsoft-Compatible serial mouses and all PS/2-type mouses.

The mouse click functions are: single click to change or select both global and current fields and double clock to perform an operation in the selected field.

Using the Keyboard with WinBIOS Setup

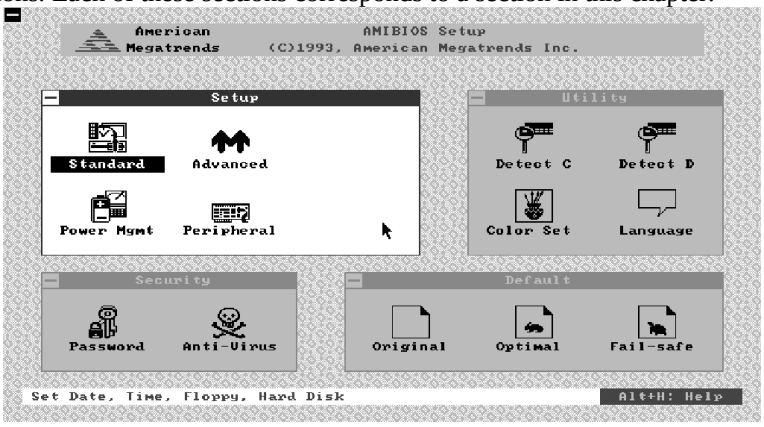
WinBIOS has a built-in keyboard driver that uses simple keystroke combinations:

<Tab> Change or select a global field.
→, ←, ↑, ↓ Change or select the current field.
<Enter> Performs an operation in the current field.
+ Increments a value.
- Decrements a value.
<Esc> Aborts any window function.
<PgUp> Returns to the previous page.
<PgDn> Advances to the next page.
<Home> Returns to the beginning of the text.
<End> Advances to the end of the text.
<Alt> Used with certain key function, as in <Alt> <key>.

Press <Ctrl> <Alt> <+> to change to High speed. Press <Ctrl> <Alt> <-> to change to Low speed.

WinBIOS Setup

The WinBIOS Setup main menu, shown below, is organized into four sections. Each of these sections corresponds to a section in this chapter.



Each section contains several icons. Clicking on each icon activates a specific AMIBIOS function. The WinBIOS Setup main windows and related functions are described on the next page.

WinBIOS Setup Main Windows

The WinBIOS Setup main windows are:

Setup — described in Section 1 on page 148, this section has five icons that permit you to set system configuration options such as date, time, hard disk type, floppy type, and many others,

Utilities — described in Section 2 beginning on page 167, has four icons that perform system functions,

Security — described in Section 3 beginning on page 169, has two icons that control AMIBIOS security features, and

Default — described in Section 4 beginning on page 173, this section has three icons that permit you to select a group of settings for all AMIBIOS WinBIOS Setup options.

Section 1

Setup

Standard Setup

Standard Setup options are displayed by choosing the Standard icon from the WinBIOS Setup main menu (see page 146). All Standard Setup options are described in this section. The Standard Setup screen follows.

Date, Day and Time Configuration

Select the Standard option. Select the Date and Time icon. The current values for each category are displayed. Enter new values through the keyboard.

Hard Disk C: Type
Hard Disk D: Type

Select one of these hard disk drive icons to configure the drive named in the option. A scrollable screen that lists all valid disk drive types is displayed. Select the correct type and press <Enter>. If the hard disk drive is an IDE drive, select Detect C: or Detect D: from the Utility section of the WinBIOS Setup main menu to have AMIBIOS automatically detect the IDE drive parameters and report them to this screen.

Entering Drive Parameters

You can also enter the hard disk drive parameters. The drive parameters are:

Parameter	Description
Type	The number for a drive with certain identification parameters.
Cylinders	The number of cylinders in the disk drive.
Heads	The number of heads.
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 will normally park when the system is shut down.
Sectors	The number of sectors per track. MFM drives have 17 sectors per track. RLL drives have 26 sectors per track. ESDI drives have 34 sectors per track. SCSI and IDE drive may have even more sectors per track.
Capacity	The formatted capacity of the drive is (Number of heads) x (Number of cylinders) x (Number of sectors per track) x (512 bytes per sector)

Hard Disk Drive Types

Hard Disk Drive Types

Type	Cylinders	Heads	Write Precompensation	Landing Zone	Sectors	Capacity
1	306	4	128	305	17	10 MB
2	615	4	300	615	17	20 MB
3	615	6	300	615	17	31 MB
4	940	8	512	940	17	62 MB
5	940	6	512	940	17	47 MB
6	615	4	65535	615	17	20 MB
7	462	8	256	511	17	31 MB
8	733	5	65535	733	17	30 MB
9	900	15	65535	901	17	112 MB
10	820	3	65535	820	17	20 MB
11	855	5	65535	855	17	35 MB
12	855	7	65535	855	17	50 MB
13	306	8	128	319	17	20 MB
14	733	7	65535	733	17	43 MB
16	612	4	0	663	17	20 MB
17	977	5	300	977	17	41 MB
18	977	7	65535	977	17	57 MB
19	1024	7	512	1023	17	60 MB
20	733	5	300	732	17	30 MB
21	733	7	300	732	17	43 MB
22	733	5	300	733	17	30 MB
23	306	4	0	336	17	10 MB
24	925	7	0	925	17	54 MB
25	925	9	65535	925	17	69 MB
26	754	7	754	754	17	44 MB
27	754	11	65535	754	17	69 MB
28	699	7	256	699	17	41 MB
29	823	10	65535	823	17	68 MB
30	918	7	918	918	17	53 MB
31	1024	11	65535	1024	17	94 MB
32	1024	15	65535	1024	17	128 MB
33	1024	5	1024	1024	17	43 MB
34	612	2	128	612	17	10 MB
35	1024	9	65535	1024	17	77 MB
36	1024	8	512	1024	17	68 MB
37	615	8	128	615	17	41 MB
38	987	3	987	987	17	25 MB
39	987	7	987	987	17	57 MB
40	820	6	820	820	17	41 MB
41	977	5	977	977	17	41 MB
42	981	5	981	981	17	41 MB
43	830	7	512	830	17	48 MB
44	830	10	65535	830	17	69 MB
45	917	15	65535	918	17	114 MB
46	1224	15	65535	1223	17	152 MB
47	USER-DEFINED HARD DRIVE - Enter user-supplied parameters.					

Using Auto Detect Hard Disk (Only for IDE Drives)

If you select Detect C: or Detect D: from the Utility section of the WinBIOS Setup main menu, AMIBIOS automatically finds all IDE hard disk drive parameters. AMIBIOS places the hard disk drive parameters that it finds in the Drive C: Type or Drive D: Type fields in Standard Setup.

Floppy Drive A:
Floppy Drive A:
Floppy Drive B:

Move the cursor to these fields via ↑ and ↓ and select the floppy type. The settings are *360 KB 5¼ inch, 1.2 MB 5¼ inch, 720 KB 3½ inch, 1.44 MB 3½ inch,* or *2.88 MB 3½ inch.*

Advanced Setup options are displayed by choosing the Advanced icon from the WinBIOS Setup main menu (see page 146). All Advanced Setup options are described in this section.

Typematic Rate (Chars/Sec)

Typematic Rate sets the rate at which characters on the screen repeat when a key is pressed and held down. The settings are *15*, *20*, *24*, or *30* characters per second. The Optimal default setting is *30*. The Fail-Safe default setting is *Disabled.*

System Keyboard

This option does not specify if a keyboard is attached to the computer. Rather, it specifies if error messages are displayed if a keyboard is not attached. This option permits you to configure workstations with no keyboards. The settings are *Absent* or *Present.* The Optimal and Fail-Safe default settings are *Present.*

Primary Display

Select this icon to configure the type of monitor attached to the computer. The settings are *Mono*, *CGA40x25*, *CGA80x25*, *VGA/EGA*, or *Absent*. The Optimal and Fail-Safe default settings are *VGA/EGA.*

Mouse Support

When this option is enabled, AMIBIOS supports a PS/2-type mouse. Pins 1-2 of J20 on the motherboard must be shorted together to enable PS/2 mouse support. The settings are *Enabled* or *Disabled.* The Optimal default setting is *Enabled.* The Fail-Safe default setting is *Disabled.*

Above 1 MB Memory Test

When this option is enabled, the BIOS memory test is performed on all system memory. When this option is disabled, the memory test is done only on the first 1 MB of system memory. The settings are *Enabled* or *Disabled.* The Optimal default setting is *Disabled.* The Fail-Safe default setting is *Enabled.*

Memory Test Tick Sound

This option enables (turns on) or disables (turns off) the ticking sound during the memory test. The settings are *Enabled* or *Disabled.* The Optimal and Fail-Safe default settings are *Enabled.*

Memory Parity Error Check

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

Hit <DEL> Message Display

Disabling this option prevents

Hit <DEL> if you want to run Setup

from appearing when the system boots. The settings are *Enabled* or *Disabled.* The Optimal and Fail-Safe default settings are *Enabled.*

Extended BIOS RAM Area

Specify in this option if the top 1 KB of the system programming area beginning at 639K or 0:300 in the BIOS area in low memory will be used to store hard disk information. The settings are *Top 1K* or *0:300*. The Optimal and Fail-Safe default settings are *0:300*.

Wait for <F1> If Any Error

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

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

If this option is enabled, AMIBIOS waits for the end user to press <F1> before continuing. If this option is disabled, AMIBIOS continues the boot process without waiting for <F1> to be pressed. The settings are *Enabled* or *Disabled*. The Optimal and Fail-Safe default settings are *Enabled*.

System Boot Up Num Lock

When *On*, this option turns off *Num Lock* when the system is powered on so the end user can use the arrow keys on both the numeric keypad and the keyboard. The settings are *On* or *Off*. The Optimal default setting is *Off*. The Fail-Safe default setting is *On*.

Floppy Drive Seek At Boot

When this option is enabled, AMIBIOS performs a Seek command on floppy drive A: before booting the system. The settings are *Enabled* or *Disabled*. The Optimal default setting is *Disabled*. The Fail-Safe default setting is *Enabled*.

System Boot Up Sequence

This option sets the sequence of boot drives (either floppy drive A: or hard disk drive C:) that the AMIBIOS attempts to boot from after AMIBIOS POST completes. The settings are *C:,A:* or *A:,C:*. The Optimal default setting is *C:,A:*. The Fail-Safe default setting is *A:,C:*.

System Boot Up CPU Speed

This option sets the speed of the CPU at system boot time. The settings are *High* or *Low*. The Optimal default setting is *High.* The Fail-Safe default setting is *Low*.

External Cache

This option enables secondary cache memory. If *Disabled* is chosen, all secondary cache memory is disabled. The settings are *Disabled* or *Enabled*. The Optimal default setting is *Enabled.* The Fail-Safe default setting is *Disabled.*

Internal Cache

This option enables internal cache memory on the CPU. If *Disabled* is chosen, the internal cache memory on the CPU is disabled. The settings are *Disabled* or *Enabled.* The Optimal and Fail-Safe default settings are *Disabled*.

Password Checking

This option enables the password check option every time the system boots or the end user runs Setup. If *Always* is chosen, a user password prompt appears every time the computer is turned on. If *Setup* is chosen, the password prompt appears if WinBIOS is executed. See page 169 for instructions on changing a password. The Optimal and Power-On defaults are *Setup.*

Video ROM Shadow Cacheable

If *Enabled* is selected, the contents of the RAM area (C0000h - C7FFFh) where the video ROM has been copied can be read from or written to secondary cache memory. The video ROM BIOS is always shadowed to RAM for faster execution. The settings are *Enabled* or *Disabled.* The Optimal default setting is *Enabled.* The Fail-Safe default setting is *Disabled.*

Shadow C800,32K
Shadow D000,32K
Shadow D800,32K
Shadow DC00,32K
Shadow E000,64K

These options enable shadowing of the contents of the ROM area named in the option title. The settings are *Enabled* or *Disabled.* The Optimal and Fail-Safe default settings are *Disabled.*

The ROM area that is not used by ISA adapter cards will be allocated to VL-Bus adapter cards.

System BIOS Cacheable

When this option is set to *Enabled,* the contents of the F0000h system memory segment can be read from or written to secondary cache memory. This memory is always copied from the BIOS ROM to system RAM for faster execution. The settings are *Enabled* or *Disabled.* The Optimal default setting is *Enabled.* The Fail-Safe default setting is *Disabled.*

Shadow RAM Write-Protection

When this option is set to *Enabled,* the system memory locations that have been copied from ROM for faster execution cannot be written to. Setting this option to *Enabled* prevents key areas such as the system BIOS and Video BIOS from inadvertent destruction. The settings are *Enabled* or *Disabled.* The Optimal and Fail-Safe default settings are *Enabled.*

External Cache Write Mode

This option specifies the type of caching algorithm. The settings are *Write-Bk* (write-back) or *Write-Th* (write-through). The Optimal default setting is *Write-Bk.* The Fail-Safe default setting is *Write-Th.*

Non-Cacheable Block

This option specifies how the non-cacheable block of system memory can be used. The settings are *DRAM* or *ATBus.* The Optimal and Fail-Safe default settings are *DRAM.*

If *DRAM* is selected, the contents of the area of memory specified in the **Non-Cacheable Block Size** and **Non-Cacheable Block Base** options cannot be read from or written to either internal or secondary cache memory.

If **ATBus** is selected, the area of memory specified in the **Non-Cacheable Block Size** and **Non-Cacheable Block Base** options is treated as if it were not there.

Non-Cacheable Block Size

This option specifies the size of the Non-Cacheable area of memory. The settings are Disabled, *128 KB, 256 KB, 512 KB, 1 MB, 2 MB,* or *4 MB.* The Optimal and Fail-Safe default settings are *Disabled.*

Non-Cacheable Block Base

This option specifies the starting address of the Non-Cacheable area of memory. The settings are *64 KB, 128 KB, 256 KB, 512 KB 1 MB, 2 MB, 4 MB,* or *8 MB.* The Optimal and Fail-Safe default settings are *64 KB.*

8/16 Bit I/O Recovery

This option specifies the length of the delay that is added to the CPU cycle after an 8-bit or 16-bit I/O operation. The length of the delay is related to the CPU type and frequency. The recommended settings are:

Setting	CPU Type and Frequency
4/2 CLK	25 or 33 MHz 486
4/2 CLK	50 MHz 486
7/3 CLK	50 MHz 486DX2
11/5 CLK	66 MHz 486DX2
11/5 CLK	75 MHz 486DX4
11/5 CLK	100 MHz 486DX4
16/8 CLK	Reserved

The Optimal default setting is *4/2 CLK.* The Fail-Safe default setting is *16/8 CLK.*

External Clock for 100MHz DX4

This option specifies the external clock speed for a 100 MHz 486DX4 CPU. The settings are *50MHz* or *33 MHz.* The Optimal and Fail-Safe default settings are *50MHz.*

> ***Important***
>
> The 486DX4 CPU must have the proper voltage. Pins 1-2, 3-4, and 5-6 on J56 must be shorted.
>
> A heat sink (U70) to change the CPU voltage from 5V to 3.3V must be installed. 3.3V CPUs cannot be used unless this voltage regulator is installed.

A 100 MHz 486DX4 CPU can be configured in two ways:

This option	CPU Speed	External Speed	Motherboard Jumper Settings
50 MHz	100 MHz	50 MHz	Pins 1-2 of J37 must be shorted. J11, J12, and J15 should all be OPEN.
33 MHz	100 MHz	33.33 MHz	J37, J11, and J15 must be OPEN. A shorting bridge must be installed on J12.

The setting of this option has no effect on the configuration of any other type of Intel CPU. It only affects the 100 MHz 486DX4 CPU.

Power Management Setup options are displayed by choosing the Power Mgmt icon from the WinBIOS Setup main menu (see page 146). All Power Management Setup options are described in this section.

Display Timeout

Power to the system monitor can be controlled when this option is set to *Enabled*. The setting of the **System Event Timer** option specifies the timeout period before the system monitor power is turned off. The settings for this option are *Disabled* or *Enabled.* The Optimal and Fail-Safe default settings are *Disabled.*

The system monitor must be VESA DPMS (Display Power Management Specification)-aware. If using a standard VGA monitor that is not DPMS-aware, you can achieve the same type of power savings by setting the **Power Supply Timeout** option to *Enabled.*

Setting the **Power Supply Timeout** option to *Enabled* requires a Green PC power supply with a two-pin auxiliary power connector (see page 162).

This option is only supported if an S-Series Intel CPU is installed on the motherboard.

Before this option can be set to *Enabled*, the **System Event Timer** option setting must be a value between *1 Min* and *15 Min.* and the **Stop Clock Mode** option must be set to *Enabled.*

Low Speed Timeout

The clock on the motherboard can be switched to 8 MHz (after the timeout period specified in the **System Event Timer** option expires) when this option is set to *Enabled.* The settings are *Disabled* or *Enabled.* The Optimal and Fail-Safe default settings are *Disabled.*

Do not set this option to *Enabled* when any VL-Bus adapter cards are installed. Some VL-Bus adapter cards do not work when the computer runs at 8 MHz.

Before this option can be set to *Enabled,* the **System Event Timer** option setting must be a value between *1 Min* and *15 Min.* and the **Stop Clock Mode** option must be set to *Enabled.*

This option is only supported if an S-Series Intel CPU is installed on the motherboard.

Power Supply Timeout

This option can be used to control a Green PC-capable power supply (such as the SENSTRON GP2-4200F power supply). When this option is set to Enabled, the power supply can be placed in Green PC poser savings mode when the timeout period specified in the **System Event Timer** option expires via the J1 output. The settings are *Disabled* or *Enabled.* The Optimal and Fail-Safe default settings are *Disabled.*

Before this option can be set to *Enabled,* the **System Event Timer** option setting must be a value between *1 Min* and *15 Min.* and the **Stop Clock Mode** option must be set to *Enabled.*

Power supplies that support a timeout feature provide a cable with a two-pin berg header, often called the Auxiliary Power Connector. Usually, the black wire is Ground and the Green wire is the active signal. Connect the black wire to Pin 1 of J1. Connect the Green wire to Pin 2 of J1 on the motherboard.

If the VGA monitor does not support DPMS (the VESA Display Power Management Specification), you can connect the VGA monitor to the auxiliary output of a Green PC power supply. When the length of time specified in the **System Event Timer** option time period has expired, AMIBIOS turns off any device connected to the auxiliary connector.

Green PC power supplies usually identify the power connectors that can be turned off in Green PC mode.

This option is only supported if an S-Series Intel CPU is installed on the motherboard.

Stop Clock Mode

When this option is set to *Enabled,* the CPU stop clock is programmed through the *system event timer.* The settings are *Enabled* or *Disabled.* The Optimal and Fail-Safe default settings are *Disabled.*

This option is only supported if an S-Series Intel CPU is installed on the motherboard.

System Event Timer

When this option is set to *Disabled,* the CPU stop clock is not generated to the CPU. Otherwise, the selected length of time specifies the period of system inactivity that must expire before the stop clock signal is generated. The following events reset this timer:

- any activity in the C0000h - C7FFFh video BIOS,
- any activity in A0000h - BFFFFh video memory,
- any I/O activity in I/O ports addresses 0001h - 3FFFh,
- any DMA activity,
- an LBM (local bus master) signal on the VL-Bus,
- IRQ 3, 4, 5, 7, 9, 10, 11, 12, or 15 activity (if the **Timer Reset by IRQ** option is set to *Enabled),*

The **Stop Clock Mode** option must be set to *Enabled* before this option can be set to any setting from *1 Min* through *15 Min.*

The settings are *Disabled, 1 Min, 2 Min, 3 Min, 4 Min, 5 Min, 6 Min, 7 Min, 8 Min, 9 Min, 10 Min, 11 Min, 12 Min, 13 Min, 14 Min,* or *15 Min.* The Optimal and Fail-Safe default settings are *Disabled.*

This option is only supported if an S-Series Intel CPU is installed on the motherboard.

Peripheral Setup

Peripheral Setup options are displayed by choosing the Peripheral Setup icon from the WinBIOS Setup main menu (see page 146). All Peripheral Setup options are described in this section.

On-Board Floppy

This option enables the use of the floppy drive controller on the motherboard (if installed). The settings are *Enabled* or *Disabled.* The Optimal and Fail-Safe default settings are *Disabled.*

On-Board IDE

This option enables the use of the IDE controller on the motherboard (if installed). The settings are *Enabled* or *Disabled.* The Optimal and Fail-Safe default settings are *Disabled.*

IDE Block Mode

Set this option to *Enabled* to achieve higher data transfer rates when using IDE drives that support IDE Block Mode. The settings are *Enabled* or *Disabled.* The Optimal and Fail-Safe default settings are *Disabled.*

IDE Drive 0 Mode
IDE Drive 1 Mode

These options specify the IDE mode that the respective IDE hard disk drive (0 or 1) will operate in. The settings are *Mode 0, Mode 1,* or *Mode 2. Mode 2* is the fastest. The Optimal and Fail-Safe default settings are *Disabled.*

Make sure you read the IDE drive technical documentation to determine the IDE modes that the hard disk drive in your computer supports. Selecting a fast mode on a slower IDE drive will result in data loss.

IDE Read Ahead

When this option is set to *Enabled,* the data transfer rate from the IDE drive is improved because sequential accesses to the IDE drive are anticipated. The settings are *Enabled* or *Disabled.*

> ***Warning***
> This option must be set to *Disabled* if using Windows NT.

First Serial Port Address

IRQ4 is used for the first serial port (COM1). This option enables serial port 1 on the motherboard (if installed). The settings are *3E8h, 3F8h,* or *Disabled.* The Optimal and Fail-Safe default settings are *Disabled.*

Second Serial Port Address

IRQ3 is used for the second serial port (COM2). This option enables serial port 2 on the motherboard, if installed. The settings are *2F8h, 2E8h,* or *Disabled.* The Optimal and Fail-Safe default settings are *Disabled.*

First Serial Port FIFO

This option enables the FIFO buffer for the first serial port. The settings are *Enabled* or *Disabled.* The BIOS Setup default is *Disabled.* The Optimal and Fail-Safe default settings are *Disabled.*

Second Serial Port FIFO

This option enables the FIFO buffer for the second serial port. The settings are *Enabled* or *Disabled.* The BIOS Setup default is *Disabled.* The Optimal and Fail-Safe default settings are *Disabled.*

Parallel Port Address

IRQ7 is used for the parallel port (LPT1). The IRQ can be changed to IRQ5. This option enables the parallel port on the motherboard, if installed. The settings are *378h, 278h,* or *Disabled.* The Optimal and Fail-Safe default settings are *Disabled.*

Section 2

Utility

The following icons appear in this section:

Detect C: if drive C: is an IDE drive, the hard disk drive parameters for drive C: are automatically detected and reported to the Hard Disk Drive C: screen in Standard Setup, so you can easily configure drive C:.

Detect D: if drive D: is an IDE drive, the hard disk drive parameters for drive D: are automatically detected and reported to the Hard Disk Drive D: screen in Standard Setup, so you can easily configure drive D:.

Color Set sets the WinBIOS Setup screen colors.

Section 3

Security

AMIBIOS Password Support

WinBIOS Setup has an optional password feature. The system can be configured so that all users must enter a password every time the system boots or when WinBIOS Setup is executed.

Setting a Password

The password check option is enabled in Advanced Setup (see page 155) by choosing either *Always* (the password prompt appears every time the system is powered on) or *Setup* (the password prompt appears only when WinBIOS is run). The password is stored in CMOS RAM.

The system asks for a password.

Enter a 1 – 6 character password. The password does not appear on the screen when typed. Make sure you write it down. If you forget it, you must drain CMOS RAM and reconfigure the system.

If You Do Not Want to Use a Password

Just press <Enter> when the password prompt appears.

Changing a Password

Select the *Password* icon from the Security section of the WinBIOS Setup main menu. Enter the password and press <Enter>. The screen does not display the characters entered. After the new password is entered, retype the new password as prompted and press <Enter>.

If the password confirmation is incorrect, an error message appears. If the new password is entered without error, press <Esc> to return to the WinBIOS Main Menu. The password is stored in CMOS RAM after WinBIOS completes. The next time the system boots, you are prompted for the password if the password function is present and is enabled.

Remember the Password

Keep a record of the new password when the password is changed. If you forget the password, remove the computer cover, set switch 1-2 (the DIAG switch) to ON, power on the computer. AMIBIOS will erase the password.

Anti-Virus

When this icon is selected from the Security section of the WinBIOS Setup main menu, AMIBIOS issues a warning when any program (or virus) issues a Disk Format command or attempts to write to the boot sector of the hard disk drive. The settings are *Enabled* or *Disabled.* If enabled, the following appears when a write is attempted to the boot sector. You may have to type *N* several times to prevent the boot sector write.

```
Boot Sector Write!!!
Possible VIRUS: Continue (Y/N)? _
```

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

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

Section 4

Default

The icons in this section permit you to select a group of settings for all WinBIOS Setup options. Not only can you use these icons to quickly set system configuration parameters, you can choose a group of settings that have a better chance of working when the system is having configuration-related problems.

Original

Choose the Original icon to return to the system configuration values present in WinBIOS Setup when you first began this WinBIOS Setup session.

Optimal

You can load the optimal default settings for the WinBIOS by selecting the Optimal icon. The Optimal default settings are best-case values that should optimize system performance. If CMOS RAM is corrupted, the Optimal settings are loaded automatically.

Fail-Safe

You can load the Fail-Safe WinBIOS Setup option settings by selecting the Fail-Safe icon from the Default section of the WinBIOS Setup main menu.

The Fail-Safe settings provide far from optimal system performance, but are the most stable settings. Use this option as a diagnostic aid if the system is behaving erratically.

7 Flash EPROM Programming

All versions of the American Megatrends Super Voyager LPX ISA motherboard use Flash EPROM to store the system BIOS.

The advantage of using a Flash EPROM is that the EPROM chip does not have to be replaced to update the BIOS. The end user can actually reprogram the BIOS, using a ROM file supplied by American Megatrends.

There are two methods for programming the Flash EPROM:

- program from system boot,
- run the AMIFlash utility.

Programming Flash from System Boot

Insert the floppy disk with the new BIOS file in drive A:, press and hold down the <Ctrl> and <Home> keys to reprogram the Super Voyager LPX motherboard Flash EPROM-based AMIBIOS before DOS boots.

Using AMIFlash

AMIFlash is a DOS utility that is executed from the DOS command line. You can reprogram the Super Voyager LPX motherboard Flash EPROM-based AMIBIOS from the DOS command prompt using AMIFlash.

Reprogramming from System Boot

When you reprogram from system boot, the American Megatrends Flash utility:

1. reads S708P.ROM from the root directory of the floppy disk in drive A:,
2. erases the Flash EPROM,
3. programs the Flash EPROM with the data read from the floppy disk in drive A:, and
4. generates a CPU reset, rebooting the system.

The bootblock part of the Flash EPROM is not programmed. Should the user inadvertently open the disk drive door or turn power off to the computer while programming the Flash EPROM, the bootblock will be unaffected. Simply turn power back on and begin the Flash ROM programming process again. The bootblock code immediately reads the A: drive, looking for the new BIOS information.

S708P.ROM

S708P.ROM resides on a floppy disk and contains the updated main BIOS code. American Megatrends will provide this file when the AMIBIOS for the Super Voyager LPX ISA motherboard must be updated.

S708P.ROM must be present in the root directory of the floppy disk before the onboard Flash EPROM can be reprogrammed. The file that has the main BIOS code must be named S708P.ROM.

Programming the Flash EPROM

Step	Action
1	Turn system power off.
2	Place the floppy disk that has the latest S708P.ROM BIOS file in floppy drive A:.
3	Make sure that the system has a speaker that is connected.
4	Turn system power on while pressing and holding down the <Ctrl> and <Home> keys.

Sequence of Operation

The following table lists the sequence of operation and the expected behavior of the AMIFlash Code.

Step	Expected behavior
1 Look for floppy disk.	The system beeps one time before the BIOS attempts to read from floppy drive A:.
2 Look for S708P.ROM on the floppy disk.	S708P.ROM must be in the root directory of the floppy disk in drive A:. There is no beep if successful.
3 Read the floppy disk.	The floppy disk is read. There is no beep if this step is successful.
4 Check for BIOS file size.	The BIOS file size is checked. There is no beep if this step is successful.
5 Check for Flash EPROM.	The BIOS looks for an Intel i28F001BX-T Flash EPROM. It does not beep if this step is successful.
6 Erase the Flash EPROM.	Two beeps sound when the BIOS begins erasing the Flash EPROM.
7 Program the Flash EPROM.	Three beeps sound when the AMIFlash Code begins reprogramming the Flash EPROM.
8 Continue programming the Flash EPROM.	Four beeps sound when reprogramming has been successfully completed.
9 AMIFlash does a reset.	A CPU reset is generated (the system reboots).
10 Reboot	Reboot the system.

Beep Codes

During normal operation, the Flash utility produces a series of beeps to:

- signify completion of a step (as shown on the previous page), or to
- signal an error.

Error beeps are arranged in a coded sequence and have different meanings depending on when they occur. The following list describes the error beep codes and when they can occur.

Step	Beeps	Description
—	None	Successful completion.
1	Continuous Single Beep	There is no floppy disk in Drive A:.
2	Five Beeps	S708P.ROM is not present in the root directory of the floppy disk in the A: drive.
3	Seven Beeps	Floppy Read Error.
4	Six Beeps	BIOS File Size Error.
5	Eight Beeps	An Intel i28F001BX-T Flash EPROM is not present.
6	Continuous Two Beeps	There is a problem in erasing the Flash EPROM.
7	Continuous Three Beeps	There is a problem in programming the Flash EPROM.
9	Continuous Four Beeps	The BIOS is not able to reset the CPU.

AMIFlash Checkpoint Codes

Code	Description
02h	Verify the AMIFlash BIOS checksum and disable internal cache memory.
0Eh	Make the CMOS RAM checksum bad and initialize the CMOS RAM status registers.
10h	Disable DMA Controllers 1 and 2 and Interrupt Controllers 1 and 2.
13h	Initialize the chipset registers.
18h	If the main BIOS is good, transfer control to the main BIOS.
1Bh	Initialize the system timer.
1Dh	Begin the refresh test.
20h	Begin the 16 KB base memory test.
23h	Initialize the interrupt vectors.
28h	Determine the CPU clock frequency.
30h	Program the system speed-dependent parameters according to the CPU clock frequency.
40h	Begin the memory test.
50h	The memory test has completed.
65h	Initialize the DMA controller.
67h	Initialize the interrupt controller.
80h	Initialize the I/O chipset, if any.
85h	Enable the appropriate IRQs.
86h	Enable the internal cache memory.
88h	Initialize the floppy drives.
90h	Indicate an error. The BIOS stops here if there is an error.
A0h	Reading the floppy disk in drive A: to program the Flash EPROM.
E0h	Configure the proper stack.
E3h	Display a message to ask the user to insert the AMIFlash Floppy Disk in drive A:.
E4h	Floppy read error.
E5h	Begin the search for the S708P.ROM file in the floppy root directory.
E6h	The S708P.ROM file not present in the floppy disk root directory.
E7h	Begin reading the File Allocation Table.
E8h	Begin reading S708P.ROM, sector by sector.
E9h	S708P.ROM is not the proper size.
EFh	Disable internal cache memory.
F0h	Enable and reset flash memory.
F1h	Detect the flash type if present.
F2h	Flash memory not detected.
F3h	Begin erasing flash blocks.
F4h	Begin programming flash blocks.
FFh	Flash programming successful and the system reboots, if possible.

Starting AMIFlash

Type

```
AMIFlash
```

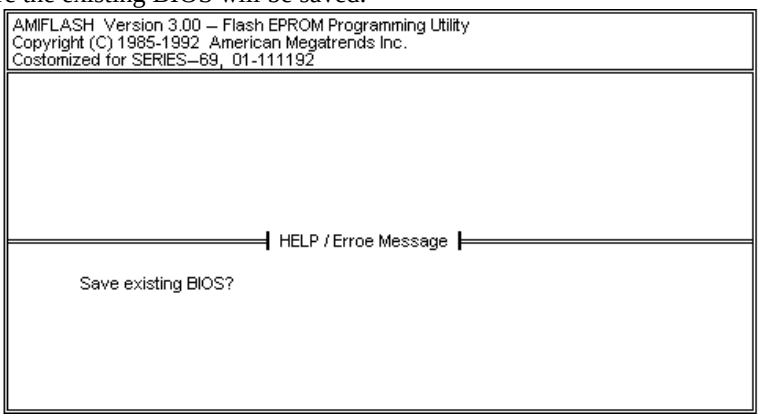
and press <Enter> at the DOS prompt. AMIFlash will prompt for the filename. Type

```
S708P.ROM
```

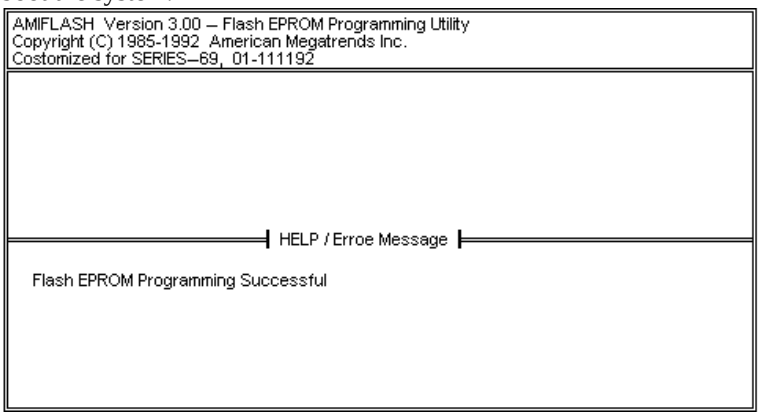
and press <Enter>. Pressing <Esc> exits AMIFlash any time before Flash EPROM reprogramming begins.

General Operation

If Flash EPROM is present, AMIFlash asks if you want to save the existing BIOS file. If you choose to save the BIOS, enter the filename where the existing BIOS will be saved.



Enter the filename with which Flash EPROM will be reprogrammed (S708P.ROM). AMIFlash reads the file and displays a startup message. Press any key to continue. After Flash programming starts, programming activity is indicated by a rotating / character. AMIFlash informs you when Flash programming is successful (as shown below). Press any key to reboot the system.



Errors During Flash Programming

If an error occurs during programming, an error messages is displayed and the system halts. Turn power off and replace the Flash EPROM with a new programmed Flash EPROM to make the system usable.

AMIFlash Messages

Message	Explanation
Save Existing BIOS ?	Press Y to save the existing BIOS.
Enter Filename:	Enter the filename in which the existing BIOS will be saved in the following format: Drive:\Pathname\Filename.Ext and press <Enter>.
Enter BIOS Filename:	Enter the filename with which the Flash EPROM will be programmed in the following format: Drive:\Pathname\Filename.Ext and press <Enter>.
Programming Flash EPROM	Displayed when the Flash EPROM is being programmed.
Saving BIOS File in	Displayed when the existing BIOS is saved to disk.

Message	Explanation
Disk	
Reading BIOS File from Disk	Displayed when the file with which Flash EPROM will be programmed is being read from the disk.
Press <ESC> to Exit	When this message is displayed, you can exit AMIFlash by pressing <Esc>.
Press Any Key to Exit	Usually displayed below another message when a fatal error occurs, for example, no Flash EPROM present in system or the hardware is not accessible.
Press Any Key to ReBoot	Displayed after successful Flash EPROM programming.
Want to Continue?	Displayed after an error message.
Want to Exit (Y/N)?	Displayed when you press <Esc>.
Please Wait..	Displayed when Flash programming is occurring.
Put Off System Power	Displayed if there is an error during Flash programming. Replace the Flash EPROM with a new programmed Flash EPROM.
No Flash EPROM present	Displayed if no Flash EPROM is present in the system.
Memory Allocation Error	Displayed when scratch memory is not available.
File Creation Error	Displayed when the specified BIOS save file could not be created.
File Does Not Exist	Displayed when the Flash EPROM program file could not be found.
File I/O Error	Displayed during a read or write error.
Disk Full	Displayed when the disk where the existing BIOS was to be saved has no space.
Flash EPROM Programming Error.	Displayed if an error occurs during Flash programming. The system is not usable unless the existing Flash EPROM is replaced with the new Programmed Flash EPROM.
BIOS File Not Of Proper Size	Displayed when the file size of the new program does not match the Flash EPROM size.
Flash EPROM Programming is going to start	The system is not usable until Flash EPROM programming is completed successfully. If an error occurs, the existing Flash EPROM must be replaced by a new programmed Flash EPROM. The system must not be turned off during programming. The system reboots if programming is completed successfully.

Appendix A

Upgrading Cache Memory

Cache memory American Megatrends Super Voyager LPX motherboard can be upgraded from 64 KB to 256 KB. Nine 32 KB x 8 15 ns SRAMs are required.

Recommended Parts

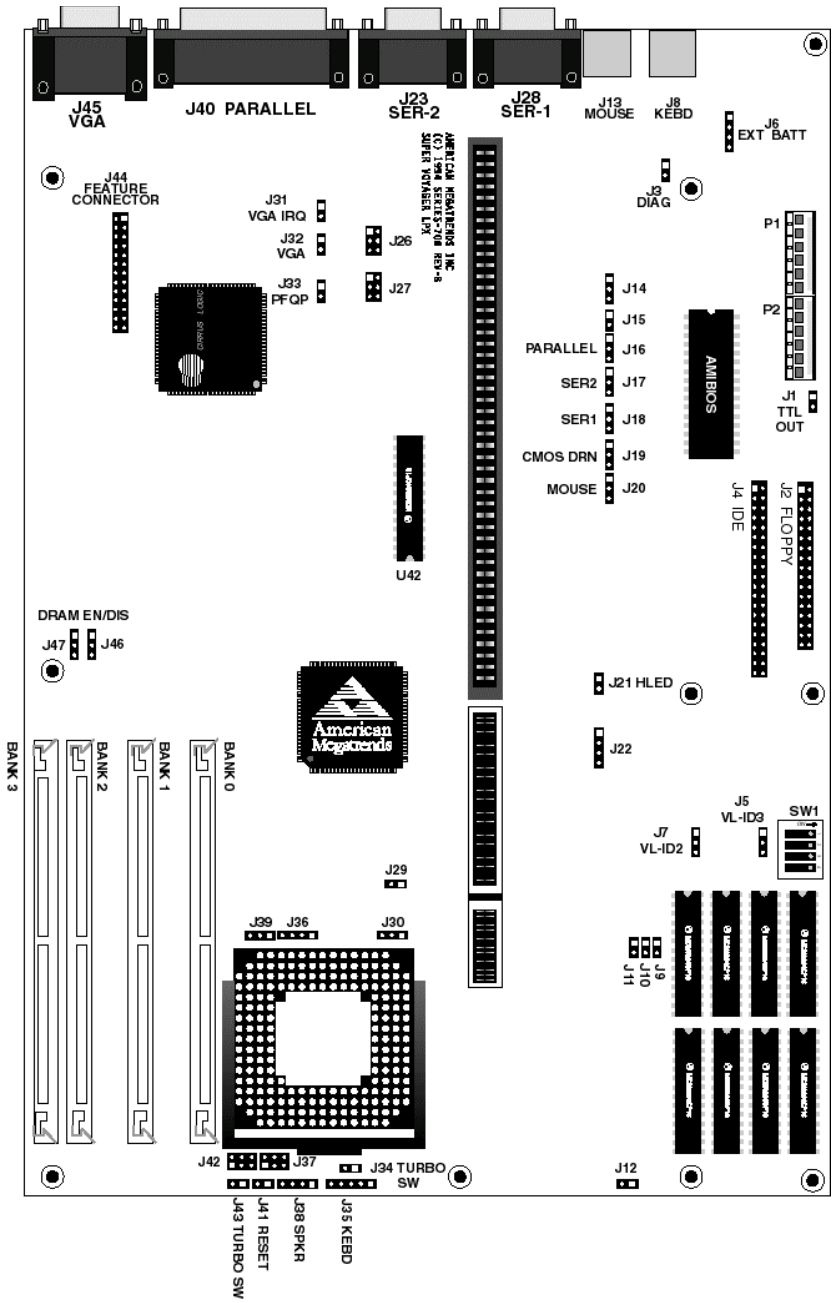
Manufacturers of the 32 KB x 8 15 ns SRAMs are:

Manufacturer	Part Number
Paradigm	PDM41256SA15P
Samsung	KM68257BP-15
Motorola	MCM6206CP15

How to Upgrade Cache Memory

Step	Action
1	Turn the system off. If the motherboard is already installed in a computer case, remove the cover and expose the motherboard.
2	Make sure you are properly grounded to prevent electrostatic discharge.
3	Remove the nine 8 KB x 8 SRAMs in sockets U1, U2, U5, U6, U13, U14, U16, U17, and U42. See the motherboard graphic on the following page for the locations of these sockets.
4	Install the new 32 KB x 8 SRAM in sockets U1, U2, U5, U6, U13, U14, U16, U17, and U42. Make sure that Pin 1 of the socket matches Pin 1 of the SRAM.
5	Turn all switches on SW1 ON.

Turn system power on. The system should report 256 KB of cache memory now. If it does not, repeat the cache memory installation procedure.



Appendix B

Heat and Power Consumption

Temperature Ranges

The following values are ambient temperatures inside the computer case. The board temperatures reflect the 80486 CPU Heat dissipation requirements because it will be the hottest component. Temperature specifications vary with the CPU frequency.

Frequency	Heat Sink	Airflow over CPU	Airflow over other components	Maximum Ambient Temperature
20 or 25 MHz	NO	400 feet per minute	Not critical	47 ° C.
33 MHz	NO	400 feet per minute	Not critical	36 ° C.
50 MHz 66 MHz	YES	200 feet per minute	Not critical	50 ° C.
75 MHz 486DX4	YES	200 feet per minute	Not critical	65 ° C.
100 MHz 486DX4	YES	200 feet per minute	Not critical	65 ° C.

Humidity

The recommended humidity range for operation of the American Megatrends Super Voyager LPX motherboard is 20% to 80% non-condensing.

The American Megatrends Super Voyager LPX motherboard requires 7 amps maximum at 5 volts. The +12V supply current to the ISA Bus is limited by the power connector.

Power Supply Requirements

The Super Voyager LPX ISA motherboard requires +5V, -5V, +12V, -12V, and about 44 Amps maximum.

Power Consumption

The SIMM memory banks consume 2 Amps each, for a total of 8 Amps.

Each ISA expansion slot is gated at 3.0 Amps maximum. Each VL-Bus expansion slot is gated at 4.5 Amps maximum. There are six ISA-only expansion slots and two VL-Bus slots, so the total maximum power consumption for the expansion slots is 27 Amps. The total maximum power consumption is 35 Amps at +5V with a 200 Watt power supply.

Power Source

Two power connectors (P1 and P2) are provided on the motherboard.

Conclusion

The minimum rating of the power supply should be 200 Watts for a fully loaded motherboard, including a 12V power source.

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