Technical Information Manual

PC 300XL (Type 6588) and IntelliStation M Pro (Type 6888)

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Note

Before using this information and the product it supports, be sure to read the general information under Appendix E, “Notices and Trademarks” on page 53.

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Preface

This *Technical Information Manual* provides information on the IBM PC 300XL (Type 6588) and the IBM IntelliStation M Pro Professional Workstation (Type 6888). It is intended for developers who want to provide hardware and software products to operate with these computers and provides in-depth information on how the computers work. Users of this publication should have an understanding of computer architecture and programming concepts.

Manual Style

Warning: The term *reserved* describes certain signals, bits, and registers that should not be changed. Use of reserved areas can cause compatibility problems, loss of data, or permanent damage to the hardware. When the contents of a register are changed, the state of the reserved bits must be preserved. When possible, read the register first and change only the bits that must be changed.

In this manual, some signals are abbreviated. A minus sign in front of a signal indicates that the signal is active low. No sign in front of a signal indicates that the signal is active high.

The use of the letter “h” indicates a hexadecimal number. Also, when numerical modifiers such as “K”, “M” and “G” are used, they typically indicate powers of 2, not powers of 10. For example, 1 KB equals 1 024 bytes (2^{10}), 1 MB equals 1 048 576 bytes (2^{20}), and 1 GB equals 1 073 741 824 bytes (2^{30}).

When expressing storage capacity, MB equals 1 000 KB (1 024 000). The value is determined by counting the number of sectors and assuming that every two sectors equals 1 KB.

Note: Depending on the operating system and other system requirements, the storage capacity available to the user might vary.

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Related Publications

In addition to this manual, the following IBM publications provide information related to the operation of the PC 300XL and IntelliStation M Pro. To order these publications, call 1-800-879-2755 in the U.S. and Puerto Rico. In other countries, contact an IBM reseller or IBM marketing representative.

- *Setting Up Your PC 300XL*
  Setting Up Your IntelliStation M Pro
  These publications contain instructions on preparing the PC 300XL and IntelliStation M Pro for operation.
- *Using Your PC 300XL*
  Using Your IntelliStation M Pro
  These publications contain information on configuring, operating, and maintaining the PC 300XL and IntelliStation M Pro. Also included are warranty information, instructions for diagnosing and solving problems, and information on how to obtain help and service.
- *Installing Options in Your PC 300XL*
  Installing Options in Your IntelliStation M Pro
  These publications contain instructions for installing options in the PC 300XL and IntelliStation M Pro.
- *Understanding Your PC*
  This publication includes general information about using computers and detailed information about the features of the PC 300XL and IntelliStation M Pro.
- *About Your Software*
  This publication (provided only with computers that have IBM-preinstalled software) contains information about the preinstalled software package.
- *Your Ready-to-Configure CD*
  This publication contains information about the *Ready-to-Configure CD* that comes with the PC 300XL and IntelliStation M Pro. The publication also contains instructions for starting the CD.
- *Adaptec SCSI Documentation*
  This documentation, which is provided with PC 300XL and IntelliStation M Pro models that have an IBM-installed SCSI adapter, includes information on configuring the adapter and instructions for installing and configuring SCSI devices.
- *Hardware Maintenance Manual*
  This separately purchased publication contains information on the PC 300XL and IntelliStation M Pro for trained service technicians. To obtain a copy, refer to the "Getting Help, Service, and Information" section in *Using Your PC 300XL* or *Using Your IntelliStation M Pro*.
- *Compatibility Report*
  This publication contains information about compatible hardware and software for the PC 300XL and IntelliStation M Pro. The publication is available on the World Wide Web at *http://www.pc.ibm.com/cdt*.

Chapter 1. System Overview

The IBM PC 300XL and IntelliStation M Pro are versatile products designed to provide state-of-the-art computing power with room for future growth. The two computers are similar in design, utilizing the same cover, frame assembly, and system board. They differ in the mix of standard features.

Hardware Features

The major features of the PC 300XL and IntelliStation M Pro are:

- Intel Pentium II microprocessor
- L2 cache integrated into the microprocessor
- Support for a maximum of 384 MB of system memory in the PC 300XL; a maximum of 512 MB in the IntelliStation M Pro
- Enhanced IDE (EIDE) interface
- EIDE or Ultra-SCSI hard disk drive
- CD-ROM drive (some models only)
- 3.5-inch, 1.44 MB diskette drive
- Video controller
  - PC 300XL: Integrated S3 Trio64V2 controller with 2 MB of 50 ns EDO DRAM
    - Some models also have a Matrox MGA Millennium graphics adapter with 4 MB WRAM
  - IntelliStation M Pro: Integrated S3 Trio64V2 controller with 2 MB of 50 ns EDO DRAM plus one of the following:
    - Matrox MGA Millennium graphics adapter with 4 MB WRAM
    - Intergraph Intense 3D graphics adapter with 16 MB SDRAM and 4 MB SGRAM
- Integrated audio controller (supports Sound Blaster Pro applications)
- Integrated Intel 10/100 D100, Ethernet controller with Wake on LAN
- System Management
  - RPL (Remote Program Load) and DHCP (Dynamic Host Configuration Protocol)
  - Integrated Wake on LAN controller
  - Automatic Power-On Startup Sequence
  - POST/BIOS Update from Network
  - DMI (Desktop Management Interface) BIOS and DMI software
  - Integrated system management controller
- One high-speed ECP/EPP parallel port
- One high-speed serial port
- One infrared port
- Monitor port
  - PC 300XL: One DDC2B-compliant monitor port (on the rear connector panel)
  - IntelliStation M Pro: Two DDC2B-compliant monitor ports (one on the rear connector panel and one on the graphics adapter installed in an expansion slot)
- Two audio ports or jacks (audio line in and audio line out)
- One Ethernet RJ-45 port
- Two USB (universal serial bus) ports
- Keyboard port (Windows 95-compatible)
- Mouse port
- Expansion
  - Five drive bays
  - Five expansion slots total (two ISA and three shared PCI/ISA)

Note: Several model variations are available for the PC 300XL and IntelliStation M Pro, including models with no hard disk drive, CD-ROM drive, or video/graphics support.

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System Software Features

The PC 300XL and IntelliStation M Pro support a variety of operating systems. Refer to *Using Your PC 300XL* or *Using Your IntelliStation M Pro* for a list of supported operating systems.

Note: Some models are shipped with a preloaded version of Windows NT 4.0. Also, a Ready-to-Configure (RTC) CD-ROM is included with all models. The RTC CD-ROM has applications and device driver support for Windows NT 4.0 and several other operating systems.

System software includes:

- Basic input/output system (BIOS)
- Plug and Play
- Power-on self-test (POST)
- Configuration/Setup Utility program
- Advanced Power Management (APM)
- Flash update utility program
- Diagnostic programs

BIOS

The PC 300XL and IntelliStation M Pro use an Intel American Megatrends International (AMI) BIOS. Enhancements to the BIOS software have been added to provide support for the following features:

- PCI bus, according to *PCI BIOS Specification 2.1*
- Plug and Play, according to *Plug and Play BIOS Specification 1.1*
- Advanced Power Management (APM), according to *APM BIOS Interface Specification 1.2*
- Advanced Programmable Interrupt Controls (APIC)
- Bootable CD-ROM
- Wake on LAN
- Remote Program Load (RPL) and Dynamic Host Configuration Protocol (DHCP)
- Flash over LAN
- Alternate boot sequence
- Enable/disable of system board Ethernet controller

Plug and Play

The PC 300XL and IntelliStation M Pro conform to the following:

- *Plug and Play BIOS Specification 1.1*
- *Plug and Play BIOS Specification, Errata and Clarification 1.0*

The computers conform to the guidelines described in the following:

- *Plug and Play BIOS Extension Design Guide 1.0*
- *Guide to Integrating the Plug and Play BIOS Extensions with System BIOS 1.2*
- *Plug and Play Kit for DOS and Windows*

POST

The PC 300XL and IntelliStation M Pro use IBM power-on self-test (POST) software. Also, initialization code is included for the Pentium II microprocessor, the Intel 82440FX core chipset, the I/O chip, the Matrox MGA Millennium graphics adapter, and the Intergraph Intense 3D graphics adapter.

POST software locates any hardware problems or configuration changes. If an error occurs while POST

is running, an error code in the form of a text message displays on the screen. For a description of POST error codes, see “POST Error Codes” on page 50. For further information on POST, refer to *Using Your PC 300XL* or *Using Your IntelliStation M Pro*.

Configuration/Setup Utility Program

The Configuration/Setup Utility program provides menus for viewing and changing selections for start options, devices and I/O ports, date and time, advanced hardware features, system security, ISA legacy resources, and power management. The Configuration/Setup Utility program also provides system summary and product data screens which contain information specific to the computer model being used. Refer to *Using Your PC 300XL* or *Using Your IntelliStation M Pro* for further information on the Configuration/Setup Utility program.

Advanced Power Management

The PC 300XL and IntelliStation M Pro come with energy-saving software. Advanced Power Management (APM) is a feature that reduces the power consumption when the entire system or components of the computer system are not in use. When enabled, APM initiates reduced-power modes for the monitor, hard disk drive, or entire system after a specified period of inactivity is reached.[1]

APM is implemented according to *APM BIOS Interface Specification 1.2*. For more information on APM, refer to *Understanding Your PC* and *Using Your PC 300XL* or *Using Your IntelliStation M Pro*.

Flash Update Utility Program

A stand-alone utility program is available to support user-initiated flash code updates. This utility program updates the BIOS code in flash memory. PC 300XL and IntelliStation M Pro computers also support BIOS updating over the LAN (Flash-over-LAN). The Flash-over-LAN function requires the use of the integrated system board Ethernet.

The flash update utility program is available on the World Wide Web (http://www.pc.ibm.com/cdt/) or through the PC Company Bulletin Board Service in files that can be downloaded onto a diskette. Instructions for using the flash update utility program will be available in a README file included in the downloaded files. Refer to *Using Your PC 300XL* or *Using Your IntelliStation M Pro* for further information.

Diagnostic Programs

Two diagnostic products are supplied with the PC 300XL and IntelliStation M Pro: QAPlus/WIN-WIN and QAPlus/PRO for DOS. QAPlus/WIN-WIN, a Windows program, provides the best software coverage; QAPlus/PRO for DOS provides the best hardware coverage. For more information on these diagnostic programs, refer to *Using Your PC 300XL* or *Using Your IntelliStation M Pro*.

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[1] APM does not support small computer system interface (SCSI) hard disk drives.

Chapter 2. System Board Features

This section provides information about system board features. For an illustration of the PC 300XL and IntelliStation M Pro system board, refer to “System Board” on page 12.

For a list of features provided with the PC 300XL and IntelliStation M Pro, refer to “Hardware Features” on page 1.

Microprocessor

The PC 300XL and IntelliStation M Pro have an Intel Pentium II microprocessor. A voltage regulator circuit on the system board provides the power required for the microprocessor. The Pentium II features the following:

- Optimization for 32-bit software
- Operation at a lower voltage level than previous microprocessors
- 64-bit microprocessor data bus
- 32-bit microprocessor address bus
- Math coprocessor
- MMX technology (boosts the processing of graphic, video, and audio data)
- L2 cache integrated into the microprocessor
  - 4-way set associative
  - Non-blocking
  - 50-percent processor speed
  - Performance increase over placement of L2 cache on the system board

Note: More information on the Intel Pentium II microprocessor can be found on the World Wide Web at *http://www.intel.com*.

The microprocessor (which has a heat sink attached) plugs directly into a connector on the system board. The microprocessor is stabilized with a bracket which screws onto the system board.

For information on replacing a microprocessor or installing an upgrade, refer to *Installing Options in Your PC 300XL* or *Installing Options in Your IntelliStation M Pro*.

Chip Set Control

The PC 300XL and the IntelliStation M Pro use the second-generation Intel 82440FX core chipset. This chip set provides a bridge between the PCI bus and the microprocessor bus. (For information on the PCI bus, see “PCI-to-ISA Bridge” on page 5.) The 82440FX chip set also controls the system memory interface.

In addition, the PC 300XL and IntelliStation M Pro use the PIIX3 chip, which provides a bridge between the PCI and ISA buses. This chip also provides a bus master IDE interface and a USB port connection.

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System Memory

Three dual inline memory module (DIMM) connectors are provided on the system board. The DIMM connectors are powered by + 3.3 volts. This voltage allows for low-power operation and supports 64-Mbit technology. Each DIMM connector is a 168-pin, gold-lead socket. For the pin assignments, see “System Memory Connectors” on page 34.

The system board supports:

- A maximum of 384 MB of memory in the PC 300XL; a maximum of 512 MB in the IntelliStation M Pro
- Dynamic random access memory (DRAM) only
- 64-bit extended data out (EDO) nonparity (NP) and 72-bit EDO error correcting code (ECC) memory modules

Any configuration of DIMMs is acceptable. However, DIMMs must have the following characteristics:

- Must be 168-pin, unbuffered, +3 V type
- Must have gold-lead tabs
- Must have 60 nanosecond (ns) access speeds only
- Must have a height of no more than 3.05 cm (1.2 in.)

Also, note the following:

- EDO NP modules and EDO ECC modules can be mixed, but they will configure as NP.
- To enable ECC, all installed memory must be of the EDO ECC type.

Note: Single inline memory modules (SIMMs) are not supported in the PC 300XL and IntelliStation M Pro.

PCI-to-ISA Bridge

The PIIX3 chip provides the bridge between the peripheral component interconnect (PCI) and industry standard architecture (ISA) buses. The chip is used to convert PCI bus cycles to ISA bus cycles.

The PCI bus is compliant with *PCI Local Bus Specification 2.1*. The PCI bus runs synchronously to the host bus and is driven at a speed of 33 MHz (half the speed of the microprocessor bus, which runs at 66 MHz). The ISA bus is permanently set to the PCI bus speed divided by four.

The PCI bus shares interrupts with the ISA bus. Free IRQs are automatically assigned to PCI adapters during POST. If no interrupts are available for PCI adapters during POST, an 1800 POST error is generated.

For information on PCI and ISA bus expansion connectors, see “Riser Card” on page 11.

The chip that provides the PCI-to-ISA bridge also includes all the subsystems of the ISA bus. These ISA-compatible subsystems are:

- Two cascaded 82C59 interrupt controllers
- Two 82C37 DMA controllers with seven independent DMA channels (four 8-bit and three 16-bit channels)
- Three counters equivalent to a 82C54 programmable interval timer
- Power management features

Bus Master IDE Interface

The system board incorporates a PCI, bus master, IDE interface that complies with the *AT Attachment Interface with Extensions*. This allows concurrent operations on the PCI and IDE buses.

The subsystem that controls internal devices is integrated with the IDE interface. Up to four IDE or EIDE devices can be attached to the system board through a ribbon cable that connects to one of two IDE connectors on the system board. The devices receive their power through separate, four-position power cables containing +5 V, +12 V, and ground (GND) voltage.

On each IDE connector, one IDE or EIDE device is designated as the primary (master) device, and the other device is designated as the secondary (subordinate) device. These designations are determined by switch or jumper settings on each device. A functional primary device must be present on each IDE connector for a secondary device to be recognized on that same IDE connector. Care must be taken to ensure that the jumpers on the IDE or EIDE devices installed in the system correctly identify them as either primary or secondary devices. Otherwise, some of the devices might not be recognized by the system. There is no performance impact between a primary device and a secondary device of the same type on the same IDE connector.

A bootable IDE or EIDE hard disk drive can be installed on either IDE connector. PCI or ISA IDE expansion adapters are not supported. For further information on IDE drives and other drives that can be installed in PC 300XL and IntelliStation M Pro computers, refer to “Internal Drives” on page 19.

Two 40-pin connectors are provided on the system board for the IDE interface. For information on connector pin assignments, see “IDE Connectors” on page 37.

USB Interface

The system board provides two connectors for the USB interface. A USB-enabled device can be attached to each connector, and if that device is a hub, multiple peripheral devices can be attached to the hub and be used by the system. Plug and Play technology is used to recognize installed devices. The USB port functions at speeds of up to 12 Mb/second. The system does not support a keyboard attached to either of the USB ports.

The USB is compliant with *Universal Host Controller Interface Design Guide 1.0*. Features provided by USB technology include:

- Support for up to 63 physical devices
- Connections of up to five meters in length from host to hub or hub to hub
- Support for hot pluggable devices
- Support for concurrent operation of multiple devices
- Support for different device bandwidths
- Guaranteed bandwidth and low latencies appropriate for telephony, audio, etc.
- Wide range of packet sizes
- Eight-signal USB cable

The external interface for the USB ports consists of two, 4-pin connectors. For information on connector pin assignments, see “USB Connectors” on page 39.

Super Input/Output Controller

Control of the integrated input/output (I/O) ports and diskette drive is provided by a single chip, the National Semiconductor PC87307. This chip, which is compatible with *Plug and Play ISA Specification 1.0a*, supports and implements the following features:

- Diskette drive(s)
- Parallel port
- Serial port
- Infrared port
- Keyboard and mouse ports
- General-purpose I/O ports
- Real-time clock

Diskette Drive Support

The system board supports a maximum of two diskette drives (see “Internal Drives” on page 19 for more information). However, the maximum number of diskette drives that can be installed in the PC 300XL or IntelliStation M Pro is dependent upon the mechanical package of the system. The following is a list of devices that the diskette drive subsystem will support:

- 1.44 MB, 3.5-inch diskette drive
- 1.2 MB, 5.25-inch diskette drive

Note: A 2.88 MB, 3.5-inch diskette drive is not supported.

One shrouded, 34-pin, berg-strip connector is provided on the system board for the diskette drive. For information on connector pin assignments, see “Diskette Drive Connector” on page 38.

Parallel Port

One parallel port is integrated into the system board. Support for the extended capabilities port (ECP), enhanced parallel port (EPP), and standard parallel port (SPP) modes is provided. These modes of operation are selected through the Configuration/Setup Utility program, with the default mode set to SPP. The ECP and EPP modes are compliant with IEEE 1284.

The external interface for the parallel port is a 25-pin, female, D-shell connector. For information on connector pin assignments, see “Parallel Port Connector” on page 39.

Serial Port

One universal asynchronous receiver/transmitter (UART) serial port is integrated into the system board. This port is PC16550A- and NS16450-compatible and includes a 16-byte data first-in first-out (FIFO) buffer.

The external interface for the serial port is a 9-pin, male, D-shell connector, attached via a ribbon cable from a shrouded connector on the system board. For information on connector pin assignments, see “Serial Port Connector” on page 40.

Infrared Port

One infrared port is integrated into the system board. When an optional external infrared module (dongle) is connected to this port, the computer is capable of wireless communication with a printer, portable computer, or other infrared-enabled device.

The infrared module plugs directly into the infrared port on the rear connector panel of the computer and provides a link of up to one meter at a rate of 1.2 Mbps. The infrared port is compliant with:

- IrDA-2, including 1.2 Mbps and 1.15 Mbps baud rates
- Sharp-IR
- TV-Remote mode

The external interface for the infrared port is a 9-pin, female, D-shell connector, attached via a ribbon cable that plugs into a shrouded connector on the system board. For information on connector pin assignments, see “Infrared Port Connector” on page 40.

Keyboard and Mouse Ports

The keyboard-and-mouse subsystem is controlled by a general purpose, 8-bit microcontroller. The controller consists of 256 bytes of data memory and 2 KB of read-only memory (ROM).

The controller has two logical devices; one controls the keyboard, and the other controls the mouse. The keyboard has two fixed I/O addresses and a fixed IRQ line (IRQ1). The keyboard can operate without a companion mouse, but the mouse can only operate with its companion keyboard. The mouse has a fixed IRQ line (IRQ12), but it does not have an I/O address; it relies on the addresses used by the keyboard.

The keyboard and mouse each have a 6-pin connector as an external interface. For information on connector pin assignments, see “Keyboard and Mouse Port Connectors” on page 41.

General-Purpose I/O Ports

The system board has 16 general-purpose input/output (GPIO) pins that can be used to implement various functions. These GPIOs are segmented into two ports, with each port containing 8 GPIO signals. Each port is configured and controlled by four I/O registers. GPIO 10-17 are controlled by the port 1 registers, and GPIO 20-27 are controlled by port 2 registers. The use of GPIO pins is dependent upon system design. Features of the GPIO ports are:

- Open-drain outputs with internal pull-ups and transistor-transistor logic (TTL) inputs
- Software-configurable base address
- Programmable direction
- 4-byte I/O address

Real-Time Clock

The low-power, real-time clock provides a time-of-day clock and a calendar. The clock is accurate to +/− 12 minutes per year. The clock settings are maintained by an external battery source at +2.4 volts. The life expectancy of the battery is approximately 2.25 years.

An external crystal is used to drive the real-time clock, and the battery is used to maintain the state of the CMOS RAM when the power to the computer is turned off. (The system has 242 bytes of CMOS RAM in two banks.) If the CMOS RAM becomes corrupted and the system will not boot, a jumper is included on the system board to set the CMOS RAM to factory default values.

Audio

The PC 300XL and IntelliStation M Pro have a stereo audio controller (Crystal CS4236 chip) on the system board that provides all the digital audio and analog mixing functions required for recording and playing high-quality sound from the computers. The audio controller also has the following features:

- Compatibility with ISA Plug-and-Play specification 1.0a
- Support for Sound Blaster, Sound Blaster Pro, and Windows Sound System applications
- Support for a maximum of four logical devices
- FM synthesizer
- Wave table synthesizer
- 16-bit ISA address decode
- Full duplex operation (simultaneous recording and playing back, using two 8- or 16-bit DMA channels)
- Support for IMA ADPCM decompression
- Support for recording and playing back of 8- or 16-bit stereo sound data up to 48 KHz in stereo

Two audio ports are provided on the rear connector panel of the PC 300XL and IntelliStation M Pro. The ports use industry-standard, 3.5 mm (1/8") mini-jacks. A description of the ports follows.

- Audio Line Out: This port is used to send audio signals from the computer to external devices, such as stereo-powered speakers, headphones, multimedia keyboards, or the Audio Line In port on a stereo system.
- Audio Line In: This port is used to connect a microphone to the computer in order to record voices or other sounds on the hard disk. This port can also be used to record sound from a CD player, stereo, or other external device. (However, the input level must be reduced accordingly using the mixer provided in the computer operating system.)

An internal piezo-electric beeper is mounted on the system board. An internal speaker is not supported. Note also that the computer has no volume control hardware. Volume control is a function of the system configuration software and the audio device driver or application.

Video

The basic video subsystem in PC 300XL and IntelliStation M Pro computers consists of a high-performance, high-resolution S3 Trio64V2 GUI controller, 2 MB of 50 ns EDO DRAM, and the local peripheral bus interface. (Note that there are no sockets for optional video memory.) The S3 Trio64V2 controller is a fully compatible superset of the VGA function and features the following:

- Complete Plug and Play support
- Support for all VGA modes
- Support for Advanced Power Management
- VESA VBE 2.0 compliance (up to 1600 x 1200)
- DDC 1.74 compliance

The video subsystem connects to the monitor through a 15-pin, female, D-shell, DDC2B-compliant connector located on the rear connector panel of the computer.

In addition to the basic video subsystem, PC 300XL and IntelliStation M Pro computers support a video adapter installed in one of the PCI expansion slots, and some models come standard with a Matrox MGA Millennium or Intergraph Intense 3D graphics adapter installed. These models have two monitor connectors. One connector is located on the installed graphics adapter, and the other (S3 Trio64V2 connector) is located on the rear connector panel of the computer. For further information on the Matrox and Intergraph adapters, refer to “Graphics Adapters” on page 17.

Note: For models with an installed graphics adapter, the VGA on the adapter is enabled, and the monitor is normally connected to the adapter. However, there are circumstances which would make it necessary to disable the preinstalled graphics adapter VGA and use either the VGA from the integrated S3 Trio64V2 video controller or from another installed graphics adapter. Refer to *Using Your PC 300XL* and *Using Your IntelliStation M Pro* for details.

Instructions for installing video device drivers for the S3 Trio64V2, Matrox MGA Millennium, and Intergraph Intense 3D video controllers are provided on the *Ready-to-Configure CD* that comes with the PC 300XL and IntelliStation M Pro computers. For the latest video device drivers available, see the World Wide Web site at http://www.pc.ibm.com/intellistation. (Note that no VESA device drivers are needed for DOS because the video BIOS interface is VESA V2.0 compliant.)

Refer to *Using Your PC 300XL* or *Using Your IntelliStation M Pro* for additional information on using video features.

Ethernet

The PC 300XL and IntelliStation M Pro have an Intel 82557 10/100 D100, PCI Ethernet controller on the system board and an RJ-45 port on the rear connector panel that provide a high-performance network connection. The Ethernet controller is a Plug and Play device that has built-in support for Wake on LAN and a viewable MAC (media access control) address for the computer. Ethernet device drivers are provided on the *Ready-to-Configure CD* that comes with PC 300XL and IntelliStation M Pro computers.

Riser Card

The PC 300XL and IntelliStation M Pro use a riser card for expansion. The riser card plugs into the system board via a 2x98-pin, EISA-style connector. Adapters plug into the ISA- or PCI-expansion connectors (slots) on the riser card. Signals from adapters are routed to the ISA or PCI buses. Each ISA-expansion connector provides a 16-bit-wide data path; each PCI-expansion connector provides a 32-bit-wide data path.

The PC 300XL and IntelliStation M Pro have five expansion slots. The bottom three slots are shared PCI/ISA, and the top two slots are dedicated ISA. Some models come standard with one or more adapters installed in the expansion slots. For information on these adapters, refer to Chapter 3, “Adapters and Internal Drives” on page 17.

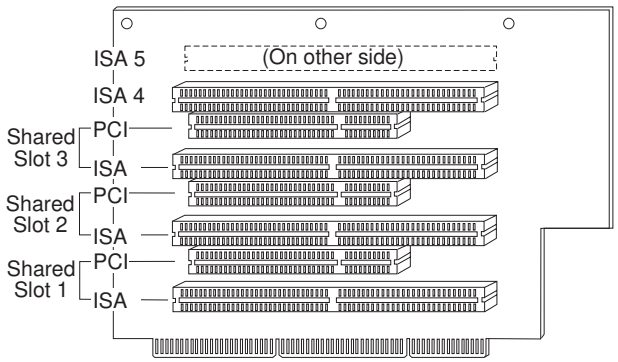

Figure 1. Riser Card for the PC 300XL and IntelliStation M Pro

Note that, due to the size of the microprocessor and heat sink, certain slots will support only half-length adapters. The size of adapter that can be used in each expansion slot varies according to the microprocessor installed in each model. The following table shows acceptable adapter sizes by model.

Table 1. Acceptable Adapter Sizes for the PC 300XL and IntelliStation M Pro

Microprocessor Installed (Speed)	Slot 1	Slot 2	Slot 3	Slot 4	Slot 5
233 MHz, 266 MHz	Half-length ISA or half-length PCI adapter	Half-length ISA or any size PCI adapter	Any size ISA or PCI adapter	Any size ISA adapter (only)	Half-length ISA adapter (only)
300 MHz	Half-length ISA or half-length PCI adapter	Half-length ISA or any size PCI adapter	Any size ISA or PCI adapter	Any size ISA adapter (only)	Half-length ISA adapter (only)

Each PCI-expansion connector is capable of driving one, low-power Schottky load. Each ISA-expansion connector is capable of driving two, low-power Schottky loads. The ISA bus is permanently set to the PCI bus speed divided by four.

The PCI bus shares interrupts with the ISA bus. Any available ISA IRQs are automatically assigned to PCI devices during POST. If no interrupts are available for PCI adapters during POST, an error message is generated.

For information on connector pin assignments, see “ISA Bus Connectors” on page 30 and “PCI Bus Connectors” on page 32.

Physical Layout

The system board might look slightly different from the one shown. A diagram of the system board, including switch and jumper settings, is attached to the underside of the top cover of the computer.

System Board

1 Monitor connector
2 Ethernet RJ-45 connector
3 Infrared connector
4 USB 2 connector
5 Serial port connector
6 USB 1 connector
7 Parallel port connector
8 Auxiliary power (5 V) connector
9 Mouse connector
10 Keyboard connector
11 Audio line-out jack
12 Audio line-in jack
13 Tela jack (audio)
14 Diskette drive connector
15 CD-ROM connector
16 Wave table (audio)
17 Primary IDE connector
18 Secondary IDE connector
19 System board jumper block
20 Power (3.3 V ac) connector
21 Main power connector
22 Boot block recovery jumper
23 Chassis security connector
24 Microprocessor connector
25 Power-on switch connector
26 Hard disk LED and power LED connector
27 Fan sink connector (some models only)
28 Fan connector
29 DIMM connectors
30 SCSI activity LED connector
31 Wake on LAN connector
32 Wake on ring connector
33 Battery
34 Feature connector
35 Riser card connector

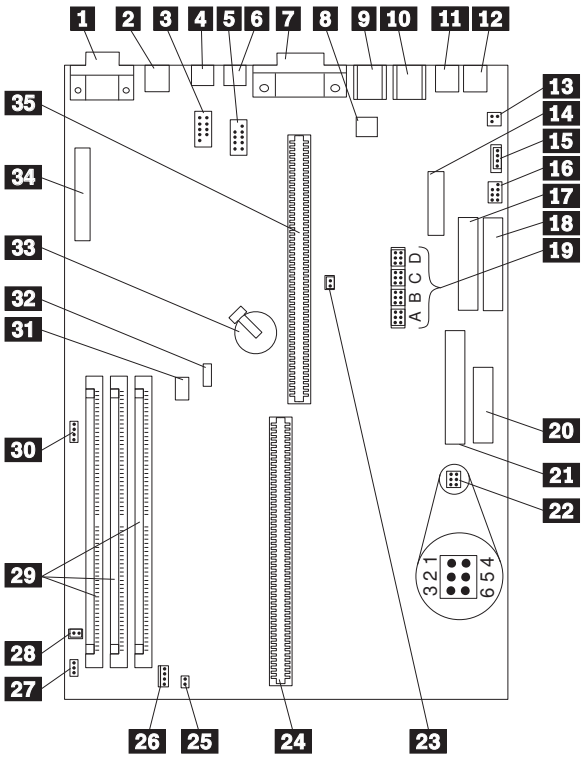

Figure 2. System Board

System Board Connectors

Connectors are provided on the system board to allow custom configurations. The following tables show the pin assignments for various system board connectors. To locate the connectors, see “System Board” on page 12.

Table 2. Pin Assignments for the Standard Power Connector

Pin	Description
J9F1-12	+5 V
J9F1-11	+5 V
J9F1-10	+5 V
J9F1-9	–5 V
J9F1-8	Ground
J9F1-7	Ground
J9F1-6	Ground
J9F1-5	Ground
J9F1-4	–12 V
J9F1-3	+12 V
J9F1-2	+5 V
J9F1-1	Power Good

Table 3. Pin Assignments for the Power (+3.3 V ac) Connector

Pin	Description
J9G1-6	+3.3 V
J9G1-5	+3.3 V
J9G1-4	+3.3 V
J9G1-3	Ground
J9G1-2	Ground
J9G1-1	Ground

Table 4. Pin Assignments for the Auxiliary Power (5 V) Connector

Pin	Description	I/O
J6N2-3	Ground	NA
J6N2-2	Power on	O
J6N2-1	AUX5 (+5 V always on)	O

Table 5. Pin Assignments for the SCSI Activity LED Connector

Pin	Description	I/O
J1F1-4	NC	NA
J1F1-3	HF LED	I
J1F1-2	HF LED	I
J1F1-1	NC	NA

Table 6. Pin Assignments for the Wake on Ring Connector		
Pin	**Description**	**I/O**
J3G1-4	Ground	NA
J3G1-3	Modem ring signal	I
J3G1-2	NC	NA
J3G1-1	+5V SB	NA

Table 7. Pin Assignments for the Wake on LAN Connector		
Pin	**Description**	**I/O**
J3F1-2	Ground	NA
J3F1-1	Wake on LAN	I

Table 8. Pin Assignments for the Hard Disk LED and Power LED Connector		
Pin	**Description**	**I/O**
J2A1-4	Disk LED	O
J2A1-3	+3.3 V	NA
J2A1-2	Power LED	O
J2A1-1	Ground	NA

Table 9. Pin Assignments for the Fan Connector		
Pin	**Description**	**I/O**
J1B1-2	+12 V	NA
J1B1-1	Ground	NA

Table 10. Pin Assignments for the Fan Sink Connector (Some Models Only)		
Pin	**Description**	**I/O**
J1A1-1	Ground	NA
J1A1-2	+12 V	NA
J1A1-3	Tachometer	O

Table 11. Pin Assignments for the CD-ROM Audio Connector		
Pin	**Description**	**I/O**
J9M1-4	Right	I
J9M1-3	Common	I
J9M1-2	Common	I
J9M1-1	Left	I

System Board Jumpers

A group of four jumper blocks is provided on the system board to allow for custom configuration. The pin layout for these jumper blocks (collectively referred to as the system board jumper block) is shown in the diagram that follows. Refer to *Installing Options in Your PC 300XL* or *Installing Options in Your IntelliStation M Pro* and the label on the underside of the computer cover for further information.

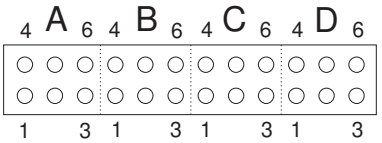

Figure 3. Pin Layout for the System Board Jumper Blocks

The following tables show the jumper pin settings required for various configurations. The default setting is identified as (D).

Table 12. Microprocessor Operation

Microprocessor Speed (MHz)	Bus Speed (MHz)	Setting (Jumper A)	Setting (Jumper B)
233 (D)	66	2-3	2-3 and 5-6
266	66	1-2	1-2 and 4-5
300	66	1-2	2-3 and 4-5

Table 13. Diskette Drive Operation

Configuration	Setting (Jumper A)
Read/Write (D)	5-6
Read only	4-5

Table 14. CMOS Operation

Configuration	Setting (Jumper C)
Normal (D)	5-6
Clear CMOS	4-5

Note: Refer to *Installing Options in Your PC 300XL* and *Installing Options in Your IntelliStation M Pro* for important information on clearing CMOS.

Table 15. Password Enable

Configuration	Setting (Jumper D)
Normal/Enabled (D)	2-3
Disabled	1-2

Note: Refer to *Installing Options in Your PC 300XL* and *Installing Options in Your IntelliStation M Pro* for important information on erasing lost or forgotten passwords.

Table 16. Boot Block Recovery Jumper

Configuration	Setting
Normal (D)	5-6
Recover	4-5

Chapter 3. Adapters and Internal Drives

This chapter provides information on adapters and internal drives that are supported by PC 300XL and IntelliStation M Pro computers.

Adapters

Some PC 300XL and IntelliStation M Pro models come standard with a graphics adapter and/or a SCSI adapter installed in the expansion slots. The graphics adapter provides support for video, and the SCSI adapter provides an interface between the PCI bus and SCSI devices.

Note: IDE expansion adapters and the IBM PCMCIA adapter for PCI are not supported.

Graphics Adapters

Some PC 300XL and IntelliStation M Pro models come standard with a Matrox MGA Millennium or Intergraph Intense 3D graphics adapter installed. The adapters plug into the riser card in the computers and connect to the PCI bus. (For information on the riser card, see “Riser Card” on page 11.) Both graphics adapters are compliant with *PCI Local Bus Specification 2.1* and support DDC 1.1 and DDC2B standards.

Matrox MGA Millennium Graphics Adapter

The Matrox MGA Millennium graphics adapter, which is preinstalled in some PC 300XL and IntelliStation M Pro computers, contains a high-performance, high-resolution graphics controller designed for use with GUI operating systems as well as CAD applications. The adapter also features the following:

- 4 MB of WRAM (Windows RAM) upgradable to 8 MB
- A 220 MHz, 32-bit RAMDAC
- A 32 KB EPROM which contains the video POST/BIOS code
- Shared frame buffer interface connectors
- VESA 2.0 compliance (up to 1280 x 1024)
- DDC 1.1 compliance
- Two external interfaces
  - A 15-pin, DDC2B-compliant monitor connector
  - A 26-pin, multimedia upgrade connector (video feature connector) for capturing video from an external source, such as a VCR

Note: The optional memory upgrade cannot be used in conjunction with the Matrox VPU MPEG daughtercard option. (The daughtercard utilizes the Matrox VPU chip and allows live video capture and hardware MPEG playback.)

Refer to “Video” on page 10 for additional information on the Matrox MGA Millennium graphics adapter.

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Intergraph Intense 3D Graphics Adapter

An Intergraph Intense 3D graphics adapter is preinstalled in some IntelliStation M Pro computers. The adapter provides a single-card, PCI bus solution for a family of high-performance, Open GL graphics products. Other features of the adapter include:

- 16 MB of SDRAM and 4 MB of SGRAM
- Support for resolutions up to 1.3 megapixels (1280 x 1024)
- Support for adding texture memory via one on-board mezzanine connector set
- Acceleration of geometry and lighting calculations with the addition of the Intense Geometry Accelerator option
- Dedicated communications bus connected via an internal 60-pin ribbon cable
- Support for VESA Display Power Management Signaling (DPMS) standard
- Three external interfaces
  - A 5-pin, stereo sync output jack, which provides a connection to the emitter module of a pair of LCD shutter glasses
  - A 15-pin (blue), DDC2B-compliant monitor port
  - A 15-pin (black) VGA input connector for accepting input from another VGA video input device, such as the system board S3 Trio64V2 video controller

Note: The Intergraph Intense 3D adapter requires one full-length PCI expansion slot and works only in PCI systems with 5-volt signaling environments.

SCSI Adapter

Some PC 300XL and IntelliStation M Pro models come with the Adaptec AHA-2940UW Ultra-SCSI PCI adapter. This adapter provides the interface between the PCI bus and SCSI devices. SCSI technology is useful with multitasking operating environments because instructions can be sent concurrently to every drive in the system, and the drives can then execute these instructions simultaneously. The Adaptec AHA-2940UW Ultra-SCSI PCI adapter provides connectors for both 8- and 16-bit internal devices, as well as 16-bit external devices. It also provides automatic bus termination, a connector for an LED to indicate SCSI bus activity, and BIOS and setup utility (SCSI*Select*) in FLASH ROM.

An extra cable is provided with SCSI models. This cable provides five identical connectors for attaching the SCSI adapter to internal SCSI devices.

For more information on connecting SCSI devices, see the *Adaptec SCSI Documentation* that comes with the computer system.

Internal Drives

The IDE and diskette interfaces in the PC 300XL and IntelliStation M Pro provide connectors for attaching internal drives. The SCSI interface (standard in some models only) provides connectors for attaching both internal and external drives. The PC 300XL and IntelliStation M Pro come standard with an internal diskette drive and an internal EIDE or Ultra-Wide SCSI hard disk drive. Some models also have an internal CD-ROM drive.

The following tables show the characteristics of internal drives that come standard with or are available for the computer.

Table 17. Diskette Drives

Characteristics	**Number/Size**
Standard	One 3.5-inch, 1.44 MB diskette drive
Maximum	Two diskette drives
Optional	3.5-inch, 1.44 MB and 5.25-inch, 1.2 MB diskette drives

Table 18. IDE and SCSI Devices

Characteristics	**Number/Size or Speed**
Standard	One EIDE or one Ultra Wide SCSI hard disk drive (size varies by model)
Standard (some models only)	One IDE CD-ROM drive (speed varies by model)
Optional	IDE or SCSI tape backup drive
Maximum IDE	Four IDE devices total. (However, the actual number that can be installed is limited by the number of available drive bays in the computer.)
Maximum SCSI	Refer to the SCSI documentation shipped with the computer.

Chapter 4. Power Supply

Power is supplied by a 200-watt power supply that has EnergyStar and Extended LAN Wakeup features. The power supply operates at either 115 V ac or 230 V ac. The voltage setting is manually selected with a switch on the rear of the computer. The power supply converts ac input voltages into dc output voltages and provides power for the following components:

- System board
- ISA and PCI adapters
- Internal drives
- Keyboard and auxiliary devices

Power Input

The following table shows the input power specifications.

Table 19. Power Input Requirements

Description	Measurements
Input voltage, low range	90 V ac (min) to 137 V ac (max) Voltage switch setting: 115 or 115 V
Input voltage, high range	180 V ac (min) to 265 V ac (max) Voltage switch setting: 230 or 230 V
Sine-wave input frequency	50 Hz to 60 Hz
Approximate input kilovolt-amperes (kVA)	0.08 (minimum) or 0.52 kVA (maximum)

Power Output

The power supply outputs shown in the following tables include the current supply capability of all the connectors, including system board, internal drives, PCI, and auxiliary outputs.

Table 20. Power Output

Output Voltage	Regulation	Minimum to Maximum (amps)
+5 V dc	+5% to −4%	1.5 to 20.0[2]
+12 V dc	+5% to −5%	0.2 to 8.0
−12 V dc	+10% to −9%	0.0 to 0.5
−5 V dc	+10% to −10%	0.0 to 0.5
+3.3 V dc	+5% to −4%	0.0 to 20.0[2]
+5 V dc (auxiliary)	+5% to −10%	0.0 to 0.020
+5 V dc (Wake on LAN)	+5% to −10%	0.0 to 0.7

[2] Simultaneous loading of +3.3 V dc and +5 V dc must not exceed 100 watts.

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Component Outputs

The power supply provides separate voltage sources for the system board and internal storage devices. The following tables show the approximate power that is provided for specific system components. Many components draw less current than the maximum shown.

Table 21. System Board

Supply Voltage	Maximum Current	Regulation Limits
+3.3 V dc	4500 mA	+5.0% to –4.0%
+5.0 V dc	9000 mA	+5.0% to –4.0%
+12.0 V dc	25.0 mA	+5.0% to –5.0%
–12.0 V dc	25.0 mA	+10.0% to –9.0%

Table 22. Keyboard Port

Supply Voltage	Maximum Current	Regulation Limits
+5.0 V dc	275 mA	+5.0% to –4.0%

Table 23. Mouse Port

Supply Voltage	Maximum Current	Regulation Limits
+5.0 V dc	300 mA	+5.0% to –4.0%

Table 24. ISA-Bus Adapters (Per Slot)

Supply Voltage	Maximum Current	Regulation Limits
+5.0 V dc	4500 mA	+5.0% to –4.0%
–5.0 V dc	200 mA	+5.0% to –5.0%
+12.0 V dc	1500 mA	+5.0% to –5.0%
–12.0 V dc	300 mA	+10.0% to –9.0%

Table 25. PCI-Bus Adapters (Per Slot)

Supply Voltage	Maximum Current	Regulation Limits
+5.0 V dc	5000 mA	+5.0% to –4.0%
+3.3 V dc	5000 mA	+5.0% to –4.0%

Note: For each PCI connector, the maximum power consumption is rated at 25 watts for +5 V and +3.3 V combined.

Table 26. Internal DASD (Direct Access Storage Devices)

Supply Voltage	Maximum Current	Regulation Limits
+5.0 V dc	1400 mA	+5.0% to –5.0%
+12.0 V dc	1500 mA	+5.0% to –5.0%

Note: Some adapters and hard disk drives draw more current than the recommended limits. These adapters and drives can be installed in the system; however, the power supply will shut down if the total power used exceeds the maximum power that is available.

Output Protection

The power supply protects against output overcurrent, overvoltage, and short circuits. Please see the power supply specifications for details.

A short circuit that is placed on any dc output (between outputs or between an output and dc return) latches all dc outputs into a shutdown state, with no damage to the power supply.

If this shutdown state occurs, the power supply returns to normal operation only after the fault has been removed and the power switch has been turned off for at least one second.

If an overvoltage fault occurs (in the power supply), the power supply latches all dc outputs into a shutdown state before any output exceeds 130% of the nominal value of the power supply.

Power Connectors

Note: The total power used by the any of following connectors must not exceed the amount shown in "Component Outputs" on page 21.

Connectors with 3 pins are provided to connect the power supply with the system board and a LAN feature. The following table lists the pin assignments for these connectors.

Table 27. Pin Assignments for 3-Pin Power Connectors

Connector	Location	Pin 1	Pin 2	Pin 3
P9[3]	System board	+5 V	Control	Ground
P12	LAN	+5 V	Control	Ground

The power supply provides 4-pin connectors for attaching internal devices. The following table lists the pin assignments for these connectors.

Table 28. Pin Assignments for 4-Pin Power Connectors

Connector	Location	Pin 1	Pin 2	Pin 3	Pin 4
P3	3.5-inch diskette drive	+5 V	Ground	Ground	+12 V
P4	–	+12 V	Ground	Ground	+5 V
P5	DASD	+12 V	Ground	Ground	+5 V
P6	DASD	+12 V	Ground	Ground	+5 V
P7	DASD	+12 V	Ground	Ground	+5 V
P8	DASD	+12 V	Ground	Ground	+5 V

[3] AUX5

Chapter 4. Power Supply

Connectors with 6 pins are used to connect the power supply to the system board and riser card. The following table lists the pin assignments for these connectors.

Table 29. Pin Assignments for 6-Pin Power Connectors

Connector	Location	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6
P1	System board	Power Good	+5 V	+12 V	–12 V	Ground	Ground
P2	System board	Ground	Ground	–5 V	+5 V	+5 V	+5 V
P10	Riser 3 V	+3.3 V	+3.3 V	+3.3 V	Ground	Ground	Ground
P11	System board 3 V	+3.3 V	+3.3 V	+3.3 V	Ground	Ground	Ground

Chapter 5. Physical Specifications

This section lists the physical specifications for the PC 300XL and IntelliStation M Pro. Both computers have five drive bays for adding internal drives and five expansion slots for adding adapters.

Note: The computers are electromagnetically compatible with FCC Class B.

The measurements in the tables that follow apply to both the PC 300XL and IntelliStation M Pro unless otherwise noted.

Table 30. Size

Description	Measurements (PC 300XL)	Measurements (IntelliStation M Pro)
Depth	475 mm (18.7 in.)	475 mm (18.7 in.)
Height	157 mm (6.2 in.)	450 mm (17.7 in.)
Width	419 mm (16.5 in.)	259 mm (10.2 in), with pedestal

Table 31. Weight

Minimum configuration	12.7 kg (28.0 lb.)
Maximum configuration	14.1 kg (31.0 lb.)

Table 32. Cables

Description	Measurement
Power cable	1.63 m (5 ft 4 in.)
Keyboard cable	1.83 m (6 ft)
Ribbon cable (IDE interface)	0.51 m (1 ft 8 in.)
SCSI cable (models with SCSI adapter only)	0.91 m (3 ft)

Table 33. Air Temperature

Description	Measurement
System on	10 to 35°C (50 to 95°F)
System off	10 to 43°C (50 to 110°F)

Note: The maximum altitude at which the specified air temperatures apply is 2134 m (7000 ft). At higher altitudes, the maximum air temperatures are lower than those specified.

Table 34. Humidity

Description	Measurement
System on	8% to 80%
System off	8% to 80%

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Table 35. Heat Output (Approximate)	
Description	**Measurement**
Minimum configuration	35 W (120 Btu per hour)
Maximum configuration	204 W (700 Btu per hour)
Deep sleep	4 W (15 Btu per hour)

Note: Maximum power and heat specifications are based on the 200-watt maximum capacity of the system power supply.

Table 36. Electrical Input	
Description	**Measurement**
Low range	90 (min) to 137 (max) V ac
Low range nominal	100 to 127 V ac
High range	180 (min) to 265 (max) V ac
High range nominal	200 to 240 V ac
Sine-wave input	50 ± 3 Hz to 60 ± 3 Hz required
Input kilovolt-amperes, minimum (approximate)	0.08 kVA
Input kilovolt-amperes, maximum (approximate)	0.52 kVA

Chapter 6. System Compatibility

This chapter provides information on some of the hardware, software, and BIOS compatibility issues for the PC 300XL and IntelliStation M Pro. For a list of compatible hardware and software option packages available, refer to the *Compatibility Report* for these computers on the World Wide Web at http://www.pc.ibm.com/cdt.

Hardware Compatibility

This section discusses hardware and BIOS compatibility issues that must be considered when designing application programs.

Many of the interfaces are the same as those used by the IBM Personal Computer AT. In most cases, the command and status organization of these interfaces is maintained.

The functional interfaces are compatible with the following interfaces:

- The Intel 8259 interrupt controllers (edge-triggered mode)
- The National Semiconductor NS16450 and NS16550A serial communication controllers
- The Motorola MC146818 Time of Day Clock command and status (CMOS reorganized)
- The Intel 8254 timer, driven from a 1.193 MHz clock (channels 0, 1, and 2)
- The Intel 8237 DMA controller, except for the Command and Request registers and the Rotate and Mask functions; the Mode register is partially supported
- The Intel 8272 or 82077 diskette drive controllers
- The Intel 8042 keyboard controller at addresses 0060h and 0064h
- All video standards using VGA, EGA, CGA, MDA, and Hercules modes
- The parallel printer ports (Parallel 1, Parallel 2, and Parallel 3) in compatibility mode

Use the following information to develop application programs. Whenever possible, use the BIOS as an interface to hardware to provide maximum compatibility and portability of applications among systems.

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Hardware Interrupts

Hardware interrupts are level-sensitive for PCI interrupts and edge-sensitive for ISA interrupts. The interrupt controller clears its in-service register bit when the interrupt routine sends an End of Interrupt (EOI) command to the controller. The EOI command is sent regardless of whether the incoming interrupt request to the controller is active or inactive.

The interrupt-in-progress latch is readable at an I/O-address bit position. This latch is read during the interrupt service routine and might be reset by the read operation, or it might require an explicit reset.

Note: For performance and latency considerations, designers might want to limit the number of devices sharing an interrupt level.

With level-sensitive interrupts, the interrupt controller requires that the interrupt request be inactive at the time the EOI command is sent; otherwise, a new interrupt request will be detected. To avoid this, a level-sensitive interrupt handler must clear the interrupt condition (usually by a read or write operation to an I/O port on the device causing the interrupt). After processing the interrupt, the interrupt handler:

1. Clears the interrupt
2. Waits one I/O delay
3. Sends the EOI
4. Waits one I/O delay
5. Enables the interrupt through the Set Interrupt Enable Flag command

Hardware interrupt IRQ9 is defined as the replacement interrupt level for the cascade level IRQ2. Program interrupt sharing is implemented on IRQ2, interrupt 0Ah. The following processing occurs to maintain compatibility with the IRQ2 used by IBM Personal Computer products:

1. A device drives the interrupt request active on IRQ2 of the channel.
2. This interrupt request is mapped in hardware to IRQ9 input on the second interrupt controller.
3. When the interrupt occurs, the system microprocessor passes control to the IRQ9 (interrupt 71h) interrupt handler.
4. This interrupt handler performs an EOI command to the second interrupt controller and passes control to the IRQ2 (interrupt 0Ah) interrupt handler.
5. This IRQ2 interrupt handler, when handling the interrupt, causes the device to reset the interrupt request before performing an EOI command to the master interrupt controller that finishes servicing the IRQ2 request.

Diskette Drives and Controller

The following tables show the reading, writing, and formatting capabilities of each type of diskette drive.

Table 37. 5.25-Inch Diskette Drive Reading, Writing, and Formatting Capabilities

Diskette Drive Type	250/500 KB Mode	300/500 KB Mode	1 MB Mode
Single sided (48 TPI)	RWF	—	—
Double sided (48 TPI)	RWF	RWF	—
High capacity (1.2 MB)	RWF	RWF	RWF

Table 38. 3.5-Inch Diskette Drive Reading, Writing, and Formatting Capabilities

Diskette Drive Type	720 KB Mode	1.44 MB Mode	2.88 MB Mode
1.44 MB drive	RWF	RWF	Not supported

Notes:

1. Do not use 5.25-inch diskettes that are designed for the 1.2 MB mode in either a 250/500 KB or 300/500 KB diskette drive.
2. Low-density 5.25-inch diskettes that are written to or formatted by a high-capacity 1.2 MB diskette drive can be reliably read only by another 1.2 MB diskette drive.

Copy Protection

The following methods of copy protection might not work in systems using the 3.5-inch, 1.44 MB diskette drive.

- Bypassing BIOS routines:
  - Data transfer rate: BIOS selects the proper data transfer rate for the media being used.
  - Diskette parameter table: Copy protection, which creates its own diskette parameter table, might not work in these drives.
- Diskette drive controls:
  - Rotational speed: The time between two events in a diskette drive is a function of the controller.
  - Access time: Diskette BIOS routines must set the track-to-track access time for the different types of media that are used in the drives.
  - 'Diskette change' signal: Copy protection might not be able to reset this signal.
- Write-current control: Copy protection that uses write-current control does not work, because the controller selects the proper write current for the media that is being used.

Hard Disk Drives and Controller

Reading from and writing to the hard disk is initiated in the same way as in other IBM Personal Computer products; however, new functions are supported.

Software Compatibility

To maintain software compatibility, the interrupt polling mechanism that is used by IBM Personal Computer products is retained. Software that interfaces with the reset port for the IBM Personal Computer positive-edge interrupt sharing (hex address 02F*x* or 06F*x*, where *x* is the interrupt level) does not create interference.

Software Interrupts

With the advent of software interrupt sharing, software interrupt routines must daisy-chain interrupts. Each routine must check the function value, and if it is not in the range of function calls for that routine, it must transfer control to the next routine in the chain. Because software interrupts are initially pointed to address 0:0 before daisy chaining, check for this case. If the next routine is pointed to address 0:0 and the function call is out of range, the appropriate action is to set the carry flag and do a RET 2 to indicate an error condition.

Machine-Sensitive Programs

Programs can select machine-specific features, but they must first identify the machine and model type. IBM has defined methods for uniquely determining the specific machine type. The machine model byte can be found through Interrupt 15H, Return System Configuration Parameters function ((AH)=C0H).

Appendix A. Connector Pin Assignments

The following tables show the pin assignments for various system board connectors.

ISA Bus Connectors

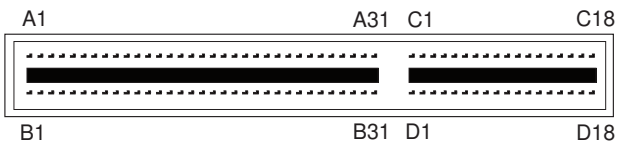

Figure 4. ISA Bus Connector

The ISA bus connectors are part of the riser card.

Table 39 (Page 1 of 2). Pin Assignments for the ISA Bus Connectors

Pin	Signal Name	I/O	Pin	Signal Name	I/O
B1	Ground	NA	A1	IOCHCK#	I
B2	RESET DRV	O	A2	SD7	I/O
B3	+5 V dc	NA	A3	SD6	I/O
B4	IRQ2	I	A4	SD5	I/O
B5	–5 V dc	NA	A5	SD4	I/O
B6	DRQ2	I	A6	SD3	I/O
B7	–12 V dc	NA	A7	SD2	I/O
B8	OWS#	I	A8	SD1	I/O
B9	+12 V dc	NA	A9	SD0	I/O
B10	Ground	NA	A10	IOCHRDY	I
B11	SMEMW#	O	A11	AEN	O
B12	SMEMR#	O	A12	SA19	I/O
B13	IOW#	I/O	A13	SA18	I/O
B14	IOR#	I/O	A14	SA17	I/O
B15	DACK3#	O	A15	SA16	I/O
B16	DRQ3	I	A16	SA15	I/O
B17	DACK1#	O	A17	SA14	I/O
B18	DRQ1	I	A18	SA13	I/O
B19	REFRESH#	I/O	A19	SA12	I/O
B20	CLK	O	A20	SA11	I/O
B21	IRQ7	I	A21	SA10	I/O
B22	IRQ6	I	A22	SA9	I/O
B23	IRQ5	I	A23	SA8	I/O
B24	IRQ4	I	A24	SA7	I/O
B25	IRQ3	I	A25	SA6	I/O
B26	DACK2#	O	A26	SA5	I/O
B27	TC	O	A27	SA4	I/O
B28	BALE	O	A28	SA3	I/O
B29	+5 V dc	NA	A29	SA2	I/O

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Table 39 (Page 2 of 2). Pin Assignments for the ISA Bus Connectors

Pin	Signal Name	I/O	Pin	Signal Name	I/O
B30	OSC	O	A30	SA1	I/O
B31	Ground	NA	A31	SA0	I/O
D1	MEMCS16#	I	C1	SBHE#	I/O
D2	IOCS16#	I	C2	LA23	I/O
D3	IRQ10	I	C3	LA22	I/O
D4	IRQ11	I	C4	LA21	I/O
D5	IRQ12	I	C5	LA20	I/O
D6	IRQ15	I	C6	LA19	I/O
D7	IRQ14	I	C7	LA18	I/O
D8	DACK0#	O	C8	LA17	I/O
D9	DRQ0	I	C9	MEMR#	I/O
D10	DACK5#	O	C10	MEMW#	I/O
D11	DRQ5	I	C11	SD8	I/O
D12	DACK6#	O	C12	SD9	I/O
D13	DRQ6	I	C13	SD10	I/O
D14	DACK7#	O	C14	SD11	I/O
D15	DRQ7	I	C15	SD12	I/O
D16	+5 V dc	NA	C16	SD13	I/O
D17	MASTER#	I	C17	SD14	I/O
D18	Ground	NA	C18	SD15	I/O

Appendix A. Connector Pin Assignments

PCI Bus Connectors

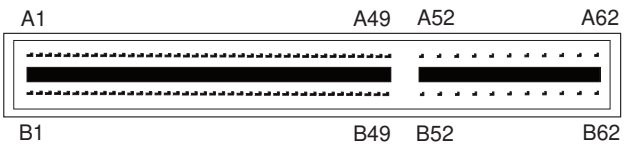

Figure 5. PCI Bus Connector

Note: The PCI bus connectors are part of the riser card.

Table 40 (Page 1 of 2). Pin Assignments for the PCI Bus Connectors

Pin	Signal Name	I/O	Pin	Signal Name	I/O
A1	TRST#	O	B1	–12 V dc	NA
A2	+12 V dc	NA	B2	TCK	O
A3	TMS	O	B3	Ground	NA
A4	TDI	O	B4	TDO	I
A5	+5 V dc	NA	B5	+5 V dc	NA
A6	INTA#	I	B6	+5 V dc	NA
A7	INTC#	I	B7	INTB#	I
A8	+5 V dc	NA	B8	INTD#	I
A9	Reserved	NA	B9	PRSNT1#	I
A10	+5 V dc (I/O)	NA	B10	Reserved	NA
A11	Reserved	NA	B11	PRSNT2#	I
A12	Ground	NA	B12	Ground	NA
A13	Ground	NA	B13	Ground	NA
A14	Reserved	NA	B14	Reserved	NA
A15	RST#	O	B15	Ground	NA
A16	+5 V dc (I/O)	NA	B16	CLK	O
A17	GNT#	O	B17	Ground	NA
A18	Ground	NA	B18	REQ#	I
A19	Reserved	NA	B19	+5 V dc (I/O)	NA
A20	Address/Data 30	I/O	B20	Address/Data 31	I/O
A21	+3.3 V dc	NA	B21	Address/Data 29	I/O
A22	Address/Data 28	I/O	B22	Ground	NA
A23	Address/Data 26	I/O	B23	Address/Data 27	I/O
A24	Ground	NA	B24	Address/Data 25	I/O
A25	Address/Data 24	I/O	B25	+3.3 V dc	NA
A26	IDSEL	O	B26	C/BE 3#	I/O
A27	+3.3 V dc	NA	B27	Address/Data 23	I/O
A28	Address/Data 22	I/O	B28	Ground	NA
A29	Address/Data 20	I/O	B29	Address/Data 21	I/O
A30	Ground	NA	B30	Address/Data 19	I/O
A31	Address/Data 18	I/O	B31	+3.3 V dc	NA
A32	Address/Data 16	I/O	B32	Address/Data 17	I/O
A33	+3.3 V dc	NA	B33	C/BE 2#	I/O

Table 40 (Page 2 of 2). Pin Assignments for the PCI Bus Connectors

Pin	Signal Name	I/O	Pin	Signal Name	I/O
A34	FRAME#	I/O	B34	Ground	NA
A35	Ground	NA	B35	IRDY#	I/O
A36	TRDY#	I/O	B36	+3.3 V dc	NA
A37	Ground	NA	B37	DEVSEL#	I/O
A38	STOP#	I/O	B38	Ground	NA
A39	+3.3 V dc	NA	B39	LOCK#	I/O
A40	SDONE	I/O	B40	PERR#	I/O
A41	SBO#	I/O	B41	+3.3 V dc	NA
A42	Ground	NA	B42	SERR#	I/O
A43	+3.3 V dc	NA	B43	+3.3 V dc	NA
A44	C/BE(1)#	I/O	B44	C/BE 1#	I/O
A45	Address/Data 14	I/O	B45	Address/Data 14	I/O
A46	Ground	NA	B46	Ground	NA
A47	Address/Data 12	I/O	B47	Address/Data 12	I/O
A48	Address/Data 10	I/O	B48	Address/Data 10	I/O
A49	Ground	NA	B49	Ground	NA
A50	##Key##	NA	B50	##Key##	NA
A51	##Key##	NA	B51	##Key##	NA
A52	Address/Data 8	I/O	B52	Address/Data 8	I/O
A53	Address/Data 7	I/O	B53	Address/Data 7	I/O
A54	+3.3 V dc	NA	B54	+3.3 V dc	NA
A55	Address/Data 5	I/O	B55	Address/Data 5	I/O
A56	Address/Data 3	I/O	B56	Address/Data 3	I/O
A57	Ground	NA	B57	Ground	NA
A58	Address/Data 1	I/O	B58	Address/Data 1	I/O
A59	+5 V dc (I/O)	NA	B59	+5 V dc (I/O)	NA
A60	ACK64#	I/O	B60	ACK64#	I/O
A61	+5 V dc	NA	B61	+5 V dc	NA
A62	+5 V dc	NA	B62	+5 V dc	NA

Appendix A. Connector Pin Assignments

System Memory Connectors

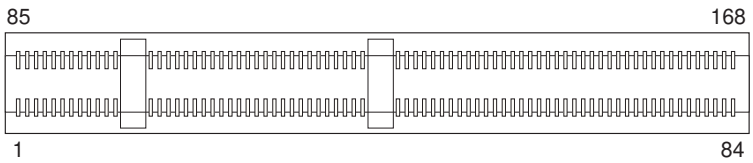

Figure 6. System Memory (DIMM) Connector

Each DIMM connector is a 168-pin, gold-lead socket.

Table 41 (Page 1 of 3). Pin Assignments for the DIMM Connectors

Pin	Signal Name	I/O	Pin	Signal Name	I/O
1	Ground	NA	85	Ground	NA
2	MD0	I/O	86	MD32	I/O
3	MD1	I/O	87	MD33	I/O
4	MD2	I/O	88	MD34	I/O
5	MD3	I/O	89	MD35	I/O
6	VDD	I/O	90	VDD	NA
7	MD4	I/O	91	MD36	NA
8	MD5	I/O	92	MD37	I/O
9	MD6	I/O	93	MD38	I/O
10	MD7	I/O	94	MD39	I/O
11	MD8	I/O	95	MD40	I/O
12	GND	NA	96	Ground	NA
13	MD9	I/O	97	MD41	I/O
14	MD10	I/O	98	MD42	I/O
15	MD11	O	99	MD43	I/O
16	MD12	O	100	MD44	I/O
17	MD13	O	101	MD45	I/O
18	VDD	O	102	VDD	NA
19	MD14	O	103	MD46	I/O
20	No connect/CB0	I/O	104	MD47	I/O
21	No connect/CB1	I/O	105	No connect/CB4	I/O
22	PAR2	I/O	106	No connect/CB5	I/O
23	Ground	I/O	107	Ground	NA
24	No connect	NA	108	No connect	NA
25	No connect	NA	109	No connect	NA
26	VDD	I/O	110	VDD	NA
27	WE0	O	111	DU	NA
28	CAS0	O	112	CAS4	O
29	CAS1	O	113	CAS5	O
30	RAS0	O	114	RAS1	O
31	OE0	O	115	DU	NA
32	Ground	O	116	Ground	NA
33	A0	O	117	A1	O

Table 41 (Page 2 of 3). Pin Assignments for the DIMM Connectors

Pin	Signal Name	I/O	Pin	Signal Name	I/O
34	A2	O	118	A3	O
35	A4	O	119	A5	O
36	A6	O	120	A7	O
37	A8	O	121	A9	O
38	A10	O	122	A11	O
39	A12	O	123	A13	O
40	VDD	NA	124	VDD	NA
41	VDD	NA	125	DU	NA
42	No connect (DU)	NA	126	DU	NA
43	Ground	NA	127	Ground	NA
44	OE2	O	128	DU	NA
45	RAS2	O	129	RAS3	O
46	CAS2	O	130	CAS6	O
47	CAS3	O	131	CAS7	O
48	WE2	O	132	DU	NA
49	VDD	O	133	VDD	NA
50	No connect	NA	134	No connect	NA
51	No connect	NA	135	No connect	NA
52	No connect/CB2	I/O	136	No connect/CB6	I/O
53	No connect/CB3	I/O	137	No connect/CB7	I/O
54	Ground	NA	138	Ground	NA
55	MD16	I/O	139	MD48	I/O
56	MD17	I/O	140	MD49	I/O
57	MD18	I/O	141	MD50	I/O
58	MD19	I/O	142	MD51	I/O
59	VDD	NA	143	VDD	NA
60	MD20	I/O	144	MD52	I/O
61	No connect	NA	145	No connect	NA
62	DU	NA	146	DU	NA
63	No connect	NA	147	No connect	NA
64	Ground	NA	148	Ground	NA
65	MD21	I/O	149	MD53	I/O
66	MD22	I/O	150	MD54	I/O
67	MD23	I/O	151	MD55	I/O
68	Ground	NA	152	Ground	NA
69	MD24	I/O	153	MD56	I/O
70	MD25	I/O	154	MD57	I/O
71	MD26	I/O	155	MD58	I/O
72	MD27	I/O	156	MD59	I/O
73	VDD	NA	157	VDD	NA
74	MD28	I/O	158	MD60	I/O
75	MD29	I/O	159	MD61	I/O
76	MD30	I/O	160	MD62	I/O

Appendix A. Connector Pin Assignments

Table 41 (Page 3 of 3). Pin Assignments for the DIMM Connectors					
Pin	**Signal Name**	**I/O**	**Pin**	**Signal Name**	**I/O**
77	MD31	I/O	161	MD63	I/O
78	Ground	NA	162	Ground	NA
79	No connect	I/O	163	No connect	NA
80	No connect	I/O	164	No connect	NA
81	No connect	I/O	165	SA0	I/O
82	SDA	I/O	166	SA1	I/O
83	SCL	I/O	167	SA2	I/O
84	VDD	NA	168	VDD	I/O

IDE Connectors

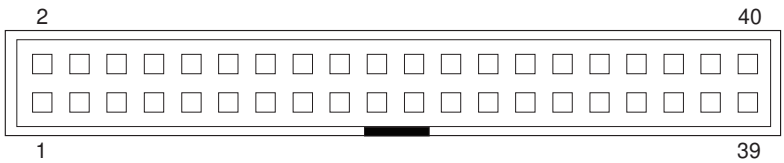

Figure 7. IDE Connector

Each IDE connector is a 40-pin, shrouded berg strip.

Table 42. Pin Assignments for the IDE Connectors

Pin	Signal Name	I/O	Pin	Signal Name	I/O
1	Reset	O	2	Ground	NA
3	D7	I/O	4	D8	I/O
5	D6	I/O	6	D9	I/O
7	D5	I/O	8	D10	I/O
9	D4	I/O	10	D11	I/O
11	D3	I/O	12	D12	I/O
13	D2	I/O	14	D13	I/O
15	D1	I/O	16	D14	I/O
17	D0	I/O	18	D15	I/O
19	Ground	NA	20	Key	NA
21	No connect	NA	22	Ground	NA
23	IOW#	O	24	No connect	NA
25	IOR#	O	26	Ground	NA
27	IOCHRDY	I	28	ALE	O
29	No connect	NA	30	Ground	NA
31	IRQ	I	32	CS16#	I
33	SA1	O	34	PDIAG#	I
35	SA0	O	36	SA2	O
37	CS0#	O	38	CS1	O
39	Active#	I	40	Ground	NA

Appendix A. Connector Pin Assignments

Diskette Drive Connector

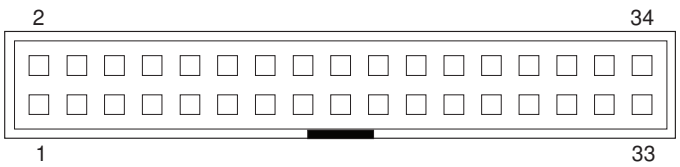

Figure 8. Diskette Drive Connector

The external connector for the diskette drive is a 34-pin, shrouded berg strip.

Table 43. Pin Assignments for the Diskette Drive Connector

Pin	Signal Name	I/O	Pin	Signal Name	I/O
1	Drive 2 installed#	I	2	High density select	O
3	Not connected	NA	4	Not connected	NA
5	Ground	NA	6	Data rate 0	NA
7	Ground	NA	8	Index#	I
9	Reserved	NA	10	Motor enable 0#	O
11	Ground	NA	12	Drive select 1#	O
13	Ground	NA	14	Drive select 0#	O
15	Ground	NA	16	Motor enable 1#	O
17	MSEN1	I	18	Direction in#	O
19	Ground	NA	20	Step#	O
21	Ground	NA	22	Write data#	O
23	Ground	NA	24	Write enable#	O
25	Ground	NA	26	Track 0#	I
27	MSEN0	I	28	Write protect#	I
29	Ground	NA	30	Read data#	I
31	Ground	NA	32	Head 1 select#	O
33	Data rate 1	NA	34	Diskette change#	I

USB Connectors

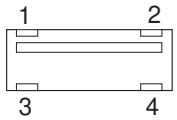

Figure 9. USB Connector

The external interface for the USB ports consists of two, 4-pin connectors.

Table 44. Pin Assignments for the USB Connectors

Pin	Signal Name	I/O
1	VCC	NA
2	-Data	I/O
3	+Data	I/O
4	Ground	NA

Parallel Port Connector

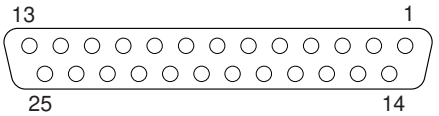

Figure 10. Parallel Port Connector

The external interface for the parallel port is a 25-pin, female, D-shell connector.

Table 45. Pin Assignments for the Parallel Port Connector

Pin	Signal Name	I/O	Pin	Signal Name	I/O
1	STROBE#	I/O	2	D0	I/O
3	D1	I/O	4	D2	I/O
5	D3	I/O	6	D4	I/O
7	D5	I/O	8	D6	I/O
9	D7	I/O	10	ACK#	I
11	BUSY	I	12	PE	I
13	SLCT	I	14	AUTO FD XT#	O
15	ERROR#	I	16	INIT#	O
17	SLCT IN#	O	18	Ground	NA
19	Ground	NA	20	Ground	NA
21	Ground	NA	22	Ground	NA
23	Ground	NA	24	Ground	NA
25	Ground	NA			

Appendix A. Connector Pin Assignments

Serial Port Connector

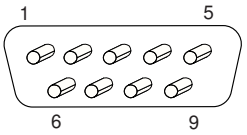

Figure 11. Serial Port Connector

The external interface for the serial port is a 9-pin, male, D-shell connector attached via a ribbon cable from a shrouded connector on the system board.

Table 46. Pin Assignments for the Serial Port Connector

Pin	Signal Name	I/O	Pin	Signal Name	I/O
1	Data carrier detect	I	2	Receive data#	I
3	Transmit data#	O	4	Data terminal ready	O
5	Ground	NA	6	Data set ready	I
7	Request to send	O	8	Clear to send	I
9	Ring indicator	I			

Infrared Port Connector

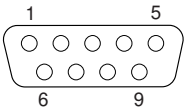

Figure 12. Infrared Port Connector

The external interface for the infrared port is a 9-pin, female, D-shell connector.

Table 47. Pin Assignments for the Infrared Connector

Pin	Signal Name	Signal Definition	I/O
1	IRTX	Infrared transmitted data (output)	O
2	Ground		NA
3	Reserved		NA
4	IRSL2	Infrared module select 2	O
5	IRSL1	Infrared module select 1	O
6	IRRX	Infrared received data (input)	I
7	VCC	Input voltage (5 V) from system board	NA
8	IRSL0	Infrared module select 0	O
9	NC	No connect	NA

Keyboard and Mouse Port Connectors

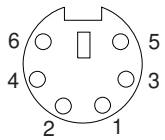

Figure 13. Keyboard and Mouse Port Connector

The keyboard and mouse ports each have a 6-pin, mini-DIN external connector.

Table 48. Pin Assignments for the Keyboard and Mouse Connectors

Pin	Signal Name	I/O	Pin	Signal Name	I/O
1	Data	I/O	2	Reserved	NA
3	Ground	NA	4	+5 V dc	NA
5	Clock	I/O	6	Reserved	NA

Monitor Connector (S3 Trio64V2)

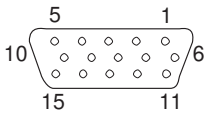

Figure 14. Monitor Connector

The external interface for the integrated S3 Trio64V2 video subsystem is a 15-pin, female, D-shell, DDC2B-compliant connector located on the rear connector panel of the PC 300XL and IntelliStation M Pro computers.

Table 49. Pin Assignments for the Monitor Connector (S3 Trio64V2)

Pin	Signal Name	I/O
1	Red	O
2	Green	O
3	Blue	O
4	Monitor ID2 - not used	I
5	Ground	NA
6	Red ground	NA
7	Green ground	NA
8	Blue ground	NA
9	+5 V, used by DDC2B when monitor off	NA
10	Ground	NA
11	Monitor ID0 - not used	I
12	DDC2B serial data	I/O
13	Horizontal sync.	O
14	Vertical sync.	O
15	DDC2B clock	O

Appendix A. Connector Pin Assignments

Monitor Connector (Graphics Adapters)

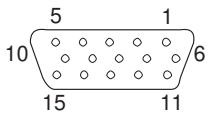

Figure 15. Monitor Connector

In addition to the S3 Trio64V2 monitor port located on the rear connector panel of the PC 300XL and IntelliStation M Pro computers, some models come with a monitor port located on a Matrox MGA Millennium or Intergraph Intense 3D graphics adapter that is preinstalled in one of the expansion slots. The monitor port located on the adapters is a 15-pin, female, D-shell connector that is blue in color. The Matrox MGA Millennium monitor connector is DDC2B-compliant; the Intergraph Intense 3D monitor connector is a D-SUB connector. The two tables that follow show the pin assignments for the monitor port on each of the adapters.

Table 50. Pin Assignments for the Monitor Connector (Matrox MGA Millennium Adapter)

Pin	Signal Name	I/O
1	Red	O
2	Green	O
3	Blue	O
4	Monitor ID2 - not used	I
5	Ground	NA
6	Red ground	NA
7	Green ground	NA
8	Blue ground	NA
9	+5 V, used by DDC2B when monitor off	NA
10	Ground	NA
11	Monitor ID0 - not used	I
12	DDC2B serial data	I/O
13	Horizontal sync.	O
14	Vertical sync.	O
15	DDC2B clock	I/O

Table 51 (Page 1 of 2). Pin Assignments for the Monitor Connector (Intergraph Intense 3D Adapter)

Pin	Signal Name	I/O
1	Red	I
2	Green	I
3	Blue	I
4	ID2	O
5	Ground	NA
6	Ground	NA
7	Ground	NA
8	Ground	NA
9	+5 V	NA
10	Ground	NA
11	ID0	O

Table 51 (Page 2 of 2). Pin Assignments for the Monitor Connector (Intergraph Intense 3D Adapter)

Pin	Signal Name	I/O
12	ID1/SDA	O
13	HSYNC.	I
14	VSYNC	I
15	ID3/SCL	O

Appendix A. Connector Pin Assignments

Ethernet Connector

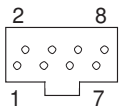

Figure 16. Ethernet Connector

The external interface for the Ethernet port is an 8-pin, RJ-45 connector.

Table 52. Pin Assignments for the Ethernet Connector

Pin	Signal Name	I/O
1	TxD+	O
2	TxD–	O
3	RxD+	I
4	Ground	NA
5	Ground	NA
6	RxD–	I
7	Ground	NA
8	Ground	NA

Appendix B. System Address Maps

System Memory Map

Memory can be mapped differently if POST detects an error.

Table 53. System Memory Map

Address Range (hex)	Size	Description
00000000–0007FFFF	512 KB	DOS applications
	640 KB	Memory gap
	768 KB	Video buffer
	1 MB	Expansion and BIOS region
	15 MB	Cacheable
	16 MB	Optional memory space gap
	512 MB	Always cacheable
FEC00000–FEC01000	4 KB	I/O APIC default
FEE00000–FE010000	4 KB	APIC default
FFF80000–FFFDF000	384 KB	Extended BIOS
FFFE0000–FFFFFFFF	128 KB	BIOS memory shadowed

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Appendix B. System Address Maps

Input/Output Address Map

The following table lists resource assignments for the I/O address map. Any addresses that are not shown are reserved.

Table 54. I/O Address Map

Address (Hex)	Device
0000–000F	DMA 1
0020–0021	Interrupt controller 1
0040–0043	Timer 1
0048–004B	Timer 2
0060	Keyboard controller data byte
0061	NMI, speaker control
0064	Keyboard controller command/status byte
0070, bit 7	Enable NMI
0070, bits 6:0	Real-time clock, address
0071	Real-time clock, data
0078	Reserved (system board configuration)
007C	Reserved (system board configuration)
0080–008F	DMA page register
00A0–00A1	Interrupt controller 2
00C0–00DE	DMA 2
00F0	Reset numeric error
0170–0177	Secondary IDE channel
01F0–01F7	Primary IDE channel
0278–027B	Parallel port 2
02F8–02FF	Onboard serial port 2
0376	Secondary IDE channel command port
0377	Secondary IDE channel status port
0378–037F	Parallel port 1
03BC–03BF	Parallel port x
03E8–03EF	Serial port 3
03F0–03F5	Diskette channel 1
03F6	Primary IDE channel command port
03F7 (Write)	Diskette channel 1 command
03F7, bit 7	Diskette change channel 1
03F7, bits 6:0	Primary IDE channel status port
03F8–03FF	Onboard serial port 1
LPT + 400h	ECP port, LPT + 400h
0CF8–0CFB	PCI configuration address register
0CFC–0CFF	PCI configuration data register
FF00–FF07	IDE bus master register

DMA I/O Address Map

The following table lists resource assignments for the DMA address map. Any addresses that are not shown are reserved.

Table 55 (Page 1 of 2). DMA I/O Addresses

Address (Hex)	Description	Bits	Byte Pointer
0000	Channel 0, Memory Address register	00–15	Yes
0001	Channel 0, Transfer Count register	00–15	Yes
0002	Channel 1, Memory Address register	00–15	Yes
0003	Channel 1, Transfer Count register	00–15	Yes
0004	Channel 2, Memory Address register	00–15	Yes
0005	Channel 2, Transfer Count register	00–15	Yes
0006	Channel 3, Memory Address register	00–15	Yes
0007	Channel 3, Transfer Count register	00–15	Yes
0008	Channels 0–3, Read Status/Write Command register	00–07	
0009	Channels 0–3, Write Request register	00–02	
000A	Channels 0–3, Write Single Mask register bits	00–02	
000B	Channels 0–3, Mode register (write)	00–07	
000C	Channels 0–3, Clear byte pointer (write)	NA	
000D	Channels 0–3, Master clear (write)/temp (read)	00–07	
000E	Channels 0–3, Clear Mask register (write)	00–03	
000F	Channels 0–3, Write All Mask register bits	00–03	
0081	Channel 2, Page Table Address register[4]	00–07	
0082	Channel 3, Page Table Address register[4]	00–07	
0083	Channel 1, Page Table Address register[4]	00–07	
0087	Channel 0, Page Table Address register[4]	00–07	
0089	Channel 6, Page Table Address register[4]	00–07	
008A	Channel 7, Page Table Address register[4]	00–07	
008B	Channel 5, Page Table Address register[4]	00–07	
008F	Channel 4, Page Table Address/Refresh register	00–07	
00C0	Channel 4, Memory Address register	00–15	Yes
00C2	Channel 4, Transfer Count register	00–15	Yes
00C4	Channel 5, Memory Address register	00–15	Yes
00C6	Channel 5, Transfer Count register	00–15	Yes
00C8	Channel 6, Memory Address register	00–15	Yes
00CA	Channel 6, Transfer Count register	00–15	Yes
00CC	Channel 7, Memory Address register	00–15	Yes
00CE	Channel 7, Transfer Count register	00–15	Yes
00D0	Channels 4–7, Read Status/Write Command register	00–07	
00D2	Channels 4–7, Write Request register	00–02	
00D4	Channels 4–7, Write Single Mask register bit	00–02	
00D6	Channels 4–7, Mode register (write)	00–07	
00D8	Channels 4–7, Clear byte pointer (write)	NA	
00DA	Channels 4–7, Master clear (write)/temp (read)	00–07	

Appendix B. System Address Maps

Table 55 (Page 2 of 2). DMA I/O Addresses

Address (Hex)	Description	Bits	Byte Pointer
00DC	Channels 4–7, Clear Mask register (write)	00–03	
00DE	Channels 4–7, Write All Mask register bits	00–03	
00DF	Channels 5–7, 8- or 16-bit mode select	00–07	

[4] Upper byte of memory address register.

Appendix C. IRQ and DMA Channel Assignments

The following tables list the interrupt request (IRQ) and direct memory access (DMA) channel assignments.

Table 56. IRQ Channel Assignments

IRQ	System Resource
NMI	Critical system error
SMI	System/power management interrupt
0	Reserved (internal timer)
1	Reserved (keyboard)
2	Reserved (interrupt controller) timer in APIC mode
3[5]	Infrared
4[5]	Serial port
5	Available
6	Diskette
7[5]	Parallel port
8	Real-time clock
9	Available
10	Available
11	Available
12[5]	Mouse
13	Coprocessor
14	IDE drives (0, 1) if enabled
15	IDE drives (2, 3) if enabled

Table 57. DMA Channel Assignments

DMA Channel	Data Width	System Resource
0	8 bits	Available
1	8 bits	Infrared[6]
2	8 bits	Reserved (diskette drive)
3	8 bits	Parallel port[6]
4	–	Available
5	16 bits	Available
6	16 bits	Available
7	16 bits	Available

[5] Can be modified to alternate settings or disabled.

[6] Can be modified to alternate settings or disabled.

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Appendix D. Error Codes

The following tables list the POST error codes and beep error codes for the PC 300XL and IntelliStation M Pro.

POST Error Codes

POST error messages appear when POST finds problems with the hardware during power-on or when a change in the hardware configuration is found. POST error messages are 3-, 4-, 5-, 8-, or 12-character alphanumeric messages. An *x* in an error message can represent any number.

Table 58 (Page 1 of 2). POST Error Codes

Code	Description
101	Interrupt failure
102	Timer failure
103	Timer-interrupt failure
104	Protected mode failure
105	Last 8042 command not accepted – keyboard failure
106	System board failure
108	Timer bus failure
109	Low MB chip select test
110	System board parity error 1 (system board parity latch set)
111	I/O parity error 2 (I/O channel check latch set)
112	I/O channel check error
113	I/O channel check error
114	External ROM checksum error
115	DMA error
116	System board port read/write error
120	Microprocessor test error
121	Hardware error
151	Real time clock failure
161	Bad CMOS Battery
162	CMOS RAM checksum/configuration error
163	Clock not updating
164	CMOS RAM memory size does not match
167	Clock not updating
175	Riser card or system board error
176	System cover has been removed
177	Corrupted administrator password
178	Riser card or system board error
183	Administrator password has been set and must be entered
184	Password removed due to checksum error
185	Corrupted boot sequence
186	System board or hardware security error
189	More than three password attempts were made to access system

Appendix D. Error Codes

Table 58 (Page 2 of 2). POST Error Codes

Code	Description
201	Memory data error
202	Memory address line error 00-15
203	Memory address line error 16-23
221	ROM to RAM remapping error
225	Unsupported memory type installed or memory pair mismatch
301	Keyboard error
302	Keyboard error
303	Keyboard to system board interface error
304	Keyboard clock high
305	No keyboard +5 V dc
601	Diskette drive or controller error
602	Diskette IPL boot record not valid
604	Unsupported diskette drive installed
605	POST cannot unlock diskette drive
662	Diskette drive configuration error
762	Math coprocessor configuration error
11xx	Serial port error (xx = serial port number)
1762	Hard disk configuration error
1780	Hard disk 0 failed
1781	Hard disk 1 failed
1782	Hard disk 2 failed
1783	Hard disk 3 failed
1800	PCI adapter has requested an unavailable hardware interrupt
1801	PCI adapter has requested an unavailable memory resource
1802	PCI adapter has requested an unavailable I/O address space, or the adapter is defective
1803	PCI adapter has requested an unavailable memory address space, or the adapter is defective
1804	PCI adapter has requested unavailable memory addresses
1805	PCI adapter ROM error
1962	Boot sequence error
2401	System board video error
8601	System board - keyboard/pointing device error
8602	Pointing device error
8603	Pointing device or system board error
12092	Level 1 cache error (processor chip)
12094	Level 2 cache error
I9990301	Hard disk failure
I9990305	No operating system found

Appendix D. Error Codes

Beep Codes

For the following beep codes, the numbers indicate the sequence and number of beeps. For example, a "2-3-2" error symptom (a burst of two beeps, three beeps, then two beeps) indicates a memory module problem. An *x* in an error message can represent any number.

Table 59. Beep Codes

Beep Code	Probable Cause
1-1-3	CMOS write/read failure
1-1-4	BIOS ROM checksum failure
1-2-1	Programmable interval timer test failure
1-2-2	DMA initialization failure
1-2-3	DMA page register write/read test failure
1-2-4	RAM refresh verification failure
1-3-1	1st 64 K RAM test failure
1-3-2	1st 64 K RAM parity test failure
2-1-1	Slave DMA register test in progress or failure
2-1-2	Master DMA register test in progress or failure
2-1-3	Master interrupt mask register test failure
2-1-4	Slave interrupt mask register test failure
2-2-2	Keyboard controller test failure
2-3-2	Screen memory test in progress or failure
2-3-3	Screen retrace tests in progress or failure
3-1-1	Timer tick interrupt test failure
3-1-2	Interval timer channel 2 test failure
3-1-4	Time-of-Day clock test failure
3-2-4	Comparing CMOS memory size against actual
3-3-1	Memory size mismatch occurred

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